Appendix I

Global Water Farms

Noise Impact Analysis

Global Water Farms

NOISE IMPACT ANALYSIS

COUNTY OF RIVERSIDE

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LIST OF ABBREVIATED TERMS

(1)	Reference
ADT	Average Daily Traffic
ANSI	American National Standards Institute
Calveno	California Vehicle Noise
CEQA	California Environmental Quality Act
CNEL	Community Noise Equivalent Level
dBA	A-weighted decibels
EPA	Environmental Protection Agency
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
INCE	Institute of Noise Control Engineering
L_{eq}	Equivalent continuous (average) sound level
MSCHP	Multiple Species Habitat Conservation Plan
mph	Miles per hour
OPR	Office of Planning and Research
PPV	Peak particle velocity
Project	Global Water Farms
REMEL	Reference Energy Mean Emission Level
RMS	Root-mean-square
VdB	Vibration Decibels

EXECUTIVE SUMMARY

Urban Crossroads, Inc. has prepared this noise study to determine the noise exposure and the necessary noise mitigation measures for the proposed Global Water Farms development ("Project"). The Project site is located immediately southwest of Coachella Canal Road and the Coachella Canal, just west of Siphon 21 of the canal in Riverside County. The Project is proposed to consist of the development of a prototype water desalinization plant. This noise study has been prepared to satisfy applicable County of Riverside noise standards and significance criteria based on Appendix G of the California Environmental Quality Act (CEQA) Guidelines (1) and the Coachella Valley Multiple Species Habitat Conservation Plan Land Use Adjacency Guidelines for noise.

SUMMARY OF CEQA SIGNIFICANCE FINDINGS

The results of this Global Water Farms Noise Impact Analysis are summarized below based on the significance criteria in Section 4 of this report consistent with Appendix G of the California Environmental Quality Act (CEQA) Guidelines. (1) Table ES-1 shows the findings of significance for each potential noise and/or vibration impact under CEQA before and after any required mitigation measures.

TABLE ES-1: SUMMARY OF CEQA SIGNIFICANCE FINDINGS

Analysis	Report Section	Significance Findings	
		Unmitigated	Mitigated
Operational Noise	7	*Less Than Significant*	-
Construction Noise	8	*Less Than Significant*	-
Construction Vibration		*Less Than Significant*	-

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1 INTRODUCTION

This noise analysis has been completed to determine the noise impacts associated with the development of the proposed Global Water Farms ("Project"). This noise study briefly describes the proposed Project, provides information regarding noise fundamentals, sets out the local regulatory setting, presents study methods and procedures for noise analysis, evaluates the potential Project-related long-term stationary-source operational noise impacts and short-term construction noise and vibration impacts.

1.1 SITE LOCATION

The approximately 2.35-acre project site is located immediately southwest of Coachella Canal Road and the Coachella Canal, just west of Siphon 21 of the canal in Riverside County. The nearest named road to the west is Vaughn Road and to the south, Chick Road. The project site is in the northeastern corner of a 641.39-acre parcel, assessor's parcel number (APN) 731-170-001. The Project site and the immediate surrounding are undeveloped. The Project site is located in the Coachella Valley Association of Governments Coachella Valley Multiple Species Habitat Conservation Plan (MSHCP). Regional access to the Project is provided from State Route 111 (SR-111) via Hot Mineral Springs Road as shown on Exhibit 1-A.

1.2 PROJECT DESCRIPTION

The Project would develop a 13,390 square foot prototype water desalinization plant. The building envelope contains four key components: an insulated recessed cement foundational heating tank, an insulated cooling tower, an equipment room, and solar trough collectors on the roof. All components except for the solar collectors are housed within a metal walled structure that sits on top of a concrete tank. When operational, the system will be capable of producing approximately ¼ of 1 acre-foot (af) – 0.25 af or 81,500 gallons – of distilled water per day, along with a volume of dried salt/mineral cake. This system is a full-scale single cell of a 4 cell Water Farm unit. A preliminary site plan for the Project is shown on Exhibit 1.

EXHIBIT 1-A: LOCATION MAP

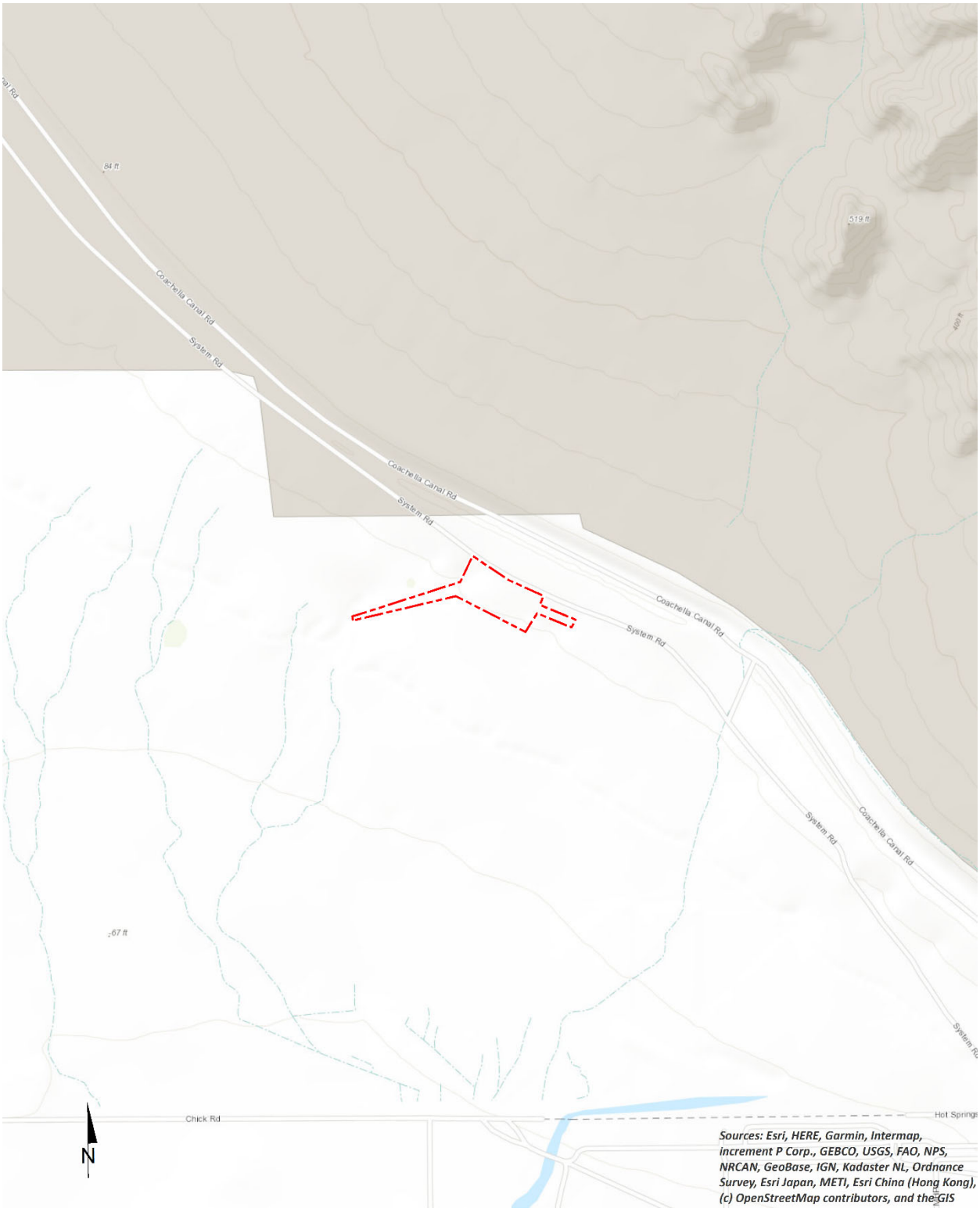
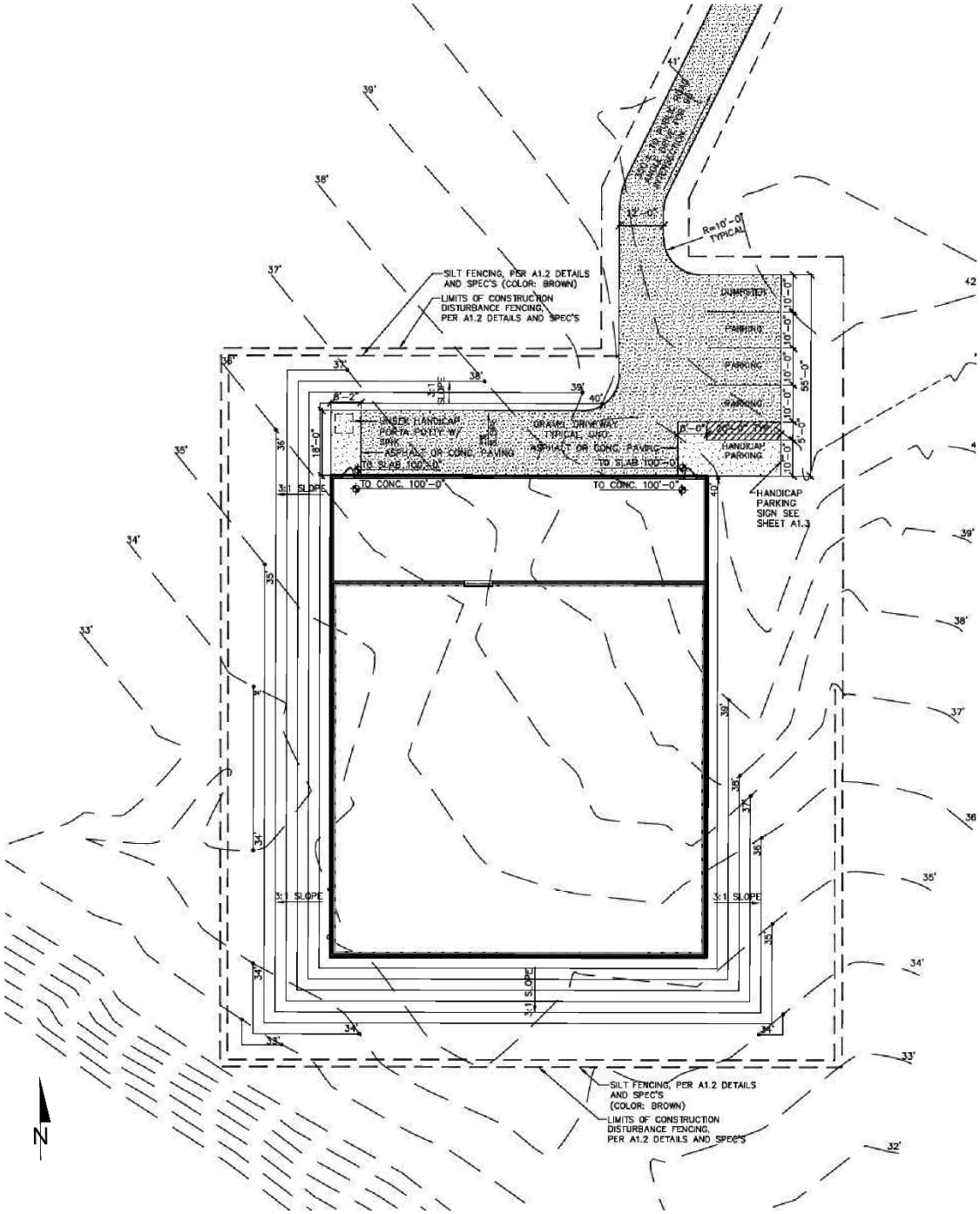


EXHIBIT 1-B: SITE PLAN



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2 FUNDAMENTALS

Noise is simply defined as "unwanted sound." Sound becomes unwanted when it interferes with normal activities, when it causes actual physical harm or when it has adverse effects on health. Noise is measured on a logarithmic scale of sound pressure level known as a decibel (dB). A-weighted decibels (dBA) approximate the subjective response of the human ear to broad frequency noise source by discriminating against very low and very high frequencies of the audible spectrum. They are adjusted to reflect only those frequencies which are audible to the human ear. Exhibit 2-A presents a summary of the typical noise levels and their subjective loudness and effects that are described in more detail below.

