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MEMORANDUM

To:	Brian Deason, Environmental Resources Supervisor, El Dorado Irrigation District
From:	Michael Carr, INCE, Dudek Jonathan Leech, INCE, Dudek
Subject:	Noise Assessment for El Dorado Irrigation District's Wastewater Collections Operations Facility Relocation Project
Date:	November 01, 2019
Attachment(s):	A - Site Plan; B – Acoustical Terms and Definitions

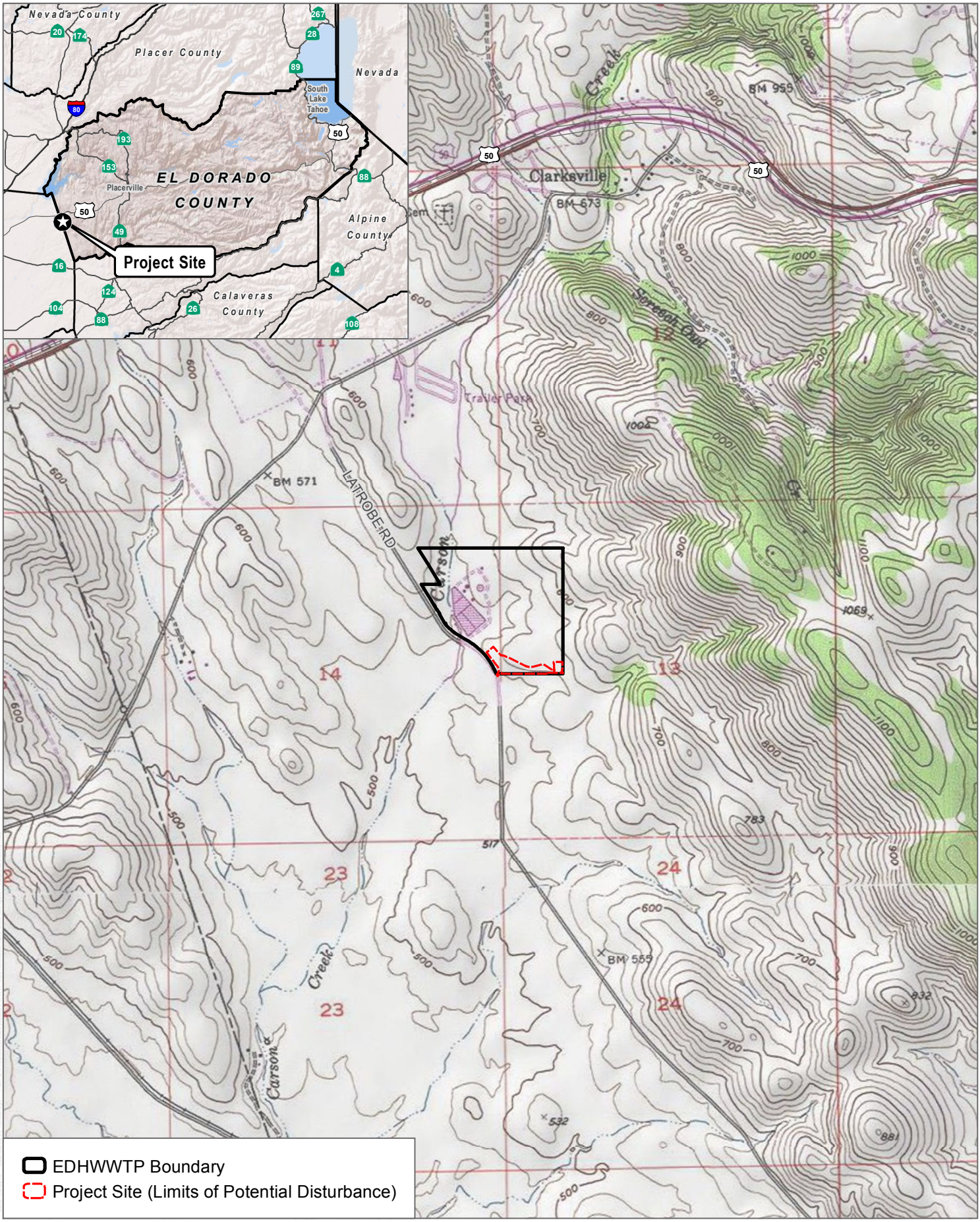
This acoustical assessment was conducted to predict potential noise impacts from El Dorado Irrigation District's (EID) proposed Wastewater Collections Operations Facility Relocation Project (project). The project site is located at the southern end of EID's existing El Dorado Hills wastewater treatment plant (EDHWWTP) at 4625 Latrobe Road in El Dorado County, California (Figure 1 – Project Location; Figure 2 – Project Site; Attachment A – Site Plan). The nearest noise sensitive receivers to the project site are existing residences located approximately 300 feet south of the project site; there are also residences located to the east of the site, but these latter residences are no closer than 350 feet from the project site and are also located on the opposite side of Blackstone Parkway. The predicted noise impacts from operations of trucks, generator testing, and other mechanical equipment at the closest sensitive receptors (i.e., residences to the south of the project site) are the focus of this noise assessment.

It is expected that relocation of EID staff and activities from the Bass Lake Wastewater Operations facility to the EDHWWTP site would not generate substantial new vehicle traffic on Latrobe Road and other vicinity roadways. Therefore, no modeling of existing or future roadway noise levels was conducted. In summary, this analysis shows that all potential noise impacts related to the project would be less than significant.

Following a brief presentation of acoustical concepts used to frame the analysis and discussion of potential noise impacts attributed to the proposed project, the remainder of this document details support for these findings.

NOISE TERMINOLOGY

Vibrations, traveling as waves through air from a source, exert a force perceived by the human ear as sound. Sound pressure level (referred to as sound level) is measured on a logarithmic scale in decibels (dB) that represent the fluctuation of air pressure above and below atmospheric pressure. Frequency, or pitch, is a physical characteristic of sound and is expressed in units of cycles per second or hertz (Hz). The normal frequency range of hearing for most people extends from about 20 to 20,000 Hz. The human ear is more sensitive to middle and high frequencies, especially when the noise levels are lower. The frequency weighting system called the "A" weighting is typically used to assess noise levels. The A-weighting network de-emphasizes the low frequency components of the sound in a manner similar to the response of a human ear (refer to Attachment B for definitions of acoustical terms).



