

This section describes the existing ambient noise conditions in the Plan Area, discusses noise and vibration thresholds for short-term construction and long-term operation of the conveyance components (CM1) and conservation measures (CM2–CM22); identifies potential impacts from construction and operational noise related to the construction and operation of the conveyance components and conservation measures; and identifies mitigation measures to mitigate significant impacts.

23.1 Environmental Setting/Affected Environment

The study area (the area in which impacts may occur) for noise consists of the Plan Area (the area covered by the BDCP) and the Areas of Additional Analysis, as discussed in Chapter 4, *Approach to the Environmental Analysis*. The potential effects of Conservation Measure (CM) 1 on these receptors are evaluated at the project level, and the effects of CM2–CM22 are evaluated at the program level, consistent with the approach described in Chapter 4.

This section describes the existing environment in the study area, and identifies receptors that may potentially be affected by noise. The section begins with an explanation of the fundamentals of noise analysis.

This section does not discuss the noise setting or potential effects in the SWP and CVP Export Service Areas Region (Export Service Areas Region) because direct and indirect effects on noise from implementing the alternatives are primarily related to effects in the Plan Area. Operational changes in the other geographic regions of the project area—Upstream of the Delta and the State Water Project (SWP) and Central Valley Project (CVP) Export Service Areas—would not result in changes to the existing environment and thus these regions are not addressed further in the noise analysis. However, to the extent that there is a potential for growth inducement effects on noise in the Export Service Areas Region, this topic is addressed in Chapter 30, *Growth Inducement and Other Indirect Effects*.

23.1.1 Definitions of Noise

Noise is generally defined as a loud, unpleasant, unexpected, or undesired sound that is typically associated with human activity and that interferes with or disrupts normal activities. Levels of sound are measured and expressed in decibels (dB). Airborne sound is a rapid fluctuation of air pressure above and below atmospheric pressure. Methods used to measure or quantify sound levels depend on the source, the receiver, and the reason for measurement. The most common metric is the overall A-weighted sound level measurement, which measures sound in a manner similar to the way a person perceives or hears sound, thus achieving a strong correlation for evaluating acceptable and unacceptable sound levels. A-weighted measurement has been adopted by regulatory bodies worldwide. These sound levels are expressed as dBA.

A-weighted sound levels are typically measured or presented as L_{eq} , which is defined as the average sound level for a stated period of time. The L_{eq} is commonly used to measure steady-state sound that

1 is usually dominant. The A-weighted noise levels of common sources measured in the environment
2 and industry for various qualitative sound levels are provided in Table 23-1.

3 Statistical methods are used to capture the dynamics of a changing acoustical environment. These
4 measurements are typically denoted by L_{xx} , where xx represents the percent of time a sound level is
5 exceeded. The L_{90} represents the sound level that is exceeded during 90% of the measurement
6 period. Similarly, the L_{10} represents the sound level exceeded for 10% of the measurement period.
7 Another sound level expression is L_{max} , which is the maximum sound pressure level over a defined
8 period. These methods are used for measuring existing noise for various land use categories in the
9 counties in the study area (Section 23.2.3, *Regional and Local Plans, Policies, and Regulations*).

10 **Table 23-1. Typical Sound Levels Measured in the Environment and Industry**

Source at a Given Distance	A-Weighted Sound Level in Decibels (dBA)	Qualitative Description
Carrier deck jet operation	140	
	130	Pain threshold
Jet takeoff (200 feet)	120	
Auto horn (3 feet)	110	Maximum vocal effort
Jet takeoff (1,000 feet) shout (0.5 feet)	100	
New York subway station Heavy truck (50 feet)	90	Very annoying Hearing damage (8-hour, continuous exposure)
Pneumatic drill (50 feet)	80	Annoying
Freight train (50 feet) Freeway traffic (50 feet)	70	Intrusive (telephone use difficult)
Air conditioning unit (20 feet)	60	
Dishwasher (next room)	50	Quiet
Living room, bedroom	40	
Library, soft whisper (5 feet)	30	Very quiet
Broadcasting/recording studio	20	
	10	Just audible

Source: Adapted from New York Department of Environmental Conservation 2001 (Table E, Assessing and Mitigating Noise Impacts).

dBA = A-weighted sound level in decibels.

11

12 Another metric used to determine the effect of environmental noise is the difference in response
13 that people have to daytime and nighttime noise levels. During the evening and at night, exterior
14 background noises are generally lower than daytime levels. However, most household noise also
15 decreases at night and exterior noise becomes more noticeable. Furthermore, most people sleep at
16 night and are more sensitive to intrusive noises at that time. To account for human sensitivity to
17 evening and nighttime noise levels, the Daytime-Nighttime Noise Level (DNL) (also abbreviated as
18 L_{dn}) and California's Community Noise Equivalent Level (CNEL) were developed. The DNL is a noise
19 metric that accounts for the greater annoyance of noise during the nighttime hours (10:00 p.m. to
20 7:00 a.m.). The CNEL is a noise index that accounts for the greater annoyance of noise during the
21 evening hours (7:00 p.m. to 10:00 p.m.) and nighttime hours.

1 DNL values are calculated by averaging hourly L_{eq} sound levels for a 24-hour period and applying a
 2 weighting factor to the nighttime L_{eq} values. CNEL values are calculated similarly, except that a
 3 weighting factor is also added to evening L_{eq} values. The weighting factors, which reflect the
 4 increased sensitivity to noise during evening and nighttime hours, are added to each hourly L_{eq}
 5 sound level before the 24-hour DNL or CNEL is calculated. For the purposes of assessing noise, the
 6 24-hour day is divided into three time periods, with the following weightings.

- 7 • Daytime hours: 7:00 a.m. to 7:00 p.m. (12 hours) – weighting factor of 0 dBA.
- 8 • Evening hours (for CNEL only): 7:00 p.m. to 10:00 p.m. (3 hours) – weighting factor of 5 dBA.
- 9 • Nighttime hours (for both CNEL and DNL): 10:00 p.m. to 7:00 a.m. (9 hours) – weighting factor
 10 of 10 dBA.

11 The adjusted time-period noise levels are then averaged to compute the overall DNL or CNEL value.
 12 For a continuous sound source, the DNL value is easily computed by adding 6.4 dBA to the overall
 13 24-hour sound level (L_{eq}). For example, if the expected continuous sound level from a sound source
 14 is 60.0 dBA, the resulting DNL from the source would be 66.4 dBA. Similarly, the CNEL for a
 15 continuous sound source is computed by adding 6.7 dBA to the overall 24-hour L_{eq} . Given the small
 16 differences, the two are often used interchangeably.

17 The effects of noise on people can be listed in three general categories.

- 18 • Subjective effects of annoyance, nuisance, dissatisfaction.
- 19 • Interference with activities such as speech, sleep, learning.
- 20 • Physiological effects such as startling and hearing loss.

21 In most cases, effects from sounds typically found in the natural environment (compared to an
 22 industrial or an occupational setting) would be limited to the first two categories: creating an
 23 annoyance or interference with activities. No completely satisfactory method exists to measure the
 24 subjective effects of sound, or to measure the corresponding reactions of annoyance and
 25 dissatisfaction. This lack of a common standard arises primarily from the wide variation in
 26 individual thresholds of annoyance and habituation to sound. Thus, an important way of
 27 determining a person's subjective reaction to a new sound is by comparing it to the existing or
 28 "ambient" environment to which that person has adapted. In general, the more the level or tonal
 29 (frequency) variations of a sound exceed the previously existing ambient sound level or tonal
 30 quality, the less acceptable the new sound will be, as judged by the exposed individual.

31 The general human response to changes in sound levels having similar frequency content (for
 32 example, comparing increases in continuous [L_{eq}] traffic sound levels) is summarized as follows.

- 33 • A 3 dB change in sound level is considered a barely noticeable difference.
- 34 • A 5 dB change in sound level will typically be noticeable.
- 35 • A 10 dB change in sound level is considered to be a doubling in loudness.

36 Noise-sensitive land uses include places where people reside such as residences, hospitals, and
 37 health care facilities. Recreational areas, places of worship, and libraries are also considered to be
 38 sensitive to noise during use hours which are typically during the day. The discussion of noise
 39 impacts in this chapter is limited to effects on human use areas. Noise from construction of surface
 40 elements of the project could have an indirect effect on wildlife in the vicinity of the project and in
 41 nearby wildlife preserve areas. While noise pollution can be detrimental to wildlife generally, bird

1 populations are particularly susceptible because they rely on acoustic signals for mating, predator
2 evasion, and communication between adults and offspring, among other behaviors. The project's
3 effects on wildlife in the vicinity of the project and in nearby wildlife preserve areas are discussed in
4 Chapter 12, *Terrestrial Biological Resources*.

5 **23.1.2 Groundborne Vibration**

6 This section describes basic concepts related to groundborne vibration. In contrast to airborne
7 sound, groundborne vibration is not a phenomenon that most people experience every day. The
8 background vibration velocity level in residential areas is usually much lower than the threshold of
9 human perception. Most perceptible indoor vibration is caused by sources within buildings, such as
10 mechanical equipment operation, people moving, or doors slamming. Typical outdoor sources of
11 perceptible groundborne vibration are construction equipment, steel-wheeled trains, and traffic on
12 rough roads.

13 Construction activity can result in varying degrees of ground vibration depending on the equipment
14 and method used. Equipment such as air compressors, light trucks, and hydraulic loaders generate
15 little or no ground vibration. Pile drivers, vibratory compactors, and demolition equipment have the
16 potential to generate substantial vibration, which may present a concern if close to buildings
17 (Federal Transit Administration 2006).

18 Dynamic construction equipment such as pile drivers can create vibrations that radiate along the
19 surface and downward into the earth. These surface waves can be felt as groundborne vibration.
20 Vibration can result in effects ranging from annoying people to damaging structures. Variations in
21 geology and distance result in different vibration levels comprising different frequencies and
22 displacements. In all cases, vibration amplitudes will decrease with increasing distance from the
23 vibration source.

24 As vibration waves travel outward from a source, they excite the particles of rock and soil through
25 which they pass and cause them to oscillate. The actual distance that these particles move is usually
26 only a few ten-thousandths to a few thousandths of an inch. The rate or velocity (in inches per
27 second) at which these particles move is the commonly accepted definition of the vibration
28 amplitude, referred to as the peak particle velocity (PPV).

29 Groundborne vibration can also be expressed in terms of root mean square (RMS) vibration velocity
30 to evaluate human response to vibration levels. RMS is defined as the average of the squared
31 amplitude of the vibration signal. The vibration amplitude is expressed in terms of vibration
32 decibels (VdB), which use a reference level of 1 micro-inch per second. The threshold of perception
33 for most people is around 65 VdB. Vibration levels in the 70–80 VdB range are often noticeable but
34 acceptable. Typically, vibration levels must exceed 100 VdB before building damage occurs. Historic
35 structures, however, may have a damage threshold as low as 90 VdB.

36 The potential for annoyance and physical damage to buildings from vibration is the primary issue
37 associated with groundborne vibration. The human response to continuous groundborne vibration
38 is shown in Table 23-2.

1 **Table 23-2. Human Response to Continuous Vibration from Traffic**

Peak Particle Velocity (Inches/Second)	Human Response
0.4–0.6	Unpleasant
0.2	Annoying
0.1	Begins to annoy
0.08	Readily perceptible
0.006–0.019	Threshold of perception

Source: Whiffen and Leonard 1971.

2

3 Damage potential thresholds for vibration generated by construction activities are shown in Table
4 23-3.

5 **Table 23-3. Maximum Vibration Levels for Preventing Damage**

Building Category	Limiting Velocity (PPV in Inches/ Second)	Approximate Maximum Vibration Level (VdB)
Reinforced-concrete, steel, or timber (no plaster)	0.5 ^a	102
Engineered concrete and masonry (no plaster)	0.3 ^a	98
Historic and some old buildings	0.25 ^b	96
Non-engineered timber and masonry buildings	0.2 ^a	94
Buildings extremely susceptible to vibration damage	0.12 ^a	90

PPV = peak particle velocity.
VdB = root mean square velocity in decibels are 1 micro-inch/second.
^a Source: Federal Transit Administration 2006.
^b Source: California Department of Transportation 2004.

6

7 At higher frequencies, groundborne vibration can be perceived as a noise source. At sufficiently high
8 amplitudes, propagation of vibration waves through the ground can cause building elements to
9 vibrate at a frequency that is audible to the human ear. Groundborne noise could result in rattling of
10 windows, walls, or other items coupled to building surfaces. Groundborne vibration levels resulting
11 in groundborne noise are often experienced as a combination of perceptible vibration and low
12 frequency noise.

13 Land uses sensitive to groundborne vibration include places where people reside, schools, libraries,
14 and places of worship. Hospital operating rooms and certain types of industries that use vibration-
15 sensitive equipment are considered highly sensitive to groundborne noise and vibration. Outdoor
16 park facilities, such as picnic areas or athletic fields, are not considered sensitive to groundborne
17 noise or vibration.

18 The human response to different levels of groundborne noise and vibration is shown in Table 23-4.
19 Vibration levels with spectral components within the range of human hearing (30 hertz [Hz] and 60
20 Hz in the table) would produce the corresponding approximate A-weighted noise levels. Thus, it is
21 possible to experience vibrations as audible noise, even though physical vibrations may not be
22 detected.

1 **Table 23-4. Human Response to Groundborne Noise**

Vibration Velocity (VdB)	Low-Frequency Noise Level ^a (dBA)	Mid-Frequency Noise Level ^b (dBA)	Human Response
65	25	40	Approximate threshold of perception for many humans. Low-frequency sound usually inaudible; mid-frequency sound excessive for quiet sleeping areas.
75	35	50	Approximate dividing line between barely perceptible and distinctly perceptible. Many people find transit vibration at this level annoying. Low-frequency noise acceptable for sleeping areas; mid-frequency noise annoying in most quiet occupied areas.
85	45	60	Vibration acceptable only for an infrequent number of events per day. Low-frequency noise annoying for sleeping areas; mid-frequency noise annoying for institutional land uses such as schools and churches, even with infrequent events.

Source: Federal Transit Administration 2006.

VdB = vibration decibel.

dBA = A-weighted decibel.

^a Approximate noise level when vibration spectrum peak is near 30 Hz.

^b Approximate noise level when vibration spectrum peak is near 60 Hz.

2
3 Groundborne noise also has the potential to affect nesting birds. This discussion is located in
4 Chapter 12, *Terrestrial Biological Resources*.

5 **23.1.3 Potential Environmental Effects Area**

6 This section describes noise conditions in the Plan Area (see Figure 1-3), including southern Sutter
7 County, western Sacramento and San Joaquin Counties; eastern Yolo, Solano, Contra Costa, and
8 Alameda Counties; the southwestern part of Sacramento County; and the cities of Isleton, West
9 Sacramento, Rio Vista, and Antioch. In general, most of the Plan Area includes places where the
10 existing environment is typical of a quiet rural setting. Primary noise sources are traffic traveling on
11 surrounding rural roadways, agricultural operations (including crop duster planes), overhead
12 commercial aircraft, and recreational related noise (e.g., fishing boats, wakeboarding and waterski
13 boats). Typical ambient sound levels as a function of population density are presented in Table 23-5.

1 **Table 23-5. Typical Ambient Sound Levels as a Function of Population Density**

Location	L _{dn} (A-Weighted Decibel)
Rural: Undeveloped	35
Rural: Partially Developed	40
Suburban: Quiet	45
Suburban: Normal	50
Urban: Normal	55
Urban: Noisy	60
Urban: Very Noisy	65

Sources: Cowan 1994; Hoover and Keith 2000.

L_{dn} = day-night sound level.

2

3 **23.1.3.1 Sutter County**

4 **Existing Sources of Noise**

5 Noise sources in southern Sutter County include transportation and non-transportation activities.
 6 Traffic noise occurs along the corridors of State Routes (SRs) 70, 99, and 113. Freight and passenger
 7 rail traffic and aircraft from the Sacramento International Airport and Sutter County Airport
 8 contribute to the noise environment. Motorized boats along the Sacramento River also contribute
 9 noise. Non-transportation noise sources include agricultural operations, commercial and industrial
 10 activities, parks and school playing fields, heating and cooling equipment, landscape maintenance,
 11 heavy equipment use, and outdoor sporting event facilities.

12 **Existing Noise-Sensitive Land Uses**

13 Sutter County land in the study area is primarily in natural preserve and open space. The Yolo
 14 Bypass, a leveed, 59,000-acre floodplain, traverses the county from the Sutter County-Yolo County
 15 Line, near the Fremont Weir in the north, to the Yolo County-Solano County line in the south. Land
 16 within the Yolo Bypass is also used for agricultural and managed wetland (duck club) activities.

17 **Existing Noise Levels**

18 Land uses near project components are primarily rural and consist of agricultural use and low-
 19 density residential development. As such existing noise levels are in the range of 40 to 50 dBA (see
 20 Table 23-5).

21 **23.1.3.2 Sacramento County**

22 **Existing Sources of Noise**

23 Noise sources in western Sacramento County, Sacramento, and Isleton include transportation and
 24 non-transportation activities. Traffic noise occurs along the corridors of Interstates 5 and 80 (I-5, I-
 25 80), Highway 50, and SR 160. Freight and passenger rail traffic, and aircraft from the Sacramento
 26 International Airport, Sacramento Executive Airport, Franklin Field Airport, and Borges-Clarksburg
 27 Airport contribute to the noise environment. Motorized boats along the Sacramento River also
 28 contribute noise. Non-transportation noise sources include agricultural operations, commercial and

1 industrial activities, parks and school playing fields, heating and cooling equipment, landscape
2 maintenance, heavy equipment use, and outdoor sporting event facilities.

3 **Existing Noise-Sensitive Land Uses**

4 Sacramento County land in the study area is primarily in agricultural, recreation, natural preserve,
5 and open space uses. Residential, commercial, and industrial uses are concentrated in the
6 communities and cities (including Sacramento and Isleton) in the Delta. Residential and recreational
7 uses are the primary noise-sensitive land uses within the county.

8 **Existing Ambient Noise Level**

9 Land uses near project components are primarily rural and consist of agricultural use and low-
10 density residential development. As such existing noise levels are in the range of 40 to 50 dBA (see
11 Table 23-5).

12 **23.1.3.3 Yolo County**

13 **Existing Sources of Noise**

14 Noise sources in eastern Yolo County and West Sacramento include transportation and
15 non-transportation activities. Traffic noise occurs along the corridors of Interstates 5 and 80 and
16 State Routes 84 and 113. Freight and passenger rail traffic, and aircraft from the Sacramento
17 International Airport and Bourges-Clarksburg Airport, contribute to the noise environment.
18 Motorized boats along the Sacramento River also contribute noise. Non-transportation noise
19 sources in the county include agricultural operations, commercial and industrial activities, parks
20 and school playing fields, heating and cooling equipment, landscape maintenance, and heavy
21 equipment use.

22 **Existing Noise-Sensitive Land Uses**

23 Yolo County land in the study area is primarily in agricultural use. Residential, commercial, office
24 and industrial, recreational, and vacant land uses also exist within the county. Residential,
25 commercial, and industrial uses are concentrated in the community of Clarksburg, in the east-
26 central portion of the county along the border of Yolo and Sacramento Counties. Residential uses are
27 the primary noise-sensitive land use in the county.

28 **Existing Noise Levels**

29 Table 23-6 summarizes existing noise measurements for portions of Yolo County near potential
30 project-related construction, or operations and maintenance activities. Relevant noise levels
31 described in the Yolo County Draft General Plan (County of Yolo 2009) are the traffic noise levels
32 along SR 84 in the area.

1 **Table 23-6. Existing Highway Traffic Noise Levels in Yolo County**

Roadway	Average Daily Traffic	L _{dn} (dBA) 100 feet from Centerline	Centerline to 70 L _{dn} (feet)	Centerline to 65 L _{dn} (feet)	Centerline to 60 L _{dn} (feet)
State Route 84, Clarksburg Road to West Sacramento	1,600	56.8	<50	<50	62

Source: Adapted from Yolo County 2009.
dBA = A-weighted sound level in decibels.
L_{dn} = day-night sound level.

2

3 Land uses near project components are primarily rural and consist of agricultural use and low-
4 density residential development. As such existing noise levels in areas located away from SR 84 are
5 in the range of 40 to 50 dBA (see Table 23-5).

6 **23.1.3.4 Solano County**7 **Existing Sources of Noise**

8 Noise sources in eastern Solano County and the city of Rio Vista include transportation and non-
9 transportation activities. Traffic noise occurs along the corridors of I-680 and SR 84, SR 113, SR 160,
10 and SR 12. Rail operations and aircraft from the Rio Vista Municipal Airport and Travis Air force
11 Base contribute to the noise environment. Motorized boats along the Sacramento River also
12 contribute noise. Non-transportation noise sources in the county include agricultural operations,
13 commercial and industrial activities, parks and school playing fields, heating and cooling equipment,
14 landscape maintenance, natural gas compression stations, and heavy equipment use.

15 **Existing Noise-Sensitive Land Uses**

16 Unincorporated Solano County land in the study area is primarily in agricultural or natural
17 resources use. Rural residential development has occurred in various communities in the
18 unincorporated county. Residential and commercial land uses are concentrated in highway areas
19 and in the city of Rio Vista. Residential uses are the primary noise-sensitive land uses in the county.

20 **Existing Noise Levels**

21 Land uses near project components are primarily rural and consist of agricultural use and low-
22 density residential development. As such existing noise levels are in the range of 40 to 50 dBA (see
23 Table 23-5).

24 **23.1.3.5 San Joaquin County**25 **Existing Sources of Noise**

26 Noise sources in western San Joaquin County include transportation and non-transportation
27 activities, including Stockton Port shipping activities. Traffic noise occurs along the corridors of I-5,
28 SR 4, and SR 12. Rail operations and aircraft from the Stockton Metropolitan Airport, Kingdon
29 Executive Airport, Lodi Airport, Lodi Airpark, Tracy Municipal Airport, and an airstrip near Vernalis
30 contribute to the noise environment in the western portion of the county. Motorized boats along the

1 San Joaquin River also contribute noise. Non-transportation noise sources in the county include
2 agricultural operations, commercial and industrial activities, parks and school playing fields, heating
3 and cooling equipment, landscape maintenance, natural gas compression stations, and heavy
4 equipment use.

5 **Existing Noise-Sensitive Land Uses**

6 San Joaquin County land in the study area is primarily in agricultural use. Residential, commercial,
7 industrial, and public facilities are mostly adjacent to the cities of Tracy, Stockton, and Lathrop.
8 Recreational and residential land uses are the primary noise-sensitive land uses in the county.

9 **Existing Noise Levels**

10 Land uses near project components are primarily rural and consist of agricultural use and low-
11 density residential development. As such existing noise levels are in the range of 40 to 50 dBA (see
12 Table 23-5).

13 **23.1.3.6 Contra Costa County**

14 **Existing Sources of Noise**

15 Noise sources in eastern Contra Costa County and eastern Antioch include transportation and
16 non-transportation activities. Traffic noise occurs along the corridors of SR 4 and SR 160.
17 Rail operations and aircraft from the Byron Airport contribute to the noise environment. Motorized
18 boats along the San Joaquin River also contribute noise. Non-transportation noise sources in the
19 county include agricultural operations, commercial and industrial activities, parks and school
20 playing fields, heating and cooling equipment, landscape maintenance, and heavy equipment use.

21 **Existing Noise-Sensitive Land Uses**

22 Contra Costa County land in the study area is primarily in agricultural and recreational use.
23 Residential, commercial, industrial, and open space land uses also exist in both unincorporated and
24 incorporated areas of the county. Residential, commercial, and industrial uses are concentrated in
25 the city of Oakley, in eastern Contra Costa County. Residential uses are the primary noise-sensitive
26 land uses in the county.

27 **Existing Noise Levels**

28 Existing noise measurements for portions of Contra Costa County in the vicinity of the study area, as
29 described in the Contra Costa County General Plan (Contra Costa County 2005), include traffic noise
30 levels from existing roadways in the area. The noise contour maps indicate that roadway noise near
31 potential project-related activities evaluated in this EIR/EIS ranged from 60 to 75 dB in 2005.

32 Land uses near project components are primarily rural and consist of agricultural use and low-
33 density residential development. As such existing noise levels are in the range of 40 to 50 dBA (see
34 Table 23-5).

1 **23.1.3.7 Alameda County**

2 **Existing Sources of Noise**

3 Noise sources in far northeastern Alameda County are primarily related to rail operations and
4 farming.

5 **Existing Noise-Sensitive Land Uses**

6 Alameda County land in the study area is primarily in agricultural use. Residential uses are the
7 primary noise-sensitive land uses in the county.

8 **Existing Noise Levels**

9 Land uses near project components are primarily rural and consist of agricultural use and low-
10 density residential development. As such existing noise levels are in the range of 40 to 50 dBA (see
11 Table 23-5).

12 **23.2 Regulatory Setting**

13 **23.2.1 Federal Plans, Policies, and Regulations**

14 Although no federal regulations limit overall environmental noise levels, federal guidance
15 documents and regulations address environmental noise from specific sources such as trucks, trains,
16 and airplanes. In addition, Occupational Safety and Health Administration (OSHA) standards address
17 occupational noise exposure common in the construction industry. Noise exposure of this type is
18 dependent on work conditions and is addressed through a facility's or contractor's health and safety
19 plan.

20 A summary of various federal noise guidelines is presented in Table 23-7 and Figure 23-1. As an
21 example, the Federal Railroad Administration (FRA) and Federal Transit Administration (FTA)
22 guidelines are presented on a sliding scale. Therefore, if the existing noise exposure at a sensitive
23 receptor is 50 dBA, an effect would occur if an increase of 5 dBA is predicted. Applicable federal
24 guidelines related to noise effects on aquatic and biological species are presented in Chapter 11, *Fish*
25 *and Aquatic Resources*, and Chapter 12, *Terrestrial Biological Resources*.

1 **Table 23-7. Summary of Federal Guidelines/Regulations for Residential Exterior Noise**

Agency	L_{eq} (dBA)
Federal Energy Regulatory Commission	49
Federal Highway Administration	67
Federal Aviation Administration	59
Federal Railroad Administration and Federal Transit Administration ^{a, b}	Sliding scale, refer to Figure 23-1
U.S. Environmental Protection Agency ^c	49
U.S. Department of Housing and Urban Development ^d	65

dBA = A-weighted sound level in decibels.

L_{eq} = overall 24-hour sound level.

^a Federal Railroad Administration 1998.

^b Federal Transit Administration 2006.

^c U.S. Environmental Protection Agency 1974.

^d 24 CFR Part 51B.

2

3 The Federal Highway Administration (FHWA) has developed methods for evaluating construction
 4 noise, which are discussed in the Roadway Noise Construction Model User's Guide (Federal Highway
 5 Administration 2006). The FHWA does not recommend specific noise level criteria for construction
 6 activities. Title 23, Part 772 of the Code of Federal Regulations (23 CFR 772), "Procedures for
 7 Abatement of Highway Traffic Noise and Construction Noise," outlines procedures for noise studies
 8 that are required for approval of Federal-aid highway projects. FHWA published a final rule revising
 9 23 CFR 772 on July 13, 2010 (Appendix A). The FHWA requires that State highway agencies prepare
 10 updated state-specific policies and procedures for applying the revised regulation in their state. The
 11 FHWA noise regulation requires State DOTs to establish a definition of "approach" that is at least 1
 12 dB(A) less than the noise abatement criteria (NAC) for use in identifying traffic noise impacts in
 13 traffic noise analyses. The Federal Transit Administration has developed criteria for groundborne
 14 vibration and methods for the assessment of construction noise (Federal Transit Administration
 15 2006).

16 **23.2.2 State Plans, Policies, and Regulations**

17 The California Noise Control Act was enacted in 1973 (Health and Safety Code § 46010 et seq.) and
 18 states that the Office of Noise Control (ONC) should provide assistance to local communities in
 19 developing local noise control programs. It also commits ONC staff to work with the Office of
 20 Planning and Research (OPR) to provide guidance for the preparation of the required noise
 21 elements in city and county general plans, pursuant to Government Code § 65302(f). In preparing
 22 the noise element, a city or county must identify local noise sources and analyze and quantify, to the
 23 extent practicable, current and projected noise levels for various sources, including highways and
 24 freeways; passenger and freight railroad operations; ground rapid transit systems; commercial,
 25 general, and military aviation and airport operations; and other ground stationary noise sources.
 26 California Administrative Code, Title 4, has guidelines for evaluating the compatibility of various
 27 land uses as a function of community noise exposure, as presented on Figure 23-2 (Office of Planning
 28 and Research 2003).

1 Section 01570 of the California Department of Water Resources (DWR) Specification 05-16 suggests
2 the following guidelines for DWR construction projects:

3 Where ambient noise levels are less than 60 dBA and it is determined that construction related noise
4 will cause noise levels to exceed 60 dBA, or where the ambient noise levels are greater than 60 dBA
5 and it is determined that construction related noise will cause noise levels to exceed the ambient
6 level by 5 dBA, a temporary sound wall shall be constructed between the sensitive area and the
7 construction related noise source. The 60 dBA limit is not a regulatory requirement. Although the 60
8 dBA limit is not a regulatory requirement, it has been established as a threshold for establishing
9 noise impacts by consensus of experts, local and resource agencies, including the U.S. Fish and
10 Wildlife Service (USFWS). It is estimated that among other things, noise levels above 60 dBA may
11 interfere with communication among birds and other wildlife.

12 Applicable state guidelines related to noise effects on aquatic and biological species are presented in
13 Chapter 11, *Fish and Aquatic Resources*, and Chapter 12, *Terrestrial Biological Resources*.

14 **23.2.2.1 Traffic Noise Analysis Protocol for New Highway Construction** 15 **and Reconstruction Projects**

16 The Caltrans Traffic Noise Analysis Protocol (Protocol) specifies the policies, procedures, and
17 practices to be used by agencies that sponsor new construction or reconstruction of federal-aid
18 highway projects (e.g. Type I projects). The Protocol defines a noise increase as a *substantial*
19 *increase* when the predicted noise levels with project implementation exceed existing noise levels by
20 12 dB (California Department of Transportation 2011).

21 **23.2.2.2 Caltrans Vibration Criteria**

22 For continuous/frequent intermittent sources such as pile driving Caltrans recommends a threshold
23 of 0.25 in/sec PPV for “historic and some old buildings” and 0.3 in/sec for “older residential
24 structures.” (California Department of Transportation 2004:27). These criteria are primarily
25 directed, but not limited to all construction related to pile driving, demolition and pavement
26 breaking activities.

27 **23.2.3 Regional and Local Plans, Policies, and Regulations**

28 As stated above, California Government Code § 65302(f) requires city and county general plans to
29 include a noise element. The purpose of a noise element is to guide future development to enhance
30 future land use compatibility. In addition to general plan requirements, some jurisdictions have
31 established noise ordinances in their municipal codes. Noise ordinances establish limits for which
32 penalties or enforcement action may be taken. Therefore, a noise ordinance generally must not be
33 exceeded, whereas general plan limits are to be considered during the development of a project and
34 may or may not be strictly applied, depending on the particular circumstances of the proposed
35 project. Local standards are listed below for informational purposes and were considered in the
36 development of thresholds to determine if noise impacts are adverse.

37 **23.2.3.1 Sutter County**

38 The Sutter County General Plan was recently updated and the final plan was adopted in March 2011.
39 The General Plan Noise Element (Sutter County 2010) states that new non-transportation noise
40 sources will be mitigated to the noise level standards shown in Table 23-8. Policy N 1.6 relates to
41 construction noise and states: require discretionary projects to limit noise-generating construction

1 activities within 1,000 feet of noise-sensitive uses (i.e., residential uses, daycares, schools,
 2 convalescent homes, and medical care facilities) to daytime hours between 7:00 a.m. and 6:00 p.m.
 3 on weekdays, 8:00 a.m. and 5:00 P.M. on Saturdays, and prohibit construction on Sundays and
 4 holidays unless permission for the latter has been applied for and granted by the County. Sutter
 5 County does not have a noise ordinance.

6 **Table 23-8. Sutter County Noise Standards for Non-Transportation Sources**

Noise Level Descriptor	Daytime	Nighttime
Hourly L_{eq} , dB	55	45
Maximum level, dB	70	65

Source: Sutter County 2010.

Note: Noise levels are measured at the property line of the noise-sensitive use.

dB = decibels.

L_{eq} = overall 24-hour sound level.

7

8 **23.2.3.2 Sacramento County**

9 The Sacramento County 2030 General Plan Update was adopted in November 2011. The City of
 10 Isleton General Plan does not include a noise element.

11 **Sacramento County**

12 The Sacramento County 2030 General Plan Update Noise Element (Sacramento County 2011) states
 13 that interior and exterior noise created by new non-transportation noise sources may not exceed
 14 the noise level standards shown in Table 23-9 at existing noise-sensitive areas in a project's vicinity.
 15 The Plan states that noise associated with construction activities shall adhere to County Code
 16 requirements.

17 **Table 23-9. Sacramento County Noise Level Performance Standards**

Receiving Land Use	Exterior Noise Levels (dBA)				Interior Noise Levels (dBA)	
	Daytime		Nighttime		Anytime	
	L_{50}	L_{max}	L_{50}	L_{max}	L_{50}	L_{max}
All residential	55	75	50	70	35	55
Transient lodging	55	75	-	-	35	55
Hospitals and nursing homes	55	75	-	-	35	55
Theaters and auditoriums	-	-	-	-	30	50
Churches, meeting halls, schools, libraries, etc.	55	75	-	-	35	60
Office buildings	60	75	-	-	45	65
Commercial buildings	-	-	-	-	45	65
Playgrounds, parks, etc.	65	75	-	-	-	-
Industry	60	80	-	-	50	70

Source: Sacramento County 2011.

dBA = A-weighted sound level in decibels.

18

1 Sacramento County Code Section 6.68, Noise Control, states that exterior noise shall not exceed
2 50 dBA between 10:00 p.m. and 7:00 a.m. and 55 dBA between 7:00 a.m. and 10:00 p.m. for
3 residential and agricultural areas. Construction activities between the hours of 6:00 a.m. and 8:00
4 p.m. Monday through Friday and 7:00 a.m. and 8:00 p.m. on weekends are exempt from this
5 ordinance. Construction may be allowed to continue past these limits when an unforeseen or
6 unavoidable condition occurs and the nature of the project requires work to continue until a specific
7 amount of work is completed that will not jeopardize inspection acceptance or create undue
8 financial hardships for the contractor or owner (Sacramento County 2009).

9 **23.2.3.3 Yolo County**

10 The Yolo County General Plan Health and Safety Element (County of Yolo 2009) addresses
11 limitations for noise sources based on OPR's noise compatibility guidelines (Figure 23-2). Yolo
12 County does not have a noise ordinance, but the 2009 General Plan recommends the adoption of a
13 comprehensive noise ordinance by 2011.

14 **23.2.3.4 Solano County**

15 The Solano County General Plan was adopted in December 2008 (Solano County 2008). The City of
16 Rio Vista adopted the latest general plan in 2002 (City of Rio Vista 2002).

17 **Solano County**

18 Exterior noise standards are presented in the Solano County General Plan Noise Element (Solano
19 County 2008) as those recommended by OPR's noise compatibility guidelines (Figure 23-2). The
20 Noise Element recommends the adoption of a noise ordinance that would set performance
21 standards and exemptions, and specifies restrictions on noise-emitting construction activities based
22 on standards for construction equipment.

23 **City of Rio Vista**

24 The City of Rio Vista General Plan Safety and Noise Element (City of Rio Vista 2002) establishes
25 noise standards for new uses affected by non-transportation noise (Table 23-10).

26 In addition, the Safety and Noise Element has policies limiting construction activities between 7:00
27 a.m. and 5:00 p.m. without an exemption from the city to cover special circumstances. The noise
28 standards require mufflers on internal combustion engines used in conjunction with construction
29 activities. The noise ordinance (City of Rio Vista 2009) prohibits any outside construction or repair
30 work on buildings or structures within a residential zone or within 500 feet of a residential zone in
31 the city on Sundays and between the hours of 7:00 p.m. and 7:00 a.m. Monday through Saturday.

1 **Table 23-10. City of Rio Vista Existing Noise Level Performance Standards**

Receiving Land Use	Exterior Noise Levels, L_{eq} (dBA)		Interior Noise Level, L_{eq} (dBA)
	Daytime	Nighttime	Anytime
All residential	50	45	35
Transient lodging	55	–	40
Hospitals and nursing homes	50	45	35
Theaters and auditoriums	–	–	35
Churches, meeting halls, schools, libraries, etc.	55	–	40
Office buildings	55	–	45
Commercial buildings	55	–	45
Playgrounds, parks, etc.	65	–	–
Industry	65	65	50

Source: City of Rio Vista 2002.

dBA = A-weighted sound level in decibels.

L_{eq} = overall 24-hour sound level.

2

3 **23.2.3.5 San Joaquin County**

4 The San Joaquin County General Plan Noise Element (San Joaquin County 1992) includes an hourly
5 equivalent sound level of 50 dB from stationary sources during the daytime and 45 dB during
6 nighttime for outdoor activity areas in residential areas and other sensitive-receptor land uses.

7 The San Joaquin County Ordinance includes noise restrictions related to airport operations, vehicle
8 noise-making devices, uses of parks, and barking dogs. The ordinance does not include specific
9 restrictions for construction or operation of equipment.

10 **23.2.3.6 Contra Costa County**

11 The Contra Costa County General Plan (Contra Costa County 2005) and City of Antioch General Plan
12 (City of Antioch 2003) address noise standards of the study area in Contra Costa County.

13 **Contra Costa County**

14 The Contra Costa County General Plan Noise Element (Contra Costa County 2005) requires that new
15 projects meet exterior noise level standards as established in OPR's noise compatibility guidelines
16 (Figure 23-2).

17 Construction activities must be concentrated during the hours of the day that are not noise-sensitive
18 for adjacent land uses and should be commissioned to occur during normal daytime work hours to
19 provide relative quiet during the more sensitive evening and early morning periods. Contra Costa
20 County does not have a noise ordinance.

21 **City of Antioch**

22 Noise standards established in the City of Antioch General Plan Environmental Hazards Element
23 (City of Antioch 2003) include a noise level of 60 dBA CNEL for residences, hospitals, and libraries;

65 dBA CNEL for school classrooms; and 70 dBA CNEL for school play and sports areas and commercial/industrial areas at the front setback. Non-residential development adjacent to occupied noise-sensitive land uses must implement a construction noise mitigation plan. This plan must include the use of temporary noise-attenuation fences; the use of noise-reduction features on construction equipment; and the restriction of construction to between the hours of 7:00 a.m. and 7:00 p.m. Monday through Saturday. No construction is allowed on Sundays or public holidays.

The City of Antioch Noise Ordinance (City of Antioch 2009) prohibits the operation of heavy construction equipment and construction activities on weekdays prior to 7:00 a.m. and after 6:00 p.m., on weekdays within 300 feet of occupied dwelling space prior to 8:00 a.m. and after 5:00 p.m., and on weekends and holidays prior to 9:00 a.m. and after 5:00 p.m., irrespective of the distance from the occupied dwelling.

23.2.3.7 Alameda County

The Alameda County General Plan consists of three general plans, one for each geographical area. The East County General Plan is relevant to this summary. The East County General Plan Environmental Safety Element (Alameda County 2000) requires noise studies as part of development review for projects located in areas exposed to high noise levels, and in areas adjacent to existing residential or other sensitive land uses. The East County General Plan Noise Element also requires the use of noise-reduction techniques to mitigate noise impacts generated by stationary sources.

The Alameda County General Ordinance Code Chapter 6.60 (Alameda County 2009) establishes noise standards for residential and commercial areas as shown in Table 23-11. Construction activities between the hours of 7:00 a.m. and 7:00 p.m. Monday through Friday, and 8:00 a.m. and 5:00 p.m. on weekends are exempt from these standards.

Table 23-11. Alameda County Existing Noise Level Standards

Cumulative Number of Minutes in Any 1-hour Period	Residential Noise Level Standards (dBA)		Commercial Noise Level Standards (dBA)	
	Daytime	Nighttime	Daytime	Nighttime
	7 a.m. to 10 p.m.	10 p.m. to 7 a.m.	7 a.m. to 10 p.m.	10 p.m. to 7 a.m.
30	50	45	65	60
15	55	50	70	65
5	60	55	75	70
1	65	60	80	75
0	70	65	85	80

Source: Alameda County 2009.

dBA = A-weighted sound level in decibels.

1 23.3 Environmental Consequences

2 23.3.1 Methods for Analysis

3 23.3.1.1 Construction Noise and Vibration

4 The assessment of potential construction noise levels was based on methodology developed by the
 5 FTA (2006). Potential effects associated with construction activities would be temporary, which, for
 6 the purposes of this chapter, is defined as the 9-year construction period. Noise levels produced by
 7 commonly used construction equipment are summarized in Table 23-12. Individual types of
 8 construction equipment are expected to generate maximum noise levels ranging from 80 to 96 dBA
 9 at a distance of 50 feet. The construction noise level at a given receiver depends on the type of
 10 construction activity, the noise level generated by that activity, and the distance and shielding
 11 between the activity and noise-sensitive receivers.

12 Utilization factors for construction noise are used in the analysis to develop L_{eq} noise exposure
 13 values. The L_{eq} value accounts for the energy-average of noise over a specified interval (usually 1
 14 hour), so a utilization factor represents the amount of time a type of equipment is used during the
 15 interval.

16 Sheet piles would be driven using impact hammers during construction of intake facilities, and
 17 drilled piles will be used for other project components such as pumping plants, canal box culvert
 18 siphons, and barge unloading facilities. Vibration source levels for pile drivers are shown in Table
 19 23-13.

20 **Table 23-12. Commonly Used Construction Equipment Noise Emission Levels**

Equipment	Typical Noise Level (dBA) 50 Feet from Source
Pile-driver (Impact)	101
Pile-driver (Sonic)	96
Grader	85
Bulldozers	85
Truck	85
Loader	80
Air Compressor	80
Backhoe	80
Pneumatic Tool	85
Excavator	85
Auger Drill Rig (for drilled piles)	85
Crane, Derrick	88
Concrete Mixer Truck	79
Concrete Batch Plant	N/A
Compactor (Ground)	83
Concrete mixer	85

Source: Federal Highway Administration 2006.

dBA = A-weighted decibel.

1 **Table 23-13. Vibration Source Levels for Pile Drivers**

Equipment		PPV at 25 feet (Inches/Second)	Approximate Vibration Level (Vdb)
Pile Driver (impact)	Upper range	1.518	112
	Typical	0.644	104
Pile Driver (sonic)	Upper range	0.734	105
	Typical	0.170	93

Source: Federal Transit Administration 2006.
 PPV = peak particle velocity.
 VdB = root mean square velocity in decibels re 1 micro-inch/second.

2

3 **23.3.1.2 Traffic Noise Modeling**

4 Traffic noise levels at sensitive receptors near construction haul routes were evaluated through use
 5 of the FHWA Traffic Noise Model Lookup program (TNM). TNM estimates average noise levels at
 6 fixed distances from the roadway centerline based on estimated traffic volumes for automobiles and
 7 medium- and heavy-duty trucks, vehicle speeds, and a designated noise drop-off rate based on
 8 ground type. Shielding effects from topographical features and buildings are not accounted for in the
 9 model. The model was programmed to produce a conservative, worst-hour estimate of temporary
 10 traffic-generated noise levels due to heavy truck and increased commuter trips associated with
 11 construction of project and conservation components. An estimate of peak-hour construction-
 12 generated traffic was based on Appendix 19A, *Bay Delta Conservation Plan Construction Traffic*
 13 *Impact Analysis Report*.

14 The environmental consequences analysis includes an assessment of traffic noise impacts based on
 15 loudest-hour traffic noise levels under future project alternatives, compared to Existing Conditions.
 16 Existing loudest-hour noise levels are shown in Table 23-14.

17 **23.3.1.3 Groundborne Vibration from Tunneling Operations**

18 Currently, there are no federal regulations or California Environmental Quality Act (CEQA)
 19 guidelines for vibration resulting from tunnel construction. Vibration sources from construction of
 20 the project would include tunnel boring machine (TBM) operation and pile driving.

21 Vibration from TBM operations occurs at low frequencies, whereas groundborne noise typically is
 22 caused by higher frequency vibrations that manifest as audible noise inside of buildings.

23 Haul trains operating inside of the tunnel during construction would be the only likely source of any
 24 perceivable groundborne noise and vibration. Groundborne noise from moving haul trains would be
 25 generated from the wheel-rail interface and could propagate through the ground to nearby buildings
 26 at a frequency within the range of human hearing and manifest as audible noise inside structures.

27 **23.3.1.4 Existing Baseline Conditions in the Study Area**

28 Under NEPA (and CEQA), the baseline is the existing ambient noise level in a given location. Baseline
 29 noise levels vary greatly depending on the extent of urban development and proximity to
 30 transportation corridors. Ambient rural noise levels are typically in the range of 40–50 dB (Table

23-5). Ambient noise levels near major highways can be as high as 75 dB. Modeled existing traffic noise levels at locations near roadways in the study area are discussed in Section 23.4.1.2.

To assess increases in noise levels due to construction of the project, a baseline of 40 dBA is used to describe the existing ambient noise level in the study area. Because many of the facilities that would be constructed under the project alternatives are located primarily in rural areas, a baseline level of 40 dBA would be characteristic of the project's mostly rural setting, and was therefore assumed to apply to the entire study area. The ambient baseline level of 40 dBA is used in this analysis to conservatively account for increases in noise levels during daytime hours, and potentially sleep disturbance during nighttime hours. Noise monitoring at specific locations has not been conducted for this project.

The thresholds for construction indicate that, where existing ambient noise level is less than 60 dBA, impacts would be significant where construction noise levels are predicted exceed the DWR standard of 60 dBA (50 dBA during nighttime hours). Therefore an existing ambient noise level of 40 dBA conservatively accounts for the most stringent construction noise increase thresholds used in the environmental consequences analysis.

The existing Banks and Jones Pumping Plants contribute to the noise environment in an isolated rural setting near the Contra Costa/Alameda county line. Existing pump noise, along with traffic on Kelso Road and overflights from small aircraft, would contribute to the noise environment at residential and recreational use directly adjacent to the Jones Pumping Plant. Banks Pumping Plant is located at the end of Kelso Road, and is not adjacent to noise-sensitive residential or recreational use areas.

For noise-sensitive land uses adjacent to project truck routes, the environmental consequences analysis includes an assessment of traffic noise impacts based on loudest-hour traffic noise levels under future project alternatives compared to Existing Conditions. Existing loudest-hour noise levels are shown in Table 23-14.

Table 23-14. Existing Loudest-Hour Traffic Noise Levels

Roadway	Segment	Existing Loudest-hour Volume	Existing Traffic Noise Level, dBA L_{eq} (1h) (100 feet from roadway centerline)
Byron Hwy	Contra Costa Co./ Alameda Co. Line to Alameda Co./San Joaquin Co. Line	656	58
Brentwood Blvd	Delta Rd (Oakley City Limits) to Balfour Rd	1,516	61
Brentwood Blvd	Balfour Rd to Brentwood City Limits (South)	1,013	60
Balfour Rd	Brentwood Blvd to Brentwood City Limits	1,300	61
Bethel Island Rd	Oakley City Limits to End	330	55
Balfour Rd	Brentwood City Limits to Byron Hwy	297	54
Old SR 41	Brentwood City Limits (South) to Marsh Creek Rd	1,682	62
Byron Hwy	Delta Rd to Old SR 4	240	53
Byron Hwy	SR 4 to Contra Costa Co./ Alameda Co. Line	907	59
SR 160 (Freeport Blvd)	Sacramento City Limits to Freeport Bridge	476	59

Roadway	Segment	Existing Loudest-hour Volume	Existing Traffic Noise Level, dBA L_{eq} (1h) (100 feet from roadway centerline)
SR 160 (Freeport Blvd/ River Rd)	Freeport Bridge to Scribner Rd	180	55
SR 160	Scribner Rd to Hood Franklin Rd	125	53
SR 160	Hood Franklin Rd to Lambert Rd	170	55
SR 160	Lambert Rd to Paintersville Bridge	122	53
SR 160 (Paintersville Bridge)	Sutter Slough Bridge Rd to SR 160 (River Rd)	128	53
SR 160	Paintersville Bridge to Walnut Grove Bridge	128	53
SR 160	Walnut Grove Bridge to A St (Isleton)	465	59
SR 160	A St (Isleton) to SR 12	378	58
SR 160	SR 12 to Brannan Island Rd	894	62
SR 84	West Sacramento City Limits to Courtland Rd	169	55
SR 84 (Courtland Rd/ Ryer Ave)	Courtland Rd to Cache Slough Ferry	25	46
SR 12 EB	I-80 to Beck Ave	1,847	65
SR 12 WB	I-80 to Beck Ave	1,625	64
SR 12	Beck Ave to Sunset Ave/ Grizzly Island Rd	3,573	68
SR 12	Sunset Ave/ Grizzly Island Rd to Walters Rd/	2,353	66
SR 12	Walters Rd/ to SR 113	1,075	63
SR 12	SR 113 to SR 84 (River Rd)	1,544	64
SR 12 (Rio Vista Bridge)	SR 84 (River Rd) to SR 160 (River Rd)	1,685	64
SR 12	SR 160 (River Rd) to Sacramento Co./ SJ Co. Line	1,030	62
SR 12	Sacramento Co./ SJ Co. Line to I-5	1,164	63
SR 113	I-80 to Dixon City Limits	1,341	64
SR 113	Dixon City Limits to SR 12	294	57
SR 4 (Marsh Creek Rd)	Vasco Rd to Byron Hwy	733	61
SR 4	Marsh Creek Rd to Discovery Bay Blvd	1,224	63
SR 4	Discovery Bay Blvd to Tracy Blvd	746	61
SR 4	Tracy Blvd to I-5	1,492	64
A St/4th St/ Jackson Blvd.	SR 160 to Isleton City Limits	75	48
Main Street (Old SR 4)	SR 160 to Cypress Rd	1,663	62
Main Street (Old SR 4)	Cypress Rd to Delta Rd (Oakley City Limits)	1,335	61
Cypress Rd	Main Street to Bethel Island Rd	764	58
Bethel Island Rd	Cypress Rd to Oakley City Limits	367	55
Delta Rd	Main Street to Byron Hwy	334	55
Pocket Rd	I-5 to Freeport Blvd	2,191	63
Freeport Blvd (Old SR 160)	Pocket Rd to Sacramento City Limits	492	56

Roadway	Segment	Existing Loudest-hour Volume	Existing Traffic Noise Level, dBA L_{eq} (1h) (100 feet from roadway centerline)
Freeport Bridge	River Rd to SR 160 (Freeport Blvd)	346	55
Hood Franklin Rd	SR 160 (River Rd) to I-5	137	51
Lambert Rd	SR 160 (River Rd) to Herzog Rd	29	44
Lambert Rd	Herzog Rd to Franklin Blvd	38	46
Franklin Blvd	Lambert Rd to Twin Cities Rd	71	48
Twin Cities Rd	River Rd to I-5	248	53
Twin Cities Rd	I-5 to Franklin Blvd	318	55
Sutter Slough Bridge Rd	Sacramento Co./ Yolo Co. Line to Paintersville Bridge	113	50
River Rd	Paintersville Bridge to Twin Cities Rd	134	51
River Rd	Twin Cities Rd to Walnut Grove Bridge	365	55
Walnut Grove Rd/River Rd	Walnut Grove Bridge to Sacramento Co./ SJ Co. Line	332	55
Isleton Rd	River Rd (Walnut Grove)/Isleton Rd Bridge to 1.5 miles west of Isleton Rd Bridge	283	54
Race Track Rd/ Tyler Island Rd	Walnut Grove Rd to Southern End of Tyler Island	34	45
Tyler Island Rd	Southern End of Tyler Island to SR 160 (River Rd)	39	46
Jackson Slough Rd	Isleton City Limits to SR 12	53	47
Jackson Slough Rd	Brannan Island Rd to SR 12	52	47
Walnut Grove Rd	Sacramento Co./ SJ Co. Line to I-5	232	53
Peltier Rd	Blossom Rd to I-5	23	44
Tracy Blvd	SR 4 to Clifton Court Rd	209	53
Tracy Blvd	Clifton Court Rd to Tracy City Limits	171	52
Byron Hwy	Alameda Co./San Joaquin Co. Line to Mountain House Pkwy	824	59
Mountain House Pkwy	Byron Hwy to Arnaudo Blvd	298	54
Mountain House Pkwy	Arnaudo Blvd to I-205	769	58
Eight Mile Rd	Stockton City Limits to I-5	769	58
Tracy Blvd	Tracy City Limits to I-205	759	58
Harbor Blvd	Industrial Blvd to US 50	2,317	63
Industrial Blvd/ Lake Washington Blvd	Harbor Blvd to Jefferson Blvd	1,858	62
Jefferson Blvd (Old SR 84)	Lake Washington Blvd to Southport Pkwy	1,718	62
Jefferson Blvd (Old SR 84)	Southport Pkwy to West Sacramento City Limits	146	51
River Rd	Freeport Bridge to Courtland Rd	249	54
River Rd	Courtland Rd to Sacramento Co./ Yolo Co. Line	63	48
Courtland Rd	SR 84 to River Rd	77	48

1 **23.3.2 Determination of Effects**

2 The action alternatives pass through several counties and through or near several communities and
 3 cities. Many of these jurisdictions have noise standards that relate to land use compatibility with
 4 transportation noise sources (e.g., traffic, rail, and aircraft) and non-transportation sources (e.g.,
 5 pumping plants, construction activity, heating and ventilating equipment) (refer to section 23.3.3 for
 6 a discussion of local plans and policies). Noise from transportation sources is controlled at the
 7 federal level, not at the local level. As such, local noise ordinances do not apply to transportation
 8 sources but rather to non-transportation sources such as construction equipment. In many of these
 9 jurisdictions, noise from construction activities is exempt from noise ordinance standards during
 10 daytime hours, leaving no numerical noise level limits that can be applied during daytime hours.

11 Section 01570 of DWR Specification 05-16 identifies DWR noise thresholds that are reasonably
 12 consistent with local standards with regard to construction noise. As discussed above, the 60 dBA
 13 noise standard in DWR Specification 05-16 has been established by consensus of experts, local and
 14 resource agencies, including USFWS, as a threshold for establishing noise impacts.

15 Thresholds described below for determining if construction or restoration noise impacts would be
 16 adverse are based on the DWR 60 dBA threshold with a -10 dB adjustment for work that would
 17 occur at night. BDCP compatibility with applicable plans and policies is described throughout the
 18 impact headers (refer to Impacts NOI-1 through NOI-4). Exceedances of established noise thresholds
 19 could indicate an incompatibility with an applicable plan, policy, or regulation adopted to avoid or
 20 mitigate noise effects. Note that as discussed in Chapter 13, *Land Use*, Section 13.2.3, state and
 21 federal agencies are not generally subject to local land use regulations; incompatibilities with plans
 22 and policies are not, by themselves, physical consequences to the environment.

23 The thresholds discussed in this chapter and used for determination of effects under NEPA are
 24 equivalent to the thresholds used for determination of significant impacts under CEQA. Thresholds
 25 described below for determining if construction vibration effects would be adverse under NEPA and
 26 have significant impacts under CEQA are based on guidance in FTA 2006. Thresholds described
 27 below for determining if operational noise impacts would be adverse under NEPA and have
 28 significant impacts under CEQA are based on local noise ordinance standards. Criteria derived from
 29 the Appendix G checklist of the CEQA Guidelines were also considered when establishing the
 30 applicable thresholds.

31 **23.3.2.1 Construction and Restoration Activity**

32 **Onsite Construction Equipment**

33 Onsite construction and restoration activity between the hours of 7:00 a.m. to 10:00 p.m. (daytime)
 34 would have adverse noise effects if the activity is predicted to result in a 1-hour A-weighted
 35 equivalent sound level that exceeds 60 dBA at noise-sensitive land uses where the ambient noise
 36 level is less than 60 dBA, or if the activity is predicted to increase the ambient noise level at
 37 residential locations by 5 dB or more where the ambient noise level is already greater than 60 dBA
 38 (pursuant to Section 01570 of DWR Specification 05-16).