EXHIBIT 2-A: TYPICAL NOISE LEVELS

COMMON OUTDOOR ACTIVITIES	COMMON INDOOR ACTIVITIES	A - WEIGHTED SOUND LEVEL dBA	SUBJECTIVE LOUDNESS	EFFECTS OF NOISE
THRESHOLD OF PAIN		140	INTOLERABLE OR DEAFENING	HEARING LOSS
NEAR JET ENGINE		130		
		120		
JET FLY-OVER AT 300m (1000 ft)	ROCK BAND	110		
LOUD AUTO HORN		100	VERY NOISY	
GAS LAWN MOWER AT 1m (3 ft)		90		
DIESEL TRUCK AT 15m (50 ft), at 80 km/hr (50 mph)	FOOD BLENDER AT 1m (3 ft)	80		SPEECH INTERFERENCE
NOISY URBAN AREA, DAYTIME	VACUUM CLEANER AT 3m (10 ft)	70	LOUD	
HEAVY TRAFFIC AT 90m (300 ft)	NORMAL SPEECH AT 1m (3 ft)	60		
QUIET URBAN DAYTIME	LARGE BUSINESS OFFICE	50	MODERATE	SLEEP DISTURBANCE
QUIET URBAN NIGHTTIME	THEATER, LARGE CONFERENCE ROOM (BACKGROUND)	40		
QUIET SUBURBAN NIGHTTIME	LIBRARY	30	FAINT	NO EFFECT
QUIET RURAL NIGHTTIME	BEDROOM AT NIGHT, CONCERT HALL (BACKGROUND)	20		
	BROADCAST/RECORDING STUDIO	10	VERY FAINT	
LOWEST THRESHOLD OF HUMAN HEARING	LOWEST THRESHOLD OF HUMAN HEARING	0		

Source: Environmental Protection Agency Office of Noise Abatement and Control, Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety (EPA/ONAC 550/9-74-004) March 1974.

2.1 RANGE OF NOISE

Since the range of intensities that the human ear can detect is so large, the scale frequently used to measure intensity is a scale based on multiples of 10, the logarithmic scale. The scale for measuring intensity is the decibel scale. Each interval of 10 decibels indicates a sound energy ten times greater than before, which is perceived by the human ear as being roughly twice as loud. (2) The most common sounds vary between 40 dBA (very quiet) to 100 dBA (very loud). Normal conversation at three feet is roughly at 60 dBA, while loud jet engine noises equate to 110 dBA

at approximately 100 feet, which can cause serious discomfort. (3) Another important aspect of noise is the duration of the sound and the way it is described and distributed in time.

2.2 NOISE DESCRIPTORS

Environmental noise descriptors are generally based on averages, rather than instantaneous, noise levels. The most used figure is the equivalent level (L_{eq}). Equivalent sound levels are not measured directly but are calculated from sound pressure levels typically measured in A-weighted decibels (dBA). The equivalent sound level (L_{eq}) represents a steady state sound level containing the same total energy as a time varying signal over a given sample period (typically one hour) and is commonly used to describe the "energy average" noise levels within the environment.

To describe the time-varying character of environmental noise, the County of Riverside relies on the L_{25}, L_8, L_2 and L_{max}, percentile noise levels to describe the stationary source noise level limits. The percentile noise descriptors are the noise levels equaled or exceeded during 25 percent, 8 percent, and 2 percent of a stated time. Sound levels associated with the L_8 typically describe transient or short-term events, while levels associated with the L_{25} describe the base or typical noise conditions. The County of Riverside relies on the percentile noise levels to describe the stationary source noise level limits. While the L_{25} describes the noise levels occurring 25 percent of the time, the L_{eq} accounts for the equivalent or energy average observed for the entire hour.

Peak hour or equivalent noise levels, while useful, do not completely describe a given noise environment. Noise levels lower than peak hour may be disturbing if they occur during times when quiet is most desirable, namely evening and nighttime (sleeping) hours. To account for this, the Community Noise Equivalent Level (CNEL), representing a composite 24-hour noise level is utilized. The CNEL is the weighted average of the intensity of a sound, with corrections for time of day, and averaged over 24 hours. The time-of-day corrections require the addition of 5 decibels to dBA L_{eq} sound levels in the evening from 7:00 p.m. to 10:00 p.m., and the addition of 10 decibels to dBA L_{eq} sound levels at night between 10:00 p.m. and 7:00 a.m. These additions are made to account for the noise sensitive time periods during the evening and night hours when sound appears louder. CNEL does not represent the actual sound level heard at any time, but rather represents the total sound exposure. The County of Riverside relies on the 24-hour CNEL level to assess land use compatibility with transportation related noise sources.

2.3 SOUND PROPAGATION

When sound propagates over a distance, it changes in level and frequency content. Based on guidance from the U.S. Department of Transportation, Federal Highway Administration (FHWA), Office of Environment and Planning, Noise and Air Quality Branch, the way noise reduces with distance depends on the following factors.

2.3.1 GEOMETRIC SPREADING

Sound from a localized source (i.e., a stationary point source) propagates uniformly outward in a spherical pattern. The sound level attenuates (or decreases) at a rate of 6 dB for each doubling

of distance from a point source. Highways consist of several localized noise sources on a defined path and hence can be treated as a line source, which approximates the effect of several point sources. Noise from a line source propagates outward in a cylindrical pattern, often referred to as cylindrical spreading. Sound levels attenuate at a rate of 3 dB for each doubling of distance from a line source. (2)

2.3.2 GROUND ABSORPTION

The propagation path of noise from a highway to a receiver is usually very close to the ground. Noise attenuation from ground absorption and reflective wave canceling adds to the attenuation associated with geometric spreading. Traditionally, the excess attenuation has also been expressed in terms of attenuation per doubling of distance. This approximation is usually sufficiently accurate for distances of less than 200 ft. For acoustically hard sites (i.e., sites with a reflective surface between the source and the receiver, such as a parking lot or body of water), no excess ground attenuation is assumed. For acoustically absorptive or soft sites (i.e., those sites with an absorptive ground surface between the source and the receiver such as soft dirt, grass, or scattered bushes and trees), an excess ground attenuation value of 1.5 dB per doubling of distance is normally assumed. When added to the cylindrical spreading, the excess ground attenuation results in an overall drop-off rate of 4.5 dB per doubling of distance from a line source. (4)

2.3.3 ATMOSPHERIC EFFECTS

Receivers located downwind from a source can be exposed to increased noise levels relative to calm conditions, whereas locations upwind can have lowered noise levels. Sound levels can be increased at large distances (e.g., more than 500 feet) due to atmospheric temperature inversion (i.e., increasing temperature with elevation). Other factors such as air temperature, humidity, and turbulence can also have significant effects. (2)

2.3.4 SHIELDING

A large object or barrier in the path between a noise source and a receiver can substantially attenuate noise levels at the receiver. The amount of attenuation provided by shielding depends on the size of the object and the frequency content of the noise source. Shielding by trees and other such vegetation typically only has an “out of sight, out of mind” effect. That is, the perception of noise impact tends to decrease when vegetation blocks the line-of-sight to nearby residents. However, for vegetation to provide a substantial, or even noticeable, noise reduction, the vegetation area must be at least 15 feet in height, 100 feet wide and dense enough to completely obstruct the line-of sight between the source and the receiver. This size of vegetation may provide up to 5 dBA of noise reduction. The Federal Highway Administration (FHWA) does not consider the planting of vegetation to be a noise abatement measure. (4)

2.3.5 REFLECTION

Field studies conducted by the FHWA have shown that the reflection from barriers and buildings does not substantially increase noise levels. (4) If all the noise striking a structure was reflected back to a given receiving point, the increase would be theoretically limited to 3 dBA. Further, not

all the acoustical energy is reflected back to same point. Some of the energy would go over the structure, some is reflected to points other than the given receiving point, some is scattered by ground coverings (e.g., grass and other plants), and some is blocked by intervening structures and/or obstacles (e.g., the noise source itself). Additionally, some of the reflected energy is lost due to the longer path that the noise must travel. FHWA measurements made to quantify reflective increases in traffic noise have not shown an increase of greater than 1-2 dBA; an increase that is not perceptible to the average human ear.

2.4 NOISE CONTROL

Noise control is the process of obtaining an acceptable noise environment for an observation point or receiver by controlling the noise source, transmission path, receiver, or all three. This concept is known as the source-path-receiver concept. In general, noise control measures can be applied to these three elements.

2.5 NOISE BARRIER ATTENUATION

Effective noise barriers can reduce noise levels by up to 10 to 15 dBA, cutting the loudness of traffic noise in half. A noise barrier is most effective when placed close to the noise source or receiver. Noise barriers, however, do have limitations. For a noise barrier to work, it must be high enough and long enough to block the path of the noise source. (4)

2.6 LAND USE COMPATIBILITY WITH NOISE

Some land uses are more tolerant of noise than others. For example, schools, hospitals, churches, and residences are more sensitive to noise intrusion than are commercial or industrial developments and related activities. As ambient noise levels affect the perceived amenity or livability of a development, so too can the mismanagement of noise impacts impair the economic health and growth potential of a community by reducing the area's desirability as a place to live, shop and work. For this reason, land use compatibility with the noise environment is an important consideration in the planning and design process. The FHWA encourages State and Local government to regulate land development in such a way that noise-sensitive land uses are either prohibited from being located adjacent to a highway, or that the developments are planned, designed, and constructed in such a way that noise impacts are minimized. (5)

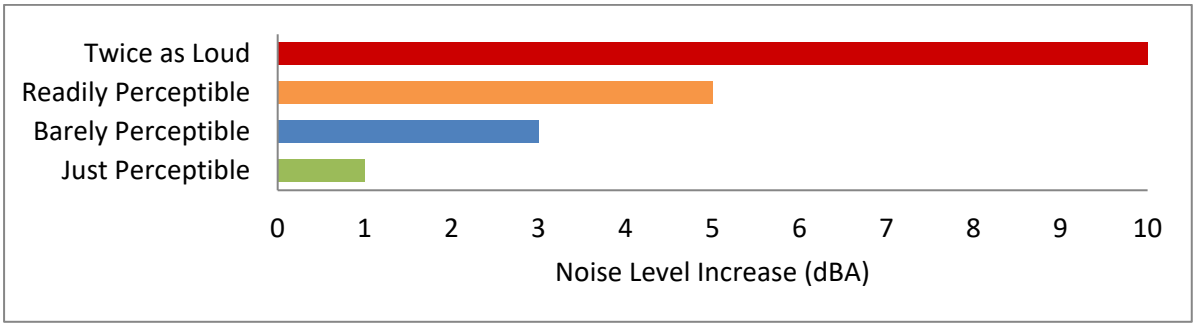
2.7 COMMUNITY RESPONSE TO NOISE

Community responses to noise varies depending upon everyone's susceptibility to noise and personal attitudes about noise. Several factors are related to the level of community annoyance including:

- Fear associated with noise producing activities.
- Socio-economic status and educational level.
- Perception that those affected are being unfairly treated.
- Attitudes regarding the usefulness of the noise-producing activity.
- Belief that the noise source can be controlled.

Approximately ten percent of the population has a very low tolerance for noise and will object to any noise not of their making. Consequently, even in the quietest environment, some complaints will occur. Twenty-five percent of the population will not complain even in very severe noise environments. Thus, a variety of reactions can be expected from people exposed to any given noise environment. (6) Surveys have shown that about ten percent of the people exposed to traffic noise of 60 dBA will report being highly annoyed with the noise, and each increase of one dBA is associated with approximately two percent more people being highly annoyed. When traffic noise exceeds 60 dBA or aircraft noise exceeds 55 dBA, people may begin to complain. (6) Despite this variability in behavior on an individual level, the population can be expected to exhibit the following responses to changes in noise levels as shown on Exhibit 2-B. A change of 3 dBA is considered *barely perceptible*, and changes of 5 dBA are considered *readily perceptible*. (4)

