City Of Merced Wastewater Collection System Master Plan

DRAFT ENVIRONMENTAL IMPACT REPORT

CHAPTER 3.11 NOISE AND VIBRATION
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3.11 NOISE AND VIBRATION

3.11.1 Basis for Analysis

The California Environmental Quality Act (CEQA) Guidelines' Appendix G Environmental Checklist was used during the Notice of Preparation (NOP) scoping process (included in Appendix A) to identify the Program components that have the potential to cause a significant impact. The following potential noise- and vibration-related impacts were determined to warrant further evaluation within this Environmental Impact Report (EIR):

- 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 or other agencies.
- Generation of excessive groundborne vibration or groundborne noise levels.

The following potential impact related to hazardous noise levels is discussed in Section 3.8, Hazards, Hazardous Materials, and Wildfires:

- 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.

The remainder of this section describes the regulatory and environmental setting to support the evaluation of the potential impacts and describes the potential impacts to noise and vibration that may result from implementation of the Program, identifying mitigation for potentially significant impacts, where feasible.

3.11.2 Regulatory Framework

This section discusses the Federal, State regulations and local policies and objectives related to noise and vibration that are relevant to the Program.

3.11.2.1 Federal

Federal, state, and local agencies regulate different aspects of environmental noise and vibration. Generally, the Federal Government sets standards for transportation-related noise and vibration sources closely linked to interstate commerce. These include aircraft, locomotives, and trucks but are not generally applicable to non-transportation related type projects. However, while not directly applicable, the federal standards for vibration can be helpful to the evaluation of construction vibration impacts associated with construction equipment used for implementation of the Program.

Federal Transit Authority Vibration Standards

The Federal Transit Authority (FTA) has adopted vibration standards that are used to evaluate potential building damage impacts related to construction activities. The vibration damage criteria adopted by the FTA are shown in Table 3.11-1.

Table 3.11-1: Construction Vibration Damage Criteria

Building Category	Peak Particle Velocity (PPV) (in/sec)
Reinforced-Concrete, steel or timber (no plaster)	0.5
Engineered concrete and masonry (no plaster)	0.3
Non-engineered timber and masonry buildings	0.2
Buildings extremely susceptible to vibration damage	0.12

Source: FTA 2018

The FTA has also adopted standards associated with human annoyance for groundborne vibration impacts for three land use categories: 1) High Sensitivity; 2) Residential; and 3) Institutional. Table 3.11-2 describes these three categories as well the associated vibration thresholds associated with human annoyance for these categories.

Table 3.11-2: Groundborne Vibration Impact Criteria for General Assessment

Land Use Category	Frequent Events[1]	Occasional Events[2]	Infrequent Events[3]
Category 1: Buildings where vibration would interfere with interior operations.	65 VdB	65 VdB	65 VdB
Category 2: Residences and buildings where people normally sleep.	72 VdB	75 VdB	80 VdB
Category 3: Institutional land uses with primarily daytime use.	75 VdB	78 VdB	83 VdB

Source: FTA 2018

Notes:

1. More than 70 events per day
2. 30-70 events per day
3. Fewer than 30 events per day

VdB = vibration decibels

3.11.2.2 State

The state government sets noise standards for transportation noise sources such as automobiles, light trucks, and motorcycles. Noise sources associated with industrial, commercial, and construction activities are generally subject to local control through noise ordinances and general plan policies. Local general plans identify general principles intended to guide and influence development plans.

State of California General Plan Guidelines – Noise Elements

The State of California General Plan Guidelines (Governor's OPR 2017) establishes guidelines for the preparation of local general plan noise elements, including a sound level/land use compatibility chart that categorizes, by land use, outdoor day/night noise level (L_{dn}) ranges in four categories (normally acceptable, conditionally acceptable, normally unacceptable, and clearly unacceptable). For many land uses, there are overlapping L_{dn} ranges for two or more

compatibility categories. Table 3.11-3 lists the normally acceptable range and conditionally acceptable range of L_{dn} values in decibels (dB) for various types of land uses.

Table 3.11-3: State of California General Plan Acceptable Noise Range Guidelines

Land Use[a]	General Plan Acceptable Noise Range	
	Normally Acceptable Range	Conditionally Acceptable Range
Low-Density Residential	less than 60 dB	55–70 dB
High-Density Residential	less than 65 dB	60–70 dB
Educational and Medical Facilities	less than 70 dB	60–70 dB
Office and Commercial	less than 70 dB	68–78 dB

Notes:

a. Not all land use types are included here. A general overview of various land use types has been provided for context purposes. All full list of land uses specific to the City of Merced is provided in Table 3.11-7.

dB = decibel

When noise levels are in the conditionally acceptable range, new construction should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation requirements are included in the design.

These overlapping L_{dn} ranges are intended to indicate that local conditions (existing sound levels and community attitudes toward dominant sound sources) should be considered in evaluating land use compatibility at specific locations.

California Department of Transportation

The California Department of Transportation's (Caltrans') Transportation and Construction Vibration Guidance Manual does not contain official Caltrans standards for vibration. However, this manual provides guidelines that can be used as screening tools for assessing the potential for adverse vibration effects related to structural damage and human annoyance. This is meant to provide practical guidance to Caltrans engineers, planners, and consultants who must address vibration issues associated with the construction, operation, and maintenance of Caltrans projects. The vibration criteria established by Caltrans for assessing human annoyance and structural damage are shown in Tables 3.11-4 and 3.11-5 respectively.

Table 3.11-4: Vibration Annoyance Potential Criteria Guidelines

Human Response	Maximum PPV (in/sec)	
	Transient Sources	Continuous/Frequent Sources
Barely perceptible	0.04	0.01
Distinctly perceptible	0.25	0.04
Strongly perceptible	0.9	0.10

Human Response	Maximum PPV (in/sec)	
	Transient Sources	Continuous/Frequent Sources
Severe	2.0	0.4

Notes:
Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.
in/sec = inches per second
PPV = peak particle velocity
Source: Caltrans 2004, 2013

Table 3.11-5: Vibration Damage Potential Criteria Guidelines

Structure and Condition	Maximum PPV (in/sec)	
	Transient Sources	Continuous/Frequent Sources
Extremely fragile historic buildings, ruins, ancient monuments	0.12	0.08
Fragile buildings	0.2	0.1
Historic and some old buildings	0.5	0.25
Older residential structure	0.5	0.3
New residential structures	1.0	0.5
Modern industrial/commercial buildings	2.0	0.5

Notes:
Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.
in/sec = inches per second
PPV = peak particle velocity
Source: Caltrans 2013

3.11.2.3 Local

Merced Vision 2030 General Plan

The City of Merced (City) Vision 2030 General Plan (2030 General Plan), adopted January 3, 2012 (City of Merced 2012) contains several policies that directly or indirectly pertain to noise, including the following:

Goal Area N-1: Noise

- **Policy N-1.3.** Reduce equipment noise levels.

