Chapter 19 Noise

19.1 Introduction

This chapter describes the environmental setting, methods of analysis, and impact analysis for noise that would potentially be affected by the construction and operation of the Project. Noise is defined as unwanted or disruptive sound. The study area for noise consists of a 1-mile-wide buffer distance around all Project facilities in Tehama, Glenn, Colusa, and Yolo Counties, including the inundation area and roads, PGPs, intakes, and associated infrastructure. A 1-mile buffer was selected based on the distance that noise from Project sources would attenuate below existing ambient levels in a quiet rural setting.

There would be no impacts related to the influence of noise from aircraft, airports or airstrips for the Project. The nearest general aviation airport is Willow-Glenn Airport that is approximately 1 mile from the GCID Main Canal siphon under the California Northern Railway (i.e., railroad siphon). Construction workers would be present on this site on a temporary basis during construction, but this location would be well outside of the 60 decibel (dB) community noise equivalent level noise contour identified in the Airport Master Plan (County of Glenn 2008). The Project would not add sensitive uses that would potentially be affected by aircraft noise. Therefore, there would be no impact, and impacts related to aircraft noise at public airports or private airstrips are not discussed further in this chapter.

Tables 19-1a and 19-1b summarize the CEQA determinations and NEPA conclusions for construction and operations impacts, respectively, that are described in the impact analysis.

Table 19-1a. Summary of Construction Impacts and Mitigation Measures for Noise Resources

Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Impact NOI-1: Generation of a substantial temporary 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			
No Project	NI/NE	-	NI/NE
Alternative 1	LTS/NE	-	LTS/NE
Alternative 2	LTS/NE	-	LTS/NE
Alternative 3	LTS/NE	-	LTS/NE
Impact NOI-3: Generation of excessive groundborne vibration or groundborne noise levels			
No Project	NI/NE	-	NI/NE
Alternative 1	LTS/NE	-	LTS/NE
Alternative 2	LTS/NE	-	LTS/NE
Alternative 3	LTS/NE	-	LTS/NE

Notes:
Impact NOI-2 is related to operations impacts and therefore is not discussed in this table.
NI = CEQA no impact
LTS = CEQA less-than-significant impact
NE = NEPA no effect or no adverse effect

Table 19-1b. Summary of Operations Impacts and Mitigation Measures for Noise Resources

Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Impact NOI-2: Generation of a substantial 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			
No Project	NI/NE	-	NI/NE
Alternative 1	LTS/NE	-	LTS/NE
Alternative 2	LTS/NE	-	LTS/NE
Alternative 3	LTS/NE	-	LTS/NE
Impact NOI-3: Generation of excessive groundborne vibration or groundborne noise levels			
No Project	NI/NE	-	NI/NE
Alternative 1	LTS/NE	-	LTS/NE
Alternative 2	LTS/NE	-	LTS/NE
Alternative 3	LTS/NE	-	LTS/NE

Notes:
Impact NOI-1 is related to construction impacts and therefore is not discussed in this table.
NI = CEQA no impact
LTS = CEQA less-than-significant impact
NE = NEPA no effect or no adverse effect

19.2 Environmental Setting

19.2.1. Fundamental Concepts of Noise and Vibration

Sound is characterized by various parameters that include the rate of oscillation of sound waves (frequency), the speed of propagation, and the pressure level or energy content (amplitude). Noise can be defined as unwanted sound. The human ear is not equally sensitive to all frequencies in the entire spectrum, so noise measurements are weighted more heavily for frequencies to which humans are sensitive in a process called “A-weighting.” Because humans are less sensitive to low-frequency sound than to high-frequency sound, A-weighted decibel (dBA) levels deemphasize low-frequency sound energy to better represent how humans hear. For example, quiet urban daytime noise or a dishwasher in the next room are perceptible by the human ear and have a noise level of 50 dBA.

In general, human sound perception is such that a change in sound level of 3 dB[1] is just noticeable, a change of 5 dB is clearly noticeable, and a change of 10 dB is perceived as doubling or halving in sound level.

For a point source, such as a stationary compressor, sound attenuates based on geometry at a rate of 6 dB per doubling of distance. For a line source, such as free-flowing traffic on a freeway, sound attenuates at a rate of 3 dB per doubling of distance. Solid barriers and atmospheric conditions, including wind, temperature gradients, and humidity, can change how sound propagates over distance and can affect the level of sound received at a given location. The degree to which the ground surface absorbs acoustical energy also affects sound propagation.

In contrast to airborne sound, groundborne vibration is not a phenomenon that most people experience every day. Background vibration velocity level in residential areas is usually much lower than the threshold of human perception. Most perceptible indoor vibration is caused by sources within buildings, such as mechanical equipment while in operation, people moving, or doors slamming. Typical outdoor sources of perceptible groundborne vibration are construction equipment, steel-wheeled trains, and traffic on rough roads. Dynamic construction equipment, such as pile drivers, can create vibrations that radiate along the surface and downward into the earth. These surface waves can be felt as groundborne vibration. Vibration can result in impacts that range from annoyance to structural damage. Variations in geology and distance result in different vibration levels with different frequencies and displacements.

19.2.2. Noise Sources in the Study Area

The study area for noise includes areas of unincorporated Colusa, Glenn, Tehama, and Yolo Counties, and the city of Willows.

In Colusa and Glenn Counties, most of the study area is undeveloped, with a few local roads (Maxwell Sites Road, Sites Lodoga Road, and Road 69) that are a source of intermittent traffic noise. The areas immediately surrounding the inundation area are rural, with ambient sound levels typically within a range of 35 dBA to 45 dBA.

In Colusa, Glenn, and Yolo Counties, the landscape is primarily dominated by agricultural areas, where farming equipment generates noise that adds to ambient noise levels.

The city of Willows in Glenn County is an urban area primarily surrounded by agriculture and Interstate (I-) 5 to the west. In general, urban areas can have noise generated by stationary or mobile sources, examples of which are identified in Appendix 19A, *Noise Definitions and Noise Calculations*.

The Sacramento River flows through parts of Tehama, Glenn, and Yolo Counties. Existing facilities on the river (e.g., diversion pumps at RBPP) generate noise (potentially up to 77 dBA at a distance of 50 feet). In areas along the river that are undeveloped, the existing noise sources are natural sounds such as water flowing, wind in trees, and wildlife activity. In these rural areas, ambient noise levels would vary between 35 dBA and 40 dBA; in more developed areas (i.e.,

[1] dB is a unitless measure of sound. A sound level measurement in decibels describes the logarithmic ratio of a measured sound pressure level to a reference sound pressure level of 20 micropascals.

varying from partially developed to urban areas associated with higher traffic volumes), the ambient noise levels would range from 40 dBA to 55 dBA (Cowan 1994, Hoover and Keith 2000, Federal Transit Administration 2018).

Existing noise sources include traffic on Interstate 5 (I-5), state highways, county roads, and local roads; locomotive horns at railroad grade crossings; rail car movements; agricultural activities; and aircraft overflights from various airports in the general region (i.e., Willow-Glenn Airport, Sacramento International Airport, Yolo County Airport, Watts-Woodland Airport, and private airstrips).

19.2.3. Surrounding Sensitive Land Uses

Sensitive land uses are generally defined as locations where people reside or where the presence of noise could adversely affect the use of the land. Land use types considered to be sensitive receptors for the purposes of this analysis are single-family and multifamily residences, senior housing, hotels/motels, places of worship, daycares, schools, and hospitals/clinics.