SOURCE: USGS 7.5-Minute Series Clarksville Quadrangle
Township 9N; Range 8E; Sections 13, 14

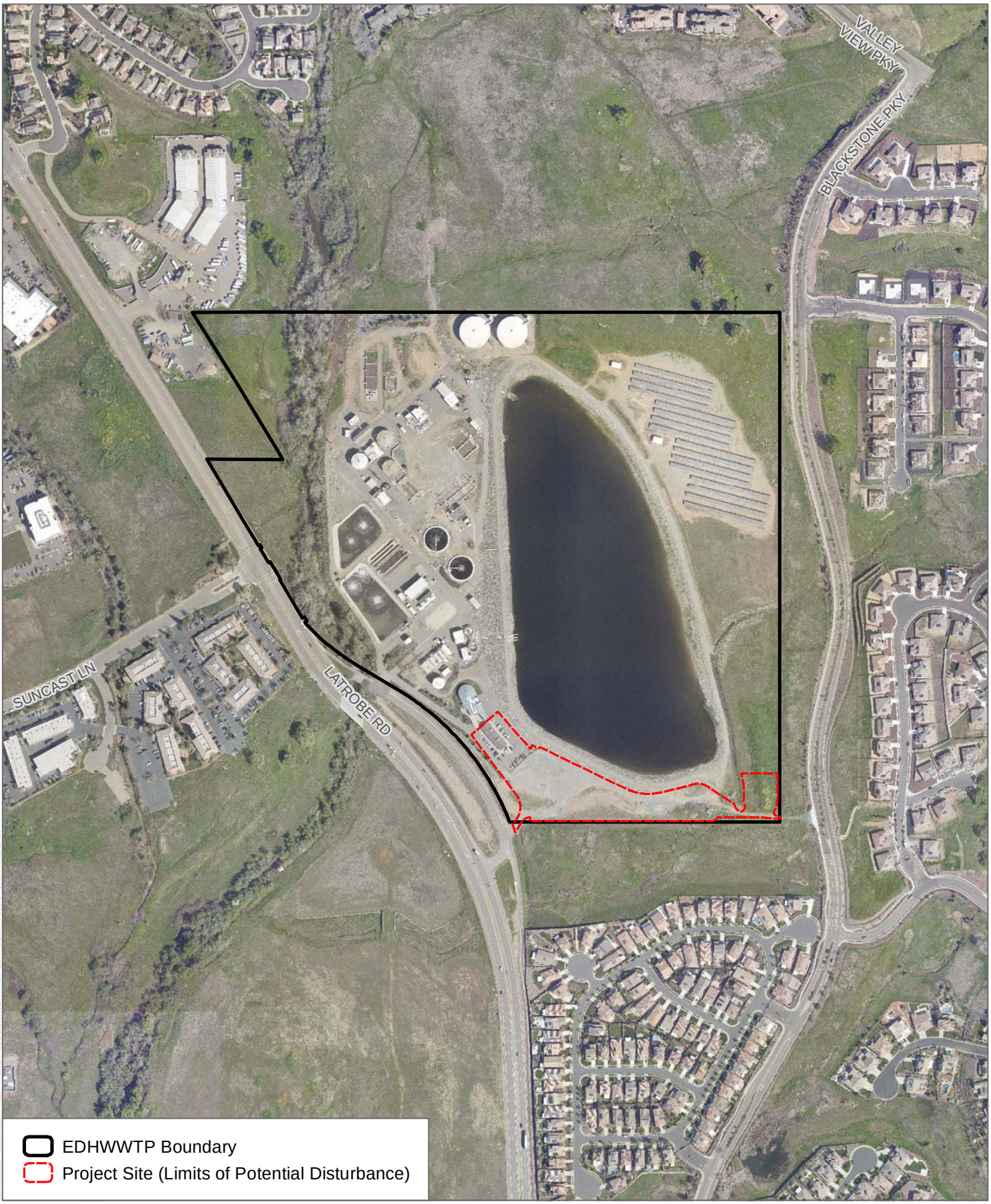
DUDEK

0 1,000 2,000 Feet

FIGURE 1

Project Location

Water Quality Creation Facility Relocation



SOURCE: Bing 2019, El Dorado County 2018

DUDEK

0 250 500 Feet

FIGURE 2

Project Site

Wastewater Treatment Plant Operations Facility Relocation

Since sound is measured on a logarithmic scale, a doubling of sound energy results in a 3 dBA (A-weighted decibels) increase in the noise level. "It is generally accepted that the average healthy ear… can barely perceive a noise level change of 3 dBA" (Caltrans 2013). A 5 dBA increase is readily noticeable. The human ear perceives a 10 dBA increase in sound level as a doubling of the sound level (i.e., 65 dBA sounds twice as loud as 55 dBA to a human ear).

The equivalent noise level (L_{eq}) is a single-number value representing the fluctuating sound level (dBA) over a specified period of time. The L_{eq} is the sound-energy average of the fluctuating level during the reference period, and is equal to the energy level from a constant unchanging sound of the same dBA level.

Community noise levels are generally higher during the daytime and early evening when traffic, commercial operations, and industrial activities are usually at their greatest magnitude or intensity. However, noise sources experienced during nighttime hours when background levels are generally lower can be potentially more irritating to the receiver, especially if those noise levels disturb sleep. In order to evaluate noise in a way that considers periodic fluctuations experienced throughout the day and night and highlight the potential for increased receptor sensitivity at night, a concept termed "community noise equivalent level" (CNEL) was developed. The CNEL scale represents a time-weighted 24-hour average noise level based on the A-weighted sound level. CNEL accounts for the increased noise sensitivity during the evening hours (7 p.m. to 10 p.m.) and nighttime hours (10 p.m. to 7 a.m.) by adding 5 dB to the average sound levels occurring during the evening hours and 10 dB to the sound levels occurring during nighttime hours.

BACKGROUND

The existing EDHWWTP at the project site processes wastewater on a continuous basis 24 hours per day, 7 days per week. Thus, noise from pumps and process equipment associated with the treatment plant is currently occurring throughout the day and night. The current plant is regularly staffed during daytime hours, 7 am to 5 pm; however, because of the uninterrupted nature of the wastewater flow, plant staff responds to abnormal conditions or emergency situations at any hour.

PROJECT DESCRIPTION

The District is proposing to relocate wastewater collections operations and maintenance staff (20 employees), as well as equipment and materials, from their Bass Lake site to the EDHWWTP site in El Dorado Hills. The relocated operations and associated staff would result in no change in the hours of operation of the existing EDHWWTP facility, and employees would typically arrive at 7 a.m. and depart around 5 p.m. Improvements are proposed to the EDHWWTP site to accommodate relocating District facilities, and are expected to include remodeling and upgrading existing facilities and structures, constructing new buildings, surfacing access, parking and equipment areas, and access improvements (Attachment A). All improvements would be in the southern portion of the EDHWWTP property within assessor's parcel number 118-020-10. Additional details regarding project components and operations are provided below.

Vehicles and Parking

Approximately 20 additional EID field vehicles would be operated out of the EDHWWTP daily each weekday with implementation of the Proposed Project. Field vehicles would typically leave the facility between 8:00 – 9:00 a.m. and return between 3:00 – 4:00 p.m. in the afternoon. The Proposed Project includes several parking areas to serve different uses within the expanded operations area. On-site parking would include 22 standard parking stalls for employees and 58 oversized stalls for large trucks, trailer-mounted equipment or other large vehicles. All parking stalls would be striped within areas surfaced with asphalt paving.