- **N-1.3.a.** Limit operating hours for noisy construction equipment used in the City of Merced.
- **N-1.3.b.** Review City functions (e.g. construction, refuse collection, street sweeping, tree trimming) to insure that noise generated by equipment has been reduced to the lowest practicable level.
- **N-1.3.c.** Include maximum noise level permitted for City equipment purchases and construction contracts.

- **Policy N-1.5.** Coordinate Planning Efforts so that Noise-Sensitive Land Uses are not Located Near Major Noise Sources
  - **N-1.5.f.** As feasible, require noise barriers and/or increased setbacks between heavy circulation corridors and noise-sensitive land uses.

Table 3.11-6: Exterior Noise Level Performance Standards for New Projects Affected by or Including Non-Transportation Noise Sources

Noise Level Descriptor	Daytime (7 a.m. to 10 p.m.)	Nighttime (10 p.m. to 7 a.m.)
Hourly L_{eq}, dB	55	45

Notes:
dB = decibel
L_{eq}= equivalent noise level

Each of the noise levels specified above shall be lowered by five dB for simple tone noises, noises consisting primarily of speech or music, or for recurring impulsive noises (e.g., humming sounds, outdoor speaker systems). The City can impose noise level standards that are more restrictive than those specified above based upon determination of existing low ambient noise levels. Fixed noise sources which are typically of concern include, but are not limited to the following: The types of uses which may typically produce the noise sources described above include but are not limited to: industrial facilities including pump stations, trucking operations, tire shops, auto maintenance shops, metal fabricating shops, shopping centers, drive-up windows, car washes, loading docks, public works projects, batch plants, bottling and canning plants, recycling centers, electric generating stations, race tracks, landfills, sand and gravel operations, and athletic fields.

General Requirements for an Acoustical Analysis
(Modifications may be approved at the discretion of the Director of Development Services)

An acoustical analysis prepared pursuant to the Noise Element should:

A. Be the financial responsibility of the applicant.

B. Be prepared by a qualified person experienced in the fields of environmental noise assessment and architectural acoustics.

C. Include representative noise level measurements with sufficient sampling periods and locations to adequately describe local conditions and the predominant noise sources.

D. Estimate existing and projected cumulative (20 years) noise levels in terms of Ldn or CNEL and/or the standards of Table 3.11-6, and compare those levels to the adopted policies of the Noise Element.

E. Recommend appropriate mitigation to achieve compliance with the adopted policies and standards of the Noise Element, giving preference to proper site planning and design over mitigation measures which require the construction of noise barriers or structural modifications to buildings which contain noise-sensitive land uses.

F. Estimate noise exposure after the prescribed mitigation measures have been implemented.

G. Describe a post-project assessment program that could be used to evaluate the effectiveness of the proposed mitigation measures.

The above Implementing Actions will be used in City Planning efforts in order to ensure that noise sensitive land uses are not located adjacent to major noise sources or if they are, that the noise impacts are minimized as much as possible, using the standards described above.

- **Policy N-1.6.** Mitigate all significant noise impacts as a condition of project approval for sensitive land uses.
    - **N-1.6.a.** Where noise mitigation measures are required to achieve the standards of Tables 3.11-6, the emphasis of such measures should be placed upon site planning and project design. The use of noise barriers should be considered a means of achieving the noise standards only after all other practical design-related noise mitigation measures have been integrated into the project.
    - **N-1.6.b.** Where noise-sensitive land uses are proposed in areas exposed to existing or projected exterior noise levels exceeding the performance standards of Table 3.11-6, an acoustical analysis may be required as part of the environmental review process so that noise mitigation may be included in the project design.

Additionally, the 2030 General Plan Noise Element also includes a land use compatibility chart which is shown in Table 3.11-7:

Table 3.11-7: Community Noise Exposure Compatibility by Land Use Category

Land Use Category	Community Noise Exposure (L_{dn} or CNEL, dB)						
	50	55	60	65	70	75	80
Residential							
Transient lodging Motels, Hotels							
Schools, Libraries, Churches, Hospitals, Nursing Homes							
Auditoriums, Concert Halls, Amphitheaters							
Sports Area, Outdoor Spectator Sports							
Playgrounds, Neighborhood Parks							

Land Use Category	Community Noise Exposure (L_{dn} or CNEL, dB)						
	50	55	60	65	70	75	80
Golf Courses, Riding Stables, Water Recreation, Cemeteries							
Office Buildings, Business Commercial and Professional							
Industrial, Manufacturing, Utilities, and Agricultural							

Key		
	Normally Acceptable	Specified land use is satisfactory, based upon the assumption that any buildings involved are or normal conventional construction, without any special noise requirements
	Conditionally Acceptable	New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design.
	Normally Unacceptable	New construction or development should be discouraged. In new construction or development does proceed, a detailed analysis of the noise reduction requirement must be made and needed noise insulation features included in the design.
	Clearly Unacceptable	New construction or development clearly should not be undertaken.

City of Merced Noise Ordinance

The City Municipal Code (Section 10.40, Truck Routes) includes designated truck routes that are to be used within the City to avoid unnecessary noise in incompatible areas. These truck routes avoid the major residential areas and are limited to major roadways within the City. Figure 2.4-4 shows these truck routes.

County of Merced Noise Ordinance

The noise standard for the Merced County Code (Code 18.41.070) apply to unincorporated areas of Merced County. Section 18.41.070 of this ordinance includes the following provisions:

- Noise generated by mechanical equipment, buzzers, bells, loud speakers or other noise generating devices shall comply with the noise standards below at any boundary line of the parcel, except fire protection devices, burglar alarms and church bells. The following general plan standards for unacceptable noise levels shall apply:

  A. If the proposed use is adjacent to property that is zoned for residential use, the maximum noise level shall not exceed 65 A-weighted decibels (dBA) L_{dn} or 75 dBA maximum A-weighted noise level (L_{max}) at the property line.

  B. If the proposed use is adjacent to a parcel that is not zoned for residential land use, the maximum noise level at the property line shall not exceed 70 dBA L_{dn} or 80 dBA L_{max} at the property line.

C. The maximum noise level for uses receiving noise shall be 65 dBA L_{dn} for uses in Residential Zones and 70 dBA L_{dn} for Institutional, Commercial, Industrial and Agricultural Zones4.