39 Onsite construction and restoration activity between the hours of 10:00 p.m. to 7:00 a.m.
 40 (nighttime) would have adverse noise effects if the activity is predicted to result in a 1-hour A-
 41 weighted equivalent sound level that exceeds 50 dBA at noise-sensitive land uses where the ambient
 42 noise level is less than 50 dBA, or if the activity is predicted to increase the ambient noise level at

1 residential locations by 5 dB or more where the ambient noise level is already greater than 50 dBA.
 2 The lower noise threshold for nighttime activity is based on the 5 to 10 dB reduction in noise
 3 performance standards that is commonly applied to noise levels during nighttime hours as used in
 4 local noise ordinances in the Plan Area.

5 In addition to raising the overall ambient noise level, construction activities during nighttime hours
 6 can potentially result in noise events that can disturb the sleep of people living in nearby residential
 7 areas. To address the potential for sleep disturbance during nighttime hours, onsite construction
 8 and restoration activity between the hours of 10:00 p.m. to 7:00 a.m. would have adverse noise
 9 effects if the activity is predicted to result in a single event maximum sound level exceeding 50 dBA
 10 at the nearest residential use (Nelson 1987). The 50 dBA L_{max} standard is used as the governing
 11 threshold for the construction noise analysis.

12 For the purposes of this analysis, sensitive land uses are defined as places where people reside,
 13 schools, libraries, and places of worship (e.g., residential parcels, natural/recreational parcels,
 14 agricultural parcels, and schools).

15 **Truck Trips and Worker Commute Trips**

16 Increased volumes of traffic on public roads due to project-generated heavy truck trips and
 17 commuter trips on local roadways are considered to result in a significant traffic noise impact if the
 18 increase in volume would result in a substantial increase in noise as defined in the Caltrans Protocol.
 19 The Protocol defines a substantial increase as a 12 dB increase in traffic noise levels under design
 20 year plus project conditions, compared to Existing Conditions. For the purposes of this analysis,
 21 sensitive land uses are defined as places where people reside, schools, libraries, and places of
 22 worship (e.g., residential parcels, natural/recreational parcels, agricultural parcels, and schools).
 23 Project-related transportation activity not occurring on public roads is evaluated as any other
 24 construction activity, using 60 dBA daytime and 50 dBA nighttime thresholds as described above.

25 **23.3.2.2 Groundborne Vibration and Noise during Construction**

26 Groundborne vibration from pile driving was analyzed based on procedures specified in the FTA
 27 Guidance Manual (Federal Transit Administration 2006). Vibration propagating from pile driving
 28 events would be considered to result in adverse effects if vibration levels would exceed 0.2 in/sec
 29 PPV at nearby residences (Table 23-2). This conservative threshold is more stringent than the
 30 Caltrans recommended guideline for historic and older buildings (*see* Section 23.1.2).

31 The thresholds for groundborne noise used in this analysis are based on thresholds used in the IRP
 32 (Integrated Resources Plan) for the City of Los Angeles Department of Public Works, and adapted
 33 from tunnel equipment groundborne vibration data used in other tunneling projects in the city of
 34 Los Angeles (City of Los Angeles Department of Public Works 2005). The threshold for groundborne
 35 vibration effects from TBM operations is 80 VdB (using a crest factor of 4), or 0.04 inches per second
 36 PPV (in/sec PPV). Based on IRP data, at the minimum tunnel depth of 60 feet to be used in the
 37 alternatives using the pipeline/tunnel conveyance, vibrations from TBM operation are predicted to
 38 be about 0.008 in/sec PPV. The threshold for groundborne vibrations from locomotive operation is
 39 75 VdB (using a crest factor of 5), or 0.025 in/sec PPV. The groundborne noise threshold for tunnel
 40 locomotives is 45 dBA, which is equivalent to approximately 0.01 in/sec PPV.

41 Based on IRP data for typical tunnel locomotive operations, the groundborne noise threshold of
 42 0.01 in/sec PPV may be exceeded within a 110-foot diagonal distance from the tunnel centerline (or

1 a 92-foot horizontal distance from the tunnel centerline above ground). However DWR has indicated
 2 that tunnel locomotives would be traveling at speeds of 5 to 10 miles per hour and would not cause
 3 excessive groundborne noise levels (Sanchez pers. comm.). Due to variations in geology, actual
 4 groundborne noise and vibration levels could vary along the conveyance alignments. For the east
 5 and west conveyance alignments, tunneling depth would be at least 120 feet below msl, and
 6 therefore groundborne noise under these alternatives would be well below the threshold discussed
 7 above and would not cause adverse effects to sensitive receptors within the immediate vicinity. For
 8 the purposes of this analysis, sensitive receptors that may be exposed to increased groundborne
 9 vibration include residences, outdoor parks, schools, and agriculture areas.

10 **23.3.2.3 Conveyance Facility Operations**

11 Operation of conveyance facilities would result in adverse effects if operational noise at residential
 12 locations would exceed 50 dBA (one-hour L_{eq}) during daytime hours (7:00 a.m. to 10:00 p.m.) or 45
 13 dBA (one-hour L_{eq}) during nighttime hours (10:00 p.m. to 7:00 a.m.). Effects associated with
 14 conveyance facility operations would occur throughout the project lifetime and are considered
 15 permanent. If the existing ambient noise level during either period equals or exceeds the applicable
 16 threshold, an adverse effect would occur if the project-related noise level equals or exceeds the
 17 ambient noise level. This threshold is designed to comply with local ordinance performance
 18 standards in the Plan Area.

19 **23.3.3 Effects and Mitigation Approaches**

20 The Noise Abatement Plan (see Appendix 3B, *Environmental Commitments*) will be in place during
 21 construction to avoid or minimize adverse effects. Supplementary information for the EIR/EIS Bay
 22 Delta Conservation Plan includes approaches to designing mitigation which are taken into account
 23 in the discussion of mitigation measures in the Environmental Consequences section of this chapter
 24 and are incorporated into the Noise Abatement Plan as appropriate. The supplementary information
 25 is included here as background information for the design of noise mitigation measures and the
 26 Noise Abatement Plan.

27 Supplemental Information for the EIR/EIS Bay-Delta Conservation Plan (California Department of
 28 Water Resources 2010a) identifies the following plan for controlling noise.

29 **1.15 TRAFFIC CONTROL/NOISE ABATEMENT/LIGHTING PLAN**

30 The Contractor shall minimize noise impacts to the extent feasible by preparing, before construction
 31 begins, and implementing a Noise Abatement Plan. The Noise Abatement Plan must be prepared in
 32 consultation with the Engineer and State Regulatory agencies, and subject to final approval by DWR.
 33 The following components shall be included in the plan:

- 34 1. In the event of complaints by nearby residents due to nighttime construction activities, the
 35 Contractor shall monitor noise levels. Noise shall be measured at the property line of nearby
 36 residential uses. In the event that construction noise exceeds the applicable limits specified in
 37 the Noise Element of the applicable County General Plan, the responsible construction activity
 38 shall cease until feasible measures, such as temporary sound walls, are implemented to reduce
 39 nighttime noise levels to compliance with the County General Plan.
- 40 2. Preventive maintenance including practicable methods and devices to control, prevent, and
 41 minimize noise.
- 42 3. Rerouting truck traffic to avoid or reduce noise impacts to sensitive locations.

- 1 4. Scheduling construction activities with the most intense noise activities to occur when ambient
- 2 noise is also at its peak.
- 3 5. The Contractor shall limit off-site trucking activities (e.g., deliveries, export of materials, etc.) to
- 4 the hours of 6:00 a.m. to 10:00 p.m. to minimize impacts to nearby residences.
- 5 6. To the extent feasible, the Contractor shall locate, store, and maintain portable and stationary
- 6 equipment as far as possible from nearby residents.

7 **23.3.3.1 No Action Alternative**

8 The No Action Alternative includes continued implementation of SWP/CVP operations,
 9 maintenance, enforcement, and protection programs by federal, state, and local agencies and non-
 10 profit groups, as well as projects that are permitted or are assumed to be constructed by 2060.
 11 Climate change that would occur with or without the BDCP is also part of the No Action Alternative.
 12 A complete list and description of programs, plans, and other assumptions considered under the No
 13 Action Alternative is provided in Chapter 3, Appendix 3D, *Defining Existing Conditions, No Action*
 14 *Alternative, No Project Alternative, and Cumulative Impact Conditions.*

15 **Future of Noise Conditions in the Delta**

16 Future noise conditions in the Delta are not expected to change substantially as existing repair,
 17 maintenance, habitat protection, and flood management activities would continue.

18 Over time, subsidence places greater stress on levees, increasing the already high costs of continued
 19 levee maintenance and repair. In some cases, the costs of maintaining, improving, or repairing
 20 levees could become higher than the assessed value of the use of the lands they protect.

21 Failure of a levee, depending on the location and magnitude of the event, could cause catastrophic
 22 flooding. If a catastrophic flood were to occur, emergency flood fighting and clean-up actions would
 23 require the use of a considerable amount of heavy construction equipment. Timing and duration of
 24 use would directly correlate with flood fighting needs, but could last for days, weeks, even months.
 25 Depending on the location and magnitude of the flood, people may or may not be present during
 26 flood fighting activities. If people are present they could be exposed to higher than normal levels of
 27 noise and vibration levels for extended periods of time.

28 Furthermore, because of the unpredictable nature of an emergency response, compliance with
 29 applicable noise standards to manage noise levels may not be possible. All of these effects could be
 30 considered significant. However, because the timing, duration, and magnitude of a flood event are
 31 unpredictable, a determination of noise effects under these conditions is not possible.

32 **SWP/CVP Operations**

33 SWP/CVP operations identified as continuing actions under the No Action Alternative include repair,
 34 maintenance, or protection of infrastructure such as levees, and may also include actions for water
 35 quality management, habitat and species protection, or flood management. While these continuing
 36 actions would result in noise effects depending on the type of construction needed for repairs, or
 37 adjustments to potential irrigation water and drainage needed for water quality and flood
 38 management, these noise effects would be temporary in nature and would not result in noise that is
 39 substantially inconsistent with noise from current operations.

1 **Ongoing Plans, Policies, and Programs**

2 The programs, plans, and projects included under the No Action Alternative are summarized in
 3 Table 23-15, along with their anticipated noise effects. For a full description of conditions under the
 4 No Action Alternative, see Appendix 3D, *Defining Existing Conditions, No Action Alternative, No*
 5 *Project Alternative, and Cumulative Impact Conditions.*

6 **Table 23-15. Noise Effects from the Plans, Policies, and Programs for the No Action Alternative**

Agency	Program/Project	Status	Description of Program/ Project	Noise Effects
California Department of Water Resources	Mayberry Farms Subsidence Reversal and Carbon Sequestration Project	Completed October 2010	Permanently flood 308-acre parcel of DWR owned land (Hunting Club leased) and restore 274 acres of palustrine emergent wetlands within Sherman Island to create permanent wetlands and to monitor waterfowl, water quality, and greenhouse gases.	Operation of heavy equipment would generate temporary and localized noise.
Contra Costa Water District	Contra Costa Canal Fish Screen Project (Rock Slough)	Under construction as of July 2011	Installation of a fish screen at Rock Slough Intake.	Construction of the screen would result in temporary and localized noise.
Contra Costa Water District, Bureau of Reclamation, and California Department of Water Resources	Middle River Intake and Pump Station (previously known as the Alternative Intake Pump Station)	Project completed and was formally dedicated July 20, 2010	This project includes a potable water intake and pump station to improve drinking water quality for Contra Costa Water District customers.	Construction noise from this project has already occurred.
California Department of Water Resources	Federal Energy Regulatory Commission (FERC) License Renewal for Oroville Project	Draft Water Quality Certification issued December 6, 2010 and comments on Draft received December 10, 2010	The renewed federal license will allow the Oroville Facilities to continue providing hydroelectric power and regulatory compliance with water supply and flood control.	No effects related to noise.
Freeport Regional Water Authority and Bureau of Reclamation	Freeport Regional Water Project	Project was completed late 2010.	Project includes an intake/pumping plant near Freeport on the Sacramento River and a conveyance structure to transport water through Sacramento County to the Folsom South Canal.	No effects related to noise.

Agency	Program/Project	Status	Description of Program/ Project	Noise Effects
California Department of Water Resources and Solano County Water Agency	North Bay Aqueduct Alternative Intake Project		This project will construct an alternative intake on the Sacramento River and a new segment of pipeline to connect it to the North Bay Aqueduct system.	Construction of the intake would result in temporary and localized noise.
Reclamation District 2093	Liberty Island Conservation Bank		This project includes the restoration of inaccessible, flood prone land, zoned as agriculture but not actively farmed, to area enhancement of wildlife resources.	No effects related to noise.
City of Stockton	Delta Water Supply Project (Phase 1)	The project is currently under construction.	This project consists of a new intake structure and pumping station adjacent to the San Joaquin River; a water treatment plant along Lower Sacramento Road; and water pipelines along Eight Mile, Davis, and Lower Sacramento Roads.	Construction of the intake would result in temporary and localized noise.
Bureau of Reclamation and State Water Resources Control Board	Battle Creek Salmon and Steelhead Restoration Project	Project is ongoing.	This project includes restoration of approximately 48 miles of habitat in Battle Creek and its tributaries to improve passage, growth, and recovery for anadromous fish populations.	Operation of heavy equipment associated with the project would generate temporary and localized noise.
Tehama Colusa Canal Authority and Bureau of Reclamation	Red Bluff Diversion Dam Fish Passage Project	Expected completion in 2012.	Proposed improvements include modifications made to upstream and downstream anadromous fish passage and water delivery to agricultural lands within CVP.	Operation of heavy equipment associated with the project would generate temporary and localized noise.
Bureau of Reclamation, California Department of Fish and Wildlife, and Natomas Central Mutual Water Company	American Basin Fish Screen and Habitat Improvement Project		This three-phase project includes consolidation of diversion facilities; removal of decommissioned facilities; aquatic and riparian habitat restoration; and installing fish screens in the Sacramento River. Total project footprint encompasses about 124 acres east of the Yolo Bypass.	Operation of heavy equipment associated with the project would generate temporary and localized noise.

Agency	Program/Project	Status	Description of Program/ Project	Noise Effects
Bureau of Reclamation, U.S. Army Corps of Engineers, Sacramento Area Flood Control Agency, and Central Valley Flood Protection Board	Folsom Dam Safety and Flood Damage Reduction Project	Expected completion by 2016.	This project includes implementation of an auxiliary spillway, dam safety modifications, security and reduction improvements, and flood damage prevention.	Construction of the auxiliary spillway would result in temporary and localized noise.
Bureau of Reclamation	Delta-Mendota Canal/California Aqueduct Intertie	Anticipated completion by 2012.	The purpose of the intertie is to better coordinate water delivery operations between the California Aqueduct (state) and the Delta-Mendota Canal (federal) and to provide better pumping capacity for the Jones Pumping Plant. New project facilities include a pipeline and pumping plant.	Construction of the intertie would result in temporary and localized noise.
Yolo County	General Plan Update	General plan was adopted November 10, 2009.	Anticipated implementation of policies and programs such as the Farmland Conversion Mitigation Program would minimize conversion of agricultural land to nonagricultural uses through mitigation.	Construction of projects under the updated plan would generate temporary and localized noise. Operation of commercial and industrial facilities would be a source of noise as well.
Zone 7 Water Agency and California Department of Water Resources	South Bay Aqueduct Improvement and Enlargement Project	Project is ongoing.	The project includes construction of the Dyer Reservoir, Altamont Water Treatment Plant, and a pipeline to transport the water from the enlarged South Bay Aqueduct.	Construction of this project would result in temporary and localized noise.
NMFS/USFWS	2008 and 2009 Biological Opinions	Ongoing.	The Biological Opinions issued by NMFS and USFWS establish certain RPAs to be implemented. Some of the RPAs require habitat restoration.	Implementation of certain RPAs would result in temporary and localized noise and vibration associated with restoration construction.

1
2

1 Construction activities and the operation of heavy equipment associated with these projects would
 2 be a source of localized and temporary noise. In some cases there may be operational sources of
 3 noise as well. Because these projects have undergone or will undergo separate environmental
 4 review, it is assumed that potential noise effects have been or will be adequately addressed. As such
 5 the No Action Alternative is not expected to result in direct and adverse noise effects.

6 **Catastrophic Seismic Risks**

7 The Delta and vicinity are within a highly active seismic area, with a generally high potential for
 8 major future earthquake events along and/or nearby regional faults, with the probability for such
 9 events increasing over time. Based on the location, extent and non-engineered nature of many
 10 existing levee structures in the Delta area, the potential for significant damage to, or failure of, these
 11 structures during a major local seismic event is generally moderate to high. (See Appendix 3E,
 12 *Potential Seismic and Climate Change Risks to SWP/CVP Water Supplies* for more detailed discussion).
 13 To reclaim land or rebuild levees after a catastrophic event due to climate change or a seismic event
 14 would introduce considerable heavy equipment and associated vehicles, including dozers,
 15 excavators, pumps, water trucks, and haul trucks, which would create adverse noise effects.

16 **CEQA Conclusion:** In total, the ongoing programs and plans under the No Action Alternative would
 17 include activities that will generate temporary and localized noise. However, because these projects
 18 have undergone or will undergo separate environmental review, it is assumed that potential noise
 19 effects have been or will be adequately addressed. Therefore, the effects of these plans, policies, and
 20 programs are not considered significant.

21 **23.3.3.2 Alternative 1A—Dual Conveyance with Pipeline/Tunnel and** 22 **Intakes 1–5 (15,000 cfs; Operational Scenario A)**

23 A total of five intakes would be constructed on the east bank of the Sacramento River under
 24 Alternative 1A. This alternative would also include an intermediate and Byron Tract forebay, and the
 25 conveyance facility would be a buried tunnel primarily along the east side of the Sacramento River
 26 (see Figures 3-2 and 3-3 in Chapter 3, *Description of Alternatives*).

27 **Impact NOI-1: Exposure of Noise-Sensitive Land Uses to Noise from Construction of Water** 28 **Conveyance Facilities**

29 **NEPA Effects:**

30 **Construction of Intakes**

31 Potential reasonable worst-case equipment noise levels from construction of the intakes were
 32 evaluated by combining the noise levels of the six loudest pieces of equipment that would likely
 33 operate at the same time (cranes and trucks). Assuming 100% utilization within a given hour of day,
 34 the combined noise level is 96 dBA L_{eq} (1hr) at 50 feet. The estimated sound levels from
 35 construction as a function of distance based on calculated point-source attenuation over “soft” (i.e.,
 36 acoustically absorptive) ground are shown in Table 23-16.

1 **Table 23-16. Predicted Noise Levels from Construction Activities**

Distance Between Source and Receiver (feet)	Calculated L_{eq} (1hr)/Nighttime L_{max} Sound Level (dBA)
50	96
100	88
200	80
400	72
600	68
800	64
1,000	62
1,200	60
1,500	57
2,000	54
2,500	51
2,800	50
3,000	49
4,000	46
5,280	43

Notes: Calculations are based on Federal Transit Administration 2006. Calculations do not include the effects, if any, of local shielding from walls, topography, or other barriers that may reduce sound levels further.

Bold denotes daytime (1hr) and nighttime (1hr) maximum noise thresholds.

L_{eq} (1 hour) = hourly-equivalent sound level (over 1 hour).

dBA = A-weighted decibel.

2
3 Estimated sound levels from impact pile driving conducted during periods of construction described
4 above are shown in Table 23-17. Because noise from pile driving is not constant, a utilization factor
5 of 20% has been applied (Thalheimer 2000). The utilization factor reduces the impact pile driver
6 peak level of 101 dBA to 94 dBA L_{eq} (1hr) at 50 feet. Use of the pile driver simultaneously with noise
7 from other equipment in Table 23-16 would produce a combined level of 98 dBA L_{eq} (1hr) at 50 feet,
8 as shown in Table 23-17.

9 The results shown in Table 23-17 indicate that during periods of pile driving, residences within
10 1,400 feet of an active intake construction site could be exposed to construction noise in excess of
11 the 60 dBA L_{eq} (1hr) daytime threshold. The nighttime threshold of 50 dBA L_{max} would be exceeded
12 at a distance of 2,800 feet.

1 **Table 23-17. Predicted Noise Levels from Construction—Pile Driving and Construction Equipment**
 2 **for Intake Structures**

Distance Between Source and Receiver (feet)	Calculated Daytime L_{eq} (1hr) Sound Level (dBA)	Nighttime L_{max} Sound Level (dBA)
50	98	96
100	90	88
200	82	80
400	74	72
600	70	68
800	66	64
1,000	64	62
1,200	62	60
1,400	60	57
1,500	59	54
2,000	56	51
2,800	52	50
3,500	50	49
4,000	48	46
5,280	45	43

Notes: Calculations are based on Federal Transit Administration 2006. Calculations do not include the effects, if any, of local shielding from walls, topography, or other barriers that may reduce sound levels further.

Nighttime L_{max} sound levels are based on the same operating assumptions as daytime levels with the exception of pile driving.

Bold denotes daytime and nighttime maximum noise thresholds.

L_{eq} (1hr) = hourly-equivalent sound level (over 1 hour).

dBA = A-weighted decibel.

3
 4 While equipment could operate at any work area identified for this alternative, the highest noise
 5 levels are expected to occur at those sites where the duration and intensity of construction activities
 6 would be greatest. The work areas for construction of Intakes 1–5 would extend through several
 7 residential areas and communities near the Sacramento River. Noise from intake construction
 8 activities is predicted to exceed daytime and nighttime noise thresholds at nearby residences,
 9 schools and outdoor parks in areas indicated in Table 23-18.

10 Although this assessment includes daytime and nighttime construction noise estimates, construction
 11 of the intakes would primarily occur during daytime hours. If nighttime construction of the intakes
 12 were to occur, noise levels could be the same as that generated during daytime hours.

13 The effect of exposing these noise-sensitive land uses to noise increases above thresholds would be
 14 adverse. Mitigation Measures NOI-1a and NOI-1b would be available to reduce this effect.

1 **Table 23-18. Land Use Affected by Equipment Noise from Construction of Intakes, Alternative 1A**

Location	Zoning	Daytime Threshold (60 dBA L_{eq} [1h])	Nighttime Threshold (50 dBA L_{max} [1h])
		Total Affected Parcels	Total Affected Parcels
Sacramento County – including River Road near the community of Hood; neighborhoods in the community of Hood; Lambert Road; Vorden Road.	Residential	121	121
	Natural/Recreational	1	4
	Agricultural/Other ^a	109	157
Yolo County – including County Road E9 near the community of Clarksburg; neighborhoods in the community of Clarksburg.	Residential	4	98
	Natural/Recreational	1	5
	Agricultural/Other ^a	152	189
	Schools	None	Clarksburg Middle School

^a Includes agricultural or unclassified use that permits residential use.

2

3 **Construction of Conveyance (Tunnel), Forebays, Barge Unloading Facilities, and Intermediate Pumping**
4 **Plant**

5 Potential reasonable worst-case equipment noise levels from construction work areas adjacent to
6 tunnel shaft sites would be comparable to those listed for the intake sites in Table 23-16. Assuming
7 100% equipment utilization within a given hour of day, the combined noise level at work areas is 96
8 dBA L_{eq} (1hr) at 50 feet.

9 The results shown in Table 23-16 indicate that noise-sensitive land uses within 1,200 feet of an
10 active tunnel work area could be exposed to construction noise in excess of the daytime (7 a.m. to 10
11 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be
12 exceeded at a distance of 2,800 feet.

13 While equipment could operate at any work area identified for this alternative, the highest noise
14 levels are expected to occur at those sites where the duration and intensity of construction activities
15 would be greatest. This includes all construction sites along the tunnel conveyance alignment, as
16 well as at the site of the Byron Tract Forebay adjacent to and south of Clifton Court Forebay. For a
17 map of the proposed pipeline/tunnel alignment, see Mapbook Figure M3-1. The tunnel and forebay
18 construction work areas would extend through several residential areas and communities near the
19 Sacramento River. Noise from construction activities is predicted to exceed daytime and nighttime
20 noise thresholds at nearby residences, schools and outdoor parks indicated in Table 23-19.

21 Although this assessment includes daytime and nighttime construction noise estimates for the
22 forebays, barge unloading facilities, intermediate pumping plant, and conveyance tunnels,
23 construction of the forebays, barge unloading facilities, and intermediate pumping plant would
24 primarily occur during daytime hours. If nighttime construction of the forebays, barge unloading
25 facilities, and intermediate pumping plant were to occur, noise levels could be the same as those
26 generated during daytime hours. Construction of the conveyance tunnels and reusable tunnel
27 material (RTM) storage actions would occur on a 24-hour basis.

1 The effect of exposing these noise-sensitive land uses to noise increases above thresholds would be
 2 adverse. Mitigation Measures NOI-1a and NOI-1b would be available to reduce this effect.

3 **Table 23-19. Land Use Affected by Equipment Noise from Construction of Conveyance and**
 4 **Associated Facilities, Alternative 1A**

Location	Zoning	Daytime Threshold (60 dBA L_{eq} [1h])	Nighttime Threshold (50 dBA L_{max} [1h])
		Total Affected Parcels	Total Affected Parcels
Sacramento County – including River Road near the community of Hood; neighborhoods in the community of Hood; Lambert Road; Vorden Road.	Residential	116	119
	Natural/Recreational	7	14
	Agricultural/Other ^a	313	503
	Schools	Bates Elementary, Mokelumne High	Bates Elementary, Mokelumne High
Yolo County – including County Road E9 near the community of Clarksburg; neighborhoods in the community of Clarksburg.	Residential	0	89
	Natural/Recreational	1	5
	Agricultural/Other ^a	150	170
	Schools	None	Clarksburg Middle School, River Delta Community Day
San Joaquin County	Residential	9	18
	Natural/Recreational	1	1
	Agricultural/Other ^a	187	273
Contra Costa County	Agricultural/Other ^a	94	118
Alameda County	Agricultural/Other ^a	21	45

^a Includes agricultural or unclassified use that permits residential use.

5

6 **Truck Trips and Worker Commutes**

7 Project-generated heavy trucks and worker commutes are predicted to result in increased traffic
 8 noise levels at noise-sensitive land uses adjacent to local roadways. Based on information provided
 9 by DWR as part of the cost estimate (see Appendix 22A), project-generated vehicle traffic volumes
 10 for the pipeline/tunnel alternative are predicted to have a maximum heavy truck composition of
 11 41%, which was assumed to apply to any of the local roadways under a worst-case noise scenario.
 12 Future noise levels are shown in Table 23-20.

1 **Table 23-20. Predicted Future Traffic Noise Levels on Commuter Roads and Haul Routes,**
 2 **Pipeline/Tunnel Alignment**

Roadway	Segment	Existing Noise Level, dBA	Future With-Project Noise Level, dBA	Noise Level Increase, dB	Substantial Increase?
Byron Hwy	Contra Costa Co./ Alameda Co. Line to Alameda Co./San Joaquin Co. Line	58	66	8	no
Brentwood Blvd	Delta Rd (Oakley City Limits) to Balfour Rd	61	67	6	no
Brentwood Blvd	Balfour Rd to Brentwood City Limits (South)	60	66	6	no
Balfour Rd	Brentwood Blvd to Brentwood City Limits	61	61	0	no
Bethel Island Rd	Oakley City Limits to End	55	55	0	no
Balfour Rd	Brentwood City Limits to Byron Hwy	54	54	0	no
Old SR 41	Brentwood City Limits (South) to Marsh Creek Rd	62	67	5	no
Byron Hwy	Delta Rd to Old SR 4	53	53	0	no
Byron Hwy	SR 4 to Contra Costa Co./ Alameda Co. Line	59	67	8	no
SR 160 (Freeport Blvd)	Sacramento City Limits to Freeport Bridge	59	67	8	no
SR 160 (Freeport Blvd/ River Rd)	Freeport Bridge to Scribner Rd	55	67	12	yes
SR 160	Scribner Rd to Hood Franklin Rd	53	66	13	yes
SR 160	Hood Franklin Rd to Lambert Rd	55	68	13	yes
SR 160	Lambert Rd to Paintersville Bridge	53	68	15	yes
SR 160 (Paintersville Bridge)	Sutter Slough Bridge Rd to SR 160 (River Rd)	53	68	15	yes
SR 160	Paintersville Bridge to Walnut Grove Bridge	53	68	15	yes
SR 160	Walnut Grove Bridge to A St (Isleton)	59	69	10	no
SR 160	A St (Isleton) to SR 12	58	69	11	no
SR 160	SR 12 to Brannan Island Rd	62	70	8	no
SR 84	West Sacramento City Limits to Courtland Rd	55	67	12	yes
SR 84 (Courtland Rd/ Ryer Ave)	Courtland Rd to Cache Slough Ferry	46	46	0	no
SR 12 EB	I-80 to Beck Ave	65	69	4	no
SR 12 WB	I-80 to Beck Ave	64	69	5	no

Roadway	Segment	Existing Noise Level, dBA	Future With-Project Noise Level, dBA	Noise Level Increase, dB	Substantial Increase?
SR 12	Beck Ave to Sunset Ave/ Grizzly Island Rd	68	72	4	no
SR 12	Sunset Ave/ Grizzly Island Rd to Walters Rd/	66	72	6	no
SR 12	Walters Rd/ to SR 113	63	71	8	no
SR 12	SR 113 to SR 84 (River Rd)	64	71	7	no
SR 12 (Rio Vista Bridge)	SR 84 (River Rd) to SR 160 (River Rd)	64	71	7	no
SR 12	SR 160 (River Rd) to Sacramento Co./ SJ Co. Line	62	65	3	no
SR 12	Sacramento Co./ SJ Co. Line to I-5	63	65	2	no
SR 113	I-80 to Dixon City Limits	64	69	5	no
SR 113	Dixon City Limits to SR 12	57	68	11	no
SR 4 (Marsh Creek Rd)	Vasco Rd to Byron Hwy	61	68	7	no
SR 4	Marsh Creek Rd to Discovery Bay Blvd	63	69	6	no
SR 4	Discovery Bay Blvd to Tracy Blvd	61	68	7	no
SR 4	Tracy Blvd to I-5	64	69	5	no
A St/4th St/ Jackson Blvd.	SR 160 to Isleton City Limits	48	48	0	no
Main Street (Old SR 4)	SR 160 to Cypress Rd	62	67	5	no
Main Street (Old SR 4)	Cypress Rd to Delta Rd (Oakley City Limits)	61	67	6	no
Cypress Rd	Main Street to Bethel Island Rd	58	58	0	no
Bethel Island Rd	Cypress Rd to Oakley City Limits	55	55	0	no
Delta Rd	Main Street to Byron Hwy	55	55	0	no
Pocket Rd	I-5 to Freeport Blvd	63	67	4	no
Freeport Blvd (Old SR 160)	Pocket Rd to Sacramento City Limits	56	65	9	no
Freeport Bridge	River Rd to SR 160 (Freeport Blvd)	55	55	0	no
Hood Franklin Rd	SR 160 (River Rd) to I-5	51	67	16	yes
Lambert Rd	SR 160 (River Rd) to Herzog Rd	44	66	22	yes
Lambert Rd	Herzog Rd to Franklin Blvd	46	66	20	yes
Franklin Blvd	Lambert Rd to Twin Cities Rd	48	48	0	no
Twin Cities Rd	River Rd to I-5	53	61	8	no
Twin Cities Rd	I-5 to Franklin Blvd	55	55	0	no

Roadway	Segment	Existing Noise Level, dBA	Future With-Project Noise Level, dBA	Noise Level Increase, dB	Substantial Increase?
Sutter Slough Bridge Rd	Sacramento Co./ Yolo Co. Line to Paintersville Bridge	50	66	16	yes
River Rd	Paintersville Bridge to Twin Cities Rd	51	58	7	no
River Rd	Twin Cities Rd to Walnut Grove Bridge	55	61	6	no
Walnut Grove Rd/River Rd	Walnut Grove Bridge to Sacramento Co./ SJ Co. Line	55	61	6	no
Isleton Rd	River Rd (Walnut Grove)/Isleton Rd Bridge to 1.5 miles west of Isleton Rd Bridge	54	59	5	no
Race Track Rd/ Tyler Island Rd	Walnut Grove Rd to Southern End of Tyler Island	45	57	12	yes
Tyler Island Rd	Southern End of Tyler Island to SR 160 (River Rd)	46	46	0	no
Jackson Slough Rd	Isleton City Limits to SR 12	47	47	0	no
Jackson Slough Rd	Brannan Island Rd to SR 12	47	47	0	no
Walnut Grove Rd	Sacramento Co./ SJ Co. Line to I-5	53	61	8	no
Peltier Rd	Blossom Rd to I-5	44	44	0	no
Tracy Blvd	SR 4 to Clifton Court Rd	53	61	8	no
Tracy Blvd	Clifton Court Rd to Tracy City Limits	52	61	9	no
Byron Hwy	Alameda Co./San Joaquin Co. Line to Mountain House Pkwy	59	66	7	no
Mountain House Pkwy	Byron Hwy to Arnaudo Blvd	54	66	12	yes
Mountain House Pkwy	Arnaudo Blvd to I-205	58	66	8	no
Eight Mile Rd	Stockton City Limits to I-5	58	58	0	no
Tracy Blvd	Tracy City Limits to I-205	58	63	5	no
Harbor Blvd	Industrial Blvd to US 50	63	68	5	no
Industrial Blvd/ Lake Washington Blvd	Harbor Blvd to Jefferson Blvd	62	67	5	no
Jefferson Blvd (Old SR 84)	Lake Washington Blvd to Southport Pkwy	62	67	5	no
Jefferson Blvd (Old SR 84)	Southport Pkwy to West Sacramento City Limits	51	66	15	yes
River Rd	Freeport Bridge to Courtland Rd	54	54	0	no
River Rd	Courtland Rd to Sacramento Co./ Yolo Co. Line	48	66	18	yes
Courtland Rd	SR 84 to River Rd	48	66	18	yes

1 As shown in Table 23-20, predicted future traffic noise levels from project-generated worker
 2 commutes and truck trips would result in an increase of 12 dB or more compared to existing traffic
 3 noise levels along 16 project roadway segments.

4 During intake construction, segments of SR 160 between Freeport Bridge and Walnut Grove Bridge
 5 would be temporarily realigned around intake construction sites. As a result, future project noise
 6 levels would further increase at residences located near intake sites. Under Alternative 1A, noise
 7 levels at receivers near realigned segments of SR 160 would increase by up to 12 dB in addition to
 8 the noise increase shown in Table 23-20.

9 The increase in noise levels would exceed the project threshold for traffic noise and would be
 10 considered adverse. Mitigation Measures NOI-1a and NOI-1b are available to address this effect.

11 **Construction of Power Transmission Lines**

12 Potential reasonable worst-case equipment noise levels from construction of the power
 13 transmission lines were evaluated by combining the noise levels of the three loudest pieces of
 14 equipment that would likely operate at the same time (an excavator, a truck and a drill rig for
 15 driving micropiles for construction of towers). Assuming 100% utilization within a given hour of
 16 day, the combined noise level is 91 dBA L_{eq} (1hr) at 50 feet. The estimated sound levels from
 17 construction as a function of distance based on calculated point-source attenuation over “soft” (i.e.,
 18 acoustically absorptive) ground are shown in Table 23-21.

19 **Table 23-21. Predicted Noise Levels from Construction of Transmission Lines**

Distance Between Source and Receiver (feet)	Calculated L_{eq} (1hr)/Nighttime L_{max} Sound Level (dBA)
50	91
100	83
200	75
400	67
600	63
800	60
1,000	57
1,200	55
1,400	53
1,800	50
2,000	49
3,000	44

Notes: Calculations are based on Federal Transit Administration 2006. Calculations do not include the effects, if any, of local shielding from walls, topography, or other barriers that may reduce sound levels further.

Bold denotes daytime (1hr) and nighttime (1hr) maximum noise thresholds.

L_{eq} (1 hour) = hourly-equivalent sound level (over 1 hour).

dBA = A-weighted decibel.

20
 21 The results shown in Table 23-21 indicate that noise-sensitive land uses within 800 feet of an active
 22 transmission line construction area could be exposed to construction noise in excess of the daytime

1 (7 a.m. to 10 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max}
2 would be exceeded at a distance of 1,800 feet from the construction area.

3 Noise-sensitive land uses that could potentially be exposed to adverse noise impacts due to
4 transmission line construction would extend outside the transmission line right-of-way within the
5 utility planning area. Several residential land uses are near the proposed transmission line
6 construction footprint. Likewise, Delta Elementary School and Delta High School on the west bank of
7 the Sacramento River are within half a mile of the proposed Intake 2 transmission lines. Although
8 there would be risk of increased noise levels, compared to the conveyance and associated
9 components, the duration of construction of transmission lines would be shorter-term. Noise
10 impacts would be intermittent and temporary, and would cease once construction work is complete.

11 Although this assessment includes daytime and nighttime construction noise estimates, construction
12 of the transmission lines would primarily occur during daylight hours. If nighttime construction of
13 the transmission lines were to occur, noise levels could be the same as those generated during
14 daytime hours.

15 The effect of exposing noise-sensitive land uses to noise increases above thresholds would be
16 adverse. Mitigation Measures NOI-1a and NOI-1b would be available to reduce this effect.

17 ***Earth-moving activities at offsite borrow/spoil areas***

18 Potential reasonable worst-case equipment noise levels from earth-moving activities at offsite
19 borrow/spoil areas were evaluated by combining the noise levels of the three loudest pieces of
20 equipment that would likely operate at the same time (an excavator, a truck and a bulldozer).
21 Assuming 100% utilization within a given hour of day, the combined noise level would be 91 dBA L_{eq}
22 (1hr) at 50 feet. The estimated sound levels from construction as a function of distance based on
23 calculated point-source attenuation over "soft" (i.e., acoustically absorptive) ground are shown in
24 Table 23-22.

25 The results shown in Table 23-22 indicate that noise-sensitive land uses within 800 feet of
26 equipment operating in the borrow/spoil area could be exposed to construction noise in excess of
27 the daytime (7 a.m. to 10 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50
28 dBA L_{max} would be exceeded at a distance of 1,800 feet from the area. Borrow/spoil areas are
29 located throughout the conveyance alignment and are generally adjacent to or in close proximity of
30 intake pumping plant sites, forebays, and main tunnel construction shafts. Noise-sensitive land uses
31 that could potentially be exposed to adverse noise impacts due to earth-moving activities in offsite
32 borrow/spoil areas would extend outside the borrow/spoil area right-of-way. The effect of exposing
33 these noise-sensitive land uses to noise increases above thresholds would be adverse. However,
34 with the exception of tunneling and RTM placement, most construction activities would occur
35 during daytime hours. Mitigation Measures NOI-1a and NOI-1b would be available to reduce this
36 effect.

1 **Table 23-22. Predicted Noise Levels from Earth-moving at offsite borrow/spoil areas**

Distance Between Source and Receiver (feet)	Calculated L_{eq} (1hr)/Nighttime L_{max} Sound Level (dBA)
50	91
100	83
200	75
400	67
600	63
800	60
1,000	57
1,200	55
1,400	53
1,800	50
2,000	49
3,000	44

Notes: Calculations are based on Federal Transit Administration 2006. Calculations do not include the effects, if any, of local shielding from walls, topography, or other barriers that may reduce sound levels further.

Bold denotes daytime (1hr) and nighttime (1hr) maximum noise thresholds.

L_{eq} (1 hour) = hourly-equivalent sound level (over 1 hour).

dBA = A-weighted decibel.

2

3 **Noise exposure to workers at construction sites**

4 Construction noise would affect workers on site. However, workers are subject to state and federal
5 Occupational Health and Safety (OSHA) standards. OSHA mitigation standards for noise limits
6 exposure are as follows: an 8-hour time-weighted average of 85 dBA or a dose of 50 percent are
7 referred to as OSHA action levels [29 CFR 1910.95(c)(2)]. Occupational exposure to noise levels in
8 excess of 85 dBA requires monitoring and mitigation to protect workers. Given that on-site workers
9 would be protected under OSHA requirements, no adverse impacts would occur to workers.

10 **CEQA Conclusion:** The impact of exposing noise-sensitive land uses during construction to noise
11 levels above the 60 dBA L_{eq} (1hr) daytime, the 50 dBA L_{max} nighttime, or the 12 dB traffic noise
12 increase threshold would be considered significant. Based on reasonable worst-case modeling, the
13 following significant impacts are expected as a result of Alternative 1A construction.

- 14 • **Intakes:** Sensitive receptors within 1,400 feet of an active intake construction site could be
15 exposed to construction noise in excess of the 60 dBA L_{eq} (1hr) daytime threshold. The
16 nighttime threshold of 50 dBA L_{max} would be exceeded at a distance of 2,800 feet. As shown in
17 Table 23-18, 125 residential parcels, 2 natural/recreational parcels, and 261 agricultural parcels
18 would be affected by daytime noise levels in excess of this threshold during construction. The
19 nighttime threshold would be exceeded at 219 residential parcels, 9 natural/recreational
20 parcels, 346 agricultural parcels, and 2 schools.
- 21 • **Conveyance and Associated Facilities:** Sensitive receptors within 1,200 feet of an active
22 tunnel work area could be exposed to construction noise in excess of the daytime (7 a.m. to 10
23 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be
24 exceeded at a distance of 2,800 feet. As shown in Table 23-19, 125 residential parcels, 9
25 natural/recreational parcels, 765 agricultural parcels, and 2 schools would be affected by

1 daytime noise levels in excess of this threshold during construction. The nighttime threshold
 2 would be exceeded at 226 residential parcels, 20 natural/recreational parcels, 1,109 agricultural
 3 parcels, and 4 schools.

- 4 • **Truck Trips and Worker Commutes:** Traffic noise from truck trips and worker commutes
 5 would result in an increase of 12 dB or more compared to existing traffic noise levels at
 6 residences and outdoor use areas along 16 project roadway segments in the study area as
 7 shown in Table 23-20. The increase in noise levels would be substantial and exceed the project
 8 threshold for traffic noise.
- 9 • **Power Transmission Lines:** Sensitive receptors within 800 feet of an active transmission line
 10 construction area could be exposed to construction noise in excess of the daytime (7 a.m. to 10
 11 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be
 12 exceeded at a distance of 1,800 feet from the construction area. As noted above, several
 13 residential land uses are near the proposed transmission line construction footprint. Likewise,
 14 Delta Elementary School and Delta High School on the west bank of the Sacramento River are
 15 within half a mile of the proposed Intake 2 transmission lines.
- 16 • **Borrow/spoil areas:** Sensitive receptors within 800 feet of equipment operating in the
 17 borrow/spoil area could be exposed to construction noise in excess of the daytime (7 a.m. to 10
 18 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be
 19 exceeded at a distance of 1,800 feet from the area. Borrow/spoil areas are located throughout
 20 the conveyance alignment and are generally adjacent to or in close proximity of intake pumping
 21 plant sites, forebays, and main tunnel construction shafts.

22 Mitigation Measures NOI-1a and NOI-1b would reduce noise impacts to sensitive land uses.
 23 Although implementation of these measures will reduce the impact, it is not anticipated that feasible
 24 measures will be available in all situations to reduce construction noise to levels below the
 25 applicable thresholds. This impact would therefore be considered significant and unavoidable.

26 **Mitigation Measure NOI-1a: Employ Noise-Reducing Construction Practices during** 27 **Construction**

28 During construction, BDCP proponents will employ best practices to reduce construction noise
 29 at noise-sensitive land uses. Implementation of this measure will ensure that construction noise
 30 levels, as applicable, do not exceed 60 dBA (one-hour L_{eq}) during daytime hours (7:00 a.m. to
 31 10:00 p.m.) and 50 dBA (single-event maximum) during nighttime hours (10:00 p.m. to 7:00
 32 a.m.).

33 Measures used to limit construction noise include the following:

- 34 • Limiting above-ground noise-generating construction operations to the hours between 7
 35 a.m. and 6 p.m. Monday through Friday, and between 8 a.m. and 5 p.m. on Saturdays.
- 36 • Locating stationary equipment (e.g., generators, compressors, rock crushers, cement mixers,
 37 idling trucks) as far as possible from noise-sensitive land uses.
- 38 • Prohibiting gasoline or diesel engines from having unmuffled exhaust.
- 39 • Requiring that all construction equipment powered by gasoline or diesel engines have
 40 sound-control devices that are at least as effective as those originally provided by the
 41 manufacturer and that all equipment be operated and maintained to minimize noise
 42 generation.

- 1 • Preventing excessive noise by shutting down idle vehicles or equipment.
- 2 • Using noise-reducing enclosures around noise-generating equipment.
- 3 • Selecting haul routes that affect the fewest number of people.
- 4 • Constructing barriers between noise sources and noise-sensitive land uses or take
- 5 advantage of existing barrier features (e.g., terrain, structures) to block sound transmission
- 6 to noise-sensitive land uses. The barriers shall be designed to obstruct the line of sight
- 7 between the noise-sensitive land use and on-site construction equipment.

8 **Mitigation Measure NOI-1b: Prior to Construction, Initiate a Complaint/Response**
 9 **Tracking Program**

10 Prior to construction, BDCP proponents will make a construction schedule available to residents
 11 living in the vicinity of the construction areas before construction begins, and designate a noise
 12 disturbance coordinator. The coordinator will be responsible for responding to complaints
 13 regarding construction noise, will determine the cause of the complaint, and will ensure that
 14 reasonable measures are implemented to correct the problem when feasible. A contact
 15 telephone number for the noise disturbance coordinator will be conspicuously posted on
 16 construction site fences and will be included in the notification of the construction schedule.

17 **Impact NOI-2: Exposure of Sensitive Receptors to Vibration or Groundborne Noise from**
 18 **Construction of Water Conveyance Facilities**

19 **NEPA Effects:** Construction at the intake sites would involve use of impact pile driving and drilled
 20 piles, and tunnel construction would involve the use of TBMs and tunnel locomotives, both of which
 21 would cause groundborne vibration in localized areas. Groundborne vibrations from pile driving at
 22 intake sites and barge loading facilities would be intermittent, and temporary, occurring over a two
 23 month period during the in-river work period (June 1 to October 31). All pile driving activities will
 24 cease after construction is complete. During tunnel construction, groundborne noise due to
 25 vibrations from tunnel locomotive passbys and TBMs could occur intermittently where tunnels are
 26 located under or near residential areas.

27 ***Pile Driving at Intake Sites***

28 Construction of the intakes would involve driving sheet piles within the intake rights-of-way. Use of
 29 impact piles would cause groundborne vibrations to exceed the threshold of 0.2 in/sec PPV at
 30 residential buildings within 70 feet of pile driving sites, as shown in Table 23-23.

1 **Table 23-23. Predicted Vibration Levels from Construction Activities—Impact Pile Driving at Intake**
 2 **Structures**

Distance Between Source and Receiver (feet)	Calculated Peak Particle Velocity (in/sec PPV)
50	0.3004
60	0.2458
70	0.2075
75	0.1923
80	0.1792
90	0.1574
100	0.1402
150	0.0897

Note: Calculations are based on Federal Transit Administration 2006 and California Department of Transportation Vibration Guidance Manual 2004. Assumes ground type n value of 1.1.

PPV = peak particle velocity.

3
 4 Groundborne vibration from impact pile driving is predicted to exceed vibration thresholds at
 5 nearby residences in the areas shown in Table 23-24. While groundborne vibration levels in excess
 6 of 0.2 in/sec PPV could occur at any of these residences, the highest vibration levels are expected at
 7 those residences nearest to the intake work areas. Construction of intakes and barge unloading
 8 facilities would result in excessive groundborne vibration levels at these nearby residential
 9 structures. The effect of exposing sensitive receptors to groundborne vibration would be adverse.
 10 Mitigation Measure NOI-2 is available to reduce this effect.

11 **Table 23-24. Land Use Affected by Vibrations from Pile Driving During Construction of Intakes,**
 12 **Alternative 1A**

Location	Zoning	Total Affected Parcels
Sacramento County – including River Road near the community of Hood; Neighborhoods in the community of Hood	Residential ^a	88
Yolo County – including County Road E9 near the community of Clarksburg	Residential ^a	1
San Joaquin County	Residential ^a	13

^a Includes agricultural or unclassified use that permits residential use.

14 **Construction of Water Conveyance (Tunnel)**

15 The use of tunneling equipment during construction would cause groundborne vibration and
 16 potentially groundborne noise within buildings in the vicinity of tunnel construction areas.
 17 Vibration sources include the TBM and locomotives moving soil, equipment, and construction
 18 workers between tunnel shaft sites. As discussed in Chapter 3, *Description of Alternatives*, the typical
 19 depth of tunnel installation would be approximately 100 feet below mean sea level (msl), but could
 20 be up to 160 feet below msl depending on site conditions. This analysis uses a conservative worst-
 21 case assumption of 60 feet below msl despite the fact that all proposed Delta tunnels will be
 22 constructed with a minimum of 100 feet of soil (soft ground) cover.

1 Groundborne vibration levels from operation of the TBM and tunnel locomotives are described
 2 below. Sensitive receptors that may be exposed to increased groundborne vibration include
 3 residences, outdoor parks, schools, and agriculture areas. As shown in Table 23-23, there are a
 4 number of potentially affected parcels within 1,200 feet of the tunnel conveyance. However, at a 60-
 5 foot tunnel depth, groundborne vibrations from the TBM are estimated to be 0.008 in/sec PPV,
 6 which is below the threshold of 0.04 in/sec PPV.¹ As demonstrated by measured ground vibration
 7 data from modern tunneling projects, the deep soil cover will effectively dampen, and absorb
 8 propagated energy.

9 During tunnel construction, passbys from locomotives hauling workers and material inside of the
 10 tunnel would produce localized groundborne vibration that could manifest as noise inside of
 11 buildings. However, as described in Section 23.4.2, *Determination of Effects*, tunnel locomotives
 12 would be operated at slow speeds inside of tunnels and would not result in excessive vibrations.
 13 Groundborne noise from tunnel locomotive operation during construction is therefore not predicted
 14 to exceed groundborne noise thresholds or result in an adverse noise impact to sensitive receptors
 15 along the tunnel conveyance.

16 The potential for tunneling induced ground vibration effects will be thoroughly analyzed in the
 17 preliminary and final design phases of the project, using site-specific geotechnical data and the
 18 expected TBM configuration. Potential effects on surface structures and human perception will be
 19 evaluated in detail during preliminary design. As additional precautions, and where necessary, a
 20 ground vibration monitoring program using seismographs and other high-precision equipment will
 21 be implemented during construction to ensure ground vibration is within the required contract
 22 limits.

23 **CEQA Conclusion:** Groundborne vibrations during tunneling would not exceed 0.008 in/sec PPV at
 24 60-foot tunnel depth and would therefore be less than significant. Likewise, locomotives are not
 25 expected to generate significant noise levels because they will travel at low speeds between 5 and
 26 10 miles per hour. However, the impact of exposing residential structures to groundborne vibration
 27 during intake construction would be significant as reasonable worst-case modeling indicates that
 28 102 residential parcels would be exposed to vibration levels in excess of 0.2 in/sec PPV during
 29 intake pile driving (see Table 23-24). Although Mitigation Measure NOI-2 will reduce this impact, it
 30 is not anticipated that feasible measures will be available in all situations to reduce vibration to
 31 levels below the applicable thresholds. This impact would therefore be significant and unavoidable.

32 **Mitigation Measure NOI-2: Employ Vibration-Reducing Construction Practices during** 33 **Construction of Water Conveyance Facilities**

34 During construction, BDCP proponents will implement vibration-reducing construction
 35 practices such that vibration from pile driving does not exceed 0.2 in/sec PPV at nearby
 36 residences.

37 The BDCP proponents shall ensure that the following measures are implemented to reduce
 38 adverse effects and/or significant effects as described above if the measures are applicable and

¹ A case study of a similar tunneling project (the New Crystal Springs Bypass Tunnel Project) shows that in a tunneling project which took place 60-155 feet below ground surface in an urban residential neighborhood more heavily populated than any of the BDCP alternatives, the groundborne vibration did not exceed 0.032 in/sec PPV during the daytime hours of 7 am to 6 pm, or 0.016 in/sec PPV during the nighttime hours of 6 pm to 7 am and was indistinguishable from the surrounding noise. (Wilson et al., 2011)

feasible. Not all measures listed below may be feasible or applicable to all contractors. Rather, these measures serve as an overlying mitigation framework to be used for specific construction practices. The applicability of measures listed below would vary based on the location, timing, nature, and feasibility of each activity.

- Locating equipment as far as practical from vibration-sensitive (and noise-sensitive) land uses (at least 100 feet)
- Use of alternative pile driving methods such as vibratory driving, hydraulic press-in driving, or use of pre-drilled pile holes.

Depending on the equipment selected, the measures identified above can reduce vibration from pile driving to below 0.2 in/sec PPV at nearby residences. The specific noise reduction cannot be currently quantified since the actual equipment to be used is unknown and that the contractor may have alternative ways to achieve the performance limit. If the above measures are determined feasible, BDCP proponents will retain a qualified acoustical consultant or engineering firm to conduct vibration monitoring at potentially affected buildings to measure the actual vibration levels during construction and ensure vibration from pile driving does not exceed 0.2 in/sec PPV.

For cases where the above measures are not feasible, the resident or property owner will be notified in writing prior to construction activity that construction may occur within 100 feet of their building. A representative for the BDCP proponents will inspect the potentially affected buildings prior to construction to inventory existing cracks in paint, plaster, concrete, and other building elements. BDCP proponents will retain a qualified acoustical consultant or engineering firm to conduct vibration monitoring at potentially affected buildings to measure the actual vibration levels during construction. Following completion of construction, a representative for the BDCP proponents will conduct a second inspection to inventory changes in existing cracks and new cracks or damage, if any, that occurred as a result of construction-induced vibration. If new damage is found, then the BDCP proponents will promptly arrange to have the damage repaired, or will reimburse the property owner for appropriate repairs.

In addition, if construction activity is required within 100 feet of residences or other vibration-sensitive buildings, a designated complaint coordinator will be responsible for handling and responding to any complaints received during such periods of construction. A reporting program will be required that documents complaints received, actions taken, and the effectiveness of these actions in resolving disputes.

Impact NOI-3: Exposure of Noise-Sensitive Land Uses to Noise from Operation of Water Conveyance Facilities

NEPA Effects: Potential reasonable worst-case pump noise levels during operation of the intake structures were evaluated by calculating sound power levels of the pump based on horsepower (Hoover and Keith 2000). For Alternative 1A, faceplate horsepower for vertical column and vertical volute type pumps is specified in the pump selection appendix of the Pipeline/Tunnel Option Conceptual Engineering Report (CER) (California Department of Water Resources 2010b). Pump specifications are shown in Table 23-25. Combined source noise levels assume that pump enclosures (including buildings) provide a nominal 15 dB of noise attenuation. This analysis assumes that pumps are operating 24 hours a day.

1 **Table 23-25. Pump Specifications—Alternative 1A**

Pump Location	Quantity	Pumping Plant Capacity (cfs)	Pump Horsepower	Individual Pump Source Level (dBA)	Combined Source Level (dBA)	Assumed Attenuation (dB)	Combined Source Level at 50 feet with Attenuation (dBA)
Intake 1	6	3,000	4,500	97	104	15	89
Intake 2	6	3,000	4,500	97	104	15	89
Intake 3	6	3,000	3,500	96	102	15	88
Intake 4	6	3,000	3,500	96	102	15	88
Intake 5	6	3,000	3,500	96	102	15	88
Intermediate Plant	16 (10/6) ^a	15,000	18,000/8,000 ^a	103/99 ^a	114	15	99

^a Vertical Column Pumps/Vertical Volute Pumps in the Intermediate Pumping Plant.

cfs = cubic feet per second.

dB = decibels.

dBA = A-weighted sound level in decibels.

2

3 The estimated sound levels from pump operation as a function of distance based on calculated
4 point-source attenuation over “soft” (i.e., acoustically absorptive) ground are shown in Table 23-26.

5 The results shown in Table 23-26 indicate that operating noise from pumping plants would exceed
6 the nighttime threshold of 45 dBA at noise-sensitive land uses within a distance of up to 2,600 feet
7 from intake pumping plant locations, and 6,000 feet from the pumping plant located at the proposed
8 intermediate forebay. Noise from operation of pumping plants is predicted to exceed daytime and
9 nighttime noise thresholds at nearby residences and outdoor parks in areas indicated in Table 23-
10 27.