On-Site Operations and Activities

Additional operations carried out onsite with the proposed project would include office activities, vehicle and equipment operation and maintenance, and materials loading and unloading. Vehicles and equipment operated onsite would include light-duty cars and trucks, industrial trucks and tractor-trailers, heavy equipment, trailer-mounted generators and pumps, and other similar equipment used in EID's operations activities. Employee vehicle access to the Project Site would be from the frontage road at the northern entrance or more directly by the southwest entrance to the site. Heavy equipment and trucks would only access the site via the southwest entrance; gates at both access points would control access to the facility. A California Legal 65-foot capable truck turnaround would be provided at the east end of the paved area. Various outside venders to deliver materials, etc. 8 AM to 4 PM (M-F)

New Buildings and Site Improvements

The Proposed Project includes construction or installation of the following primary components as shown in the attached project site plan (Attachment A):

1) Remodeling an existing 3,584 sq. ft. building by adding an additional 1,500 sq. ft. of office space, utility space, locker room, and laboratory drop off and pick up area to accommodate wastewater collections staff;

2) Construction of a new 4,000 sq. ft. metal storage building, two 800 sq. ft. material storage sheds, and one 1,824 sq. ft. ultra-block wall containing five material storage bays;

3) Installation of a 1,000 gallon diesel vehicle and equipment fueling station;

4) Resurfacing of areas for onsite vehicle circulation and parking;

5) Improving the existing entrances at the southwest corner and southeast corner of the property for access; and,

6) Developing areas for materials and equipment storage to support wastewater collections operations activities. Operations materials would be contained within a concrete ultra-block structure containing five material storage bays used to store aggregate base, crushed rock, and sand.

NOISE SIGNIFICANCE CRITERIA

The El Dorado County Code of Ordinances includes Chapter 9.16, Noise. While making it "unlawful for any person to produce or emit any loud or raucous noise" (El Dorado County 2016), the County Code addresses un-muffled engines, saying that it is "unlawful for any person to operate an internal combustion engine in the unincorporated territory of the County that is not equipped with a muffler designed for use with the engine, which is in good operating condition and is not equipped with a cutout, bypass or similar device" (El Dorado County 2016).

The Public Health, Safety, and Noise Element of the El Dorado County General Plan includes objectives, goals, and policies related to acceptable noise levels (El Dorado County 2015). The Noise Element states that noise-sensitive developments include hospitals, schools, churches, and residential areas. These relevant policies are listed in the Element:

> **Policy 6.5.1.2** Where proposed non-residential land uses are likely to produce noise levels exceeding the performance standards of Table 6-2 [Table 1 in this report] at existing or planned noise-sensitive uses, an acoustical analysis shall be required as part of the environmental review process so that noise mitigation may be included in the project design.

Table 1
Noise Level Performance Protection Standards for Noise Sensitive Land Uses Affected by Non-Transportation Sources* [Table 6-2 in Noise Element]

	Daytime 7 a.m.–7 p.m.		Evening 7 p.m.–10 p.m.		Night 10 p.m.–7 a.m.	
Noise Level Descriptor	*Community*	*Rural*	*Community*	*Rural*	*Community*	*Rural*
Hourly Leq, dB	55	50	50	45	45	40
Maximum level (Lmax), dB	70	60	60	55	55	50

Notes:
Each of the noise levels specified above shall be lowered by 5 dB for simple tone noises, noises consisting primarily of speech or music, or for recurring impulsive noises. These noise level standards do not apply to residential units established in conjunction with industrial or commercial uses (e.g., caretaker dwellings).
The County can impose noise level standards which are up to 5 dB less than those specified above based upon determination of existing low ambient noise levels in the vicinity of the project site.
In Community areas the exterior noise level standard shall be applied to the property line of the receiving property. In Rural Areas the exterior noise level standard shall be applied at a point 100 feet away from the residence. The above standards shall be measured only on property containing a noise sensitive land use as defined in Objective 6.5.1. This measurement standard may be amended to provide for measurement at the boundary of a recorded noise easement between all effected property owners and approved by the County.

* For the purposes of the Noise Element, transportation noise sources are defined as traffic on public roadways, railroad line operations, and aircraft in flight. Control of noise from these sources is preempted by federal and state regulations. Control of noise from facilities of regulated public facilities is preempted by California Public Utilities Commission regulations. All other noise sources are subject to local regulations. Non-transportation noise sources may include industrial operations, outdoor recreation facilities, HVAC units, schools, hospitals, commercial land uses, other outdoor land use, etc.

Policy 6.5.1.3 Where noise mitigation measures are required to achieve the standards of Tables 6-1 and 6-2 [Tables 2 and 1, respectively, in this report], the emphasis of such measures shall be placed upon site planning and project design. The use of noise barriers shall be considered a means of achieving the noise standards only after all other practical design-related noise mitigations measures have been integrated into the project and the noise barriers are not incompatible with the surroundings.

Table 2
Maximum Allowable Noise Exposure for Transportation Noise Sources [Table 6-1 in Noise Element]

Land Use	Outdoor Activity Areas[1] Ldn/CNEL, dB	Interior Spaces	
		Ldn/CNEL, dB	*Ldn, dB[2]*
Residential	60[3]	45	—
Transient lodging	60[3]	45	—
Hospitals, nursing homes	60[3]	45	—
Theaters, auditoriums, music halls	—	—	35
Churches, meeting halls, schools	60[3]	—	40
Office buildings	—	—	45
Libraries, museums	—	—	45
Playgrounds, neighborhood parks	70	—	—

Notes:
1 In Communities and Rural Centers, where the location of outdoor activity areas is not clearly defined, the exterior noise level standard shall be applied to the property line of the receiving land use. For residential uses with front yards facing the identified noise source, an exterior noise level criterion of 65 dB L_{dn} shall be applied at the building facade, in addition to a 60 dB L_{dn} criterion at the outdoor activity area. In Rural Regions, an exterior noise level criterion of 60 dB L_{dn} shall be applied at a 100-foot radius from the residence unless it is within Platted Lands where the underlying land use designation is consistent with Community Region densities, in which case the 65 dB L_{dn} may apply. The 100-foot radius applies to properties that are 5 acres and larger; the balance will fall under the property line requirement.
2 As determined for a typical worst-case hour during periods of use.
3 Where it is not possible to reduce noise in outdoor activity areas to 60 dB L_{dn}/CNEL or less using a practical application of the best-available noise reduction measures, an exterior noise level of up to 65 dB L_{dn}/CNEL may be allowed provided that available exterior noise level reduction measures have been implemented and interior noise levels are in compliance with this table.

Policy 6.5.1.7 Noise created by new proposed non-transportation noise sources shall be mitigated so as not to exceed the noise level standards of Table 6-2 [Tables 1 in this report] for noise-sensitive uses.

Policy 6.5.1.11 The standards outlined in [Additional] Tables [included in the Noise Element] shall not apply to those activities associated with actual construction of a project as long as such construction occurs between the hours of 7 a.m. and 7 p.m., Monday through Friday and 8 a.m. and 5 p.m. on weekends, and on federally-recognized holidays.

Policy 6.5.1.13 When determining the significance of impacts and appropriate mitigation to reduce those impacts for new development projects, including ministerial development, the following criteria shall be taken into consideration:

A. In areas which ambient noise levels are in accordance with the standards in Table 6-2 [Table 1 of this report], increases in ambient noise levels caused by new nontransportaiton noise sources that exceed 5 dBA shall be considered significant; and

B. In areas in which ambient noise levels are not in accordance with the standards in Table 6-2, increases in ambient noise levels caused by new nontransportation noise sources that exceed 3 dBA shall be considered significant.