- Elevated Noise Level During Construction. During construction, the noise level may be temporarily elevated. To minimize the impact, all construction in or adjacent to urban areas shall follow the following procedures for noise control: Construction hours shall be limited to the daytime hours between seven a.m. and six p.m., and all construction equipment shall be properly muffled and maintained.

3.11.3 Environmental Setting

3.11.3.1 Noise Baseline and Terminology

Table 3.11-8 defines common terminology and metrics used throughout this section for easy reference and Table 3.11-9 outlines typical noise levels for common noise sources to provide perspective on Program noise levels compared to common noise sources.

Table 3.11-8 Definition of Acoustical Terms

Term	Definition
Decibel (dB)	Unit of measurement of sound level.
Decibel A-Weighted (dBA)	A unit of measurement of sound level corrected to the A–weighted scale, as defined in ANSI S1.4–1971 (R1976), using a reference level of 20 micropascals (0.00002 Newtons per square meter).
A–Weighted Scale	A sound measurement scale, which corrects the pressures of individual frequencies according to human sensitivities. The scale is based upon the fact that the region of highest sensitivity for the average ear is between 2,000 and 4,000 Hz. Sound levels are measured on a logarithmic scale in decibels, dB. The universal measure for environmental sound is the A–weighted sound level, dBA.
Hertz (Hz)	Unit of measurement of frequency, numerically equal to cycles per second.
Loudness	A listener's perception of sound pressure incident in his ear.
L_{01}, L_{10}, L_{50}, L_{90}	The A–weighted noise levels that are exceeded 1 percent, 10 percent, 50 percent, and 90 percent of the time during the measurement period.
Equivalent Noise Level (L_{eq})	Also, called the equivalent continuous noise level. It is the continuous sound level that is equivalent, in terms of noise energy content, to the actual fluctuating noise existing at the location over a given period, usually one hour. L_{eq} is usually measured in hourly intervals over long periods in order to develop 24–hour noise levels.
Community Noise Equivalent Level (CNEL)	The CNEL is a measure of the cumulative noise exposure in the community, with greater weights applied to evening and nighttime periods. This noise descriptor is the equivalent noise level over a 24–hour period mathematically weighted during the evening and night when residents are more sensitive to intrusive noise. The daytime period is from 7:00 a.m. to 7:00 p.m.; evening from 7:00 p.m. to 10:00 p.m.; and nighttime from 10:00 p.m. to 7:00 a.m. A weighting factor of 1 dB is added to the measured day levels defined as 7 a.m. to 7 p.m., evening levels (7 p.m. to 10 p.m.) have a weighting factor of three and 10 dB to the nighttime levels (10 p.m. to 7 a.m.). The weighted levels over a 24–hour period are then averaged to produce the single number CNEL rating.
Day/Night Noise Level (L_{dn})	The same as CNEL except that the evening time period is not considered separately, but instead is included as part of the daytime period. Measurements of both CNEL and L_{dn} in the same residential environments reveal that CNEL is usually slightly higher (by less than 1 dB) than L_{dn} due to the evening factor weighting.

Term	Definition
L_{min}, L_{max}	The minimum and maximum A–weighted noise level during the measurement period.
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.
Intrusive	Noise that intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.

Table 3.11-9: Typical Sound Levels of Common Noise Sources

Decibels	Description
130	Threshold of pain
120	Jet aircraft take-off at 100 feet
110	Riveting machine at operators' position
100	Shotgun at 200 feet
90	Bulldozer at 50 feet
80	Diesel Locomotive at 300 feet
70	Commercial jet aircraft interior during flight
60	Normal conversational speech at 5-10 feet
50	Open office background level
40	Background level within a residence
30	Soft whisper at 2 feet
20	Interior of recording studio

Source: City of Merced 2012

The existing noise environment in a project area is characterized by the area's general level of development because the level of development and ambient noise levels tend to be closely correlated. Areas that are not urbanized are relatively quiet, while areas that are more urbanized are nosier because of roadway traffic, industrial activities, and other human activities.

The measurement of any sounds level requires language used specifically for the measurement of acoustical conditions. Decibel or dB is the preferred unit used to measure sound levels using logarithmic scale to account for the large range in audible sound intensities. A general rule for dB scale is that a 10-dB increase in sound is perceived as a doubling of loudness by the human ear (FHWA 2017). For example, a 55-dB sound level would sound twice as loud as a 45-dB sound level. The average healthy person cannot detect differences of 1 dB, whereas a 5-dB change is clearly noticeable. Several sound measurement descriptors are used to assess the effects of sound on the human environment. These include the equivalent sound level, which is the level of a constant sound that has the same sound energy as the actual fluctuating sound. It is similar to the average sound level. The day-night sound level, L_{dn}, is similar to the 24-hour L_{eq}; except that a 10-dB penalty is added to sound levels between 10 p.m. and 7 a.m. to

account for the greater sensitivity of people to sound at night. The CNEL also places a weighted factor on sound events occurring in the evening hours. The L_{90} value is the sound level (L) that is exceeded 90 percent of the time and is often used to describe the background or residual sound level.

Existing ambient noise levels and predicted noise levels associated with reasonable build-out within the Program Study Area were analyzed in the Draft EIR for the 2030 General Plan (City of Merced 2010). Existing noise levels within the Program Study Area were set forth in the 2030 General Plan Draft EIR and vary based on location and time of day, but generally range from 45 dBA to 79 dBA, with an average of 62 dBA (City of Merced 2010). Similarly, at reasonable build-out, the 2030 General Plan Draft EIR estimated noise levels would also vary based on location within the City but would range from 52 dBA to 81 dBA, with an average of 66.5 dBA (City of Merced 2010). Due to the relatively flat topography of the region, noise tends to travel further when unobstructed by structures.

3.11.3.2 Vibration

Operation of heavy construction equipment, particularly pile driving and other impact devices such as pavement breakers, create seismic waves that radiate along the surface of the Earth and downward into the Earth. These surface waves can be felt as ground vibration. Vibration from operation of this equipment can result in effects ranging from annoyance of people to damage of structures. Varying geology and distance would result in different vibration levels containing different frequencies and displacements. In all cases, vibration amplitudes would decrease with increasing distance.

Perceptible groundborne vibration is generally limited to areas within a few hundred feet of construction activities. As seismic waves travel outward from a vibration source, they excite the particles of rock and soil through which they pass and cause them to oscillate. The actual distance that these particles move is usually only a few ten-thousandths to a few thousandths of an inch. The rate or velocity (in inches per second [in/sec]) at which these particles move is the commonly accepted descriptor of the vibration amplitude, referred to as the peak particle velocity (PPV). Table 3.11-4 summarizes vibration annoyance potential criteria guidelines suggested by Caltrans, while Table 3.11-5 summarizes vibration damage potential criteria guidelines suggested by Caltrans.