Potential sensitive receptors within 1 mile of the Project components were identified in the study area by reviewing Project facility locations, offsite quarry locations, and surrounding land uses on aerial imagery. The areas within Colusa and Glenn Counties primarily consist of agricultural and undeveloped lands, which are generally not considered to be sensitive types of land use. The unincorporated community of Sites includes residential land uses, but residents would be relocated prior to commencement of construction. Other residential land uses are in the city of Willows to the north of the existing GCID Main Canal.

Land uses in the general region of Colusa and Glenn Counties, as well as in Tehama and Yolo Counties, also consist predominantly of agricultural and undeveloped lands. There are also single-family homes, schools, and industrial areas. These are primarily located within cities and communities, including the city of Willows.

19.3 Methods of Analysis

19.3.1. Sensitive Receptors

The types of sensitive receptors in the study area are described in Section 19.2.3, *Surrounding Sensitive Land Uses*. Locations of sensitive receptors were determined by a desktop review of aerial imagery (Google Earth 2020). The distances of sensitive receptors from potential noise-generating Project activities and components are summarized in Table 19-2.

Table 19-2. Summary of Sensitive Receptors

Project Component	Surrounding Land Uses	Nearest Sensitive Receptor	Distance from Construction Equipment Use to Nearest Sensitive Receptor[1]	Distance from Operations Use to Nearest Sensitive Receptor[1]	Jurisdiction(s)
RBPP	School, recreational use, industrial, agricultural, and undeveloped	School	1,200 feet	1,200 feet	Tehama County
GCID System Upgrades: GCID Main Canal Head Gate; Willow Creek Siphon; Walker Creek Siphon; and approximately 16 miles of Main Canal Road and canal improvements	Residences, agricultural, and undeveloped	Single-family residence	1,200 feet	1,200 feet	Glenn County
GCID System Upgrades: Railroad Siphon on GCID Main Canal; approximately 1 mile of Main Canal Road and canal improvements	Residences, lodging, agricultural, and undeveloped	Single-family residence	100 feet	100 feet	Glenn County, City of Willows
Inundation Area, Main Dams, Saddle Dams, Saddle Dikes, Funks Reservoir	Agricultural or undeveloped	Single-family residence	More than 1 mile	More than 1 mile	Colusa and Glenn Counties
TRR East	Agricultural or agricultural buildings and structures	Single-family residence	1,600 feet	3,000 feet	Colusa County
TRR West	Agricultural or agricultural buildings and structures	Single-family residence	More than 1 mile	More than 1 mile	Colusa County
Road 69, McDermott Road, and Sites Lodoga Road	Agricultural or single-family residences	Single-family residence	100 feet from Road 69	100 feet from Road 69	Glenn and Colusa Counties

Project Component	Surrounding Land Uses	Nearest Sensitive Receptor	Distance from Construction Equipment Use to Nearest Sensitive Receptor[1]	Distance from Operations Use to Nearest Sensitive Receptor[1]	Jurisdiction(s)
South Road Alignment and Huffmaster Road Realignment	Agricultural or single-family residences	Single-family residence	400 feet	600 feet	Colusa County
Haul Truck and Employee Trips	Agricultural or single-family residences	Single-family residences	100 feet	N/A	Colusa, Glenn, Yolo and Tehama Counties; City of Willows
TC Canal Intake	Agricultural or single-family residence	Single-family residence	2,600 feet	N/A	Yolo County
Dunnigan Pipeline to CBD	Single-family residence, agricultural, auction yard[2], or undeveloped	Single-family residence	700 feet	N/A	Yolo County
CBD Outlet	Agricultural and undeveloped	Single-family residence	More than 1 mile	More than 1 mile	Yolo County
Sacramento River Discharge	Single-family residence, agricultural, and undeveloped	Single-family residence	1,000 feet	1,000 feet	Yolo County

Notes:
1 Distances are approximate.
2 Existing Auction Yard in Yolo County is not considered a sensitive receptor.
CBD = Colusa Basin Drain; GCID = Glenn-Colusa Irrigation District; N/A = not applicable; RBPP = Red Bluff Pumping Plant; TC = Tehama-Colusa; TRR = Terminal Regulating Reservoir.

19.3.2. Construction Noise and Vibration

Construction noise and vibration can be generated by construction equipment, haul truck and construction employee vehicle trips, and blasting. This section describes the various qualitative and quantitative methodologies to evaluate different noise- and vibration-generating activities and impacts on sensitive receptors. BMP-22, Development and Implementation of a Construction Noise Abatement Plan, described in Appendix 2D, *Best Management Practices, Management Plans, and Technical Studies*, is incorporated into the analysis of potential

construction noise and vibration impacts on sensitive receptors. The development and implementation of the noise abatement plan as part of this BMP will avoid and reduce construction-related noise and vibration impacts on sensitive receptors. The plan includes:

- Measures to limit heavy equipment use to regulated hours per County requirements and avoid nighttime equipment use
- Use of temporary enclosures, barriers, or other actions between sensitive receptors and construction activities to reduce noise levels

19.3.2.1. Construction Equipment

The assessment of potential construction noise levels was based on methodology developed by the Federal Transit Administration (2018). Noise levels produced by commonly used construction equipment are shown in Table 19-3. Individual types of construction equipment are expected to generate maximum noise levels ranging from 76 dBA to 101 dBA at a distance of 50 feet. The construction noise level at a given receptor location depends on the type of construction activity and the distance, ground type (smooth vs. sound-absorptive) and shielding between the activity and sensitive receptors.

Table 19-3. Commonly Used Construction Equipment Noise Levels

Equipment	Typical Noise Level (dBA) 50 Feet from Source
Pile-driver (Impact)	101
Pile-driver (Sonic/Vibratory)	95
Auger Drill Rig (for drilled piles)	85
Heavy Truck	84
Excavator	85
Bulldozer	85
Pump	81
Generator	81
Mixer	80
Grader	85
Scraper	85
Roller	85
Compactor	82
Concrete Batch Plant	84
Concrete and Rock Processing	84
Recycling Plant	84

Source: Federal Transit Administration 2018.
Note: dBA = A-weighted decibel.

Construction equipment used would vary by component or construction phase of the Project and would involve pile drivers, excavators, bulldozers, scrapers, heavy trucks, pumps, generators, graders, compactors, and other heavy equipment. The source levels used to calculate noise exposure are based on the L_{max} (maximum sound level, see Appendix 19A for a definition of terms) of equipment noise emission levels developed by the Federal Transit Administration (2018). Usage factors represent the amount of time a type of equipment is used during a typical

interval. Usage factors for construction noise are used in the analysis to develop reasonable worst-case L_{eq} (equivalent sound level) noise exposure values. The L_{eq} value accounts for the energy-average of noise over a specified interval (usually 1 hour).

Potential noise levels resulting from Project construction activities were evaluated by combining the noise levels of the three loudest pieces of equipment that would likely operate at the same time (e.g., a roller, bulldozer, and truck being operated simultaneously during the clearing phase) and applying the appropriate usage factor (percent of time in a given hour that equipment is in operation; between 25% and 100%) to each piece of equipment. Sound levels from construction activities are calculated as a function of distance from the source(s), based on point-source attenuation over mixed (i.e., acoustically absorptive) ground.

19.3.2.2. Construction Haul Truck Noise

Construction haul truck noise is assessed based on potential to exceed local jurisdictions' noise compatibility standards at sensitive land uses along Project haul routes.

19.3.2.3. Construction Vibration

The potential impacts of vibration during construction were evaluated using the construction vibration modeling methods recommended by the U.S. Department of Transportation. The California Department of Transportation (Caltrans) provides guidelines regarding vibration associated with construction and operation of transportation infrastructure (California Department of Transportation 2020). Table 19-4 lists the Caltrans vibration guidelines for potential damage to different types of structures.