EXHIBIT 2-B: NOISE LEVEL INCREASE PERCEPTION



2.8 VIBRATION

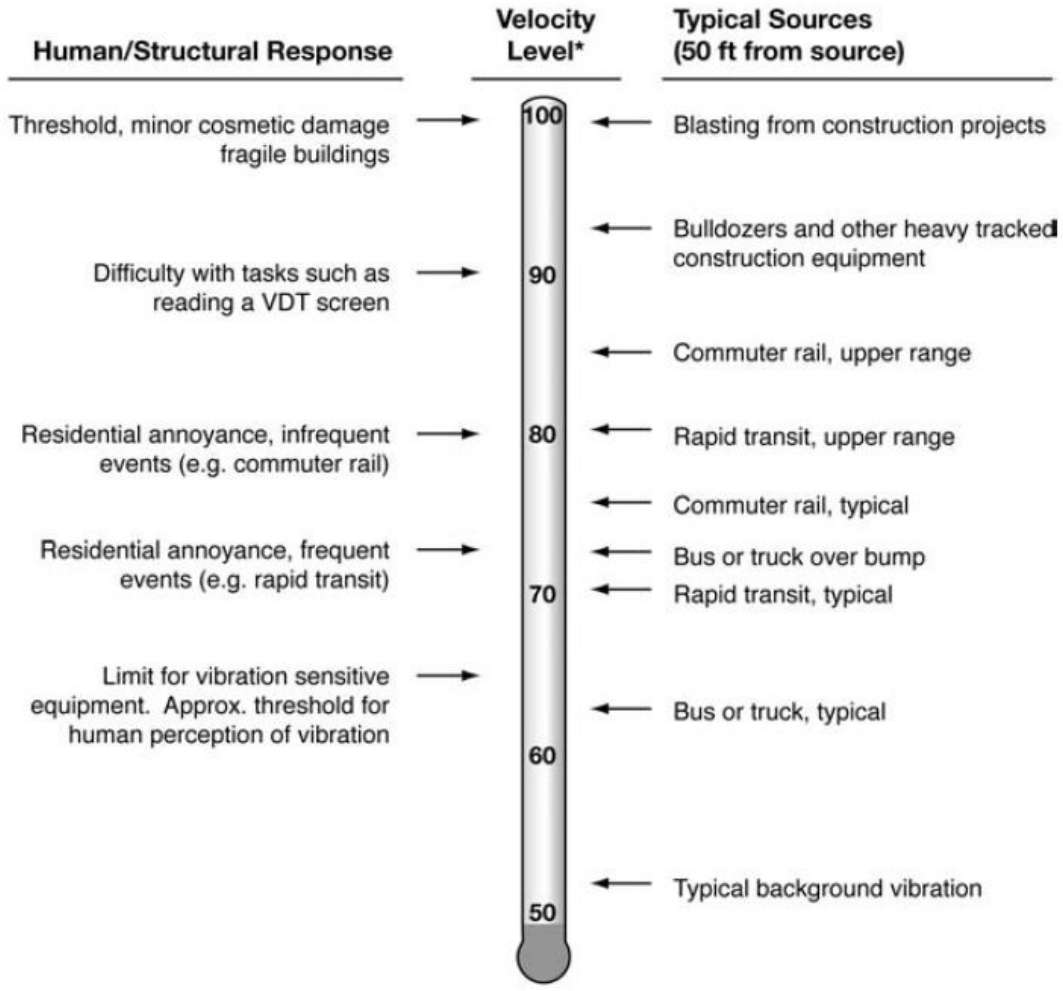
Per the Federal Transit Administration (FTA) *Transit Noise and Vibration Impact Assessment Manual* (7), vibration is the periodic oscillation of a medium or object. The rumbling sound caused by the vibration of room surfaces is called structure-borne noise. Sources of ground-borne vibrations include natural phenomena (e.g., earthquakes, volcanic eruptions, sea waves, landslides) or human-made causes (e.g., explosions, machinery, traffic, trains, construction equipment). Vibration sources may be continuous, such as factory machinery, or transient, such as explosions. As is the case with airborne sound, ground-borne vibrations may be described by amplitude and frequency.

There are several different methods that are used to quantify vibration. The peak particle velocity (PPV) is defined as the maximum instantaneous peak of the vibration signal. The PPV is most frequently used to describe vibration impacts to buildings but is not always suitable for evaluating human response (annoyance) because it takes some time for the human body to respond to vibration signals. Instead, the human body responds to average vibration amplitude often described as the root mean square (RMS). The RMS amplitude is defined as the average of the squared amplitude of the signal and is most frequently used to describe the effect of vibration on the human body. Decibel notation (VdB) is commonly used to measure RMS. Decibel notation (VdB) serves to reduce the range of numbers used to describe human response to vibration. Typically, ground-borne vibration generated by man-made activities attenuates rapidly with

distance from the source of the vibration. Sensitive receivers for vibration include structures (especially older masonry structures), people (especially residents, the elderly, and sick), and vibration-sensitive equipment and/or activities.

The background vibration-velocity level in residential areas is generally 50 VdB. Ground-borne vibration is normally perceptible to humans at approximately 65 VdB. For most people, a vibration-velocity level of 75 VdB is the approximate dividing line between barely perceptible and distinctly perceptible levels. Typical outdoor sources of perceptible ground-borne vibration are construction equipment, steel-wheeled trains, and traffic on rough roads. If a roadway is smooth, the ground-borne vibration is rarely perceptible. The range of interest is from approximately 50 VdB, which is the typical background vibration-velocity level, to 100 VdB, which is the general threshold where minor damage can occur in fragile buildings. Exhibit 2-C illustrates common vibration sources and the human and structural response to ground-borne vibration.

EXHIBIT 2-C: TYPICAL LEVELS OF GROUND-BORNE VIBRATION



* *RMS Vibration Velocity Level in VdB relative to 10^{-6} inches/second*

Source: Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual.

3 REGULATORY SETTING

To limit population exposure to physically and/or psychologically damaging as well as intrusive noise levels, the federal government, the State of California, various county governments, and most municipalities in the state have established standards and ordinances to control noise. In most areas, automobile and truck traffic is the major source of environmental noise. Traffic activity generally produces an average sound level that remains constant with time. Air and rail traffic, and commercial and industrial activities are also major sources of noise in some areas. Federal, state, and local agencies regulate different aspects of environmental noise. Federal and state agencies generally set noise standards for mobile sources such as aircraft and motor vehicles, while regulation of stationary sources is left to local agencies.

3.1 STATE OF CALIFORNIA NOISE REQUIREMENTS

The State of California regulates freeway noise, sets standards for sound transmission, provides occupational noise control criteria, identifies noise standards, and provides guidance for local land use compatibility. State law requires that each county and city adopt a General Plan that includes a Noise Element which is to be prepared per guidelines adopted by the Governor's Office of Planning and Research (OPR). (8) The purpose of the Noise Element is to *limit the exposure of the community to excessive noise levels*. In addition, the California Environmental Quality Act (CEQA) requires that all known environmental effects of a project be analyzed, including environmental noise impacts.

3.2 STATE OF CALIFORNIA BUILDING CODE

The State of California's noise insulation standards for dwelling and sleeping units are codified in the California Code of Regulations, Title 24, Building Standards Administrative Code, Chapter 12, Section 1206 Sound Control. These noise standards are applied to new construction in California for controlling interior noise levels resulting from exterior noise sources within habitable rooms of dwelling and sleeping units. For new construction, the acceptable interior noise limit is 45 dBA CNEL in habitable rooms (9).

Interior noise level requirements for non-residential structures are controlled set by the California Code of Regulations, Title 24, California Green Building Standards Code, Chapter 5, Section 5.507.4 Acoustical Control. These noise standards are applied to new non-residential construction in California for controlling interior noise levels resulting from exterior noise sources within occupied spaces. It does not apply to buildings with few or no occupants or where occupants are not likely to be affected by exterior noise. For new construction, the acceptable interior noise limit is 50 dBA L_{eq} in occupied spaces (10).

3.3 COUNTY OF RIVERSIDE GENERAL PLAN NOISE ELEMENT

The County of Riverside has adopted a Noise Element of the General Plan to control and abate environmental noise, and to protect the citizens of the County of Riverside from excessive exposure to noise. (11) The Noise Element specifies the maximum allowable exterior noise levels

for new developments impacted by transportation noise sources such as arterial roads, freeways, airports and railroads. In addition, the Noise Element identifies several polices to minimize the impacts of excessive noise levels throughout the community and establishes noise level requirements for all land uses. To protect County of Riverside residents from excessive noise, the Noise Element contains the following policies related to the Project:

N 1.1 Protect noise-sensitive land uses from high levels of noise by restricting noise-producing land uses from these areas. If the noise-producing land use cannot be relocated, then noise buffers such as setbacks, landscaping, or block walls shall be used.

N 1.3 Consider the following uses noise-sensitive and discourage these uses in areas in excess of 65 CNEL:

- *Schools*
- *Hospitals*
- *Rest Homes*
- *Long Term Care Facilities*
- *Mental Care Facilities*
- *Residential Uses*
- *Libraries*
- *Passive Recreation Uses*
- *Places of Worship*

N 1.5 Prevent and mitigate the adverse impacts of excessive noise exposure on the residents, employees, visitors, and noise-sensitive uses of Riverside County.

N 4.1 Prohibit facility-related noise, received by any sensitive use, from exceeding the following worst-case noise levels:

a. 45 dBA 9-minute L_{eq} between 10:00 p.m. and 7:00 a.m.;

b. 65 dBA 9-minute L_{eq} between 7:00 a.m. and 10:00 p.m.

N 13.1 Minimize the impacts of construction noise on adjacent uses within acceptable standards.

N 13.2 Ensure that construction activities are regulated to establish hours of operation in order to prevent and/or mitigate the generation of excessive or adverse impacts on surrounding areas.

N 13.3 Condition subdivision approval adjacent to developed/occupied noise-sensitive land uses (see policy N 1.3) by requiring the developer to submit a construction-related noise mitigation plan to the [County] for review and approval prior to issuance of a grading permit. The plan must depict the location of construction equipment and how the noise from this equipment will be mitigated during construction of this project, through the use of such methods as:

i. Temporary noise attenuation fences;

ii. Preferential location and equipment; and

iii. Use of current noise suppression technology and equipment.

N 16.3 Prohibit exposure of residential dwellings to perceptible ground vibration from passing trains as perceived at the ground or second floor. Perceptible motion shall be presumed to be a motion velocity of 0.01 inches/second over a range of 1 to 100 Hz.

To ensure noise-sensitive land uses are protected from high levels of noise (N 1.1), Table N-1 of the Noise Element identifies guidelines to evaluate proposed developments based on exterior and interior noise level limits for land uses and requires a noise analysis to determine needed mitigation measures if necessary. The Noise Element identifies residential use as a noise-

sensitive land use (N 1.3) and discourages new residential development in areas with transportation related levels of 65 dBA CNEL or greater existing ambient noise levels. To prevent and mitigate noise impacts for its residents (N 1.5), County of Riverside requires noise attenuation measures for sensitive land use exposed to transportation related noise levels higher than 65 dBA CNEL.

Policy N 4.1 of the Noise Element sets a stationary-source exterior noise limit to not to be exceeded for a cumulative period of more than ten minutes in any hour of 65 dBA L_{eq} for daytime hours of 7:00 a.m. to 10:00 p.m., and 45 dBA L_{eq} during the noise-sensitive nighttime hours of 10:00 p.m. to 7:00 a.m. To prevent high levels of construction noise from impacting noise-sensitive land uses, policies N 13.1 through 13.3 identify construction noise mitigation requirements for new development located near existing noise-sensitive land uses. Policy 16.3 establishes the vibration perception threshold for rail-related vibration levels, used in this analysis as a threshold for determining potential vibration impacts due to Project construction. (11)

3.3.1 LAND USE COMPATIBILITY

The noise criteria identified in the County of Riverside Noise Element (Table N-1) are guidelines to evaluate the land use compatibility of transportation related noise. The compatibility criteria, shown on Exhibit 3-A, provides the County with a planning tool to gauge the compatibility of land uses relative to existing and future exterior noise levels.

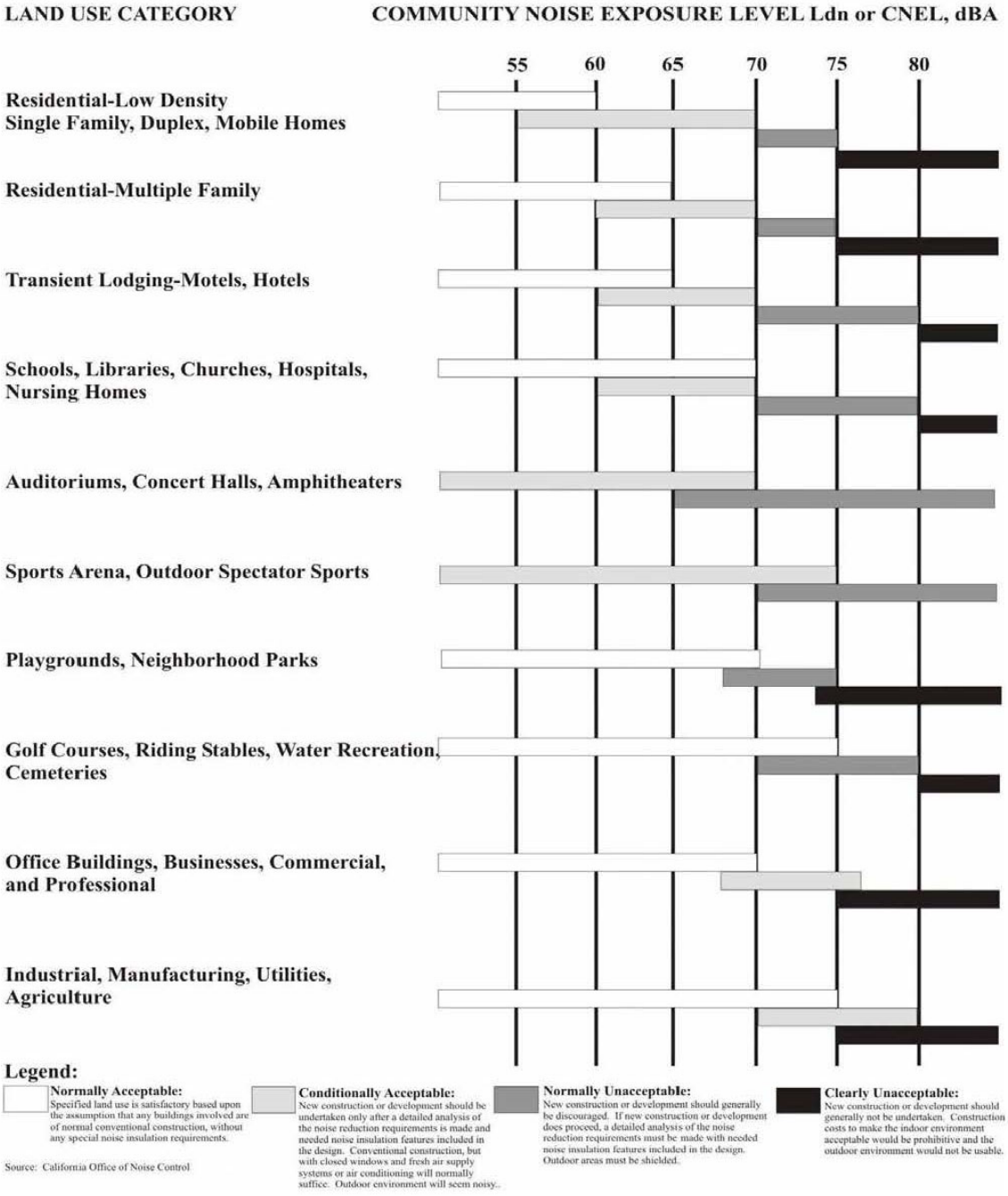
The *Land Use Compatibility for Community Noise Exposure* matrix describes categories of compatibility and not specific noise standards. The Project's land use is most closely to the *Office Buildings, Businesses, Commercial, and Professional* land use is considered *normally acceptable* with exterior noise levels below 70 dBA CNEL, and *conditionally acceptable* with exterior noise levels of up to 77 dBA CNEL. For *conditionally acceptable* exterior noise levels, exceeding 77 dBA CNEL for Project land uses, *new construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and the needed noise insulation features are included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice*. (11)