11 **Table 23-26. Predicted Noise Levels from Intake and Intermediate Pumping Plant Operations—**
12 **Alternative 1A**

Distance Between Source and Receiver (feet)	Intakes 1–2 Calculated L_{eq} Sound Level (dBA)	Intakes 3–5 Calculated L_{eq} Sound Level (dBA)	Intermediate Pumping Plant Calculated L_{eq} Sound Level (dBA)
50	89	88	99
100	82	80	91
200	74	72	83
300	69	68	79
400	66	65	75
600	61	60	71
800	58	57	67
1,000	55	54	65
1,200	53	52	63
1,400	52	50	61
1,600	50	49	60

Distance Between Source and Receiver (feet)	Intakes 1-2 Calculated L_{eq} Sound Level (dBA)	Intakes 3-5 Calculated L_{eq} Sound Level (dBA)	Intermediate Pumping Plant Calculated L_{eq} Sound Level (dBA)
2,000	47	46	57
2,200	46	45	56
2,600	45	43	54
3,600	41	40	50
5,000	37	36	47
6,000	35	34	45
7,000	33	32	43

Notes: Calculations are based on Federal Transit Administration 2006. Calculation do not include the effects, if any, of local shielding from walls, topography, or other barriers that may reduce sound levels further.

Noise levels assume a nominal pump enclosure attenuation of 15 dB.

Bold denotes daytime and nighttime maximum noise thresholds.

dBA = A-weighted sound level in decibels.

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As shown in Table 23-27, operation of water conveyance facilities could result in substantial increases in noise levels affecting nearby communities and residences. While noise levels in excess of applicable thresholds could occur throughout the affected area, the highest noise levels are expected at those land uses most adjacent to the pumping plants. The effect of exposing noise-sensitive land uses to noise increases above thresholds would be adverse. Mitigation Measure NOI-3 is available to reduce this effect.

8

Table 23-27. Land Use Affected by Noise from Operation of Pumping Plants, Alternative 1A

Location	Zoning	50 dBA L_{eq} Daytime Operations Threshold	45 dBA L_{eq} Nighttime Operations Threshold
		Total Affected Parcels	Total Affected Parcels
Sacramento County – including River Road near the community of Hood; neighborhoods in the community of Hood; Lambert Road; Vorden Road.	Residential	108	121
	Natural/Recreational	2	2
	Agricultural/Other ^a	79	156
Yolo County – including County Road E9 near the community of Clarksburg; neighborhoods in the community of Clarksburg.	Agricultural/Other ^a	85	138

^a Includes agricultural or unclassified use that permits residential use.

9

10 **Noise Exposure to Workers at Conveyance Facilities**

11

12

Noise from operation of conveyance facilities would affect workers on site. However, workers are subject to state and federal Occupational Health and Safety (OSHA) standards. OSHA mitigation

standards for noise limits exposure are as follows: an 8-hour time-weighted average of 85 dBA or a dose of 50 percent are referred to as OSHA action levels [29 CFR 1910.95(c)(2)]. Occupational exposure to noise levels in excess of 85 dBA requires monitoring and mitigation to protect workers. Given that on-site workers would be protected under OSHA requirements, no adverse impacts would occur to workers.

CEQA Conclusion: The impact of exposing noise-sensitive land uses during pumping plant operations to noise levels above the daytime (50 dBA L_{max}) or nighttime (45 dBA L_{max}) noise thresholds would be significant. Based on reasonable worst-case modeling, 108 residential parcels, 2 natural/recreational parcels, and 165 agricultural parcels would be affected by daytime noise levels in excess of the operational threshold. The nighttime threshold would be exceeded at 121 residential parcels, 2 natural/recreational parcels, and 294 agricultural parcels. The impact of exposing these receptors to noise increases above thresholds would be significant. Mitigation Measure NOI-3 will reduce operational noise levels below applicable thresholds, thus resulting in a less-than-significant impact.

Mitigation Measure NOI-3: Design and Construct Intake Facilities and Other Pump Facilities Such That Operational Noise Does Not Exceed 50 dBA (One-Hour L_{eq}) during Daytime Hours (7:00 A.M. to 10:00 P.M.) or 45 dBA (One-Hour L_{eq}) during Nighttime Hours (10:00 P.M. to 7:00 A.M.) or the Applicable Local Noise Standard (Whichever Is Less) at Nearby Noise Sensitive Land Uses

BDCP proponents will retain a qualified acoustical consultant to design acoustical treatments for the intake facilities and other pump facilities. Implementation of this measure will ensure that operational noise levels, as applicable, do not exceed 50 dBA (one-hour L_{eq}) during daytime hours (7:00 a.m. to 10:00 p.m.) or 45 dBA (one-hour L_{eq}) during nighttime hours (10:00 p.m. to 7:00 a.m.) or the applicable local noise standard (whichever is less) at nearby noise-sensitive land uses. Measures that can be implemented to achieve this include but are not limited to:

- enclosing all pumps, motors, and other noise-generating equipment in solid wall structures;
- limiting openings in the enclosing structure and installing acoustic ventilation louvers where ventilation openings are required,
- installing acoustic access doors and wall panels,
- using low-noise motors,
- using low noise transformers,
- placing sound barriers (earth berms or constructed barriers) around noise sources

Verification noise monitoring will be conducted at each operational intake or pump location to confirm that acoustical treatments reduce operational noise to comply with the applicable noise standard. If noise is not in compliance with the applicable standard, BDCP proponents will implement additional necessary treatments until compliance is achieved.

Impact NOI-4: Exposure of Noise-Sensitive Land Uses to Noise from Implementation of Proposed Conservation Measures 2-10

NEPA Effects: Implementation of CM2 and CM3–CM10 could generate increases in noise related to restoration or enhancement activities. Habitat restoration and enhancement conservation measures are anticipated to require use of noise-generating equipment during construction and maintenance:

- 1 • Grading, excavation, and placement of fill material.
- 2 • Breaching, modification, or removal of existing levees, and construction of new levees.
- 3 • Modification, demolition, and removal of existing infrastructure (e.g., buildings, roads, fences,
- 4 electric transmission and gas lines, irrigation infrastructure).
- 5 • Construction of new infrastructure (e.g., buildings, roads, fences, electric transmission and gas
- 6 lines, irrigation infrastructure).
- 7 • Removal of existing vegetation and planting/seeding of vegetation.
- 8 • Levee maintenance.
- 9 • Mowing, burning, and trimming to manage vegetation.

10 Because the specific areas for implementing these conservation measures have not been
 11 determined, this effect is evaluated qualitatively.

- 12 • Yolo Bypass Fishery Enhancement (CM2). Noise-generating activities from enhancement
- 13 activities in the Yolo Bypass would include use of construction vehicles and equipment for
- 14 modifying or installing new facilities, or changes in operation of existing facilities, including the
- 15 following.
 - 16 ○ Installing fish ladders and experimental ramps at Fremont Weir or widening the existing
 - 17 fish ladder.
 - 18 ○ Installing fish screens on small Yolo Bypass diversions.
 - 19 ○ Constructing new or replacement operable check-structures at Tule Canal/Toe Drain.
 - 20 ○ Replacing the Lisbon Weir with a fish-passable gate structure.
 - 21 ○ Realigning Lower Putah Creek.
 - 22 ○ Increasing operation of upstream unscreened pumps.
 - 23 ○ Installing operable gates at Fremont Weir.
 - 24 ○ Constructing physical barriers in the Sacramento River.
 - 25 ○ Constructing associated support facilities (operations buildings, parking lots, access
 - 26 facilities such as roads and bridges).
 - 27 ○ Improving levees adjacent to the Fremont Weir Wildlife Area.
 - 28 ○ Replacing agricultural crossings of the Tule Canal/Toe Drain with fish-passable structures
 - 29 such as flat car bridges, earthen crossings with large, open culverts.
 - 30 ○ Grading, removal of existing berms, levees, and water control structures, construction of
 - 31 berms or levees, re-working of agricultural delivery channels, and earthwork or
 - 32 construction of structures to reduce Tule Canal/Toe Drain channel capacities.
- 33 • Tidal Habitat Restoration (CM4). Restoration of freshwater tidal habitat in the Cache Slough,
- 34 Cosumnes/Mokelumne, West Delta, South Delta, and Suisun Marsh ROAs would require
- 35 breaching and lowering of levees, installing new or modified levees to protect adjacent areas
- 36 from flooding, connecting remnant sloughs or channels to improve circulation, and modifying
- 37 ground elevations to reduce impacts of subsidence. Noise-generating activities would include
- 38 use of construction vehicles and equipment for the following activities.

- 1 ○ Construction site preparation could require clearing and grubbing, demolition of existing
2 structures, surface water quality protection, dust control, establishment of storage areas and
3 stockpile areas, temporary utilities and fuel storage, and erosion control.
- 4 ○ Earthwork activities for development of the restoration habitat areas could include the
5 construction activities described below on the landside and waterside of existing levees in
6 areas that would be selected for tidal habitat restoration.
- 7 ● Seasonally Inundated Floodplain Restoration (CM5). Seasonally inundated floodplain habitat
8 would be restored within the north, east, and/or south Delta. Noise-generating activities would
9 include use of construction vehicles and equipment for modifying or installing new facilities, or
10 changes in operation of existing facilities, including the following activities.
- 11 ○ Site preparation could require clearing and grubbing, demolition of existing structures,
12 surface water quality protection, dust control, establishment of storage areas and stockpile
13 areas, temporary utilities and fuel storage, and erosion control.
- 14 ○ Earthwork activities for development of the seasonally inundated floodplains could include
15 setting back levees, removal of existing levees, removal of riprap to allow for channel
16 meander between the setback levees, grading to restore drainage patterns and increase
17 inundation frequency and duration, and establishment of riparian habitat.
- 18 ● Channel Margin Habitat Enhancement (CM6). Channel margin habitat would be enhanced on the
19 Sacramento River between Freeport and Walnut Grove, the San Joaquin River between Vernalis
20 and Mossdale, Steamboat and Sutter Sloughs, and the North and South Forks of the Mokelumne
21 River. Noise-generating activities would include use of construction vehicles and equipment for
22 the following activities.
- 23 ○ Site preparation could require clearing and grubbing, demolition of existing structures,
24 surface water quality protection, dust control, establishment of storage areas and stockpile
25 areas, temporary utilities and fuel storage, and erosion control.
- 26 ○ Earthwork activities for development of the channel margin habitat areas could include
27 modification of levees or setting back levees. Riprap would be removed where levees are set
28 back and channel geometry would be modified in unconfined channel reaches or along
29 channels where levees are set back.
- 30 ● Riparian Habitat Restoration (CM7). Riparian habitat restoration in Cosumnes/Mokelumne,
31 east, west, and south Delta areas would require site preparation and earthwork using noise-
32 generating construction vehicles and equipment for the following activities.
- 33 ○ Clearing and grubbing, demolition of existing structures, surface water quality protection,
34 dust control, establishment of storage areas and stockpile areas, temporary utilities and fuel
35 storage, and erosion control.
- 36 ○ Removal of riprap, minor landform modifications to restore water circulation, planting of
37 riparian vegetation, irrigation and maintenance of plantings, and control of nonnative
38 species.
- 39 ● Grassland Communities Restoration (CM8). Restoration of grassland habitat would require
40 sowing native species using a variety of techniques (e.g., seed drilling, native hay spreading,
41 plugs). Noise-generating activities would include use of construction vehicles and equipment for
42 reseeding and for recontouring graded land.

- 1 • Vernal Pool Complex Restoration (CM9). Vernal pool complex restoration could require use of
2 noise-generating construction vehicles and equipment to excavate or recontour historical vernal
3 pools and swales to natural bathymetry.
- 4 • Nontidal Marsh Restoration (CM10). Nontidal wetlands restoration could include the use of
5 noise-generating construction vehicles and equipment for site preparation, planting of native
6 marsh vegetation, and maintenance of plantings, including grading to establish an elevational
7 gradient to support both open water perennial aquatic habitat intermixed with shallower marsh
8 habitat.

9 The effect would vary according to the type of construction equipment and techniques used in
10 construction of the specific conservation measure, the location and timing of the actions called for in
11 the conservation measure, and the noise environment at the time of implementation. However, the
12 noise levels from these activities are expected to be similar to those shown in Table 23-16 because
13 similar types of equipment will be used. The results shown in Table 23-16 indicate that residences
14 within 1,200 feet of an active restoration work area could be exposed to construction noise in excess
15 of the daytime (7 a.m. to 10 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50
16 dBA L_{max} would be exceeded within a distance of 2,800 feet.

17 The effect of exposing sensitive land uses to increases in construction noise levels above thresholds
18 would be adverse. Mitigation Measures NOI-1a and NOI-1b are available to reduce this effect.

19 **CEQA Conclusion:** The impact of exposing noise-sensitive land uses during construction to noise
20 increases above the daytime (60 dBA L_{eq}) and nighttime (50 dBA L_{max}) thresholds would be
21 significant. Noise levels during implementation of these conservation measures are expected to vary
22 according to the type of construction equipment and techniques used, but are likely to be similar to
23 noise levels shown in Table 23-16. The results shown in Table 23-16 indicate that residences within
24 1,200 feet of an active restoration work area could be exposed to construction noise in excess of the
25 daytime (7 a.m. to 10 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA
26 L_{max} would be exceeded within a distance of 2,800 feet. The impact of exposing these receptors to
27 noise increases above thresholds would be significant. Although Mitigation Measures NOI-1a and
28 NOI-1b will reduce this impact, it is not anticipated that feasible measures will be available in all
29 situations to reduce construction noise to levels below the applicable thresholds. This impact would
30 therefore be significant and unavoidable.

31 **Mitigation Measure NOI-1a: Employ Noise-Reducing Construction Practices during**
32 **Construction**

33 Please see Mitigation Measure NOI-1a under Impact NOI-1.

34 **Mitigation Measure NOI-1b: Prior to Construction, Initiate a Complaint/Response**
35 **Tracking Program**

36 Please see Mitigation Measure NOI-1b under Impact NOI-1.

23.3.3.3 Alternative 1B—Dual Conveyance with East Alignment and Intakes 1–5 (15,000 cfs; Operational Scenario A)

Impact NOI-1: Exposure of Noise-Sensitive Land Uses to Noise from Construction of Water Conveyance Facilities

NEPA Effects: For a description of noise generated by this component of the project, see the discussion of Impact NOI-1, *Construction of Intakes*, under Alternative 1A. A total of five intakes would be constructed under Alternative 1B. No intermediate forebay would be constructed, and the conveyance facility would be a canal on the east side of the Sacramento River (see Figures 3-4 and 3-5 in Chapter 3, *Description of Alternatives*).

Construction of Intakes

The results shown in Table 23-17 indicate that during periods of pile driving, residences located within 1,400 feet of an active intake construction site could be exposed to construction noise in excess of the DWR daytime (7 a.m. to 10 p.m.) maximum noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be exceeded at a distance of 2,800 feet.

While equipment could operate at any work area identified for this alternative, the highest noise levels are expected to occur at those sites where the duration and intensity of construction activities would be greatest. The work areas for construction of Intakes 1–5 would extend through several residential areas and communities near the Sacramento River. Noise from construction of intakes is predicted to exceed daytime and nighttime noise thresholds at nearby residences, schools and outdoor parks indicated in Table 23-28.

Although this assessment includes daytime and nighttime construction noise estimates, construction of the intakes would primarily occur during daytime hours. If nighttime construction of the intakes were to occur, noise levels could be the same as that generated during daytime hours.

The effect of exposing these noise-sensitive land uses to noise increases above thresholds would be adverse. Mitigation Measures NOI-1a and NOI-1b are available to address this effect.

Table 23-28. Land Use Affected by Equipment Noise from Construction of Intakes, Alternative 1B

Location	Zoning	Daytime Threshold (60 dBA L_{eq} [1h])	Nighttime Threshold (50 dBA L_{max} [1h])
		Total Affected Parcels	Total Affected Parcels
Sacramento County – including River Road near the community of Hood; neighborhoods in the community of Hood; Lambert Road; Vorden Road.	Residential	120	120
	Natural/Recreational	4	4
	Agricultural/Other ^a	212	159
Yolo County – including County Road E9 near the community of Clarksburg; neighborhoods in the community of Clarksburg.	Residential	4	98
	Natural/Recreational	1	5
	Agricultural/Other ^a	152	189
	Schools	None	Clarksburg Middle School

^a Includes agricultural or unclassified use that permits residential use.

1 **Construction of Conveyance (Canal), Forebay, Barge Unloading Facilities, and Intermediate Pumping**
2 **Plant**

3 Alternative 1B would use the east alignment conveyance alternative. A pipeline connecting the
4 intakes to the canal would be constructed via open trenching to a depth of approximately 30 feet.
5 Hydraulic siphons would be constructed in tunnels at approximately 160-foot depths where the
6 canal alignment crosses a major waterway or floodway. Potential reasonable worst-case equipment
7 noise levels from construction work areas would be comparable to those listed for the intake sites in
8 Table 23-17. Assuming 100% equipment utilization within a given hour of day, the combined noise
9 level at work areas is 96 dBA L_{eq} (1hr) at 50 feet.

10 The results shown in Table 23-16 indicate that residences within 1,200 feet of an active work area
11 could be exposed to construction noise in excess of the DWR daytime (7 a.m. to 10 p.m.) maximum
12 noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be exceeded at a
13 distance of 2,800 feet.

14 While equipment could operate at any work area identified for this alternative, the highest noise
15 levels are expected to occur at those sites where the duration and intensity of construction activities
16 would be greatest. This includes all construction sites along the canal or tunnel conveyance
17 alignment, as well as at the site of the Byron Tract Forebay adjacent to and south of Clifton Court
18 Forebay. For a map of the proposed east alignment, see Mapbook Figure M3-2. The canal, tunnel,
19 and forebay construction work areas would extend through several residential areas and
20 communities near the Sacramento River. Noise from construction activities is predicted to exceed
21 daytime and nighttime noise thresholds at nearby residences, schools and outdoor parks indicated
22 in Table 23-29.

23 Although this assessment includes daytime and nighttime construction noise estimates for the
24 forebay, barge unloading facilities, intermediate pumping plant, and conveyance tunnels and canals,
25 construction of the forebay, barge unloading facilities, intermediate pumping plant, and canals
26 would primarily occur during daytime hours. If nighttime construction of the forebay, barge
27 unloading facilities, intermediate pumping plant, and canals were to occur, noise levels could be the
28 same as those generated during daytime hours. Construction of the conveyance tunnels and RTM
29 storage actions would occur on a 24-hour basis.

30 The effect of exposing these noise-sensitive land uses to noise increases above thresholds would be
31 adverse. Mitigation Measures NOI-1a and NOI-1b are available to address this effect.

1 **Table 23-29. Land Use Affected by Equipment Noise from Construction of Conveyance and**
 2 **Associated Facilities, Alternative 1B**

Location	Zoning	Daytime Threshold (60 dBA L_{eq} [1h])	Nighttime Threshold (50 dBA L_{max} [1h])
		Total Affected Parcels	Total Affected Parcels
Sacramento County – including River Road near the community of Hood; neighborhoods in the community of Hood; Lambert Road.	Residential	99	99
	Natural/Recreational	2	7
	Agricultural/Other ^a	217	310
Yolo County	Residential	21	125
	Natural/Recreational	1	5
	Agricultural/Other ^a	159	177
	Schools	None	Clarksburg Middle School, Delta Elementary (K-6 Charter), Delta High
San Joaquin County	Residential	9	26
	Natural/Recreational	2	2
	Agricultural/Other ^a	472	1,118
	Schools	Holt Union Elementary	Holt Union Elementary
Contra Costa County	Agricultural/Other ^a	89	98
Alameda County	Agricultural/Other ^a	21	45

^a Includes agricultural or unclassified use that permits residential use.

3

4 ***Truck Trips and Worker Commutes***

5 Project-generated heavy trucks and worker commutes are predicted to result in increased traffic
 6 noise levels at noise-sensitive land uses adjacent to local roadways. Project-generated vehicle traffic
 7 volumes for the east alignment alternative are predicted to have a maximum heavy truck
 8 composition of 38%, which was assumed to apply to any of the local roadways under a worst-case
 9 noise scenario. Future noise levels are shown in Table 23-30.

1 **Table 23-30. Predicted Future Traffic Noise Levels on Commuter Roads and Haul Routes, East**
 2 **Alignment**

Roadway	Segment	Existing Noise Level, dBA	Future With-Project Noise Level, dBA	Noise Level Increase, dB	Substantial Increase?
Byron Hwy	Contra Costa Co./ Alameda Co. Line to Alameda Co./San Joaquin Co. Line	58	65	7	no
Brentwood Blvd	Delta Rd (Oakley City Limits) to Balfour Rd	61	66	5	no
Brentwood Blvd	Balfour Rd to Brentwood City Limits (South)	60	66	6	no
Balfour Rd	Brentwood Blvd to Brentwood City Limits	61	61	0	no
Bethel Island Rd	Oakley City Limits to End	55	55	0	no
Balfour Rd	Brentwood City Limits to Byron Hwy	54	54	0	no
Old SR 41	Brentwood City Limits (South) to Marsh Creek Rd	62	66	4	no
Byron Hwy	Delta Rd to Old SR 4	53	53	0	no
Byron Hwy	SR 4 to Contra Costa Co./ Alameda Co. Line	59	65	6	no
SR 160 (Freeport Blvd)	Sacramento City Limits to Freeport Bridge	59	70	11	no
SR 160 (Freeport Blvd/ River Rd)	Freeport Bridge to Scribner Rd	55	69	14	yes
SR 160	Scribner Rd to Hood Franklin Rd	53	69	16	yes
SR 160	Hood Franklin Rd to Lambert Rd	55	71	16	yes
SR 160	Lambert Rd to Paintersville Bridge	53	71	18	yes
SR 160 (Paintersville Bridge)	Sutter Slough Bridge Rd to SR 160 (River Rd)	53	72	19	yes
SR 160	Paintersville Bridge to Walnut Grove Bridge	53	72	19	yes
SR 160	Walnut Grove Bridge to A St (Isleton)	59	72	13	yes
SR 160	A St (Isleton) to SR 12	58	72	14	yes
SR 160	SR 12 to Brannan Island Rd	62	73	11	no
SR 84	West Sacramento City Limits to Courtland Rd	55	66	11	no
SR 84 (Courtland Rd/ Ryer Ave)	Courtland Rd to Cache Slough Ferry	46	46	0	no
SR 12 EB	I-80 to Beck Ave	65	71	6	no
SR 12 WB	I-80 to Beck Ave	64	71	7	no

Roadway	Segment	Existing Noise Level, dBA	Future With-Project Noise Level, dBA	Noise Level Increase, dB	Substantial Increase?
SR 12	Beck Ave to Sunset Ave/ Grizzly Island Rd	68	74	6	no
SR 12	Sunset Ave/ Grizzly Island Rd to Walters Rd/	66	74	8	no
SR 12	Walters Rd/ to SR 113	63	73	10	no
SR 12	SR 113 to SR 84 (River Rd)	64	73	9	no
SR 12 (Rio Vista Bridge)	SR 84 (River Rd) to SR 160 (River Rd)	64	73	9	no
SR 12	SR 160 (River Rd) to Sacramento Co./ SJ Co. Line	62	65	3	no
SR 12	Sacramento Co./ SJ Co. Line to I-5	63	65	2	no
SR 113	I-80 to Dixon City Limits	64	69	5	no
SR 113	Dixon City Limits to SR 12	57	68	11	no
SR 4 (Marsh Creek Rd)	Vasco Rd to Byron Hwy	61	70	9	no
SR 4	Marsh Creek Rd to Discovery Bay Blvd	63	71	8	no
SR 4	Discovery Bay Blvd to Tracy Blvd	61	70	9	no
SR 4	Tracy Blvd to I-5	64	71	7	no
A St/4th St/ Jackson Blvd.	SR 160 to Isleton City Limits	48	48	0	no
Main Street (Old SR 4)	SR 160 to Cypress Rd	62	66	4	no
Main Street (Old SR 4)	Cypress Rd to Delta Rd (Oakley City Limits)	61	66	5	no
Cypress Rd	Main Street to Bethel Island Rd	58	58	0	no
Bethel Island Rd	Cypress Rd to Oakley City Limits	55	55	0	no
Delta Rd	Main Street to Byron Hwy	55	55	0	no
Pocket Rd	I-5 to Freeport Blvd	63	69	6	no
Freeport Blvd (Old SR 160)	Pocket Rd to Sacramento City Limits	56	68	12	yes
Freeport Bridge	River Rd to SR 160 (Freeport Blvd)	55	65	10	no
Hood Franklin Rd	SR 160 (River Rd) to I-5	51	69	18	yes
Lambert Rd	SR 160 (River Rd) to Herzog Rd	44	63	19	yes
Lambert Rd	Herzog Rd to Franklin Blvd	46	63	17	yes
Franklin Blvd	Lambert Rd to Twin Cities Rd	48	63	15	yes
Twin Cities Rd	River Rd to I-5	53	59	6	no
Twin Cities Rd	I-5 to Franklin Blvd	55	63	8	no

Roadway	Segment	Existing Noise Level, dBA	Future With-Project Noise Level, dBA	Noise Level Increase, dB	Substantial Increase?
Sutter Slough Bridge Rd	Sacramento Co./ Yolo Co. Line to Paintersville Bridge	50	64	14	yes
River Rd	Paintersville Bridge to Twin Cities Rd	51	51	0	no
River Rd	Twin Cities Rd to Walnut Grove Bridge	55	60	5	no
Walnut Grove Rd/River Rd	Walnut Grove Bridge to Sacramento Co./ SJ Co. Line	55	61	6	no
Isleton Rd	River Rd (Walnut Grove)/Isleton Rd Bridge to 1.5 miles west of Isleton Rd Bridge	54	54	0	no
Race Track Rd/Tyler Island Rd	Walnut Grove Rd to Southern End of Tyler Island	45	45	0	no
Tyler Island Rd	Southern End of Tyler Island to SR 160 (River Rd)	46	46	0	no
Jackson Slough Rd	Isleton City Limits to SR 12	47	47	0	no
Jackson Slough Rd	Brannan Island Rd to SR 12	47	47	0	no
Walnut Grove Rd	Sacramento Co./ SJ Co. Line to I-5	53	65	12	yes
Peltier Rd	Blossom Rd to I-5	44	63	19	yes
Tracy Blvd	SR 4 to Clifton Court Rd	53	66	13	yes
Tracy Blvd	Clifton Court Rd to Tracy City Limits	52	66	14	yes
Byron Hwy	Alameda Co./San Joaquin Co. Line to Mountain House Pkwy	59	65	6	no
Mountain House Pkwy	Byron Hwy to Arnaudo Blvd	54	64	10	no
Mountain House Pkwy	Arnaudo Blvd to I-205	58	65	7	no
Eight Mile Rd	Stockton City Limits to I-5	58	65	7	no
Tracy Blvd	Tracy City Limits to I-205	58	67	9	no
Harbor Blvd	Industrial Blvd to US 50	63	66	3	no
Industrial Blvd/Lake Washington Blvd	Harbor Blvd to Jefferson Blvd	62	66	4	no
Jefferson Blvd (Old SR 84)	Lake Washington Blvd to Southport Pkwy	62	66	4	no
Jefferson Blvd (Old SR 84)	Southport Pkwy to West Sacramento City Limits	51	64	13	yes
River Rd	Freeport Bridge to Courtland Rd	54	54	0	no
River Rd	Courtland Rd to Sacramento Co./ Yolo Co. Line	48	64	16	yes
Courtland Rd	SR 84 to River Rd	48	64	16	yes

1 As shown in Table 23-30, predicted future traffic noise levels from project-generated worker
 2 commutes and truck trips would result in an increase of 12 dB or more compared to existing traffic
 3 noise levels along 21 project roadway segments.

4 During intake construction, segments of SR 160 between Freeport Bridge and Walnut Grove Bridge
 5 would be temporarily realigned around intake construction sites. As a result, future project noise
 6 levels would further increase at residences located near intake sites. Under Alternative 1B, noise
 7 levels at receivers near realigned segments of SR 160 would increase by up to 12 dB in addition to
 8 the noise increase shown in Table 23-30.

9 The increase in noise levels exceed the project threshold for traffic noise and would be considered
 10 adverse. Mitigation Measures NOI-1a and NOI-1b are available to address this effect.

11 ***Construction of Power Transmission Lines***

12 Noise from construction of power transmission lines for Alternative 1B is the same as Alternative
 13 1A. The results shown in Table 23-21 (see Impact NOI-1 in Alternative 1A) indicate that noise-
 14 sensitive land uses within 800 feet of an active transmission line construction area could be exposed
 15 to construction noise in excess of the daytime (7 a.m. to 10 p.m.) noise threshold of 60 dBA L_{eq} (1hr).
 16 The nighttime threshold of 50 dBA L_{max} would be exceeded at a distance of 1,800 feet from the
 17 construction area. Noise-sensitive receptors that could be exposed to adverse noise impacts due to
 18 transmission line construction include residential areas near the proposed transmission line
 19 construction footprint. Although this assessment includes daytime and nighttime construction noise
 20 estimates, construction of the transmission lines would primarily occur during daylight hours. If
 21 nighttime construction of the transmission lines were to occur, noise levels could be the same as
 22 those generated during daytime hours. The effect of exposing noise-sensitive land uses to noise
 23 increases above thresholds would be adverse. Mitigation Measures NOI-1a and NOI-1b are available
 24 to address this effect.

25 ***Earth-moving activities at offsite borrow/spoil areas***

26 Noise from earth-moving activities at offsite borrow/spoil areas for Alternative 1B is the same as
 27 Alternative 1A. The results shown in Table 23-22 (see Impact NOI-1 in Alternative 1A) indicate that
 28 noise-sensitive land uses within 800 feet of equipment operating in the borrow/spoil area could be
 29 exposed to construction noise in excess of the daytime (7 a.m. to 10 p.m.) noise threshold of 60 dBA
 30 L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be exceeded at a distance of 1,800 feet
 31 from the area. Noise-sensitive land uses that could potentially be exposed to adverse noise impacts
 32 due to earth-moving activities in offsite borrow/spoil areas would extend outside the borrow/spoil
 33 area right-of-way. The effect of exposing these noise-sensitive land uses to noise increases above
 34 thresholds would be adverse. However, with the exception of tunneling and RTM placement, most
 35 construction activities would occur during daytime hours. Mitigation Measures NOI-1a and NOI-1b
 36 are available to address this effect.

37 ***Noise exposure to workers at construction sites***

38 Impact NOI-1 for Alternative 1B is the same as Impact NOI-1 for Alternative 1A in terms of noise
 39 exposure to on-site workers. On-site workers would be protected under OSHA requirements. No
 40 adverse impacts would occur to workers.

41 ***CEQA Conclusion:*** The impact of exposing noise-sensitive land uses during construction to noise
 42 levels above the 60 dBA L_{eq} (1hr) daytime, the 50 dBA L_{max} nighttime, or the 12 dB traffic noise

1 increase threshold would be considered significant. Based on reasonable worst-case modeling, the
2 following significant impacts are expected as a result of Alternative 1B construction.

- 3 • **Intakes:** Sensitive receptors within 1,400 feet of an active intake construction site could be
4 exposed to construction noise in excess of the 60 dBA L_{eq} (1hr) daytime threshold. The
5 nighttime threshold of 50 dBA L_{max} would be exceeded at a distance of 2,800 feet. As shown in
6 Table 23-28, 124 residential parcels, 5 natural/recreational parcels, and 364 agricultural parcels
7 would be affected by daytime noise levels in excess of this threshold during construction. The
8 nighttime threshold would be exceeded at 218 residential parcels, 9 natural/recreational
9 parcels, 348 agricultural parcels, and 1 school.
- 10 • **Conveyance and Associated Facilities:** Sensitive receptors within 1,200 feet of an active
11 tunnel work area could be exposed to construction noise in excess of the daytime (7 a.m. to 10
12 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be
13 exceeded at a distance of 2,800 feet. As shown in Table 23-29, 129 residential parcels, 5
14 natural/recreational parcels, 958 agricultural parcels, and 1 school would be affected by
15 daytime noise levels in excess of this threshold during construction. The nighttime threshold
16 would be exceeded at 250 residential parcels, 14 natural/recreational parcels, 1,748 agricultural
17 parcels, and 4 schools.
- 18 • **Truck Trips and Worker Commutes:** Traffic noise from truck trips and worker commutes
19 would result in an increase of 12 dB or more compared to existing traffic noise levels at
20 residences and outdoor use areas along 21 project roadway segments in the study area as
21 shown in Table 23-30. The increase in noise levels would be substantial and exceed the project
22 threshold for traffic noise.
- 23 • **Power Transmission Lines:** Sensitive receptors within 800 feet of an active transmission line
24 construction area could be exposed to construction noise in excess of the daytime (7 a.m. to 10
25 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be
26 exceeded at a distance of 1,800 feet from the construction area. As noted above, several
27 residential land uses are near the proposed transmission line construction footprint.
- 28 • **Borrow/spoil areas:** Sensitive receptors within 800 feet of equipment operating in the
29 borrow/spoil area could be exposed to construction noise in excess of the daytime (7 a.m. to 10
30 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be
31 exceeded at a distance of 1,800 feet from the area. Borrow/spoil areas are located throughout
32 the conveyance alignment and are generally adjacent to or in close proximity of intake pumping
33 plant sites, forebays, and main tunnel construction shafts.

34 Mitigation Measures NOI-1a and NOI-1b would reduce noise impacts to sensitive land uses.
35 Although implementation of these measures will reduce the impact, it is not anticipated that feasible
36 measures will be available in all situations to reduce construction noise to levels below the
37 applicable thresholds. This impact would therefore be considered significant and unavoidable.

38 **Mitigation Measure NOI-1a: Employ Noise-Reducing Construction Practices during** 39 **Construction**

40 Please see Mitigation Measure NOI-1a under Impact NOI-1 in the discussion of Alternative 1A.

1 **Mitigation Measure NOI-1b: Prior to Construction, Initiate a Complaint/Response**
 2 **Tracking Program**

3 Please see Mitigation Measure NOI-1b under Impact NOI-1 in the discussion of Alternative 1A.

4 **Impact NOI-2: Exposure of Sensitive Receptors to Vibration or Groundborne Noise from**
 5 **Construction of Water Conveyance Facilities**

6 ***NEPA Effects:***

7 ***Pile Driving at Intake Sites***

8 For a description of noise generated by this component of the project, see the discussion of Impact
 9 NOI-2, *Pile Driving at Intake Sites*, under Alternative 1A. Under Alternative 1B, groundborne
 10 vibration from impact pile driving would exceed vibration thresholds at land uses described in Table
 11 23-31. While groundborne vibration levels in excess of 0.2 in/sec PPV could occur at any of these
 12 residences, the highest vibration levels are expected at those residences nearest to the intake work
 13 areas. Construction of intakes and barge unloading facilities would result in excessive groundborne
 14 vibration levels at these nearby residential structures. The effect of exposing sensitive receptors to
 15 groundborne vibration would be adverse. Mitigation Measure NOI-2 is available to reduce this effect.

16 **Table 23-31. Land Use Affected by Vibrations from Pile Driving During Construction of Intakes,**
 17 **Alternative 1B**

Location	Zoning	Total Affected Parcels
Sacramento County – including River Road near the community of Hood; Neighborhoods in the community of Hood	Residential ^a	80
Yolo County – including County Road E9 near the community of Clarksburg	Residential ^a	1
San Joaquin County	Residential ^a	4

^a Includes agricultural or unclassified use that permits residential use.

18
 19 ***Construction of Water Conveyance (Pipeline Portions)***

20 The use of tunneling equipment during construction could cause groundborne vibration and
 21 potentially groundborne noise within buildings in the vicinity of tunnel construction areas.
 22 Vibration sources include the TBM and locomotives moving soil, equipment, and construction
 23 workers between tunnel shaft sites. As discussed in Chapter 3, *Description of Alternatives*, the typical
 24 depth of tunnel installation would be approximately 100 feet below msl, but could be up to 160 feet
 25 below msl depending on site conditions. For the east alignment alternative, tunnel depth would be
 26 120 feet or greater below msl. Groundborne noise levels for the east alignment alternative would
 27 therefore be below the applicable threshold and would not result in an adverse noise impact to
 28 sensitive receptors adjacent to the water conveyance.

29 ***CEQA Conclusion:*** Groundborne vibrations from tunneling activities would not exceed applicable
 30 thresholds as tunnel depth would be 120 feet or greater below msl and would therefore be less than
 31 significant. However, the impact of exposing residential structures to groundborne vibration during
 32 intake construction would be significant as reasonable worst-case modeling indicates that 85
 33 residential parcels would be exposed to vibration levels in excess of 0.2 in/sec PPV during intake

1 pile driving (see Table 23-31). Although Mitigation Measure NOI-2 will reduce this impact, it is not
 2 anticipated that feasible measures will be available in all situations to reduce vibration to levels
 3 below the applicable thresholds. This impact would therefore be significant and unavoidable.

4 **Mitigation Measure NOI-2: Employ Vibration-Reducing Construction Practices during**
 5 **Construction of Water Conveyance Facilities**

6 Please see Mitigation Measure NOI-2 under Impact NOI-2 in the discussion of Alternative 1A.

7 **Impact NOI-3: Exposure of Noise-Sensitive Land Uses to Noise from Operation of Water**
 8 **Conveyance Facilities**

9 **NEPA Effects:** Potential reasonable worst-case pump noise levels during operation of the intake
 10 structures were evaluated by calculating sound power levels of the pump based on horsepower
 11 (Hoover and Keith 2000). For Alternative 1B, faceplate horsepower for vertical column type pumps
 12 is specified in the pump selection appendix of the East Option CER (California Department of Water
 13 Resources 2010c). Pump specifications are shown in Table 23-32. Combined source noise levels
 14 assume that pump enclosures (including buildings) provide a nominal 15 dB of noise attenuation.
 15 This analysis assumes that pumps are operating 24 hours a day.

16 The estimated sound levels from pump operation as a function of distance based on calculated
 17 point-source attenuation over “soft” (i.e., acoustically absorptive) ground are shown in Table 23-33.

18 **Table 23-32. Pump Specifications—Alternative 1B**

Pump Location	Quantity	Pumping Plant Capacity (cfs)	Pump Horsepower	Individual Pump Source Level (dBA)	Combine d Source Level (dBA)	Assumed Attenuation (dB)	Combined Source Level with Attenuation (dBA)
Intake 1	6	3,000	3,500	96	103	15	88
Intake 2	6	3,000	3,500	96	103	15	88
Intake 3	6	3,000	3,500	96	103	15	88
Intake 4	6	3,000	3,500	96	103	15	88
Intake 5	6	3,000	3,500	96	103	15	88
Intermediate Plant	15	15,000	7,000	99	110	15	95

cfs = cubic feet per second.

dB = decibels.

dBA = A-weighted sound level in decibels.

19

1 **Table 23-33. Predicted Noise Levels from Intake and Intermediate Plant Pump Operations—**
 2 **Alternative 1B**

Distance Between Source and Receiver (feet)	Intakes 1–5 Calculated L_{eq} Sound Level (dBA)	Intermediate Plant Calculated L_{eq} Sound Level (dBA)
50	88	95
100	80	87
200	72	79
300	68	75
400	65	72
600	60	67
800	57	64
1,000	54	61
1,200	52	59
1,400	50	57
1,600	49	56
2,000	46	53
2,200	45	52
2,600	43	50
3,600	40	47
4,000	38	45
4,500	37	44
5,000	36	43

Notes: Calculations are based on Federal Transit Administration 2006. Calculation do not include the effects, if any, of local shielding from walls, topography, or other barriers that may reduce sound levels further.

Noise levels assume a nominal pump enclosure attenuation of 15 dB.

Bold denotes daytime and nighttime maximum noise thresholds.

dBA = A-weighted sound level in decibels.

3

4 The results shown in Table 23-33 indicate that operating noise from pumping plants would exceed
 5 the nighttime threshold of 45 dBA at noise-sensitive land uses within a distance of up to 2,200 feet
 6 from intake pumping plant locations, and 4,000 feet from the intermediate pumping plant along the
 7 east conveyance alignment. Noise from operation of pumping plants is predicted to exceed daytime
 8 and nighttime noise thresholds at nearby residences and outdoor parks in areas indicated in Table
 9 23-34.

1 **Table 23-34. Land use affected by noise from operation of pumping plants, Alternative 1B**

Location	Zoning	50 dBA L_{eq} Daytime	45 dBA L_{eq} Nighttime
		Operations Threshold	Operations Threshold
		Total Affected Parcels	Total Affected Parcels
Sacramento County – including River Road near the community of Hood; neighborhoods in the community of Hood.	Residential	108	121
	Natural/Recreational	2	2
	Agricultural/Other ^a	56	101
Yolo County – including County Road E9 near the community of Clarksburg; neighborhoods in the community of Clarksburg.	Agricultural/Other ^a	85	138
San Joaquin County	Agricultural/Other ^a	27	61

^a Includes agricultural or unclassified use that permits residential use.

2

3 Operation of water conveyance facilities could result in substantial increases in noise levels affecting
4 nearby communities and residences. While noise levels in excess of applicable thresholds could
5 occur throughout the affected area, the highest noise levels are expected at those land uses most
6 adjacent to the pumping plants. The effect of exposing noise-sensitive land uses to noise increases
7 above thresholds would be adverse. Mitigation Measure NOI-3 is available to reduce this effect.

8 ***Noise exposure to workers at conveyance facilities***

9 Impact NOI-3 for Alternative 1B is the same as Impact NOI-3 for Alternative 1A in terms of noise
10 exposure to on-site workers. On-site workers would be protected under OSHA requirements. No
11 adverse impacts would occur to workers.

12 ***CEQA Conclusion:*** The impact of exposing noise-sensitive land uses during pumping plant
13 operations to noise levels above the daytime (50 dBA L_{max}) or nighttime (45 dBA L_{max}) noise
14 thresholds would be significant. Based on reasonable worst-case modeling, 108 residential parcels,
15 2 natural/recreational parcels, and 168 agricultural parcels would be affected by daytime noise
16 levels in excess of the operational threshold. The nighttime threshold would be exceeded at 121
17 residential parcels, 2 natural/recreational parcels, and 300 agricultural parcels. The impact of
18 exposing these receptors to noise increases above thresholds would be significant. Mitigation
19 Measure NOI-3 would reduce operational noise levels below applicable thresholds, thus resulting in
20 a less-than-significant level.

21 **Mitigation Measure NOI-3: Design and Construct Intake Facilities and Other Pump**
22 **Facilities Such That Operational Noise Does Not Exceed 50 dBA (One-Hour L_{eq}) during**
23 **Daytime Hours (7:00 A.M. to 10:00 P.M.) or 45 dBA (One-Hour L_{eq}) during Nighttime**
24 **Hours (10:00 P.M. to 7:00 A.M.) or the Applicable Local Noise Standard (Whichever Is**
25 **Less) at Nearby Noise Sensitive Land Uses**

26 Please see Mitigation Measure NOI-3 under Impact NOI-3 in the discussion of Alternative 1A.

1 **Impact NOI-4: Exposure of Noise-Sensitive Land Uses to Noise from Implementation of**
 2 **Proposed Conservation Measures 2-10**

3 **NEPA Effects:** Although locations or target acreages may vary for proposed conservation measures,
 4 at the program level of development, the amount and location of restoration actions under this
 5 alternative would be the same as Alternative 1A, and therefore the impact would be the same as
 6 under Alternative 1A. Habitat restoration and enhancement conservation measures are anticipated
 7 to include a number of noise-generating activities, including from construction equipment use. Noise
 8 levels during implementation of these conservation measures are expected to vary according to the
 9 type of construction equipment and techniques used, but are likely to be similar to noise levels
 10 shown in Table 23-16 (see Impact NOI-1 in Alternative 1A). The results shown in Table 23-16
 11 indicate that residences within 1,200 feet of an active restoration work area could be exposed to
 12 construction noise in excess of the daytime (7 a.m. to 10 p.m.) noise threshold of 60 dBA L_{eq} (1hr).
 13 The nighttime threshold of 50 dBA L_{max} would be exceeded within a distance of 2,800 feet.

14 The effect of exposing sensitive land uses to increases in construction noise levels above thresholds
 15 would be adverse. Mitigation Measures NOI-1a and NOI-1b are available to reduce this effect.

16 **CEQA Conclusion:** The impact of exposing noise-sensitive land uses during construction to noise
 17 increases above the daytime (60 dBA L_{eq}) and nighttime (50 dBA L_{max}) thresholds would be
 18 significant. Noise levels during implementation of these conservation measures are expected to vary
 19 according to the type of construction equipment and techniques used, but are likely to be similar to
 20 noise levels shown in Table 23-16 (see Impact NOI-1 in Alternative 1A). The results shown in Table
 21 23-16 indicate that residences within 1,200 feet of an active restoration work area could be exposed
 22 to construction noise in excess of the daytime (7 a.m. to 10 p.m.) noise threshold of 60 dBA L_{eq} (1hr).
 23 The nighttime threshold of 50 dBA L_{max} would be exceeded within a distance of 2,800 feet. The
 24 impact of exposing these receptors to noise increases above thresholds would be significant.
 25 Although Mitigation Measures NOI-1a and NOI-1b will reduce this impact, it is not anticipated that
 26 feasible measures will be available in all situations to reduce construction noise to levels below the
 27 applicable thresholds. This impact would therefore be significant and unavoidable.

28 **Mitigation Measure NOI-1a: Employ Noise-Reducing Construction Practices during**
 29 **Construction**

30 Please see Mitigation Measure NOI-1a under Impact NOI-1 in the discussion of Alternative 1A.

31 **Mitigation Measure NOI-1b: Prior to Construction, Initiate a Complaint/Response**
 32 **Tracking Program**

33 Please see Mitigation Measure NOI-1b under Impact NOI-1 in the discussion of Alternative 1A.

34 **23.3.3.4 Alternative 1C—Dual Conveyance with West Alignment and**
 35 **Intakes W1–W5 (15,000 cfs; Operational Scenario A)**

36 **Impact NOI-1: Exposure of Noise-Sensitive Land Uses to Noise from Construction of Water**
 37 **Conveyance Facilities**

38 **NEPA Effects:** A total of five intakes would be constructed under Alternative 1C. They would be sited
 39 on the west bank of the Sacramento River, directly opposite the locations identified for the
 40 pipeline/tunnel and east alignments. Under this alternative, water would be carried south in a canal

1 along the western side of the Delta to an intermediate pumping plant and then pumped through a
 2 tunnel to a continuing canal to the proposed Byron Tract Forebay immediately northwest of Clifton
 3 Court Forebay (see Figures 3-6 and 3-7 in Chapter 3, *Description of Alternatives*).

4 **Construction of Intakes**

5 Potential reasonable worst-case equipment noise levels from construction of intakes would be
 6 comparable to those listed for the intake sites in Table 23-17. The results shown in Table 23-17
 7 indicate that during periods of pile driving, residences located within 1,400 feet of an active intake
 8 construction site could be exposed to construction noise in excess of the DWR daytime (7 a.m. to 10
 9 p.m.) maximum noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would
 10 be exceeded at a distance of 2,800 feet.

11 While equipment could operate at any work area identified for this alternative, the highest noise
 12 levels are expected to occur at those sites where the duration and intensity of construction activities
 13 would be greatest. The work areas for construction of Intakes 1–5 would extend through several
 14 residential areas and communities near the Sacramento River. Noise from construction of intakes is
 15 predicted to exceed daytime and nighttime noise thresholds at nearby residences, schools and
 16 outdoor parks indicated in Table 23-35.

17 Although this assessment includes daytime and nighttime construction noise estimates, construction
 18 of the intakes would primarily occur during daytime hours. If nighttime construction of the intakes
 19 were to occur, noise levels could be the same as that generated during daytime hours.

20 The effect of exposing these noise-sensitive land uses to noise increases above thresholds would be
 21 adverse. Mitigation Measures NOI-1a and NOI-1b are available to address this effect.

22 **Table 23-35. Land Use Affected by Equipment Noise from Construction of Intakes, Alternative 1C**

Location	Zoning	Daytime Threshold (60 dBA L_{eq} [1h])	Nighttime Threshold (50 dBA L_{max} [1h])
		Total Affected Parcels	Total Affected Parcels
Sacramento County – including River Road near the community of Hood; neighborhoods in the community of Hood.	Residential	48	122
	Natural/Recreational	2	3
	Agricultural/Other ^a	74	161
Yolo County – including County Road E9 near the community of Clarksburg; neighborhoods in the community of Clarksburg.	Residential	15	107
	Natural/Recreational	1	5
	Agricultural/Other ^a	114	190
	Schools	None	Clarksburg Middle School, Delta Elementary (K-6 Charter), Delta High

^a Includes agricultural or unclassified use that permits residential use.

1 **Construction of Conveyance (Tunnel and Canal), Forebays, Barge Unloading Facilities, and Intermediate**
2 **Pumping Plant**

3 Potential reasonable worst-case equipment noise levels from construction work areas adjacent to
4 tunnel shaft sites would be comparable to those listed for the intake sites in Table 23-16. Assuming
5 100% equipment utilization within a given hour of day, the combined noise level at work areas is 96
6 dBA L_{eq} (1hr) at 50 feet.

7 The results shown in Table 23-16 indicate that residences located within 1,200 feet of an active
8 tunnel work area could be exposed to construction noise in excess of the DWR daytime (7 a.m. to 10
9 p.m.) maximum noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would
10 be exceeded at a distance of 2,800 feet.

11 While equipment could operate at any work area identified for this alternative, the highest noise
12 levels are expected to occur at those sites where the duration and intensity of construction activities
13 would be greatest. This includes all construction sites along the canal or tunnel conveyance
14 alignment, as well as at the site of the Byron Tract Forebay adjacent to and west of Clifton Court
15 Forebay. For a map of the proposed west alignment, see Mapbook Figure M3-3. The canal, tunnel,
16 and forebay work areas would extend through several residential areas and communities located
17 near the Sacramento River. Noise from construction activities is predicted to exceed daytime and
18 nighttime noise thresholds at nearby residences, schools and outdoor parks indicated in Table 23-
19 36.

20 Although this assessment includes daytime and nighttime construction noise estimates for the
21 forebay, barge unloading facilities, intermediate pumping plant, and conveyance tunnels and canals,
22 construction of the forebay, barge unloading facilities, intermediate pumping plant, and canals
23 would primarily occur during daytime hours. If nighttime construction of the forebay, barge
24 unloading facilities, intermediate pumping plant, and canals were to occur, noise levels could be the
25 same as those generated during daytime hours. Construction of the conveyance tunnels and RTM
26 storage actions would occur on a 24-hour basis.

27 The effect of exposing these noise-sensitive land uses to noise increases above thresholds would be
28 adverse. Mitigation Measures NOI-1a and NOI-1b are available to address this effect.

29 **Truck Trips and Worker Commutes**

30 Project-generated heavy trucks and worker commutes are predicted to result in increased traffic
31 noise levels at noise-sensitive land uses adjacent to local roadways. Based on information provided
32 by DWR as part of the cost estimate (see Appendix 22A), project-generated vehicle traffic volumes
33 for the west alignment alternative are predicted to have a maximum heavy truck composition of
34 41%, which was assumed to apply to any of the local roadways under a worst-case noise scenario.
35 Future noise levels are shown in Table 23-37.

1 **Table 23-36. Land Use Affected by Equipment Noise from Construction of Conveyance and**
 2 **Associated Facilities, Alternative 1C**

Location	Zoning	Daytime Threshold (60 dBA L_{eq} [1h])	Nighttime Threshold (50 dBA L_{max} [1h])
		Total Affected Parcels	Total Affected Parcels
Sacramento County – including River Road near the community of Hood; neighborhoods in the community of Hood; Lambert Road.	Residential	27	107
	Natural/Recreational	10	15
	Agricultural/Other ^a	118	186
Yolo County	Residential	23	129
	Natural/Recreational	1	5
	Agricultural/Other ^a	408	500
	Schools	Clarksburg Middle School	Clarksburg Middle School, Delta Elementary (K-6 Charter), Delta High
San Joaquin County	Residential	0	0
	Natural/Recreational	0	0
	Agricultural/Other ^a	1	3
	Schools	Holt Union Elementary	Holt Union Elementary
Contra Costa County—including the neighborhoods of Knightsen, Discovery Bay and Byron	Residential	1,098	2,851
	Natural/Recreational	16	206
	Agricultural/Other ^a	512	829
	Schools	Knightsen Elementary, Old River Elementary	Knightsen Elementary, Old River Elementary
Alameda County	Agricultural/Other ^a	9	14

^a Includes agricultural or unclassified use that permits residential use.