The El Dorado County Code of Ordinances includes Chapter 9.16, Noise, which provides a subjective means of maintaining the ambient noise environment within the County. Section 130.37 of the Zoning Ordinance reiterates the standards and thresholds that are contained within the El Dorado County General Plan, Public Health, Safety and Noise Element.

Based on the criteria identified in Appendix G of the California Environmental Quality Act (CEQA) Guidelines, the proposed project would have a significant impact on noise if it would result in:

1. Result in 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
2. Result in the generation of excessive groundborne vibration or groundborne noise levels.
3. 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, expose people residing or working in the project area to excessive noise levels.

With respect to significance criterion #1, and based upon the above information, a significant impact could occur if the project produces noise levels that exceed the performance standards listed in Table 1 at noise-sensitive receptors. This threshold is further refined after analysis of the existing conditions because some existing residential receivers have measured noise levels that already exceed the performance standards. Moreover, a significant impact could occur if the predicted project operational noise levels are calculated to exceed existing ambient noise levels greater than the criteria outlined in Policy 6.5.1.13 of the El Dorado County Public Health, Safety and Noise Element.

With respect to significance criterion #2, the project would not have the potential to generate long-term groundborne vibration or noise. Ground vibrations from construction activities do not often reach the levels that can damage structures or affect activities that are not vibration-sensitive, although the vibrations may be felt by nearby persons in close proximity and result in annoyance (FTA 2006). As a guide, major construction activity within 200 feet and pile driving within 600 feet may be potentially disruptive to vibration sensitive operations (Caltrans 2002). The project construction activities would not include pile driving. In addition, there are no vibration sensitive structures or land uses located within 200 feet of the project. Consequently, groundborne vibration impacts would be less than significant, and this issue is not discussed further.

With respect to significance criterion #3, the project site is not located within 2 miles of an airport; the closest airport is Cameron Airpark, approximately 5 miles northeast of the project site. Therefore, people accessing the project site would not be exposed to elevated noise levels from aircraft operation and airport noise impacts are not addressed further in the analysis.

EXISTING CONDITIONS

Transportation activities, including vehicular traffic on the local and regional roadway network, and aircraft overflights are the principal sources of noise that influence the outdoor ambient noise environment in the Project vicinity. In order to evaluate existing noise levels in the Project area, ambient sound pressure measurements were conducted. The ambient noise levels survey will also be used as a baseline for noise increases and to assess the applicability of the performance standards.

Ambient Noise Monitoring

Six (6) noise level measurements were conducted to assess current ambient conditions in the Project area. Two (2) short-term measurements were conducted on-site and two (2) long-term measurements were conducted near the residential area to the south of the site and two (2) long-term measurements near the residential area to the east of the site. Figure 3 shows the measurement locations.

The short-term measurements were conducted on October 18, 2018. The measurements were made using a calibrated Rion NL-62 sound level meter. The sound level meter meets the current American National Standards Institute standard for a Type 1 precision sound level meter. The sound level meter was positioned at a height of approximately 5 feet above the ground on a tripod during measurements. Table 3 shows the average noise levels measured during the short-term monitoring periods along with details of the measurements.

Table 3
Measured Average Sound Levels

Site	Location/Noise Sources	Date/Time	Leq[1] (dBA)
ST1	Western portion of the project site. Traffic, Birds, Aircraft	10/18/2018 12:12 p.m. to 12:18 p.m.	57
ST2	Eastern portion of the project site. Distant Traffic, Birds, Aircraft, Distant Conversation, People Yelling, Distant Dog Barking	10/18/2018 12:31 p.m.to 12:37 p.m.	50

Notes:
[1] Equivalent continuous sound level (time-averaged, A-weighted sound pressure level)
Field survey meteorological conditions: temperature = 64 degrees Fahrenheit; clear sky; 2-mile-per-hour wind.

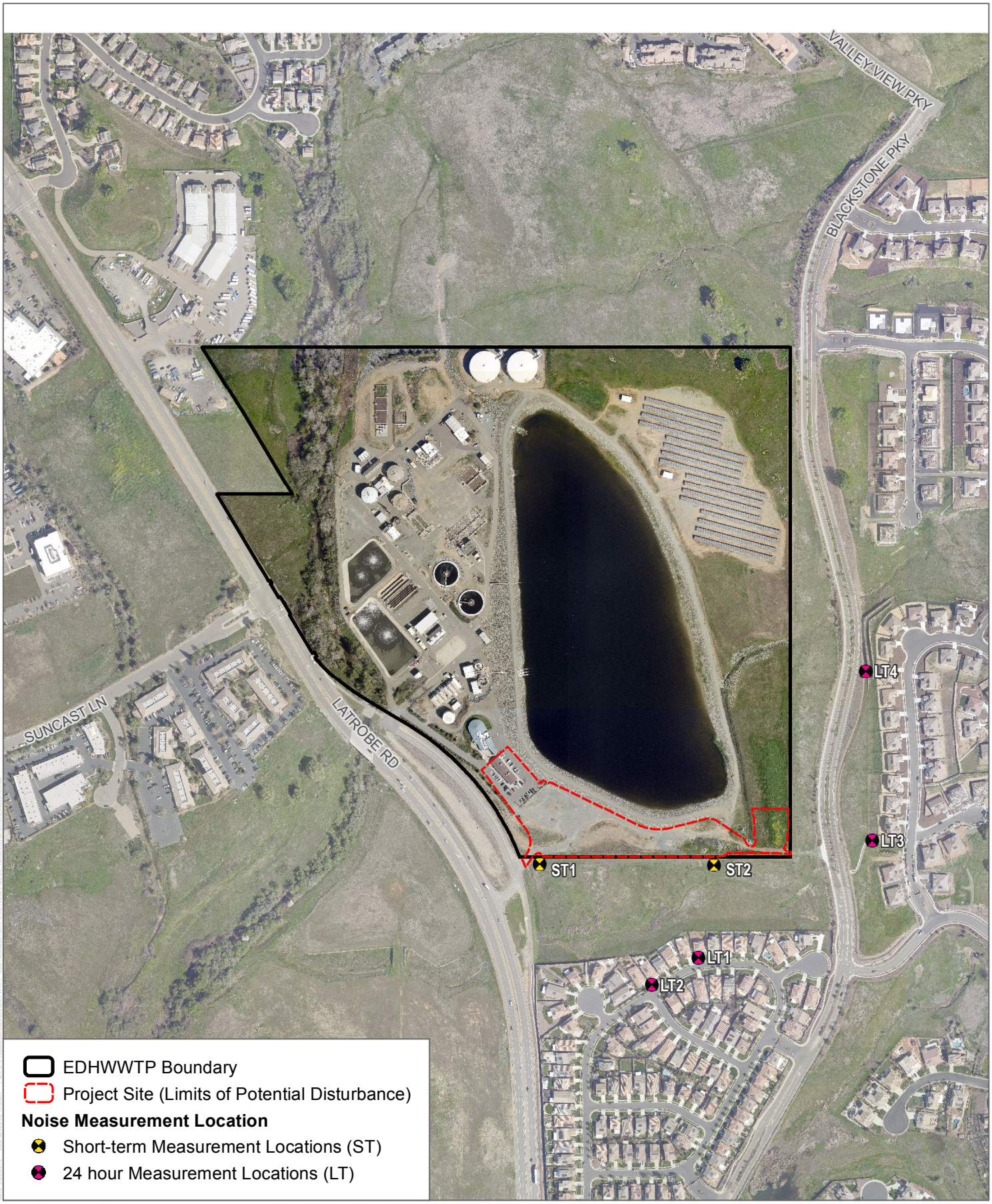
The long-term measurements were conducted on December 2nd-to 4th 2018 and May 15-16th 2019. The long-term noise measurements were taken with calibrated SoftdB Piccolo Sound Level Meters. The sound level meter meets the current American National Standards Institute (ANSI) standard for a Type 2 sound level meter. The sound level meter was positioned at a height of approximately 5 feet above the ground during the long-term noise measurements. Table 4 shows the results of the long-term ambient noise measurements. The results are divided into Daytime, Evening, and Night hours with both Leq and Lmax presented.