3.3.2 COUNTY OF RIVERSIDE STATIONARY NOISE STANDARDS

The County of Riverside has set stationary-source hourly average L_{eq} exterior noise limits to control Rancho California Road associated with the development of the proposed Global Water Farms. The County considers noise generated using motor vehicles to be a stationary noise source when operated on private property such as at a loading dock. These facility-related noises, as projected to any portion of any surrounding property containing a *habitable dwelling, hospital, school, library or nursing home*, must not exceed the following worst-case noise levels.

Policy N 4.1 of the County of Riverside General Plan Noise Element sets a stationary-source average L_{eq} exterior noise limit not to be exceeded for a cumulative period of more than ten minutes in any hour of 65 dBA L_{eq} for daytime hours of 7:00 a.m. to 10:00 p.m., and 45 dBA L_{eq} during the noise-sensitive nighttime hours of 10:00 p.m. to 7:00 a.m. (11)

EXHIBIT 3-A: LAND USE COMPATIBILITY FOR COMMUNITY NOISE EXPOSURE



Source: County of Riverside General Plan Noise Element, Table N-1.

The County of Riverside Municipal Code Section 9.52.040 *General sound level standards* identify lower, more restrictive exterior noise level standards, which for the purpose of this report, are used to evaluate potential Project-related operational noise level limits instead of the higher the General Plan exterior noise level standards previously identified. The County of Riverside Municipal Code identifies exterior noise level limits of 45 dBA L_{eq} during the daytime hours of 7:00 a.m. to 10:00 p.m., and 45 dBA L_{eq} during the noise-sensitive nighttime hours of 10:00 p.m. to 7:00 a.m. for agricultural uses. (12)

Based on several discussions with the County of Riverside Department of Environmental Health (DEH), Office of Industrial Hygiene (OIH), it is important to recognize that the County of Riverside Municipal Code noise level standards, incorrectly identify maximum noise level (L_{max}) standards that should instead reflect the average L_{eq} noise levels. Moreover, the County of Riverside DEH OIH's April 15th, 2015 *Requirements for determining and mitigating, non-transportation noise source impacts to residential properties* also identifies operational (stationary-source) noise level limits using the L_{eq} metric, consistent with the direction of the County of Riverside General Plan guidelines and standards provided in the Noise Element. Therefore, this report has been prepared consistent with direction of the County of Riverside DEH OIH guidelines and standards using the average L_{eq} noise level metric for stationary-source (operational) noise level evaluation.

3.4 CONSTRUCTION NOISE STANDARDS

To control noise impacts associated with the construction of the proposed Project, the County of Riverside has established limits to the hours of operation. Section 9.52.020 of the County's Noise Regulation ordinance indicates that noise associated with any private construction activity located within one-quarter of a mile from an inhabited dwelling is considered exempt between the hours of 6:00 a.m. and 6:00 p.m., during the months of June through September, and 7:00 a.m. and 6:00 p.m., during the months of October through May. (12) Neither the County's General Plan nor Municipal Code establish numeric maximum acceptable construction source noise levels at potentially affected receivers for CEQA analysis purposes. Therefore, a numerical construction threshold based on Federal Transit Administration (FTA) *Transit Noise and Vibration Impact Assessment Manual* is used for analysis of daytime construction impacts, as discussed below.

According to the FTA, local noise ordinances are typically not very useful in evaluating construction noise. They usually relate to nuisance and hours of allowed activity, and sometimes specify limits in terms of maximum levels, but are generally not practical for assessing the impact of a construction project. Project construction noise criteria should account for the existing noise environment, the absolute noise levels during construction activities, the duration of the construction, and the adjacent land use. Due to the lack of standardized construction noise thresholds, the FTA provides guidelines that can be considered reasonable criteria for construction noise assessment. The FTA considers a daytime exterior construction noise level of 80 dBA L_{eq} as a reasonable threshold for noise sensitive residential land use. (7 p. 179)

3.5 CONSTRUCTION VIBRATION STANDARDS

Construction activity can result in varying degrees of ground-borne vibration, depending on the equipment and methods used, distance to the affected structures and soil type. (7) Construction vibration is generally associated with pile driving and rock blasting. Other construction equipment such as air compressors, light trucks, hydraulic loaders, etc., generates little or no ground vibration. Occasionally large bulldozers and loaded trucks can cause perceptible vibration levels at close proximity.

The County of Riverside does not have vibration standards for temporary construction, but the County's General Plan Noise Element does contain the human reaction to typical vibration levels. Vibration levels with peak particle velocity of 0.0787 inches per second are considered readily perceptible and above 0.1968 in/sec are considered annoying to people in buildings. Further, County of Riverside General Plan Policy N 16.3 identifies a motion velocity perception threshold for vibration due to passing trains of 0.01 inches per second (in/sec) over the range of one to 100 Hz, which is used in this noise study to assess potential impacts due to Project construction vibration levels. (11)

3.6 COACHELLA VALLEY MULTIPLE SPECIES HABITAT CONSERVATION PLAN

The Coachella Valley MSHCP adopted by the Coachella Valley Association of Governments (13) requires "*Proposed development adjacent to or within a Conservation Area that generates noise in excess of 75 dBA L_{eq} hourly shall incorporate setbacks, berms, or walls, as appropriate, to minimize the effects of noise on the adjacent Conservation Area in accordance with the guidelines to be included in the Implementation Manual."* Since the proposed Global Water Farms development will include noise generating water pumps, solar panel tracker motors, an air conditioner, and a parking lot, operational noise levels have been calculated at adjacent receiver locations within the Dos Palmas Conservation Area Reserve Management Unit 4.

4 SIGNIFICANCE CRITERIA

The following significance criteria are based on currently adopted guidance provided by Appendix G of the California Environmental Quality Act (CEQA) Guidelines. (1) For the purposes of this report, impacts would be potentially significant if the Project results in or causes:

A. Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

B. Generation of excessive ground-borne vibration or ground-borne noise levels?

C. For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

4.1 NOISE LEVEL INCREASES (THRESHOLD A)

Noise level increases resulting from the Project are evaluated based on the Appendix G CEQA Guidelines described above at the closest sensitive receiver locations. Under CEQA, consideration must be given to the magnitude of the increase, the existing ambient noise levels, and the location of noise-sensitive receivers to determine if a noise increase represents a significant adverse environmental impact. This approach *recognizes that there is no single noise increase that renders the noise impact significant.* (14)

This is primarily because of the wide variation in individual thresholds of annoyance and differing individual experiences with noise. Thus, an important way of determining a person's subjective reaction to a new noise is the comparison of it to the existing environment to which one has adapted—the so-called *ambient* environment.

In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will typically be judged. The Federal Interagency Committee on Noise (FICON) (15) developed guidance to be used for the assessment of project-generated increases in noise levels that consider the ambient noise level. The FICON recommendations are based on studies that relate aircraft noise levels to the percentage of persons highly annoyed by aircraft noise. Although the FICON recommendations were specifically developed to assess aircraft noise impacts, these recommendations are often used in environmental noise impact assessments involving the use of cumulative noise exposure metrics, such as the average-daily noise level (CNEL) and equivalent continuous noise level (L_{eq}). The FICON guidance provides an established source of criteria to assess the impacts of substantial temporary or permanent increase in ambient noise levels. Based on the FICON criteria, the amount to which a given noise level increase is considered acceptable is reduced when the without Project noise levels are already shown to exceed certain land-use specific exterior noise level criteria. The specific levels are based on typical responses to noise level increases of 5 dBA or *readily perceptible*, 3 dBA or *barely perceptible*, and 1.5 dBA depending on the underlying without Project noise levels for noise-sensitive uses. These levels of increases and their perceived acceptance are consistent with guidance provided by both the Federal Highway Administration (4 p. 9) and Caltrans (16 p. 2_48).

4.2 VIBRATION (THRESHOLD B)

As described in Section 3.5, the vibration impacts originating from the construction of the Global Water Farms, vibration-generating activities are appropriately evaluated the thresholds of significance outlined in the County of Riverside General Plan. (11) These guidelines identify a motion velocity perception threshold for vibration due to passing trains of 0.01 inches per second (in/sec) over the range of one to 100 Hz, which is used in this noise study to assess potential impacts due to Project construction vibration levels.

4.3 CEQA GUIDELINES NOT FURTHER ANALYZED (THRESHOLD C)

CEQA Noise Threshold C applies when there are nearby public and private airports and/or air strips and focuses on land use compatibility of the Project to nearby airports and airstrips. The Project site is not located within two miles of an airport or airstrip. The closest airport is the Desert Air Sky Ranch Airport located 10 miles to the northwest. As such, the Project site would not be exposed to excessive noise levels from airport operations, and therefore, impacts are considered *less than significant,* and no further noise analysis is conducted in relation to Appendix G to the CEQA Guidelines, Noise Threshold C.

4.4 SIGNIFICANCE CRITERIA SUMMARY

Noise impacts shall be considered significant if any of the following occur as a direct result of the proposed development. Table 4-1 shows the significance criteria summary matrix that includes the allowable criteria used to identify potentially significant incremental noise level increases.

TABLE 4-1: SIGNIFICANCE CRITERIA SUMMARY

Analysis	Condition(s)	Significance Criteria	
		Daytime	**Nighttime**
Operational	Exterior Noise Level Standards[3]	55 dBA L_{eq}	45 dBA L_{eq}
	If ambient is < 60 dBA Leq[2]	≥ 5 dBA L_{eq} Project increase	
	If ambient is 60 - 65 dBA Leq[2]	≥ 3 dBA L_{eq} Project increase	
	If ambient is > 65 dBA Leq[2]	≥ 1.5 dBA L_{eq} Project increase	
	MSCHP	75 dBA L_{eq}	
Construction	Noise Level Threshold[4]	80 dBA L_{eq}	
	MSCHP	75 dBA L_{eq}	
	Vibration Level Threshold[5]	0.01 in/sec RMS	

[1] County of Riverside General Plan Noise Element.
[2] FICON, 1992.
[3] County of Riverside General Plan Municipal Code, Section 9.52.040.
[4] Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual.
[5] County of Riverside General Plan Noise Element, Policy N 16.3.
"Daytime" = 7:00 a.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.

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5 EXISTING NOISE LEVEL MEASUREMENTS

To assess the existing noise level environment, 24-hour noise level measurements were taken at five locations in the Project study area. The receiver locations were selected to describe and document the existing noise environment within the Project study area. Exhibit 5-A provides the boundaries of the Project study area and the noise level measurement locations. To fully describe the existing noise conditions, noise level measurements were collected by Urban Crossroads, Inc. on Thursday, February 10, 2022. Appendix 5.1 includes study area photos.