Groundborne vibration and noise can also disturb people. Numerous studies have been conducted to characterize the human response to vibration, which are discussed in Federal Transit Administration and Caltrans guidance (Federal Transit Administration 2018, California Department of Transportation 2020). People are generally more sensitive to vibration during nighttime hours when they are sleeping than in the daytime. Table 19-5 provides the Caltrans guidelines regarding vibration annoyance potential (expressed here as peak particle velocity [PPV]). Table 19-6 summarizes typical vibration levels generated by construction equipment at reference distances between 25 feet and 100 feet.

Table 19-4. Caltrans Vibration Guidelines for Potential Damage to Structures

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

Source: California Department of Transportation 2020: Table 19.
Notes: Transient sources create a single, isolated vibration event (e.g., blasting or the use of drop balls). Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

PPV = peak particle velocity in inches per second (in/sec).

Table 19-5. Caltrans Guidelines for Vibration Annoyance Potential

Human Response	Maximum PPV (in/sec)	
	Transient Sources	Continuous/Frequent Intermittent Sources
Barely perceptible	0.04	0.01
Distinctly perceptible	0.25	0.04
Strongly perceptible	0.9	0.10
Severe	2.0	0.4

Source: California Department of Transportation 2020: Table 20.
Note: Transient sources create a single, isolated vibration event (e.g., 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.
PPV = peak particle velocity in inches per second (in/sec).

Table 19-6. Typical Vibration Source Levels for Construction Equipment

Equipment	PPV (in/sec) at 25 Feet	PPV (in/sec) at 50 Feet	PPV (in/sec) at 75 Feet	PPV (in/sec) at 100 Feet
Impact Pile Driver	0.644	0.228	0.124	0.081
Vibratory Pile Driver	0.170	0.060	0.033	0.021
Auger Drill	0.089	0.032	0.017	0.011
Hoe Ram	0.089	0.032	0.017	0.011
Large Bulldozer	0.089	0.032	0.017	0.011
Loaded Trucks	0.076	0.027	0.015	0.010
Jackhammer	0.035	0.012	0.007	0.004
Small Bulldozer	0.003	0.001	0.001	< 0.001

Source: Federal Transit Administration 2018.
Note: PPV = peak particle velocity in inches per second (in/sec).

19.3.2.4. Blasting

During construction, blasting of rock within onsite quarries at the reservoir site would be required on an intermittent basis. Based on estimates of rock quantities in the dam foundations discussed in Appendix 2C, *Construction Means, Methods, and Assumptions*, up to 70 blasts within a 12-month period may be required. Each individual blast produces an impulsive noise and accompanying overpressure during a brief period of up to several seconds. Blasts would be done during midday or early afternoon hours when sensitive receptors are least likely to be disturbed. The nearest sensitive receptors would be more than 1 mile from blasting sites, and as such blasting is unlikely to result in any disturbance of receptors. Because of the low frequency of blasting events, their distance from sensitive receptors, and the time of day that they would occur, blasting is not expected to result in negative community reaction at the nearest sensitive receptors. Therefore, the impacts of blasting on sensitive receptors are not discussed further in the impact analysis.

19.3.3. Operational Noise

Permanent noise sources from the Project would be associated with continuous operation of new pumps or energy dissipators at various facilities, including:

- the Funks and TRR East PGPs under Alternatives 1 and 3
- the Funks and TRR West PGPs under Alternative 2
- the TC Canal intake and CBD outlet under Alternatives 1, 2, and 3
- the Sacramento River discharge under Alternative 2

Maintenance would involve periodic site visits to the new infrastructure and intermittent landscaping or repair activities. At the Funks Reservoir complex, operations would also include daily activities at the administration and operations building and the maintenance and storage building. In addition, the two recreation areas and day-use boat ramp would involve the public camping, hiking, and boating. The road alignments that would be used for maintenance access or public access, including Sites Lodoga Road and Huffmaster Road, are summarized in Table 2-4, Section 2.6.3, and Section 2.7.4 in Chapter 2, *Project Description and Alternatives*.

BMP-22 is incorporated into the analysis of potential operations and maintenance impacts on sensitive receptors. This BMP requires specific types of equipment and operation practices, such as acoustical enclosures, exhaust silencers, and limiting heavy equipment noise hours of operation.

19.3.4. Thresholds of Significance

An impact on noise would be considered significant if the Project would 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.
- Generation of excessive groundborne vibration or groundborne noise levels.

The regulations for each local jurisdiction were considered to evaluate noise impacts under the above CEQA thresholds of significance. Appendix 4A, *Regulatory Requirements,* includes specific information regarding multiple jurisdiction noise requirements and guidance. These are summarized below for construction and operation.

<u>Construction Equipment</u>

- Colusa County normally restricts daytime construction noise to 86 dBA L_{max} at the property plane of the Project. However, the County does not consider an exceedance of this limit to constitute a significant impact unless noise limits are also exceeded at the nearest sensitive receptor (Appendix 4A, *Regulatory Requirements*).[2] For construction occurring after 7:00 p.m. or before 7:00 a.m., the County's generally applicable noise

[2] *See* Colusa County Initial Study / Evaluation of Environmental Impacts, American Commodity Company Bioenergy Plant, pp. 36-37 (2019).

limits at receiving land uses apply. These include 55 dBA L_{eq} from 7:00 p.m. to 9:00 p.m. and 50 dBA L_{eq} from 9:00 p.m. to 7:00 a.m. at residential receivers.

- Glenn County does not regulate noise from construction equipment between 7:00 a.m. and 7:00 p.m. "provided standard, reasonable practices are being followed." Glenn County Code Section 15.560.100. From 7:00 p.m. to 10:00 p.m. the limit at a residential receptor is 55 dBA L_{eq} and from 10:00 p.m. to 7:00 a.m. the limit is 45 dBA L_{eq}.
- Tehama County has not adopted a noise ordinance and has no regulations concerning noise from construction. The County's General Plan requires all internal combustion engines used in conjunction with construction activities be muffled according to the equipment manufacturer's requirements (Implementation Measure N-2.4b).
- Yolo County has no regulations concerning noise from construction, but the Countywide General Plan Health and Safety Element includes a policy, Goal-NO-1 to "protect people from the harmful effects of excessive noise."
- The City of Willows has no regulations concerning noise from construction but generally prohibits "excessive" noise.

Construction and Operations – Mobile Sources

The noise compatibility standards from the general plans for Colusa, Glenn, and Yolo Counties are used to determine the level of significance for the impacts of traffic noise on haul routes during construction and associated with the permanent operation of new Project roads. Noise from a transportation source is considered to result in a significant impact if the level exceeds 60 dBA L_{dn} (day-night sound level) at a residential land use, consistent with the Colusa, Glenn, and Yolo County General Plans.