3

1 **Table 23-37. Predicted Future Traffic Noise Levels on Commuter Roads and Haul Routes, West**
 2 **Alignment**

Roadway	Segment	Existing Noise Level, dBA	Future With-Project Noise Level, dBA	Noise Level Increase, dB	Substantial Increase?
Byron Hwy	Contra Costa Co./ Alameda Co. Line to Alameda Co./San Joaquin Co. Line	58	68	10	no
Brentwood Blvd	Delta Rd (Oakley City Limits) to Balfour Rd	61	69	8	no
Brentwood Blvd	Balfour Rd to Brentwood City Limits (South)	60	69	9	no
Balfour Rd	Brentwood Blvd to Brentwood City Limits	61	65	4	no
Bethel Island Rd	Oakley City Limits to End	55	57	2	no
Balfour Rd	Brentwood City Limits to Byron Hwy	54	63	9	no
Old SR 41	Brentwood City Limits (South) to Marsh Creek Rd	62	69	7	no
Byron Hwy	Delta Rd to Old SR 4	53	66	13	yes
Byron Hwy	SR 4 to Contra Costa Co./ Alameda Co. Line	59	69	10	no
SR 160 (Freeport Blvd)	Sacramento City Limits to Freeport Bridge	59	72	13	yes
SR 160 (Freeport Blvd/ River Rd)	Freeport Bridge to Scribner Rd	55	55	0	no
SR 160	Scribner Rd to Hood Franklin Rd	53	53	0	no
SR 160	Hood Franklin Rd to Lambert Rd	55	55	0	no
SR 160	Lambert Rd to Paintersville Bridge	53	53	0	no
SR 160 (Paintersville Bridge)	Sutter Slough Bridge Rd to SR 160 (River Rd)	53	74	21	yes
SR 160	Paintersville Bridge to Walnut Grove Bridge	53	74	21	yes
SR 160	Walnut Grove Bridge to A St (Isleton)	59	74	15	yes
SR 160	A St (Isleton) to SR 12	58	74	16	yes
SR 160	SR 12 to Brannan Island Rd	62	74	12	yes
SR 84	West Sacramento City Limits to Courtland Rd	55	72	17	yes
SR 84 (Courtland Rd/ Ryer Ave)	Courtland Rd to Cache Slough Ferry	46	63	17	yes
SR 12 EB	I-80 to Beck Ave	65	72	7	no
SR 12 WB	I-80 to Beck Ave	64	72	8	no
SR 12	Beck Ave to Sunset Ave/ Grizzly Island Rd	68	75	7	no

Roadway	Segment	Existing Noise Level, dBA	Future With-Project Noise Level, dBA	Noise Level Increase, dB	Substantial Increase?
SR 12	Sunset Ave/ Grizzly Island Rd to Walters Rd/	66	75	9	no
SR 12	Walters Rd/ to SR 113	63	74	11	no
SR 12	SR 113 to SR 84 (River Rd)	64	74	10	no
SR 12 (Rio Vista Bridge)	SR 84 (River Rd) to SR 160 (River Rd)	64	74	10	no
SR 12	SR 160 (River Rd) to Sacramento Co./ SJ Co. Line	62	67	5	no
SR 12	Sacramento Co./ SJ Co. Line to I-5	63	67	4	no
SR 113	I-80 to Dixon City Limits	64	71	7	no
SR 113	Dixon City Limits to SR 12	57	70	13	yes
SR 4 (Marsh Creek Rd)	Vasco Rd to Byron Hwy	61	70	9	no
SR 4	Marsh Creek Rd to Discovery Bay Blvd	63	71	8	no
SR 4	Discovery Bay Blvd to Tracy Blvd	61	70	9	no
SR 4	Tracy Blvd to I-5	64	71	7	no
A St/4th St/ Jackson Blvd.	SR 160 to Isleton City Limits	48	48	0	no
Main Street (Old SR 4)	SR 160 to Cypress Rd	62	69	7	no
Main Street (Old SR 4)	Cypress Rd to Delta Rd (Oakley City Limits)	61	69	8	no
Cypress Rd	Main Street to Bethel Island Rd	58	64	6	no
Bethel Island Rd	Cypress Rd to Oakley City Limits	55	57	2	no
Delta Rd	Main Street to Byron Hwy	55	66	11	no
Pocket Rd	I-5 to Freeport Blvd	63	71	8	no
Freeport Blvd (Old SR 160)	Pocket Rd to Sacramento City Limits	56	70	14	yes
Freeport Bridge	River Rd to SR 160 (Freeport Blvd)	55	70	15	yes
Hood Franklin Rd	SR 160 (River Rd) to I-5	51	51	0	no
Lambert Rd	SR 160 (River Rd) to Herzog Rd	44	44	0	no
Lambert Rd	Herzog Rd to Franklin Blvd	46	46	0	no
Franklin Blvd	Lambert Rd to Twin Cities Rd	48	48	0	no
Twin Cities Rd	River Rd to I-5	53	69	16	yes
Twin Cities Rd	I-5 to Franklin Blvd	55	55	0	no
Sutter Slough Bridge Rd	Sacramento Co./ Yolo Co. Line to Paintersville Bridge	50	72	22	yes
River Rd	Paintersville Bridge to Twin Cities Rd	51	69	18	yes

Roadway	Segment	Existing Noise Level, dBA	Future With-Project Noise Level, dBA	Noise Level Increase, dB	Substantial Increase?
River Rd	Twin Cities Rd to Walnut Grove Bridge	55	57	2	no
Walnut Grove Rd/River Rd	Walnut Grove Bridge to Sacramento Co./ SJ Co. Line	55	69	14	yes
Isleton Rd	River Rd (Walnut Grove)/Isleton Rd Bridge to 1.5 miles west of Isleton Rd Bridge	54	54	0	no
Race Track Rd/ Tyler Island Rd	Walnut Grove Rd to Southern End of Tyler Island	45	45	0	no
Tyler Island Rd	Southern End of Tyler Island to SR 160 (River Rd)	46	46	0	no
Jackson Slough Rd	Isleton City Limits to SR 12	47	47	0	no
Jackson Slough Rd	Brannan Island Rd to SR 12	47	47	0	no
Walnut Grove Rd	Sacramento Co./ SJ Co. Line to I-5	53	69	16	yes
Peltier Rd	Blossom Rd to I-5	44	44	0	no
Tracy Blvd	SR 4 to Clifton Court Rd	53	53	0	no
Tracy Blvd	Clifton Court Rd to Tracy City Limits	52	52	0	no
Byron Hwy	Alameda Co./San Joaquin Co. Line to Mountain House Pkwy	59	69	10	no
Mountain House Pkwy	Byron Hwy to Arnaudo Blvd	54	68	14	yes
Mountain House Pkwy	Arnaudo Blvd to I-205	58	69	11	no
Eight Mile Rd	Stockton City Limits to I-5	58	58	0	no
Tracy Blvd	Tracy City Limits to I-205	58	58	0	no
Harbor Blvd	Industrial Blvd to US 50	63	71	8	no
Industrial Blvd/ Lake Washington Blvd	Harbor Blvd to Jefferson Blvd	62	71	9	no
Jefferson Blvd (Old SR 84)	Lake Washington Blvd to Southport Pkwy	62	71	9	no
Jefferson Blvd (Old SR 84)	Southport Pkwy to West Sacramento City Limits	51	70	19	yes
River Rd	Freeport Bridge to Courtland Rd	54	70	16	yes
River Rd	Courtland Rd to Sacramento Co./ Yolo Co. Line	48	72	24	yes
Courtland Rd	SR 84 to River Rd	48	70	22	yes

1
2

1 As shown in Table 23-37, predicted future traffic noise levels from project-generated worker
2 commutes and truck trips would result in an increase of 12 dB or more compared to existing traffic
3 noise levels along 22 project roadway segments.

4 During intake construction, segments of County Highway E9 would be temporarily realigned around
5 intake construction sites. Under the west alignment alternative, no additional noise increase is
6 anticipated at residences adjacent to intake construction sites.

7 The increase in noise levels exceed the project threshold for traffic noise and would be considered
8 adverse. Mitigation Measures NOI-1a and NOI-1b are available to address this effect.

9 ***Construction of Power Transmission Lines***

10 Noise from construction of power transmission lines for Alternative 1C is the same as Alternative
11 1A. The results shown in Table 23-21 (see Impact NOI-1 in Alternative 1A) indicate that noise-
12 sensitive land uses within 800 feet of an active transmission line construction area could be exposed
13 to construction noise in excess of the daytime (7 a.m. to 10 p.m.) noise threshold of 60 dBA L_{eq} (1hr).
14 The nighttime threshold of 50 dBA L_{max} would be exceeded at a distance of 1,800 feet from the
15 construction area. Noise-sensitive receptors that could be exposed to adverse noise impacts due to
16 transmission line construction include residential areas near the proposed transmission line
17 construction footprint. Likewise, as noted in Chapter 24, *Hazards and Hazardous Materials*,
18 Lakewood Drive, Sycamore Drive, and Summer Lake Community Parks, as well as Mokelumne High
19 (Continuation) School would be near the proposed transmission line construction footprint for
20 Alternative 1C. Although this assessment includes daytime and nighttime construction noise
21 estimates, construction of the transmission lines would primarily occur during daylight hours. If
22 nighttime construction of the transmission lines were to occur, noise levels could be the same as
23 those generated during daytime hours. The effect of exposing noise-sensitive land uses to noise
24 increases above thresholds would be adverse. Mitigation Measures NOI-1a and NOI-1b are available
25 to address this effect.

26 ***Earth-moving activities at offsite borrow/spoil areas***

27 Noise from earth-moving activities at offsite borrow/spoil areas for Alternative 1C is the same as
28 Alternative 1A. The results shown in Table 23-22 (see Impact NOI-1 in Alternative 1A) indicate that
29 noise-sensitive land uses within 800 feet of equipment operating in the borrow/spoil area could be
30 exposed to construction noise in excess of the daytime (7 a.m. to 10 p.m.) noise threshold of 60 dBA
31 L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be exceeded at a distance of 1,800 feet from
32 the area. Noise-sensitive land uses that could potentially be exposed to adverse noise impacts due to
33 earth-moving activities in offsite borrow/spoil areas would extend outside the borrow/spoil area
34 right-of-way. The effect of exposing these noise-sensitive land uses to noise increases above
35 thresholds would be adverse. However, with the exception of tunneling and RTM placement, most
36 construction activities would occur during daytime hours. Mitigation Measures NOI-1a and NOI-1b
37 are available to address this effect.

38 ***Noise exposure to workers at construction sites***

39 Impact NOI-1 for Alternative 1C is the same as Impact NOI-1 for Alternative 1A in terms of noise
40 exposure to on-site workers. On-site workers would be protected under OSHA requirements. No
41 adverse impacts would occur to workers.

1 **CEQA Conclusion:** The impact of exposing noise-sensitive land uses during construction to noise
 2 levels above the 60 dBA L_{eq} (1hr) daytime, the 50 dBA L_{max} nighttime, or the 12 dB traffic noise
 3 increase threshold would be considered significant. Based on reasonable worst-case modeling, the
 4 following significant impacts are expected as a result of Alternative 1C construction.

- 5 • **Intakes:** Sensitive receptors within 1,400 feet of an active intake construction site could be
 6 exposed to construction noise in excess of the 60 dBA L_{eq} (1hr) daytime threshold. The
 7 nighttime threshold of 50 dBA L_{max} would be exceeded at a distance of 2,800 feet. As shown in
 8 Table 23-35, 63 residential parcels, 3 natural/recreational parcels, and 188 agricultural parcels
 9 would be affected by daytime noise levels in excess of this threshold during construction. The
 10 nighttime threshold would be exceeded at 229 residential parcels, 8 natural/recreational
 11 parcels, 351 agricultural parcels, and 3 schools.
- 12 • **Conveyance and Associated Facilities:** Sensitive receptors within 1,200 feet of an active
 13 tunnel work area could be exposed to construction noise in excess of the daytime (7 a.m. to 10
 14 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be
 15 exceeded at a distance of 2,800 feet. As shown in Table 23-36, 1,148 residential parcels, 26
 16 natural/recreational parcels, 1,048 agricultural parcels, and 4 schools would be affected by
 17 daytime noise levels in excess of this threshold during construction. The nighttime threshold
 18 would be exceeded at 3,087 residential parcels, 221 natural/recreational parcels, 1,532
 19 agricultural parcels, and 6 schools.
- 20 • **Truck Trips and Worker Commutes:** Traffic noise from truck trips and worker commutes
 21 would result in an increase of 12 dB or more compared to existing traffic noise levels at
 22 residences and outdoor use areas along 22 project roadway segments in the study area as
 23 shown in Table 23-37. The increase in noise levels would be substantial and exceed the project
 24 threshold for traffic noise.
- 25 • **Power Transmission Lines:** Sensitive receptors within 800 feet of an active transmission line
 26 construction area could be exposed to construction noise in excess of the daytime (7 a.m. to 10
 27 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be
 28 exceeded at a distance of 1,800 feet from the construction area. As noted above, residential
 29 areas and several schools are near the proposed transmission line construction footprint.
- 30 • **Borrow/spoil areas:** Sensitive receptors within 800 feet of equipment operating in the
 31 borrow/spoil area could be exposed to construction noise in excess of the daytime (7 a.m. to 10
 32 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be
 33 exceeded at a distance of 1,800 feet from the area. Borrow/spoil areas are located throughout
 34 the conveyance alignment and are generally adjacent to or in close proximity of intake pumping
 35 plant sites, forebays, and main tunnel construction shafts.

36 Mitigation Measures NOI-1a and NOI-1b would reduce noise impacts to sensitive land uses.
 37 Although implementation of these measures will reduce the impact, it is not anticipated that feasible
 38 measures will be available in all situations to reduce construction noise to levels below the
 39 applicable thresholds. This impact would therefore be considered significant and unavoidable.

40 **Mitigation Measure NOI-1a: Employ Noise-Reducing Construction Practices during** 41 **Construction**

42 Please see Mitigation Measure NOI-1a under Impact NOI-1 in the discussion of Alternative 1A.

1 **Mitigation Measure NOI-1b: Prior to Construction, Initiate a Complaint/Response**
 2 **Tracking Program**

3 Please see Mitigation Measure NOI-1b under Impact NOI-1 in the discussion of Alternative 1A.

4 **Impact NOI-2: Exposure of Sensitive Receptors to Vibration or Groundborne Noise from**
 5 **Construction of Water Conveyance Facilities**

6 **NEPA Effects:**

7 ***Pile Driving at Intake Sites***

8 For a description of noise generated by this component of the project, see the discussion of Impact
 9 NOI-2, *Pile Driving at Intake Sites*, under Alternative 1A. Under Alternative 1C, groundborne
 10 vibration from impact pile driving would exceed vibration thresholds at land uses described in Table
 11 23-38. While groundborne vibration levels in excess of 0.2 in/sec PPV could occur at any of these
 12 residences, the highest vibration levels are expected at those residences nearest to the intake work
 13 areas. Construction of intakes and barge unloading facilities would result in excessive groundborne
 14 vibration levels at these nearby residential structures. The effect of exposing sensitive receptors to
 15 groundborne vibration would be adverse. Mitigation Measure NOI-2 is available to reduce this effect.

16 **Table 23-38. Land Use Affected by Vibrations from Pile Driving During Construction of Intakes,**
 17 **Alternative 1C**

Location	Zoning	Total Affected Parcels
Sacramento County – including River Road near the community of Hood; Neighborhoods in the community of Hood	Residential ^a	1
Yolo County – including County Road E9 near the community of Clarksburg	Residential ^a	85
Solano County	Residential ^a	2

^a Includes agricultural or unclassified use that permits residential use.

18
 19 ***Construction of Conveyance (Tunnel Portions)***

20 The use of tunneling equipment during construction would cause groundborne vibration and
 21 potentially groundborne noise within buildings in the vicinity of tunnel construction areas.
 22 Vibration sources include the TBM and locomotives moving soil, equipment, and construction
 23 workers between tunnel shaft sites. As discussed in Chapter 3, *Description of Alternatives*, the typical
 24 depth of tunnel installation would be approximately 100 feet below msl, but could be up to 160 feet
 25 below msl depending on site conditions. For the west alignment alternative, tunnel depth would be
 26 120 feet or greater below msl. Groundborne noise levels for the west alignment alternative would
 27 therefore be below the applicable threshold and would not result in an adverse noise impact to
 28 sensitive receptors adjacent to tunnel water conveyance.

29 **CEQA Conclusion:** Groundborne vibrations from tunneling activities would not exceed applicable
 30 thresholds as tunnel depth would be 120 feet or greater below msl and would therefore be less than
 31 significant. However, the impact of exposing residential structures to groundborne vibration during
 32 intake construction would be significant as reasonable worst-case modeling indicates that 88
 33 residential parcels would be exposed to vibration levels in excess of 0.2 in/sec PPV during intake

1 pile driving (see Table 23-38). Although Mitigation Measure NOI-2 will reduce this impact, it is not
 2 anticipated that feasible measures will be available in all situations to reduce vibration to levels
 3 below the applicable thresholds. This impact would therefore be significant and unavoidable.

4 **Mitigation Measure NOI-2: Employ Vibration-Reducing Construction Practices during**
 5 **Construction of Water Conveyance Facilities**

6 Please see Mitigation Measure NOI-2 under Impact NOI-2 in the discussion of Alternative 1A.

7 **Impact NOI-3: Exposure of Noise-Sensitive Land Uses to Noise from Operation of Water**
 8 **Conveyance Facilities**

9 **NEPA Effects:** Potential reasonable worst-case pump noise levels during operation of the intake
 10 structures were evaluated by calculating sound power levels of the pump based on horsepower
 11 (Hoover and Keith 2000). Faceplate horsepower for vertical column type pumps is specified in the
 12 pump selection appendix of the West Option CER (California Department of Water Resources
 13 2010d). Pump specifications are shown in Table 23-39. Combined source noise levels assume that
 14 pump enclosures (including buildings) provide a nominal 15 dB of noise attenuation. This analysis
 15 assumes that pumps are operating 24 hours a day.

16 **Table 23-39. Pump Specifications—Alternative 1C**

Pump Location	Quantity	Pumping Plant Capacity (cfs)	Pump Horsepower	Individual Pump Source Level (dBA)	Combined Source Level (dBA)	Assumed Attenuation (dB)	Combined Source Level with Attenuation (dBA)
Intake 1	6	3,000	5,000	97	105	15	90
Intake 2	6	3,000	3,500	96	103	15	88
Intake 3	6	3,000	3,500	96	103	15	88
Intake 4	6	3,000	3,500	96	103	15	88
Intake 5	6	3,000	3,500	96	103	15	88
Intermediate Plant	15	15,000	12,000	101	113	15	98

cfs = cubic feet per second.

dB = decibels.

dBA = A-weighted sound level in decibels.

17
 18 The estimated sound levels from pump operation as a function of distance based on calculated
 19 point-source attenuation over “soft” (i.e., acoustically absorptive) ground are shown in Table 23-40.

1 **Table 23-40. Predicted Noise Levels from Pump Operation, Intakes, Alternative 1C**

Distance Between Source and Receiver (Feet)	Intake 1 Calculated L_{eq} Sound Level (dBA)	Intakes 2-5 Calculated L_{eq} Sound Level (dBA)	Intermediate Plant Calculated L_{eq} Sound Level (dBA)
50	90	88	98
100	82	80	90
200	74	72	82
300	69	68	77
400	66	65	74
600	62	60	69
800	58	57	66
1,000	56	54	63
1,200	54	52	61
1,400	52	50	60
1,600	50	49	58
2,000	48	46	56
2,200	47	45	55
2,600	45	43	53
3,200	43	41	50
4,000	40	38	48
4,900	38	36	45
5,000	36	35	44

Notes: Calculations are based on Federal Transit Administration 2006. Calculations do not include the effects, if any, of local shielding from walls, topography, or other barriers that may reduce sound levels further.

Noise levels assume a nominal pump enclosure attenuation of 15 dB.

Bold denotes daytime and nighttime maximum noise thresholds.

dBA = A-weighted sound level in decibels.

2

3 The results shown in Table 23-40 indicate that operating noise from pumping plants would exceed
4 the nighttime threshold of 45 dBA at noise-sensitive land uses within a distance of up to 2,600 feet
5 from intake pumping plant locations, and 4,900 feet from the intermediate pumping plant along the
6 west conveyance alignment. Noise from operation of pumping plants is predicted to exceed daytime
7 and nighttime noise thresholds at nearby residences and outdoor parks in areas indicated in Table
8 23-41.

1 **Table 23-41. Land Use Affected by Noise from Operation of Pumping Plants, Alternative 1C**

Location	Zoning	50 dBA L_{eq} Daytime Operations Threshold	45 dBA L_{eq} Nighttime Operations Threshold
		Total Affected Parcels	Total Affected Parcels
Sacramento County – including River Road near the community of Hood; neighborhoods in the community of Hood.	Residential	2	71
	Natural/Recreational	2	2
	Agricultural/Other ^a	45	73
Yolo County – including County Road E9 near the community of Clarksburg; neighborhoods in the community of Clarksburg.	Residential	0	6
	Natural/Recreational	0	1
	Agricultural/Other ^a	87	132

^a Includes agricultural or unclassified use that permits residential use.

2

3 Operation of water conveyance facilities could result in substantial increases in noise levels affecting
4 nearby communities and residences. While noise levels in excess of applicable thresholds could
5 occur throughout the affected area, the highest noise levels are expected at those land uses most
6 adjacent to the pumping plants. The effect of exposing noise-sensitive land uses to noise increases
7 above thresholds would be adverse. Mitigation Measure NOI-3 is available to reduce this effect.

8 ***Noise exposure to workers at conveyance facilities***

9 Impact NOI-3 for Alternative 1C is the same as Impact NOI-3 for Alternative 1A in terms of noise
10 exposure to on-site workers. On-site workers would be protected under OSHA requirements. No
11 adverse impacts would occur to workers.

12 ***CEQA Conclusion:*** The impact of exposing noise-sensitive land uses during pumping plant
13 operations to noise levels above the daytime (50 dBA L_{max}) or nighttime (45 dBA L_{max}) noise
14 thresholds would be significant. Based on reasonable worst-case modeling, 2 residential parcels, 2
15 natural/recreational parcels, and 132 agricultural parcels would be affected by daytime noise levels
16 in excess of the operational threshold. The nighttime threshold would be exceeded at 77 residential
17 parcels, 3 natural/recreational parcels, and 205 agricultural parcels. The impact of exposing these
18 receptors to noise increases above thresholds would be significant. Mitigation Measure NOI-3 would
19 reduce operational noise levels below applicable thresholds, thus resulting in a less-than-significant
20 level.

21 **Mitigation Measure NOI-3: Design and Construct Intake Facilities and Other Pump** 22 **Facilities Such That Operational Noise Does Not Exceed 50 dBA (One-Hour L_{eq}) during** 23 **Daytime Hours (7:00 A.M. to 10:00 P.M.) or 45 dBA (One-Hour L_{eq}) during Nighttime** 24 **Hours (10:00 P.M. to 7:00 A.M.) or the Applicable Local Noise Standard (Whichever Is** 25 **Less) at Nearby Noise Sensitive Land Uses**

26 Please see Mitigation Measure NOI-3 under Impact NOI-3 in the discussion of Alternative 1A.

1 **Impact NOI-4: Exposure of Noise-Sensitive Land Uses to Noise from Implementation of**
 2 **Proposed Conservation Measures 2-10**

3 **NEPA Effects:** Although locations or target acreages may vary for proposed conservation measures,
 4 at the program level of development, the amount and location of restoration actions under this
 5 alternative would be the same as Alternative 1A, and therefore the impact would be the same as
 6 under Alternative 1A. Noise levels during implementation of these conservation measures are
 7 expected to vary according to the type of construction equipment and techniques used, but are likely
 8 to be similar to noise levels shown in Table 23-16 (see Impact NOI-1 in Alternative 1A). The results
 9 shown in Table 23-16 indicate that residences within 1,200 feet of an active restoration work area
 10 could be exposed to construction noise in excess of the daytime (7 a.m. to 10 p.m.) noise threshold of
 11 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be exceeded within a distance of
 12 2,800 feet.

13 The effect of exposing sensitive land uses to increases in construction noise levels above thresholds
 14 would be adverse. Mitigation Measures NOI-1a and NOI-1b are available to address this effect.

15 **CEQA Conclusion:** The impact of exposing noise-sensitive land uses during construction to noise
 16 increases above the daytime (60 dBA L_{eq}) and nighttime (50 dBA L_{max}) thresholds would be
 17 considered significant. Noise levels during implementation of these conservation measures are
 18 expected to vary according to the type of construction equipment and techniques used, but are likely
 19 to be similar to noise levels shown in Table 23-16 (see Impact NOI-1 in Alternative 1A). The results
 20 shown in Table 23-16 indicate that residences within 1,200 feet of an active restoration work area
 21 could be exposed to construction noise in excess of the daytime (7 a.m. to 10 p.m.) noise threshold of
 22 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be exceeded within a distance of
 23 2,800 feet. The impact of exposing these receptors to noise increases above thresholds would be
 24 significant. Although Mitigation Measures NOI-1a and NOI-1b will reduce this impact, it is not
 25 anticipated that feasible measures will be available in all situations to reduce construction noise to
 26 levels below the applicable thresholds. This impact would therefore be considered significant and
 27 unavoidable.

28 **Mitigation Measure NOI-1a: Employ Noise-Reducing Construction Practices during**
 29 **Construction**

30 Please see Mitigation Measure NOI-1a under Impact NOI-1 in the discussion of Alternative 1A.

31 **Mitigation Measure NOI-1b: Prior to Construction, Initiate a Complaint/Response**
 32 **Tracking Program**

33 Please see Mitigation Measure NOI-1b under Impact NOI-1 in the discussion of Alternative 1A.

34 **23.3.3.5 Alternative 2A—Dual Conveyance with Pipeline/Tunnel and Five**
 35 **Intakes (15,000 cfs; Operational Scenario B)**

36 Five intakes would be constructed under Alternative 2A on the east bank of the Sacramento River.
 37 This alternative would also construct an intermediate forebay, and the conveyance facility would be
 38 a buried pipeline (see Figures 3-2 and 3-3 in Chapter 3, *Description of Alternatives*). An operable
 39 barrier would be constructed at the head of Old River.

1 **Impact NOI-1: Exposure of Noise-Sensitive Land Uses to Noise from Construction of Water**
 2 **Conveyance Facilities**

3 **NEPA Effects:**

4 **Construction of Intakes**

5 Potential reasonable worst-case equipment noise levels from construction of intakes under this
 6 alternative would be comparable to those listed for the intake sites in Table 23-17. The results
 7 shown in Table 23-17 indicate that during periods of pile driving, residences located within 1,400
 8 feet of an active intake construction site could be exposed to construction noise in excess of the
 9 DWR daytime (7 a.m. to 10 p.m.) maximum noise threshold of 60 dBA L_{eq} (1hr). The nighttime
 10 threshold of 50 dBA L_{max} would be exceeded at a distance of 2,800 feet.

11 While equipment could operate at any work area identified for this alternative, the highest noise
 12 levels are expected to occur at those sites where the duration and intensity of construction activities
 13 would be greatest. The work areas for construction of Intakes 1, 2, 3, 6, and 7 would extend through
 14 several residential areas and communities located near the Sacramento River. Noise from intake
 15 construction activities is predicted to exceed daytime and nighttime noise thresholds at nearby
 16 residences, schools and outdoor parks in areas indicated in Table 23-42.

17 Although this assessment includes daytime and nighttime construction noise estimates, construction
 18 of the intakes would primarily occur during daytime hours. If nighttime construction of the intakes
 19 were to occur, noise levels could be the same as that generated during daytime hours.

20 The effect of exposing these noise-sensitive land uses to noise increases above thresholds would be
 21 adverse. Mitigation Measures NOI-1a and NOI-1b would be available to reduce this effect.

22 **Table 23-42. Land Use Affected By Equipment Noise from Construction of Intakes, Alternative 2A**

Location	Zoning	Daytime Threshold (60 dBA L_{eq} [1h])	Nighttime Threshold (50 dBA L_{max} [1h])
		Total Affected Parcels	Total Affected Parcels
Sacramento County – including River Road near the community of Hood; neighborhoods in the community of Hood; Lambert Road; Vorden Road.	Residential	3	112
	Natural/Recreational	9	15
	Agricultural/Other ^a	140	214
	Schools	None	None
Yolo County – including County Road E9 near the community of Clarksburg; neighborhoods in the community of Clarksburg.	Residential	4	98
	Natural/Recreational	1	5
	Agricultural/Other ^a	128	164
	Schools	None	Clarksburg Middle School, River Delta Community Day

^a Includes agricultural or unclassified use that permits residential use.

23

1 **Construction of Conveyance (Tunnel), Forebays, Barge Unloading Facilities, and Intermediate Pumping**
 2 **Plant**

3 For a description of noise generated by this component of the project, see the discussion of Impact
 4 NOI-1, *Construction of Conveyance (Tunnel), Forebays, Barge Unloading Facilities, and Intermediate*
 5 *Pumping Plant*, under Alternative 1A. Noise from construction activities is predicted to exceed
 6 daytime and nighttime noise thresholds at nearby residences, schools and outdoor parks indicated
 7 in Table 23-43. While equipment could operate at any work area identified for this alternative, the
 8 highest noise levels are expected to occur at those sites where the duration and intensity of
 9 construction activities would be greatest. This includes all construction sites along the tunnel
 10 conveyance alignment, as well as at the site of the Byron Tract Forebay adjacent to and south of
 11 Clifton Court Forebay. For a map of the proposed pipeline/tunnel alignment, see Mapbook Figure
 12 M3-1.

13 Although this assessment includes daytime and nighttime construction noise estimates for the
 14 forebays, barge unloading facilities, intermediate pumping plant, and conveyance tunnels,
 15 construction of the forebays, barge unloading facilities, and intermediate pumping plant would
 16 primarily occur during daytime hours. If nighttime construction of the forebays, barge unloading
 17 facilities, and intermediate pumping plant were to occur, noise levels could be the same as those
 18 generated during daytime hours. Construction of the conveyance tunnels and RTM storage actions
 19 would occur on a 24-hour basis.

20 The effect of exposing these noise-sensitive land uses to noise increases above thresholds would be
 21 adverse. Mitigation Measures NOI-1a and NOI-1b would be available to reduce this effect.

22 **Table 23-43. Land Use Affected by Equipment Noise from Construction of Conveyance and**
 23 **Associated Facilities, Alternative 2A**

Location	Zoning	Daytime Threshold (60	Nighttime Threshold
		dBA L_{eq} [1h])	(50 dBA L_{max} [1h])
		Total Affected Parcels	Total Affected Parcels
Sacramento County – including River Road near the community of Hood; neighborhoods in the community of Hood; Lambert Road; Vorden Road.	Residential	105	121
	Natural/Recreational	14	26
	Agricultural/Other ^a	403	597
	Schools	Bates Elementary, Mokelumne High	Bates Elementary, Mokelumne High
Yolo County – including County Road E9 near the community of Clarksburg; neighborhoods in the community of Clarksburg.	Residential	0	89
	Natural/Recreational	1	5
	Agricultural/Other ^a	133	166
	Schools	None	None
San Joaquin County	Residential	9	18
	Natural/Recreational	1	1
	Agricultural/Other ^a	187	273
Contra Costa County	Agricultural/Other ^a	94	118
Alameda County	Agricultural/Other ^a	21	45

^a Includes agricultural or unclassified use that permits residential use.

1 **Truck Trips and Worker Commutes**

2 The estimate of truck trips and worker commutes under Alternative 2A would be similar to
3 Alternative 1A except for the addition of trips associated with construction of the operable barrier.
4 Traffic noise from truck trips and worker commutes would result in an increase of 12 dB or more
5 compared to existing traffic noise levels at residences and outdoor use areas along 16 project
6 roadway segments in the study area as shown in Table 23-20.

7 During intake construction, segments of SR 160 between Freeport Bridge and Walnut Grove Bridge
8 would be temporarily realigned around intake construction sites. As a result, future project noise
9 levels would further increase at residences located near intake sites. Under Alternative 2A, noise
10 levels at receivers near realigned segments of SR 160 would increase by up to 6 dB in addition to the
11 noise increase shown in Table 23-20.

12 The increase in noise levels exceed the project threshold for traffic noise and would be considered
13 adverse. Mitigation Measures NOI-1a and NOI-1b are available to address this effect.

14 **Construction of Power Transmission Lines**

15 Noise from construction of power transmission lines for Alternative 2A is the same as Alternative
16 1A. The results shown in Table 23-21 (see Impact NOI-1 in Alternative 1A) indicate that noise-
17 sensitive land uses within 800 feet of an active transmission line construction area could be exposed
18 to construction noise in excess of the daytime (7 a.m. to 10 p.m.) noise threshold of 60 dBA L_{eq} (1hr).
19 The nighttime threshold of 50 dBA L_{max} would be exceeded at a distance of 1,800 feet from the
20 construction area. Several residential land uses are near the proposed transmission line
21 construction footprint. Likewise, Delta Elementary School and Delta High School on the west bank of
22 the Sacramento River are within half a mile of the proposed Intake 2 transmission lines. Although
23 this assessment includes daytime and nighttime construction noise estimates, construction of the
24 transmission lines would primarily occur during daylight hours. If nighttime construction of the
25 transmission lines were to occur, noise levels could be the same as those generated during daytime
26 hours. The effect of exposing noise-sensitive land uses to noise increases above thresholds would be
27 adverse. Mitigation Measures NOI-1a and NOI-1b are available to address this effect.

28 **Earth-moving activities at offsite borrow/spoil areas**

29 Noise from earth-moving activities at offsite borrow/spoil areas for Alternative 2A is the same as
30 Alternative 1A. The results shown in Table 23-22 (see Impact NOI-1 in Alternative 1A) indicate that
31 noise-sensitive land uses within 800 feet of equipment operating in the borrow/spoil area could be
32 exposed to construction noise in excess of the daytime (7 a.m. to 10 p.m.) noise threshold of 60 dBA
33 L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be exceeded at a distance of 1,800 feet from
34 the area. Noise-sensitive land uses that could potentially be exposed to adverse noise impacts due to
35 earth-moving activities in offsite borrow/spoil areas would extend outside the borrow/spoil area
36 right-of-way. The effect of exposing these noise-sensitive land uses to noise increases above
37 thresholds would be adverse. However, with the exception of tunneling and RTM placement, most
38 construction activities would occur during daytime hours. Mitigation Measures NOI-1a and NOI-1b
39 are available to address this effect.

1 **Noise exposure to workers at construction sites**

2 Impact NOI-1 for Alternative 2A is the same as Impact NOI-1 for Alternative 1A in terms of noise
3 exposure to on-site workers. On-site workers would be protected under OSHA requirements. No
4 adverse impacts would occur to workers.

5 **CEQA Conclusion:** The impact of exposing noise-sensitive land uses during construction to noise
6 levels above the 60 dBA L_{eq} (1hr) daytime, the 50 dBA L_{max} nighttime, or the 12 dB traffic noise
7 increase threshold would be considered significant. Based on reasonable worst-case modeling, the
8 following significant impacts are expected as a result of Alternative 2A construction.

- 9 • **Intakes:** Sensitive receptors within 1,400 feet of an active intake construction site could be
10 exposed to construction noise in excess of the 60 dBA L_{eq} (1hr) daytime threshold. The
11 nighttime threshold of 50 dBA L_{max} would be exceeded at a distance of 2,800 feet. As shown in
12 Table 23-42, 7 residential parcels, 10 natural/recreational parcels, and 268 agricultural parcels
13 would be affected by daytime noise levels in excess of this threshold during construction. The
14 nighttime threshold would be exceeded at 210 residential parcels, 20 natural/recreational
15 parcels, 378 agricultural parcels, and 2 schools.
- 16 • **Conveyance and Associated Facilities:** Sensitive receptors within 1,200 feet of an active
17 tunnel work area could be exposed to construction noise in excess of the daytime (7 a.m. to 10
18 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be
19 exceeded at a distance of 2,800 feet. As shown in Table 23-43, 114 residential parcels, 16
20 natural/recreational parcels, 838 agricultural parcels, and 2 schools would be affected by
21 daytime noise levels in excess of this threshold during construction. The nighttime threshold
22 would be exceeded at 228 residential parcels, 32 natural/recreational parcels, 1,119 agricultural
23 parcels, and 2 schools.
- 24 • **Truck Trips and Worker Commutes:** Traffic noise from truck trips and worker commutes
25 would result in an increase of 12 dB or more compared to existing traffic noise levels at
26 residences and outdoor use areas along 16 project roadway segments in the study area as
27 shown in Table 23-20. The increase in noise levels would be substantial and exceed the project
28 threshold for traffic noise. See the discussion of Impact NOI-1 under Alternative 1A.
- 29 • **Power Transmission Lines:** Sensitive receptors within 800 feet of an active transmission line
30 construction area could be exposed to construction noise in excess of the daytime (7 a.m. to 10
31 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be
32 exceeded at a distance of 1,800 feet from the construction area. As noted above, several
33 residential land uses are near the proposed transmission line construction footprint. Likewise,
34 Delta Elementary School and Delta High School on the west bank of the Sacramento River are
35 within half a mile of the proposed Intake 2 transmission lines.
- 36 • **Borrow/spoil areas:** Sensitive receptors within 800 feet of equipment operating in the
37 borrow/spoil area could be exposed to construction noise in excess of the daytime (7 a.m. to 10
38 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be
39 exceeded at a distance of 1,800 feet from the area. Borrow/spoil areas are located throughout
40 the conveyance alignment and are generally adjacent to or in close proximity of intake pumping
41 plant sites, forebays, and main tunnel construction shafts.

42 Mitigation Measures NOI-1a and NOI-1b would reduce noise impacts to sensitive land uses.
43 Although implementation of these measures will reduce the impact, it is not anticipated that feasible

1 measures will be available in all situations to reduce construction noise to levels below the
2 applicable thresholds. This impact would therefore be significant and unavoidable.

3 **Mitigation Measure NOI-1a: Employ Noise-Reducing Construction Practices during**
4 **Construction**

5 Please see Mitigation Measure NOI-1a under Impact NOI-1 in the discussion of Alternative 1A.

6 **Mitigation Measure NOI-1b: Prior to Construction, Initiate a Complaint/Response**
7 **Tracking Program**

8 Please see Mitigation Measure NOI-1b under Impact NOI-1 in the discussion of Alternative 1A.

9 **Impact NOI-2: Exposure of Sensitive Receptors to Vibration or Groundborne Noise from**
10 **Construction of Water Conveyance Facilities**

11 ***NEPA Effects:***

12 ***Pile Driving at Intake Sites***

13 Impact NOI-2 for Alternative 2A is the same as for Alternative 1A. In addition, an operable barrier
14 would be constructed at the head of Old River. Construction of the operable barrier would include
15 impact driving of sheet piles, which would cause high groundborne vibration levels in areas
16 immediately adjacent to pile driving sites. However, the nearest residential use is 3,000 feet away
17 from the construction site, so vibration levels would be well below the impact threshold.

18 Groundborne vibration levels from impact pile driving are predicted to exceed vibration thresholds
19 at nearby residences in the areas shown in Table 23-44. While groundborne vibration levels in
20 excess of 0.2 in/sec PPV could occur at any of these residences, the highest vibration levels are
21 expected at those residences nearest to the intake work areas. Construction of intakes and barge
22 unloading facilities would result in excessive groundborne vibration levels at these nearby
23 residential structures. The effect of exposing sensitive receptors to groundborne vibration would be
24 adverse. Mitigation Measure NOI-2 is available to reduce this effect.

25 **Table 23-44. Land Use Affected by Vibrations from Pile Driving During Construction of Intakes,**
26 **Alternative 2A**

Location	Zoning	Total Affected Parcels
Sacramento County – including River Road near the community of Hood; Neighborhoods in the community of Hood	Residential ^a	79
Yolo County – including County Road E9 near the community of Clarksburg	Residential ^a	1
San Joaquin County	Residential ^a	13

^a Includes agricultural or unclassified use that permits residential use.

27
28 ***Construction of Water Conveyance (Tunnel)***

29 Vibration sources include the TBM and locomotives moving soil, equipment, and construction
30 workers between tunnel shaft sites. At a 60-foot tunnel depth, groundborne vibrations from the
31 TBM are estimated to be 0.008 in/sec PPV, which is below the threshold of 0.04 in/sec PPV. As

1 described in Section 23.4.2, *Determination of Effects*, tunnel locomotives would be operated at slow
2 speeds inside of tunnels and would not result in excessive vibrations. Groundborne noise from
3 tunnel locomotive operation during construction is therefore not predicted to exceed groundborne
4 noise thresholds or result in an adverse noise impact to sensitive receptors along the tunnel
5 conveyance.

6 **CEQA Conclusion:** Groundborne vibrations during tunneling would not exceed 0.008 in/sec PPV at
7 60-foot tunnel depth and would therefore be less than significant. Likewise, locomotives are not
8 expected to generate significant noise levels because they will travel at low speeds between 5 and
9 10 miles per hour. However, the impact of exposing residential structures to groundborne vibration
10 during intake construction would be significant as reasonable worst-case modeling indicates that 93
11 residential parcels would be exposed to vibration levels in excess of 0.2 in/sec PPV during intake
12 pile driving (see Table 23-44). Although Mitigation Measure NOI-2 will reduce this impact, it is not
13 anticipated that feasible measures will be available in all situations to reduce vibration to levels
14 below the applicable thresholds. This impact would therefore be considered significant and
15 unavoidable.

16 **Mitigation Measure NOI-2: Employ Vibration-Reducing Construction Practices during**
17 **Construction of Water Conveyance Facilities**

18 Please see Mitigation Measure NOI-2 under Impact NOI-2 in the discussion of Alternative 1A.

19 **Impact NOI-3: Exposure of Noise-Sensitive Land Uses to Noise from Operation of Water**
20 **Conveyance Facilities**

21 **NEPA Effects:** Potential reasonable worst-case pump noise levels during operation of the intake
22 structures were evaluated by calculating sound power levels of the pump based on horsepower
23 (Hoover and Keith 2000). Under Alternative 2A, faceplate horsepower for vertical column and
24 vertical volute type pumps is specified in pump selection appendix of the Conceptual Engineering
25 Report [*Note to Lead Agencies: from a power requirement perspective, it was assumed that intakes 6*
26 *and 7 are equivalent to intakes 4 and 5*]. Pump specifications are shown in Table 23-45. Combined
27 source noise levels assume that pump enclosures (including buildings) provide a nominal 15 dB of
28 noise attenuation. This analysis assumes that pumps are operating 24 hours a day.

1 **Table 23-45. Pump Specifications—Alternative 2A**

Pump Location	Quantity	Pumping Plant		Individual		Assumed Attenuation (dB)	Combined Source Level with Attenuation (dBA)
		Capacity (cfs)	Pump Horsepower	Pump Source Level (dBA)	Combined Source Level (dBA)		
Intake 1	6	3,000	4,500	97	104	15	89
Intake 2	6	3,000	4,500	97	104	15	89
Intake 3	6	3,000	3,500	96	102	15	88
Intake 6	6	3,000	3,500	96	102	15	88
Intake 7	6	3,000	3,500	96	102	15	88
Intermediate Plant	16 (10/6) ^a	15,000	18,000/ 8,000 ^a	103/99 ^a	114	15	99

^a Vertical Column Pumps/Vertical Volute Pumps in the Intermediate Pumping Plant.

cfs = cubic feet per second.

dB = decibels.

dBA = A-weighted sound level in decibels.

2

3 The estimated sound levels from pump operation as a function of distance based on calculated
4 point-source attenuation over “soft” (i.e., acoustically absorptive) ground are shown in Table 23-46.

5 **Table 23-46. Predicted Noise Levels from Pump Operation, Intakes, Alternative 2A**

Distance Between Source and Receiver (Feet)	Intake 1-2	Intakes 3, 6, 7	Intermediate Pumping Plant
	Calculated L_{eq} Sound Level (dBA)	Calculated L_{eq} Sound Level (dBA)	Calculated L_{eq} Sound Level (dBA)
50	89	88	99
100	82	80	91
200	74	72	83
300	69	68	79
400	66	65	75
600	61	60	71
800	58	57	67
1,000	55	54	65
1,200	53	52	63
1,400	52	50	61
1,600	50	49	60
2,000	47	46	57
2,200	46	45	56
2,600	45	43	54
3,600	41	40	50
5,000	37	36	47
6,000	35	34	45
7,000	33	32	46

Notes: Calculations are based on Federal Transit Administration 2006. Calculation do not include the effects, if any, of local shielding from walls, topography, or other barriers that may reduce sound levels further.

Noise levels assume a nominal pump enclosure attenuation of 15 dB.

Bold denotes daytime and nighttime maximum noise thresholds.

dBA = A-weighted sound level in decibels.

The results shown in Table 23-46 indicate that operating noise from pumping plants would exceed the nighttime threshold of 45 dBA at noise-sensitive land uses within a distance of up to 2,600 feet from intake pumping plant locations, and 6,000 feet from the pumping plant located at the proposed intermediate forebay. Noise from operation of pumping plants is predicted to exceed daytime and nighttime noise thresholds at nearby residences and outdoor parks in areas indicated in Table 23-47.

Table 23-47. Land use affected by noise from operation of pumping plants, Alternative 2A

Location	Zoning	50 dBA L_{eq} Daytime Operations Threshold	45 dBA L_{eq} Nighttime Operations Threshold
		Total Affected Parcels	Total Affected Parcels
Sacramento County – including River Road near the community of Hood; neighborhoods in the community of Hood; Lambert Road; Vorden Road.	Natural/Recreational	4	5
	Agricultural/Other ^a	92	178
Yolo County – including County Road E9 near the community of Clarksburg; neighborhoods in the community of Clarksburg.	Agricultural/Other ^a	64	103

^a Includes agricultural or unclassified use that permits residential use.

Operation of water conveyance facilities could result in substantial increases in noise levels affecting nearby communities and residences. While noise levels in excess of applicable thresholds could occur throughout the affected area, the highest noise levels are expected at those land uses most adjacent to the pumping plants. The effect of exposing noise-sensitive land uses to noise increases above thresholds would be adverse. Mitigation Measure NOI-3 is available to reduce this effect.

Noise exposure to workers at conveyance facilities

Impact NOI-3 for Alternative 2A is the same as Impact NOI-3 for Alternative 1A in terms of noise exposure to on-site workers. On-site workers would be protected under OSHA requirements. No adverse impacts would occur to workers.

CEQA Conclusion: The impact of exposing noise-sensitive land uses during pumping plant operations to noise levels above the daytime (50 dBA L_{max}) or nighttime (45 dBA L_{max}) noise thresholds would be significant. Based on reasonable worst-case modeling, 4 natural/recreational parcels and 156 agricultural parcels would be affected by daytime noise levels in excess of the operational threshold. The nighttime threshold would be exceeded at 5 natural/recreational parcels and 281 agricultural parcels (see Table 23-47). The impact of exposing these receptors to noise increases above thresholds would be significant. Mitigation Measure NOI-3 would reduce operational noise levels below applicable thresholds, thus resulting in a less-than-significant level.

Mitigation Measure NOI-3: Design and Construct Intake Facilities and Other Pump Facilities Such That Operational Noise Does Not Exceed 50 dBA (One-Hour L_{eq}) during Daytime Hours (7:00 A.M. to 10:00 P.M.) or 45 dBA (One-Hour L_{eq}) during Nighttime

1 **Hours (10:00 P.M. to 7:00 A.M.) or the Applicable Local Noise Standard (Whichever Is**
 2 **Less) at Nearby Noise Sensitive Land Uses**

3 Please see Mitigation Measure NOI-3 under Impact NOI-3 in the discussion of Alternative 1A.

4 **Impact NOI-4: Exposure of Noise-Sensitive Land Uses to Noise from Implementation of**
 5 **Proposed Conservation Measures 2-10**

6 **NEPA Effects:** Although locations or target acreages may vary for proposed conservation measures,
 7 at the program level of development, the amount and location of restoration actions under this
 8 alternative would be the same as Alternative 1A, and therefore the impact would be the same as
 9 under Alternative 1A. Noise levels during implementation of these conservation measures are
 10 expected to vary according to the type of construction equipment and techniques used, but are likely
 11 to be similar to noise levels shown in Table 23-16 (see Impact NOI-1 in Alternative 1A). The results
 12 shown in Table 23-16 indicate that residences within 1,200 feet of an active restoration work area
 13 could be exposed to construction noise in excess of the daytime (7 a.m. to 10 p.m.) noise threshold of
 14 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be exceeded within a distance of
 15 2,800 feet.

16 The effect of exposing sensitive land uses to increases in construction noise levels above thresholds
 17 would be adverse. Mitigation Measures NOI-1a and NOI-1b are available to address this effect.

18 **CEQA Conclusion:** The impact of exposing noise-sensitive land uses during construction to noise
 19 increases above the daytime (60 dBA L_{eq}) and nighttime (50 dBA L_{max}) thresholds would be
 20 considered significant. Noise levels during implementation of these conservation measures are
 21 expected to vary according to the type of construction equipment and techniques used, but are likely
 22 to be similar to noise levels shown in Table 23-16 (see Impact NOI-1 in Alternative 1A). The results
 23 shown in Table 23-16 indicate that residences within 1,200 feet of an active restoration work area
 24 could be exposed to construction noise in excess of the daytime (7 a.m. to 10 p.m.) noise threshold of
 25 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be exceeded within a distance of
 26 2,800 feet. The impact of exposing these receptors to noise increases above thresholds would be
 27 significant. Although Mitigation Measures NOI-1a and NOI-1b will reduce this impact, it is not
 28 anticipated that feasible measures will be available in all situations to reduce construction noise to
 29 levels below the applicable thresholds. This impact would therefore be significant and unavoidable.

30 **Mitigation Measure NOI-1a: Employ Noise-Reducing Construction Practices during**
 31 **Construction**

32 Please see Mitigation Measure NOI-1a under Impact NOI-1 in the discussion of Alternative 1A.

33 **Mitigation Measure NOI-1b: Prior to Construction, Initiate a Complaint/Response**
 34 **Tracking Program**

35 Please see Mitigation Measure NOI-1b under Impact NOI-1 in the discussion of Alternative 1A.

36 **23.3.3.6 Alternative 2B—Dual Conveyance with East Alignment and Five**
 37 **Intakes (15,000 cfs; Operational Scenario B)**

38 A total of five intakes would be constructed under Alternative 2B. This alternative would also
 39 construct an intermediate forebay and an operable barrier at the head of Old River; the conveyance

would be a canal on the east side of the Sacramento River (see Figures 3-4 and 3-5 in Chapter 3, *Description of Alternatives*). Intake sites for Alternative 2B are the same as Alternative 2A.

Impact NOI-1: Exposure of Noise-Sensitive Land Uses to Noise from Construction of Water Conveyance Facilities

NEPA Effects:

Construction of Intakes

The work areas for construction of Intakes 1, 2, 3, 6, and 7 would extend through several residential areas and communities located near the Sacramento River. Noise from intake construction activities is predicted to exceed daytime and nighttime noise thresholds at nearby residences, schools and outdoor parks in areas indicated in Table 23-48. While equipment could operate at any work area identified for this alternative, the highest noise levels are expected to occur at those sites where the duration and intensity of construction activities would be greatest.

Although this assessment includes daytime and nighttime construction noise estimates, construction of the intakes would primarily occur during daytime hours. If nighttime construction of the intakes were to occur, noise levels could be the same as that generated during daytime hours.

The effect of exposing these noise-sensitive land uses to noise increases above thresholds would be adverse. Mitigation Measures NOI-1a and NOI-1b are available to address this effect.

Table 23-48. Land Use Affected By Equipment Noise from Construction of Intakes, Alternative 2B

Location	Zoning	Daytime Threshold (60 dBA L_{eq} [1h])	Nighttime Threshold (50 dBA L_{max} [1h])
		Total Affected Parcels	Total Affected Parcels
Sacramento County – including River Road near the community of Hood; neighborhoods in the community of Hood; Lambert Road; Vorden Road.	Residential	3	112
	Natural/Recreational	9	15
	Agricultural/Other ^a	138	215
	Schools	None	None
Yolo County – including County Road E9 near the community of Clarksburg; neighborhoods in the community of Clarksburg.	Residential	4	98
	Natural/Recreational	1	5
	Agricultural/Other ^a	128	164
	Schools	None	Clarksburg Middle School, River Delta Community Day

^a Includes agricultural or unclassified use that permits residential use.

Construction of Conveyance (Canal), Forebay, Barge Unloading Facilities, and Intermediate Pumping Plant

For a description of noise generated by this component of the project, see the discussion of Impact NOI-1, *Construction of Conveyance (Canal), Forebay, Barge Unloading Facilities, and Intermediate Pumping Plant*, under Alternative 1B. Noise from construction activities is predicted to exceed daytime and nighttime noise thresholds at nearby residences, schools and outdoor parks indicated in Table 23-49. While equipment could operate at any work area identified for this alternative, the

1 highest noise levels are expected to occur at those sites where the duration and intensity of
 2 construction activities would be greatest. This includes all construction sites along the canal or
 3 tunnel conveyance alignment, as well as at the site of the Byron Tract Forebay adjacent to and south
 4 of Clifton Court Forebay. For a map of the proposed east alignment, see Mapbook Figure M3-2.

5 Although this assessment includes daytime and nighttime construction noise estimates for the
 6 forebay, barge unloading facilities, intermediate pumping plant, and conveyance tunnels and canals,
 7 construction of the forebay, barge unloading facilities, intermediate pumping plant, and canals
 8 would primarily occur during daytime hours. If nighttime construction of the forebay, barge
 9 unloading facilities, intermediate pumping plant, and canals were to occur, noise levels could be the
 10 same as those generated during daytime hours. Construction of the conveyance tunnels and muck
 11 storage actions would occur on a 24-hour basis.

12 The effect of exposing these noise-sensitive land uses to noise increases above thresholds would be
 13 adverse. Mitigation Measures NOI-1a and NOI-1b are available to address this effect.

14 **Table 23-49. Land Use Affected by Equipment Noise from Construction of Conveyance and**
 15 **Associated Facilities, Alternative 2B**

Location	Zoning	Daytime Threshold	Nighttime Threshold
		(60 dBA L_{eq} [1h])	(50 dBA L_{max} [1h])
		Total Affected Parcels	Total Affected Parcels
Sacramento County – including River Road near the community of Hood; neighborhoods in the community of Hood; Lambert Road; Vorden Road.	Residential	100	100
	Natural/Recreational	10	19
	Agricultural/Other ^a	340	447
	Schools	Bates Elementary, Mokelumne High	Bates Elementary, Mokelumne High
Yolo County – including County Road E9 near the community of Clarksburg; neighborhoods in the community of Clarksburg.	Residential	21	125
	Natural/Recreational	1	5
	Agricultural/Other ^a	135	173
	Schools	None	None
San Joaquin County	Residential	9	26
	Natural/Recreational	2	2
	Agricultural/Other ^a	472	1,118
Contra Costa County	Agricultural/Other ^a	89	98
Alameda County	Agricultural/Other ^a	21	45

^a Includes agricultural or unclassified use that permits residential use.

17 **Truck Trips and Worker Commutes**

18 The estimate of truck trips and worker commutes under Alternative 2B would be similar to
 19 Alternative 1B. Traffic noise from truck trips and worker commutes would result in an increase of
 20 12 dB or more compared to existing traffic noise levels at residences and outdoor use areas along 16
 21 project roadway segments in the study area as shown in Table 23-30.

22 During intake construction, segments of SR 160 between Freeport Bridge and Walnut Grove Bridge
 23 would be temporarily realigned around intake construction sites. As a result, future project noise
 24 levels would further increase at residences located near intake sites. Under Alternative 2B, noise

1 levels at receivers near realigned segments of SR 160 would increase by up to 8 dB in addition to the
2 noise increase shown in Table 23-30.

3 The increase in noise levels exceed the project threshold for traffic noise and would be considered
4 adverse. Mitigation Measures NOI-1a and NOI-1b are available to address this effect.

5 ***Construction of Power Transmission Lines***

6 Noise from construction of power transmission lines for Alternative 2B is the same as Alternative
7 1A. The results shown in Table 23-21 (see Impact NOI-1 in Alternative 1A) indicate that noise-
8 sensitive land uses within 800 feet of an active transmission line construction area could be exposed
9 to construction noise in excess of the daytime (7 a.m. to 10 p.m.) noise threshold of 60 dBA L_{eq} (1hr).
10 The nighttime threshold of 50 dBA L_{max} would be exceeded at a distance of 1,800 feet from the
11 construction area. Noise-sensitive receptors that could be exposed to adverse noise impacts due to
12 transmission line construction include residential areas near the proposed transmission line
13 construction footprint. Although this assessment includes daytime and nighttime construction noise
14 estimates, construction of the transmission lines would primarily occur during daylight hours. If
15 nighttime construction of the transmission lines were to occur, noise levels could be the same as
16 those generated during daytime hours. The effect of exposing noise-sensitive land uses to noise
17 increases above thresholds would be adverse. Mitigation Measures NOI-1a and NOI-1b are available
18 to address this effect.

19 ***Earth-moving activities at offsite borrow/spoil areas***

20 Noise from earth-moving activities at offsite borrow/spoil areas for Alternative 2B is the same as
21 Alternative 1A. The results shown in Table 23-22 (see Impact NOI-1 in Alternative 1A) indicate that
22 noise-sensitive land uses within 800 feet of equipment operating in the borrow/spoil area could be
23 exposed to construction noise in excess of the daytime (7 a.m. to 10 p.m.) noise threshold of 60 dBA
24 L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be exceeded at a distance of 1,800 feet from
25 the area. Noise-sensitive land uses that could potentially be exposed to adverse noise impacts due to
26 earth-moving activities in offsite borrow/spoil areas would extend outside the borrow/spoil area
27 right-of-way. The effect of exposing these noise-sensitive land uses to noise increases above
28 thresholds would be adverse. However, with the exception of tunneling and RTM placement, most
29 construction activities would occur during daytime hours. Mitigation Measures NOI-1a and NOI-1b
30 are available to address this effect.

31 ***Noise exposure to workers at construction sites***

32 Impact NOI-1 for Alternative 2B is the same as Impact NOI-1 for Alternative 1A in terms of noise
33 exposure to on-site workers. On-site workers would be protected under OSHA requirements. No
34 adverse impacts would occur to workers.

35 ***CEQA Conclusion:*** The impact of exposing noise-sensitive land uses during construction to noise
36 levels above the 60 dBA L_{eq} (1hr) daytime, the 50 dBA L_{max} nighttime, or the 12 dB traffic noise
37 increase threshold would be considered significant. Based on reasonable worst-case modeling, the
38 following significant impacts are expected as a result of Alternative 2B construction.

- 39 ● ***Intakes:*** Sensitive receptors within 1,400 feet of an active intake construction site could be
40 exposed to construction noise in excess of the 60 dBA L_{eq} (1hr) daytime threshold. The
41 nighttime threshold of 50 dBA L_{max} would be exceeded at a distance of 2,800 feet. As shown in
42 Table 23-48, 7 residential parcels, 10 natural/recreational parcels, and 266 agricultural parcels

1 would be affected by daytime noise levels in excess of this threshold during construction. The
 2 nighttime threshold would be exceeded at 210 residential parcels, 20 natural/recreational
 3 parcels, 379 agricultural parcels, and 2 schools.