5.1 MEASUREMENT PROCEDURE AND CRITERIA

To describe the existing noise environment, the hourly noise levels were measured during typical weekday conditions over a 24-hour period. By collecting individual hourly noise level measurements, it is possible to describe the equivalent daytime and nighttime hourly noise levels. The long-term noise readings were recorded using Piccolo Type 2 integrating sound level meter and dataloggers. The Piccolo sound level meters were calibrated using a Larson-Davis calibrator, Model CAL 150. All noise meters were programmed in "slow" mode to record noise levels in "A" weighted form. The sound level meters and microphones were equipped with a windscreen during all measurements. All noise level measurement equipment satisfies the American National Standards Institute (ANSI) standard specifications for sound level meters ANSI S1.4-2014/IEC 61672-1:2013. (17)

5.2 NOISE MEASUREMENT LOCATIONS

The noise level measurements were positioned as close to the nearest sensitive receiver locations as possible to assess the existing ambient hourly noise levels surrounding the Project site. Both Caltrans and the FTA recognize that it is not reasonable to collect noise level measurements that can fully represent every part of a private yard, patio, deck, or balcony normally used for human activity when estimating impacts for new development projects. This is demonstrated in the Caltrans general site location guidelines which indicate that, *sites must be free of noise contamination by sources other than sources of interest. Avoid sites located near sources such as barking dogs, lawnmowers, pool pumps, and air conditioners unless it is the express intent of the analyst to measure these sources*. (2) Further, FTA guidance states, t*hat it is not necessary nor recommended that existing noise exposure be determined by measuring at every noise-sensitive location in the project area. Rather, the recommended approach is to characterize the noise environment for clusters of sites based on measurements or estimates at representative locations in the community*. (7)

Based on recommendations of Caltrans and the FTA, it is not necessary to collect measurements at each individual building or residence, because each receiver measurement represents a group of buildings that share acoustical equivalence. (7) In other words, the area represented by the receiver shares similar shielding, terrain, and geometric relationship to the reference noise source. Receivers represent a location of noise sensitive areas and are used to estimate the future noise level impacts. Collecting reference ambient noise level measurements at the nearby sensitive receiver locations allows for a comparison of the before and after Project noise levels

and is necessary to assess potential noise impacts due to the Project's contribution to the ambient noise levels.

5.3 NOISE MEASUREMENT RESULTS

The noise measurements presented below focus on the equivalent or the hourly energy average sound levels (L_{eq}). The equivalent sound level (L_{eq}) represents a steady state sound level containing the same total energy as a time varying signal over a given sample period. Table 5-1 identifies the hourly daytime noise levels at each noise level measurement location taken simultaneously from 1:00 to 2:00 p.m.

TABLE 5-1: 24-HOUR AMBIENT NOISE LEVEL MEASUREMENTS

Location[1]	Description	Energy Average Noise Level (dBA L_{eq})[2]
L1	West of the Project site, near anticipated intake pump location	39.8
L2	North of the Project site across Coachella Canal Rd.	42.0
L3	Eastern end of the Project site	42.5
L4	East of the Project site near potential Least Bell's Vireo habitat	38.5
L5	Southern end of Project site	38.7

[1] See Exhibit 5-A for the noise level measurement locations.
[2] Energy (logarithmic) average levels. The long-term 24-hour measurement worksheets are included in Appendix 5.2.

Table 5-1 provides the equivalent noise levels used to describe the daytime and nighttime ambient conditions. These daytime and nighttime energy average noise levels represent the average of all hourly noise levels observed during these time periods expressed as a single number. Appendix 5.2 provides summary worksheets of the noise levels for each of the daytime and nighttime hours.

EXHIBIT 5-A: NOISE MEASUREMENT LOCATIONS

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6 SENSITIVE RECEIVER LOCATIONS

To assess the potential for long-term operational and short-term construction noise impacts, the following sensitive receiver locations, as shown on Exhibit 6-A, were identified as representative locations for analysis. Sensitive receivers are generally defined as locations where people reside or where the presence of unwanted sound could otherwise adversely affect the use of the land. Noise-sensitive land uses are generally considered to include schools, hospitals, single-family dwellings, mobile home parks, churches, libraries, and recreation areas. Moderately noise-sensitive land uses typically include multi-family dwellings, hotels, motels, dormitories, out-patient clinics, cemeteries, golf courses, country clubs, athletic/tennis clubs, and equestrian clubs. Land uses that are considered relatively insensitive to noise include business, commercial, and professional developments. Land uses that are typically not affected by noise include: industrial, manufacturing, utilities, agriculture, undeveloped land, parking lots, warehousing, liquid and solid waste facilities, salvage yards, and transit terminals.

To describe the potential off-site Project noise levels, six receiver locations in the vicinity of the Project site were identified. All distances are measured from the Project site boundary to the receiver point.

Other sensitive land uses in the Project study area that are located at greater distances than those identified in this noise study will experience lower noise levels than those presented in this report due to the additional attenuation from distance and the shielding of intervening structures. All human receivers are located over a mile from the Project site and thus all receivers in this analysis are located within the MSCHP and represent potential species of concern. All receivers are placed 3 feet above ground level to represent nesting heights of the species of concern.

EXHIBIT 6-A: RECEIVER LOCATIONS

7 OPERATIONAL NOISE IMPACTS

This section analyzes the potential stationary-source (i.e., on-site) operational noise impacts at the nearest receiver locations, identified in Section 6, resulting from the operation of the proposed Project. Exhibit 7-A identifies the noise source locations used to assess the hourly average L_{eq} operational noise levels.

7.1 OPERATIONAL NOISE SOURCES

This operational noise analysis is intended to describe noise level impacts associated with the expected typical of daytime and nighttime activities at the Project site. The on-site Project-related noise sources are expected to include water pumps, solar panel tracker motors, an air conditioner, and a parking lot.

7.2 REFERENCE NOISE LEVELS

To estimate the Project service commercial land use operational noise impacts, reference noise levels were taken from similar types of projects to represent the noise levels expected with the development of the proposed Project. While sound pressure levels (e.g., L_{eq}) quantify in decibels the intensity of given sound sources at a reference distance, sound power levels (L_w) are connected to the sound source and are independent of distance. Sound pressure levels vary substantially with distance from the source and diminish because of intervening obstacles and barriers, air absorption, wind, and other factors. Sound power is the acoustical energy emitted by the sound source and is an absolute value that is not affected by the environment. The reference Project operational noise levels are based on the Project related noise sources shown on Exhibit 7-A. The reference Project operational sound power levels are summarized below:

- A/C Condenser Units: 80 dBA L_w is based on a conservative estimate of a potential air conditioner condenser operating during all hours of the day. The air conditioner operation is expected to be limited to the daytime hours of 7:00 a.m. to 10:00 p.m.
- Intake Water Pump: 97.2 dBA L_w based on reference noise levels taken from Carlsbad Desalinization Plant Final Environmental Impact Report (18) operating during all hours of the day and night.
- Internal Water Pumps: 95.2 dBA L_w based on reference noise levels taken from Carlsbad Desalinization Plant Final Environmental Impact Report (18) operating during all hours of the day and night.
- Solar Panel Tracker Motors: 68.8 dBA L_w based on reference noise levels taken from Soitec Solar Development Final Program Environmental Impact Report (19) operating during all daylight hours.
- Parking Lot Activities: 87.8 dBA L_w based on reference noise level measurements describing parking lot vehicle activity collected by Urban Crossroads, Inc. The parking lot activity is expected to be limited to the daytime hours of 7:00 a.m. to 10:00 p.m.

EXHIBIT 7-A: OPERATIONAL NOISE SOURCE LOCATIONS

7.3 CADNAA NOISE PREDICTION MODEL

To fully describe the exterior operational noise levels from the Project, Urban Crossroads, Inc. developed a noise prediction model using the CadnaA (Computer Aided Noise Abatement) computer program. CadnaA can analyze multiple types of noise sources using the spatially accurate Project site plan, georeferenced Nearmap aerial imagery, topography, buildings, and barriers in its calculations to predict outdoor noise levels.

Using the ISO 9613 protocol, CadnaA will calculate the distance from each noise source to the noise receiver locations, using the ground absorption, distance, and barrier/building attenuation inputs to provide a summary of noise level at each receiver and the partial noise level contributions by noise source. Consistent with the ISO 9613 protocol, the CadnaA noise prediction model relies on the reference sound power level (L_w) to describe individual noise sources. While sound pressure levels (e.g., L_{eq}) quantify in decibels the intensity of given sound sources at a reference distance, sound power levels (L_w) are connected to the sound source and are independent of distance. Sound pressure levels vary substantially with distance from the source and diminish because of intervening obstacles and barriers, air absorption, wind, and other factors. Sound power is the acoustical energy emitted by the sound source and is an absolute value that is not affected by the environment.

The operational noise level calculations provided in this noise study account for the distance attenuation provided due to geometric spreading, when sound from a localized stationary source (i.e., a point source) propagates uniformly outward in a spherical pattern. A default ground attenuation factor of 0.5 was used in the noise analysis to account for mixed ground representing a simi-hard surface. Appendix 7.1 includes the detailed noise model inputs used to estimate the Project operational noise levels presented in this section.

7.4 PROJECT OPERATIONAL NOISE LEVELS

Using the reference noise levels to represent the proposed Project operations that include water pumps, solar panel tracker motors, an air conditioner, and a parking lot, Urban Crossroads, Inc. calculated the unmitigated operational source noise levels that are expected to be generated at the Project site and the Project-related noise level increases that would be experienced at each of the sensitive receiver locations. Table 7-1 shows the unmitigated Project operational noise levels during the daytime hours of 7:00 a.m. to 10:00 p.m. The hourly noise levels at the off-site receiver locations are expected to range from 12.7 to 36.5 dBA L_{eq}.

TABLE 7-1: PROJECT DAYTIME OPERATIONAL NOISE LEVELS

Noise Source[1]	Operational Noise Levels by Receiver Location (dBA L_{max})					
	R1	R2	R3	R4	R5	R6
Air Conditioning Unit	5.8	8.3	13.7	2.1	0.4	0.0
Intake Pump	36.3	25.7	20.3	0.0	0.0	1.7
Solar Tracking Units	0.0	0.0	0.0	1.9	2.5	0.0
Equipment Building	1.8	7.3	9.4	9.0	8.0	12.7
Parking Lot Vehicle Movements	23.7	26.1	32.9	8.3	9.3	15.2
Total (All Noise Sources)	**36.5**	**29.0**	**33.2**	**12.8**	**12.7**	**17.4**

[1] See Exhibit 7-A for the noise source locations. CadnaA noise model calculations are included in Appendix 7.1.

Table 7-2 shows the unmitigated Project operational noise levels during the nighttime hours of 10:00 p.m. to 7:00 a.m. The hourly noise levels at the off-site receiver locations are expected to range from 10.2 to 36.3 dBA L_{eq}.

TABLE 7-2: PROJECT NIGHTTIME OPERATIONAL NOISE LEVELS

Noise Source[1]	Operational Noise Levels by Receiver Location (dBA L_{max})					
	R1	R2	R3	R4	R5	R6
Air Conditioning Unit	5.8	8.3	13.7	2.1	0.4	0.0
Intake Pump	36.3	25.7	20.3	0.0	0.0	1.7
Solar Tracking Units	0.0	0.0	0.0	0.0	0.0	0.0
Equipment Building	1.8	7.3	9.4	9.0	8.0	12.7
Parking Lot Vehicle Movements	0.0	0.0	0.0	0.0	0.0	0.0
Total (All Noise Sources)	**36.3**	**25.9**	**21.5**	**11.0**	**10.2**	**13.6**

[1] See Exhibit 7-A for the noise source locations. CadnaA noise model calculations are included in Appendix 7.1.

7.5 PROJECT OPERATIONAL NOISE LEVEL COMPLIANCE

To demonstrate compliance with local noise regulations, the Project-only operational noise levels are evaluated against exterior noise level thresholds based on the MSHCP Section 4.5.4 noise level standards within the MSHCP. Based on the CadnaA noise prediction model results that account for the noise attenuation due to distance from the noise source activities, Table 7-3 shows the operational noise levels associated with the Global Water Farms Project will satisfy the MSCHP's 75 dBA L_{eq} noise level standard. Therefore, the operational noise impacts are considered *less than significant* at the nearest noise-sensitive receiver locations.

TABLE 7-3: OPERATIONAL NOISE LEVEL COMPLIANCE

Receiver Location[1]	Project Operational Noise Levels (dBA L_{max})[2]		Exterior Noise Level Standards (dBA L_{max})[3]		Noise Level Standards Exceeded?[4]	
	Daytime	Nighttime	Daytime	Nighttime	Daytime	Nighttime
R1	36.5	36.3	75	75	No	No
R2	29.0	25.9	75	75	No	No
R3	33.2	21.5	75	75	No	No
R4	12.8	11.0	75	75	No	No
R5	12.7	10.2	75	75	No	No
R6	17.4	13.6	75	75	No	No

[1] See Exhibit 6-A for the receiver locations.
[2] Proposed Project operational noise levels as shown on Tables 7-2 and 7-3.
[3] Exterior noise level standard for MSHCP as shown on Table 4-1.
[4] Do the estimated Project operational noise source activities exceed the noise level standards?
[5] Non-residential land use with no expected nighttime occupancy.
"Daytime" = 7:01 a.m. to 10:00 p.m.; "Nighttime" = 10:01 p.m. to 7:00 a.m.