Existing groundborne vibration levels within the Program Study Area include heavy-duty vehicular traffic on local roadways, railway operations from the Union Pacific Railroad (UPRR) and the Burlington Northern/Santa Fe (BNSF) railroad tracks, as well as airport activities from the Merced Regional Airport (City of Merced 2012).

3.11.3.3 Sensitive Receptors

Noise-sensitive receptors are typically defined as land uses that are more sensitive to noise than others. These can include residential, school, library, and hospital uses, which often require concentrating, sleeping, or other activities that require a quiet atmosphere.

The Program would largely be built within the City's Specific Urban Development Plan/Sphere of Influence (SUDP/SOI), which includes urban, rural, commercial, residential, and industrial areas. Sensitive receptors, including homes, schools, parks, hospitals, and commercial businesses, are located throughout the area. The City generally tends to be situated around Main Street, which runs in a northwest to southeast direction. Typically, older residential and commercial development exists in the southern limits of the Program Study Area, while newer development and

commercial buildings exist moving northward. The extreme northern areas within the Program Study Area remain largely undeveloped and currently consist of open and rural areas, with planned development in the future.

3.11.3.4 Airports and Airstrips

There is one airport within the Program Study Area, the Merced Regional Airport, which is located in the southwest corner of the City. The Castle Airport, which is located approximately 3 miles to west of State Route (SR) 59, is not directly within the Program Study Area; however, portions of this airport's designated safety zones and noise contours overlap with the Program Study Area (Figure 3.8-1).

The Merced Regional Airport is a publicly owned facility that provides both commercial air and freight air cargo services for the City of Merced, as well as the surrounding areas. The Castle Airport, which was once the location of the Castle Air Force Base, has since been converted to civilian use. The 2030 General Plan land uses surrounding both of these airports generally consist of industrial designations to be consistent with the Merced County Airport Land Use Compatibility Plan and Federal Aviation Administration (FAA) recommendations regarding potential hazards (Merced County Airport Land Use Commission 2012; City of Merced 2012).

3.11.4 Environmental Impacts

This section analyzes the Program's potential to result in significant impacts to noise and vibration. When an impact was determined to be potentially significant, feasible mitigation measures (MMs) were identified to reduce or avoid that impact.

3.11.4.1 Impact Analysis

Impact NOS-1	**Potential to generate 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 or other agencies.**

Impact NOS-1 Analysis
Program Impacts

Construction

Temporary noises would be generated during the construction of the Program components through use of heavy vehicles and equipment needed to construct Program components like new pipelines, pump stations, and Wastewater Treatment and Reclamation Facility (WWTRF) expansion facilities. Construction noise would be generated intermittently as development occurs throughout the SUDP/SOI consistent with reasonable build-out of the 2030 General Plan. Program construction noise impacts would occur over the reasonable build-out planning horizon, would be distributed and dispersed throughout the Program Study Area, and would be localized and temporary to individual projects. Additionally, the majority of Program pipeline features would be located within transportation corridors identified within the 2030 General Plan where noise attenuation measures are required for development projects that would limit exposure from Program construction within those same roadway corridors.

Implementation of the Program could generate a significant impact if these temporary increases in ambient noise levels were in excess of standards established in the 2030 General Plan or the City or County Noise Ordinance (See Section 3.11.2.3, Local). The 2030 General Plan Draft EIR considered these potential construction activity noise impacts associated with reasonable build-out of the SUDP/SOI, concluding that typical construction equipment's generation of maximum noise levels (ranging from 80 to 89 dBA Lmax at a distance of 50 feet) would not have a significant impact to ambient noise levels (City of Merced 2010). The 2030 General Plan EIR also evaluated increased truck traffic on area roadways as a result of construction activities and transporting heavy materials and equipment to and from constructions sites but states that the implementing actions identified in the Noise Element limit impacts to less than significant. The 2030 General Plan Draft EIR concludes that the noise increase for construction activities would be of short duration, and likely occur primarily during daytime hours and would thereby be less than significant (City of Merced 2010). The evaluation of the 2030 General Plan Draft EIR is incorporated by reference into this section. The Roadway Construction Noise Model (RCNM) was run for comparative purposes to determine the estimated noise levels from typical Program construction equipment. The results of the RCNM are shown in Table 3.11-10 (ranging from 76.5 to 85 dBA L_{max} at a distance of 50 feet).

Table 3.11-10: Program Roadway Construction Noise Model Typical Construction Equipment

Equipment	Acoustical Use Factor (%)	Sound Level at Receptor					
		(25 Feet)		(50 Feet)		(100 Feet)	
		L_{max}	L_{eq}	L_{max}	L_{eq}	L_{max}	L_{eq}
Equipment with Frequent or Regular Usage							
Chain Saw	20	89.7	82.8	83.7	76.7	77.7	70.7
Backhoe	40	83.6	79.6	77.6	73.6	71.5	67.6
Excavator	40	86.7	82.8	80.7	76.7	74.7	70.7
Front End Loader	40	85.1	81.2	79.1	75.1	73.1	69.1
Dump Truck	40	82.5	78.5	76.5	72.5	70.4	66.5
Generator	50	86.7	83.6	80.6	77.6	74.6	71.6
Grader	40	91.0	87.0	85.0	81.0	79.0	75.0
Paver	50	83.2	80.2	77.2	74.2	71.2	68.2
Pumps	50	87.0	84.0	80.9	77.9	74.9	71.9
Compactor	20	89.3	82.3	83.2	76.2	77.2	70.2
Estimated Maximum Noise Level Frequently Used Equipment[1]		**96.3**	**92.2**	**90.2**	**86.1**	**84.2**	**80.1**

Equipment	Acoustical Use Factor (%)	Sound Level at Receptor					
		(25 Feet)		(50 Feet)		(100 Feet)	
		L_{max}	L_{eq}	L_{max}	L_{eq}	L_{max}	L_{eq}
Equipment with Sporadic or Intermittent Usage							
Impact Pile Driver	20	107.3	100.3	101.3	94.3	95.2	88.3
Blasting	1	100	80.0	94.0	74.0	88.0	68.0
Jackhammer	20	94.9	87.9	88.9	81.9	82.9	75.9
Pavement Scarifier	20	95.5	88.5	89.5	82.5	83.5	76.5
Estimated Maximum Noise Level Infrequently Used Equipment[1]		**108.4**	**100.8**	**102.4**	**94.8**	**96.4**	**88.8**

Notes: 1. This row is provided to estimate total maximum noise levels at a given time and distance during normal construction activities that would occur under the Program. Because decibels are logarithmic units, sound pressure levels cannot simply be added or subtracted through ordinary arithmetic (i.e. adding and subtracting) to get a total maximum. Instead, a logarithmic equation is used to estimate the maximum noise levels associated with use of all construction equipment based on the percentage of acoustical use.