- 4 • **Conveyance and Associated Facilities:** Sensitive receptors within 1,200 feet of an active
 5 tunnel work area could be exposed to construction noise in excess of the daytime (7 a.m. to 10
 6 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be
 7 exceeded at a distance of 2,800 feet. As shown in Table 23-49, 130 residential parcels, 13
 8 natural/recreational parcels, 1,057 agricultural parcels, and 2 schools would be affected by
 9 daytime noise levels in excess of this threshold during construction. The nighttime threshold
 10 would be exceeded at 251 residential parcels, 26 natural/recreational parcels, 1,881 agricultural
 11 parcels, and 2 schools.
- 12 • **Truck Trips and Worker Commutes:** Traffic noise from truck trips and worker commutes
 13 would result in an increase of 12 dB or more compared to existing traffic noise levels at
 14 residences and outdoor use areas along 21 project roadway segments in the study area as
 15 shown in Table 23-30. The increase in noise levels would be substantial and exceed the project
 16 threshold for traffic noise. Mitigation Measures NOI-1a and NOI-1b are available to address this
 17 effect.
- 18 • **Power Transmission Lines:** Sensitive receptors within 800 feet of an active transmission line
 19 construction area could be exposed to construction noise in excess of the daytime (7 a.m. to 10
 20 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be
 21 exceeded at a distance of 1,800 feet from the construction area. As noted above, several
 22 residential land uses are near the proposed transmission line construction footprint.
- 23 • **Borrow/spoil areas:** Sensitive receptors within 800 feet of equipment operating in the
 24 borrow/spoil area could be exposed to construction noise in excess of the daytime (7 a.m. to 10
 25 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be
 26 exceeded at a distance of 1,800 feet from the area. Borrow/spoil areas are located throughout
 27 the conveyance alignment and are generally adjacent to or in close proximity of intake pumping
 28 plant sites, forebays, and main tunnel construction shafts.

29 Mitigation Measures NOI-1a and NOI-1b would reduce noise impacts to sensitive land uses.
 30 Although implementation of these measures will reduce the impact, it is not anticipated that feasible
 31 measures will be available in all situations to reduce construction noise to levels below the
 32 applicable thresholds. This impact would therefore be significant and unavoidable.

33 **Mitigation Measure NOI-1a: Employ Noise-Reducing Construction Practices during** 34 **Construction**

35 Please see Mitigation Measure NOI-1a under Impact NOI-1 in the discussion of Alternative 1A.

36 **Mitigation Measure NOI-1b: Prior to Construction, Initiate a Complaint/Response** 37 **Tracking Program**

38 Please see Mitigation Measure NOI-1b under Impact NOI-1 in the discussion of Alternative 1A.

1 **Impact NOI-2: Exposure of Sensitive Receptors to Vibration or Groundborne Noise from**
 2 **Construction of Water Conveyance Facilities**

3 ***NEPA Effects:***

4 ***Pile Driving at Intake Sites***

5 Impact NOI-2 for Alternative 2B is the same as for Alternative 1B. In addition, an operable barrier
 6 would be constructed at the head of Old River. Construction of the operable barrier would include
 7 impact driving of sheet piles, which would cause high groundborne vibration levels in areas
 8 immediately adjacent to pile driving sites. However, the nearest residential use is 3,000 feet away
 9 from the construction site, so vibration levels would be well below the impact threshold.

10 Groundborne vibration levels from impact pile driving are predicted to exceed vibration thresholds
 11 at nearby residences in the areas shown in Table 23-50. While groundborne vibration levels in
 12 excess of 0.2 in/sec PPV could occur at any of these residences, the highest vibration levels are
 13 expected at those residences nearest to the intake work areas. Construction of intakes and barge
 14 unloading facilities would result in excessive groundborne vibration levels at these nearby
 15 residential structures. The effect of exposing sensitive receptors to groundborne vibration would be
 16 adverse. Mitigation Measure NOI-2 is available to reduce this effect.

17 **Table 23-50. Land Use Affected by Vibrations from Pile Driving During Construction of Intakes,**
 18 **Alternative 2B**

Location	Zoning	Total Affected Parcels
Sacramento County – including River Road near the community of Hood; Neighborhoods in the community of Hood	Residential ^a	76
Yolo County – including County Road E9 near the community of Clarksburg	Residential ^a	1
San Joaquin County	Residential ^a	4

^a Includes agricultural or unclassified use that permits residential use.

19
 20 ***Construction of Water Conveyance (Pipeline Portions)***

21 Under Alternative 2B, groundborne noise effects during construction of the conveyance would be
 22 the same as Impact NOI-2 for Alternative 1B. Tunnels and siphons would be constructed at a depth
 23 of more than 120 feet below msl. Groundborne noise levels at residential receivers are predicted to
 24 be below thresholds, and would not result in an adverse effect.

25 ***CEQA Conclusion:*** Groundborne vibrations from tunneling activities would not exceed applicable
 26 thresholds as tunnel depth would be 120 feet or greater below msl and would therefore be less than
 27 significant. However, the impact of exposing residential structures to groundborne vibration during
 28 intake construction would be significant as reasonable worst-case modeling indicates that 81
 29 residential parcels would be exposed to vibration levels in excess of 0.2 in/sec PPV during intake
 30 pile driving (see Table 23-50). Although Mitigation Measure NOI-2 will reduce the impact, it is not
 31 anticipated that feasible measures will be available in all situations to reduce vibration to levels
 32 below the applicable thresholds. This impact would therefore be considered significant and
 33 unavoidable.

1 **Mitigation Measure NOI-2: Employ Vibration-Reducing Construction Practices during**
 2 **Construction of Water Conveyance Facilities**

3 Please see Mitigation Measure NOI-2 under Impact NOI-2 in the discussion of Alternative 1A.

4 **Impact NOI-3: Exposure of Noise-Sensitive Land Uses to Noise from Operation of Water**
 5 **Conveyance Facilities**

6 **NEPA Effects:** Potential reasonable worst-case pump noise levels during operation of the intake
 7 structures were evaluated by calculating sound power levels of the pump based on horsepower
 8 (Hoover and Keith 2000). Faceplate horsepower for vertical column type pumps is specified in
 9 pump selection appendix of the Conceptual Engineering Report. Pump specifications are shown in
 10 Table 23-51. Combined source noise levels assume that pump enclosures (including buildings)
 11 provide a nominal 15 dB of noise attenuation. This analysis assumes that pumps are operating 24
 12 hours a day.

13 **Table 23-51. Pump Specifications—Alternative 2B**

Pump Location	Quantity	Pumping Plant Capacity (cfs)	Pump Horsepower	Individual Pump Source Level (dBA)	Combined Source Level (dBA)	Assumed Attenuation (dB)	Combined Source Level with Attenuation (dBA)
Intake 1	6	3,000	3,500	96	103	15	88
Intake 2	6	3,000	3,500	96	103	15	88
Intake 3	6	3,000	3,500	96	103	15	88
Intake 6	6	3,000	3,500	96	103	15	88
Intake 7	6	3,000	3,500	96	103	15	88
Intermediate Plant	15	15,000	7,000	99	110	15	95

cfs = cubic feet per second.
 dB = decibels.
 dBA = A-weighted sound level in decibels.

14
 15 The estimated sound levels from pump operation as a function of distance based on calculated
 16 point-source attenuation over “soft” (i.e., acoustically absorptive) ground are shown in Table 23-52.

1 **Table 23-52. Predicted Noise Levels from Pump Operation, Intakes, Alternative 2B**

Distance Between Source and Receiver (Feet)	Intakes 1,2,3,6, and 7 Calculated L_{eq} Sound Level (dBA)	Intermediate Plant Calculated L_{eq} Sound Level (dBA)
50	88	95
100	80	87
200	72	79
300	68	75
400	65	72
600	60	67
800	57	64
1,000	54	61
1,200	52	59
1,400	50	57
1,600	49	56
2,000	46	53
2,200	45	52
2,600	43	50
3,600	40	47
4,000	38	45
4,500	37	44
5,000	36	43

Notes: Calculations are based on Federal Transit Administration 2006. Calculation do not include the effects, if any, of local shielding from walls, topography, or other barriers that may reduce sound levels further.

Noise levels assume a nominal pump enclosure attenuation of 15 dB.

Bold denotes daytime and nighttime maximum noise thresholds.

dBA = A-weighted sound level in decibels.

2

3 The results shown in Table 23-44 indicate that operating noise from pumping plants would exceed
4 the nighttime threshold of 45 dBA at noise-sensitive land uses within a distance of up to 2,200 feet
5 from intake pumping plant locations, and 4,000 feet from the intermediate pumping plant along the
6 east conveyance alignment. Noise from operation of pumping plants is predicted to exceed daytime
7 and nighttime noise thresholds at nearby residences and outdoor parks in areas indicated in Table
8 23-53.

9 Operation of water conveyance facilities could result in substantial increases in noise levels affecting
10 nearby communities and residences. While noise levels in excess of applicable thresholds could
11 occur throughout the affected area, the highest noise levels are expected at those land uses most
12 adjacent to the pumping plants. The effect of exposing noise-sensitive land uses to noise increases
13 above thresholds would be adverse. Mitigation Measure NOI-3 is available to reduce this effect.

1 **Table 23-53. Land use affected by noise from operation of pumping plants, Alternative 2B**

Location	Zoning	50 dBA L_{eq} Daytime	45 dBA L_{eq} Nighttime
		Operations Threshold	Operations Threshold
		Total Affected Parcels	Total Affected Parcels
Sacramento County – including River Road near the community of Hood; neighborhoods in the community of Hood.	Natural/Recreational	4	5
	Agricultural/Other ^a	70	123
Yolo County – including County Road E9 near the community of Clarksburg; neighborhoods in the community of Clarksburg.	Agricultural/Other ^a	64	103
San Joaquin County	Agricultural/Other ^a	27	61

^a Includes agricultural or unclassified use that permits residential use.

2

3 **Noise exposure to workers at conveyance facilities**

4 Impact NOI-2B for Alternative 1B is the same as Impact NOI-3 for Alternative 1A in terms of noise
5 exposure to on-site workers. On-site workers would be protected under OSHA requirements. No
6 adverse impacts would occur to workers.

7 **CEQA Conclusion:** The impact of exposing noise-sensitive land uses during pumping plant
8 operations to noise levels above the daytime (50 dBA L_{max}) or nighttime (45 dBA L_{max}) noise
9 thresholds would be significant. Based on reasonable worst-case modeling, 4 natural/recreational
10 parcels and 161 agricultural parcels would be affected by daytime noise levels in excess of the
11 operational threshold. The nighttime threshold would be exceeded at 5 natural/recreational parcels
12 and 287 agricultural parcels (see Table 23-53). The impact of exposing these receptors to noise
13 increases above thresholds would be significant. Mitigation Measure NOI-3 would reduce
14 operational noise levels below applicable thresholds, thus resulting in a less-than-significant level.

15 **Mitigation Measure NOI-3: Design and Construct Intake Facilities and Other Pump**
16 **Facilities Such That Operational Noise Does Not Exceed 50 dBA (One-Hour L_{eq}) during**
17 **Daytime Hours (7:00 A.M. to 10:00 P.M.) or 45 dBA (One-Hour L_{eq}) during Nighttime**
18 **Hours (10:00 P.M. to 7:00 A.M.) or the Applicable Local Noise Standard (Whichever Is**
19 **Less) at Nearby Noise Sensitive Land Uses**

20 Please see Mitigation Measure NOI-3 under Impact NOI-3 in the discussion of Alternative 1A.

21 **Impact NOI-4: Exposure of Noise-Sensitive Land Uses to Noise from Implementation of**
22 **Proposed Conservation Measures 2-10**

23 **NEPA Effects:** Although locations or target acreages may vary for proposed conservation measures,
24 at the program level of development, the amount and location of restoration actions under this
25 alternative would be the same as Alternative 1A, and therefore the impact would be the same as
26 under Alternative 1A. Noise levels during implementation of these conservation measures are
27 expected to vary according to the type of construction equipment and techniques used, but are likely
28 to be similar to noise levels shown in Table 23-16 (see Impact NOI-1 in Alternative 1A). The results
29 shown in Table 23-16 indicate that residences within 1,200 feet of an active restoration work area

1 could be exposed to construction noise in excess of the daytime (7 a.m. to 10 p.m.) noise threshold of
 2 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be exceeded within a distance of
 3 2,800 feet.

4 The effect of exposing sensitive land uses to increases in construction noise levels above thresholds
 5 would be adverse. Mitigation Measures NOI-1a and NOI-1b are available to address this effect.

6 **CEQA Conclusion:** The impact of exposing noise-sensitive land uses during construction to noise
 7 increases above the daytime (60 dBA L_{eq}) and nighttime (50 dBA L_{max}) thresholds would be
 8 significant. Noise levels during implementation of these conservation measures are expected to vary
 9 according to the type of construction equipment and techniques used, but are likely to be similar to
 10 noise levels shown in Table 23-16 (see Impact NOI-1 in Alternative 1A). The results shown in Table
 11 23-16 indicate that residences within 1,200 feet of an active restoration work area could be exposed
 12 to construction noise in excess of the daytime (7 a.m. to 10 p.m.) noise threshold of 60 dBA L_{eq} (1hr).
 13 The nighttime threshold of 50 dBA L_{max} would be exceeded within a distance of 2,800 feet. The
 14 impact of exposing these receptors to noise increases above thresholds would be significant.
 15 Although Mitigation Measures NOI-1a and NOI-1b will reduce the impact, it is not anticipated that
 16 feasible measures will be available in all situations to reduce construction noise to levels below the
 17 applicable thresholds. This impact would therefore be considered significant and unavoidable.

18 **Mitigation Measure NOI-1a: Employ Noise-Reducing Construction Practices during**
 19 **Construction**

20 Please see Mitigation Measure NOI-1a under Impact NOI-1 in the discussion of Alternative 1A.

21 **Mitigation Measure NOI-1b: Prior to Construction, Initiate a Complaint/Response**
 22 **Tracking Program**

23 Please see Mitigation Measure NOI-1b under Impact NOI-1 in the discussion of Alternative 1A.

24 **23.3.3.7 Alternative 2C—Dual Conveyance with West Alignment Intakes**
 25 **W1–W5 (15,000 cfs; Operational Scenario B)**

26 A total of five intakes would be constructed under Alternative 2C. They would be sited on the west
 27 bank of the Sacramento River, directly opposite the locations identified for the pipeline/tunnel and
 28 east alignments. Under this alternative, water would be carried south in a canal along the western
 29 side of the Delta to an intermediate pumping plant and then pumped through a tunnel to a
 30 continuing canal to the proposed Byron Tract Forebay immediately northwest of Clifton Court
 31 Forebay (see Figures 3-6 and 3-7 in Chapter 3, *Description of Alternatives*). An operable barrier
 32 would also be constructed at the head of Old River.

33 **Impact NOI-1: Exposure of Noise-Sensitive Land Uses to Noise from Construction of Water**
 34 **Conveyance Facilities**

35 **NEPA Effects:**

36 **Construction of Intakes**

37 Impact NOI-1 for Alternative 2C is the same as Impact NOI-1 for Alternative 1C in terms of
 38 construction equipment noise levels. Noise from construction of intakes is predicted to exceed
 39 daytime and nighttime noise thresholds at nearby residences, schools and outdoor parks indicated

1 in Table 23-35 (see Impact NOI-1 in Alternative 1C). While equipment could operate at any
2 construction work area, the highest noise levels are expected to occur at those sites where the
3 duration and intensity of construction activities would be greatest.

4 Although this assessment includes daytime and nighttime construction noise estimates, construction
5 of the intakes would primarily occur during daytime hours. If nighttime construction of the intakes
6 were to occur, noise levels could be the same as that generated during daytime hours.

7 The effect of exposing these noise-sensitive land uses to noise increases above thresholds would be
8 adverse. Mitigation Measures NOI-1a and NOI-1b are available to address this effect.

9 ***Construction of Conveyance (Tunnel and Canal), Forebay, Barge Unloading Facilities, and Intermediate***
10 ***Pumping Plant***

11 Impact NOI-1 for Alternative 2C is the same as Impact NOI-1 for Alternative 1C in terms of
12 construction equipment noise levels. Noise from construction activities is predicted to exceed
13 daytime and nighttime noise thresholds at nearby residences, schools and outdoor parks indicated
14 in Table 23-36 (see Impact NOI-1 in Alternative 1C). While equipment could operate at any work
15 area identified for this alternative, the highest noise levels are expected to occur at those sites where
16 the duration and intensity of construction activities would be greatest. This includes all construction
17 sites along the canal or tunnel conveyance alignment, as well as at the site of the Byron Tract
18 Forebay adjacent to and west of Clifton Court Forebay. For a map of the proposed west alignment,
19 see Mapbook Figure M3-3.

20 Although this assessment includes daytime and nighttime construction noise estimates for the
21 forebay, barge unloading facilities, intermediate pumping plant, and conveyance tunnels and canals,
22 construction of the forebay, barge unloading facilities, intermediate pumping plant, and canals
23 would primarily occur during daytime hours. If nighttime construction of the forebay, barge
24 unloading facilities, intermediate pumping plant, and canals were to occur, noise levels could be the
25 same as those generated during daytime hours. Construction of the conveyance tunnels and RTM
26 storage actions would occur on a 24-hour basis.

27 The effect of exposing these noise-sensitive land uses to noise increases above thresholds would be
28 adverse. Mitigation Measures NOI-1a and NOI-1b are available to address this effect.

29 ***Truck Trips and Worker Commutes***

30 The estimate of truck trips and worker commutes under Alternative 2C would be similar to
31 Alternative 1C except for the addition of trips associated with construction of the operable barrier.
32 Traffic noise from truck trips and worker commutes would result in an increase of 12 dB or more
33 compared to existing traffic noise levels at residences and outdoor use areas along 22 project
34 roadway segments in the study area as shown in Table 23-37.

35 During intake construction, segments of County Highway E9 would be temporarily realigned around
36 intake construction sites. Under the west alignment alternative, no additional noise increase is
37 anticipated at residences adjacent to intake construction sites.

38 The increase in noise levels exceed the project threshold for traffic noise and would be considered
39 adverse. Mitigation Measures NOI-1a and NOI-1b are available to address this effect.

1 **Construction of Power Transmission Lines**

2 Noise from construction of power transmission lines for Alternative 2C is the same as Alternative
 3 1C. The results shown in Table 23-21 (see Impact NOI-1 in Alternative 1A) indicate that noise-
 4 sensitive land uses within 800 feet of an active transmission line construction area could be exposed
 5 to construction noise in excess of the daytime (7 a.m. to 10 p.m.) noise threshold of 60 dBA L_{eq} (1hr).
 6 The nighttime threshold of 50 dBA L_{max} would be exceeded at a distance of 1,800 feet from the
 7 construction area. Noise-sensitive receptors that could be exposed to adverse noise impacts due to
 8 transmission line construction include residential areas near the proposed transmission line
 9 construction footprint. Likewise, as noted in Chapter 24, *Hazards and Hazardous Materials*,
 10 Lakewood Drive, Sycamore Drive, and Summer Lake Community Parks, as well as Mokelumne High
 11 (Continuation) School would be near the proposed transmission line construction footprint for
 12 Alternative 2C. Although this assessment includes daytime and nighttime construction noise
 13 estimates, construction of the transmission lines would primarily occur during daylight hours. If
 14 nighttime construction of the transmission lines were to occur, noise levels could be the same as
 15 those generated during daytime hours. The effect of exposing noise-sensitive land uses to noise
 16 increases above thresholds would be adverse. Mitigation Measures NOI-1a and NOI-1b are available
 17 to address this effect.

18 **Earth-moving activities at offsite borrow/spoil areas**

19 Noise from earth-moving activities at offsite borrow/spoil areas for Alternative 2C is the same as
 20 Alternative 1C. The results shown in Table 23-22 (see Impact NOI-1 in Alternative 1A) indicate that
 21 noise-sensitive land uses within 800 feet of equipment operating in the borrow/spoil area could be
 22 exposed to construction noise in excess of the daytime (7 a.m. to 10 p.m.) noise threshold of 60 dBA
 23 L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be exceeded at a distance of 1,800 feet from
 24 the area. Noise-sensitive land uses that could potentially be exposed to adverse noise impacts due to
 25 earth-moving activities in offsite borrow/spoil areas would extend outside the borrow/spoil area
 26 right-of-way. The effect of exposing these noise-sensitive land uses to noise increases above
 27 thresholds would be adverse. However, with the exception of tunneling and RTM placement, most
 28 construction activities would occur during daytime hours. Mitigation Measures NOI-1a and NOI-1b
 29 are available to address this effect.

30 **Noise exposure to workers at construction sites**

31 Impact NOI-1 for Alternative 2C is the same as Impact NOI-1 for Alternative 1A in terms of noise
 32 exposure to on-site workers. On-site workers would be protected under OSHA requirements. No
 33 adverse impacts would occur to workers.

34 **CEQA Conclusion:** The impact of exposing noise-sensitive land uses during construction to noise
 35 levels above the 60 dBA L_{eq} (1hr) daytime, the 50 dBA L_{max} nighttime, or the 12 dB traffic noise
 36 increase threshold would be considered significant. Based on reasonable worst-case modeling, the
 37 following significant impacts are expected as a result of Alternative 2C construction.

- 38 • **Intakes:** Sensitive receptors within 1,400 feet of an active intake construction site could be
 39 exposed to construction noise in excess of the 60 dBA L_{eq} (1hr) daytime threshold. The
 40 nighttime threshold of 50 dBA L_{max} would be exceeded at a distance of 2,800 feet. As shown in
 41 Table 23-35 (see Impact NOI-1 in Alternative 1C), 63 residential parcels, 3 natural/recreational
 42 parcels, and 188 agricultural parcels would be affected by daytime noise levels in excess of this

1 threshold during construction. The nighttime threshold would be exceeded at 229 residential
2 parcels, 8 natural/recreational parcels, 351 agricultural parcels, and 3 schools.

- 3 • **Conveyance and Associated Facilities:** Sensitive receptors within 1,200 feet of an active
4 tunnel work area could be exposed to construction noise in excess of the daytime (7 a.m. to 10
5 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be
6 exceeded at a distance of 2,800 feet. As shown in Table 23-36 (see Impact NOI-1 in Alternative
7 1C), 1,148 residential parcels, 26 natural/recreational parcels, 1,048 agricultural parcels, and 4
8 schools would be affected by daytime noise levels in excess of this threshold during
9 construction. The nighttime threshold would be exceeded at 3,087 residential parcels, 221
10 natural/recreational parcels, 1,532 agricultural parcels, and 6 schools.
- 11 • **Truck Trips and Worker Commutes:** Traffic noise from truck trips and worker commutes
12 would result in an increase of 12 dB or more compared to existing traffic noise levels at
13 residences and outdoor use areas along 22 project roadway segments in the study area as
14 shown in Table 23-37. The increase in noise levels would be substantial and exceed the project
15 threshold for traffic noise. Mitigation Measures NOI-1a and NOI-1b are available to address this
16 effect.
- 17 • **Power Transmission Lines:** Sensitive receptors within 800 feet of an active transmission line
18 construction area could be exposed to construction noise in excess of the daytime (7 a.m. to 10
19 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be
20 exceeded at a distance of 1,800 feet from the construction area. As noted above, residential
21 areas and several schools are near the proposed transmission line construction footprint.
- 22 • **Borrow/spoil areas:** Sensitive receptors within 800 feet of equipment operating in the
23 borrow/spoil area could be exposed to construction noise in excess of the daytime (7 a.m. to 10
24 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be
25 exceeded at a distance of 1,800 feet from the area. Borrow/spoil areas are located throughout
26 the conveyance alignment and are generally adjacent to or in close proximity of intake pumping
27 plant sites, forebays, and main tunnel construction shafts.

28 Mitigation Measures NOI-1a and NOI-1b would reduce the impact. Although implementation of
29 these measures will reduce the impact, it is not anticipated that feasible measures will be available
30 in all situations to reduce construction noise to levels below the applicable thresholds. This impact
31 would therefore be significant and unavoidable.

32 **Mitigation Measure NOI-1a: Employ Noise-Reducing Construction Practices during** 33 **Construction**

34 Please see Mitigation Measure NOI-1a under Impact NOI-1 in the discussion of Alternative 1A.

35 **Mitigation Measure NOI-1b: Prior to Construction, Initiate a Complaint/Response** 36 **Tracking Program**

37 Please see Mitigation Measure NOI-1b under Impact NOI-1 in the discussion of Alternative 1A.

1 **Impact NOI-2: Exposure of Sensitive Receptors to Vibration or Groundborne Noise from**
 2 **Construction of Water Conveyance Facilities**

3 **NEPA Effects:**

4 ***Pile Driving at Intake Sites***

5 Under Alternative 2C, groundborne vibration effects would be the same as Impact NOI-2 for
 6 Alternative 1C. Groundborne vibration levels from construction of intakes would exceed vibration
 7 thresholds at nearby receptors, including residential structures (see Table 23-38 under Impact NOI-
 8 2 in Alternative 1C). The effect of exposing sensitive receptors to groundborne vibration would be
 9 adverse. Mitigation Measure NOI-2 is available to reduce this effect.

10 ***Construction of Water Conveyance (Tunnel Portions)***

11 Under Alternative 2C, groundborne noise effects during construction of the conveyance would be
 12 the same as Impact NOI-2 for Alternative 1C. Tunnels and siphons would be constructed at a depth
 13 of more than 120 feet below msl. Groundborne noise levels at residential receivers are predicted to
 14 be below thresholds, and would not result in an adverse effect.

15 **CEQA Conclusion:** Groundborne vibrations during tunneling would not exceed the applicable
 16 threshold as tunnel depth would be 120 feet or greater below msl and would therefore be less than
 17 significant. However, the impact of exposing residential structures to groundborne vibration during
 18 intake construction would be significant as reasonable worst-case modeling indicates that 88
 19 residential parcels would be exposed to vibration levels in excess of 0.2 in/sec PPV during intake
 20 pile driving (see Table 23-38 under Impact NOI-2 in Alternative 1C). Although Mitigation Measure
 21 NOI-2 reduce the impact, it is not anticipated that feasible measures will be available in all situations
 22 to reduce vibration to levels below the applicable thresholds. This impact would therefore be
 23 significant and unavoidable.

24 **Mitigation Measure NOI-2: Employ Vibration-Reducing Construction Practices during**
 25 **Construction of Water Conveyance Facilities**

26 Please see Mitigation Measure NOI-2 under Impact NOI-2 in the discussion of Alternative 1A.

27 **Impact NOI-3: Exposure of Noise-Sensitive Land Uses to Noise from Operation of Water**
 28 **Conveyance Facilities**

29 **NEPA Effects:**

30 Impact NOI-3 for Alternative 2C is the same as Impact NOI-3 for Alternative 1C. Operation of
 31 pumping plants under Alternative 2C would expose persons to noise levels greater than the noise
 32 thresholds for project operations (see Table 23-41 under Impact NOI-3 in Alternative 1C). Noise
 33 levels from operation of project-level physical and structural components would therefore be
 34 considered to result in an adverse effect.

35 Operation of water conveyance facilities could result in substantial increases in noise levels affecting
 36 nearby communities and residences. While noise levels in excess of applicable thresholds could
 37 occur throughout the affected area, the highest noise levels are expected at those land uses most
 38 adjacent to the pumping plants. The effect of exposing noise-sensitive land uses to noise increases
 39 above thresholds would be adverse. Mitigation Measure NOI-3 is available to reduce this effect.

1 **Noise exposure to workers at conveyance facilities**

2 Impact NOI-3 for Alternative 2C is the same as Impact NOI-3 for Alternative 1A in terms of noise
3 exposure to on-site workers. On-site workers would be protected under OSHA requirements. No
4 adverse impacts would occur to workers.

5 **CEQA Conclusion:** The impact of exposing noise-sensitive land uses during pumping plant
6 operations to noise levels above the daytime (50 dBA L_{max}) or nighttime (45 dBA L_{max}) noise
7 thresholds would be significant. Based on reasonable worst-case modeling, 2 residential parcels, 2
8 natural/recreational parcels, and 132 agricultural parcels would be affected by daytime noise levels
9 in excess of the operational threshold. The nighttime threshold would be exceeded at 77 residential
10 parcels, 3 natural/recreational parcels, and 205 agricultural parcels. The impact of exposing these
11 receptors to noise increases above thresholds would be significant. Mitigation Measure NOI-3 would
12 reduce operational noise levels below applicable thresholds, thus resulting in a less-than-significant
13 level.

14 **Mitigation Measure NOI-3: Design and Construct Intake Facilities and Other Pump**
15 **Facilities Such That Operational Noise Does Not Exceed 50 dBA (One-Hour L_{eq}) during**
16 **Daytime Hours (7:00 A.M. to 10:00 P.M.) or 45 dBA (One-Hour L_{eq}) during Nighttime**
17 **Hours (10:00 P.M. to 7:00 A.M.) or the Applicable Local Noise Standard (Whichever Is**
18 **Less) at Nearby Noise Sensitive Land Uses**

19 Please see Mitigation Measure NOI-3 under Impact NOI-3 in the discussion of Alternative 1A.

20 **Impact NOI-4: Exposure of Noise-Sensitive Land Uses to Noise from Implementation of**
21 **Proposed Conservation Measures 2-10**

22 **NEPA Effects:** Although locations or target acreages may vary for proposed conservation measures,
23 at the program level of development, the amount and location of restoration actions under this
24 alternative would be the same as Alternative 1A, and therefore the impact would be the same as
25 under Alternative 1A. Noise levels during implementation of these conservation measures are
26 expected to vary according to the type of construction equipment and techniques used, but are likely
27 to be similar to noise levels shown in Table 23-16 (see Impact NOI-1 in Alternative 1A). The results
28 shown in Table 23-16 indicate that residences within 1,200 feet of an active restoration work area
29 could be exposed to construction noise in excess of the daytime (7 a.m. to 10 p.m.) noise threshold of
30 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be exceeded within a distance of
31 2,800 feet.

32 The effect of exposing sensitive land uses to increases in construction noise levels above thresholds
33 would be adverse. Mitigation Measures NOI-1a and NOI-1b are available to address this effect.

34 **CEQA Conclusion:** The impact of exposing noise-sensitive land uses during construction to noise
35 increases above the daytime (60 dBA L_{eq}) and nighttime (50 dBA L_{max}) thresholds would be
36 significant. Noise levels during implementation of these conservation measures are expected to vary
37 according to the type of construction equipment and techniques used, but are likely to be similar to
38 noise levels shown in Table 23-16 (see Impact NOI-1 in Alternative 1A). The results shown in Table
39 23-16 indicate that residences within 1,200 feet of an active restoration work area could be exposed
40 to construction noise in excess of the daytime (7 a.m. to 10 p.m.) noise threshold of 60 dBA L_{eq} (1hr).
41 The nighttime threshold of 50 dBA L_{max} would be exceeded within a distance of 2,800 feet. The
42 impact of exposing these receptors to noise increases above thresholds would be significant.

1 Although Mitigation Measures NOI-1a and NOI-1b will reduce the impact, it is not anticipated that
 2 feasible measures will be available in all situations to reduce construction noise to levels below the
 3 applicable thresholds. This impact would therefore be considered significant and unavoidable.

4 **Mitigation Measure NOI-1a: Employ Noise-Reducing Construction Practices during**
 5 **Construction**

6 Please see Mitigation Measure NOI-1a under Impact NOI-1 in the discussion of Alternative 1A.

7 **Mitigation Measure NOI-1b: Prior to Construction, Initiate a Complaint/Response**
 8 **Tracking Program**

9 Please see Mitigation Measure NOI-1b under Impact NOI-1 in the discussion of Alternative 1A.

10 **23.3.3.8 Alternative 3—Dual Conveyance with Pipeline/Tunnel and**
 11 **Intakes 1 and 2 (6,000 cfs; Operational Scenario A)**

12 Two intakes would be constructed under Alternative 3 on the east bank of the Sacramento River. For
 13 the purposes of this analysis, Alternative 3 was assumed to construct Intakes 1 and 2. This
 14 alternative would also construct an intermediate forebay, and the conveyance facility would be a
 15 buried pipeline (see Figures 3-2 and 3-8 in Chapter 3, *Description of Alternatives*).

16 **Impact NOI-1: Exposure of Noise-Sensitive Land Uses to Noise from Construction of Water**
 17 **Conveyance Facilities**

18 *NEPA Effects:*

19 ***Construction of Intakes***

20 Potential reasonable worst-case equipment noise levels from construction of intakes would be
 21 comparable to those listed for the intake sites in Table 23-17. The results shown in Table 23-17
 22 indicate that during periods of pile driving, residences located within 1,400 feet of an active intake
 23 construction site could be exposed to construction noise in excess of the DWR daytime (7 a.m. to 10
 24 p.m.) maximum noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would
 25 be exceeded at a distance of 2,800 feet from an active intake construction site.

26 While equipment could operate at any work area identified for this alternative, the highest noise
 27 levels are expected to occur at those sites where the duration and intensity of construction activities
 28 would be greatest. The work areas for construction of Intakes 1 and 2 would extend through several
 29 residential areas and communities located near the Sacramento River. Noise from intake
 30 construction activities is predicted to exceed daytime and nighttime noise thresholds at nearby
 31 residences, schools and outdoor parks in areas indicated in Table 23-54.

32 Although this assessment includes daytime and nighttime construction noise estimates, construction
 33 of the intakes would primarily occur during daytime hours. If nighttime construction of the intakes
 34 were to occur, noise levels could be the same as that generated during daytime hours.

35 The effect of exposing these noise-sensitive land uses to noise increases above thresholds would be
 36 adverse. Mitigation Measures NOI-1a and NOI-1b are available to address this effect.

1 **Table 23-54. Land use affected by equipment noise from construction of intakes, Alternative 3**

Location	Zoning	Daytime Threshold (60 dBA L_{eq} [1h])	Nighttime Threshold (50 dBA L_{max} [1h])
		Total Affected Parcels	Total Affected Parcels
Sacramento County – including River Road across the river from the community of Clarksburg.	Natural/Recreational	0	3
	Agricultural/Other ^a	59	104
	Schools	None	None
Yolo County – including County Road E9 near the community of Clarksburg; neighborhoods in the community of Clarksburg.	Residential	4	98
	Natural/Recreational	1	5
	Agricultural/Other ^a	105	131
	Schools	None	Clarksburg Middle School

^a Includes agricultural or unclassified use that permits residential use.

2

3 **Construction of Conveyance (Tunnel), Forebays, Barge Unloading Facilities, and Intermediate Pumping** 4 **Plant**

5 Construction of the conveyance under Alternative 3 would be the same as Alternative 1A. Noise
6 from construction activities is predicted to exceed daytime and nighttime noise thresholds at nearby
7 residences, schools and outdoor parks indicated in Table 23-19 (see Impact NOI-1 in Alternative
8 1A). While equipment could operate at any work area identified for this alternative, the highest
9 noise levels are expected to occur at those sites where the duration and intensity of construction
10 activities would be greatest. This includes all construction sites along the tunnel conveyance
11 alignment, as well as at the site of the Byron Tract Forebay adjacent to and south of Clifton Court
12 Forebay. For a map of the proposed pipeline/tunnel alignment, see Mapbook Figure M3-1.

13 Although this assessment includes daytime and nighttime construction noise estimates for the
14 forebays, barge unloading facilities, intermediate pumping plant, and conveyance tunnels,
15 construction of the forebays, barge unloading facilities, and intermediate pumping plant would
16 primarily occur during daytime hours. If nighttime construction of the forebays, barge unloading
17 facilities, and intermediate pumping plant were to occur, noise levels could be the same as those
18 generated during daytime hours. Construction of the conveyance tunnels and RTM storage actions
19 would occur on a 24-hour basis.

20 The effect of exposing these noise-sensitive land uses to noise increases above thresholds would be
21 adverse. Mitigation Measures NOI-1a and NOI-1b would be available to reduce this effect.

22 **Truck Trips and Worker Commutes**

23 The estimate of truck trips and worker commutes under Alternative 3 would be similar to
24 Alternative 1A. Traffic noise from truck trips and worker commutes would result in an increase of
25 12 dB or more compared to existing traffic noise levels at residences and outdoor use areas along 16
26 project roadway segments in the study area as shown in Table 23-20.

27 During intake construction, segments of SR 160 between Freeport Bridge and Walnut Grove Bridge
28 would be temporarily realigned around intake construction sites. As a result, future project noise
29 levels would further increase at residences located near intake sites. Under Alternative 3, noise

1 levels at receivers near realigned segments of SR 160 would increase by up to 6 dB in addition to the
2 noise increase shown in Table 23-20.

3 The increase in noise levels exceed the project threshold for traffic noise and would be considered
4 adverse. Mitigation Measures NOI-1a and NOI-1b are available to address this effect.

5 ***Construction of Power Transmission Lines***

6 Noise from construction of power transmission lines for Alternative 3 is the same as Alternative 1A.
7 The results shown in Table 23-21 (see Impact NOI-1 in Alternative 1A) indicate that noise-sensitive
8 land uses within 800 feet of an active transmission line construction area could be exposed to
9 construction noise in excess of the daytime (7 a.m. to 10 p.m.) noise threshold of 60 dBA L_{eq} (1hr).
10 The nighttime threshold of 50 dBA L_{max} would be exceeded at a distance of 1,800 feet from the
11 construction area. Several residential land uses are near the proposed transmission line
12 construction footprint. Likewise, Delta Elementary School and Delta High School on the west bank of
13 the Sacramento River are within half a mile of the proposed Intake 2 transmission lines. Although
14 this assessment includes daytime and nighttime construction noise estimates, construction of the
15 transmission lines would primarily occur during daylight hours. If nighttime construction of the
16 transmission lines were to occur, noise levels could be the same as those generated during daytime
17 hours. The effect of exposing noise-sensitive land uses to noise increases above thresholds would be
18 adverse. Mitigation Measures NOI-1a and NOI-1b are available to address this effect.

19 ***Earth-moving activities at offsite borrow/spoil areas***

20 Noise from earth-moving activities at offsite borrow/spoil areas for Alternative 3 is the same as
21 Alternative 1A. The results shown in Table 23-22 (see Impact NOI-1 in Alternative 1A) indicate that
22 noise-sensitive land uses within 800 feet of equipment operating in the borrow/spoil area could be
23 exposed to construction noise in excess of the daytime (7 a.m. to 10 p.m.) noise threshold of 60 dBA
24 L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be exceeded at a distance of 1,800 feet from
25 the area. Noise-sensitive land uses that could potentially be exposed to adverse noise impacts due to
26 earth-moving activities in offsite borrow/spoil areas would extend outside the borrow/spoil area
27 right-of-way. The effect of exposing these noise-sensitive land uses to noise increases above
28 thresholds would be adverse. However, with the exception of tunneling and RTM placement, most
29 construction activities would occur during daytime hours. Measures NOI-1a and NOI-1b are
30 available to address this effect.

31 ***Noise exposure to workers at construction sites***

32 Impact NOI-1 for Alternative 3 is the same as Impact NOI-1 for Alternative 1A in terms of noise
33 exposure to on-site workers. On-site workers would be protected under OSHA requirements. No
34 adverse impacts would occur to workers.

35 ***CEQA Conclusion:*** The impact of exposing noise-sensitive land uses during construction to noise
36 levels above the 60 dBA L_{eq} (1hr) daytime, the 50 dBA L_{max} nighttime, or the 12 dB traffic noise
37 increase threshold would be considered significant. Based on reasonable worst-case modeling, the
38 following significant impacts are expected as a result of Alternative 3 construction.

- 39 ● ***Intakes:*** Sensitive receptors within 1,400 feet of an active intake construction site could be
40 exposed to construction noise in excess of the 60 dBA L_{eq} (1hr) daytime threshold. The
41 nighttime threshold of 50 dBA L_{max} would be exceeded at a distance of 2,800 feet. As shown in
42 Table 23-54, 4 residential parcels, 1 natural/recreational parcels, and 46 agricultural parcels

1 would be affected by daytime noise levels in excess of this threshold during construction. The
 2 nighttime threshold would be exceeded at 98 residential parcels, 8 natural/recreational parcels,
 3 235 agricultural parcels, and 1 school.

- 4 • **Conveyance and Associated Facilities:** Sensitive receptors within 1,200 feet of an active
 5 tunnel work area could be exposed to construction noise in excess of the daytime (7 a.m. to 10
 6 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be
 7 exceeded at a distance of 2,800 feet. As shown in Table 23-19 (see Impact NOI-1 in Alternative
 8 1A), 125 residential parcels, 9 natural/recreational parcels, 765 agricultural parcels, and 2
 9 schools would be affected by daytime noise levels in excess of this threshold during
 10 construction. The nighttime threshold would be exceeded at 226 residential parcels, 20
 11 natural/recreational parcels, 1,109 agricultural parcels, and 4 schools.
- 12 • **Truck Trips and Worker Commutes:** Traffic noise from truck trips and worker commutes
 13 would result in an increase of 12 dB or more compared to existing traffic noise levels at
 14 residences and outdoor use areas along 16 project roadway segments in the study area as
 15 shown in Table 23-30. The increase in noise levels would be substantial and exceed the project
 16 threshold for traffic noise. Mitigation Measures NOI-1a and NOI-1b are available to address this
 17 effect.
- 18 • **Power Transmission Lines:** Sensitive receptors within 800 feet of an active transmission line
 19 construction area could be exposed to construction noise in excess of the daytime (7 a.m. to 10
 20 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be
 21 exceeded at a distance of 1,800 feet from the construction area. As noted above, several
 22 residential land uses are near the proposed transmission line construction footprint. Likewise,
 23 Delta Elementary School and Delta High School on the west bank of the Sacramento River are
 24 within half a mile of the proposed Intake 2 transmission lines.
- 25 • **Borrow/spoil areas:** Sensitive receptors within 800 feet of equipment operating in the
 26 borrow/spoil area could be exposed to construction noise in excess of the daytime (7 a.m. to 10
 27 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be
 28 exceeded at a distance of 1,800 feet from the area. Borrow/spoil areas are located throughout
 29 the conveyance alignment and are generally adjacent to or in close proximity of intake pumping
 30 plant sites, forebays, and main tunnel construction shafts.

31 Mitigation Measures NOI-1a and NOI-1b would reduce the impact. Although implementation of
 32 these measures will reduce the impact, it is not anticipated that feasible measures will be available
 33 in all situations to reduce construction noise to levels below the applicable thresholds. This impact
 34 would therefore be significant and unavoidable.

35 **Mitigation Measure NOI-1a: Employ Noise-Reducing Construction Practices during** 36 **Construction**

37 Please see Mitigation Measure NOI-1a under Impact NOI-1 in the discussion of Alternative 1A.

38 **Mitigation Measure NOI-1b: Prior to Construction, Initiate a Complaint/Response** 39 **Tracking Program**

40 Please see Mitigation Measure NOI-1b under Impact NOI-1 in the discussion of Alternative 1A.

1 **Impact NOI-2: Exposure of Sensitive Receptors to Vibration or Groundborne Noise from**
 2 **Construction of Water Conveyance Facilities**

3 **NEPA Effects:**

4 **Pile Driving at Intake Sites**

5 Impact NOI-2 for Alternative 3 is the same as Impact NOI-2 for Alternative 1A. However, fewer
 6 sensitive receptors would be affected by groundborne vibration levels of this magnitude compared
 7 to Alternative 1A, because fewer intakes would be constructed (two rather than five). Groundborne
 8 vibration levels from impact pile driving are predicted to exceed vibration thresholds at nearby
 9 residences in the areas shown in Table 23-55.

10 While groundborne vibration levels in excess of 0.2 in/sec PPV could occur at any of these
 11 residences, the highest vibration levels are expected at those residences nearest to the intake work
 12 areas. Construction of intakes and barge unloading facilities would result in excessive groundborne
 13 vibration levels at these nearby residential structures. The effect of exposing sensitive receptors to
 14 groundborne vibration would be adverse. Mitigation Measure NOI-2 is available to reduce this effect.

15 **Table 23-55. Land use affected by vibrations from pile driving during construction of intakes,**
 16 **Alternative 3**

Location	Zoning	Total Affected Parcels
Sacramento County – including River Road near the community of Hood; Neighborhoods in the community of Hood	Residential ^a	41
Yolo County – including County Road E9 near the community of Clarksburg	Residential ^a	1
San Joaquin County	Residential ^a	13

^a Includes agricultural or unclassified use that permits residential use.

17
 18 **Construction of Water Conveyance (Tunnel)**

19 Vibration sources include the TBM and locomotives moving soil, equipment, and construction
 20 workers between tunnel shaft sites. At a 60-foot tunnel depth, groundborne vibrations from the
 21 TBM are estimated to be 0.008 in/sec PPV, which is below the threshold of 0.04 in/sec PPV. As
 22 described in Section 23.4.2, *Determination of Effects*, tunnel locomotives would be operated at slow
 23 speeds inside of tunnels and would not result in excessive vibrations. Groundborne noise from
 24 tunnel locomotive operation during construction is therefore not predicted to exceed groundborne
 25 noise thresholds or result in an adverse noise impact to sensitive receptors along the tunnel
 26 conveyance.

27 **CEQA Conclusion:** Groundborne vibrations during tunneling would not exceed 0.008 in/sec PPV at
 28 60-foot tunnel depth and would therefore be less than significant. Likewise, locomotives are not
 29 expected to generate significant noise levels because they will travel at low speeds between 5 and
 30 10 miles per hour. However, the impact of exposing residential structures to groundborne vibration
 31 during intake construction would be significant as reasonable worst-case modeling indicates that 55
 32 residential parcels would be exposed to vibration levels in excess of 0.2 in/sec PPV during intake
 33 pile driving (see Table 23-55). Although Mitigation Measure NOI-2 will reduce the impact, it is not

1 anticipated that feasible measures will be available in all situations to reduce vibration to levels
2 below the applicable thresholds. This impact would therefore be significant and unavoidable.

3 **Mitigation Measure NOI-2: Employ Vibration-Reducing Construction Practices during**
4 **Construction of Water Conveyance Facilities**

5 Please see Mitigation Measure NOI-2a under Impact NOI-2 in the discussion of Alternative 1A.

6 **Impact NOI-3: Exposure of Noise-Sensitive Land Uses to Noise from Operation of Water**
7 **Conveyance Facilities**

8 **NEPA Effects:** Potential reasonable worst-case pump noise levels during operation of the intake
9 structures were evaluated by calculating sound power levels of the pump based on horsepower
10 (Hoover and Keith 2000). Faceplate horsepower for vertical column and vertical volute type pumps
11 is specified in pump selection appendix of the Conceptual Engineering Report. Pump specifications
12 are shown in Table 23-56. Combined source noise levels assume that pump enclosures (including
13 buildings) provide a nominal 15 dB of noise attenuation. This analysis assumes that pumps are
14 operating 24 hours a day.

15 **Table 23-56. Pump Specifications—Alternative 3**

Pump Location	Quantity	Pumping Plant Capacity (cfs)	Pump Horsepower	Individual Pump Source Level (dBA)	Combined Source Level (dBA)	Assumed Attenuation (dB)	Combined Source Level with Attenuation (dBA)
Intake 1	6	3,000	4,500	97	104	15	89
Intake 2	6	3,000	4,500	97	104	15	89
Intermediate Plant	16 (10/6) ^a	15,000	18,000/ 8,000 ^a	103/99 ^a	114	15	99

^a Vertical Column Pumps/Vertical Volute Pumps in the Intermediate Pumping Plant.

cfs = cubic feet per second.

dB = decibels.

dBA = A-weighted sound level in decibels.

16
17 The estimated sound levels from pump operation as a function of distance based on calculated
18 point-source attenuation over “soft” (i.e., acoustically absorptive) ground are shown in Table 23-57.

1 **Table 23-57. Predicted Noise Levels from Pump Operation, Intakes, Alternative 3**

Distance Between Source and Receiver (Feet)	Intake 1-2 Calculated L_{eq} Sound Level (dBA)	Intermediate Plant Calculated L_{eq} Sound Level (dBA)
50	89	99
100	82	91
200	74	83
300	69	79
400	66	75
600	61	71
800	58	67
1,000	55	65
1,200	53	63
1,400	52	61
1,600	50	60
2,000	47	57
2,200	46	56
2,600	45	54
3,600	41	50
5,000	37	47
6,000	35	45
7,000	33	43

Notes: Calculations are based on Federal Transit Administration 2006. Calculation do not include the effects, if any, of local shielding from walls, topography, or other barriers that may reduce sound levels further.

Noise levels assume a nominal pump enclosure attenuation of 15 dB.

Bold denotes daytime and nighttime maximum noise thresholds.

dBA = A-weighted sound level in decibels.

2
3 The results shown in Table 23-57 indicate that operating noise from pumping plants would exceed
4 the nighttime threshold of 45 dBA at noise-sensitive land uses within a distance of up to 2,600 feet
5 from intake pumping plant locations, and 6,000 feet from the pumping plant located at the proposed
6 intermediate forebay. Noise from operation of pumping plants is predicted to exceed daytime and
7 nighttime noise thresholds at nearby residences and outdoor parks in areas indicated in Table 23-
8 58.

1 **Table 23-58. Land Use Affected by Noise from Operation of Pumping Plants, Alternative 3**

Location	Zoning	50 dBA L_{eq} Daytime	45 dBA L_{eq} Nighttime
		Operations Threshold	Operations Threshold
		Total Affected Parcels	Total Affected Parcels
Sacramento County – including River Road near the community of Hood; neighborhoods in the community of Hood; Lambert Road; Vorden Road.	Agricultural/ Other ^a	46	99
Yolo County – including County Road E9 near the community of Clarksburg; neighborhoods in the community of Clarksburg.	Agricultural/ Other ^a	52	87

^a Includes agricultural or unclassified use that permits residential use.

2

3 Operation of water conveyance facilities could result in substantial increases in noise levels affecting
4 nearby communities and residences. While noise levels in excess of applicable thresholds could
5 occur throughout the affected area, the highest noise levels are expected at those land uses most
6 adjacent to the pumping plants. The effect of exposing noise-sensitive land uses to noise increases
7 above thresholds would be adverse. Mitigation Measure NOI-3 is available to reduce this effect.

8 ***Noise exposure to workers at conveyance facilities***

9 Impact NOI-3 for Alternative 3 is the same as Impact NOI-3 for Alternative 1A in terms of noise
10 exposure to on-site workers. On-site workers would be protected under OSHA requirements. No
11 adverse impacts would occur to workers.

12 ***CEQA Conclusion:*** The impact of exposing noise-sensitive land uses during pumping plant
13 operations to noise levels above the daytime (50 dBA L_{max}) or nighttime (45 dBA L_{max}) noise
14 thresholds would be considered significant. Based on reasonable worst-case modeling 98
15 agricultural parcels would be affected by daytime noise levels in excess of the operational threshold.
16 The nighttime threshold would be exceeded at 186 agricultural parcels (see Table 23-58). The
17 impact of exposing these receptors to noise increases above thresholds would be significant.
18 Mitigation Measure NOI-3 would reduce operational noise levels below applicable thresholds, thus
19 resulting in a less-than-significant level.

20 **Mitigation Measure NOI-3: Design and Construct Intake Facilities and Other Pump**
21 **Facilities Such That Operational Noise Does Not Exceed 50 dBA (One-Hour L_{eq}) during**
22 **Daytime Hours (7:00 A.M. to 10:00 P.M.) or 45 dBA (One-Hour L_{eq}) during Nighttime**
23 **Hours (10:00 P.M. to 7:00 A.M.) or the Applicable Local Noise Standard (Whichever Is**
24 **Less) at Nearby Noise Sensitive Land Uses**

25 Please see Mitigation Measure NOI-3 under Impact NOI-3 in the discussion of Alternative 1A.

26 **Impact NOI-4: Exposure of Noise-Sensitive Land Uses to Noise from Implementation of**

27 **Proposed Conservation Measures 2-10**

28 NEPA Effects: Although locations or target acreages may vary for proposed conservation measures,
29 at the program level of development, the amount and location of restoration actions under this

1 alternative would be the same as Alternative 1A, and therefore the impact would be the same as
 2 under Alternative 1A. Noise levels during implementation of these conservation measures are
 3 expected to vary according to the type of construction equipment and techniques used, but are likely
 4 to be similar to noise levels shown in Table 23-16 (see Impact NOI-1 in Alternative 1A). The results
 5 shown in Table 23-16 indicate that residences within 1,200 feet of an active restoration work area
 6 could be exposed to construction noise in excess of the daytime (7 a.m. to 10 p.m.) noise threshold of
 7 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be exceeded within a distance of
 8 2,800 feet.

9 The effect of exposing sensitive land uses to increases in construction noise levels above thresholds
 10 would be adverse. Mitigation Measures NOI-1a and NOI-1b are available to address this effect.

11 **CEQA Conclusion:** The impact of exposing noise-sensitive land uses during construction to noise
 12 increases above the daytime (60 dBA L_{eq}) and nighttime (50 dBA L_{max}) thresholds would be
 13 considered significant. Noise levels during implementation of these conservation measures are
 14 expected to vary according to the type of construction equipment and techniques used, but are likely
 15 to be similar to noise levels shown in Table 23-16 (see Impact NOI-1 in Alternative 1A). The results
 16 shown in Table 23-16 indicate that residences within 1,200 feet of an active restoration work area
 17 could be exposed to construction noise in excess of the daytime (7 a.m. to 10 p.m.) noise threshold of
 18 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be exceeded within a distance of
 19 2,800 feet. The impact of exposing these receptors to noise increases above thresholds would be
 20 significant. Although Mitigation Measures NOI-1a and NOI-1b will reduce the impact, it is not
 21 anticipated that feasible measures will be available in all situations to reduce construction noise to
 22 levels below the applicable thresholds. This impact would therefore be considered significant and
 23 unavoidable.

24 **Mitigation Measure NOI-1a: Employ Noise-Reducing Construction Practices during**
 25 **Construction**

26 Please see Mitigation Measure NOI-1a under Impact NOI-1 in the discussion of Alternative 1A.

27 **Mitigation Measure NOI-1b: Prior to Construction, Initiate a Complaint/Response**
 28 **Tracking Program**

29 Please see Mitigation Measure NOI-1b under Impact NOI-1 in the discussion of Alternative 1A.

30 **23.3.3.9 Alternative 4—Dual Conveyance with Modified Pipeline/Tunnel**
 31 **and Intakes 2, 3, and 5 (9,000 cfs; Operational Scenario H)**

32 Three intakes would be constructed under Alternative 4 on the east bank of the Sacramento River.
 33 This alternative would also construct an intermediate forebay, and the conveyance facility would be
 34 a buried pipeline (see Figures 3-9 and 3-10 in Chapter 3, *Description of Alternatives*).

1 **Impact NOI-1: Exposure of Noise-Sensitive Land Uses to Noise from Construction of Water**
 2 **Conveyance Facilities**

3 **NEPA Effects:**

4 **Construction of Intakes**

5 Potential reasonable worst-case equipment noise levels from construction of the intakes were
 6 evaluated by combining the noise levels of the six loudest pieces of equipment that would likely
 7 operate at the same time (cranes and trucks). Assuming 100% utilization within a given hour of day,
 8 the combined noise level is 96 dBA L_{eq} (1hr) at 50 feet. The estimated sound levels from
 9 construction as a function of distance based on calculated point-source attenuation over “soft” (i.e.,
 10 acoustically absorptive) ground are shown in Table 23-59.

11 **Table 23-59. Predicted Noise Levels from Construction Activities**

Distance Between Source and Receiver (feet)	Calculated L_{eq} (1hr)/Nighttime L_{max} Sound Level (dBA)
50	96
100	88
200	80
400	72
600	68
800	64
1,000	62
1,200	60
1,500	57
2,000	54
2,500	51
2,800	50
3,000	49
4,000	46
5,280	43

Notes: Calculations are based on Federal Transit Administration 2006. Calculations do not include the effects, if any, of local shielding from walls, topography, or other barriers that may reduce sound levels further.

Bold denotes daytime (1hr) and nighttime (1hr) maximum noise thresholds.

L_{eq} (1 hour) = hourly-equivalent sound level (over 1 hour).

dBA = A-weighted decibel.

12
 13 Estimated sound levels from impact pile driving conducted during periods of construction described
 14 above are shown in Table 23-60. Because noise from pile driving is not constant, a utilization factor
 15 of 20% has been applied (Thalheimer 2000). The utilization factor reduces the impact pile driver
 16 peak level of 101 dBA to 94 dBA L_{eq} (1hr) at 50 feet. Use of the pile driver simultaneously with noise
 17 from other equipment in Table 23-59 would produce a combined level of 98 dBA L_{eq} (1hr) at 50 feet,
 18 as shown in Table 23-60. The results shown in Table 23-60 indicate that during periods of pile
 19 driving, residences located within 1,400 feet of an active intake construction site could be exposed

1 to construction noise in excess of the DWR daytime (7 a.m. to 10 p.m.) maximum noise threshold of
 2 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be exceeded at a distance of 2,800
 3 feet from an active intake construction site.