Table 4
Measured Average Noise Level Near Southern Residential Properties

Noise Level Descriptor	Daytime 7 a.m.–7 p.m.				Evening 7 p.m.–10 p.m.				Night 10 p.m.–7 a.m.			
	LT1	*LT2*	*LT3*	*LT4*	*LT1*	*LT2*	*LT3*	*LT4*	*LT1*	*LT2*	*LT3*	*LT4*
Hourly L_{eq}, dBA	51	55	56	47	48	53	52	45	45	45	45	40
Maximum Level, dBA	68	72	75	73	66	53	69	62	45	65	72	66

Existing measured levels near the property boundary of the residences to the show existing daytime sound levels ranging from approximately 51 to 55 dBA. Existing evening hourly Leq ranged from approximately 48 to 53 dBA; with existing nighttime hourly Leq ranging from approximately 40 to 45 dBA at nearby residential property boundaries. The existing noise levels illustrated through the ambient monitoring survey are representative of a noise environment driven primarily by their relative exposure to transportation noise sources in the vicinity.

As the Project site and the residential developments in the vicinity are within the El Dorado Hills Community Region (El Dorado County 2019), the nearby receptors are considered "Community". Therefore, Hourly L_{eq} Performance Standards for daytime, evening, and nighttime are 55 dBA, 50 dBA, and 45 dBA, respectively. The existing sound levels documented during the monitoring survey were found to exceed the El Dorado County performance standards at monitoring sites LT-1, LT-2 and LT-3. Therefore, for the purpose of this analysis, the criteria established through Policy 6.5.1.13.B (increase in ambient noise level of 3 dB) will be applied as the refined threshold of significance for the operational noise impacts due to the project.



SOURCE: Bing 2019; El Dorado County 2013

DUDEK

0 250 500 Feet

FIGURE 3

Noise Measurement Locations

Wastewater Treatment Operations Facility Relocation

NOISE IMPACT ANALYSIS

Following the analyses follow the criteria identified in Appendix G of the California Environmental Quality Act (CEQA) Guidelines recounted earlier in this memorandum.

1. Result in 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.

The proposed project would generate short-term noise during construction, and long-term noise during operation. Operational noise from the proposed project would be produced by new mechanical equipment and new on-site activities.

CONSTRUCTION

Construction noise levels in the project vicinity would fluctuate depending on the particular type, number, and duration of usage for the various pieces of equipment. The effects of construction noise depend largely on the types of construction activities occurring on any given day, noise levels generated by those activities, distances to noise-sensitive receptors, and the existing ambient noise environment in the vicinity of the receiver.

Construction of the proposed Project is estimated to take approximately 12-months to complete. Construction hours would be between the hours of 7 a.m. and 7 p.m., Monday through Friday and 8 a.m. and 5 p.m. on weekends, and halt during federally recognized holidays. Project construction is anticipated to include a grader, excavator and mini excavator, backhoe, wheeled loader and skip loader, bulldozer, and a water truck (which generates similar noise as a dump truck).

The Federal Transit Administration has compiled data regarding the noise-generating characteristics of specific types of construction equipment. The typical noise levels for various pieces of construction equipment at a distance of 50 feet are presented in Table 5. The noise values represent maximum noise generation, or full-power operation of the equipment. Equipment typically operate in alternating cycles of full power and low power, thus producing noise levels less than the maximum level, which are characterized through the “acoustical usage factors” for the type of equipment. Based on the reference noise levels, usage rates, fleet mixes and operational characteristics discussed above, overall hourly average noise levels attributable to construction activities is calculated.

Table 5
Construction Equipment Noise Emission Levels

Equipment Description	Impact Device?	Acoustical Use Factor (%)	Measured L_{max} @50ft (dBA, slow)
Auger Drill Rig	No	20	84
Backhoe	No	40	78
Compactor (ground)	No	20	83
Compressor (air)	No	40	78
Dozer	No	40	82
Dump Truck	No	40	76
Excavator	No	40	81
Flat Bed Truck	No	40	74
Front End Loader	No	40	79
Generator	No	50	81
Generator (<25KVA, VMS signs)	No	50	73
Grader	No	40	-- N/A – (85 dBA spec)
Man Lift	No	20	75
Pavement Scarafier	No	20	90
Paver	No	50	77
Pickup Truck	No	40	75
Pneumatic Tools	No	50	85
Pumps	No	50	81
Roller	No	20	80
Scraper	No	40	84
Tractor	No	40	-- N/A – (84 dBA spec)

Source: FTA 2006.

In addition to reduced noise exposure levels resulting from the operational characteristics of the construction equipment, noise levels from construction operations decrease at a rate of approximately 6 dBA per doubling of distance from the source. The residential buildings to the south are located at least 300 feet from the closest boundary of the construction area. At this distance the noise levels presented in Table 5 would be reduced by at least 15 dB. Residences to the east are located no closer than 350 feet from the closest boundary of the constriction area, resulting in a reduction of at least 17 dB below the values represented in Table 5.

Furthermore, Section 130.37.020 of the El Dorado County Zoning Ordinance provides an exemption for construction performed during daylight hours, provided that all construction equipment are fitted with factory installed muffling devices and maintained in good working order (El Dorado County 2019). The project proposed construction schedule would comply with these limited construction work hours. Thus, the project would produce a less than significant construction noise impact based on the exemption in the Noise Element Policies and El Dorado County Code of Ordinances.

OPERATIONS

Operation of the proposed project would include operations of trucks, generator testing, and other mechanical equipment. These noise sources are analyzed in the following subsections. As indicated under **Background** (see above), the existing EDHWWTP is operational 24-hours a day, 7 days a week. The site is only staffed from 7 a.m. to 5 p.m. daily, but employees respond as necessary during abnormal or emergency conditions at the WWTP that could occur in the overnight period. The consolidation of operations and maintenance staff to the project site, and the introduction of EID maintenance activities

to the site would generally not entail noise-generating functions in the overnight period. Generator testing would be performed only during the daytime; routine operation of vehicles would be associated almost exclusively with daytime employees; and, handling of materials and use of equipment on-site would also occur during the daytime when staff are present, except in a rare case where an off-site collection line emergency required crew to retrieve equipment and materials from the site during an overnight period.