L_{eq} = equivalent noise level

L_{max} = maximum noise level

Source: FHWA 2019

As the results in Table 3.11-10 show, the maximum (L_{max}) noise typical construction equipment would generate ranges from 82.5 to 91 dBA L_{max} at 25 feet, 76.5 to 85 dBA L_{max} at 50 feet, and 70.4 to 79 dBA L_{max} at 100 feet for individual pieces of frequently used equipment and could range from 94.9 to 107.3 dBA L_{max} at 25 feet for infrequently used equipment (see Table 3.11-9 for common noise comparisons). To estimate maximum noise generation with multiple pieces of equipment operating at the same time, a logarithmic equation was used which factored in all equipment operating based on a set acoustical use factor to provide an estimated maximum noise generation range up to 96.3 L_{max} dBA at 25 feet, 90.2 L_{max} dBA at 50 feet, and 84.2 L_{max} at 100-feet for regularly used equipment with maximum generations of 108.4 L_{max} dBA at 25 feet for infrequently used equipment. These estimated maximum noise levels are similar to those contemplated in the 2030 General Plan Draft EIR that were found to have a less than significant; however, ambient noise levels within the City range between 60 and 80 dBA at 100 feet, as identified in the 2030 General Plan EIR. The 2030 General Plan calls for a 55 L_{eq} dBA hourly daytime performance standard activities and the 45 L_{eq} dBA nighttime performance standard in addition to the standards set for community noise exposure compatibility shown in Table 3.11-7. Thus there is a potential for Program construction activities to substantially increase localized ambient noise levels and MM NOS-1, Noise and Vibration Reduction Measures, and MM NOS-2, Notification and Coordination with Noise Sensitive Receptors, would be required to implement best management practices for noise reduction as well as require notification and coordination with sensitive receptors of construction activities occurring.

MM NOS-1 would incorporate noise-reduction measures to limit construction activities to daytime hours. This measure would include construction equipment muffling and shielding, locating fixed construction equipment, and staging areas away from sensitive receptors, and installation of construction noise barriers to block sound

transmission near noise-sensitive land uses. MM NOS-2 would include notification and coordination with noise-sensitive receptors within 500 feet of proposed construction activities. MM NOS-1 and MM NOS-2 include measures that help meet the City's performance standards as required by the 2030 General Plan and reduce any potential for significant impact to less than significant. These measures are also consistent with the City and County Noise Ordinances which require use of designated truck routes and allow elevation of noise levels during construction with the incorporation of noise control measures limiting construction to daytime hours of 7 a.m. to 6 p.m. and proper maintenance and muffling of construction equipment. Construction activities associated with implementation of the Program would be temporary, would follow truck routes for equipment deliveries, and would not occur all in one location at one time, and with the implementation of MM NOS-1 and MM NOS-2, would not substantially increase temporary or permanent ambient noise levels in violation of a plan or policy. Therefore, with implementation of MM NOS-1 and MM NOS-2, impacts related to construction noise would be reduced to a less than significant level.

Operation

Operation of the Program would not involve substantial additional noise within the City. The increase in operational truck trips under reasonable build-out of 2030 General Plan SUDP/SOI was contemplated in the 2030 General Plan Draft EIR for the entire City roadway network and found to be less than significant (City of Merced 2010). The Program would equate to approximately 10 additional trips per year for the trunk sewer infrastructure and pump stations and approximately two additional truck trips per day for maintenance of the upgraded WWTRF, including truck trips associated with hauling of biosolids. Noise generated from these additional truck trips would be consistent with existing conditions of both the existing wastewater collection system as well as existing traffic noise throughout the Program Study Area and would not introduce a substantial source of temporary or permanent noise. Thus, no standards would be exceeded, and the impact would be less than significant.

However, public service facility activities can produce noise which affects adjacent sensitive land uses (City of Merced 2010). These noise sources can be continuous and may contain tonal components which have a potential to annoy individuals who live nearby. In addition, noise generation from fixed noise sources may vary based upon climatic conditions, time of day and existing ambient noise levels. The 2030 General Plan and Draft EIR, considers these potential effects from permanent fixed noise sources such as pump stations and lift stations and sets performance standards for proposed new noise-producing uses and concludes that the implementing actions identified in the Noise Element limit impacts to less than significant. However, operational noise from the addition of new or upsized pump stations could result in the addition of noise from pumps or generators greater than 5 dBA above ambient conditions allowed by the implementing actions, potentially significantly impacting sensitive receptors if nearby. New pump stations typically have operational noise generated from pumps themselves that range from 90 to 100 dBA, if not enclosed (Environmental Protection Department 2005). The pumps associated with the new infrastructure are anticipated to be subterranean and also within the enclosed pump station building, which dampens external noise levels by 20 to 50 dBA (Environmental Protection Department 2005). The enclosed nature of these pump stations would therefore reduce noise levels to approximately 70 to 80 dBA (if a 20 dBA reduction is achieved) or 40 dBA to 50 dBA (if a 50 dBA reduction is achieved). Therefore, because operational noise could exceed more than 5 dBA of the exterior noise thresholds identified in the 2030 General Plan (55 dBA during the daytime, and 45 dBA during the nighttime and community noise exposure compatibility standards in Table 3.11-7), and because these new pump stations or pump station upgrades would be placed within City-owned parcels or rights-of-way and residential growth areas identified in the 2030 General Plan could occur directly around these new or upgraded pump stations, a potentially significant impact could occur to nearby residents if not designed appropriately. As such, to

ensure that design conditions reduce perceptible noise levels outside the pump station properties, MM NOS-3 would be required to reduce noise from pumps and generators. These noise reduction measures would utilize Best Available Technology (BAT) to reduce noise generated from pump station operations to acceptable levels as identified in the 2030 General Plan, therefore, reducing potential operational impacts to a less than significant level. Further, the nearest sensitive receptor to the WWTRF is approximately 1,700 feet away from the WWTRF, any increases in noise at the WWTRF would be barely (if at all) perceptible to this sensitive receptor due to attenuation distances, and therefore, would not result in any impacts related to operational noise. Therefore, the operational noise impacts associated with implementation of the Program components would be less than significant with mitigation incorporated.