4 **Table 23-60. Predicted Noise Levels from Construction—Pile Driving and Construction Equipment**
 5 **for Intake Structures**

Distance Between Source and Receiver (feet)	Calculated Daytime L_{eq} (1hr) Sound Level (dBA)	Nighttime L_{max} Sound Level (dBA)
50	98	96
100	90	88
200	82	80
400	74	72
600	70	68
800	66	64
1,000	64	62
1,200	62	60
1,400	60	57
1,500	59	54
2,000	56	51
2,800	52	50
3,500	50	49
4,000	48	46
5,280	45	43

Notes: Calculations are based on Federal Transit Administration 2006. Calculations do not include the effects, if any, of local shielding from walls, topography, or other barriers that may reduce sound levels further.

Nighttime L_{max} sound levels are based on the same operating assumptions as daytime levels with the exception of pile driving.

Bold denotes daytime and nighttime maximum noise thresholds.

L_{eq} (1hr) = hourly-equivalent sound level (over 1 hour).

dBA = A-weighted decibel.

6

7 While equipment could operate at any work area identified for this alternative, the highest noise
 8 levels are expected to occur at those sites where the duration and intensity of construction activities
 9 would be greatest. The work areas for construction of intakes 2, 3 and 5 would extend through
 10 several residential areas and communities located near the Sacramento River. Noise from intake
 11 construction activities is predicted to exceed daytime and nighttime noise thresholds at nearby
 12 residences, schools and outdoor parks in areas indicated in Table 23-61.

13 Although this assessment includes daytime and nighttime construction noise estimates, construction
 14 of the intakes would primarily occur during daytime hours. If nighttime construction of the intakes
 15 were to occur, noise levels could be the same as that generated during daytime hours.

16 The effect of exposing these noise-sensitive land uses to noise increases above thresholds would be
 17 adverse. Mitigation Measures NOI-1a and NOI-1b would be available to reduce this effect.

1 **Table 23-61. Land Use Affected by Equipment Noise from Construction of Intakes, Alternative 4**

Location	Zoning	Daytime Threshold (60 dBA L_{eq} [1h])	Nighttime Threshold (50 dBA L_{max} [1h])
		Total Affected Parcels	Total Affected Parcels
Sacramento County – including River Road across the river from the community of Clarksburg.	Residential	121	121
	Natural/Recreational	2	2
	Agricultural/Other ^a	105	120
	Schools	None	None
Yolo County – including County Road E9 near the community of Clarksburg; neighborhoods in the community of Clarksburg.	Residential	9	70
	Natural/Recreational	1	5
	Agricultural/Other ^a	100	104
	Schools	None	Clarksburg Middle School

^a Includes agricultural or unclassified use that permits residential use.

2

3 ***Construction of Conveyance (Tunnel), Forebays, and Barge Unloading Facilities***

4 Potential reasonable worst-case equipment noise levels from construction work areas adjacent to
5 tunnel shaft sites would be comparable to those listed for the intake sites in Table 23-59. Assuming
6 100% equipment utilization within a given hour of day, the combined noise level at work areas is 96
7 dBA L_{eq} (1hr) at 50 feet.

8 The results shown in Table 23-59 indicate that noise-sensitive land uses within 1,200 feet of an
9 active tunnel work area could be exposed to construction noise in excess of the daytime (7 a.m. to 10
10 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be
11 exceeded at a distance of 2,800 feet.

12 While equipment could operate at any work area identified for this alternative, the highest noise
13 levels are expected to occur at those sites where the duration and intensity of construction activities
14 would be greatest. This includes all construction sites along the tunnel conveyance alignment, as
15 well as at the site of the Byron Tract Forebay adjacent to and south of Clifton Court Forebay. For a
16 map of the proposed pipeline/tunnel alignment under Alternative 4, see Mapbook Figure M3-4. The
17 tunnel and forebay construction work areas would extend through several residential areas and
18 communities near the Sacramento River. Noise from construction activities is predicted to exceed
19 daytime and nighttime noise thresholds at nearby residences, schools and outdoor parks indicated
20 in Table 23-62.

21 Although this assessment includes daytime and nighttime construction noise estimates for the
22 forebays, barge unloading facilities, and conveyance tunnels, construction of the forebays and barge
23 unloading facilities would primarily occur during daytime hours. If nighttime construction of the
24 forebays and barge unloading facilities were to occur, noise levels could be the same as those
25 generated during daytime hours. Construction of the conveyance tunnels and RTM storage actions
26 would occur on a 24-hour basis.

27 The effect of exposing these noise-sensitive land uses to noise increases above thresholds would be
28 adverse. Mitigation Measures NOI-1a and NOI-1b are available to reduce this effect.

1 **Table 23-62. Land Use Affected by Equipment Noise from Construction of Conveyance and**
 2 **Associated Facilities, Alternative 4**

Location	Zoning	Daytime Threshold (60 dBA L _{eq} [1h])	Nighttime Threshold (50 dBA L _{max} [1h])
		Total Affected Parcels	Total Affected Parcels
Sacramento County – including River Road near the community of Hood; neighborhoods in the community of Hood; Lambert Road; Twin Cities Road.	Residential	120	121
	Natural/Recreational	10	29
	Agricultural/Other ^a	184	250
	Schools	None	None
Yolo County – including County Road E9 near the community of Clarksburg; neighborhoods in the community of Clarksburg.	Residential	10	95
	Natural/Recreational	1	5
	Agricultural/Other ^a	100	104
	Schools	None	Clarksburg Middle School, River Delta Community Day
San Joaquin County	Residential	8	18
	Natural/Recreational	4	10
	Agricultural/Other ^a	164	435
Contra Costa County	Agricultural/Other ^a	92	122
	Natural/Recreational	1	1
Alameda County	Agricultural/Other ^a	13	27

^a Includes agricultural or unclassified use that permits residential use.

3

4 ***Truck Trips and Worker Commutes***

5 Project-generated heavy trucks and worker commutes are predicted to result in increased traffic
 6 noise levels at noise-sensitive land uses adjacent to local roadways. Based on information provided
 7 by DWR as part of the cost estimate (see Appendix 22A), project-generated vehicle traffic volumes
 8 for the pipeline/tunnel conveyance alternative are predicted to have a maximum heavy truck
 9 composition of 41%, which was assumed to apply to any of the local roadways under a worst-case
 10 noise scenario. Future noise levels are shown in Table 23-63.

1 **Table 23-63. Predicted Future Traffic Noise Levels on Commuter Roads and Haul Routes, Alternative 4**

Roadway	Segment	Existing Noise Level, dBA	Future With-Project Noise Level, dBA	Noise Level Increase, dB	Substantial Increase?
Byron Hwy	Contra Costa Co./ Alameda Co. Line to Alameda Co./San Joaquin Co. Line	58	66	8	no
Brentwood Blvd	Delta Rd (Oakley City Limits) to Balfour Rd	61	67	6	no
Brentwood Blvd	Balfour Rd to Brentwood City Limits (South)	60	66	6	no
Balfour Rd	Brentwood Blvd to Brentwood City Limits	61	61	0	no
Bethel Island Rd	Oakley City Limits to End	55	55	0	no
Balfour Rd	Brentwood City Limits to Byron Hwy	54	54	0	no
Old SR 41	Brentwood City Limits (South) to Marsh Creek Rd	62	67	5	no
Byron Hwy	Delta Rd to Old SR 4	53	53	0	no
Byron Hwy	SR 4 to Contra Costa Co./ Alameda Co. Line	59	67	8	no
SR 160 (Freeport Blvd)	Sacramento City Limits to Freeport Bridge	59	67	8	no
SR 160 (Freeport Blvd/ River Rd)	Freeport Bridge to Scribner Rd	55	67	12	yes
SR 160	Scribner Rd to Hood Franklin Rd	53	66	13	yes
SR 160	Hood Franklin Rd to Lambert Rd	55	68	13	yes
SR 160	Lambert Rd to Paintersville Bridge	53	68	15	yes
SR 160 (Paintersville Bridge)	Sutter Slough Bridge Rd to SR 160 (River Rd)	53	68	15	yes
SR 160	Paintersville Bridge to Walnut Grove Bridge	53	68	15	yes
SR 160	Walnut Grove Bridge to A St (Isleton)	59	69	10	no
SR 160	A St (Isleton) to SR 12	58	69	11	no
SR 160	SR 12 to Brannan Island Rd	62	70	8	no
SR 84	West Sacramento City Limits to Courtland Rd	55	67	12	yes
SR 84 (Courtland Rd/ Ryer Ave)	Courtland Rd to Cache Slough Ferry	46	46	0	no
SR 12 EB	I-80 to Beck Ave	65	69	4	no
SR 12 WB	I-80 to Beck Ave	64	69	5	no
SR 12	Beck Ave to Sunset Ave/	68	72	4	no

Roadway	Segment	Existing Noise Level, dBA	Future With-Project Noise Level, dBA	Noise Level Increase, dB	Substantial Increase?
	Grizzly Island Rd				
SR 12	Sunset Ave/ Grizzly Island Rd to Walters Rd/	66	72	6	no
SR 12	Walters Rd/ to SR 113	63	71	8	no
SR 12	SR 113 to SR 84 (River Rd)	64	71	7	no
SR 12 (Rio Vista Bridge)	SR 84 (River Rd) to SR 160 (River Rd)	64	71	7	no
SR 12	SR 160 (River Rd) to Sacramento Co./ SJ Co. Line	62	65	3	no
SR 12	Sacramento Co./ SJ Co. Line to I-5	63	65	2	no
SR 113	I-80 to Dixon City Limits	64	69	5	no
SR 113	Dixon City Limits to SR 12	57	68	11	no
SR 4 (Marsh Creek Rd)	Vasco Rd to Byron Hwy	61	68	7	no
SR 4	Marsh Creek Rd to Discovery Bay Blvd	63	69	6	no
SR 4	Discovery Bay Blvd to Tracy Blvd	61	68	7	no
SR 4	Tracy Blvd to I-5	64	69	5	no
A St/4th St/ Jackson Blvd.	SR 160 to Isleton City Limits	48	48	0	no
Main Street (Old SR 4)	SR 160 to Cypress Rd	62	67	5	no
Main Street (Old SR 4)	Cypress Rd to Delta Rd (Oakley City Limits)	61	67	6	no
Cypress Rd	Main Street to Bethel Island Rd	58	58	0	no
Bethel Island Rd	Cypress Rd to Oakley City Limits	55	55	0	no
Delta Rd	Main Street to Byron Hwy	55	55	0	no
Pocket Rd	I-5 to Freeport Blvd	63	67	4	no
Freeport Blvd (Old SR 160)	Pocket Rd to Sacramento City Limits	56	65	9	no
Freeport Bridge	River Rd to SR 160 (Freeport Blvd)	55	55	0	no
Hood Franklin Rd	SR 160 (River Rd) to I-5	51	67	16	yes
Lambert Rd	SR 160 (River Rd) to Herzog Rd	44	66	22	yes
Lambert Rd	Herzog Rd to Franklin Blvd	46	66	20	yes
Franklin Blvd	Lambert Rd to Twin Cities Rd	48	48	0	no
Twin Cities Rd	River Rd to I-5	53	61	8	no
Twin Cities Rd	I-5 to Franklin Blvd	55	55	0	no
Sutter Slough Bridge	Sacramento Co./ Yolo Co. Line	50	66	16	yes

Roadway	Segment	Existing Noise Level, dBA	Future With-Project Noise Level, dBA	Noise Level Increase, dB	Substantial Increase?
Rd	to Paintersville Bridge				
River Rd	Paintersville Bridge to Twin Cities Rd	51	58	7	no
River Rd	Twin Cities Rd to Walnut Grove Bridge	55	61	6	no
Walnut Grove Rd/River Rd	Walnut Grove Bridge to Sacramento Co./ SJ Co. Line	55	61	6	no
Isleton Rd	River Rd (Walnut Grove)/Isleton Rd Bridge to 1.5 miles west of Isleton Rd Bridge	54	59	5	no
Race Track Rd/ Tyler Island Rd	Walnut Grove Rd to Southern End of Tyler Island	45	57	12	yes
Tyler Island Rd	Southern End of Tyler Island to SR 160 (River Rd)	46	46	0	no
Jackson Slough Rd	Isleton City Limits to SR 12	47	47	0	no
Jackson Slough Rd	Brannan Island Rd to SR 12	47	47	0	no
Walnut Grove Rd	Sacramento Co./ SJ Co. Line to I-5	53	61	8	no
Peltier Rd	Blossom Rd to I-5	44	44	0	no
Tracy Blvd	SR 4 to Clifton Court Rd	53	61	8	no
Tracy Blvd	Clifton Court Rd to Tracy City Limits	52	61	9	no
Byron Hwy	Alameda Co./San Joaquin Co. Line to Mountain House Pkwy	59	66	7	no
Mountain House Pkwy	Byron Hwy to Arnaudo Blvd	54	66	12	yes
Mountain House Pkwy	Arnaudo Blvd to I-205	58	66	8	no
Eight Mile Rd	Stockton City Limits to I-5	58	58	0	no
Tracy Blvd	Tracy City Limits to I-205	58	63	5	no
Harbor Blvd	Industrial Blvd to US 50	63	68	5	no
Industrial Blvd/ Lake Washington Blvd	Harbor Blvd to Jefferson Blvd	62	67	5	no
Jefferson Blvd (Old SR 84)	Lake Washington Blvd to Southport Pkwy	62	67	5	no
Jefferson Blvd (Old SR 84)	Southport Pkwy to West Sacramento City Limits	51	66	15	yes
River Rd	Freeport Bridge to Courtland Rd	54	54	0	no
River Rd	Courtland Rd to Sacramento Co./ Yolo Co. Line	48	66	18	yes
Courtland Rd	SR 84 to River Rd	48	66	18	yes

1 As shown in Table 23-63, predicted future traffic noise levels from project-generated worker
 2 commutes and truck trips would result in an increase of 12 dB or more compared to existing traffic
 3 noise levels along 16 project roadway segments.

4 During intake construction, segments of SR 160 between Freeport Bridge and Walnut Grove Bridge
 5 would be temporarily realigned around intake construction sites. As a result, future project noise
 6 levels would further increase at residences located near intake sites. Under Alternative 4, noise
 7 levels at receivers near realigned segments of SR 160 would increase by up to 3 dB in addition to the
 8 noise increase shown in Table 23-63.

9 The increase in noise levels would exceed the project threshold for traffic noise and would be
 10 considered adverse. Mitigation Measures NOI-1a and NOI-1b are available to address this effect.

11 **Construction of Power Transmission Lines**

12 Potential reasonable worst-case equipment noise levels from construction of the power
 13 transmission lines were evaluated by combining the noise levels of the three loudest pieces of
 14 equipment that would likely operate at the same time (an excavator, a truck and a drill rig for
 15 driving micropiles for construction of towers). Assuming 100% utilization within a given hour of
 16 day, the combined noise level is 91 dBA L_{eq} (1hr) at 50 feet. The estimated sound levels from
 17 construction as a function of distance based on calculated point-source attenuation over "soft" (i.e.,
 18 acoustically absorptive) ground are shown in Table 23-64.

19 **Table 23-64. Predicted Noise Levels from Construction of Transmission Lines**

Distance Between Source and Receiver (feet)	Calculated L_{eq} (1hr)/Nighttime L_{max} Sound Level (dBA)
50	91
100	83
200	75
400	67
600	63
800	60
1,000	57
1,200	55
1,400	53
1,800	50
2,000	49
3,000	44

Notes: Calculations are based on Federal Transit Administration 2006. Calculations do not include the effects, if any, of local shielding from walls, topography, or other barriers that may reduce sound levels further.

Bold denotes daytime (1hr) and nighttime (1hr) maximum noise thresholds.

L_{eq} (1 hour) = hourly-equivalent sound level (over 1 hour).

dBA = A-weighted decibel.

20
 21 The results shown in Table 23-64 indicate that noise-sensitive land uses within 800 feet of an active
 22 transmission line construction area could be exposed to construction noise in excess of the daytime

1 (7 a.m. to 10 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max}
2 would be exceeded at a distance of 1,800 feet from the construction area.

3 Noise-sensitive land uses that could potentially be exposed to adverse noise impacts due to
4 transmission line construction would extend outside the transmission line right-of-way within the
5 utility planning area. Several residential land uses are near the proposed transmission line
6 construction footprint. Likewise, Delta Elementary School and Delta High School on the west bank of
7 the Sacramento River are within half a mile of the proposed Intake 2 transmission lines. Although
8 there would be risk of increased noise levels, compared to the conveyance and associated
9 components, the duration of construction of transmission lines would be shorter-term. Noise
10 impacts would be intermittent and temporary, and would cease once construction work is complete.

11 Although this assessment includes daytime and nighttime construction noise estimates, construction
12 of the transmission lines would primarily occur during daylight hours. If nighttime construction of
13 the transmission lines were to occur, noise levels could be the same as those generated during
14 daytime hours.

15 The effect of exposing noise-sensitive land uses to noise increases above thresholds would be
16 adverse. Mitigation Measures NOI-1a and NOI-1b would be available to reduce this effect.

17 ***Earth-moving activities at offsite borrow/spoil areas***

18 Potential reasonable worst-case equipment noise levels from earth-moving activities at offsite
19 borrow/spoil areas were evaluated by combining the noise levels of the three loudest pieces of
20 equipment that would likely operate at the same time (an excavator, a truck and a bulldozer).
21 Assuming 100% utilization within a given hour of day, the combined noise level would be 91 dBA L_{eq}
22 (1hr) at 50 feet. The estimated sound levels from construction as a function of distance based on
23 calculated point-source attenuation over "soft" (i.e., acoustically absorptive) ground are shown in
24 Table 23-65.

25 The results shown in Table 23-65 indicate that noise-sensitive land uses within 800 feet of
26 equipment operating in the borrow/spoil area could be exposed to construction noise in excess of
27 the daytime (7 a.m. to 10 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50
28 dBA L_{max} would be exceeded at a distance of 1,800 feet from the area. Borrow/spoil areas are
29 located throughout the conveyance alignment and are generally adjacent to or in close proximity of
30 intake pumping plant sites, forebays, and main tunnel construction shafts. Noise-sensitive land uses
31 that could potentially be exposed to adverse noise impacts due to earth-moving activities in offsite
32 borrow/spoil areas would extend outside the borrow/spoil area right-of-way. The effect of exposing
33 these noise-sensitive land uses to noise increases above thresholds would be adverse. However,
34 with the exception of tunneling and RTM placement, most construction activities would occur
35 during daytime hours. Mitigation Measures NOI-1a and NOI-1b would be available to reduce this
36 effect.

1 **Table 23-65. Predicted Noise Levels from Earth-moving at offsite borrow/spoil areas**

Distance Between Source and Receiver (feet)	Calculated L_{eq} (1hr)/Nighttime L_{max} Sound Level (dBA)
50	91
100	83
200	75
400	67
600	63
800	60
1,000	57
1,200	55
1,400	53
1,800	50
2,000	49
3,000	44

Notes: Calculations are based on Federal Transit Administration 2006. Calculations do not include the effects, if any, of local shielding from walls, topography, or other barriers that may reduce sound levels further.

Bold denotes daytime (1hr) and nighttime (1hr) maximum noise thresholds.

L_{eq} (1 hour) = hourly-equivalent sound level (over 1 hour).

dBA = A-weighted decibel.

2

3 **Noise exposure to workers at construction sites**

4 Construction noise would affect workers on site. However, workers are subject to state and federal
5 Occupational Health and Safety (OSHA) standards. OSHA mitigation standards for noise limits
6 exposure are as follows: an 8-hour time-weighted average of 85 dBA or a dose of 50 percent are
7 referred to as OSHA action levels [29 CFR 1910.95(c)(2)]. Occupational exposure to noise levels in
8 excess of 85 dBA requires monitoring and mitigation to protect workers. Given that on-site workers
9 would be protected under OSHA requirements, no adverse impacts would occur to workers.

10 **CEQA Conclusion:** The impact of exposing noise-sensitive land uses during construction to noise
11 levels above the 60 dBA L_{eq} (1hr) daytime, the 50 dBA L_{max} nighttime, or the 12 dB traffic noise
12 increase threshold would be considered significant. Based on reasonable worst-case modeling, the
13 following significant impacts are expected as a result of Alternative 4 construction.

- 14 • **Intakes:** Sensitive receptors within 1,400 feet of an active intake construction site could be
15 exposed to construction noise in excess of the 60 dBA L_{eq} (1hr) daytime threshold. The
16 nighttime threshold of 50 dBA L_{max} would be exceeded at a distance of 2,800 feet. As shown in
17 Table 23-61, 130 residential parcels, 3 natural/recreational parcels, and 205 agricultural parcels
18 would be affected by daytime noise levels in excess of this threshold during construction. The
19 nighttime threshold would be exceeded at 191 residential parcels, 7 natural/recreational
20 parcels, 224 agricultural parcels, and 1 school.
- 21 • **Conveyance and Associated Facilities:** Sensitive receptors within 1,200 feet of an active
22 tunnel work area could be exposed to construction noise in excess of the daytime (7 a.m. to 10
23 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be
24 exceeded at a distance of 2,800 feet. As shown in Table 23-62, 138 residential parcels, 15

1 natural/recreational parcels, and 553 agricultural parcels would be affected by daytime noise
 2 levels in excess of this threshold during construction. The nighttime threshold would be
 3 exceeded at 234 residential parcels, 45 natural/recreational parcels, 938 agricultural parcels,
 4 and 2 schools.

- 5 • **Truck Trips and Worker Commutes:** Traffic noise from truck trips and worker commutes
 6 would result in an increase of 12 dB or more compared to existing traffic noise levels at
 7 residences and outdoor use areas along 16 project roadway segments in the study area as
 8 shown in Table 23-63. The increase in noise levels would be substantial and exceed the project
 9 threshold for traffic noise.
- 10 • **Power Transmission Lines:** Sensitive receptors within 800 feet of an active transmission line
 11 construction area could be exposed to construction noise in excess of the daytime (7 a.m. to 10
 12 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be
 13 exceeded at a distance of 1,800 feet from the construction area. As noted above, several
 14 residential land uses are near the proposed transmission line construction footprint. Likewise,
 15 Delta Elementary School and Delta High School on the west bank of the Sacramento River are
 16 within half a mile of the proposed Intake 2 transmission lines.
- 17 • **Borrow/spoil areas:** Sensitive receptors within 800 feet of equipment operating in the
 18 borrow/spoil area could be exposed to construction noise in excess of the daytime (7 a.m. to 10
 19 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be
 20 exceeded at a distance of 1,800 feet from the area. Borrow/spoil areas are located throughout
 21 the conveyance alignment and are generally adjacent to or in close proximity of intake pumping
 22 plant sites, forebays, and main tunnel construction shafts.

23 Mitigation Measures NOI-1a and NOI-1b would reduce noise impacts to sensitive land uses.
 24 Although implementation of these measures will reduce the impact, it is not anticipated that feasible
 25 measures will be available in all situations to reduce construction noise to levels below the
 26 applicable thresholds. This impact would therefore be significant and unavoidable.

27 **Mitigation Measure NOI-1a: Employ Noise-Reducing Construction Practices during** 28 **Construction**

29 During construction, BDCP proponents will employ best practices to reduce construction noise
 30 at noise-sensitive land uses. Implementation of this measure will ensure that construction noise
 31 levels, as applicable, do not exceed 60 dBA (one-hour L_{eq}) during daytime hours (7:00 a.m. to
 32 10:00 p.m.) and 50 dBA (single-event maximum) during nighttime hours (10:00 p.m. to 7:00
 33 a.m.).

34 Measures used to limit construction noise include the following:

- 35 • Limiting above-ground noise-generating construction operations to the hours between 7
 36 a.m. and 6 p.m. Monday through Friday, and between 8 a.m. and 5 p.m. on Saturdays.
- 37 • Locating stationary equipment (e.g., generators, compressors, rock crushers, cement mixers,
 38 idling trucks) as far as possible from noise-sensitive land uses.
- 39 • Prohibiting gasoline or diesel engines from having unmuffled exhaust.
- 40 • Requiring that all construction equipment powered by gasoline or diesel engines have
 41 sound-control devices that are at least as effective as those originally provided by the

1 manufacturer and that all equipment be operated and maintained to minimize noise
2 generation.

- 3 • Preventing excessive noise by shutting down idle vehicles or equipment.
- 4 • Using noise-reducing enclosures around noise-generating equipment.
- 5 • Selecting haul routes that affect the fewest number of people.
- 6 • Constructing barriers between noise sources and noise-sensitive land uses or take
7 advantage of existing barrier features (e.g., terrain, structures) to block sound transmission
8 to noise-sensitive land uses. The barriers shall be designed to obstruct the line of sight
9 between the noise-sensitive land use and on-site construction equipment.

10 **Mitigation Measure NOI-1b: Prior to Construction, Initiate a Complaint/Response**
11 **Tracking Program**

12 Prior to construction, BDCP proponents will make a construction schedule available to residents
13 living in the vicinity of the construction areas before construction begins, and designate a noise
14 disturbance coordinator. The coordinator will be responsible for responding to complaints
15 regarding construction noise, will determine the cause of the complaint, and will ensure that
16 reasonable measures are implemented to correct the problem when feasible. A contact
17 telephone number for the noise disturbance coordinator will be conspicuously posted on
18 construction site fences and will be included in the notification of the construction schedule.

19 **Impact NOI-2: Exposure of Sensitive Receptors to Vibration or Groundborne Noise from**
20 **Construction of Water Conveyance Facilities**

21 **NEPA Effects:** Construction at the intake sites would involve use of impact pile driving and drilled
22 piles, and tunnel construction would involve the use of TBMs and tunnel locomotives, both of which
23 would cause groundborne vibration in localized areas. Groundborne vibrations from pile driving at
24 intake sites and barge loading facilities would be intermittent, and temporary, occurring over a two
25 month period during the in-river work period (June 1 to October 31). All pile driving activities will
26 cease after construction is complete. During tunnel construction, groundborne noise due to
27 vibrations from tunnel locomotive passbys and TBMs could occur intermittently where tunnels are
28 located under or near residential areas.

29 ***Pile Driving at Intake Sites***

30 Construction of the intakes would involve driving sheet piles within the intake rights-of-way. Use of
31 impact piles would cause groundborne vibrations to exceed the threshold of 0.2 in/sec PPV at
32 residential buildings within 70 feet of pile driving sites, as shown in Table 23-66.

1 **Table 23-66. Predicted Vibration Levels from Construction Activities—Impact Pile Driving at Intake**
 2 **Structures**

Distance Between Source and Receiver (feet)	Calculated Peak Particle Velocity (in/sec PPV)
50	0.3004
60	0.2458
70	0.2075
75	0.1923
80	0.1792
90	0.1574
100	0.1402
150	0.0897

Note: Calculations are based on Federal Transit Administration 2006 and California Department of Transportation Vibration Guidance Manual 2004. Assumes ground type n value of 1.1.
 PPV = peak particle velocity.

3
 4 Groundborne vibration from impact pile driving is predicted to exceed vibration thresholds at
 5 nearby residences in the areas shown in Table 23-67. While groundborne vibration levels in excess
 6 of 0.2 in/sec PPV could occur at any of these residences, the highest vibration levels are expected at
 7 those residences nearest to the intake work areas. Construction of intakes and barge unloading
 8 facilities would result in excessive groundborne vibration levels at these nearby residential
 9 structures. The effect of exposing sensitive receptors to groundborne vibration would be adverse.
 10 Mitigation Measure NOI-2 is available to reduce this effect.

11 **Table 23-67. Land Use Affected By Vibrations From Pile Driving During Construction Of Intakes,**
 12 **Alternative 4**

Location	Zoning	Total Affected Parcels
Sacramento County – including River Road near the community of Hood; Neighborhoods in the community of Hood	Residential ^a	78
San Joaquin County	Residential ^a	4

^a Includes agricultural or unclassified use that permits residential use.

14 **Construction of Water Conveyance (Tunnel)**

15 The use of tunneling equipment during construction would cause groundborne vibration and
 16 potentially groundborne noise within buildings in the vicinity of tunnel construction areas.
 17 Vibration sources include the TBM and locomotives moving soil, equipment, and construction
 18 workers between tunnel shaft sites. As discussed in Chapter 3, *Description of Alternatives*, the typical
 19 depth of tunnel installation would be approximately 100 feet below msl, but could be up to 160 feet
 20 below msl depending on site conditions. This analysis uses a conservative worst-case assumption of
 21 60 feet below msl despite the fact that all proposed Delta tunnels will be constructed with a
 22 minimum of 100 feet of soil (soft ground) cover.

23 Groundborne vibration levels from operation of the TBM and tunnel locomotives are described
 24 below. Sensitive receptors that may be exposed to increased groundborne vibration include
 25 residences, outdoor parks, schools, and agriculture areas. As shown in Table 23-19, there are a
 26 number of potentially affected parcels within 1,200 feet of the tunnel conveyance. However, at a 60-
 27 foot tunnel depth, groundborne vibrations from the TBM are estimated to be 0.008 in/sec PPV,

1 which is below the threshold of 0.04 in/sec PPV.² As demonstrated by measured ground vibration
 2 data from modern tunneling projects, the deep soil cover will effectively dampen, and absorb
 3 propagated energy.

4 During tunnel construction, passbys from locomotives hauling workers and material inside of the
 5 tunnel would produce localized groundborne vibration that could manifest as noise inside of
 6 buildings. However, as described in Section 23.4.2, *Determination of Effects*, tunnel locomotives
 7 would be operated at slow speeds inside of tunnels and would not result in excessive vibrations.
 8 Groundborne noise from tunnel locomotive operation during construction is therefore not predicted
 9 to exceed groundborne noise thresholds or result in an adverse noise impact to sensitive receptors
 10 along the tunnel conveyance.

11 The potential for tunneling induced ground vibration effects will be thoroughly analyzed in the
 12 preliminary and final design phases of the project, using site-specific geotechnical data and the
 13 expected TBM configuration. Potential effects on surface structures and human perception will be
 14 evaluated in detail during preliminary design. As additional precautions, and where necessary, a
 15 ground vibration monitoring program using seismographs and other high-precision equipment will
 16 be implemented during construction to ensure ground vibration is within the required contract
 17 limits.

18 **CEQA Conclusion:** Groundborne vibrations during tunneling would not exceed 0.008 in/sec PPV at
 19 60-foot tunnel depth and would therefore be less than significant. Likewise, locomotives are not
 20 expected to generate significant noise levels because they will travel at low speeds between 5 and
 21 10 miles per hour. However, the impact of exposing residential structures to groundborne vibration
 22 during intake construction would be significant as reasonable worst-case modeling indicates that up
 23 to 82 residential parcels could be exposed to vibration levels in excess of 0.2 in/sec PPV during
 24 intake pile driving (see Table 23-67). Although Mitigation Measure NOI-2 will reduce the impact, it
 25 is not anticipated that feasible measures will be available in all situations to reduce vibration to
 26 levels below the applicable thresholds. This impact would therefore be considered significant and
 27 unavoidable.

28 **Mitigation Measure NOI-2: Employ Vibration-Reducing Construction Practices during**
 29 **Construction of Water Conveyance Facilities**

30 During construction, BDCP proponents will implement vibration-reducing construction
 31 practices such that vibration from pile driving does not exceed 0.2 in/sec PPV at nearby
 32 residences.

33 The BDCP proponents shall ensure that the following measures are implemented to reduce
 34 adverse effects and/or significant effects as described above if the measures are applicable and
 35 feasible. Not all measures listed below may be feasible or applicable to all contractors. Rather,
 36 these measures serve as an overlying mitigation framework to be used for specific construction
 37 practices. The applicability of measures listed below would vary based on the location, timing,
 38 nature, and feasibility of each activity.

² A case study of a similar tunneling project (the New Crystal Springs Bypass Tunnel Project) shows that in a tunneling project which took place 60-155 feet below ground surface in an urban residential neighborhood more heavily populated than any of the BDCP alternatives, the groundborne vibration did not exceed 0.032 in/sec PPV during the daytime hours of 7 am to 6 pm, or 0.016 in/sec PPV during the nighttime hours of 6 pm to 7 am and was indistinguishable from the surrounding noise. (Wilson et al., 2011)

- 1 • Locating equipment as far as practical from vibration-sensitive (and noise-sensitive) land
- 2 uses (at least 100 feet)
- 3 • Use of alternative pile driving methods such as vibratory driving, hydraulic press-in driving,
- 4 or use of pre-drilled pile holes.

5 Depending on the equipment selected, the measures identified above can reduce vibration from
 6 pile driving to below 0.2 in/sec PPV at nearby residences. The specific noise reduction cannot be
 7 currently quantified since the actual equipment to be used is unknown and that the contractor
 8 may have alternative ways to achieve the performance limit. If the above measures are
 9 determined feasible, BDCP proponents will retain a qualified acoustical consultant or
 10 engineering firm to conduct vibration monitoring at potentially affected buildings to measure
 11 the actual vibration levels during construction and ensure vibration from pile driving does not
 12 exceed 0.2 in/sec PPV.

13 For cases where the above measures are not feasible, the resident or property owner will be
 14 notified in writing prior to construction activity that construction may occur within 100 feet of
 15 their building. A representative for the BDCP proponents will inspect the potentially affected
 16 buildings prior to construction to inventory existing cracks in paint, plaster, concrete, and other
 17 building elements. BDCP proponents will retain a qualified acoustical consultant or engineering
 18 firm to conduct vibration monitoring at potentially affected buildings to measure the actual
 19 vibration levels during construction. Following completion of construction, a representative for
 20 the BDCP proponents will conduct a second inspection to inventory changes in existing cracks
 21 and new cracks or damage, if any, that occurred as a result of construction-induced vibration. If
 22 new damage is found, then the BDCP proponents will promptly arrange to have the damage
 23 repaired, or will reimburse the property owner for appropriate repairs.

24 In addition, if construction activity is required within 100 feet of residences or other vibration-
 25 sensitive buildings, a designated complaint coordinator will be responsible for handling and
 26 responding to any complaints received during such periods of construction. A reporting
 27 program will be required that documents complaints received, actions taken, and the
 28 effectiveness of these actions in resolving disputes.

29 **Impact NOI-3: Exposure of Noise-Sensitive Land Uses to Noise from Operation of Water** 30 **Conveyance Facilities**

31 NEPA Effects: Potential reasonable worst-case pump noise levels during operation of the intake
 32 structures were evaluated by calculating sound power levels of the pump based on horsepower
 33 (Hoover and Keith 2000). Faceplate horsepower for vertical column and vertical volute type pumps
 34 is specified in pump selection appendix of the Conceptual Engineering Report. Pump specifications
 35 are shown in Table 23-68. Combined source noise levels assume that pump enclosures (including
 36 buildings) provide a nominal 15 dB of noise attenuation. This analysis assumes that pumps are
 37 operating 24 hours a day.

1 **Table 23-68. Pump Specifications—Alternative 4**

Pump Location	Quantity	Pumping Plant Capacity (cfs)	Pump Horsepower	Individual Pump Source Level (dBA)	Combined Source Level (dBA)	Assumed Attenuation (dB)	Combined Source Level with Attenuation (dBA)
Intake 2	6	3,000	4,500	97	104	15	89
Intake 3	6	3,000	3,500	96	102	15	88
Intake 5	6	3,000	3,500	96	102	15	88

cfs = cubic feet per second.
dB = decibels.
dBA = A-weighted sound level in decibels.

2

3 The estimated sound levels from pump operation as a function of distance based on calculated
4 point-source attenuation over “soft” (i.e., acoustically absorptive) ground are shown in Table 23-69.

5 **Table 23-69. Predicted Noise Levels from Pump Operation, Intakes, Alternative 4**

Distance Between Source and Receiver (Feet)	Intake 2 Calculated L_{eq} Sound Level (dBA)	Intakes 3 and 5 Calculated L_{eq} Sound Level (dBA)
50	89	88
100	82	80
200	74	72
300	69	68
400	66	65
600	61	60
800	58	57
1,000	55	54
1,200	53	52
1,400	52	50
1,600	50	49
2,000	47	46
2,200	46	45
2,600	45	43
3,600	41	40
5,000	37	36
6,000	35	34
7,000	33	32

Notes: Calculations are based on Federal Transit Administration 2006. Calculation do not include the effects, if any, of local shielding from walls, topography, or other barriers that may reduce sound levels further.

Noise levels assume a nominal pump enclosure attenuation of 15 dB.

Bold denotes daytime and nighttime maximum noise thresholds.

dBA = A-weighted sound level in decibels.

6

7 The results shown in Table 23-69 indicate that operating noise from intake pumping plants would
8 exceed the nighttime threshold of 45 dBA at noise-sensitive land uses within a distance of up to
9 2,600 feet from intake pumping plant locations. Noise from operation of intake pumping plants is
10 predicted to exceed daytime and nighttime noise thresholds at nearby residences and outdoor parks
11 in areas indicated in Table 23-70.

1 **Table 23-70. Land Use Affected by Noise from Operation of Pumping Plants, Alternative 4**

Location	Zoning	50 dBA L_{eq} Daytime	45 dBA L_{eq} Nighttime
		Operations Threshold	Operations Threshold
		Total Affected Parcels	Total Affected Parcels
Sacramento County – including River Road near the community of Hood; neighborhoods in the community of Hood; Lambert Road; Vorden Road.	Natural/Recreational	1	1
	Agricultural/Other ^a	27	38
Yolo County – including County Road E9 near the community of Clarksburg; neighborhoods in the community of Clarksburg.	Agricultural/Other ^a	43	72

^a Includes agricultural or unclassified use that permits residential use.

2

3 Operation of water conveyance facilities could result in increases in noise levels affecting nearby
4 communities and residences. While operating noise levels in excess of applicable thresholds could
5 occur throughout the affected area, the highest noise levels are expected at those land uses most
6 adjacent to the pumping plants. The effect of exposing noise-sensitive land uses to noise increases
7 above thresholds would be adverse. Mitigation Measure NOI-3 is available to reduce this effect.

8 ***Noise exposure to workers at conveyance facilities***

9 Noise from operation of conveyance facilities would affect workers on site. However, workers are
10 subject to state and federal Occupational Health and Safety (OSHA) standards. OSHA mitigation
11 standards for noise limits exposure are as follows: an 8-hour time-weighted average of 85 dBA or a
12 dose of 50 percent are referred to as OSHA action levels [29 CFR 1910.95(c)(2)]. Occupational
13 exposure to noise levels in excess of 85 dBA requires monitoring and mitigation to protect workers.
14 Given that on-site workers would be protected under OSHA requirements, no adverse impacts
15 would occur to workers.

16 ***CEQA Conclusion:*** The impact of exposing noise-sensitive land uses during pumping plant
17 operations to noise levels above the daytime (50 dBA L_{max}) or nighttime (45 dBA L_{max}) noise
18 thresholds would be considered significant. Based on reasonable worst-case modeling, 70
19 agricultural parcels would be affected by daytime noise levels in excess of the operational threshold.
20 The nighttime threshold would be exceeded at 110 agricultural parcels (see Table 23-70). The
21 impact of exposing these receptors to noise increases above thresholds would be significant.
22 Mitigation Measure NOI-3 would reduce operational noise levels below applicable thresholds, thus
23 resulting in a less-than-significant level.

1 **Mitigation Measure NOI-3: Design and Construct Intake Facilities and Other Pump**
 2 **Facilities Such That Operational Noise Does Not Exceed 50 dBA (One-Hour L_{eq}) during**
 3 **Daytime Hours (7:00 A.M. to 10:00 P.M.) or 45 dBA (One-Hour L_{eq}) during Nighttime**
 4 **Hours (10:00 P.M. to 7:00 A.M.) or the Applicable Local Noise Standard (Whichever Is**
 5 **Less) at Nearby Noise Sensitive Land Uses**

6 BDCP proponents will retain a qualified acoustical consultant to design acoustical treatments for
 7 the intake facilities and other pump facilities. Implementation of this measure will ensure that
 8 operational noise levels, as applicable, do not exceed 50 dBA (one-hour L_{eq}) during daytime
 9 hours (7:00 a.m. to 10:00 p.m.) or 45 dBA (one-hour L_{eq}) during nighttime hours (10:00 p.m. to
 10 7:00 a.m.) or the applicable local noise standard (whichever is less) at nearby noise-sensitive
 11 land uses. Measures that can be implemented to achieve this include but are not limited to:

- 12 • enclosing all pumps, motors, and other noise-generating equipment in solid wall structures;
- 13 • limiting openings in the enclosing structure and installing acoustic ventilation louvers
 14 where ventilation openings are required,
- 15 • installing acoustic access doors and wall panels,
- 16 • using low-noise motors,
- 17 • using low noise transformers,
- 18 • placing sound barriers (earth berms or constructed barriers) around noise sources

19 Verification noise monitoring will be conducted at each operational intake or pump location to
 20 confirm that acoustical treatments reduce operational noise to comply with the applicable noise
 21 standard. If noise is not in compliance with the applicable standard, BDCP proponents will
 22 implement additional necessary treatments until compliance is achieved.

23 **Impact NOI-4: Exposure of Noise-Sensitive Land Uses to Noise from Implementation of**
 24 **Proposed Conservation Measures 2-10**

25 **NEPA Effects:** Implementation of CM2 and CM3–CM10 could generate increases in noise related to
 26 restoration or enhancement activities. Habitat restoration and enhancement conservation measures
 27 are anticipated to require use of noise-generating equipment during construction and maintenance:

- 28 • Grading, excavation, and placement of fill material.
- 29 • Breaching, modification, or removal of existing levees, and construction of new levees.
- 30 • Modification, demolition, and removal of existing infrastructure (e.g., buildings, roads, fences,
 31 electric transmission and gas lines, irrigation infrastructure).
- 32 • Construction of new infrastructure (e.g., buildings, roads, fences, electric transmission and gas
 33 lines, irrigation infrastructure).
- 34 • Removal of existing vegetation and planting/seeding of vegetation.
- 35 • Levee maintenance.
- 36 • Mowing, burning, and trimming to manage vegetation.

37 Because the specific areas for implementing these conservation measures have not been
 38 determined, this effect is evaluated qualitatively.

- 1 • Yolo Bypass Fishery Enhancement (CM2). Noise-generating activities from enhancement
 2 activities in the Yolo Bypass would include use of construction vehicles and equipment for
 3 modifying or installing new facilities, or changes in operation of existing facilities, including the
 4 following.
- 5 ○ Installing fish ladders and experimental ramps at Fremont Weir or widening the existing
 6 fish ladder.
 - 7 ○ Installing fish screens on small Yolo Bypass diversions.
 - 8 ○ Constructing new or replacement operable check-structures at Tule Canal/Toe Drain.
 - 9 ○ Replacing the Lisbon Weir with a fish-passable gate structure.
 - 10 ○ Realigning Lower Putah Creek.
 - 11 ○ Increasing operation of upstream unscreened pumps.
 - 12 ○ Installing operable gates at Freemont Weir.
 - 13 ○ Constructing physical barriers in the Sacramento River.
 - 14 ○ Constructing associated support facilities (operations buildings, parking lots, access
 15 facilities such as roads and bridges).
 - 16 ○ Improving levees adjacent to the Fremont Weir Wildlife Area.
 - 17 ○ Replacing agricultural crossings of the Tule Canal/Toe Drain with fish-passable structures
 18 such as flat car bridges, earthen crossings with large, open culverts.
 - 19 ○ Grading, removal of existing berms, levees, and water control structures, construction of
 20 berms or levees, re-working of agricultural delivery channels, and earthwork or
 21 construction of structures to reduce Tule Canal/Toe Drain channel capacities.
- 22 • Tidal Habitat Restoration (CM4). Restoration of freshwater tidal habitat in the Cache Slough,
 23 Cosumnes/Mokelumne, West Delta, South Delta, and Suisun Marsh ROAs would require
 24 breaching and lowering of levees, installing new or modified levees to protect adjacent areas
 25 from flooding, connecting remnant sloughs or channels to improve circulation, and modifying
 26 ground elevations to reduce impacts of subsidence. Noise-generating activities would include
 27 use of construction vehicles and equipment for the following activities.
- 28 ○ Construction site preparation could require clearing and grubbing, demolition of existing
 29 structures, surface water quality protection, dust control, establishment of storage areas and
 30 stockpile areas, temporary utilities and fuel storage, and erosion control.
 - 31 ○ Earthwork activities for development of the restoration habitat areas could include the
 32 construction activities described below on the landside and waterside of existing levees in
 33 areas that would be selected for tidal habitat restoration.
- 34 • Seasonally Inundated Floodplain Restoration (CM5). Seasonally inundated floodplain habitat
 35 would be restored within the north, east, and/or south Delta. Noise-generating activities would
 36 include use of construction vehicles and equipment for modifying or installing new facilities, or
 37 changes in operation of existing facilities, including the following activities.
- 38 ○ Site preparation could require clearing and grubbing, demolition of existing structures,
 39 surface water quality protection, dust control, establishment of storage areas and stockpile
 40 areas, temporary utilities and fuel storage, and erosion control.

- 1 ○ Earthwork activities for development of the seasonally inundated floodplains could include
2 setting back levees, removal of existing levees, removal of riprap to allow for channel
3 meander between the setback levees, grading to restore drainage patterns and increase
4 inundation frequency and duration, and establishment of riparian habitat.
- 5 ● Channel Margin Habitat Enhancement (CM6). Channel margin habitat would be enhanced on the
6 Sacramento River between Freeport and Walnut Grove, the San Joaquin River between Vernalis
7 and Mossdale, Steamboat and Sutter Sloughs, and the North and South Forks of the Mokelumne
8 River. Noise-generating activities would include use of construction vehicles and equipment for
9 the following activities.
- 10 ○ Site preparation could require clearing and grubbing, demolition of existing structures,
11 surface water quality protection, dust control, establishment of storage areas and stockpile
12 areas, temporary utilities and fuel storage, and erosion control.
- 13 ○ Earthwork activities for development of the channel margin habitat areas could include
14 modification of levees or setting back levees. Riprap would be removed where levees are set
15 back and channel geometry would be modified in unconfined channel reaches or along
16 channels where levees are set back.
- 17 ● Riparian Habitat Restoration (CM7). Riparian habitat restoration in Cosumnes/Mokelumne,
18 east, west, and south Delta areas would require site preparation and earthwork using noise-
19 generating construction vehicles and equipment for the following activities.
- 20 ○ Clearing and grubbing, demolition of existing structures, surface water quality protection,
21 dust control, establishment of storage areas and stockpile areas, temporary utilities and fuel
22 storage, and erosion control.
- 23 ○ Removal of riprap, minor landform modifications to restore water circulation, planting of
24 riparian vegetation, irrigation and maintenance of plantings, and control of nonnative
25 species.
- 26 ● Grassland Communities Restoration (CM8). Restoration of grassland habitat would require
27 sowing native species using a variety of techniques (e.g., seed drilling, native hay spreading,
28 plugs). Noise-generating activities would include use of construction vehicles and equipment for
29 reseeding and for recontouring graded land.
- 30 ● Vernal Pool Complex Restoration (CM9). Vernal pool complex restoration could require use of
31 noise-generating construction vehicles and equipment to excavate or recontour historical vernal
32 pools and swales to natural bathymetry.
- 33 ● Nontidal Marsh Restoration (CM10). Nontidal wetlands restoration could include the use of
34 noise-generating construction vehicles and equipment for site preparation, planting of native
35 marsh vegetation, and maintenance of plantings, including grading to establish an elevational
36 gradient to support both open water perennial aquatic habitat intermixed with shallower marsh
37 habitat.

38 The effect would vary according to the type of construction equipment and techniques used in
39 construction of the specific conservation measure, the location and timing of the actions called for in
40 the conservation measure, and the noise environment at the time of implementation. However, the
41 noise levels from these activities are expected to be similar to those shown in Table 23-15 because
42 similar types of equipment will be used. The results shown in Table 23-16 indicate that residences
43 within 1,200 feet of an active restoration work area could be exposed to construction noise in excess

1 of the daytime (7 a.m. to 10 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50
2 dBA L_{max} would be exceeded within a distance of 2,800 feet.

3 The effect of exposing sensitive land uses to increases in construction noise levels above thresholds
4 would be adverse. Mitigation Measures NOI-1a and NOI-1b are available to reduce this effect.

5 **CEQA Conclusion:** The impact of exposing noise-sensitive land uses during construction to noise
6 increases above the daytime (60 dBA L_{eq}) and nighttime (50 dBA L_{max}) thresholds would be
7 significant. Noise levels during implementation of these conservation measures are expected to vary
8 according to the type of construction equipment and techniques used, but are likely to be similar to
9 noise levels shown in Table 23-59. The results shown in Table 23-59 indicate that residences within
10 1,200 feet of an active restoration work area could be exposed to construction noise in excess of the
11 daytime (7 a.m. to 10 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA
12 L_{max} would be exceeded within a distance of 2,800 feet. The impact of exposing these receptors to
13 noise increases above thresholds would be significant. Although Mitigation Measures NOI-1a and
14 NOI-1b will reduce the impact, it is not anticipated that feasible measures will be available in all
15 situations to reduce construction noise to levels below the applicable thresholds. This impact would
16 therefore be considered significant and unavoidable.

17 **Mitigation Measure NOI-1a: Employ Noise-Reducing Construction Practices during**
18 **Construction**

19 Please see Mitigation Measure NOI-1a under Impact NOI-1.

20 **Mitigation Measure NOI-1b: Prior to Construction, Initiate a Complaint/Response**
21 **Tracking Program**

22 Please see Mitigation Measure NOI-1b under Impact NOI-1.

23 **23.3.3.10 Alternative 5—Dual Conveyance with Pipeline/Tunnel and**
24 **Intake 1 (3,000 cfs; Operational Scenario C)**

25 One intake would be constructed on the east bank of the Sacramento River under Alternative 5.
26 Alternative 5 would also construct an intermediate forebay; the conveyance would be a buried
27 pipeline (see Figures 3-2 and 3-12 in Chapter 3, *Description of Alternatives*).

28 **Impact NOI-1: Exposure of Noise-Sensitive Land Uses to Noise from Construction of Water**
29 **Conveyance Facilities**

30 **NEPA Effects:**

31 **Construction of Intakes**

32 Potential reasonable worst-case equipment noise levels from construction of intakes would be
33 comparable to those listed for the intake sites in Table 23-17. The results shown in Table 23-17
34 indicate that during periods of pile driving, residences located within 1,400 feet of the active intake
35 construction site could be exposed to construction noise in excess of the DWR daytime (7 a.m. to 10
36 p.m.) maximum noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would
37 be exceeded at a distance of 2,800 feet from an active intake construction site.

1 While equipment could operate at any work area identified for this alternative, the highest noise
 2 levels are expected to occur at those sites where the duration and intensity of construction activities
 3 would be greatest. The work areas for construction of intake 1 would extend through several
 4 residential areas and communities located near the Sacramento River. Noise from intake
 5 construction activities is predicted to exceed daytime and nighttime noise thresholds at nearby
 6 residences and outdoor parks in areas indicated in Table 23-71.

7 Although this assessment includes daytime and nighttime construction noise estimates, construction
 8 of the intakes would primarily occur during daytime hours. If nighttime construction of the intakes
 9 were to occur, noise levels could be the same as that generated during daytime hours.

10 The effect of exposing these noise-sensitive land uses to noise increases above thresholds would be
 11 adverse. Mitigation Measures NOI-1a and NOI-1b would be available to reduce this effect.

12 **Table 23-71. Land Use Affected by Equipment Noise from Construction of Intakes, Alternative 5**

Location	Zoning	Daytime Threshold	Nighttime Threshold
		(60 dBA L_{eq} [1h])	(50 dBA L_{max} [1h])
		Total Affected Parcels	Total Affected Parcels
Sacramento County – including River Road near the community of Hood.	Natural/Recreational	0	3
	Agricultural/Other ^a	28	59
	Schools	None	None
Yolo County – including County Road E9 near the community of Clarksburg.	Agricultural/Other ^a	49	72
	Schools	None	None

^a Includes agricultural or unclassified use that permits residential use.

13
 14 ***Construction of Conveyance (Tunnel), Forebays, Barge Unloading Facilities, and Intermediate Pumping***
 15 ***Plant***

16 Construction of the conveyance under Alternative 5 would be similar to Alternative 1A. Noise from
 17 construction activities is predicted to exceed daytime and nighttime noise thresholds at nearby
 18 residences, schools and outdoor parks indicated in Table 23-19 (see Impact NOI-1 in Alternative
 19 1A). While equipment could operate at any work area identified for this alternative, the highest
 20 noise levels are expected to occur at those sites where the duration and intensity of construction
 21 activities would be greatest. This includes all construction sites along the tunnel conveyance
 22 alignment, as well as at the site of the Byron Tract Forebay adjacent to and south of Clifton Court
 23 Forebay. For a map of the proposed pipeline/tunnel alignment, see Mapbook Figure M3-1.

24 Although this assessment includes daytime and nighttime construction noise estimates for the
 25 forebays, barge unloading facilities, intermediate pumping plant, and conveyance tunnels,
 26 construction of the forebays, barge unloading facilities, and intermediate pumping plant would
 27 primarily occur during daytime hours. If nighttime construction of the forebays, barge unloading
 28 facilities, and intermediate pumping plant were to occur, noise levels could be the same as those
 29 generated during daytime hours. Construction of the conveyance tunnels and RTM storage actions
 30 would occur on a 24-hour basis.

31 The effect of exposing these noise-sensitive land uses to noise increases above thresholds would be
 32 adverse. Mitigation Measures NOI-1a and NOI-1b would be available to reduce this effect.

1 **Truck Trips and Worker Commutes**

2 The estimate of truck trips and worker commutes under Alternative 5 would be similar to
3 Alternative 1A. Traffic noise from truck trips and worker commutes would result in an increase of
4 12 dB or more compared to existing traffic noise levels at residences and outdoor use areas along 16
5 project roadway segments in the study area as shown in Table 23-20.

6 During intake construction, segments of SR 160 between Freeport Bridge and Walnut Grove Bridge
7 would be temporarily realigned around intake construction sites. As a result, future project noise
8 levels would further increase at residences located near intake sites. Under Alternative 5, noise
9 levels at receivers near realigned segments of SR 160 would increase by up to 6 dB in addition to the
10 noise increase shown in Table 23-20.

11 The increase in noise levels would exceed the project threshold for traffic noise and would be
12 considered adverse. Mitigation Measures NOI-1a and NOI-1b are available to address this effect.

13 **Construction of Power Transmission Lines**

14 Noise from construction of power transmission lines for Alternative 5 is the same as Alternative 1A.
15 The results shown in Table 23-21 (see Impact NOI-1 in Alternative 1A) indicate that noise-sensitive
16 land uses within 800 feet of an active transmission line construction area could be exposed to
17 construction noise in excess of the daytime (7 a.m. to 10 p.m.) noise threshold of 60 dBA L_{eq} (1hr).
18 The nighttime threshold of 50 dBA L_{max} would be exceeded at a distance of 1,800 feet from the
19 construction area. Several residential land uses are near the proposed transmission line
20 construction footprint. Likewise, Delta Elementary School and Delta High School on the west bank of
21 the Sacramento River are within half a mile of the proposed Intake 2 transmission lines. Although
22 this assessment includes daytime and nighttime construction noise estimates, construction of the
23 transmission lines would primarily occur during daylight hours. If nighttime construction of the
24 transmission lines were to occur, noise levels could be the same as those generated during daytime
25 hours. The effect of exposing noise-sensitive land uses to noise increases above thresholds would be
26 adverse. Mitigation Measures NOI-1a and NOI-1b are available to address this effect.