Operations – Stationary Sources

- Colusa County: Exceedance of 60 dBA L_{dn}/CNEL[3] at residential outdoor activity areas or increase in ambient noise levels by more than 3 dB, per Colusa County General Plan.
- Glenn County: Exceedance of 50 dBA L_{eq} from 7:00 a.m. to 10:00 p.m. or 45 dBA L_{eq} from 10:00 p.m. to 7:00 a.m.; or 70 dBA L_{max} from 7:00 a.m. to 10:00 p.m. or 65 dBA L_{max} from 10:00 p.m. to 7:00 p.m.; or 60 dBA L_{dn}/CNEL, all measured at outdoor activity areas of residential uses, per Glenn County General Plan.
- Tehama County: Daytime limit at outdoor activity areas of residences is 50 dBA L_{eq} (overall 24-hour sound level) and nighttime limit is 45 dBA L_{eq}. Daytime limit at schools is 55 dBA L_{eq} with no nighttime limit.
- Yolo County General Plan: Exceedance of 60 dBA CNEL at residential outdoor activity areas, per Yolo County General Plan.
- City of Willows: General prohibition on "excessive" noise

[3] Community noise equivalent level (CNEL) is the energy average of the A weighted sound levels occurring during a 24-hour period with 5 dB added to the A-weighted sound levels occurring during the period from 7:00 p.m. to 10:00 p.m. and 10 dB added to the A-weighted sound levels occurring during the period from 10:00 p.m. to 7:00 a.m.

19.4 Impact Analysis and Mitigation Measures

Impact NOI-1: Generation of a substantial temporary 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

No Project

Under the No Project Alternative, existing sources of traffic and agricultural noise would continue and there would be no temporary use of heavy equipment or haul trucks related to the Project. Construction of other unrelated projects and development in the area would still occur, resulting in an increase in noise levels in the vicinity of those areas on a temporary basis.

Significance Determination

The No Project Alternative would not generate a substantial temporary increase in ambient noise levels in the Project vicinity in excess of standards established in local general plans or noise ordinances, or applicable standards of other agencies, because no Project facilities would be constructed. There would be no impact/no effect.

Alternatives 1 and 3

This discussion focuses on the impacts of noise from temporary use of heavy equipment associated with the construction of components for Alternatives 1 and 3. Operational noise impacts are evaluated under Impact NOI-2.

Construction

Temporary use of heavy equipment for construction of Alternatives 1 and 3 components may exceed daytime and nighttime construction thresholds on an intermittent basis. To characterize the overall noise level of the worst-case noise condition during a given phase of construction, the three loudest pieces of equipment were assumed to operate simultaneously at a perimeter location for a receptor distance of 50 feet. Pile drivers using a vibratory hammer and heavy equipment such as bulldozers and trucks were assumed to operate up to 50% percent (i.e., 30 minutes of a given hour). Sound levels for the components of Alternatives 1, 2, and 3 are shown in Table 19-7.

Table 19-7. Construction Noise Levels by Project Component

Construction Activity/ Component	Jurisdiction(s)	Equipment Used[a]	Combined Source Level at 50 feet (L_{eq}, dBA)[b]	Distance to exceedance of noise level, feet		
				55 dBA L_{eq}[c]	50 dBA L_{eq}[d]	45 dBA L_{eq}[e]
Demolition and Clearing	Tehama, Glenn, Colusa, and Yolo Counties	Bulldozer, grader, loader	86	800	1,240	1,920
RBPP	Tehama County	Pump, generator,	84	650	1,000	1,560

Construction Activity/ Component	Jurisdiction(s)	Equipment Used[a]	Combined Source Level at 50 feet (L_{eq}, dBA)[b]	Distance to exceedance of noise level, feet		
				55 dBA L_{eq}[c]	50 dBA L_{eq}[d]	45 dBA L_{eq}[e]
		crane				
Sacramento River Diversion and Conveyance to Regulating Reservoirs (TRR East [Alternatives 1 and 3], TRR West [Alternative 2])	Glenn and Colusa Counties, City of Willows	Vibratory pile driver, bulldozer, grader, scraper	93	1,390	2,160	3,350
Tunnels, I/O Works	Glenn and Colusa Counties	Concrete truck, fuel truck, water truck	86	750	1,160	1,810
Dams and Dikes	Glenn and Colusa Counties	Vibratory pile driver, scraper, bulldozer	93	1,130	2,160	3,350
Conveyance to Sacramento River, Dunnigan Pipeline	Yolo County	Bulldozer, grader, loader	86	800	1,240	1,920
Dunnigan Pipeline CBD Outlet (Alternatives 1 and 3)	Yolo County	Vibratory pile driver, scraper, grader	93	1,390	2,160	3,350
Dunnigan Pipeline Sacramento River Discharge (Alternative 2)	Yolo County	Vibratory pile driver, scraper, grader	93	1,390	2,160	3,350
Railroad Siphon	Glenn County and City of Willows	Drill rig, excavator, heavy truck	86	750	1,160	1,810
Road Construction	Glenn and Colusa Counties	Bulldozer, grader, scraper	87	820	1,270	1,970
Concrete Batch Plant	Glenn and Colusa Counties	Batch plant, rock processing, recycling	89	980	1,520	2,360
Recreation Areas	Glenn and Colusa Counties	Bulldozer, grader, roller	87	820	1,270	1,970

Note: Distance calculations do not include the effects, if any, of local shielding from walls, topography, or other barriers that may further reduce sound levels.
dBA = A-weighted decibel; I/O = inlet/outlet; L_{eq} = equivalent sound level; RBPP = Red Bluff Pumping Plant.
[a] The three loudest pieces of equipment that may operate in one location simultaneously.
[b] Based on usage factors of 25% to 100% for types of equipment used.
[c] The maximum distance where the combined equipment level may potentially exceed the daytime noise limit of 55 dBA L_{eq} for nontransportation sources in the Counties of Colusa and Glenn. Daytime is defined as the hours between 7:00 a.m. and 10:00 p.m. Noise from heavy equipment is not regulated during the hours from 7:00 a.m. to 7:00 p.m. in Colusa and Glenn Counties.
[d] The maximum distance where the combined equipment level may potentially exceed the nighttime noise limit of 50 dBA L_{eq} for nontransportation sources in the County of Colusa. Daytime is defined as the hours between 7:00 a.m. and 10:00 p.m. Noise from heavy equipment is not regulated during the hours from 7:00 a.m. to 7:00 p.m. in Colusa and Glenn Counties.
[e] The maximum distance where the combined equipment level may potentially exceed the nighttime noise limit of 45 dBA L_{eq} for nontransportation sources in the County of Glenn. Nighttime is defined as the hours from 10:00 p.m. to 7:00 a.m. The distances shown in this column assume permits for nighttime work would be obtained if it was determined to be necessary.

Expected construction noise attenuation as a result of implementation of BMP-22 is summarized in Table 19-8. Site-specific characteristics such as ground surface, construction activity, and distance to nearest sensitive receptor would influence the type of action implemented and the expected sound reduction.

Table 19-8. Construction Noise Abatement Plan and Construction Noise Attenuation

Action	Description	Expected Sound Reduction
Use of enclosures around noise-generating equipment	Install enclosures around a single piece of noise-generating equipment in a fixed location, such as a generator or ventilation fan. The achievable amount of noise reduction relative to a receptor would vary depending on the enclosure type and the location of equipment	For a given piece of equipment, sound reductions from an enclosure or silencer can be substantially reduced from a single piece of equipment and would typically be in the range of 8 to 25 dBA
Store stationary equipment as far as feasible from noise-sensitive locations	Potential noise reduction is dependent on the distance to the nearest receptor	Depending on ground type, doubling the distance between a single piece of equipment and a receptor would reduce noise levels by 6 to 8 dBA for that piece of equipment
Use of shrouds around pile hammers	Shroud or noise blanket of sufficient mass installed on pile driver scaffolding is effective as a noise reduction method for noise from impact or vibratory pile hammers, provided use of such a method is feasible for installation and construction scheduling	A noise blanket has been shown to reduce pile hammer noise by 8 to 23 dBA (Teachout 2005; Washington Department of Transportation 2018).