Level of Significance Prior to Mitigation: Potentially Significant

Mitigation Required: MM NOS-1, MM NOS-2, and MM NOS-3

Level of Significance After Mitigation: Less than Significant

Proposed Project: New Trunk Sewer Infrastructure Impacts

Construction

Numerous sensitive receptors would be located within 25 feet of construction activities, including residences and businesses along Thornton Road, Dickenson Ferry Road, Mission Avenue, Cardella Road, Yosemite Avenue, Bellevue Road, Central Yosemite Highway, Iron Stone Drive, Snelling Highway, and G Street. As shown in Table 3.11-10, these sensitive receptors could be subject to noise levels at an L_{max} of 97.3 dBA at 25 feet; however construction would only occur within 25 feet of any one sensitive receptor for a short period of time, likely no more than one day, considering the rate of pipeline placement (approximately 250 to 500 feet per day). Additionally, although not anticipated, more intensive construction equipment could be required for construction of the new trunk sewer infrastructure. Portions of the trunk sewer infrastructure may also avoid or minimize noise impacts by being installed with trenchless technologies near residential receptors. This may particularly be the case along the Northern Trunk alignment, which would require trenchless installation technologies to cross railroad and highway facilities. The drilling associated with trenchless technologies would generate localized noise levels consistent with those of Table 3.11-10 but would likely reduce the total number of receptors exposed. As shown in Table 3.11-10, construction activities could reach a L_{max} of 108.4 dBA at 25 feet or 96.4 dBA at 100 feet if more intensive construction equipment, such as an impact pile driver, jackhammer, blasting, or pavement scarifier, would be required (e. to remove rocks, pavement, or other dense materials). These pieces of equipment could be required during removal of large rocks, placement of structures (such as the pump station associated with the Northern Trunk Sewer) or when scarifying pavement. As described for the Program, MM NOS-1 and MM NOS-2 would be implemented to reduce exterior noise levels to ambient levels by implementing noise-reduction measures and notifying sensitive receptors within 500 feet of any upcoming construction activities. Implementation of these measures would reduce potential impacts to noise from construction of the new trunk sewer infrastructure to a less than significant level.

Operation

As discussed for the overall Program above, operational noise from implementation of the new trunk sewer infrastructure would include approximately 10 additional truck trips a year associated with operation of the new trunk

sewer infrastructure, as well as muffled noise associated with operations of the new enclosed pump station for the Northern Trunk Sewer. The additional truck trips would not cause substantial noise increases that would be perceptible to the human ear and would be consistent with the existing ambient traffic noise within the City. However, as discussed for the Program above, operational noise associated with the Northern Trunk Sewer pump station could cause a potentially significant impact prior to mitigation for current or future residential sensitive receptors in this area. Specifically, the new pump station would be located on a City-owned parcel or right-of-way in a rural agricultural portion of the Program Study Area with limited nearby sensitive receptors. However, based on build-out projections identified within the 2030 General Plan, communities within this area could be built in the future, which could be built on properties surrounding the selected pump station site. The 2030 General Plan Draft EIR accounts for the potential exposure by proscribing implementation measures to reduce potential noise exposure, however, due to the uncertainty associated with the future development, MM NOS-3 would be required to reduce exceedances of the 2030 General Plan ambient noise thresholds. Therefore, MM NOS-3 would be required to implement noise reduction standards for this new pump station and reduce potential operational noise impacts to acceptable levels identified within the 2030 General Plan, and thus to a less than significant level. Operational noise associated with the New Trunk Sewer infrastructure would, therefore, be less than significant with mitigation incorporated.

Level of Significance Prior to Mitigation: Potentially Significant

Mitigation Required: MM NOS-1, MM NOS-2, and MM NOS-3

Level of Significance After Mitigation: Less than Significant

Proposed Project: Existing WWTRF Expansion Impacts

Construction

Similar to the Program discussion above, the expansion of the WWTRF would involve construction activities that could generate noise that could exceed the performance standards identified in the 2030 General Plan. However, the nearest sensitive receptor to the WWTRF is approximately 0.33 miles (approximately 1,700 feet) north of the WWTRF. Construction noise based on this distance is shown in Table 3.11-11 below.

Table 3.11-11: Wastewater Treatment and Reclamation Facility Roadway Construction Noise Model Typical Construction Equipment

Equipment	Acoustical Use Factor (%)	Sound Level at Receptor (1,700 Feet)	
		L_{max}	L_{eq}
Chain Saw	20	53.1	46.1
Backhoe	40	46.9	43.0
Excavator	40	50.1	46.1
Front End Loader	40	48.5	44.5

Equipment	Acoustical Use Factor (%)	Sound Level at Receptor (1,700 Feet)	
		L_{max}	L_{eq}
Dump Truck	40	45.8	44.5
Generator	50	50.0	47.0
Grader	40	54.4	50.4
Paver	50	46.6	43.6
Pumps	50	50.3	47.3
Compactor	20	52.6	45.6
Estimated Maximum Noise Level Frequently Used Equipment[1]		**60.6**	**56.3**

Notes:

[1] This row is provided to estimate total maximum noise levels at a given time and distance during normal construction activities that would occur under the Program. Because decibels are logarithmic units, sound pressure levels cannot simply be added or subtracted through ordinary arithmetic (i.e. adding and subtracting) to get a total maximum. Instead, a logarithmic equation is used to estimate the maximum noise levels associated with use of all construction equipment based on the percentage of acoustical use.

L_{eq} = equivalent noise level

L_{max} = maximum noise level

Source: FHWA 2019

The expansion of the WWTRF would result in a L_{max} of 60.6 (representing an extremely conservative assumption that all the equipment in Table 3.11-11 would be operated at the same time), which would exceed the daytime noise standards identified in the 2030 General Plan of 55 dBA. Therefore, similar to the Program discussion above, MM NOS-1 and MM NOS-2 would be required to reduce this potentially significant impact of exceedance of the 2030 General Plan threshold to a less than significant level. MM NOS-1 would include noise reduction measures to limit construction activities to daytime hours, measures for construction equipment muffling and shielding, locating fixed construction equipment and staging areas away from sensitive receptors, and installation of construction noise barriers to block sound transmission near noise-sensitive land uses (if applicable). MM NOS-2 would include notification and coordination with noise-sensitive receptors within 500 feet of proposed construction activities. Therefore, impacts would be less than significant with mitigation incorporated.