7.6 PROJECT OPERATIONAL NOISE LEVEL INCREASES

To describe the Project operational noise level increases, the Project operational noise levels are combined with the existing ambient noise levels measurements for the nearest receiver locations potentially impacted by Project operational noise sources. Since the units used to measure noise, decibels (dB), are logarithmic units, the Project-operational and existing ambient noise levels cannot be combined using standard arithmetic equations. (2) Instead, they must be logarithmically added using the following base equation:

$$SPL_{Total} = 10\log_{10}[10^{SPL1/10} + 10^{SPL2/10} + \ldots 10^{SPLn/10}]$$

Where "SPL1," "SPL2," etc. are equal to the sound pressure levels being combined, or in this case, the Project-operational and existing ambient noise levels. The difference between the combined Project and ambient noise levels describes the Project noise level increases to the existing ambient noise environment. Noise levels that would be experienced at receiver locations when Project-source noise is added to the daytime and nighttime ambient conditions are presented on Tables 10-4 and 10-5, respectively.

As indicated on Tables 10-4 and 10-5, the Project will generate an operational noise level increase ranging from 0.0 to 1.7 dBA L_{eq} at the nearest receiver locations. In effect, the amount to which a given noise level increase is considered acceptable is reduced based on existing ambient noise conditions. Based on the significance criteria presented in Table 4-1, the Project-related operational noise level increases will satisfy the operational noise level increase criteria at the nearest sensitive receiver locations and the impact will be *less than significant.*

TABLE 7-4: DAYTIME PROJECT OPERATIONAL NOISE LEVEL INCREASES

Receiver Location[1]	Total Project Operational Noise Level[2]	Measurement Location[3]	Reference Ambient Noise Levels[4]	Combined Project and Ambient[5]	Project Increase[6]	Increase Criteria[7]	Increase Criteria Exceeded?
R1	36.5	L1	39.8	41.5	1.7	5	No
R2	29.0	L1	39.8	40.1	0.3	5	No
R3	33.2	L2	42.0	42.5	0.5	5	No
R4	12.8	L3	42.5	42.5	0.0	5	No
R5	12.7	L4	38.5	38.5	0.0	5	No
R6	17.4	L5	38.7	38.7	0.0	5	No

[1] See Exhibit 7-A for the receiver locations.
[2] Total Project daytime operational noise levels as shown on Table 7-1.
[3] Reference noise level measurement locations as shown on Exhibit 5-A.
[4] Observed daytime ambient noise levels as shown on Table 5-1.
[5] Represents the combined ambient conditions plus the Project activities.
[6] The noise level increase expected with the addition of the proposed Project activities.
[7] Significance increase criteria as shown on Table 4-1.
[8] Non-residential land use with no expected nighttime occupancy.

TABLE 7-5: NIGHTTIME OPERATIONAL NOISE LEVEL INCREASES

Receiver Location[1]	Total Project Operational Noise Level[2]	Measurement Location[3]	Reference Ambient Noise Levels[4]	Combined Project and Ambient[5]	Project Increase[6]	Increase Criteria[7]	Increase Criteria Exceeded?
R1	36.3	L1	39.8	41.4	1.6	5	No
R2	25.9	L1	39.8	40.0	0.2	5	No
R3	21.5	L2	42.0	42.0	0.0	5	No
R4	11.0	L3	42.5	42.5	0.0	5	No
R5	10.2	L4	38.5	38.5	0.0	5	No
R6	13.6	L5	38.7	38.7	0.0	5	No

[1] See Exhibit 7-A for the receiver locations.
[2] Total Project nighttime operational noise levels as shown on Table 7-2.
[3] Reference noise level measurement locations as shown on Exhibit 5-A.
[4] Observed nighttime ambient noise levels as shown on Table 5-1.
[5] Represents the combined ambient conditions plus the Project activities.
[6] The noise level increase expected with the addition of the proposed Project activities.
[7] Significance increase criteria as shown on Table 4-1.
[8] Non-residential land use with no expected nighttime occupancy.

8 CONSTRUCTION IMPACTS

This section analyzes potential impacts resulting from the short-term construction activities associated with the development of the Project. Exhibit 8-A shows the construction noise source locations in relation to the nearby sensitive receiver locations previously described in Section 6.

8.1 CONSTRUCTION NOISE LEVELS

Noise generated by the Project construction equipment will include a combination of trucks, power tools, concrete mixers, and portable generators that when combined can reach high levels. The number and mix of construction equipment are expected to occur in the following stages:

- Site Preparation
- Grading
- Building Construction
- Architectural Coating

8.2 CONSTRUCTION REFERENCE NOISE LEVELS

To describe peak construction noise activities, this construction noise analysis was prepared using reference noise level measurements published in the *FHWA Road Construction Nosie Model* (RCNM) (20). The RCNM database provides a conservative source of reference construction noise levels. Table 8-1 provides a summary of the FHWA construction reference noise level measurements expressed in hourly average dBA L_{eq} using the estimated FHWA RCNM usage factors to describe the typical construction activities for each stage of Project construction (20).

EXHIBIT 8-A: CONSTRUCTION NOISE SOURCE LOCATIONS

TABLE 8-1: CONSTRUCTION REFERENCE NOISE LEVELS

Construction Stage	Construction Activity	Reference Noise Level @ 50 Feet (dBA L_{max})[1]	Composite Reference Noise Level (dBA L_{eq})	Reference Power Level (dBA L_w)
Site Preparation	Crawler Tractors	82	84	115
	Rubber Tired Dozers	79		
Grading	Crawler Tractors	82	90	122
	Excavators	81		
	Graders	85		
	Rubber Tired Dozers	79		
	Graders	85		
Building Construction	Cranes	81	86	118
	Crawler Tractors	82		
	Rubber Tired Dozers	79		
	Generator Sets	73		
	Welders	74		
Arch. Coating	Air Compressors	78	78	110

[1] FHWA's Roadway Construction Noise Model, January 2006.

8.3 CONSTRUCTION NOISE ANALYSIS

Using the reference construction equipment noise levels and the CadnaA noise prediction model, calculations of the Project construction noise level impacts at the nearby sensitive receiver locations were completed. To assess the worst-case construction noise levels, the Project construction noise analysis relies on the highest noise level impacts when the equipment with the highest reference noise level is operating at the closest point from the edge of primary construction activity (Project site boundary) to each receiver location. Consistent with FTA guidance for general construction noise assessment, Table 8-1 presents the combined noise level for all equipment, assuming they operate at the same time. As shown on Table 8-2, the construction noise levels are expected to range from 33.9 to 52.0 dBA L_{eq}, and the highest construction levels are expected to range from 40.9 to 52.0 dBA L_{eq} at the nearby receiver locations. Appendix 8.1 includes the detailed CadnaA construction noise model inputs.

The construction noise analysis presents a conservative approach with the combined noise-level-producing equipment for each stage of Project construction operating at the closest point from primary construction activity to the nearby sensitive receiver locations. This scenario is unlikely to occur during typical construction activities and likely overstates the construction noise levels which will be experienced at each receiver location.

TABLE 8-2: CONSTRUCTION EQUIPMENT NOISE LEVEL SUMMARY

Receiver Location[1]	Construction Noise Levels (dBA L_{max})					
	Site Preparation	Grading	Building Construction	#REF!	Arch. Coating	Highest Levels[2]
R1	37.9	40.9	37.9	35.9	33.9	40.9
R2	42.2	45.2	42.2	40.2	38.2	45.2
R3	47.3	50.3	47.3	45.3	43.3	50.3
R4	44.2	47.2	44.2	42.2	40.2	47.2
R5	42.7	45.7	42.7	40.7	38.7	45.7
R6	49.0	52.0	49.0	47.0	45.0	52.0

[1] Noise receiver locations are shown on Exhibit 6-A.
[2] Construction noise level calculations based on distance from the project site boundaries (construction activity area) to nearby receiver locations. CadnaA construction noise model inputs are included in Appendix 8.1.

8.4 CONSTRUCTION NOISE LEVEL COMPLIANCE

To evaluate whether the Project will generate potentially significant short-term noise levels at nearest receiver locations, a construction-related daytime noise level threshold of 75 dBA L_{eq} is used as a reasonable threshold to assess the daytime construction noise level impacts. The construction noise analysis shows that the nearest receiver locations will satisfy the MSHCP 75 dBA L_{eq} significance threshold during Project construction activities as shown on Table 8-3. Therefore, the noise impacts due to Project construction noise are considered *less than significant* at all receiver locations.

TABLE 8-3: CONSTRUCTION NOISE LEVEL COMPLIANCE

Receiver Location[1]	Construction Noise Levels (dBA L_{max})		
	Highest Construction Noise Levels[2]	Threshold[3]	Threshold Exceeded?[4]
R1	39.0	75	No
R2	43.1	75	No
R3	43.3	75	No
R4	41.7	75	No
R5	39.2	75	No
R6	44.1	75	No

[1] Noise receiver locations are shown on Exhibit 6-A.
[2] Highest construction noise level calculations based on distance from the construction noise source activity to nearby receiver locations as shown on Table 8-2.
[3] Coachella Valley Association of Governments, Coachella Valley Multiple Species Habitat Conservation Plan, Section 4.5.4 Noise (Appendix 3.1).
[4] Do the estimated Project construction noise levels exceed the construction noise level threshold?
[5] Construction noise level thresholds are limited to MSCHP Lands (Section 3.5).

8.5 CONSTRUCTION VIBRATION IMPACTS

Construction activity can result in varying degrees of ground vibration, depending on the equipment and methods used, distance to the affected structures and soil type. It is expected that ground-borne vibration from Project construction activities would cause only intermittent, localized intrusion. Ground-borne vibration levels resulting from typical construction activities occurring within the Project site were estimated by data published by the Federal Transit Administration (FTA). (7) However, while vehicular traffic is rarely perceptible, construction has the potential to result in varying degrees of temporary ground vibration, depending on the specific construction activities and equipment used. Ground vibration levels associated with various types of construction equipment are summarized on Table 8-4. Based on the representative vibration levels presented for various construction equipment types, it is possible to estimate the potential Project construction vibration levels using the following vibration assessment methods defined by the FTA. To describe the human response (annoyance) associated with vibration impacts the FTA provides the following equation: $PPV_{equip} = PPV_{ref} \times (25/D)^{1.5}$

TABLE 8-4: VIBRATION SOURCE LEVELS FOR CONSTRUCTION EQUIPMENT

Equipment	PPV (in/sec) at 25 feet
Small bulldozer	0.003
Loaded Trucks	0.076
Large bulldozer	0.089

Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual

Using the vibration source level of construction equipment provided on Table 11-4 and the construction vibration assessment methodology published by the FTA, it is possible to estimate the Project vibration impacts. Table 8-5 presents the expected Project related vibration levels at the nearby receiver locations.

At distances ranging over a mile from the Project construction activities to the nearest human receiver, construction vibration velocity levels would be less than 0.00 in/sec PPV and will remain below the threshold of 0.01 in/sec RMS at all receiver locations. Therefore, the Project-related vibration impacts are considered *less than significant*.

Moreover, the impacts at the site of the nearest sensitive receiver locations are unlikely to be sustained during the entire construction period but will occur rather only during the times that heavy construction equipment is operating adjacent to the Project site perimeter.

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9 REFERENCES

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3. **Environmental Protection Agency Office of Noise Abatement and Control.** *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety.* March 1974. EPA/ONAC 550/9/74-004.
4. **U.S. Department of Transportation, Federal Highway Administration, Office of Environment and Planning, Noise and Air Quality Branch.** *Highway Traffic Noise Analysis and Abatement Policy and Guidance.* December 2011.
5. **U.S. Department of Transportation, Federal Highway Administration.** *Highway Traffic Noise in the United States, Problem and Response.* April 2000. p. 3.
6. **U.S. Environmental Protection Agency Office of Noise Abatement and Control.** *Noise Effects Handbook-A Desk Reference to Health and Welfare Effects of Noise.* October 1979 (revised July 1981). EPA 550/9/82/106.
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8. **Office of Planning and Research.** *State of California General Plan Guidelines.* October 2017.
9. **State of California.** *the California Code of Regulations, Title 24, Building Standards Administrative Code, Chapter 12, Section 1206 Sound Control.* 2019. https://up.codes/viewer/california/ibc-2018/chapter/12/interior-environment#12.
10. —. California Code of Regulations, Title 24, Part 11, Chapter 5, Section 5.507.4. *ICC Digital Coes.* [Online] 2019. https://up.codes/viewer/california/ibc-2018/chapter/12/interior-environment#12.
11. **County of Riverside.** *General Plan Noise Element.* December 2015.
12. —. *Municipal Code, Chapter 9.52 Noise Regulation.*
13. **Western Riverside County Regional Conservation Authority.** *Western Riverside County Multiple Species Habitat Conservation Plan.* August 2007.
14. **California Court of Appeal.** *Gray v. County of Madera, F053661.* 167 Cal.App.4th 1099; - Cal.Rptr.3d, October 2008.
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18. **Dudek andAsscoiates, Inc.** *Calsbad Desalination Plant Noise Assessment Report.* 2005.
19. **Dudek and Associates, Inc. .** *Soitec Solar Development Final Program Environmental Impact Report.* 2015.
20. **U.S. Department of Transportation, Federal Highway Administration.** *Road Construction Noise Model, version 1.0.* 2006.