Action	Description	Expected Sound Reduction
Use of temporary sound barriers	Install sound barriers certain areas of higher activity. The effectiveness of sound barriers increases when placed nearer to the source or nearer to the receptor, rather than at a middle location	Depending on locations of receptors, a barrier of sufficient dimensions can effectively reduce noise levels from all heavy activity occurring at a construction site. A barrier with a height of 20 feet and a length of four times the distance to a receptor location can provide reduce construction site noise by 5 to 15 dBA

Components

Construction for several of the GCID Main Canal system upgrades, including the Willow Creek siphon, Walker Creek siphon, and GCID Main Canal head gate, would include pile driving. As shown in Table 19-3, a vibratory pile driver can produce a noise level of up to 93 dBA L_{eq}, which is the loudest equipment type that would be used. The nearest sensitive receptor is a single-family residence located about 1,200 feet from the construction site boundary for both the Willow Creek and Walker Creek siphon pile-driving sites.

This work would be conducted in Glenn County. As such, during times of pile driving, an exceedance of Glenn County's noise limit of 55 dBA L_{eq} could occur at the nearest residential receptors approximately 1,200 feet away. In accordance with BMP-22, pile driving will be limited to the hours of 7:00 a.m. to 7:00 p.m. Accordingly, work conducted between 7:00 a.m. and 7:00 p.m. using "standard, reasonable practices" would not be regulated by Glenn County. This BMP will implement measures such as use of shrouds around pile hammers to reduce noise during construction, where applicable. For these reasons, noise during pile driving would not generate a substantial temporary increase in ambient noise levels in excess of established standards.

For the railroad siphon, a pile driver would not be required. Instead, a new barrel would be installed using a bore-and-jack method inside of an earthen coffer dam, which would be built using heavy earthmoving equipment. Accordingly, for this location the combined noise level at 50 feet would be approximately 86 dBA L_{eq}, as shown in Table 19-7. As identified in Table 19-2, sensitive receptors are located within 100 feet of the railroad siphon, and a residential area is adjacent to approximately 1 mile of GCID Main Canal system upgrades. Based on the distance to sensitive receptors shown in Table 19-2, noise from heavy equipment in the area of the siphon and canal upgrades would affect a neighborhood of single-family residences at the south end of the city of Willows, which also includes a park with ballfields, an inn, and outdoor use areas. The City of Willows has no regulations concerning noise from construction but generally prohibits "excessive" noise. BMP-22 will implement measures such as installation of enclosures around noise-generating equipment, and installation of sound barriers to reduce noise during construction, where applicable (Table 19-8). For these reasons, noise during construction of the siphon would not generate a substantial temporary increase in ambient noise levels in excess of established standards.

As identified in Table 19-2, construction noise associated with the inundation area, main dams, saddle dams, and saddle dikes is unlikely to be noticeable by sensitive receptors because they are

located more than 1 mile away from the noise-generating activity. This also applies to Funks Reservoir, Funks PGP, and Funks pipelines. As described in BMP-22, no nighttime work will be done for reservoir facilities within 1,000 feet of occupied residences and blasting would be conducted at a distance of at least 1,000 feet from the nearest noise-sensitive land use. Therefore, temporary noise from construction of these components would not exceed Colusa County's daytime or nighttime noise level thresholds at the nearest sensitive receptors and would not exceed Glenn County's nighttime noise limits.

As identified in Table 19-2, the RBPP is located within 1,200 feet of the nearest sensitive receptor, Shasta College's Tehama Campus. Construction would involve use of heavy equipment such as a mobile crane, generator, and dewatering pump for a relatively short period (i.e., less than 2 weeks). Tehama County has not adopted a noise ordinance and has no regulations concerning noise from construction. However, as shown in Table 19-7, construction at RBPP would have a noise level of 50 dBA at a distance of 1,000 feet, which would not affect the nearest receptor 1,200 feet away. No nighttime construction is anticipated at this location.

According to modeling, noise from heavy equipment during land clearing, grubbing, and earthwork for TRR East would not exceed the Colusa County limit of 86 dBA L_{max} at any point outside the property plane for Alternatives 1 and 3. Based on the distances shown in Tables 19-2 and 19-7, noise levels during construction would not exceed Colusa County daytime or nighttime limits at the nearest sensitive receptor, which is a residence approximately 1,600 feet away from the limit of construction.

Construction of the TC Canal intake in Yolo County would require the use of heavy equipment, including a vibratory pile driver. Yolo County has no regulations concerning noise from construction. According to modeling, noise levels may exceed 50 dBA L_{eq} at a distance of 2,160 feet during periods of pile driving, as shown in Table 19-7. The nearest sensitive receptor is 2,600 feet from the TC Canal intake construction site, as identified in Table 19-2, therefore noise levels would not exceed 50 dBA L_{eq} at the nearest receptor.

The Dunnigan Pipeline staging area, also in Yolo County, would be approximately 700 feet from the nearest sensitive receptor as shown in Table 19-2. Noise levels may exceed 55 dBA L_{eq}, and noise from construction may be intermittently noticeable at this location. Yolo County has no regulations concerning noise from construction; noise control practices would avoid excessive noise at this location. BMP-22 will implement measures such as installation of enclosures around noise-generating equipment to reduce noise during construction, where applicable. For these reasons, noise during construction and staging would not result in a substantial temporary increase in ambient noise levels. Construction of the CBD outlet would require pile driving, as shown in Table 19-2, but the nearest residence is more than 1 mile away from the CBD outlet site.

Alternatives 1 and 3 would improve existing roads in Glenn County and Colusa County for use as haul routes during construction and for ongoing maintenance, such as Road 69, McDermott Road, and Sites Lodoga Road, which include residences with driveway access to these routes. The nearest sensitive land use to a haul route is a residence located 100 feet from Road 69 in Glenn County. During construction activities associated with the road improvements, noise levels from heavy equipment could be up to 79 dBA at 100 feet. The worst-case noise level

would occur for a short period of time as the equipment progresses along the linear path of the road construction limits. Noise from heavy construction equipment is not regulated by the municipal codes of Glenn and Colusa Counties during the hours from 7:00 a.m. to 7:00 p.m. Noise from road construction would potentially exceed daytime and nighttime noise limits at receptors in Glenn and Colusa Counties if work is done during regulated hours between 7:00 p.m. and 7:00 a.m. According to modeling results shown in Table 19-7, construction noise limits could be exceeded at up to 820 feet during daytime hours, and 1,920 feet during nighttime hours. BMP-22 includes complaint/response tracking to coordinate and respond to noise-related issues during construction. Best noise control practices in this BMP will also be used to reduce noise levels as necessary.

Haul Truck Trips and Construction Employee Trips

Based on the analysis in Chapter 18, *Navigation, Transportation, and Traffic*, haul routes and construction employee work routes would be distributed along I-5 and local roads for travel to and from borrow sites and staging areas. Truck and worker trips would be distributed among haul roads, accessed via Road 69 and Maxwell Sites Road, to serve individual construction sites associated with the new main dams, saddle dams, roads, and the I/O works. The construction-related haul truck and employee traffic on local roads would result in a temporary increase in traffic noise along routes to these locations. The highest number of vehicle trips is projected to occur on Road 69 in Glenn County, with up to 1,277 trips per day (Table 18-12, Chapter 18). This represents a total of 990 haul trucks and 287 commuter one-way trips per day (Table 18-11, Chapter 18). The added haul truck and construction employee trips per day would noticeably increase traffic noise levels at residential receptors along Road 69 on a temporary basis. Under these conditions, traffic noise levels along Road 69 may potentially reach a maximum value of 57 dBA L_{dn}. This would not exceed the noise compatibility standard of 60 dBA L_{dn} for residential use specified in the general plans for Glenn County and Colusa County.