27 **Earth-moving activities at offsite borrow/spoil areas**

28 Noise from earth-moving activities at offsite borrow/spoil areas for Alternative 5 is the same as
29 Alternative 1A. The results shown in Table 23-22 (see Impact NOI-1 in Alternative 1A) indicate that
30 noise-sensitive land uses within 800 feet of equipment operating in the borrow/spoil area could be
31 exposed to construction noise in excess of the daytime (7 a.m. to 10 p.m.) noise threshold of 60 dBA
32 L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be exceeded at a distance of 1,800 feet from
33 the area. Noise-sensitive land uses that could potentially be exposed to adverse noise impacts due to
34 earth-moving activities in offsite borrow/spoil areas would extend outside the borrow/spoil area
35 right-of-way. The effect of exposing these noise-sensitive land uses to noise increases above
36 thresholds would be adverse. However, with the exception of tunneling and RTM placement, most
37 construction activities would occur during daytime hours. Measures NOI-1a and NOI-1b are
38 available to address this effect.

39 **Noise exposure to workers at construction sites**

40 Impact NOI-1 for Alternative 5 is the same as Impact NOI-1 for Alternative 1A in terms of noise
41 exposure to on-site workers. On-site workers would be protected under OSHA requirements. No
42 adverse impacts would occur to workers.

1 **CEQA Conclusion:** The impact of exposing noise-sensitive land uses during construction to noise
 2 levels above the 60 dBA L_{eq} (1hr) daytime, the 50 dBA L_{max} nighttime, or the 12 dB traffic noise
 3 increase threshold would be considered significant. Based on reasonable worst-case modeling, the
 4 following significant impacts are expected as a result of Alternative 5 construction.

- 5 • **Intakes:** Sensitive receptors within 1,400 feet of an active intake construction site could be
 6 exposed to construction noise in excess of the 60 dBA L_{eq} (1hr) daytime threshold. The
 7 nighttime threshold of 50 dBA L_{max} would be exceeded at a distance of 2,800 feet. As shown in
 8 Table 23-71, 77 agricultural parcels would be affected by daytime noise levels in excess of this
 9 threshold during construction. The nighttime threshold would be exceeded at 3
 10 natural/recreational parcels and 131 agricultural parcels.
- 11 • **Conveyance and Associated Facilities:** Sensitive receptors within 1,200 feet of an active
 12 tunnel work area could be exposed to construction noise in excess of the daytime (7 a.m. to 10
 13 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be
 14 exceeded at a distance of 2,800 feet. As shown in Table 23-19 (see Impact NOI-1 in Alternative
 15 1A), 125 residential parcels, 9 natural/recreational parcels, 765 agricultural parcels, and 2
 16 schools would be affected by daytime noise levels in excess of this threshold during
 17 construction. The nighttime threshold would be exceeded at 226 residential parcels, 20
 18 natural/recreational parcels, 1,109 agricultural parcels, and 4 schools.
- 19 • **Truck Trips and Worker Commutes:** Traffic noise from truck trips and worker commutes
 20 would result in an increase of 12 dB or more compared to existing traffic noise levels at
 21 residences and outdoor use areas along 16 project roadway segments in the study area as
 22 shown in Table 23-20. The increase in noise levels would be substantial and exceed the project
 23 threshold for traffic noise. Mitigation Measures NOI-1a and NOI-1b are available to address this
 24 effect.
- 25 • **Power Transmission Lines:** Sensitive receptors within 800 feet of an active transmission line
 26 construction area could be exposed to construction noise in excess of the daytime (7 a.m. to 10
 27 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be
 28 exceeded at a distance of 1,800 feet from the construction area. As noted above, several
 29 residential land uses are near the proposed transmission line construction footprint. Likewise,
 30 Delta Elementary School and Delta High School on the west bank of the Sacramento River are
 31 within half a mile of the proposed Intake 2 transmission lines.
- 32 • **Borrow/spoil areas:** Sensitive receptors within 800 feet of equipment operating in the
 33 borrow/spoil area could be exposed to construction noise in excess of the daytime (7 a.m. to 10
 34 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be
 35 exceeded at a distance of 1,800 feet from the area. Borrow/spoil areas are located throughout
 36 the conveyance alignment and are generally adjacent to or in close proximity of intake pumping
 37 plant sites, forebays, and main tunnel construction shafts.

38 Mitigation Measures NOI-1a and NOI-1b would reduce noise impacts to sensitive land uses.
 39 Although implementation of these measures will reduce the impact, it is not anticipated that feasible
 40 measures will be available in all situations to reduce construction noise to levels below the
 41 applicable thresholds. This impact would therefore be significant and unavoidable.

1 **Mitigation Measure NOI-1a: Employ Noise-Reducing Construction Practices during**
 2 **Construction**

3 Please see Mitigation Measure NOI-1a under Impact NOI-1 in the discussion of Alternative 1A.

4 **Mitigation Measure NOI-1b: Prior to Construction, Initiate a Complaint/Response**
 5 **Tracking Program**

6 Please see Mitigation Measure NOI-1b under Impact NOI-1 in the discussion of Alternative 1A.

7 **Impact NOI-2: Exposure of Sensitive Receptors to Vibration or Groundborne Noise from**
 8 **Construction of Water Conveyance Facilities**

9 ***NEPA Effects:***

10 ***Pile Driving at Intake Sites***

11 Impact NOI-2 for Alternative 5 is the same as Impact NOI-2 for Alternative 1A. However, fewer
 12 sensitive receptors would be affected by groundborne vibration levels of this magnitude compared
 13 to Alternative 1A, because fewer intakes would be constructed (one rather than five). Groundborne
 14 vibration levels from impact pile driving are predicted to exceed vibration thresholds at nearby
 15 residences in the areas shown in Table 23-72.

16 While groundborne vibration levels in excess of 0.2 in/sec PPV could occur at any of these
 17 residences, the highest vibration levels are expected at those residences nearest to the intake work
 18 areas. Construction of intakes and barge unloading facilities would result in excessive groundborne
 19 vibration levels at these nearby residential structures. The effect of exposing sensitive receptors to
 20 groundborne vibration would be adverse. Mitigation Measure NOI-2 is available to reduce this effect.

21 **Table 23-72. Land Use Affected by Vibrations from Pile Driving During Construction of Intakes,**
 22 **Alternative 5**

Location	Zoning	Total Affected Parcels
Sacramento County – including River Road near the community of Hood; Neighborhoods in the community of Hood	Residential ^a	28
Yolo County – including County Road E9 near the community of Clarksburg	Residential ^a	1
San Joaquin County	Residential ^a	13

^a Includes agricultural or unclassified use that permits residential use.

24 ***Construction of Water Conveyance (Tunnel)***

25 Vibration sources include the TBM and locomotives moving soil, equipment, and construction
 26 workers between tunnel shaft sites. At a 60-foot tunnel depth, groundborne vibrations from the
 27 TBM are estimated to be 0.008 in/sec PPV, which is below the threshold of 0.04 in/sec PPV. As
 28 described in Section 23.4.2, *Determination of Effects*, tunnel locomotives would be operated at slow
 29 speeds inside of tunnels and would not result in excessive vibrations. Groundborne noise from
 30 tunnel locomotive operation during construction is therefore not predicted to exceed groundborne

1 noise thresholds or result in an adverse noise impact to sensitive receptors along the tunnel
2 conveyance.

3 **CEQA Conclusion:** Groundborne vibrations during tunneling would not exceed 0.008 in/sec PPV at
4 60-foot tunnel depth and would therefore be less than significant. Likewise, locomotives are not
5 expected to generate significant noise levels because they will travel at low speeds between 5 and
6 10 miles per hour. However, the impact of exposing residential structures to groundborne vibration
7 during intake construction would be significant as reasonable worst-case modeling indicates that 42
8 residential parcels would be exposed to vibration levels in excess of 0.2 in/sec PPV during intake
9 pile driving (see Table 23-72). Although Mitigation Measure NOI-2 will reduce the impact, it is not
10 anticipated that feasible measures will be available in all situations to reduce vibration to levels
11 below the applicable thresholds. This impact would therefore be considered significant and
12 unavoidable.

13 **Mitigation Measure NOI-2: Employ Vibration-Reducing Construction Practices during**
14 **Construction of Water Conveyance Facilities**

15 Please see Mitigation Measure NOI-2 under Impact NOI-2 in the discussion of Alternative 1A.

16 **Impact NOI-3: Exposure of Noise-Sensitive Land Uses to Noise from Operation of Water**
17 **Conveyance Facilities**

18 **NEPA Effects:** Potential reasonable worst-case pump noise levels during operation of the intake
19 structures were evaluated by calculating sound power levels of the pump based on horsepower
20 (Hoover and Keith 2000). Faceplate horsepower for vertical column and vertical volute type pumps
21 is specified in pump selection appendix of the Conceptual Engineering Report. Pump specifications
22 are shown in Table 23-73. Combined source noise levels assume that pump enclosures (including
23 buildings) provide a nominal 15 dB of noise attenuation. This analysis assumes that pumps are
24 operating 24 hours a day.

25 **Table 23-73. Pump Specifications—Alternative 5**

Pump Location	Quantity	Pumping Plant		Individual Pump	Combined Source	Assumed Attenuation (dB)	Combined Source Level
		Capacity (cfs)	Pump Horsepower	Source Level (dBA)	Level (dBA)		with Attenuation (dBA)
Intake 1	6	3,000	4,500	97	104	15	89
Intermediate Plant	16 (10/6) ^a	15,000	18,000/ 8,000 ^a	103/99 ^a	114	15	99

cfs = cubic feet per second.

dB = decibels.

dBA = A-weighted sound level in decibels.

^a Vertical Column Pumps/Vertical Volute Pumps in the Intermediate Pumping Plant.

26
27 The estimated sound levels from pump operation as a function of distance based on calculated
28 point-source attenuation over “soft” (i.e., acoustically absorptive) ground are shown in Table 23-74.

1 **Table 23-74. Predicted Noise Levels from Pump Operation, Intakes, Alternative 5**

Distance Between Source and Receiver (Feet)	Intake 1 Calculated L_{eq} Sound Level (dBA)	Intermediate Plant Calculated L_{eq} Sound Level (dBA)
50	89	99
100	82	91
200	74	83
300	69	79
400	66	75
600	61	71
800	58	67
1,000	55	65
1,200	53	63
1,400	52	61
1,600	50	60
2,000	47	57
2,200	46	56
2,600	45	54
3,600	41	50
5,000	37	47
6,000	35	45
7,000	33	43

Notes: Calculations are based on Federal Transit Administration 2006. Calculation do not include the effects, if any, of local shielding from walls, topography, or other barriers that may reduce sound levels further.

Noise levels assume a nominal pump enclosure attenuation of 15 dB.

Bold denotes daytime and nighttime maximum noise thresholds.

dBA = A-weighted sound level in decibels.

2

3 The results shown in Table 23-74 indicate that operating noise from pumping plants would exceed
4 the nighttime threshold of 45 dBA at noise-sensitive land uses within a distance of up to 2,600 feet
5 from intake pumping plant locations, and 6,000 feet from the pumping plant located at the proposed
6 intermediate forebay. Noise from operation of pumping plants is predicted to exceed daytime and
7 nighttime noise thresholds at nearby residences and outdoor parks in areas indicated in Table 23-
8 75.

1 **Table 23-75. Land Use Affected by Noise from Operation of Pumping Plants, Alternative 5**

Location	Zoning	50 dBA L_{eq} Daytime	45 dBA L_{eq} Nighttime
		Operations Threshold	Operations Threshold
		Total Affected Parcels	Total Affected Parcels
Sacramento County – including River Road near the community of Hood; neighborhoods in the community of Hood; Lambert Road; Vorden Road.	Agricultural/ Other ^a	34	80
Yolo County – including County Road E9 near the community of Clarksburg; neighborhoods in the community of Clarksburg.	Agricultural/ Other ^a	26	38

^a Includes agricultural or unclassified use that permits residential use.

2

3 Operation of water conveyance facilities could result in substantial increases in noise levels affecting
4 nearby communities and residences. While noise levels in excess of applicable thresholds could
5 occur throughout the affected area, the highest noise levels are expected at those land uses most
6 adjacent to the pumping plants. The effect of exposing noise-sensitive land uses to noise increases
7 above thresholds would be adverse. Mitigation Measure NOI-3 is available to reduce this effect.

8 ***Noise exposure to workers at conveyance facilities***

9 Impact NOI-3 for Alternative 5 is the same as Impact NOI-3 for Alternative 1A in terms of noise
10 exposure to on-site workers. On-site workers would be protected under OSHA requirements. No
11 adverse impacts would occur to workers.

12 ***CEQA Conclusion:*** The impact of exposing noise-sensitive land uses during pumping plant
13 operations to noise levels above the daytime (50 dBA L_{max}) or nighttime (45 dBA L_{max}) noise
14 thresholds would be considered significant. Based on reasonable worst-case modeling, 60
15 agricultural parcels would be affected by daytime noise levels in excess of the operational threshold.
16 The nighttime threshold would be exceeded at 118 agricultural parcels (see Table 23-75). This is a
17 potentially significant impact. Mitigation Measure NOI-3 would reduce operational noise levels
18 below applicable thresholds, thus resulting in a less-than-significant level.

19 **Mitigation Measure NOI-3: Design and Construct Intake Facilities and Other Pump**
20 **Facilities Such That Operational Noise Does Not Exceed 50 dBA (One-Hour L_{eq}) during**
21 **Daytime Hours (7:00 A.M. to 10:00 P.M.) or 45 dBA (One-Hour L_{eq}) during Nighttime**
22 **Hours (10:00 P.M. to 7:00 A.M.) or the Applicable Local Noise Standard (Whichever Is**
23 **Less) at Nearby Noise Sensitive Land Uses**

24 Please see Mitigation Measure NOI-3 under Impact NOI-3 in the discussion of Alternative 1A.

25 **Impact NOI-4: Exposure of Noise-Sensitive Land Uses to Noise from Implementation of**

26 **Proposed Conservation Measures 2-10**

27 ***NEPA Effects:*** Although locations or target acreages may vary for proposed conservation measures,
28 at the program level of development, the amount and location of restoration actions under this
29 alternative would be the similar to Alternative 1A, except that less tidal habitat restoration is
30 proposed. Noise levels during implementation of these conservation measures are expected to vary

1 according to the type of construction equipment and techniques used, but are likely to be similar to
 2 noise levels shown in Table 23-16 (see Impact NOI-1 in Alternative 1A). The results shown in Table
 3 23-16 indicate that residences within 1,200 feet of an active restoration work area could be exposed
 4 to construction noise in excess of the daytime (7 a.m. to 10 p.m.) noise threshold of 60 dBA L_{eq} (1hr).
 5 The nighttime threshold of 50 dBA L_{max} would be exceeded within a distance of 2,800 feet.

6 The effect of exposing sensitive land uses to increases in construction noise levels above thresholds
 7 would be adverse. Mitigation Measures NOI-1a and NOI-1b are available to address this effect.

8 **CEQA Conclusion:** The impact of exposing noise-sensitive land uses during construction to noise
 9 increases above the daytime (60 dBA L_{eq}) and nighttime (50 dBA L_{max}) thresholds would be
 10 significant. Noise levels during implementation of these conservation measures are expected to vary
 11 according to the type of construction equipment and techniques used, but are likely to be similar to
 12 noise levels shown in Table 23-16 (see Impact NOI-1 in Alternative 1A). The results shown in Table
 13 23-16 indicate that residences within 1,200 feet of an active restoration work area could be exposed
 14 to construction noise in excess of the daytime (7 a.m. to 10 p.m.) noise threshold of 60 dBA L_{eq} (1hr).
 15 The nighttime threshold of 50 dBA L_{max} would be exceeded within a distance of 2,800 feet. The
 16 impact of exposing these receptors to noise increases above thresholds would be significant.
 17 Although Mitigation Measures NOI-1a and NOI-1b will reduce the impact, it is not anticipated that
 18 feasible measures will be available in all situations to reduce construction noise to levels below the
 19 applicable thresholds. This impact would therefore be considered significant and unavoidable.

20 **Mitigation Measure NOI-1a: Employ Noise-Reducing Construction Practices during**
 21 **Construction**

22 Please see Mitigation Measure NOI-1a under Impact NOI-1 in the discussion of Alternative 1A.

23 **Mitigation Measure NOI-1b: Prior to Construction, Initiate a Complaint/Response**
 24 **Tracking Program**

25 Please see Mitigation Measure NOI-1b under Impact NOI-1 in the discussion of Alternative 1A.

26 **23.3.3.11 Alternative 6A—Isolated Conveyance with Pipeline/Tunnel and**
 27 **Intakes 1–5 (15,000 cfs; Operational Scenario D)**

28 A total of five intakes would be constructed under Alternative 6A. This alternative would also
 29 construct an intermediate forebay, and the conveyance facility would be a buried pipeline (see
 30 Figures 3-2 and 3-13 in Chapter 3, *Description of Alternatives*).

31 **Impact NOI-1: Exposure of Noise-Sensitive Land Uses to Noise from Construction of Water**
 32 **Conveyance Facilities**

33 **NEPA Effects:**

34 **Construction of Intakes**

35 Impact NOI-1 for Alternative 6A is the same as Impact NOI-1 for Alternative 1A in terms of
 36 construction equipment noise levels. Noise from intake construction activities is predicted to exceed
 37 daytime and nighttime noise thresholds at nearby residences, schools and outdoor parks in areas
 38 indicated in Table 23-18 (see Impact NOI-1 in Alternative 1A). While equipment could operate at

1 any work area identified for this alternative, the highest noise levels are expected to occur at those
2 sites where the duration and intensity of construction activities would be greatest.

3 Although this assessment includes daytime and nighttime construction noise estimates, construction
4 of the intakes would primarily occur during daytime hours. If nighttime construction of the intakes
5 were to occur, noise levels could be the same as that generated during daytime hours.

6 The effect of exposing these noise-sensitive land uses to noise increases above thresholds would be
7 adverse. Mitigation Measures NOI-1a and NOI-1b would be available to reduce this effect.

8 ***Construction of Conveyance (Tunnel), Forebays, Barge Unloading Facilities, and Intermediate Pumping***
9 ***Plants***

10 Construction of the conveyance under Alternative 6A would be the same as Alternative 1A. Noise
11 from construction activities is predicted to exceed daytime and nighttime noise thresholds at nearby
12 residences, schools and outdoor parks indicated in Table 23-19 (see Impact NOI-1 in Alternative
13 1A). While equipment could operate at any work area identified for this alternative, the highest
14 noise levels are expected to occur at those sites where the duration and intensity of construction
15 activities would be greatest. This includes all construction sites along the tunnel conveyance
16 alignment, as well as at the site of the Byron Tract Forebay adjacent to and south of Clifton Court
17 Forebay. For a map of the proposed pipeline/tunnel alignment, see Mapbook Figure M3-1.

18 Although this assessment includes daytime and nighttime construction noise estimates for the
19 forebays, barge unloading facilities, intermediate pumping plant, and conveyance tunnels,
20 construction of the forebays, barge unloading facilities, and intermediate pumping plant would
21 primarily occur during daytime hours. If nighttime construction of the forebays, barge unloading
22 facilities, and intermediate pumping plant were to occur, noise levels could be the same as those
23 generated during daytime hours. Construction of the conveyance tunnels and RTM storage actions
24 would occur on a 24-hour basis.

25 The effect of exposing these noise-sensitive land uses to noise increases above thresholds would be
26 adverse. Mitigation Measures NOI-1a and NOI-1b would be available to reduce this effect.

27 ***Truck Trips and Worker Commutes***

28 The estimate of truck trips and worker commutes under Alternative 6A would be similar to
29 Alternative 1A except for the addition of trips associated with construction of the operable barrier.
30 Traffic noise from truck trips and worker commutes would result in an increase of 12 dB or more
31 compared to existing traffic noise levels at residences and outdoor use areas along 16 project
32 roadway segments in the study area as shown in Table 23-20.

33 During intake construction, segments of SR 160 between Freeport Bridge and Walnut Grove Bridge
34 would be temporarily realigned around intake construction sites. As a result, future project noise
35 levels would further increase at residences located near intake sites. Under Alternative 6A, noise
36 levels at receivers near realigned segments of SR 160 would increase by up to 12 dB in addition to
37 the noise increase shown in Table 23-20.

38 The increase in noise levels would exceed the project threshold for traffic noise and would be
39 considered adverse. Mitigation Measures NOI-1a and NOI-1b are available to address this effect.

1 **Construction of Power Transmission Lines**

2 Noise from construction of power transmission lines for Alternative 6A are the same as Alternative
 3 1A. The results shown in Table 23-21 (see Impact NOI-1 in Alternative 1A) indicate that noise-
 4 sensitive land uses within 800 feet of an active transmission line construction area could be exposed
 5 to construction noise in excess of the daytime (7 a.m. to 10 p.m.) noise threshold of 60 dBA L_{eq} (1hr).
 6 The nighttime threshold of 50 dBA L_{max} would be exceeded at a distance of 1,800 feet from the
 7 construction area. Several residential land uses are near the proposed transmission line
 8 construction footprint. Likewise, Delta Elementary School and Delta High School on the west bank of
 9 the Sacramento River are within half a mile of the proposed Intake 2 transmission lines. Although
 10 this assessment includes daytime and nighttime construction noise estimates, construction of the
 11 transmission lines would primarily occur during daylight hours. If nighttime construction of the
 12 transmission lines were to occur, noise levels could be the same as those generated during daytime
 13 hours. The effect of exposing noise-sensitive land uses to noise increases above thresholds would be
 14 adverse. Mitigation Measures NOI-1a and NOI-1b are available to address this effect.

15 **Earth-moving activities at offsite borrow/spoil areas**

16 Noise from earth-moving activities at offsite borrow/spoil areas for Alternative 6A are the same
 17 as Alternative 1A. The results shown in Table 23-22 (see Impact NOI-1 in Alternative 1A)
 18 indicate that noise-sensitive land uses within 800 feet of equipment operating in the
 19 borrow/spoil area could be exposed to construction noise in excess of the daytime (7 a.m. to 10
 20 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be
 21 exceeded at a distance of 1,800 feet from the area. Borrow/spoil areas are located throughout
 22 the conveyance alignment and are generally adjacent to or in close proximity of intake pumping
 23 plant sites, forebays, and main tunnel construction shafts. The effect of exposing these noise-
 24 sensitive land uses to noise increases above thresholds would be adverse. However, with the
 25 exception of tunneling and RTM placement, most construction activities would occur during
 26 daytime hours. Mitigation Measures NOI-1a and NOI-1b are available to address this effect.

27 **Noise exposure to workers at construction sites**

28 Impact NOI-1 for Alternative 6A is the same as Impact NOI-1 for Alternative 1A in terms of
 29 noise exposure to on-site workers. On-site workers would be protected under OSHA
 30 requirements. No adverse impacts would occur to workers.

31 **CEQA Conclusion:** The impact of exposing noise-sensitive land uses during construction to noise
 32 levels above the daytime 60 dBA L_{eq} (1hr) daytime, the 50 dBA L_{max} nighttime, or the 12 dB traffic
 33 noise increase threshold would be considered significant. Based on reasonable worst-case modeling,
 34 the following significant impacts are expected as a result of Alternative 6A construction.

- 35 • **Intakes:** Sensitive receptors within 1,400 feet of an active intake construction site could be
 36 exposed to construction noise in excess of the 60 dBA L_{eq} (1hr) daytime threshold. The
 37 nighttime threshold of 50 dBA L_{max} would be exceeded at a distance of 2,800 feet. As shown in
 38 Table 23-18 (see Impact NOI-1 in Alternative 1A), 125 residential parcels, 2
 39 natural/recreational parcels, and 261 agricultural parcels would be affected by daytime noise
 40 levels in excess of this threshold during construction. The nighttime threshold would be
 41 exceeded at 219 residential parcels, 9 natural/recreational parcels, 346 agricultural parcels, and
 42 2 schools.

- 1 • **Conveyance and Associated Facilities:** Sensitive receptors within 1,200 feet of an active
2 tunnel work area could be exposed to construction noise in excess of the daytime (7 a.m. to 10
3 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be
4 exceeded at a distance of 2,800 feet. As shown in Table 23-19 (see Impact NOI-1 in Alternative
5 1A), 125 residential parcels, 9 natural/recreational parcels, 765 agricultural parcels, and 2
6 schools would be affected by daytime noise levels in excess of this threshold during
7 construction. The nighttime threshold would be exceeded at 226 residential parcels, 20
8 natural/recreational parcels, 1,109 agricultural parcels, and 4 schools.
- 9 • **Truck Trips and Worker Commutes:** Traffic noise from truck trips and worker commutes
10 would result in an increase of 12 dB or more compared to existing traffic noise levels at
11 residences and outdoor use areas along 16 project roadway segments in the study area as
12 shown in Table 23-20. The increase in noise levels would be substantial and exceed the project
13 threshold for traffic noise. Mitigation Measures NOI-1a and NOI-1b are available to address this
14 effect.
- 15 • **Power Transmission Lines:** Sensitive receptors within 800 feet of an active transmission line
16 construction area could be exposed to construction noise in excess of the daytime (7 a.m. to 10
17 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be
18 exceeded at a distance of 1,800 feet from the construction area. As noted above, several
19 residential land uses are near the proposed transmission line construction footprint. Likewise,
20 Delta Elementary School and Delta High School on the west bank of the Sacramento River are
21 within half a mile of the proposed Intake 2 transmission lines.
- 22 • **Borrow/spoil areas:** Sensitive receptors within 800 feet of equipment operating in the
23 borrow/spoil area could be exposed to construction noise in excess of the daytime (7 a.m. to 10
24 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be
25 exceeded at a distance of 1,800 feet from the area. Borrow/spoil areas are located throughout
26 the conveyance alignment and are generally adjacent to or in close proximity of intake pumping
27 plant sites, forebays, and main tunnel construction shafts.

28 Mitigation Measures NOI-1a and NOI-1b would reduce noise impacts to sensitive land uses.
29 Although implementation of these measures will reduce the impact, it is not anticipated that feasible
30 measures will be available in all situations to reduce construction noise to levels below the
31 applicable thresholds. This impact would therefore be significant and unavoidable.

32 **Mitigation Measure NOI-1a: Employ Noise-Reducing Construction Practices during**
33 **Construction**

34 Please see Mitigation Measure NOI-1a under Impact NOI-1 in the discussion of Alternative 1A.

35 **Mitigation Measure NOI-1b: Prior to Construction, Initiate a Complaint/Response**
36 **Tracking Program**

37 Please see Mitigation Measure NOI-1b under Impact NOI-1 in the discussion of Alternative 1A.

38 **Impact NOI-2: Exposure of Sensitive Receptors to Vibration or Groundborne Noise from**
39 **Construction of Water Conveyance Facilities**

1 **NEPA Effects:**

2 **Pile Driving at Intake Sites**

3 Impact NOI-2 for Alternative 6A is the same as Impact NOI-2 for Alternative 1A. Groundborne
4 vibration levels from construction of intakes could exceed vibration thresholds at nearby receptors,
5 including residential structures (see Table 23-24 under Impact NOI-2 in Alternative 1A). The effect
6 of exposing sensitive receptors to groundborne vibration would be adverse. Mitigation Measure
7 NOI-2 is available to reduce this effect.

8 **Construction of Water Conveyance (Tunnel)**

9 Under Alternative 6A, groundborne noise effects during construction of the conveyance would be
10 the same as Impact NOI-2 for Alternative 1A. At a 60-foot tunnel depth, groundborne vibrations
11 from the TBM are estimated to be 0.008 in/sec PPV, which is below the threshold of 0.04 in/sec PPV.
12 As described in Section 23.4.2, *Determination of Effects*, tunnel locomotives would be operated at
13 slow speeds inside of tunnels and would not result in excessive vibrations. Groundborne noise from
14 tunnel locomotive operation during construction is therefore not predicted to exceed groundborne
15 noise thresholds or result in an adverse noise impact to sensitive receptors along the tunnel
16 conveyance.

17 **CEQA Conclusion:** Groundborne vibrations during tunneling would not exceed 0.008 in/sec PPV at
18 60-foot tunnel depth and would therefore be less than significant. Likewise, locomotives are not
19 expected to generate significant noise levels because they will travel at low speeds between 5 and
20 10 miles per hour. However, the impact of exposing residential structures to groundborne vibration
21 during intake construction would be significant as reasonable worst-case modeling indicates that
22 102 residential parcels would be exposed to vibration levels in excess of 0.2 in/sec PPV during
23 intake pile driving (see Table 23-24 under Impact NOI-2 in Alternative 1A). Although Mitigation
24 Measure NOI-2 will reduce the impact, it is not anticipated that feasible measures will be available in
25 all situations to reduce vibration to levels below the applicable thresholds. This impact would
26 therefore be significant and unavoidable.

27 **Mitigation Measure NOI-2: Employ Vibration-Reducing Construction Practices during**
28 **Construction of Water Conveyance Facilities**

29 Please see Mitigation Measure NOI-2 under Impact NOI-2 in the discussion of Alternative 1A.

30 **Impact NOI-3: Exposure of Noise-Sensitive Land Uses to Noise from Operation of Water**
31 **Conveyance Facilities**

32 **NEPA Effects:** Impact NOI-3 for Alternative 6A is the same as Impact NOI-3 for Alternative 1A.
33 Operation of pumping plants under Alternative 6A would expose persons to noise levels greater
34 than the noise thresholds for project operations. Operation of water conveyance facilities could
35 result in substantial increases in noise levels affecting nearby communities and residences (see
36 Table 23-27 under Impact NOI-3 in Alternative 1A). While noise levels in excess of applicable
37 thresholds could occur throughout the affected area, the highest noise levels are expected at those
38 land uses most adjacent to the pumping plants. The effect of exposing noise-sensitive land uses to
39 noise increases above thresholds would be adverse. Mitigation Measure NOI-3 is available to reduce
40 this effect.

1 **Noise exposure to workers at conveyance facilities**

2 Impact NOI-3 for Alternative 6A is the same as Impact NOI-3 for Alternative 1A in terms of noise
3 exposure to on-site workers. On-site workers would be protected under OSHA requirements. No
4 adverse impacts would occur to workers.

5 **CEQA Conclusion:** The impact of exposing noise-sensitive land uses during pumping plant
6 operations to noise levels above the daytime (50 dBA L_{max}) or nighttime (45 dBA L_{max}) noise
7 thresholds would be significant. Based on reasonable worst-case modeling, 108 residential parcels,
8 2 natural/recreational parcels, and 165 agricultural parcels would be affected by daytime noise
9 levels in excess of the operational threshold. The nighttime threshold would be exceeded at 121
10 residential parcels, 2 natural/recreational parcels, and 294 agricultural parcels. The impact of
11 exposing these receptors to noise increases above thresholds would be significant. Mitigation
12 Measure NOI-3 would reduce operational noise levels below applicable thresholds, thus resulting in
13 a less-than-significant level.

14 **Mitigation Measure NOI-3: Design and Construct Intake Facilities and Other Pump**
15 **Facilities Such That Operational Noise Does Not Exceed 50 dBA (One-Hour L_{eq}) during**
16 **Daytime Hours (7:00 A.M. to 10:00 P.M.) or 45 dBA (One-Hour L_{eq}) during Nighttime**
17 **Hours (10:00 P.M. to 7:00 A.M.) or the Applicable Local Noise Standard (Whichever Is**
18 **Less) at Nearby Noise Sensitive Land Uses**

19 Please see Mitigation Measure NOI-3 under Impact NOI-3 in the discussion of Alternative 1A.

20 **Impact NOI-4: Exposure of Noise-Sensitive Land Uses to Noise from Implementation of**
21 **Proposed Conservation Measures 2-10**

22 **NEPA Effects:** Although locations or target acreages may vary for proposed conservation measures,
23 at the program level of development, the amount and location of restoration actions under this
24 alternative would be the same as Alternative 1A, and therefore the impact would be the same as
25 under Alternative 1A. Noise levels during implementation of these conservation measures are
26 expected to vary according to the type of construction equipment and techniques used, but are likely
27 to be similar to noise levels shown in Table 23-16 (see Impact NOI-1 in Alternative 1A). The results
28 shown in Table 23-16 indicate that residences within 1,200 feet of an active restoration work area
29 could be exposed to construction noise in excess of the daytime (7 a.m. to 10 p.m.) noise threshold of
30 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be exceeded within a distance of
31 2,800 feet.

32 The effect of exposing sensitive land uses to increases in construction noise levels above thresholds
33 would be adverse. Mitigation Measures NOI-1a and NOI-1b are available to address this effect.

34 **CEQA Conclusion:** The impact of exposing noise-sensitive land uses during construction to noise
35 increases above the daytime (60 dBA L_{eq}) and nighttime (50 dBA L_{max}) thresholds would be
36 significant. Noise levels during implementation of these conservation measures are expected to vary
37 according to the type of construction equipment and techniques used, but are likely to be similar to
38 noise levels shown in Table 23-16 (see Impact NOI-1 in Alternative 1A). The results shown in Table
39 23-16 indicate that residences within 1,200 feet of an active restoration work area could be exposed
40 to construction noise in excess of the daytime (7 a.m. to 10 p.m.) noise threshold of 60 dBA L_{eq} (1hr).
41 The nighttime threshold of 50 dBA L_{max} would be exceeded within a distance of 2,800 feet. The
42 impact of exposing these receptors to noise increases above thresholds would be significant.

1 Although Mitigation Measures NOI-1a and NOI-1b will reduce the impact, it is not anticipated that
 2 feasible measures will be available in all situations to reduce construction noise to levels below the
 3 applicable thresholds. This impact would therefore be considered significant and unavoidable.

4 **Mitigation Measure NOI-1a: Employ Noise-Reducing Construction Practices during**
 5 **Construction**

6 Please see Mitigation Measure NOI-1a under Impact NOI-1 in the discussion of Alternative 1A.

7 **Mitigation Measure NOI-1b: Prior to Construction, Initiate a Complaint/Response**
 8 **Tracking Program**

9 Please see Mitigation Measure NOI-1b under Impact NOI-1 in the discussion of Alternative 1A.

10 **23.3.3.12 Alternative 6B—Isolated Conveyance with East Alignment and**
 11 **Intakes 1–5 (15,000 cfs; Operational Scenario D)**

12 A total of five intakes on the east bank of the Sacramento River would be constructed under
 13 Alternative 6B. This alternative would also construct an intermediate forebay, and the conveyance
 14 facility would be a canal on the east side of the Sacramento River (see Figures 3-4 and 3-14 in
 15 Chapter 3, *Description of Alternatives*).

16 **Impact NOI-1: Exposure of Noise-Sensitive Land Uses to Noise from Construction of Water**
 17 **Conveyance Facilities**

18 ***NEPA Effects:***

19 ***Construction of Intakes***

20 Impact NOI-1 for Alternative 6B is the same as Impact NOI-1 for Alternative 1B in terms of
 21 construction equipment noise levels. Noise from intake construction activities is predicted to exceed
 22 daytime and nighttime noise thresholds at nearby residences, schools and outdoor parks in areas
 23 indicated in Table 23-28 (see Impact NOI-1 in Alternative 1B). While equipment could operate at
 24 any work area identified for this alternative, the highest noise levels are expected to occur at those
 25 sites where the duration and intensity of construction activities would be greatest.

26 Although this assessment includes daytime and nighttime construction noise estimates, construction
 27 of the intakes would primarily occur during daytime hours. If nighttime construction of the intakes
 28 were to occur, noise levels could be the same as that generated during daytime hours.

29 The effect of exposing these noise-sensitive land uses to noise increases above thresholds would be
 30 adverse. Mitigation Measures NOI-1a and NOI-1b would be available to reduce this effect.

31 ***Construction of Conveyance (Canal), Forebay, Barge Unloading Facilities, and Intermediate Pumping***
 32 ***Plant***

33 Impact NOI-1 for Alternative 6B is the same as Impact NOI-1 for Alternative 1B in terms of
 34 construction equipment noise levels. Noise from construction activities is predicted to exceed
 35 daytime and nighttime noise thresholds at nearby residences, schools and outdoor parks indicated
 36 in Table 23-29 (see Impact NOI-1 in Alternative 1B). While equipment could operate at any work
 37 area identified for this alternative, the highest noise levels are expected to occur at those sites where
 38 the duration and intensity of construction activities would be greatest. This includes all construction

1 sites along the canal or tunnel conveyance alignment, as well as at the site of the Byron Tract
2 Forebay adjacent to and south of Clifton Court Forebay. For a map of the proposed east alignment,
3 see Mapbook Figure M3-2.

4 Although this assessment includes daytime and nighttime construction noise estimates for the
5 forebay, barge unloading facilities, intermediate pumping plant, and conveyance tunnels and canals,
6 construction of the forebay, barge unloading facilities, intermediate pumping plant, and canals
7 would primarily occur during daytime hours. If nighttime construction of the forebay, barge
8 unloading facilities, intermediate pumping plant, and canals were to occur, noise levels could be the
9 same as those generated during daytime hours. Construction of the conveyance tunnels and RTM
10 storage actions would occur on a 24-hour basis.

11 The effect of exposing these noise-sensitive land uses to noise increases above thresholds would be
12 adverse. Mitigation Measures NOI-1a and NOI-1b would be available to reduce this effect.

13 ***Truck Trips and Worker Commutes***

14 The estimate of truck trips and worker commutes under Alternative 6B would be similar to
15 Alternative 1B except for the addition of trips associated with construction of the operable barrier.
16 Traffic noise from truck trips and worker commutes would result in an increase of 12 dB or more
17 compared to existing traffic noise levels at residences and outdoor use areas along 21 project
18 roadway segments in the study area as shown in Table 23-30.

19 During intake construction, segments of SR 160 between Freeport Bridge and Walnut Grove Bridge
20 would be temporarily realigned around intake construction sites. As a result, future project noise
21 levels would further increase at residences located near intake sites. Under Alternative 6B, noise
22 levels at receivers near realigned segments of SR 160 would increase by up to 12 dB in addition to
23 the noise increase shown in Table 23-30.

24 The increase in noise levels would exceed the project threshold for traffic noise and would be
25 considered adverse. Mitigation Measures NOI-1a and NOI-1b are available to address this effect.

26 ***Construction of Power Transmission Lines***

27 Noise from construction of power transmission lines for Alternative 6B is the same as Impact NOI-1
28 for Alternative 1A. The results shown in Table 23-21 (see Impact NOI-1 in Alternative 1A) indicate
29 that noise-sensitive land uses within 800 feet of an active transmission line construction area could
30 be exposed to construction noise in excess of the daytime (7 a.m. to 10 p.m.) noise threshold of 60
31 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be exceeded at a distance of 1,800 feet
32 from the construction area. Several residential land uses are near the proposed transmission line
33 construction footprint. Likewise, Delta Elementary School and Delta High School on the west bank of
34 the Sacramento River are within half a mile of the proposed Intake 2 transmission lines. Although
35 this assessment includes daytime and nighttime construction noise estimates, construction of the
36 transmission lines would primarily occur during daylight hours. If nighttime construction of the
37 transmission lines were to occur, noise levels could be the same as those generated during daytime
38 hours. The effect of exposing noise-sensitive land uses to noise increases above thresholds would be
39 adverse. Mitigation Measures NOI-1a and NOI-1b are available to address this effect.

1 **Earth-moving activities at offsite borrow/spoil areas**

2 Noise from earth-moving activities at offsite borrow/spoil areas for Alternative 6B is the same as
 3 Alternative 1A. The results shown in Table 23-22 (see Impact NOI-1 in Alternative 1A) indicate that
 4 noise-sensitive land uses within 800 feet of equipment operating in the borrow/spoil area could be
 5 exposed to construction noise in excess of the daytime (7 a.m. to 10 p.m.) noise threshold of 60 dBA
 6 L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be exceeded at a distance of 1,800 feet from
 7 the area. Borrow/spoil areas are located throughout the conveyance alignment and are generally
 8 adjacent to or in close proximity of intake pumping plant sites, forebays, and main tunnel
 9 construction shafts. The effect of exposing these noise-sensitive land uses to noise increases above
 10 thresholds would be adverse. However, with the exception of tunneling and RTM placement, most
 11 construction activities would occur during daytime hours. Mitigation Measures NOI-1a and NOI-1b
 12 are available to address this effect.

13 **Noise exposure to workers at construction sites**

14 Impact NOI-1 for Alternative 6B is the same as Impact NOI-1 for Alternative 1A in terms of noise
 15 exposure to on-site workers. On-site workers would be protected under OSHA requirements. No
 16 adverse impacts would occur to workers.

17 **CEQA Conclusion:** The impact of exposing noise-sensitive land uses during construction to noise
 18 levels above the daytime 60 dBA L_{eq} (1hr) daytime, the 50 dBA L_{max} nighttime, or the 12 dB traffic
 19 noise increase threshold would be considered significant. Based on reasonable worst-case modeling,
 20 the following significant impacts are expected as a result of Alternative 6B construction.

- 21 • **Intakes:** Sensitive receptors within 1,400 feet of an active intake construction site could be
 22 exposed to construction noise in excess of the 60 dBA L_{eq} (1hr) daytime threshold. The
 23 nighttime threshold of 50 dBA L_{max} would be exceeded at a distance of 2,800 feet. As shown in
 24 Table 23-28 (see Impact NOI-1 in Alternative 1B), 124 residential parcels, 5
 25 natural/recreational parcels, and 364 agricultural parcels would be affected by daytime noise
 26 levels in excess of this threshold during construction. The nighttime threshold would be
 27 exceeded at 218 residential parcels, 9 natural/recreational parcels, 348 agricultural parcels, and
 28 1 school.
- 29 • **Conveyance and Associated Facilities:** Sensitive receptors within 1,200 feet of an active
 30 tunnel work area could be exposed to construction noise in excess of the daytime (7 a.m. to 10
 31 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be
 32 exceeded at a distance of 2,800 feet. As shown in Table 23-29 (see Impact NOI-1 in Alternative
 33 1B), 129 residential parcels, 5 natural/recreational parcels, 958 agricultural parcels, and 1
 34 school would be affected by daytime noise levels in excess of this threshold during construction.
 35 The nighttime threshold would be exceeded at 250 residential parcels, 14 natural/recreational
 36 parcels, 1,748 agricultural parcels, and 4 schools.
- 37 • **Truck Trips and Worker Commutes:** Traffic noise from truck trips and worker commutes
 38 would result in an increase of 12 dB or more compared to existing traffic noise levels at
 39 residences and outdoor use areas along 21 project roadway segments in the study area as
 40 shown in Table 23-30. The increase in noise levels would be substantial and exceed the project
 41 threshold for traffic noise. Mitigation Measures NOI-1a and NOI-1b are available to address this
 42 effect.

- 1 • **Power Transmission Lines:** Sensitive receptors within 800 feet of an active transmission line
 2 construction area could be exposed to construction noise in excess of the daytime (7 a.m. to 10
 3 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be
 4 exceeded at a distance of 1,800 feet from the construction area. As noted above, several
 5 residential land uses are near the proposed transmission line construction footprint.
- 6 • **Borrow/spoil areas:** Sensitive receptors within 800 feet of equipment operating in the
 7 borrow/spoil area could be exposed to construction noise in excess of the daytime (7 a.m. to 10
 8 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be
 9 exceeded at a distance of 1,800 feet from the area. Borrow/spoil areas are located throughout
 10 the conveyance alignment and are generally adjacent to or in close proximity of intake pumping
 11 plant sites, forebays, and main tunnel construction shafts.

12 Mitigation Measures NOI-1a and NOI-1b would reduce noise impacts to sensitive land uses.
 13 Although implementation of these measures will reduce the impact, it is not anticipated that feasible
 14 measures will be available in all situations to reduce construction noise to levels below the
 15 applicable thresholds. This impact would therefore be considered significant and unavoidable.

16 **Mitigation Measure NOI-1a: Employ Noise-Reducing Construction Practices during**
 17 **Construction**

18 Please see Mitigation Measure NOI-1a under Impact NOI-1 in the discussion of Alternative 1A.

19 **Mitigation Measure NOI-1b: Prior to Construction, Initiate a Complaint/Response**
 20 **Tracking Program**

21 Please see Mitigation Measure NOI-1b under Impact NOI-1 in the discussion of Alternative 1A.

22 **Impact NOI-2: Exposure of Sensitive Receptors to Vibration or Groundborne Noise from**
 23 **Construction of Water Conveyance Facilities**

24 ***NEPA Effects:***

25 ***Pile Driving at Intake Sites***

26 Impact NOI-2 for Alternative 6B is the same as Impact NOI-2 for Alternative 1B. Groundborne
 27 vibration levels from construction of intakes could exceed vibration thresholds at nearby receptors,
 28 including residential structures (see Table 23-31 under Impact NOI-2 in Alternative 1B). The effect
 29 of exposing sensitive receptors to groundborne vibration would be adverse. Mitigation Measure
 30 NOI-2 is available to reduce this effect.

31 ***Construction of Water Conveyance (Pipeline Portions)***

32 Under Alternative 6B, groundborne noise effects during construction of the conveyance would be
 33 the same as Impact NOI-2 for Alternative 1B. Tunnel depth would be 120 feet or greater below msl.
 34 Groundborne noise levels for the east alignment alternative would therefore be below the applicable
 35 threshold and would not result in an adverse noise impact to sensitive receptors adjacent to the
 36 water conveyance.

37 ***CEQA Conclusion:*** Groundborne vibrations during tunneling would not exceed 0.008 in/sec PPV at
 38 125-foot tunnel depth and would therefore be less than significant. However, the impact of exposing
 39 residential structures to groundborne vibration during intake construction would be significant as

1 reasonable worst-case modeling indicates that 85 residential parcels would be exposed to vibration
 2 levels in excess of 0.2 in/sec PPV during intake pile driving (see Table 23-31 under Impact NOI-3 in
 3 Alternative 1B). Although implementation of Mitigation Measure NOI-2 will reduce the impact, it is
 4 not anticipated that feasible measures will be available in all situations to reduce vibration to levels
 5 below the applicable thresholds. This impact would therefore be considered significant and
 6 unavoidable.

7 **Mitigation Measure NOI-2: Employ Vibration-Reducing Construction Practices during**
 8 **Construction of Water Conveyance Facilities**

9 Please see Mitigation Measure NOI-2 under Impact NOI-2 in the discussion of Alternative 1A.

10 **Impact NOI-3: Exposure of Noise-Sensitive Land Uses to Noise from Operation of Water**
 11 **Conveyance Facilities**

12 *NEPA Effects:* Impact NOI-3 for Alternative 6B is the same as Impact NOI-3 for Alternative 1B.
 13 Operation of pumping plants under Alternative 6B would expose persons to noise levels greater
 14 than the noise thresholds for project operations. Operation of water conveyance facilities could
 15 result in substantial increases in noise levels affecting nearby communities and residences (see
 16 Table 23-34 under Impact NOI-3 in Alternative 1B). While noise levels in excess of applicable
 17 thresholds could occur throughout the affected area, the highest noise levels are expected at those
 18 land uses most adjacent to the pumping plants. The effect of exposing noise-sensitive land uses to
 19 noise increases above thresholds would be adverse. Mitigation Measure NOI-3 is available to reduce
 20 this effect.

21 ***Noise exposure to workers at conveyance facilities***

22 Impact NOI-3 for Alternative 6B is the same as Impact NOI-3 for Alternative 1A in terms of noise
 23 exposure to on-site workers. On-site workers would be protected under OSHA requirements. No
 24 adverse impacts would occur to workers.

25 *CEQA Conclusion:* The impact of exposing noise-sensitive land uses during pumping plant
 26 operations to noise levels above the daytime (50 dBA L_{max}) or nighttime (45 dBA L_{max}) noise
 27 thresholds would be significant. Based on reasonable worst-case modeling, 108 residential parcels,
 28 2 natural/recreational parcels, and 168 agricultural parcels would be affected by daytime noise
 29 levels in excess of the operational threshold. The nighttime threshold would be exceeded at 121
 30 residential parcels, 2 natural/recreational parcels, and 300 agricultural parcels. The impact of
 31 exposing these receptors to noise increases above thresholds would be significant (see Table 23-34
 32 under Impact NOI-3 in Alternative 1B). Mitigation Measure NOI-3 would reduce operational noise
 33 levels below applicable thresholds, thus resulting in a less-than-significant level.

34 **Mitigation Measure NOI-3: Design and Construct Intake Facilities and Other Pump**
 35 **Facilities Such That Operational Noise Does Not Exceed 50 dBA (One-Hour L_{eq}) during**
 36 **Daytime Hours (7:00 A.M. to 10:00 P.M.) or 45 dBA (One-Hour L_{eq}) during Nighttime**
 37 **Hours (10:00 P.M. to 7:00 A.M.) or the Applicable Local Noise Standard (Whichever Is**
 38 **Less) at Nearby Noise Sensitive Land Uses**

39 Please see Mitigation Measure NOI-3 under Impact NOI-3 in the discussion of Alternative 1A.

1 **Impact NOI-4: Exposure of Noise-Sensitive Land Uses to Noise from Implementation of**
 2 **Proposed Conservation Measures 2-10**

3 **NEPA Effects:** Although locations or target acreages may vary for proposed conservation measures,
 4 at the program level of development, the amount and location of restoration actions under this
 5 alternative would be the same as Alternative 1A, and therefore the impact would be the same as
 6 under Alternative 1A. Noise levels during implementation of these conservation measures are
 7 expected to vary according to the type of construction equipment and techniques used, but are likely
 8 to be similar to noise levels shown in Table 23-16 (see Impact NOI-1 in Alternative 1A). The results
 9 shown in Table 23-16 indicate that residences within 1,200 feet of an active restoration work area
 10 could be exposed to construction noise in excess of the daytime (7 a.m. to 10 p.m.) noise threshold of
 11 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be exceeded within a distance of
 12 2,800 feet. See the discussion of Impact NOI-4 under Alternative 1A.

13 The effect of exposing sensitive land uses to increases in construction noise levels above thresholds
 14 would be adverse. Mitigation Measures NOI-1a and NOI-1b are available to address this effect.

15 **CEQA Conclusion:** The impact of exposing noise-sensitive land uses during construction to noise
 16 increases above the daytime (60 dBA L_{eq}) and nighttime (50 dBA L_{max}) thresholds would be
 17 significant. Noise levels during implementation of these conservation measures are expected to vary
 18 according to the type of construction equipment and techniques used, but are likely to be similar to
 19 noise levels shown in Table 23-16 (see Impact NOI-1 in Alternative 1A). The results shown in Table
 20 23-16 indicate that residences within 1,200 feet of an active restoration work area could be exposed
 21 to construction noise in excess of the daytime (7 a.m. to 10 p.m.) noise threshold of 60 dBA L_{eq} (1hr).
 22 The nighttime threshold of 50 dBA L_{max} would be exceeded within a distance of 2,800 feet. The
 23 impact of exposing these receptors to noise increases above thresholds would be significant.
 24 Although Mitigation Measures NOI-1a and NOI-1b would reduce this impact, it is not anticipated that
 25 feasible measures will be available in all situations to reduce construction noise to levels below the
 26 applicable thresholds. This impact would therefore be significant and unavoidable.

27 **Mitigation Measure NOI-1a: Employ Noise-Reducing Construction Practices during**
 28 **Construction**

29 Please see Mitigation Measure NOI-1a under Impact NOI-1 in the discussion of Alternative 1A.

30 **Mitigation Measure NOI-1b: Prior to Construction, Initiate a Complaint/Response**
 31 **Tracking Program**

32 Please see Mitigation Measure NOI-1b under Impact NOI-1 in the discussion of Alternative 1A.

33 **23.3.3.13 Alternative 6C—Isolated Conveyance with West Alignment and**
 34 **Intakes W1–W5 (15,000 cfs; Operational Scenario D)**

35 A total of five intakes would be constructed under Alternative 6C. They would be sited on the west
 36 bank of the Sacramento River, directly opposite the locations identified for pipeline/tunnel and east
 37 alignments. Under this alternative, water would be carried south in a canal along the western side of
 38 the Delta to an intermediate pumping plant and then pumped through a tunnel to a continuing canal
 39 to the proposed Byron Tract Forebay immediately northwest of Clifton Court Forebay (see Figures
 40 3-6 and 3-15 in Chapter 3, *Description of Alternatives*).

1 **Impact NOI-1: Exposure of Noise-Sensitive Land Uses to Noise from Construction of Water**
 2 **Conveyance Facilities**

3 ***NEPA Effects:***

4 ***Construction of Intakes***

5 Impact NOI-1 for Alternative 6C is the same as Impact NOI-1 for Alternative 1C in terms of
 6 construction equipment noise levels. Noise from construction of intakes is predicted to exceed
 7 daytime and nighttime noise thresholds at nearby residences, schools and outdoor parks indicated
 8 in Table 23-35 (see Impact NOI-1 in Alternative 1C). While equipment could operate at any
 9 construction work area, the highest noise levels are expected to occur at those sites where the
 10 duration and intensity of construction activities would be greatest.

11 Although this assessment includes daytime and nighttime construction noise estimates, construction
 12 of the intakes would primarily occur during daytime hours. If nighttime construction of the intakes
 13 were to occur, noise levels could be the same as that generated during daytime hours.

14 The effect of exposing these noise-sensitive land uses to noise increases above thresholds would be
 15 adverse. Mitigation Measures NOI-1a and NOI-1b are available to address this effect.

16 ***Construction of Conveyance (Tunnel and Canal), Forebay, Barge Unloading Facilities, and Intermediate***
 17 ***Pumping Plant***

18 Impact NOI-1 for Alternative 6C is the same as Impact NOI-1 for Alternative 1C in terms of
 19 construction equipment noise levels. Noise from construction activities is predicted to exceed
 20 daytime and nighttime noise thresholds at nearby residences, schools and outdoor parks indicated
 21 in Table 23-36 (see Impact NOI-1 in Alternative 1C). While equipment could operate at any work
 22 area identified for this alternative, the highest noise levels are expected to occur at those sites where
 23 the duration and intensity of construction activities would be greatest. This includes all construction
 24 sites along the canal or tunnel conveyance alignment, as well as at the site of the Byron Tract
 25 Forebay adjacent to and west of Clifton Court Forebay. For a map of the proposed west alignment,
 26 see Mapbook Figure M3-3.

27 Although this assessment includes daytime and nighttime construction noise estimates for the
 28 forebay, barge unloading facilities, intermediate pumping plant, and conveyance tunnels and canals,
 29 construction of the forebay, barge unloading facilities, intermediate pumping plant, and canals
 30 would primarily occur during daytime hours. If nighttime construction of the forebay, barge
 31 unloading facilities, intermediate pumping plant, and canals were to occur, noise levels could be the
 32 same as those generated during daytime hours. Construction of the conveyance tunnels and RTM
 33 storage actions would occur on a 24-hour basis.

34 The effect of exposing these noise-sensitive land uses to noise increases above thresholds would be
 35 adverse. Mitigation Measures NOI-1a and NOI-1b are available to address this effect.

36 ***Truck Trips and Worker Commutes***

37 The estimate of truck trips and worker commutes under Alternative 6C would be similar to
 38 Alternative 1C except for the addition of trips associated with construction of the operable barrier.
 39 Traffic noise from truck trips and worker commutes would result in an increase of 12 dB or more
 40 compared to existing traffic noise levels at residences and outdoor use areas along 22 project
 41 roadway segments in the study area as shown in Table 23-37.

1 During intake construction, segments of County Highway E9 would be temporarily realigned around
2 intake construction sites. Under the west alignment alternative, no additional noise increase is
3 anticipated at residences adjacent to intake construction sites.

4 The increase in noise levels would exceed the project threshold for traffic noise and would be
5 considered adverse. Mitigation Measures NOI-1a and NOI-1b are available to address this effect.

6 ***Construction of Power Transmission Lines***

7 Noise from construction of power transmission lines for Alternative 6C is the same as Impact NOI-1
8 for Alternative 1A. The results shown in Table 23-21 (see Impact NOI-1 in Alternative 1A) indicate
9 that noise-sensitive land uses within 800 feet of an active transmission line construction area could
10 be exposed to construction noise in excess of the daytime (7 a.m. to 10 p.m.) noise threshold of 60
11 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be exceeded at a distance of 1,800 feet
12 from the construction area. Noise-sensitive receptors that could be exposed to adverse noise
13 impacts due to transmission line construction include residential areas near the proposed
14 transmission line construction footprint. Likewise, as noted in Chapter 24, *Hazards and Hazardous*
15 *Materials*, Lakewood Drive, Sycamore Drive, and Summer Lake Community Parks, as well as
16 Mokelumne High (Continuation) School would be near the proposed transmission line construction
17 footprint for Alternative 6C. Although this assessment includes daytime and nighttime construction
18 noise estimates, construction of the transmission lines would primarily occur during daylight hours.
19 If nighttime construction of the transmission lines were to occur, noise levels could be the same as
20 those generated during daytime hours. The effect of exposing noise-sensitive land uses to noise
21 increases above thresholds would be adverse. Mitigation Measures NOI-1a and NOI-1b are available
22 to address this effect.