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10 CERTIFICATION

The contents of this noise study report represent an accurate depiction of the noise environment and impacts associated with the proposed Global Water Farms Project. The information contained in this noise study report is based on the best available data at the time of preparation. If you have any questions, please contact me directly at (619) 778-1971.

William Maddux
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(619) 788-1971
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EDUCATION

Bachelor of Science in Urban and Regional Planning
California Polytechnic State University, Pomona • June 2000

PROFESSIONAL AFFILIATIONS

ASA – Acoustical Society of America
AEP – Association of Environmental Planners
AWMA – Air and Waste Management Association
INCE – Institute of Noise Control Engineers

PROFESSIONAL CERTIFICATIONS

Approved Acoustical Consultant • County of San Diego
FHWA Traffic Noise Model of Training • November 2004
CadnaA Basic and Advanced Training Certificate • October 2008.

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APPENDIX 3.1:

COACHELLA VALLEY MULTIPLE SPECIES HABITAT CONSERVATION PLAN

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Little San Bernardino Mountains Linanthus. This measure does not apply to single-family residences and any non-commercial accessory uses and structures, including but not limited to second units on an existing legal lot, or to O&M of Covered Activities. To avoid and minimize impacts to this species as much as possible, the following avoidance and minimization effort shall occur:

- **Salvage**: Salvage of top soil and/or seeds should occur prior to ground disturbance in accordance with Section 6.6.1. Salvage should be conducted by or in cooperation with the CVCC.

4.5 Land Use Adjacency Guidelines

The purpose of Land Use Adjacency Guidelines is to avoid or minimize indirect effects from Development adjacent to or within the Conservation Areas. Adjacent means sharing a common boundary with any parcel in a Conservation Area. Such indirect effects are commonly referred to as edge effects, and may include noise, lighting, drainage, intrusion of people, and the introduction of non-native plants and non-native predators such as dogs and cats. Edge effects will also be addressed through reserve management activities such as fencing. The following Land Use Adjacency Guidelines shall be considered by the Permittees in their review of individual public and private Development projects adjacent to or within the Conservation Areas to minimize edge effects, and shall be implemented where applicable.

4.5.1 Drainage

Proposed Development adjacent to or within a Conservation Area shall incorporate plans to ensure that the quantity and quality of runoff discharged to the adjacent Conservation Area is not altered in an adverse way when compared with existing conditions. Stormwater systems shall be designed to prevent the release of toxins, chemicals, petroleum products, exotic plant materials or other elements that might degrade or harm biological resources or ecosystem processes within the adjacent Conservation Area.

4.5.2 Toxics

Land uses proposed adjacent to or within a Conservation Area that use chemicals or generate bioproducts such as manure that are potentially toxic or may adversely affect wildlife and plant species, Habitat, or water quality shall incorporate measures to ensure that application of such chemicals does not result in any discharge to the adjacent Conservation Area.

4.5.3 Lighting

For proposed Development adjacent to or within a Conservation Area, lighting shall be shielded and directed toward the developed area. Landscape shielding or other appropriate methods shall be incorporated in project designs to minimize the effects of lighting adjacent to or within the adjacent Conservation Area in accordance with the guidelines to be included in the Implementation Manual.

4.5.4 Noise

Proposed Development adjacent to or within a Conservation Area that generates noise in excess of 75 dBA L_{eq} hourly shall incorporate setbacks, berms, or walls, as appropriate, to minimize the effects of noise on the adjacent Conservation Area in accordance with the guidelines to be included in the Implementation Manual.

4.5.5 Invasives

Invasive, non-native plant species shall not be incorporated in the landscape for land uses adjacent to or within a Conservation Area. Landscape treatments within or adjacent to a Conservation Area shall incorporate native plant materials to the maximum extent Feasible; recommended native species are listed in Table 4-112. The plants listed in Table 4-113 shall not be used within or adjacent to a Conservation Area. This list may be amended from time to time through a Minor Amendment with Wildlife Agency Concurrence.

APPENDIX 5.1:

STUDY AREA PHOTOS

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JN: 14665 Study Area Photos

L1_E
33, 26' 23.350000"115, 42' 6.800000"

L1_N
33, 26' 23.290000"115, 42' 6.860000"

L1_S
33, 26' 23.360000"115, 42' 6.800000"

L1_W
33, 26' 23.360000"115, 42' 6.830000"

L2_E
33, 26' 25.080000"115, 41' 50.510000"

L2_N
33, 26' 25.090000"115, 41' 50.490000"

JN: 14665 Study Area Photos

L2_S
33, 26' 25.080000"115, 41' 50.490000"

L2_W
33, 26' 25.050000"115, 41' 50.510000"

L3_E
33, 26' 21.800000"115, 41' 44.200000"

L3_N
33, 26' 21.830000"115, 41' 44.220000"

L3_S
33, 26' 21.830000"115, 41' 44.200000"

L3_W
33, 26' 21.780000"115, 41' 44.220000"

JN: 14665 Study Area Photos

L4_E
33, 26' 20.290000"115, 41' 42.380000"

L4_N
33, 26' 20.310000"115, 41' 42.440000"

L4_S
33, 26' 20.260000"115, 41' 42.380000"

L4_W
33, 26' 20.270000"115, 41' 42.410000"

L5_E
33, 26' 22.480000"115, 41' 52.630000"

L5_N
33, 26' 22.460000"115, 41' 52.710000"

JN: 14665 Study Area Photos

L5_S
33, 26' 22.480000"115, 41' 52.660000"

L5_W
33, 26' 22.460000"115, 41' 52.630000"

APPENDIX 5.2:

NOISE LEVEL MEASUREMENT WORKSHEETS

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Hourly L_{eq} to CNEL

Location: Located southwest of the Project site.
Hour: 13
Noise Level (dBA L_{eq}): 39.8

JN: 14665
Analyst: A. Khan
Date: 3/16/2022

Hour	*Reference Hourly Noise Levels (dBA L_{eq})* [1]	*Hourly Adjustment* [2]	*Adjusted Hourly Noise Level (dBA L_{eq})* [3]	*CNEL Penalty*	*CNEL-Adjusted Hourly Noise Level (dBA L_{eq})*
0	59.7	-8.2	31.7	10	41.7
1	58.4	-9.5	30.4	10	40.4
2	57.4	-10.4	29.4	10	39.4
3	61.0	-6.8	33.0	10	43.0
4	64.5	-3.4	36.5	10	46.5
5	69.6	1.7	41.6	10	51.6
6	69.5	1.7	41.5	10	51.5
7	68.8	0.9	40.8	0	40.8
8	68.8	1.0	40.8	0	40.8
9	69.0	1.2	41.0	0	41.0
10	67.9	0.1	39.9	0	39.9
11	68.3	0.5	40.3	0	40.3
12	68.3	0.5	40.3	0	40.3
13	67.9	0.0	39.8	0	39.8
14	68.2	0.4	40.2	0	40.2
15	68.5	0.7	40.5	0	40.5
16	68.5	0.7	40.5	0	40.5
17	68.6	0.8	40.6	0	40.6
18	67.1	-0.8	39.0	0	39.0
19	67.1	-0.8	39.1	5	44.1
20	65.9	-2.0	37.9	5	42.9
21	66.4	-1.4	38.4	5	43.4
22	63.3	-4.5	35.3	10	45.3
23	61.6	-6.3	33.5	10	43.5
				24-Hour CNEL	**44.2**

[1] Reference hourly noise level data based on exterior measurement location collected by Urban Crossroads, Inc. on March 16, 2022 at the Project site.

[2] Difference in hourly noise levels based on the reference hour. Hourly noise levels are used to determine the relationship of each hourly noise level to the subsequent hourly noise level for the full 24-hours.

[3] Measured hourly noise level plus the adjustment based on the reference hourly noise levels.

Hourly L_{eq} to CNEL

Location: Located north of the Project site, north of Coachella Canal Road.
JN: 14665
Hour: 13
Analyst: A. Khan
Noise Level (dBA L_{eq}): 42.0
Date: 3/16/2022

Hour	*Reference Hourly Noise Levels (dBA L_{eq})* [1]	*Hourly Adjustment* [2]	*Adjusted Hourly Noise Level (dBA L_{eq})* [3]	*CNEL Penalty*	*CNEL-Adjusted Hourly Noise Level (dBA L_{eq})*
0	59.7	-8.2	33.8	10	43.8
1	58.4	-9.5	32.5	10	42.5
2	57.4	-10.4	31.5	10	41.5
3	61.0	-6.8	35.1	10	45.1
4	64.5	-3.4	38.6	10	48.6
5	69.6	1.7	43.7	10	53.7
6	69.5	1.7	43.7	10	53.7
7	68.8	0.9	42.9	0	42.9
8	68.8	1.0	42.9	0	42.9
9	69.0	1.2	43.1	0	43.1
10	67.9	0.1	42.0	0	42.0
11	68.3	0.5	42.4	0	42.4
12	68.3	0.5	42.4	0	42.4
13	67.9	0.0	42.0	0	42.0
14	68.2	0.4	42.3	0	42.3
15	68.5	0.7	42.6	0	42.6
16	68.5	0.7	42.6	0	42.6
17	68.6	0.8	42.8	0	42.8
18	67.1	-0.8	41.2	0	41.2
19	67.1	-0.8	41.2	5	46.2
20	65.9	-2.0	40.0	5	45.0
21	66.4	-1.4	40.5	5	45.5
22	63.3	-4.5	37.4	10	47.4
23	61.6	-6.3	35.7	10	45.7
				24-Hour CNEL	**46.4**

[1] Reference hourly noise level data based on exterior measurement location collected by Urban Crossroads, Inc. on March 16, 2022 at the Project site.

[2] Difference in hourly noise levels based on the reference hour. Hourly noise levels are used to determine the relationship of each hourly noise level to the subsequent hourly noise level for the full 24-hours.

[3] Measured hourly noise level plus the adjustment based on the reference hourly noise levels.

Hourly L_{eq} to CNEL

Location: Located east of the Project site.
Hour: 13
Noise Level (dBA L_{eq}): 42.5

JN: 14665
Analyst: A. Khan
Date: 3/16/2022

Hour	*Reference Hourly Noise Levels (dBA L_{eq})* [1]	*Hourly Adjustment* [2]	*Adjusted Hourly Noise Level (dBA L_{eq})* [3]	*CNEL Penalty*	*CNEL-Adjusted Hourly Noise Level (dBA L_{eq})*
0	59.7	-8.2	34.4	10	44.4
1	58.4	-9.5	33.0	10	43.0
2	57.4	-10.4	32.1	10	42.1
3	61.0	-6.8	35.7	10	45.7
4	64.5	-3.4	39.1	10	49.1
5	69.6	1.7	44.2	10	54.2
6	69.5	1.7	44.2	10	54.2
7	68.8	0.9	43.4	0	43.4
8	68.8	1.0	43.5	0	43.5
9	69.0	1.2	43.7	0	43.7
10	67.9	0.1	42.6	0	42.6
11	68.3	0.5	43.0	0	43.0
12	68.3	0.5	43.0	0	43.0
13	67.9	0.0	42.5	0	42.5
14	68.2	0.4	42.9	0	42.9
15	68.5	0.7	43.2	0	43.2
16	68.5	0.7	43.2	0	43.2
17	68.6	0.8	43.3	0	43.3
18	67.1	-0.8	41.7	0	41.7
19	67.1	-0.8	41.8	5	46.8
20	65.9	-2.0	40.6	5	45.6
21	66.4	-1.4	41.1	5	46.1
22	63.3	-4.5	38.0	10	48.0
23	61.6	-6.3	36.2	10	46.2
				24-Hour CNEL	**46.9**

[1] Reference hourly noise level data based on exterior measurement location collected by Urban Crossroads, Inc. on March 16, 2022 at the Project site.

[2] Difference in hourly noise levels based on the reference hour. Hourly noise levels are used to determine the relationship of each hourly noise level to the subsequent hourly noise level for the full 24-hours.

[3] Measured hourly noise level plus the adjustment based on the reference hourly noise levels.