MAINTENANCE BUILDING

The proposed new maintenance building will measure 50' x 80' and have a metal skin exterior. The maintenance building is proposed to be located in the northwestern portion of the project site. Roll-up doors are intended on the short sides of the structure, facing southwest and northeast. The nearest noise-sensitive receptor to the maintenance building is located approximately 300-feet from the project boundary and 515-feet to the south of the maintenance building; residences to the east of the site are located approximately 350-feet from the project boundary and 1,175-feet from the proposed maintenance building. If the roll-up doors are expected to be open during the day, for vehicle ingress/egress and ventilation purposes, then anticipated noises from the interior could be emitted through the opening with only partial shielding and include the following:

- *Vehicle engine idling* (84 dBA Lmax at 50 feet[1], for some average aggregate portion of an hour [e.g., 5% or as allowed by CA air pollution standards]); and,
- *Pneumatic tool operation* (including intermittent noises but at a minimum represented by an operating air compressor [76 dBA Leq at 50 feet, based on 80 dBA Lmax and 40% acoustical usage factor [AUF] per FWHA RCNM).

Based upon the distance between maintenance building and the closest residential receiver at 515-feet (to the south of the project site), maximum noise levels from the maintenance building would attenuate to 58 dBA Lmax; average noise levels generated by the equipment are calculated to be approximately 51 dBA Leq. At the closest residence to the east, approximately 1,175-feet from the maintenance building, the maximum sound level from the maintenance activities would approximately 49 dBA Lmax, with average noise levels of approximately 42 dBA Leq during operation. Per Table 1, the predicted noise levels from the activities within the maintenance building would not exceed the daytime community noise level standards of 70 dBA Lmax and 55 dBA Leq. Furthermore, this expected maintenance building operational noise levels are predicted to be less than the measured existing ambient noise levels at the closest residences and would not result in an increase in the ambient noise levels. As such, maintenance building operations would not exceed the local standards at the nearest noise-sensitive receptors. Additionally, activities in the maintenance building are expected to occur only during daytime hours, with the exception of response to rare emergency conditions which may occur in the overnight period.

If the roll-up doors are anticipated to be typically closed, then these above interior noises would be attenuated; however, the remaining need for building ventilation would suggest that an exhaust fan would be operating on the roof. In such a scenario, one could assume an exhaust fan noise emission level

[1] FHWA-HEP-10-025

of 76 dBA at a distance of 5 feet[2]. Alternatively, were the building to feature air conditioning during the summer, operation of a 3-ton (of refrigeration) packaged air handler would be assumed to emit 75 dBA Leq at a distance of one meter[3]. At 515-feet (i.e., the closest residence to the south), the sound level produced by the ventilation system would be reduced to approximately 31 dBA Leq, and thus the noise from this mechanical equipment would be less than even the overnight standards (i.e., 40 dBA Leq) and less than the existing measured ambient levels (i.e., 45 Leq) . At 1,175-feet (i.e., the closest residence to the east), the sound level from the ventilation system would be reduced to approximately 24 dBA Leq, which is also lower than both the overnight standard and the night-time ambient noise level. Consequently, even if the maintenance building is cooled overnight, the resulting noise levels at the nearest residences would comply with standards and would be below ambient levels.

FUEL STATION

Sound level data for a typical fuel dispenser (e.g., Gilbarco) is not readily apparent, so it is assumed the noise emission is no louder than that of a "pump" per FHWA RCNM. Assuming a truck fill up takes up to 3 minutes in a given hour, the estimated hourly noise level of the pump is 52 dBA Leq at 50 feet. At 300 feet, this pump noise level would be reduced to 36 dBA L_{eq} while at 350 feet it would be reduced to 34 dBA Leq. This expected pump noise level at the nearest noise sensitive land uses would be below the 55 dBA hourly Leq daytime threshold shown in Table 1, and it would also below the existing measured daytime hourly ambient noise levels of 47 to 56 dBA Leq shown on Table 4. Equipment fueling during daytime hours, at the end of a regular shift, is standard operational procedure to ensure vehicles would be ready for use the next shift or during emergency operations. Consequently, use of the fueling station would not occur in the overnight period. Thus, the pump noise is not expected to produce a significant noise impact.

ONSITE VEHICLE CIRCULATION

PARKING AREA

Assuming half of the 45 proposed new 9'x18' vehicle parking stalls would, on average, see activity during each hour of two 2-hour long "peak" onsite employee traffic periods associated with the project's daily start and close of operations, the hourly noise level could be estimated as 40 dBA Leq at 50 feet using a reference sound exposure level (SEL) of 92 dBA (per FTA's *Transit Noise and Vibration Impact Assessment* guidance manual Table 5.5) and accounting for the vehicle volume (per same FTA guidance, Table 5.6). At 300 feet where the nearest noise sensitive land uses are located (to the south), the level would be reduced further to approximately 25 dBA L_{eq} while at 350 feet (the closest residence to the east) this sound level would be reduced to 23 dBA Leq. This expected parking lot noise level is below the performance standards in Table 1 and the measured existing ambient noise levels shown on Table 4, even during the most restrictive overnight period (i.e., 10 p.m. to 7 a.m.). Thus, while vehicles are not expected to routinely

2 http://cookselect.lorencook.com/Reports/DetailsReport.aspx?file=31ae00b0-9176-4321-bab8-d5c06705fa79&modelTitle=225 ACRUB-HP
3 Based on overall sound power level of 83 dBA per https://www.trane.com/download/equipmentpdfs/rtprc006en_r6.pdf

arrive, depart, or maneuver in the parking lot areas in the overnight period, even during rare emergency response occurrences parking lot noise would not be expected to produce a significant impact.

TRUCK TURN-AROUND

The proposed truck turn-around should accommodate vehicle speed of no more than 10 miles per hour[4], which means one could apply the FHWA (Dec. 2011) reference level of 83 dBA at 50 feet for speeds less than 35 mph. Assuming a semi-trailer would use the turn-around no more than once per hour, the resulting hourly noise level would be 65 dBA Leq at 50 feet. At 300 feet, the truck turn-around noise would be reduced to about 50 dBA Leq and at 350 feet this sound level would be reduced to approximately 48 dBA Leq. This expected truck turn-around noise level is below the daytime performance standards in Table 1 and the measured existing daytime ambient noise levels shown on Table 4. Semi-truck operations, primarily for delivery of maintenance materials or movement of EID maintenance equipment to/from field locations, would occur during daytime hours, with only rare occurrences overnight associated with emergency response activities. Thus, on-site truck turn-around noise would not be expected to produce a significant impact.

PORTABLE GENERATORS

Project information suggests up to four (4) portable generators (from the existing Bass Lake facility) would get tested every 30 days for 5-10 minutes (per John Chavers 10/10/18 12:48pst email). Assuming these are diesel generators with power capacities larger than 25 kVA, then the reference Lmax during testing could be 81 dBA at 50 feet per FHWA RCNM Table 1. Assuming a 16% AUF (to account for a 10-minute test within an hour), one arrives at an hourly Leq of 73 dBA at 50 feet for assessment purposes. Generator testing would only be carried out during daytime hours. For the purpose of this analysis, it is assumed that generator testing would occur with a (proposed) building or wall between the generator placement and the noise sensitive receptors, interrupting the direct line of sight. At the noise sensitive land uses approximately 300 feet away, and with a building or barrier blocking the line of sight, the generator testing noise would be reduced to about 53 dBA Leq. This expected generator noise level is below the daytime performance standard of 55 dBA hourly Leq in Table 1 and within 2 dB of the lower daytime measured existing ambient noise levels (LT1) shown on Table 4. At 350 feet, and assuming an intervening structure, the noise level would be reduced to 51 dBA Leq which is below the daytime standard of 55 dBA and also below the ambient noise level of 56 dBA Leq at the closest residence to the east. Thus, generator testing noise would not be expected to produce a significant impact.