Operation

Operational noise associated with the expansion of the WWTRF would be similar to existing conditions and would not result in a substantial change from ambient noise levels. The additional approximately two truck trips per day associated with removal of biosolids from the WWTRF and general operational activities at the WWTRF would increase operational noise slightly; however, these additional trips would be periodic and would not be perceptible to

the human ear because they would blend with the existing traffic on the local roadways. Therefore, operational noise associated with the expansion of the WWTRF would be less than significant.

Level of Significance Prior to Mitigation: Potentially Significant

Mitigation Required: MM NOS-1 and MM NOS-2

Level of Significance After Mitigation: Less than Significant

Impact NOS-1 Findings

Impact NOS-1 Overall Level of Significance Prior to Mitigation: Potentially Significant

Impact NOS-1 Mitigation Required: MM NOS-1, MM NOS-2, and MM NOS-3

Impact NOS-1 Overall Level of Significance After Mitigation: Less than Significant

Impact NOS-2 Potential to generate excessive groundborne vibration or groundborne noise levels.

Impact NOS-2 Analysis

Program Impacts

Construction

During construction of the Program components, equipment that could generate groundborne vibrations, such as excavators, loaders, backhoes, and loaded trucks, could be used within 25 feet of sensitive receptors. Vibrations are considered barely perceptible at 0.04 in/sec PPV and strongly perceptible at 0.9 in/sec PPV for transient sources (Caltrans 2004). Additionally, extremely fragile historic buildings are considered to experience potential damage from vibration at 0.12 in/sec PPV, and modern industrial/commercial buildings are considered to experience potential damage from vibration at 2.0 in/sec PPV (Caltrans 2013).

Construction of the Program would employ conventional activities, and the equipment and techniques used would not cause excessive groundborne vibration; however, pipeline installation could have a maximum range of 0.003 to 0.210 in/sec PPV from use of the vibratory compactor/roller within 25 feet of a sensitive receptor (See Table 3.11-12).

Table 3.11-12: Construction Equipment Related to Groundborne Vibration

Type of Equipment	PPV at 25 feet	PPV at 50 feet	PPV at 100 feet	Level at Which Human Annoyance Could Occur
Large Bulldozer	0.089	0.031	0.011	0.1
Loaded Trucks	0.076	0.027	0.010	0.1
Small Bulldozer	0.003	0.001	0.000	0.1

Type of Equipment	PPV at 25 feet	PPV at 50 feet	PPV at 100 feet	Level at Which Human Annoyance Could Occur
Vibratory Hammer	0.070	0.025	0.009	0.1
Vibratory Compactor/roller	0.210	0.074	0.026	0.1

Note:
PPV = peak particle velocity
Source: FTA 2006

Where construction is required within 25 feet of a sensitive receptor, vibration levels would fall between the barely perceptible range to distinctly perceptible range with the use of a vibratory compactor/roller (see Table 3.11-5 and Table 3.11-12). Although human annoyance could occur in the distinct locations where a vibratory compactor/roller is required within 25 feet of a residence or other sensitive receptor, these construction activities would be intermittent and temporary. However, the likelihood of construction work that could reach a maximum PPV of 0.210 near 25 feet of a sensitive receptor being required would be limited and would more likely include PPV ranges between 0.001 and 0.074 at 50 feet and 0.004 to 0.026 at 100 feet, which would not exceed any potential structure damage threshold or human annoyance threshold. Additionally, due to the linear nature of much of the program construction activities (i.e., pipeline placement), construction activities within any one location would be limited to several days to a week given the rate of placement (200 to 500 feet per day), and it is not anticipated that vibration impacts from construction activities would be significant or would exceed an annoyance thresholds or potential structural damage thresholds. However, because human annoyance thresholds could be exceeded and could thus result in a potentially significant impact, MM NOS-1 would be required and would incorporate noise and vibration reduction measures to limit construction activities to daytime hours, locating fixed construction equipment and staging areas away from sensitive receptors, and installation of construction noise and vibration barriers to block sound transmission near noise-sensitive land uses which would successfully mitigation potential impacts. Additionally, MM NOS-2 would be implemented and would include notification and coordination with noise-sensitive receptors within 500 feet of proposed construction activities. Therefore, impacts related to groundborne vibrations from construction would be considered less than significant with mitigation incorporated.

Operation

Operation of the Program would not result in operational groundborne vibrations impacts because of the absence of sensitive receptors and groundborne vibration-generating activities. Once constructed, the new pipelines would be located underground and would not result in any vibrations that would be perceptible to sensitive receptors. Additionally, operation of the pump stations and WWTRF expansion components would not result in any substantial vibrations. Therefore, there would be no impact.

Level of Significance Prior to Mitigation: Potentially Significant

Mitigation Required: MM NOS-1 and MM NOS-2

Level of Significance After Mitigation: Less than Significant

Proposed Project: New Trunk Sewer Infrastructure Impacts

Construction and Operation

Similar to the discussion under the Program impacts above, the construction of the new trunk sewer infrastructure would involve the use of conventional construction equipment, which could produce groundborne vibrations within 100 feet of construction activities. Pipeline installation could have a maximum range of 0.003 to 0.210 PPV from use of the vibratory compactor/roller within 25 feet of a sensitive receptor (See Table 3.11-12); however, pipeline installation would more likely include PPV ranges between 0.001 and 0.074 at 50 feet and 0.004 to 0.026 at 100 feet. However, because vibration levels could reach a level where human annoyance could occur, this would result in a potentially significant impact prior to mitigation. To reduce potential impacts from vibration, specifically the use of a vibratory compactor/roller, MM NOS-1 and MM NOS-2 would be implemented. Construction activities would not exceed any potential structure damage threshold or human annoyance threshold due to the distance of vibratory construction activities from sensitive receptors and duration of such construction activities near any one sensitive receptor given the rate of pipeline placement and distance from sensitive receptors. Operationally, the new trunk sewer infrastructure would not result in substantial increases in vibrations from the new upgraded water collection infrastructure. The new pump station associated with the Northern Trunk Sewer would be located in an enclosed structure, and vibrations would not be perceptible outside of the structure. Therefore, impacts associated with groundborne vibrations from construction and operation of the new trunk sewer would be less than significant with mitigation incorporated.

Level of Significance Prior to Mitigation: Potentially Significant

Mitigation Required: MM NOS-1 and MM NOS-2

Level of Significance After Mitigation: Less than Significant

Proposed Project: Existing WWTRF Expansion Impacts

Construction and Operation

The expansion of the WWTRF would involve construction activities that could generate vibration levels similar to that described for the Program above; however, there are no sensitive receptors within 500 feet of the WWTRF. Since vibration dissipates to a barely perceptible level after 100 feet (as shown in Table 3.11-12), impacts related to groundborne vibration associated with the expansion of the WWTRF during both construction and operation would be less than significant.