Hourly L_{eq} to CNEL

Location: Located east of the Project site near LBV Habitat.
JN: 14665
Hour: 13
Analyst: A. Khan
Noise Level (dBA L_{eq}): 38.5
Date: 3/16/2022

Hour	*Reference Hourly Noise Levels (dBA L_{eq})* [1]	*Hourly Adjustment* [2]	*Adjusted Hourly Noise Level (dBA L_{eq})* [3]	*CNEL Penalty*	*CNEL-Adjusted Hourly Noise Level (dBA L_{eq})*
0	59.7	-8.2	30.4	10	40.4
1	58.4	-9.5	29.0	10	39.0
2	57.4	-10.4	28.1	10	38.1
3	61.0	-6.8	31.7	10	41.7
4	64.5	-3.4	35.1	10	45.1
5	69.6	1.7	40.2	10	50.2
6	69.5	1.7	40.2	10	50.2
7	68.8	0.9	39.4	0	39.4
8	68.8	1.0	39.5	0	39.5
9	69.0	1.2	39.7	0	39.7
10	67.9	0.1	38.6	0	38.6
11	68.3	0.5	39.0	0	39.0
12	68.3	0.5	39.0	0	39.0
13	67.9	0.0	38.5	0	38.5
14	68.2	0.4	38.9	0	38.9
15	68.5	0.7	39.2	0	39.2
16	68.5	0.7	39.2	0	39.2
17	68.6	0.8	39.3	0	39.3
18	67.1	-0.8	37.7	0	37.7
19	67.1	-0.8	37.8	5	42.8
20	65.9	-2.0	36.6	5	41.6
21	66.4	-1.4	37.1	5	42.1
22	63.3	-4.5	34.0	10	44.0
23	61.6	-6.3	32.2	10	42.2
				24-Hour CNEL	**42.9**

[1] Reference hourly noise level data based on exterior measurement location collected by Urban Crossroads, Inc. on March 16, 2022 at the Project site.

[2] Difference in hourly noise levels based on the reference hour. Hourly noise levels are used to determine the relationship of each hourly noise level to the subsequent hourly noise level for the full 24-hours.

[3] Measured hourly noise level plus the adjustment based on the reference hourly noise levels.

Hourly L_{eq} to CNEL

Location: Located south of the Project site.
Hour: 13
Noise Level (dBA L_{eq}): 39.7

JN: 14665
Analyst: A. Khan
Date: 3/16/2022

Hour	*Reference Hourly Noise Levels (dBA L_{eq})* [1]	*Hourly Adjustment* [2]	*Adjusted Hourly Noise Level (dBA L_{eq})* [3]	*CNEL Penalty*	*CNEL-Adjusted Hourly Noise Level (dBA L_{eq})*
0	59.7	-8.2	31.6	10	41.6
1	58.4	-9.5	30.3	10	40.3
2	57.4	-10.4	29.3	10	39.3
3	61.0	-6.8	32.9	10	42.9
4	64.5	-3.4	36.4	10	46.4
5	69.6	1.7	41.5	10	51.5
6	69.5	1.7	41.4	10	51.4
7	68.8	0.9	40.7	0	40.7
8	68.8	1.0	40.7	0	40.7
9	69.0	1.2	40.9	0	40.9
10	67.9	0.1	39.8	0	39.8
11	68.3	0.5	40.2	0	40.2
12	68.3	0.5	40.2	0	40.2
13	67.9	0.0	39.7	0	39.7
14	68.2	0.4	40.1	0	40.1
15	68.5	0.7	40.4	0	40.4
16	68.5	0.7	40.4	0	40.4
17	68.6	0.8	40.5	0	40.5
18	67.1	-0.8	38.9	0	38.9
19	67.1	-0.8	39.0	5	44.0
20	65.9	-2.0	37.8	5	42.8
21	66.4	-1.4	38.3	5	43.3
22	63.3	-4.5	35.2	10	45.2
23	61.6	-6.3	33.4	10	43.4
				24-Hour CNEL	**44.1**

[1] Reference hourly noise level data based on exterior measurement location collected by Urban Crossroads, Inc. on March 16, 2022 at the Project site.

[2] Difference in hourly noise levels based on the reference hour. Hourly noise levels are used to determine the relationship of each hourly noise level to the subsequent hourly noise level for the full 24-hours.

[3] Measured hourly noise level plus the adjustment based on the reference hourly noise levels.

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APPENDIX 7.1:

CADNAA OPERATIONAL NOISE MODEL INPUTS

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14665 - Global Water Farms - Operation

CadnaA Noise Prediction Model: 14665-02_Operation2.cna
Date: 25.03.22
Analyst: B. Maddux

Calculation Configuration

Configuration	
Parameter	Value
General	
Country	(user defined)
Max. Error (dB)	0.00
Max. Search Radius (#(Unit,LEN))	2000.01
Min. Dist Src to Rcvr	0.00
Partition	
Raster Factor	0.50
Max. Length of Section (#(Unit,LEN))	999.99
Min. Length of Section (#(Unit,LEN))	1.01
Min. Length of Section (%)	0.00
Proj. Line Sources	On
Proj. Area Sources	On
Ref. Time	
Reference Time Day (min)	960.00
Reference Time Night (min)	480.00
Daytime Penalty (dB)	0.00
Recr. Time Penalty (dB)	5.00
Night-time Penalty (dB)	10.00
DTM	
Standard Height (m)	274.32
Model of Terrain	Triangulation
Reflection	
max. Order of Reflection	2
Search Radius Src	100.00
Search Radius Rcvr	100.00
Max. Distance Source - Rcvr	1000.00 1000.00
Min. Distance Rvcr - Reflector	1.00 1.00
Min. Distance Source - Reflector	0.10
Industrial (ISO 9613)	
Lateral Diffraction	some Obj
Obst. within Area Src do not shield	On
Screening	Incl. Ground Att. over Barrier
	Dz with limit (20/25)
Barrier Coefficients C1,2,3	3.0 20.0 0.0
Temperature (#(Unit,TEMP))	10
rel. Humidity (%)	70
Ground Absorption G	0.50
Wind Speed for Dir. (#(Unit,SPEED))	3.0
Roads (TNM)	
Railways (FTA/FRA)	
Aircraft (???)	
Strictly acc. to AzB	

Receiver Noise Levels

Name	M.	ID	Level Lr			Limit. Value			Land Use			Height		Coordinates		
			Day	Night	CNEL	Day	Night	CNEL	Type	Auto	Noise Type			X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)				(ft)		(ft)	(ft)	(ft)
RECEIVERS		R1	36.5	36.3	43.0	0.0	0.0	0.0		x	Total	3.00	a	6728889.02	2103853.12	3.00
RECEIVERS		R2	29.0	25.8	33.0	0.0	0.0	0.0		x	Total	3.00	a	6729353.86	2104040.62	3.00
RECEIVERS		R3	33.2	21.5	32.1	0.0	0.0	0.0		x	Total	3.00	a	6730245.79	2104248.95	3.00
RECEIVERS		R4	12.7	10.1	17.1	0.0	0.0	0.0		x	Total	3.00	a	6730848.22	2103802.77	3.00
RECEIVERS		R5	12.6	9.0	16.2	0.0	0.0	0.0		x	Total	3.00	a	6731035.39	2103665.30	3.00
RECEIVERS		R6	17.3	13.1	20.4	0.0	0.0	0.0		x	Total	3.00	a	6730037.46	2103899.99	3.00

Point Source(s)

Name	M.	ID	Result. PWL			Lw / Li			Operating Time			K0	Height		Coordinates		
			Day	Evening	Night	Type	Value	norm.	Day	Special	Night				X	Y	Z
			(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)	(dB)	(ft)		(ft)	(ft)	(ft)
POINTSOURCE		Parking1	95.2	95.2	95.2	Lw	95.2		900.00	0.00	0.00	0.0	5.00	r	6730229.24	2104145.86	905.00
POINTSOURCE		Pump01	97.2	97.2	97.2	Lw	97.2					0.0	0.50	r	6728928.51	2103862.24	900.50
POINTSOURCE		AC1	80.0	80.0	80.0	Lw	80					0.0	3.00	r	6730120.52	2104107.82	903.00
POINTSOURCE		Tracker1	68.8	68.8	68.8	Lw	68.8		900.00	0.00	0.00	0.0	0.50	g	6730225.52	2103985.18	925.27
POINTSOURCE		Tracker2	68.8	68.8	68.8	Lw	68.8		900.00	0.00	0.00	0.0	0.50	g	6730225.52	2104026.33	925.27
POINTSOURCE		Tracker3	68.8	68.8	68.8	Lw	68.8		900.00	0.00	0.00	0.0	0.50	g	6730225.52	2104068.00	925.27

Area Source(s)

Name	M.	ID	Result. PWL			Result. PWL''			Lw / Li			Operating Time			Height
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Special	Night	(ft)
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)	
BUILDING		BUILDING00001	77.0	77.0	77.0	45.6	45.6	45.6	Li	EQ1					25

Name	Height				Coordinates			
	Begin		End		x	y	z	Ground
	(ft)		(ft)		(ft)	(ft)	(ft)	(ft)
BUILDING	24.77	r			6730231.48	2104110.34	924.77	900.00
					6730231.83	2103971.45	924.77	900.00
					6730123.50	2103971.45	924.77	900.00
					6730123.15	2104109.99	924.77	900.00

Building(s)

Name	M.	ID	RB	Residents	Absorption	Height		Coordinates			
						Begin		x	y	z	Ground
						(ft)		(ft)	(ft)	(ft)	(ft)
BUILDING		BUILDING00001		0		24.77	r	6730231.65	2104110.50	924.77	900.00
								6730232.00	2103971.28	924.77	900.00
								6730123.33	2103971.28	924.77	900.00
								6730122.99	2104110.15	924.77	900.00

APPENDIX 8.1

CADNAA CONSTRUCTION NOISE MODEL INPUTS

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14665 - Global Water Farms - Construction

CadnaA Noise Prediction Model: 14665-02_Construction.cna
Date: 25.03.22
Analyst: B. Maddux

Calculation Configuration

Configuration	
Parameter	Value
General	
Country	(user defined)
Max. Error (dB)	0.00
Max. Search Radius (#(Unit,LEN))	2000.01
Min. Dist Src to Rcvr	0.00
Partition	
Raster Factor	0.50
Max. Length of Section (#(Unit,LEN))	999.99
Min. Length of Section (#(Unit,LEN))	1.01
Min. Length of Section (%)	0.00
Proj. Line Sources	On
Proj. Area Sources	On
Ref. Time	
Reference Time Day (min)	960.00
Reference Time Night (min)	480.00
Daytime Penalty (dB)	0.00
Recr. Time Penalty (dB)	5.00
Night-time Penalty (dB)	10.00
DTM	
Standard Height (m)	274.32
Model of Terrain	Triangulation
Reflection	
max. Order of Reflection	2
Search Radius Src	100.00
Search Radius Rcvr	100.00
Max. Distance Source - Rcvr	1000.00 1000.00
Min. Distance Rvcr - Reflector	1.00 1.00
Min. Distance Source - Reflector	0.10
Industrial (ISO 9613)	
Lateral Diffraction	some Obj
Obst. within Area Src do not shield	On
Screening	Incl. Ground Att. over Barrier
	Dz with limit (20/25)
Barrier Coefficients C1,2,3	3.0 20.0 0.0
Temperature (#(Unit,TEMP))	10
rel. Humidity (%)	70
Ground Absorption G	0.50
Wind Speed for Dir. (#(Unit,SPEED))	3.0
Roads (TNM)	
Railways (FTA/FRA)	
Aircraft (???)	
Strictly acc. to AzB	

Receiver Noise Levels

Name	M.	ID	Level Lr			Limit. Value			Land Use			Height		Coordinates		
			Day	Night	CNEL	Day	Night	CNEL	Type	Auto	Noise Type			X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)				(ft)		(ft)	(ft)	(ft)
RECEIVERS		R1	40.9	40.9	47.5	0.0	0.0	0.0		x	Total	3.00	a	6728889.02	2103853.12	3.00
RECEIVERS		R2	45.2	45.2	51.9	0.0	0.0	0.0		x	Total	3.00	a	6729353.86	2104040.62	3.00
RECEIVERS		R3	50.3	50.3	57.0	0.0	0.0	0.0		x	Total	3.00	a	6730245.79	2104248.95	3.00
RECEIVERS		R4	47.2	47.2	53.8	0.0	0.0	0.0		x	Total	3.00	a	6730848.22	2103802.77	3.00
RECEIVERS		R5	45.7	45.7	52.4	0.0	0.0	0.0		x	Total	3.00	a	6731035.39	2103665.30	3.00
RECEIVERS		R6	52.0	52.0	58.7	0.0	0.0	0.0		x	Total	3.00	a	6730037.46	2103899.99	3.00

Area Source(s)

Name	M.	ID	Result. PWL			Result. PWL''			Lw / Li			Operating Time			Height
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Special	Night	(ft)
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)	
Construction Activity		Construction1	122.0	122.0	122.0	78.4	78.4	78.4	Lw	122					8

Name	Height				Coordinates			
	Begin		End		x	y	z	Ground
	(ft)		(ft)		(ft)	(ft)	(ft)	(ft)
Construction Activity	8.00	a			6729843.81	2104173.85	8.00	900.00
					6729950.67	2104400.07	8.00	900.00
					6730265.28	2104190.16	8.00	900.00
					6730567.12	2104052.47	8.00	900.00
					6730537.42	2103972.98	8.00	900.00
					6730411.12	2103737.84	8.00	900.00

Name	Height				Coordinates			
	Begin		End		x	y	z	Ground
	(ft)		(ft)		(ft)	(ft)	(ft)	(ft)
					6729805.49	2104050.24	8.00	900.00