For construction of supporting infrastructure outside of the reservoir and dam, fewer haul trucks and employee trips would be required. Up to 154 truck hauls and 146 employee trips per day would be needed for construction of the Dunnigan Pipeline, and 25 truck hauls and 28 employee trips per day would be needed for construction of GCID Main Canal upgrades (Table 18-11, Chapter 18). According to traffic noise modeling, the added vehicle traffic would potentially result in a value of up to 50 dBA L_{dn} on haul routes approaching these locations, this would not exceed the noise compatibility standard of 60 dBA L_{dn} for residential use specified in the general plans for Glenn and Yolo Counties. For these reasons, temporary and intermittent increases in noise from haul trucks and employee vehicles during construction for Alternatives 1 and 3 would not result in an impact related to a temporary increase in ambient noise levels.

CEQA Significance Determination and Mitigation Measures

Construction would primarily occur between the hours of 7:00 a.m. and 7:00 p.m., when construction noise is not regulated by Colusa County and Glenn County. Yolo County, Tehama County, and the City of Willows have no regulations concerning noise from construction but have general policies to limit excessive noise exposure. Work during regulated hours in Glenn and Colusa County may be required in some cases, such as for road construction. Implementation of BMP-22 will reduce noise during construction as identified in Table 19-8 and described above, where applicable and in proximity to sensitive receptors. Construction noise

would be short-term, intermittent, and would cease once work is complete. For these reasons, construction would not generate a substantial temporary increase in ambient noise levels in the vicinity of Alternatives 1 and 3 in excess of existing standards; impacts would be less than significant.

NEPA Conclusion

Construction effects on temporary increases in ambient noise levels would be the same as described above for CEQA. Construction of Alternative 1 or 3 would temporarily increase noise levels as compared to the No Project Alternative. Construction would primarily occur during daytime hours between 7:00 a.m. and 7:00 p.m., when construction noise is not regulated by Colusa County and Glenn County. Yolo County, Tehama County, and the City of Willows have no regulations concerning noise from construction but have general policies to limit excessive noise exposure. Work during regulated hours in Glenn and Colusa County may be required in some cases, such as for road construction. Implementation of BMP-22 will reduce noise during construction, where applicable. Given all of the above, there would be no adverse effect due to the temporary increase in noise during construction of Alternatives 1 and 3.

Alternative 2

Construction

Facilities constructed under Alternative 2 would be similar to those for Alternatives 1 and 3, except for the South Road and realignment of Huffmaster Road, the numbers and locations of saddle dams and dikes, TRR West, and the longer Dunnigan Pipeline extending to the Sacramento River discharge.

The heavy equipment required for construction of Alternative 2 would be the similar to that required for construction of Alternatives 1 and 3. Equipment noise levels by activity or component are shown in Table 19-7. According to modeling, pile driving at the Sacramento River discharge would potentially result in noise levels exceeding 50 dBA L_{eq} at the nearest single-family residence, located approximately 2,000 feet away from the coffer dam site. The impacts of construction noise levels relative to daytime and nighttime thresholds would be the same for Alternative 2 as for Alternatives 1 and 3. Implementation of BMP-22 will reduce noise levels for various activities as identified in Table 19-8, as needed and depending on the location.

Haul trips and construction personnel trips would be slightly lower for the main haul routes serving construction sites associated with the new main dams, saddle dams, roads, and I/O Works. Modeled noise levels along these haul routes would be the same as Alternatives 1 and 3. A higher volume of trucks would be required for construction of the Dunnigan Pipeline under Alternative 2 because it involves a longer alignment. Up to 280 truck hauls and 228 employee trips per day would be needed for construction of the Dunnigan Pipeline (Table 18-14, Chapter 18). The trips needed for the GCID Main Canal improvements would be the same as those described above for Alternatives 1 and 3 (25 truck hauls and 28 employee trips per day as shown in Table 18-14, Chapter 18). At these volumes, traffic noise levels on haul roads could reach a value of 53 dBA L_{dn}, which would not exceed the noise compatibility standard of 60 dBA L_{dn} for residential use specified in the general plans for Glenn, Colusa, and Yolo Counties.

CEQA Significance Determination and Mitigation Measures

Additional single-family residences would potentially be exposed to construction noise under Alternative 2 compared to Alternatives 1and 3 as a result of construction of the Sacramento River discharge. Therefore, construction noise impacts for Alternative 2 would be slightly greater than those for Alternatives 1 and 3. Construction would primarily occur between the hours of 7:00 a.m. and 7:00 p.m., when construction noise is not regulated by Colusa County and Glenn County. Yolo County, Tehama County, and the City of Willows have no regulations concerning noise from construction but have general policies to limit excessive noise exposure. Work during regulated hours in Glenn and Colusa Counties may be required in some cases, such as for road construction. Implementation of BMP-22 will reduce noise during construction as identified in Table 19-8 and described above, where applicable and in proximity to sensitive receptors. Construction would be short-term, intermittent, and would cease once work is complete. For these reasons, construction would not generate a substantial temporary increase in ambient noise levels in the vicinity of the Alternative 2 in excess of existing standards. Impacts would be less than significant.

NEPA Conclusion

Construction effects on temporary increases in ambient noise levels would be the same as described above for CEQA. Construction of Alternative 2 would temporarily increase noise levels as compared to the No Project Alternative. Additional single-family residences would potentially be exposed to temporary construction noise under Alternative 2 compared to Alternatives 1and 3 as a result of construction of the Sacramento River discharge. Therefore, construction noise impacts for Alternative 2 would be slightly greater than those for Alternatives 1 and 3. Construction would primarily occur during daytime hours between 7:00 a.m. and 7:00 p.m., when construction noise is not regulated by Colusa County and Glenn County. Yolo County, Tehama County, and the City of Willows have no regulations concerning noise from construction but have general policies to limit excessive noise exposure. Work during regulated hours in Glenn and Colusa Counties may be required in some cases, such as for road construction. Implementation of BMP-22 will reduce noise during construction, where applicable. Given all of the above, there would be no adverse effect due to the temporary increase in noise during construction of Alternative 2.

Impact NOI-2: Generation of a substantial 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

No Project

Under the No Project Alternative, existing sources of traffic and agricultural noise would continue. Project facilities would not be built or operated and therefore would not generate operating noise.

Significance Determination

The No Project Alternative would not generate a substantial permanent increase in ambient noise levels in the Project vicinity in excess of standards established in local general plans or noise

ordinances, or applicable standards of other agencies, because no Project facilities would be constructed and operated. There would be no impact/no effect.

Alternatives 1 and 3

This discussion focuses on permanent sources of noise from the operation of the PGPs and ongoing maintenance of the components for Alternatives 1 and 3. The operation of Alternative 1 or 3 would be the same because the differences in water deliveries would not affect noise, and both alternatives have the same permanent facilities and realignment of Sites Lodoga Road.

Operations

Permanent operation of various facilities, under Alternatives 1 and 3, would involve operation of different pumps at different locations, including the RBPP and the Funks and TRR East PGPs. Two additional pumps at the RBPP would potentially produce a noise level of 91 dBA, assuming no noise attenuation. However, the pumps would be housed in a similar enclosure as the existing pumps. Considering the flow rate would increase by 25% with the addition of new pumps as indicated in Chapter 2, the noise level from operation of the upgraded plant would not be noticeably higher compared to existing conditions.