BACK-UP ALARMS

When back-up alarms may be used onsite, reference sound pressure levels are anticipated to be 75 dBA at 50 feet (based on Federal Signal Model 252)[5]. The corresponding hourly Leq would depend on how often such an alarm may be used. Assuming the backup alarms would only need to operation about 5 minutes during each hour, the hourly noise from backup alarms would be approximately 53 dBA hourly Leq at 50 feet. "Smart" back-up alarms, such as a Federal Signal Model 253, are capable of producing

4 https://nacto.org/docs/usdg/design_vehicles_turning_radii_washburn.pdf
5 https://www.fedsig.com/product/252-vehicular-back-up-alarm

lower signal sound levels (down to 60 dBA at a distance of 50 feet)[6] if the surrounding ambient sound levels are sufficiently modest (down to 46-50 dBA). At the noise sensitive land uses approximately 300 feet away, the backup alarm noise would be reduced to about 38 dBA Leq and at residences located at 350 feet (closest residence to the east) the noise level would be reduced to 36 dBA Leq. Thus expected back-up alarm noise level is below even the overnight performance standard of 40 dBA hourly L_{eq} in Table 1 and less than overnight measured existing ambient noise levels shown on Table 4. Thus, backup alarm noise would not be expected to produce a significant impact, even if used during rare overnight emergency response activities.

OVERALL ON-SITE OPERATIONS

Based on the types of operational activities proposed for the Project and the nature of the sounds associated with the activities, and the distance from the proposed Project activities to the nearby noise-sensitive receptors, overall operational noise level generated by the proposed project are anticipated to be below the El Dorado County noise standards.

2. The exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels.

Vibration during construction would be a temporary phenomenon. The primary response to ground-borne vibration is annoyance; however, in extreme cases, vibration can cause damage to buildings, particularly those that are old or otherwise fragile. Some common sources of ground-borne vibration are trains, and construction activities such as blasting, pile-driving, and heavy earth-moving equipment. The primary source of ground-borne vibration occurring as part of the proposed project would be short-term construction activity.

Groundborne vibration information related to construction activities has been collected by Caltrans (2013). Information from Caltrans indicates that transient vibrations (such as construction activity) of approximately 0.035 inch per second (in/sec) peak particle velocity (PPV) may be characterized as barely perceptible, and vibration levels of 0.24 in/sec PPV may be characterized as distinctly perceptible by persons. Caltrans identifies a threshold for structural building damage, which typically occurs at vibration levels of 0.5 in/sec PPV or greater for buildings of reinforced-concrete, steel, or timber construction, or 0.2 in/sec PPV for typical residential construction.

The most relevant equipment to the proposed Project, and the vibration levels produced by such equipment, is illustrated in Table 2. Loaded trucks would produce the highest level of vibration for the proposed project (bulldozers and drill augers would not be employed).

6 http://www.federalsignaldistribution.com/audible/products/253.htm

Table 2
Vibration Velocities for Typical Construction Equipment

Equipment	PPV at 25 Feet (Inches Per Second)
Large Bulldozer	0.089
Loaded Trucks	0.076
Drill Rig / Auger	0.089
Jackhammer	0.035
Small Bulldozer	0.003

Source: Caltrans 2013(b).

As shown in Table 2, heavier pieces of construction equipment, such as bulldozers, would have PPVs of approximately 0.089 inches per second or less at a distance of 25 feet. Pile driving or blasting will not be used for construction of the proposed project. Per vibration propagation principles as summarized in guidance from Caltrans or FTA, groundborne vibration is typically attenuated substantially over short distances. Existing residential uses are located approximately 300 feet from the nearest construction area, at which distance, the expected vibration levels would attenuate to approximately 0.002 in/sec. PPV. Vibration levels at these receptors would be less than the Caltrans building damage threshold of 0.2 in/sec. PPV. and below the level considered barely perceptible to persons (0.035 in/sec PPV). Therefore, project-generated construction vibration levels should generally not be discernible to area residents. While some persons particularly sensitive to vibration may perceive some vibration episodes during certain construction activities, vibration levels would not be anticipated to reach annoyance levels for residents along the project alignment. Groundborne vibration would not be associated with the proposed project following construction activities. Impacts related to groundborne vibration would be less than significant.

REFERENCES

Caltrans (California Department of Transportation). 2002. *Transportation Related Earthborne Vibrations*. January 23, 2002.

Caltrans. 2013. *Technical Noise Supplement to the Traffic Noise Analysis Protocol: A Guide for Measuring, Modeling, and Abating Highway Operation and Construction Noise Impacts*. September 2013. Accessed November 2016. http://www.dot.ca.gov/hq/env/noise/pub/TeNS_Sept_2013B.pdf.

El Dorado County. 2019. "Public Health, Safety, and Noise Element." In *El Dorado County General Plan*. July 2004; amended 2019.

El Dorado County. 2019. El Dorado County Code of Ordinances, Chapter 9.16, Noise.

El Dorado County. 2015. El Dorado County General Plan, Figure LU-1 Land Use Diagram.

FTA (Federal Transit Administration). 2006. *Transit Noise and Vibration Impact Assessment*. FTA-VA-90-1003-06. Office of Planning and Environment. May 2006.