Level of Significance Prior to Mitigation: Less than Significant

Mitigation Required: None Required

Level of Significance After Mitigation: Less than Significant

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Impact NOS-2 Findings

Impact NOS-2 Overall Level of Significance Prior to Mitigation: Potentially Significant

Impact NOS-2 Mitigation Measure: MM NOS-2

Impact NOS-2 Overall Level of Significance After Mitigation: Less than Significant

3.11.5 Noise and Vibration Mitigation

Mitigation Measure NOS-1: Noise and Vibration Reduction Measures

The City shall require the construction contractor to implement the following measures, as applicable, during construction of the Program components:

- Construction activities shall aim to meet current City General Plan ambient noise level requirements outlined in Table N-1 of 55 dBA for daytime activities and 45 dBA for nighttime activities community noise exposure compatibility standards shown in Table 3.11-7 where feasible.
- Construction activities shall be limited to between 7:00 a.m. and 6:00 p.m. Monday through Saturday to avoid noise-sensitive hours of the evenings and nights. Construction activities shall be prohibited on Sundays and holidays, except by the contractor obtaining prior approval from the City. Notification of Sunday or holiday construction noise and vibration within 500 feet of a sensitive receptors shall occur, consistent with MM NOS-2.
- Prior to any nighttime construction activities (if required), the construction contractor shall secure any necessary noise waivers form the City and comply with any terms and conditions of the waiver.
- Sensitive receptors (residences, schools, hospitals, etc.) within 500 feet of Project construction activities shall be identified to obtain addresses. Notification of construction noise and vibration within 500 feet of a sensitive receptors shall occur, consistent with MM NOS-2.
- Construction equipment noise shall be minimized by muffling and shielding intakes and exhaust on construction equipment (per the manufacturer's specifications) and by shrouding or shielding impact tools.
- Construction contractors shall locate fixed construction equipment (such as compressors or generators) and construction staging areas as far as possible from nearby sensitive receptors, including residences, schools, and hospitals.
- Construction barriers between noise sources and noise-sensitive land uses shall be used to block sound transmission where prolonged noise levels would exceed City standards.
- If construction were to occur near a school, the construction contractor shall coordinate the most noise- and vibration-producing construction activities with school administration to limit disturbance to the campus.

Mitigation Measure NOS-1 Implementation

Responsible Party: The contractor.

Timing: Throughout all construction activities.

Monitoring and Reporting Program: The contractor shall prepare a monthly noise report that shall be submitted to and kept on file by the City. The monthly noise report shall include when and where construction activities occurred and any notes on compliance with the specifications of this mitigation measure. This noise report shall be submitted in conjunction with MM NOS-2 below.

Standards for Success: Noise and vibration from construction activities does not exceed noise standards identified in the 2030 Merced Vison General Plan or the structural damage and human annoyance thresholds in the Caltrans Transportation and Construction Vibration Guidance Manual. (See Section 3.11.2, Regulatory Framework)

Mitigation Measure NOS-2: Notification and Coordination with Noise Sensitive Receptors

The City shall require the construction contractor to notify landowners and occupants of occupied properties (residences, schools, commercial businesses) within 500 feet of construction areas of the construction schedule, in writing at least two weeks prior to groundbreaking. The construction contractor shall designate a Noise Complaint Coordinator who will be responsible for responding to complaints regarding construction noise. The Coordinator shall ensure that reasonable measures are implemented to correct any problems. A contact telephone number for the Coordinator shall be posted at the construction site and included in the written notification of the construction schedule sent to surrounding properties.

Mitigation Measure NOS-2 Implementation

Responsible Party: The City and chosen contractor.

Timing: Written notice provided to occupied residences, business, and schools within 500 feet of construction activities at least two weeks prior to groundbreaking activities.

Monitoring and Reporting Program: The Contractor shall submit a monthly noise report of any noise complaints to the City. This monthly noise report shall include a write up of any complaints received and the follow up regarding how the complaint was resolved.

Standards for Success: Noise complaints during construction are minimized, and any complaint that is submitted is fully responded to in a timely manner throughout construction activities.

Mitigation Measure NOS-3: Implement Standards for Noise Reduction of Pump Stations

The City shall consider residential and sensitive noise receptors in the pump station site selection process and where feasible, shall site new facilities in nonresidential areas. If pump station siting is required within residential areas (either currently residential or identified as residential within the 2030 Merced Vison General Plan), siting preference shall be given to those sites furthest away from sensitive receptors. All new pump stations shall be enclosed. New and upgraded pump station equipment (such as pumps and intermittently used back-up generators) shall be designed and constructed in accordance with Best Available Technology (BAT) noise attenuation measures. Pump station design shall include a current General Plan consistency analysis to estimate the noise levels of selected equipment at the pump station property boundary and shall include as many of the following noise control measures or BAT necessary to reduce those noise levels to meet the standards identified in the current General Plan. Potential BAT noise reduction measures may include, but are not limited to, the following:

- Subterranean placement of submersible pump equipment;
- Use of acoustical louvers to absorb and reduce noise from motors;
- Placement of acoustical panels on the pump station building walls to absorb noise;
- Placement of noise barriers;

- Use of acoustic lagging or damping materials;
- Use of vibration isolation mounts.

Mitigation Measure NOS-3 Implementation

Responsible Party: The City.

Timing: Noise generation calculations and reduction measures shall be identified and incorporated into project design.

Monitoring and Reporting Program: The City shall document sensitive receptor considerations for new pump station siting and include these considerations as design criteria. The City shall review the modeled noise calculations and prescribed reduction BAT measures for consistency with the City's current General Plan prior to approving pump station design.

Standards for Success: Operational noise shall be reduced below the noise standards identified in the current City General Plan.

3.11.6 Abbreviations

BAT	Best Available Technology
BNSF	Burlington Northern/Santa Fe
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
City	City of Merced
CNEL	Community Noise Equivalent Level
dB	Decibel
dBA	Decibel A-Weighted
EIR	Environmental Impact Report
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
L	sound level
Leq	Equivalent Noise Level
Ldn	Day/Night Noise Level
Lmin	minimum A–weighted noise level
Lmax	maximum A–weighted noise level
MMs	Mitigation Measures
NOP	Notice of Preparation
PPV	Peak Particle Velocity
RCNM	Roadway Construction Noise Model
SUDP/SOI	Specific Urban Development Plan/Sphere of Influence

UPRR	Union Pacific Railroad
VdB	Vibration Decibels
WWTRF	Wastewater Treatment and Reclamation Facility
2030 General Plan	Merced Vision 2030 General Plan

3.11.7 References

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