The Funks PGP would include pumping power of 10,400 horsepower to achieve a flow rate of up to 2,100 cfs. The plant would include two turbines, rated at 20 and 14.5 megawatts. With no noise attenuating features, the bank of pumps would potentially produce noise levels of up to 100 dBA, and turbines would produce levels of up to 117 dBA at 50 feet. However, turbines would be located underground, and pumps would be enclosed in noise attenuating structures that would reduce noise levels to comply with Colusa County noise limits. The Operation and Maintenance Noise Design and Practices BMP includes measures to design pump stations to comply with local noise level performance standards by use of structures, sound barriers, acoustical enclosures, and exhaust silencers. Maintenance noise can be reduced by prohibiting unmuffled exhaust from gasoline or diesel engines, placing enclosures around fixed noise-generating equipment and shutting down idle vehicles and equipment. Given that the nearest residence to more than 1 mile away, noise from enclosed pumps and turbines would attenuate to below existing ambient levels at the nearest receptors.

The TRR East PGP would include pumping power of 11,700 horsepower to achieve a flow rate of up to 1,800 cfs. The PGP would include two turbines that are each rated at 13 megawatts. With no noise attenuating features, the bank of pumps would potentially produce noise levels of up to 101 dBA, and turbines would produce levels of up to 115 dBA at 50 feet. However, turbines would be located underground, and pumps would be enclosed in noise attenuating structures that would reduce noise levels to comply with Colusa County noise limits. BMP-24, Use of Design Features and Noise Control Practices to Reduce Operation and Maintenance Noise, will implement measures including designing pump stations to comply with local noise level performance standards by use of structures, sound barriers, acoustical enclosures, and exhaust silencers as required to reduce noise from operation of facilities. Given that the nearest residence to TRR East PGP is approximately 3,000 feet, noise from enclosed pumps and turbines would attenuate to below existing ambient levels at this distance.

Substations installed at the Funks and TRR East PGPs would potentially produce noise levels of up to 60 dBA at 50 feet. These levels would not be noticeable at the nearest receptors at either location.

Periodic maintenance under Alternatives 1 and 3 would be required for Sites Reservoir and associated facilities. Maintenance activities would involve the use of landscaping equipment, and heavy equipment would occasionally be needed (e.g., to maintain the embankments and dams, or remove sediment in the conveyance channels). Although heavy equipment may be required to repair any structural damage that may occur to various facilities over time, repairs would take place on an occasional, as-needed basis. While these activities would be conducted during the operating life of Alternatives 1 and 3, they would only occur intermittently and are not expected to be a substantial or frequent source of operational noise. In addition, maintenance activities that would require heavy equipment are expected to be conducted during daytime hours when noise from construction is not regulated by the applicable local jurisdictions.

Road Alignments and Recreation Areas

Alternatives 1 and 3 would involve realigning Sites Lodoga Road and adding a new bridge across the reservoir. The bridge would serve existing traffic traveling between Maxwell and Lodoga, as well as traffic associated with the Peninsula Hills and Stone Corral Creek Recreation Areas, and the day-use boat ramp on the west side of the reservoir. The new recreation areas would generate an estimated 1,558 daily one-way automobile trips to Sites Reservoir, primarily via Maxwell Sites Road, the main travel route through the community of Maxwell. As discussed in Chapter 18, *Navigation, Transportation, and Traffic*, the average daily traffic on Maxwell Sites Road is 1,617 vehicles per day (including trucks), which produces a calculated noise level of 56 dBA L_{dn}, according to modeling. If all recreational users accessed Sites Reservoir by Maxwell Sites Road, the addition of 3,116 daily automobile trips (doubled to account for vehicles arriving and departing on the same day) would result in a combined noise level of about 60 dBA L_{dn}, according to modeling. The increase of 4 dB would potentially be noticeable but noise from vehicle traffic would not exceed compatibility standards for residential use. Furthermore, some recreationists may elect to access Sites Reservoir via a different route and avoid Maxwell.

The new recreation areas would introduce noise sources associated with recreational boating, camping, and other recreational activities. Given the rural and open space setting of the new recreation areas, these activities may potentially result in a noticeable increase in noise above ambient levels. However, the nearest sensitive receptors are more than 1 mile from the Sites Lodoga Road realignment including the bridge, Huffmaster Road realignment, and recreation areas, and new sources of recreational noise would not be noticeable at these receptors. The realignment of Huffmaster Road under Alternatives 1 and 3 would involve moving the affected section out of the inundation area footprint. The realigned Huffmaster Road would consist of a gravel road to serve the existing residences located at the end of its current alignment and would not result in an increase in traffic. Therefore, noise levels associated with ongoing operation of the recreation areas and new roads are not expected to result in an exceedance of county noise standards.

CEQA Significance Determination and Mitigation Measures

Ongoing operation and maintenance of facilities would be done at a minimum distance of 3,000 feet from the nearest residence. Furthermore, BMP-24 will reduce noise from operation of facilities by designing pump stations to comply with local noise level performance standards by use of structures, sound barriers, acoustical enclosures, and exhaust silencers as well as prohibiting unmuffled exhaust from gasoline or diesel engines. New roads and recreation areas would be located more than 1 mile from the nearest residence. At these distances, the increase in noise levels from permanent operations is not expected to be noticeable, nor would it result in an exceedance of county noise standards. Therefore, this impact would be less than significant.

NEPA Conclusion

Operation effects on a substantial permanent increase in ambient noise would be the same as described above for CEQA. Operation of Alternative 1 or 3 would increase ambient noise levels as compared to the No Project Alternative, but ongoing operation and maintenance of facilities would be done at a minimum distance of 3,000 feet from the nearest residence. Furthermore, BMP-24 will reduce noise from operation of facilities by designing pump stations to comply with local noise level performance standards by use of structures, sound barriers, acoustical enclosures, and exhaust silencers as well as prohibiting unmuffled exhaust from gasoline or diesel engines. New roads and recreation areas would be located more than 1 mile from the nearest residence. At these distances, the increase in noise levels from permanent operations is not expected to be noticeable, nor would it result in an exceedance of county noise standards. There would be no adverse effect on sensitive receptors due to noise from the permanent operation of facilities under Alternative 1 or 3.

Alternative 2

Operations

Effects of noise from recreational use and traffic generated by the operations of the recreation areas for Alternative 2 would be the similar as those for Alternatives 1 and 3. There would be no bridge over the new reservoir for Alternative 2, and the realigned Huffmaster Road and South Road would serve existing traffic traveling between Maxwell and Lodoga, as well as traffic generated by the recreation areas on the west side of the reservoir. The nearest sensitive receptor to the new alignment of Huffmaster Road is a single-family residence located near the southern end of the inundation area. The recreation areas would generate an estimated 1,558 daily one-way automobile trips to the reservoir, primarily via Maxwell Sites Road. The realigned Huffmaster Road and the South Road would carry some of these vehicles. The increase in daily traffic would be negligible as it is anticipated fewer trips would occur on the South Road, given it is a less direct route to the recreation areas on the west side of the reservoir (Chapter 18).

Operations and maintenance activities would be the same for Alternative 2 as for Alternative 1 or 3 with respect to all components, except the realignment of Huffmaster Road, South Road alignment, and the Dunnigan Pipeline extended to the Sacramento River discharge. Except for noise from occasional maintenance, the operation of the Sacramento River discharge would not result in noise that would be noticeable at the nearest receptor. The discharge would only release water on a periodic basis into the Sacramento River down a riprap slope, and the discharge would be installed more than 2,000 feet from the nearest sensitive receptor.