ATTACHMENT A

Preliminary Site Plan

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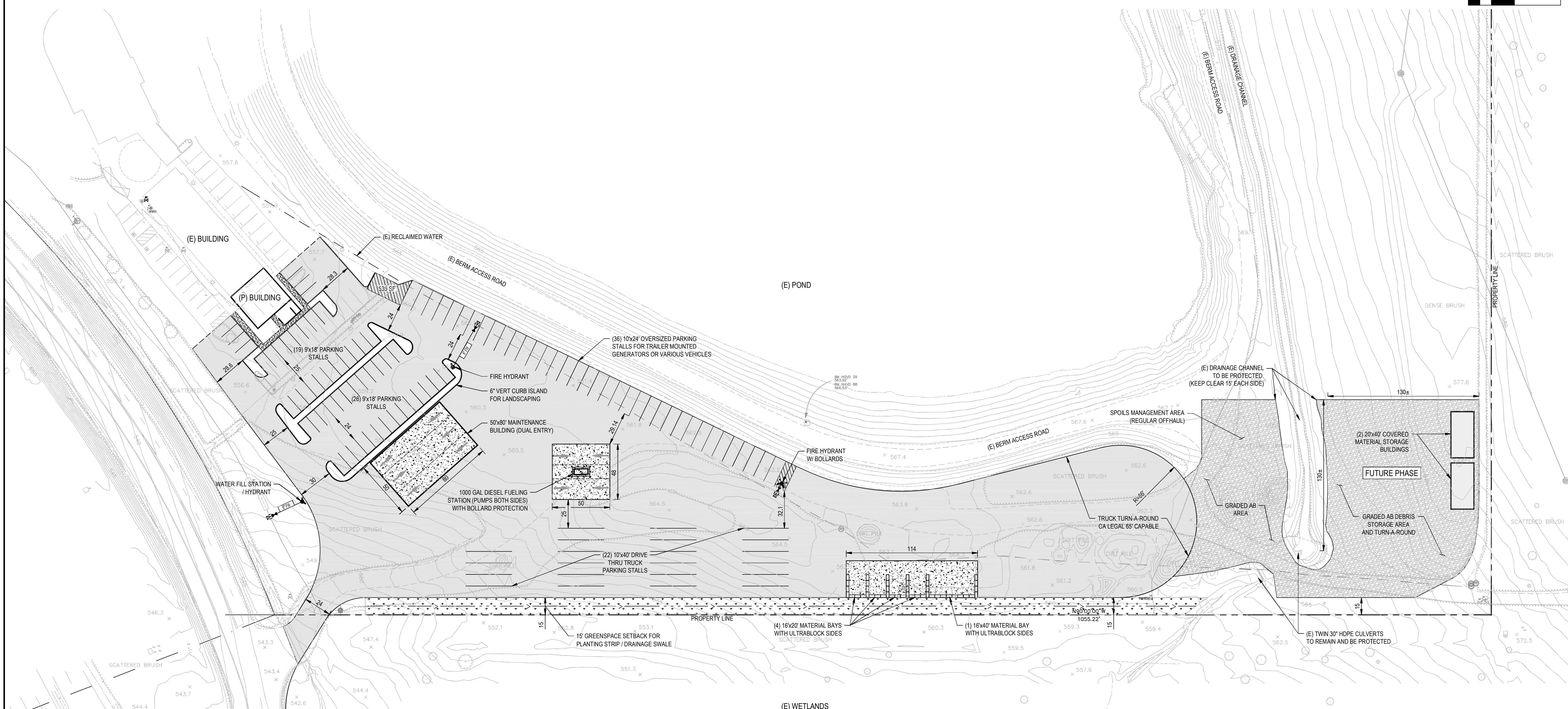
ATTACHMENT B


N
0 40' 80'
1"=40'
(E) BUILDING
(P) BUILDING
(E) RECLAIMED WATER
530 SF
(E) BERM ACCESS ROAD
(E) POND
(19) 9'x18' PARKING STALLS
(26) 9'x18' PARKING STALLS
(36) 10'x24' OVERSIZED PARKING STALLS FOR TRAILER MOUNTED GENERATORS OR VARIOUS VEHICLES
FIRE HYDRANT
6" VERT CURB ISLAND FOR LANDSCAPING
50'x80' MAINTENANCE BUILDING (DUAL ENTRY)
WATER FILL STATION / HYDRANT
1000 GAL DIESEL FUELING STATION (PUMPS BOTH SIDES) WITH BOLLARD PROTECTION
FIRE HYDRANT W/ BOLLARDS
(22) 10'x40' DRIVE THRU TRUCK PARKING STALLS
(E) BERM ACCESS ROAD
(E) DRAINAGE CHANNEL
(E) DRAINAGE CHANNEL TO BE PROTECTED (KEEP CLEAR 15' EACH SIDE)
SPOILS MANAGEMENT AREA (REGULAR OFFHAUL)
TRUCK TURN-A-ROUND CA LEGAL 65' CAPABLE
R=86'
GRADED AB AREA
130±
(2) 20'x40' COVERED MATERIAL STORAGE BUILDINGS
FUTURE PHASE
GRADED AB DEBRIS STORAGE AREA AND TURN-A-ROUND
PROPERTY LINE
DENSE BRUSH
SCATTERED BRUSH
114
PROPERTY LINE
15' GREENSPACE SETBACK FOR PLANTING STRIP / DRAINAGE SWALE
(4) 16'x20' MATERIAL BAYS WITH ULTRABLOCK SIDES
(1) 16'x40' MATERIAL BAY WITH ULTRABLOCK SIDES
1055.22'
(E) TWIN 30" HDPE CULVERTS TO REMAIN AND BE PROTECTED
(E) WETLANDS
(E) LATROBE ROAD

Legend

- (P) CLASS II AB (COMPACTED TO 95%)
- (P) AC / CLASS II AB (COMPACTED TO 95%)
- (P) CONCRETE / CLASS II AB (COMPACTED TO 95%)
- (P) PLANTING STRIP / DRAINAGE SWALE

General Notes

PARKING COUNT AS FOLLOWS:

- 9' x 18' (79)
- 10' x 24' (36)
- 10' x 40' (22)

NO.	DATE	REVISION	BY	APP'D

GHD

DRAWN BY: JSB
CHECKED BY: JSB / BWJ / DBJ
REVIEWED BY: BWJ / DBJ
SCALE: AS NOTED

EL DORADO IRRIGATION DISTRICT
2890 MOSQUITO ROAD - P. O. BOX 1047
PLACERVILLE, CALIFORNIA 95667

WASTE WATER COLLECTION FACILITY
RELOCATION IMPROVEMENTS

OPTION "B" REVISED

DATE: 09/10/2018
PROJECT NO: 11159165

1 OF 1

ATTACHMENT B

Acoustical Terms and Definitions

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Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
A-Weighted Sound Level (dBA)	The sound pressure level (SPL) in decibels as measured on a sound level meter (SLM) using the A-weighted filter network, which de-emphasizes the very low and very high frequency components of the measured sound in a manner similar to the frequency response of the average healthy human ear.
Day-night Sound Level (L_{dn})	The A-weighted equivalent continuous sound level over a 24-hour period with a 10 dB adjustment added to sound levels occurring during the nighttime hours (10 p.m. to 7 a.m.).
Decibel (dB)	The unit for expressing SPL and is equal to 10 times the logarithm (to the base 10) of the ratio of the measured sound pressure squared to a reference pressure, which is 20 micropascals.
Equivalent Sound Level ($L_{eq[xh]}$)	The value corresponding to a steady-state sound level containing the same total energy as a time-varying signal over a given sample period. The L_{eq} may feature notation in its subscript indicating the time period (e.g., eight hours as “8h” to populate “[Xh]”) of energy averaging.
Maximum Sound Level (L_{max})	The highest value measured by an SLM over a given sample period, based on a time-weighted sound level in dB using a “fast” or “slow” time constant.
Statistical Sound Level (L_{XX})	The SPL exceeded a cumulative XX percent (%) of the measured time period. By way of example, L_{50} is also referred to as a “median” sound level. The L_{90} value is often considered akin to a “background” sound level of indistinct contribution to the outdoor sound environment or an approximation of continuous or steady-state sources of noise such as mechanical equipment.
Peak Particle Velocity (PPV)	The maximum instantaneous positive or negative peak of a vibration wave. (In this document, a PPV descriptor with units of mm/sec or in/sec is used to evaluate construction-generated vibration for building damage risk and human annoyance.
Vibration Velocity Decibel (VdB)	Ten times the common logarithm of the ratio of the square of the amplitude of the RMS vibration velocity to the square of the amplitude of the reference RMS vibration velocity. The reference velocity in the United States is one micro-inch per second.