CEQA Significance Determination and Mitigation Measures

Ongoing operation and maintenance of facilities, including the Sacramento River discharge, would be done at a minimum distance of 2,000 feet from the nearest residence. Furthermore, BMP-24 will reduce noise from operation of facilities by designing pump stations to comply with local noise level performance standards by use of structures, sound barriers, acoustical enclosures, and exhaust silencers as well as prohibiting unmuffled exhaust from gasoline or diesel engines. New roads and recreation areas would be located more than 600 feet from the nearest residence. At these distances, the increase in noise levels from permanent operations is not expected to be noticeable or result in an exceedance of county noise standards. Therefore, this impact would be less than significant.

NEPA Conclusion

Operation effects on a substantial permanent increase in ambient noise would be the same as described above for CEQA. Operation of Alternative 2 would increase ambient noise levels as compared to the No Project Alternative, but ongoing operation and maintenance of facilities, including the Sacramento River discharge, would be done at a minimum distance of 2,000 feet from the nearest residence. Furthermore, BMP-24 will reduce noise from operation of facilities by designing pump stations to comply with local noise level performance standards by use of structures, sound barriers, acoustical enclosures, and exhaust silencers as well as prohibiting unmuffled exhaust from gasoline or diesel engines. New roads and recreation areas would be located more than 600 feet from the nearest residence. At these distances, the increase in noise levels from permanent operations is not expected to be noticeable or result in an exceedance of county noise standards. There would be no adverse effect on sensitive receptors due to noise from the permanent operation of facilities under Alternative 2.

Impact NOI-3: Generation of excessive groundborne vibration or groundborne noise levels

No Project

Under the No Project Alternative, there would be no temporary use of heavy equipment related to the Project, although construction of other unrelated projects in the Project region would still occur. Vibration at sensitive receptors would generally be a rare occurrence and would only result in perceptible vibration when impact equipment such as pile drivers are used, or if heavy equipment is operated near structures containing sensitive receptors.

Significance Determination

The No Project Alternative would not generate excessive groundborne vibration or groundborne noise levels because no Project facilities would be constructed and operated. There would be no impact/no effect.

Alternatives 1 and 3

This discussion focuses on the temporary impacts of vibration from use of heavy equipment in the inundation area and the facility construction footprint, and the permanent sources of vibration from ongoing operations.

Construction

Construction of Alternatives 1 and 3 would involve the use of heavy equipment that could generate groundborne vibration. Typical vibration levels associated with heavy equipment at reference distances of 25 feet or greater are listed in Table 19-6. Under Alternatives 1 and 3, the construction equipment that would produce the highest level of vibration is a vibratory pile driver. Operation of pile drivers would result in noticeable levels of groundborne vibration immediately adjacent to the locations of piles. Structures within 50 feet of pile-driving activity could be exposed to vibration levels of 0.060 inch per second PPV or greater, which would potentially be noticeable inside those structures. All structures are located more than 50 feet from where pile driving would occur (Tables 19-2 and 19-6), and as such vibration would not be noticeable at this distance. Similarly, vibration from other heavy equipment (e.g., rollers, bulldozers) would not be noticeable at the nearest residences. Therefore, vibration from Alternative 1 or 3 construction is not expected to exceed thresholds related to structural damage for any of the buildings nearest to construction areas or result in impacts related to the annoyance of sensitive receptors from vibration.

Operations

The operation of Alternative 1 or 3 would be the same because the differences in water deliveries would not affect vibration and both alternatives have the same permanent facilities. Rubber-tired vehicles used for maintenance are not a significant source of vibration. Pumps are generally not a significant source of vibration. While it is not anticipated that pumps would generate vibration as part of operations, the nearest residence is more than 0.5 mile from the nearest pumping plant (Table 19-2); therefore, any vibration from facility operations is not expected to exceed vibration thresholds.

CEQA Significance Determination and Mitigation Measures

Vibration during construction and operation of Alternative 1 or 3 is not expected to exceed any thresholds associated with damage to buildings or annoyance to sensitive receptors because either sensitive receptors are absent or they are outside the area that would potentially be affected. Therefore, vibration-related construction and operations impacts under Alternative 1 or 3 would be less than significant.

NEPA Conclusion

Construction and operation effects on excessive groundborne vibration or groundborne noise levels would be the same as described above for CEQA. Vibration during construction and operation of Alternative 1 or 3 would increase groundborne vibration as compared to the No Project Alternative but is not expected to exceed thresholds associated with damage to buildings or annoyance to sensitive receptors because either sensitive receptors are absent or they are outside the area that would potentially be affected. There would be no adverse effect on sensitive receptors or damage to buildings due to vibration during construction and operations under Alternative 1 or 3.

Alternative 2

Construction and Operations

Vibration impacts from construction would generally be comparable between Alternative 2 and Alternative 1 or 3 because the construction equipment required would be similar and used in mostly the same locations. Alternative 2 would require pile driving adjacent to the Sacramento River, which could be an additional source of vibration. All structures are located more than 50 feet from where pile driving would occur (Tables 19-2 and 19-6), including the nearest residence relative to the Sacramento River discharge. Vibration from Project construction is not expected to exceed thresholds related to structural damage for any of the buildings nearest to construction areas or result in impacts related to the annoyance of sensitive receptors from vibration. Vibration impacts from operations are the same for Alternative 2 as for Alternative 1 or 3. Vibration from facility operations is not expected to exceed vibration thresholds.

CEQA Significance Determination and Mitigation Measures

Vibration during construction and operation under Alternative 2 is expected to be similar to that of Alternative 1 or 3 and is not expected to exceed any thresholds associated with structural damage or the annoyance of sensitive receptors. Therefore, vibration-related construction and operations impacts under Alternative 2 would be less than significant.

NEPA Conclusion

Construction and operation effects on excessive groundborne vibration or groundborne noise levels would be the same as described above for CEQA. Vibration during construction and operation under Alternative 2 would increase groundborne vibration as compared to the No Project Alternative but is expected to be similar to that of Alternative 1 or 3 and is not expected to exceed thresholds associated with structural damage or the annoyance of sensitive receptors. There would be no adverse effect due to vibration from construction or operations under Alternative 2.

19.5 References

19.5.1. Printed References

California Department of Transportation. 2020. *Transportation and Construction Vibration Guidance Manual.* April. Sacramento, CA.

County of Glenn. 2008. *Willows-Glenn County Airport Master Plan*. Adopted August 19. Available: https://www.countyofglenn.net/sites/default/files/Airports/WLWChp5.pdf. Accessed: October 30, 2020.

Cowan, J. P. 1994. *Handbook of Environmental Acoustics*. New York, NY: Van Nostrand Reinhold.

Federal Transit Administration. 2018. *Transit Noise and Vibration Impact Assessment*. FTA Report No. 0123. Available:

https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf. Accessed: October 10, 2019.

Google Earth. 2020. *Glenn County, California*. Lat 39.447882, Lon -122.011904, Eye alt 45 miles. Image Landsat/Copernicus. V 7.3.3.7786. Updated: July 21, 2020. Available: http://www.earth.google.com. Accessed: November 23, 2020.

Hoover, R. M., and R. H. Keith. 2000. *Noise Control for Buildings, Manufacturing Plants, Equipment and Products*. Houston, TX: Hoover & Keith, Inc.

Teachout, E. and T. Cushman. 2005. *Use of a Pile Driver Shroud to Minimize Disturbance to Wildlife.* Proceedings of Transportation Research Board Noise and Vibration Conference, Seattle, Washington, July 20, 2005.

Washington Department of Transportation. 2018. *Biological Assessment Preparation Advanced Training Manual*. Version 1-2018. Available: https://wsdot.wa.gov/environment/technical/fish-wildlife/esa-efh/BA-preparation-manual. Accessed: March 24, 2021.