23 ***Earth-moving activities at offsite borrow/spoil areas***

24 Noise from earth-moving activities at offsite borrow/spoil areas for Alternative 6C is the same as
25 Alternative 1C. The results shown in Table 23-22 (see Impact NOI-1 in Alternative 1A) indicate that
26 noise-sensitive land uses within 800 feet of equipment operating in the borrow/spoil area could be
27 exposed to construction noise in excess of the daytime (7 a.m. to 10 p.m.) noise threshold of 60 dBA
28 L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be exceeded at a distance of 1,800 feet from
29 the area. Noise-sensitive land uses that could potentially be exposed to adverse noise impacts due to
30 earth-moving activities in offsite borrow/spoil areas would extend outside the borrow/spoil area
31 right-of-way. The effect of exposing these noise-sensitive land uses to noise increases above
32 thresholds would be adverse. However, with the exception of tunneling and RTM placement, most
33 construction activities would occur during daytime hours. Mitigation Measures NOI-1a and NOI-1b
34 are available to address this effect.

35 ***Noise exposure to workers at construction sites***

36 Impact NOI-1 for Alternative 6C is the same as Impact NOI-1 for Alternative 1A in terms of noise
37 exposure to on-site workers. On-site workers would be protected under OSHA requirements. No
38 adverse impacts would occur to workers.

39 ***CEQA Conclusion:*** The impact of exposing noise-sensitive land uses during construction to noise
40 levels above the daytime 60 dBA L_{eq} (1hr) daytime, the 50 dBA L_{max} nighttime, or the 12 dB traffic
41 noise increase threshold would be considered significant. Based on reasonable worst-case modeling,
42 the following significant impacts are expected as a result of Alternative 6C construction.

- 1 • **Intakes:** Sensitive receptors within 1,400 feet of an active intake construction site could be
 2 exposed to construction noise in excess of the 60 dBA L_{eq} (1hr) daytime threshold. The
 3 nighttime threshold of 50 dBA L_{max} would be exceeded at a distance of 2,800 feet. As shown in
 4 Table 23-35 (see Impact NOI-1 in Alternative 1C), 63 residential parcels, 3 natural/recreational
 5 parcels, and 188 agricultural parcels would be affected by daytime noise levels in excess of this
 6 threshold during construction. The nighttime threshold would be exceeded at 229 residential
 7 parcels, 8 natural/recreational parcels, 351 agricultural parcels, and 3 schools.
- 8 • **Conveyance and Associated Facilities:** Sensitive receptors within 1,200 feet of an active
 9 tunnel work area could be exposed to construction noise in excess of the daytime (7 a.m. to 10
 10 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be
 11 exceeded at a distance of 2,800 feet. As shown in Table 23-36 (see Impact NOI-1 in Alternative
 12 1C), 1,148 residential parcels, 26 natural/recreational parcels, 1,048 agricultural parcels, and 4
 13 schools would be affected by daytime noise levels in excess of this threshold during
 14 construction. The nighttime threshold would be exceeded at 3,087 residential parcels, 221
 15 natural/recreational parcels, 1,532 agricultural parcels, and 6 schools.
- 16 • **Truck Trips and Worker Commutes:** Traffic noise from truck trips and worker commutes
 17 would result in an increase of 12 dB or more compared to existing traffic noise levels at
 18 residences and outdoor use areas along 22 project roadway segments in the study area as
 19 shown in Table 23-37. The increase in noise levels would be substantial and exceed the project
 20 threshold for traffic noise. Mitigation Measures NOI-1a and NOI-1b are available to address this
 21 effect.
- 22 • **Power Transmission Lines:** Sensitive receptors within 800 feet of an active transmission line
 23 construction area could be exposed to construction noise in excess of the daytime (7 a.m. to 10
 24 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be
 25 exceeded at a distance of 1,800 feet from the construction area. As noted above, residential
 26 areas and several schools are near the proposed transmission line construction footprint.
- 27 • **Borrow/spoil areas:** Sensitive receptors within 800 feet of equipment operating in the
 28 borrow/spoil area could be exposed to construction noise in excess of the daytime (7 a.m. to 10
 29 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be
 30 exceeded at a distance of 1,800 feet from the area. Borrow/spoil areas are located throughout
 31 the conveyance alignment and are generally adjacent to or in close proximity of intake pumping
 32 plant sites, forebays, and main tunnel construction shafts.

33 Mitigation Measures NOI-1a and NOI-1b would reduce noise impacts to sensitive land uses.
 34 Although implementation of these measures will reduce the impact, it is not anticipated that feasible
 35 measures will be available in all situations to reduce construction noise to levels below the
 36 applicable thresholds. This impact would therefore be considered significant and unavoidable.

37 **Mitigation Measure NOI-1a: Employ Noise-Reducing Construction Practices during**
 38 **Construction**

39 Please see Mitigation Measure NOI-1a under Impact NOI-1 in the discussion of Alternative 1A.

40 **Mitigation Measure NOI-1b: Prior to Construction, Initiate a Complaint/Response**
 41 **Tracking Program**

42 Please see Mitigation Measure NOI-1b under Impact NOI-1 in the discussion of Alternative 1A.

1 **Impact NOI-2: Exposure of Sensitive Receptors to Vibration or Groundborne Noise from**
2 **Construction of Water Conveyance Facilities**

3 ***NEPA Effects:***

4 ***Pile Driving at Intake Sites***

5 Impact NOI-2 for Alternative 6C is the same as Impact NOI-2 for Alternative 1C. Groundborne
6 vibration levels from construction of intakes could exceed vibration thresholds at nearby receptors,
7 including residential structures (see Table 23-38 under Impact NOI-2 in Alternative 1C). The effect
8 of exposing sensitive receptors to groundborne vibration would be adverse. Mitigation Measure
9 NOI-2 is available to reduce this effect.

10 ***Construction of Conveyance (Tunnel Portions)***

11 Under Alternative 6C, groundborne noise effects during construction of the conveyance would be
12 the same as Impact NOI-2 for Alternative 1C. Tunnels and siphons would be constructed at a depth
13 of more than 120 feet below msl. Groundborne noise levels at residential receivers are predicted to
14 be below thresholds, and would not result in an adverse effect.

15 ***CEQA Conclusion:*** Groundborne vibrations during tunneling would not exceed 0.008 in/sec PPV at
16 120-foot tunnel depth and would therefore be less than significant. Likewise, locomotives are not
17 expected to generate significant noise levels because they will travel at low speeds between 5 and
18 10 miles per hour. However, the impact of exposing residential structures to groundborne vibration
19 during intake construction would be significant as reasonable worst-case modeling indicates that 88
20 residential parcels would be exposed to vibration levels in excess of 0.2 in/sec PPV during intake
21 pile driving (see Table 23-38 under Impact NOI-2 in Alternative 1C). Although Mitigation Measure
22 NOI-2 will reduce the impact, it is not anticipated that feasible measures will be available in all
23 situations to reduce vibration to levels below the applicable thresholds. This impact would therefore
24 be significant and unavoidable.

25 **Mitigation Measure NOI-2: Employ Vibration-Reducing Construction Practices during**
26 **Construction of Water Conveyance Facilities**

27 Please see Mitigation Measure NOI-2 under Impact NOI-2 in the discussion of Alternative 1A.

28 **Impact NOI-3: Exposure of Noise-Sensitive Land Uses to Noise from Operation of Water**
29 **Conveyance Facilities**

30 NEPA Effects: Impact NOI-3 for Alternative 6C is the same as Impact NOI-3 for Alternative 1C.
31 Operation of pumping plants under Alternative 6C would expose persons to noise levels greater
32 than the noise thresholds for project operations. Operation of water conveyance facilities could
33 result in substantial increases in noise levels affecting nearby communities and residences (see
34 Table 23-41 under Impact NOI-3 in Alternative 1C). While noise levels in excess of applicable
35 thresholds could occur throughout the affected area, the highest noise levels are expected at those
36 land uses most adjacent to the pumping plants. The effect of exposing noise-sensitive land uses to
37 noise increases above thresholds would be adverse. Mitigation Measure NOI-3 is available to reduce
38 this effect.

1 **Noise exposure to workers at conveyance facilities**

2 Impact NOI-3 for Alternative 6C is the same as Impact NOI-3 for Alternative 1A in terms of noise
3 exposure to on-site workers. On-site workers would be protected under OSHA requirements. No
4 adverse impacts would occur to workers.

5 **CEQA Conclusion:** The impact of exposing noise-sensitive land uses during pumping plant
6 operations to noise levels above the daytime (50 dBA L_{max}) or nighttime (45 dBA L_{max}) noise
7 thresholds would be significant. Based on reasonable worst-case modeling, 2 residential parcels, 2
8 natural/recreational parcels, and 132 agricultural parcels would be affected by daytime noise levels
9 in excess of the operational threshold. The nighttime threshold would be exceeded at 77 residential
10 parcels, 3 natural/recreational parcels, and 205 agricultural parcels. The impact of exposing these
11 receptors to noise increases above thresholds would be significant (see Table 23-41 under Impact
12 NOI-3 in Alternative 1C). Mitigation Measure NOI-3 would reduce operational noise levels below
13 applicable thresholds, thus resulting in a less-than-significant level.

14 **Mitigation Measure NOI-3: Design and Construct Intake Facilities and Other Pump**
15 **Facilities Such That Operational Noise Does Not Exceed 50 dBA (One-Hour L_{eq}) during**
16 **Daytime Hours (7:00 A.M. to 10:00 P.M.) or 45 dBA (One-Hour L_{eq}) during Nighttime**
17 **Hours (10:00 P.M. to 7:00 A.M.) or the Applicable Local Noise Standard (Whichever Is**
18 **Less) at Nearby Noise Sensitive Land Uses**

19 Please see Mitigation Measure NOI-3 under Impact NOI-3 in the discussion of Alternative 1A.

20 **Impact NOI-4: Exposure of Noise-Sensitive Land Uses to Noise from Implementation of**
21 **Proposed Conservation Measures 2-10**

22 **NEPA Effects:** Although locations or target acreages may vary for proposed conservation measures,
23 at the program level of development, the amount and location of restoration actions under this
24 alternative would be the same as Alternative 1A, and therefore the impact would be the same as
25 under Alternative 1A. Noise levels during implementation of these conservation measures are
26 expected to vary according to the type of construction equipment and techniques used, but are likely
27 to be similar to noise levels shown in Table 23-16 (see Impact NOI-1 in Alternative 1A). The results
28 shown in Table 23-16 indicate that residences within 1,200 feet of an active restoration work area
29 could be exposed to construction noise in excess of the daytime (7 a.m. to 10 p.m.) noise threshold of
30 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be exceeded within a distance of
31 2,800 feet.

32 The effect of exposing sensitive land uses to increases in construction noise levels above thresholds
33 would be adverse. Mitigation Measures NOI-1a and NOI-1b are available to address this effect.

34 **CEQA Conclusion:** The impact of exposing noise-sensitive land uses during construction to noise
35 increases above the daytime (60 dBA L_{eq}) and nighttime (50 dBA L_{max}) thresholds would be
36 significant. Noise levels during implementation of these conservation measures are expected to vary
37 according to the type of construction equipment and techniques used, but are likely to be similar to
38 noise levels shown in Table 23-16 (see Impact NOI-1 in Alternative 1A). The results shown in Table
39 23-16 indicate that residences within 1,200 feet of an active restoration work area could be exposed
40 to construction noise in excess of the daytime (7 a.m. to 10 p.m.) noise threshold of 60 dBA L_{eq} (1hr).
41 The nighttime threshold of 50 dBA L_{max} would be exceeded within a distance of 2,800 feet. The
42 impact of exposing these receptors to noise increases above thresholds would be significant.

1 Although Mitigation Measures NOI-1a and NOI-1b would reduce this impact, it is not anticipated that
 2 feasible measures will be available in all situations to reduce construction noise to levels below the
 3 applicable thresholds. This effect would therefore be significant and unavoidable.

4 **Mitigation Measure NOI-1a: Employ Noise-Reducing Construction Practices during**
 5 **Construction**

6 Please see Mitigation Measure NOI-1a under Impact NOI-1 in the discussion of Alternative 1A.

7 **Mitigation Measure NOI-1b: Prior to Construction, Initiate a Complaint/Response**
 8 **Tracking Program**

9 Please see Mitigation Measure NOI-1b under Impact NOI-1 in the discussion of Alternative 1A.

10 **23.3.3.14 Alternative 7—Dual Conveyance with Pipeline/Tunnel, Intakes 2,**
 11 **3, and 5, and Enhanced Aquatic Conservation (9,000 cfs;**
 12 **Operational Scenario E)**

13 Three intakes would be constructed under Alternative 7 on the east bank of the Sacramento River.
 14 This alternative would also construct an intermediate forebay, and the conveyance facility would be
 15 a buried pipeline (see Figures 3-2 and 3-11 in Chapter 3, *Description of Alternatives*).

16 **Impact NOI-1: Exposure of Noise-Sensitive Land Uses to Noise from Construction of Water**
 17 **Conveyance Facilities**

18 ***NEPA Effects:***

19 ***Construction of Intakes***

20 Potential reasonable worst-case equipment noise levels from construction of intakes would be
 21 comparable to those listed for the intake sites in Table 23-17. The results shown in Table 23-17
 22 indicate that during periods of pile driving, residences located within 1,400 feet of an active intake
 23 construction site could be exposed to construction noise in excess of the DWR daytime (7 a.m. to 10
 24 p.m.) maximum noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would
 25 be exceeded at a distance of 2,800 feet from an active intake construction site.

26 While equipment could operate at any work area identified for this alternative, the highest noise
 27 levels are expected to occur at those sites where the duration and intensity of construction activities
 28 would be greatest. The work areas for construction of Intakes 2, 3, and 5 would extend through
 29 several residential areas and communities located near the Sacramento River. Noise from intake
 30 construction activities is predicted to exceed daytime and nighttime noise thresholds at nearby
 31 residences, schools and outdoor parks in areas indicated in Table 23-76.

32 Although this assessment includes daytime and nighttime construction noise estimates, construction
 33 of the intakes would primarily occur during daytime hours. If nighttime construction of the intakes
 34 were to occur, noise levels could be the same as that generated during daytime hours.

35 The effect of exposing these noise-sensitive land uses to noise increases above thresholds would be
 36 adverse. Mitigation Measures NOI-1a and NOI-1b are available to address this effect.

1 **Table 23-76. Land Use Affected by Equipment Noise from Construction of Intakes, Alternative 7**

Location	Zoning	Daytime Threshold (60 dBA L_{eq} [1h])	Nighttime Threshold (50 dBA L_{max} [1h])
		Total Affected Parcels	Total Affected Parcels
Sacramento County – including River Road across the river from the community of Clarksburg, River Road near the community of Hood.	Residential	3	112
	Natural/Recreational	1	1
	Agricultural/Other ^a	65	97
	Schools	None	None
Yolo County – including County Road E9 near the community of Clarksburg; neighborhoods in the community of Clarksburg.	Residential	4	98
	Natural/Recreational	1	5
	Agricultural/Other ^a	98	118
	Schools	None	Clarksburg Middle School

^a Includes agricultural or unclassified use that permits residential use.

2

3 **Construction of Conveyance (Tunnel), Forebays, Barge Unloading Facilities, and Intermediate Pumping** 4 **Plant**

5 Construction of the conveyance under Alternative 7 would be the same as Alternative 1A. Noise
6 from construction activities is predicted to exceed daytime and nighttime noise thresholds at nearby
7 residences, schools and outdoor parks indicated in Table 23-19 (see Impact NOI-1 in Alternative
8 1A). While equipment could operate at any work area identified for this alternative, the highest
9 noise levels are expected to occur at those sites where the duration and intensity of construction
10 activities would be greatest. This includes all construction sites along the tunnel conveyance
11 alignment, as well as at the site of the Byron Tract Forebay adjacent to and south of Clifton Court
12 Forebay. For a map of the proposed pipeline/tunnel alignment, see Mapbook Figure M3-1.

13 Although this assessment includes daytime and nighttime construction noise estimates for the
14 forebays, barge unloading facilities, intermediate pumping plant, and conveyance tunnels,
15 construction of the forebays, barge unloading facilities, and intermediate pumping plant would
16 primarily occur during daytime hours. If nighttime construction of the forebays, barge unloading
17 facilities, and intermediate pumping plant were to occur, noise levels could be the same as those
18 generated during daytime hours. Construction of the conveyance tunnels and RTM storage actions
19 would occur on a 24-hour basis.

20 The effect of exposing these noise-sensitive land uses to noise increases above thresholds would be
21 adverse. Mitigation Measures NOI-1a and NOI-1b would be available to reduce this effect.

22 **Truck Trips and Worker Commutes**

23 The estimate of truck trips and worker commutes under Alternative 7 would be similar to
24 Alternative 1A. Traffic noise from truck trips and worker commutes would result in an increase of
25 12 dB or more compared to existing traffic noise levels at residences and outdoor use areas along 16
26 project roadway segments in the study area as shown in Table 23-20.

27 During intake construction, segments of SR 160 between Freeport Bridge and Walnut Grove Bridge
28 would be temporarily realigned around intake construction sites. As a result, future project noise
29 levels would further increase at residences located near intake sites. Under Alternative 7, noise

1 levels at receivers near realigned segments of SR 160 would increase by up to 3 dB in addition to the
2 noise increase shown in Table 23-20.

3 The increase in noise levels would exceed the project threshold for traffic noise and would be
4 considered adverse. Mitigation Measures NOI-1a and NOI-1b are available to address this effect.

5 ***Construction of Power Transmission Lines***

6 Noise from construction of power transmission lines for Alternative 7 is the same as Alternative 1A.
7 The results shown in Table 23-21 (see Impact NOI-1 in Alternative 1A) indicate that noise-sensitive
8 land uses within 800 feet of an active transmission line construction area could be exposed to
9 construction noise in excess of the daytime (7 a.m. to 10 p.m.) noise threshold of 60 dBA L_{eq} (1hr).
10 The nighttime threshold of 50 dBA L_{max} would be exceeded at a distance of 1,800 feet from the
11 construction area. Several residential land uses are near the proposed transmission line
12 construction footprint. Likewise, Delta Elementary School and Delta High School on the west bank of
13 the Sacramento River are within half a mile of the proposed Intake 2 transmission lines.

14 Although this assessment includes daytime and nighttime construction noise estimates, construction
15 of the transmission lines would primarily occur during daylight hours. If nighttime construction of
16 the transmission lines were to occur, noise levels could be the same as those generated during
17 daytime hours.

18 The effect of exposing noise-sensitive land uses to noise increases above thresholds would be
19 adverse. Mitigation Measures NOI-1a and NOI-1b are available to address this effect.

20 ***Earth-moving activities at offsite borrow/spoil areas***

21 Noise from earth-moving activities at offsite borrow/spoil areas for Alternative 7 is the same as
22 Alternative 1A. The results shown in Table 23-22 (see Impact NOI-1 in Alternative 1A) indicate that
23 noise-sensitive land uses within 800 feet of equipment operating in the borrow/spoil area could be
24 exposed to construction noise in excess of the daytime (7 a.m. to 10 p.m.) noise threshold of 60 dBA
25 L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be exceeded at a distance of 1,800 feet from
26 the area. Borrow/spoil areas are located throughout the conveyance alignment and are generally
27 adjacent to or in close proximity of intake pumping plant sites, forebays, and main tunnel
28 construction shafts. The effect of exposing these noise-sensitive land uses to noise increases
29 above thresholds would be adverse. However, with the exception of tunneling and RTM
30 placement, most construction activities would occur during daytime hours. Mitigation Measures
31 NOI-1a and NOI-1b are available to address this effect.

32 ***Noise exposure to workers at construction sites***

33 Impact NOI-1 for Alternative 7 is the same as Impact NOI-1 for Alternative 1A in terms of noise
34 exposure to on-site workers. On-site workers would be protected under OSHA requirements.
35 No adverse impacts would occur to workers.

36 ***CEQA Conclusion:*** The impact of exposing noise-sensitive land uses during construction to noise
37 levels above the daytime 60 dBA L_{eq} (1hr) daytime, the 50 dBA L_{max} nighttime, or the 12 dB traffic
38 noise increase threshold would be considered significant. Based on reasonable worst-case modeling,
39 the following significant impacts are expected as a result of Alternative 7 construction.

- 40 • **Intakes:** Sensitive receptors within 1,400 feet of an active intake construction site could be
41 exposed to construction noise in excess of the 60 dBA L_{eq} (1hr) daytime threshold. The
42 nighttime threshold of 50 dBA L_{max} would be exceeded at a distance of 2,800 feet. As shown in

1 Table 23-76, 7 residential parcels, 2 natural/recreational parcels, and 163 agricultural parcels
 2 would be affected by daytime noise levels in excess of this threshold during construction. The
 3 nighttime threshold would be exceeded at 210 residential parcels, 6 natural/recreational
 4 parcels, 215 agricultural parcels, and 1 school.

- 5 • **Conveyance and Associated Facilities:** Sensitive receptors within 1,200 feet of an active
 6 tunnel work area could be exposed to construction noise in excess of the daytime (7 a.m. to 10
 7 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be
 8 exceeded at a distance of 2,800 feet. As shown in Table 23-19 (see Impact NOI-1 in Alternative
 9 1A), 125 residential parcels, 9 natural/recreational parcels, 765 agricultural parcels, and 2
 10 schools would be affected by daytime noise levels in excess of this threshold during
 11 construction. The nighttime threshold would be exceeded at 226 residential parcels, 20
 12 natural/recreational parcels, 1,109 agricultural parcels, and 4 schools.
- 13 • **Truck Trips and Worker Commutes:** Traffic noise from truck trips and worker commutes
 14 would result in an increase of 12 dB or more compared to existing traffic noise levels at
 15 residences and outdoor use areas along 16 project roadway segments in the study area as
 16 shown in Table 23-20. The increase in noise levels would be substantial and exceed the project
 17 threshold for traffic noise. Mitigation Measures NOI-1a and NOI-1b are available to address this
 18 effect.
- 19 • **Power Transmission Lines:** Sensitive receptors within 800 feet of an active transmission line
 20 construction area could be exposed to construction noise in excess of the daytime (7 a.m. to 10
 21 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be
 22 exceeded at a distance of 1,800 feet from the construction area. As noted above, several
 23 residential land uses are near the proposed transmission line construction footprint. Likewise,
 24 Delta Elementary School and Delta High School on the west bank of the Sacramento River are
 25 within half a mile of the proposed Intake 2 transmission l.
- 26 • **Borrow/spoil areas:** Sensitive receptors within 800 feet of equipment operating in the
 27 borrow/spoil area could be exposed to construction noise in excess of the daytime (7 a.m. to 10
 28 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be
 29 exceeded at a distance of 1,800 feet from the area. Borrow/spoil areas are located throughout
 30 the conveyance alignment and are generally adjacent to or in close proximity of intake pumping
 31 plant sites, forebays, and main tunnel construction shafts.

32 Mitigation Measures NOI-1a and NOI-1b would reduce noise impacts to sensitive land uses.
 33 Although implementation of these measures will reduce the impact, it is not anticipated that feasible
 34 measures will be available in all situations to reduce construction noise to levels below the
 35 applicable thresholds. This impact would therefore be significant and unavoidable.

36 **Mitigation Measure NOI-1a: Employ Noise-Reducing Construction Practices during** 37 **Construction**

38 Please see Mitigation Measure NOI-1a under Impact NOI-1 in the discussion of Alternative 1A.

39 **Mitigation Measure NOI-1b: Prior to Construction, Initiate a Complaint/Response** 40 **Tracking Program**

41 Please see Mitigation Measure NOI-1b under Impact NOI-1 in the discussion of Alternative 1A.

1 **Impact NOI-2: Exposure of Sensitive Receptors to Vibration or Groundborne Noise from**
 2 **Construction of Water Conveyance Facilities**

3 ***NEPA Effects:***

4 ***Pile Driving at Intake Sites***

5 Pile Driving at Intake Sites Impact NOI-2 for Alternative 7 is the same as Impact NOI-2 for
 6 Alternative 1A. However, fewer sensitive receptors would be affected by groundborne vibration
 7 levels of this magnitude compared to Alternative 1A, because fewer intakes would be constructed
 8 (three rather than five).

9 Groundborne vibration levels from impact pile driving are predicted to exceed vibration thresholds
 10 at nearby residences in the areas shown in Table 23-77. While groundborne vibration levels in
 11 excess of 0.2 in/sec PPV could occur at any of these residences, the highest vibration levels are
 12 expected at those residences nearest to the intake work areas. Construction of intakes and barge
 13 unloading facilities would result in excessive groundborne vibration levels at these nearby
 14 residential structures. The effect of exposing sensitive receptors to groundborne vibration would be
 15 adverse. Mitigation Measure NOI-2 is available to reduce this effect.

16 **Table 23-77. Land Use Affected by Vibrations from Pile Driving During Construction of Intakes,**
 17 **Alternative 7**

Location	Zoning	Total Affected Parcels
Sacramento County – including River Road near the community of Hood; Neighborhoods in the community of Hood	Residential ^a	40
San Joaquin County	Residential ^a	13

^a Includes agricultural or unclassified use that permits residential use.

18
 19 ***Construction of Water Conveyance (Tunnel)***

20 Under Alternative 7, groundborne noise effects during construction of the conveyance would be the
 21 same as Impact NOI-2 for Alternative 1A. At a 60-foot tunnel depth, groundborne vibrations from
 22 the TBM are estimated to be 0.008 in/sec PPV, which is below the threshold of 0.04 in/sec PPV. As
 23 described in Section 23.4.2, *Determination of Effects*, tunnel locomotives would be operated at slow
 24 speeds inside of tunnels and would not result in excessive vibrations. Groundborne noise from
 25 tunnel locomotive operation during construction is therefore not predicted to exceed groundborne
 26 noise thresholds or result in an adverse noise impact to sensitive receptors along the tunnel
 27 conveyance.

28 ***CEQA Conclusion:*** Groundborne vibrations during tunneling would not exceed 0.008 in/sec PPV at
 29 60-foot tunnel depth and would therefore be less than significant. Likewise, locomotives are not
 30 expected to generate significant noise levels because they will travel at low speeds between 5 and
 31 10 miles per hour. However, the impact of exposing residential structures to groundborne vibration
 32 during intake construction would be significant as reasonable worst-case modeling indicates that 53
 33 residential parcels would be exposed to vibration levels in excess of 0.2 in/sec PPV during intake
 34 pile driving (see Table 23-77). Although Mitigation Measure NOI-2 will reduce the impact, it is not
 35 anticipated that feasible measures will be available in all situations to reduce vibration to levels

1 below the applicable thresholds. This impact would therefore be considered significant and
2 unavoidable.

3 **Mitigation Measure NOI-2: Employ Vibration-Reducing Construction Practices during**
4 **Construction of Water Conveyance Facilities**

5 Please see Mitigation Measure NOI-2 under Impact NOI-2 in the discussion of Alternative 1A.

6 **Impact NOI-3: Exposure of Noise-Sensitive Land Uses to Noise from Operation of Water**
7 **Conveyance Facilities**

8 **NEPA Effects:** Potential reasonable worst-case pump noise levels during operation of the intake
9 structures were evaluated by calculating sound power levels of the pump based on horsepower
10 (Hoover and Keith 2000). Faceplate horsepower for vertical column and vertical volute type pumps
11 is specified in pump selection appendix of the Conceptual Engineering Report. Pump specifications
12 are shown in Table 23-78. Combined source noise levels assume that pump enclosures (including
13 buildings) provide a nominal 15 dB of noise attenuation. This analysis assumes that pumps are
14 operating 24 hours a day.

15 **Table 23-78. Pump Specifications—Alternative 7**

Pump Location	Quantity	Pumping Plant Capacity (cfs)	Pump Horsepower	Individual Pump Source Level (dBA)	Combined Source Level (dBA)	Assumed Attenuation (dB)	Combined Source Level with Attenuation (dBA)
Intake 2	6	3,000	4,500	97	104	15	89
Intake 3	6	3,000	3,500	96	102	15	88
Intake 5	6	3,000	3,500	96	102	15	88
Intermediate Plant	16 (10/6) ^a	15,000	18,000/ 8,000 ^a	103/99 ^a	114	15	99

^a Vertical Column Pumps/Vertical Volute Pumps in the Intermediate Pumping Plant.

cfs = cubic feet per second.

dB = decibels.

dBA = A-Weighted Sound Level in Decibels.

16
17 The estimated sound levels from pump operation as a function of distance based on calculated
18 point-source attenuation over “soft” (i.e., acoustically absorptive) ground are shown in Table 23-79.

1 **Table 23-79. Predicted Noise Levels from Pump Operation, Intakes, Alternative 7**

Distance Between Source and Receiver (Feet)	Intake 2 Calculated L_{eq} Sound Level (dBA)	Intakes 3 and 5 Calculated L_{eq} Sound Level (dBA)	Intermediate Plant Calculated L_{eq} Sound Level (dBA)
50	89	88	99
100	82	80	91
200	74	72	83
300	69	68	79
400	66	65	75
600	61	60	71
800	58	57	67
1,000	55	54	65
1,200	53	52	63
1,400	52	50	61
1,600	50	49	60
2,000	47	46	57
2,200	46	45	56
2,600	45	43	54
3,600	41	40	50
5,000	37	36	47
6,000	35	34	45
7,000	33	32	46

Notes: Calculations are based on Federal Transit Administration 2006. Calculation do not include the effects, if any, of local shielding from walls, topography, or other barriers that may reduce sound levels further.

Noise levels assume a nominal pump enclosure attenuation of 15 dB.

Bold denotes daytime and nighttime maximum noise thresholds.

dBA = A-weighted sound level in decibels.

2

3 The results shown in Table 23-79 indicate that operating noise from pumping plants would exceed
4 the nighttime threshold of 45 dBA at noise-sensitive land uses within a distance of up to 2,600 feet
5 from intake pumping plant locations, and 6,000 feet from the pumping plant located at the proposed
6 intermediate forebay. Noise from operation of pumping plants is predicted to exceed daytime and
7 nighttime noise thresholds at nearby residences and outdoor parks in areas indicated in Table 23-
8 80.

9 Operation of water conveyance facilities could result in substantial increases in noise levels affecting
10 nearby communities and residences. While noise levels in excess of applicable thresholds could
11 occur throughout the affected area, the highest noise levels are expected at those land uses most
12 adjacent to the pumping plants. The effect of exposing noise-sensitive land uses to noise increases
13 above thresholds would be adverse. Mitigation Measure NOI-3 is available to reduce this effect.

1 **Table 23-80. Land Use Affected by Noise from Operation of Pumping Plants, Alternative 7**

Location	Zoning	50 dBA L_{eq} Daytime	45 dBA L_{eq} Nighttime
		Operations Threshold	Operations Threshold
		Total Affected Parcels	Total Affected Parcels
Sacramento County – including River Road near the community of Hood; neighborhoods in the community of Hood; Lambert Road; Vorden Road.	Natural/Recreational	1	1
	Agricultural/Other ^a	52	106
Yolo County – including County Road E9 near the community of Clarksburg; neighborhoods in the community of Clarksburg.	Agricultural/Other ^a	44	77

^a Includes agricultural or unclassified use that permits residential use.

2

3 **Noise exposure to workers at conveyance facilities**

4 Impact NOI-3 for Alternative 7 is the same as Impact NOI-3 for Alternative 1A in terms of noise
5 exposure to on-site workers. On-site workers would be protected under OSHA requirements. No
6 adverse impacts would occur to workers.

7 **CEQA Conclusion:** The impact of exposing noise-sensitive land uses during pumping plant
8 operations to noise levels above the daytime (50 dBA L_{max}) or nighttime (45 dBA L_{max}) noise
9 thresholds would be considered significant. Based on reasonable worst-case modeling, 1
10 natural/recreational parcel and 96 agricultural parcels would be affected by daytime noise levels in
11 excess of the operational threshold. The nighttime threshold would be exceeded at 1
12 natural/recreational parcel and 183 agricultural parcels. The impact of exposing these receptors to
13 noise increases above thresholds would be significant (see Table 23-80). Mitigation Measure NOI-3
14 would reduce operational noise levels below applicable thresholds, thus resulting in a less-than-
15 significant level.

16 **Mitigation Measure NOI-3: Design and Construct Intake Facilities and Other Pump**
17 **Facilities Such That Operational Noise Does Not Exceed 50 dBA (One-Hour L_{eq}) during**
18 **Daytime Hours (7:00 A.M. to 10:00 P.M.) or 45 dBA (One-Hour L_{eq}) during Nighttime**
19 **Hours (10:00 P.M. to 7:00 A.M.) or the Applicable Local Noise Standard (Whichever Is**
20 **Less) at Nearby Noise Sensitive Land Uses**

21 Please see Mitigation Measure NOI-3 under Impact NOI-3 in the discussion of Alternative 1A.

22 **Impact NOI-4: Exposure of Noise-Sensitive Land Uses to Noise from Implementation of**
23 **Proposed Conservation Measures 2-10**

24 **NEPA Effects:** Although locations or target acreages may vary for proposed conservation measures,
25 at the program level of development, the amount and location of restoration actions under this
26 alternative would be the same as Alternative 1A, except that more channel margin habitat
27 enhancement and seasonally inundated floodplain restoration is proposed, and therefore the effects
28 would be the same as under Alternative 1A. Noise levels during implementation of these

1 conservation measures are expected to vary according to the type of construction equipment and
 2 techniques used, but are likely to be similar to noise levels shown in Table 23-16 (see Impact NOI-1
 3 in Alternative 1A). The results shown in Table 23-16 indicate that residences within 1,200 feet of an
 4 active restoration work area could be exposed to construction noise in excess of the daytime (7 a.m.
 5 to 10 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be
 6 exceeded within a distance of 2,800 feet.

7 The effect of exposing sensitive land uses to increases in construction noise levels above thresholds
 8 would be adverse. Mitigation Measures NOI-1a and NOI-1b are available to address this effect.

9 **CEQA Conclusion:** The impact of exposing noise-sensitive land uses during construction to noise
 10 increases above the daytime (60 dBA L_{eq}) and nighttime (50 dBA L_{max}) thresholds would be
 11 significant. Noise levels during implementation of these conservation measures are expected to vary
 12 according to the type of construction equipment and techniques used, but are likely to be similar to
 13 noise levels shown in Table 23-16 (see Impact NOI-1 in Alternative 1A). The results shown in Table
 14 23-16 indicate that residences within 1,200 feet of an active restoration work area could be exposed
 15 to construction noise in excess of the daytime (7 a.m. to 10 p.m.) noise threshold of 60 dBA L_{eq} (1hr).
 16 The nighttime threshold of 50 dBA L_{max} would be exceeded within a distance of 2,800 feet. The
 17 impact of exposing these receptors to noise increases above thresholds would be significant.
 18 Although Mitigation Measures NOI-1a and NOI-1b would reduce this impact, it is not anticipated that
 19 feasible measures will be available in all situations to reduce construction noise to levels below the
 20 applicable thresholds. This effect would therefore be significant and unavoidable.

21 **Mitigation Measure NOI-1a: Employ Noise-Reducing Construction Practices during**
 22 **Construction**

23 Please see Mitigation Measure NOI-1a under Impact NOI-1 in the discussion of Alternative 1A.

24 **Mitigation Measure NOI-1b: Prior to Construction, Initiate a Complaint/Response**
 25 **Tracking Program**

26 Please see Mitigation Measure NOI-1b under Impact NOI-1 in the discussion of Alternative 1A.

27 **23.3.3.15 Alternative 8—Dual Conveyance with Pipeline/Tunnel, Intakes 2,**
 28 **3, and 5, and Increased Delta Outflow (9,000 cfs; Operational**
 29 **Scenario F)**

30 The impacts of Alternative 8 would be the same as Alternative 7. Both are assumed to construct
 31 Intakes 2, 3 and 5 and an intermediate forebay, and the conveyance facility would be a buried
 32 pipeline (see Figures 3-2 and 3-11 in Chapter 3, *Description of Alternatives*).

33 **Impact NOI-1: Exposure of Noise-Sensitive Land Uses to Noise from Construction of Water**
 34 **Conveyance Facilities**

35 **NEPA Effects:**

36 **Construction of Intakes**

37 Impact NOI-1 for Alternative 8 is the same as Impact NOI-1 for Alternative 7 in terms of construction
 38 equipment noise levels. Noise from intake construction activities is predicted to exceed daytime and
 39 nighttime noise thresholds at nearby residences, schools and outdoor parks in areas indicated in

1 Table 23-76 (see Impact NOI-1 in Alternative 7). While equipment could operate at any work area
2 identified for this alternative, the highest noise levels are expected to occur at those sites where the
3 duration and intensity of construction activities would be greatest.

4 Although this assessment includes daytime and nighttime construction noise estimates, construction
5 of the intakes would primarily occur during daytime hours. If nighttime construction of the intakes
6 were to occur, noise levels could be the same as that generated during daytime hours.

7 The effect of exposing these noise-sensitive land uses to noise increases above thresholds would be
8 adverse. Mitigation Measures NOI-1a and NOI-1b would be available to reduce this effect.

9 ***Construction of Conveyance (Tunnel), Forebays, Barge Unloading Facilities, and Intermediate Pumping*** 10 ***Plant***

11 Construction of the conveyance under Alternative 8 would be the same as Alternative 1A. Noise
12 from construction activities is predicted to exceed daytime and nighttime noise thresholds at nearby
13 residences, schools and outdoor parks indicated in Table 23-19 (see Impact NOI-1 in Alternative
14 1A). While equipment could operate at any work area identified for this alternative, the highest
15 noise levels are expected to occur at those sites where the duration and intensity of construction
16 activities would be greatest. This includes all construction sites along the tunnel conveyance
17 alignment, as well as at the site of the Byron Tract Forebay adjacent to and south of Clifton Court
18 Forebay. For a map of the proposed pipeline/tunnel alignment, see Mapbook Figure M3-1.

19 Although this assessment includes daytime and nighttime construction noise estimates for the
20 forebays, barge unloading facilities, intermediate pumping plant, and conveyance tunnels,
21 construction of the forebays, barge unloading facilities, and intermediate pumping plant would
22 primarily occur during daytime hours. If nighttime construction of the forebays, barge unloading
23 facilities, and intermediate pumping plant were to occur, noise levels could be the same as those
24 generated during daytime hours. Construction of the conveyance tunnels and RTM storage actions
25 would occur on a 24-hour basis.

26 The effect of exposing these noise-sensitive land uses to noise increases above thresholds would be
27 adverse. Mitigation Measures NOI-1a and NOI-1b would be available to reduce this effect.

28 ***Truck Trips and Worker Commutes***

29 The estimate of truck trips and worker commutes under Alternative 8 would be similar to
30 Alternative 7. Traffic noise from truck trips and worker commutes would result in an increase of 12
31 dB or more compared to existing traffic noise levels at residences and outdoor use areas along 16
32 project roadway segments in the study area as shown in Table 23-20.

33 During intake construction, segments of SR 160 between Freeport Bridge and Walnut Grove Bridge
34 would be temporarily realigned around intake construction sites. As a result, future project noise
35 levels would further increase at residences located near intake sites. Under Alternative 8, noise
36 levels at receivers near realigned segments of SR 160 would increase by up to 3 dB in addition to the
37 noise increase shown in Table 23-20.

38 The increase in noise levels would exceed the project threshold for traffic noise and would be
39 considered adverse. Mitigation Measures NOI-1a and NOI-1b are available to address this effect.

1 **Construction of Power Transmission Lines**

2 Noise from construction of power transmission lines for Alternative 8 is the same as Alternative 1A.
 3 The results shown in Table 23-21 (see Impact NOI-1 in Alternative 1A) indicate that noise-sensitive
 4 land uses within 800 feet of an active transmission line construction area could be exposed to
 5 construction noise in excess of the daytime (7 a.m. to 10 p.m.) noise threshold of 60 dBA L_{eq} (1hr).
 6 The nighttime threshold of 50 dBA L_{max} would be exceeded at a distance of 1,800 feet from the
 7 construction area. Several residential land uses are near the proposed transmission line
 8 construction footprint. Likewise, Delta Elementary School and Delta High School on the west bank of
 9 the Sacramento River are within half a mile of the proposed Intake 2 transmission lines. Although
 10 this assessment includes daytime and nighttime construction noise estimates, construction of the
 11 transmission lines would primarily occur during daylight hours. If nighttime construction of the
 12 transmission lines were to occur, noise levels could be the same as those generated during daytime
 13 hours. The effect of exposing noise-sensitive land uses to noise increases above thresholds would be
 14 adverse. Mitigation Measures NOI-1a and NOI-1b are available to address this effect.

15 **Earth-moving activities at offsite borrow/spoil areas**

16 Noise from earth-moving activities at offsite borrow/spoil areas for Alternative 8 are the same as
 17 Alternative 1A. The results shown in Table 23-22 (see Impact NOI-1 in Alternative 1A) indicate that
 18 noise-sensitive land uses within 800 feet of equipment operating in the borrow/spoil area could be
 19 exposed to construction noise in excess of the daytime (7 a.m. to 10 p.m.) noise threshold of 60 dBA
 20 L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be exceeded at a distance of 1,800 feet from
 21 the area. Borrow/spoil areas are located throughout the conveyance alignment and are generally
 22 adjacent to or in close proximity of intake pumping plant sites, forebays, and main tunnel
 23 construction shafts. The effect of exposing these noise-sensitive land uses to noise increases
 24 above thresholds would be adverse. However, with the exception of tunneling and RTM
 25 placement, most construction activities would occur during daytime hours. Mitigation Measures
 26 NOI-1a and NOI-1b are available to address this effect.

27 **Noise exposure to workers at construction sites**

28 Impact NOI-1 for Alternative 8 is the same as Impact NOI-1 for Alternative 1A in terms of noise
 29 exposure to on-site workers. On-site workers would be protected under OSHA requirements.
 30 No adverse impacts would occur to workers.

31 **CEQA Conclusion:** The impact of exposing noise-sensitive land uses during construction to noise
 32 levels above the daytime 60 dBA L_{eq} (1hr) daytime, the 50 dBA L_{max} nighttime, or the 12 dB traffic
 33 noise increase threshold would be considered significant. Based on reasonable worst-case modeling,
 34 the following significant impacts are expected as a result of Alternative 8 construction.

- 35 • **Intakes:** Sensitive receptors within 1,400 feet of an active intake construction site could be
 36 exposed to construction noise in excess of the 60 dBA L_{eq} (1hr) daytime threshold. The
 37 nighttime threshold of 50 dBA L_{max} would be exceeded at a distance of 2,800 feet. As shown in
 38 Table 23-76 (see Impact NOI-1 in Alternative 7), 7 residential parcels, 2 natural/recreational
 39 parcels, and 163 agricultural parcels would be affected by daytime noise levels in excess of this
 40 threshold during construction. The nighttime threshold would be exceeded at 210 residential
 41 parcels, 6 natural/recreational parcels, 215 agricultural parcels, and 1 school.
- 42 • **Conveyance and Associated Facilities:** Sensitive receptors within 1,200 feet of an active
 43 tunnel work area could be exposed to construction noise in excess of the daytime (7 a.m. to 10
 44 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be

1 exceeded at a distance of 2,800 feet. As shown in Table 23-19 (see Impact NOI-1 in Alternative
 2 1A), 125 residential parcels, 9 natural/recreational parcels, 765 agricultural parcels, and 2
 3 schools would be affected by daytime noise levels in excess of this threshold during
 4 construction. The nighttime threshold would be exceeded at 226 residential parcels, 20
 5 natural/recreational parcels, 1,109 agricultural parcels, and 4 schools.

- 6 • **Truck Trips and Worker Commutes:** Traffic noise from truck trips and worker commutes
 7 would result in an increase of 12 dB or more compared to existing traffic noise levels at
 8 residences and outdoor use areas along 16 project roadway segments in the study area as
 9 shown in Table 23-20. The increase in noise levels would be substantial and exceed the project
 10 threshold for traffic noise. Mitigation Measures NOI-1a and NOI-1b are available to address this
 11 effect.
- 12 • **Power Transmission Lines:** Sensitive receptors within 800 feet of an active transmission line
 13 construction area could be exposed to construction noise in excess of the daytime (7 a.m. to 10
 14 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be
 15 exceeded at a distance of 1,800 feet from the construction area. As noted above, several
 16 residential land uses are near the proposed transmission line construction footprint. Likewise,
 17 Delta Elementary School and Delta High School on the west bank of the Sacramento River are
 18 within half a mile of the proposed Intake 2 transmission lines.
- 19 • **Borrow/spoil areas:** Sensitive receptors within 800 feet of equipment operating in the
 20 borrow/spoil area could be exposed to construction noise in excess of the daytime (7 a.m. to 10
 21 p.m.) noise threshold of 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be
 22 exceeded at a distance of 1,800 feet from the area. Borrow/spoil areas are located throughout
 23 the conveyance alignment and are generally adjacent to or in close proximity of intake pumping
 24 plant sites, forebays, and main tunnel construction shafts.

25 Mitigation Measures NOI-1a and NOI-1b would reduce noise impacts to sensitive land uses.
 26 Although implementation of these measures will reduce the impact, it is not anticipated that feasible
 27 measures will be available in all situations to reduce construction noise to levels below the
 28 applicable thresholds. This impact would therefore be significant and unavoidable.

29 **Mitigation Measure NOI-1a: Employ Noise-Reducing Construction Practices during** 30 **Construction**

31 Please see Mitigation Measure NOI-1a under Impact NOI-1 in the discussion of Alternative 1A.

32 **Mitigation Measure NOI-1b: Prior to Construction, Initiate a Complaint/Response** 33 **Tracking Program**

34 Please see Mitigation Measure NOI-1b under Impact NOI-1 in the discussion of Alternative 1A.

35 **Impact NOI-2: Exposure of Sensitive Receptors to Vibration or Groundborne Noise from** 36 **Construction of Water Conveyance Facilities**

37 **NEPA Effects:**

38 **Pile Driving at Intake Sites**

39 Impact NOI-2 for Alternative 8 is the same as Impact NOI-2 for Alternative 1A. Groundborne
 40 vibration levels from construction of intakes could exceed vibration thresholds at nearby receptors,

1 including residential structures (see Table 23-24 under Impact NOI-2 in Alternative 1A). The effect
 2 of exposing sensitive receptors to groundborne vibration would be adverse. Mitigation Measure
 3 NOI-2 is available to reduce this effect.

4 ***Construction of Water Conveyance (Tunnel)***

5 Under Alternative 8, groundborne noise effects during construction of the conveyance would be the
 6 same as Impact NOI-2 for Alternative 1A. At a 60-foot tunnel depth, groundborne vibrations from
 7 the TBM are estimated to be 0.008 in/sec PPV, which is below the threshold of 0.04 in/sec PPV. As
 8 described in Section 23.4.2, *Determination of Effects*, tunnel locomotives would be operated at slow
 9 speeds inside of tunnels and would not result in excessive vibrations. Groundborne noise from
 10 tunnel locomotive operation during construction is therefore not predicted to exceed groundborne
 11 noise thresholds or result in an adverse noise impact to sensitive receptors along the tunnel
 12 conveyance.

13 ***CEQA Conclusion:*** Groundborne vibrations during tunneling would not exceed 0.008 in/sec PPV at
 14 60-foot tunnel depth and would therefore be less than significant. Likewise, locomotives are not
 15 expected to generate significant noise levels because they will travel at low speeds between 5 and
 16 10 miles per hour. However, the impact of exposing residential structures to groundborne vibration
 17 during intake construction would be significant as reasonable worst-case modeling indicates that
 18 102 residential parcels would be exposed to vibration levels in excess of 0.2 in/sec PPV during
 19 intake pile driving (see Table 23-24 under Impact NOI-2 in Alternative 1A). Although Mitigation
 20 Measure NOI-2 will reduce the impact, it is not anticipated that feasible measures will be available in
 21 all situations to reduce vibration to levels below the applicable thresholds. This impact would
 22 therefore be considered significant and unavoidable.

23 **Mitigation Measure NOI-2: Employ Vibration-Reducing Construction Practices during** 24 **Construction of Water Conveyance Facilities**

25 Please see Mitigation Measure NOI-2 under Impact NOI-2 in the discussion of Alternative 1A.

26 **Impact NOI-3: Exposure of Noise-Sensitive Land Uses to Noise from Operation of Water** 27 **Conveyance Facilities**

28 ***NEPA Effects:*** Impact NOI-3 for Alternative 8 is the same as Impact NOI-3 for Alternative 7.
 29 Operation of water conveyance facilities could result in substantial increases in noise levels affecting
 30 nearby communities and residences (see Table 23-80 under Impact NOI-3 in Alternative 7). While
 31 noise levels in excess of applicable thresholds could occur throughout the affected area, the highest
 32 noise levels are expected at those land uses most adjacent to the pumping plants. The effect of
 33 exposing noise-sensitive land uses to noise increases above thresholds would be adverse. Mitigation
 34 Measure NOI-3 is available to reduce this effect.

35 ***Noise exposure to workers at conveyance facilities***

36 Impact NOI-3 for Alternative 8 is the same as Impact NOI-3 for Alternative 1A in terms of noise
 37 exposure to on-site workers. On-site workers would be protected under OSHA requirements. No
 38 adverse impacts would occur to workers.

39 ***CEQA Conclusion:*** The impact of exposing noise-sensitive land uses during pumping plant
 40 operations to noise levels above the daytime (50 dBA L_{max}) or nighttime (45 dBA L_{max}) noise
 41 thresholds would be considered significant. Based on reasonable worst-case modeling, 1

1 natural/recreational parcel and 96 agricultural parcels would be affected by daytime noise levels in
 2 excess of the operational threshold. The nighttime threshold would be exceeded at 1
 3 natural/recreational parcel and 183 agricultural parcels. The impact of exposing these receptors to
 4 noise increases above thresholds would be significant(see Table 23-80 under Impact NOI-3 in
 5 Alternative 7). Mitigation Measure NOI-3 would reduce operational noise levels below applicable
 6 thresholds, thus resulting in a less-than-significant level.

7 **Mitigation Measure NOI-3: Design and Construct Intake Facilities and Other Pump**
 8 **Facilities Such That Operational Noise Does Not Exceed 50 dBA (One-Hour L_{eq}) during**
 9 **Daytime Hours (7:00 A.M. to 10:00 P.M.) or 45 dBA (One-Hour L_{eq}) during Nighttime**
 10 **Hours (10:00 P.M. to 7:00 A.M.) or the Applicable Local Noise Standard (Whichever Is**
 11 **Less) at Nearby Noise Sensitive Land Uses**

12 Please see Mitigation Measure NOI-3 under Impact NOI-3 in the discussion of Alternative 1A.

13 **Impact NOI-4: Exposure of Noise-Sensitive Land Uses to Noise from Implementation of**
 14 **Proposed Conservation Measures 2-10**

15 **NEPA Effects:** Although locations or target acreages may vary for proposed conservation measures,
 16 at the program level of development, the amount and location of restoration actions under this
 17 alternative would be the same as Alternative 1A, and therefore the impact would be the same as
 18 under Alternative 1A. Noise levels during implementation of these conservation measures are
 19 expected to vary according to the type of construction equipment and techniques used, but are likely
 20 to be similar to noise levels shown in Table 23-16 (see Impact NOI-1 in Alternative 1A). The results
 21 shown in Table 23-16 indicate that residences within 1,200 feet of an active restoration work area
 22 could be exposed to construction noise in excess of the daytime (7 a.m. to 10 p.m.) noise threshold of
 23 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be exceeded within a distance of
 24 2,800 feet.

25 The effect of exposing sensitive land uses to increases in construction noise levels above thresholds
 26 would be adverse. Mitigation Measures NOI-1a and NOI-1b are available to address this effect.

27 **CEQA Conclusion:** The impact of exposing noise-sensitive land uses during construction to noise
 28 increases above the daytime (60 dBA L_{eq}) and nighttime (50 dBA L_{max}) thresholds would be
 29 significant. Noise levels during implementation of these conservation measures are expected to vary
 30 according to the type of construction equipment and techniques used, but are likely to be similar to
 31 noise levels shown in Table 23-15 (see Impact NOI-1 in Alternative 1A). The results shown in Table
 32 23-15 indicate that residences within 1,200 feet of an active restoration work area could be exposed
 33 to construction noise in excess of the daytime (7 a.m. to 10 p.m.) noise threshold of 60 dBA L_{eq} (1hr).
 34 The nighttime threshold of 50 dBA L_{max} would be exceeded within a distance of 2,800 feet. The
 35 impact of exposing these receptors to noise increases above thresholds would be significant.
 36 Although Mitigation Measures NOI-1a and NOI-1b would reduce this impact, it is not anticipated that
 37 feasible measures will be available in all situations to reduce construction noise to levels below the
 38 applicable thresholds. This impact would therefore be significant and unavoidable.

39 **Mitigation Measure NOI-1a: Employ Noise-Reducing Construction Practices during**
 40 **Construction**

41 Please see Mitigation Measure NOI-1a under Impact NOI-1 in the discussion of Alternative 1A.

1 **Mitigation Measure NOI-1b: Prior to Construction, Initiate a Complaint/Response**
 2 **Tracking Program**

3 Please see Mitigation Measure NOI-1b under Impact NOI-1 in the discussion of Alternative 1A.

4 **23.3.3.16 Alternative 9—Through Delta Separate Corridors (15,000 cfs;**
 5 **Operational Scenario G)**

6 Alternative 9 would construct two fish screens, at the entrances to the Delta Cross Channel and
 7 Georgiana Slough. These intakes would be smaller sized than for the other alternatives. Two new
 8 diversion pumping plants would be constructed, on the San Joaquin River at the Head of Old River
 9 and on Middle River upstream of Victoria Canal. There would be no new forebay. The conveyance
 10 would be through existing canals and Delta channels, with modifications to the levees and channels,
 11 operable barriers, a fish movement corridor around Clifton Court Forebay, and a water supply
 12 corridor.

13 **Impact NOI-1: Exposure of Noise-Sensitive Land Uses to Noise from Construction of Water**
 14 **Conveyance Facilities**

15 **NEPA Effects:** Construction of operable barriers and pumping plants under Alternative 9 would
 16 require the use of impact-driven sheet piles to construct cofferdams and barrier foundations.
 17 Potential reasonable worst-case equipment noise levels from construction work areas would be
 18 comparable to those listed for the intake sites in Table 23-17. Assuming 100% equipment utilization
 19 within a given hour of day, the combined noise level at work areas is 98 dBA L_{eq} (1hr) at 50 feet.

20 The results shown in Table 23-17 indicate that during periods of pile driving, residences located
 21 within 1,400 feet of an active intake construction site could be exposed to construction noise in
 22 excess of the DWR daytime (7 a.m. to 10 p.m.) maximum noise threshold of 60 dBA L_{eq} (1hr). The
 23 nighttime threshold of 50 dBA L_{max} would be exceeded at a distance of 2,800 feet.

24 Noise from construction is predicted to exceed daytime and nighttime noise thresholds at nearby
 25 residences, schools and outdoor parks in areas indicated in Table 23-81.

26 **Table 23-81. Land Use Affected by Equipment Noise from Construction, Alternative 9**

Location	Zoning	Daytime Threshold (60 dBA L_{eq} [1h])	Nighttime Threshold (50 dBA L_{max} [1h])
		Total Affected Parcels	Total Affected Parcels
Sacramento County – including neighborhoods in the communities of Walnut Grove, Grand Island Estates, and Locke.	Residential	197	234
	Natural/Recreational	32	37
	Agricultural/Other ^a	335	419
	Schools	None	Walnut Grove Elementary
San Joaquin County	Residential	15	18
	Natural/Recreational	1	2
	Agricultural/Other ^a	219	531
Contra Costa County	Agricultural/Other ^a	54	79
Alameda County	Agricultural/Other ^a	16	19

^a Includes agricultural or unclassified use that permits residential use.

1 Pile driving and equipment noise during construction of the operable barriers, fish screens, and
 2 pumping plants could result in a substantial increase in ambient noise levels affecting nearby
 3 communities and residences. For above-ground construction during nighttime hours, single-event
 4 noise levels could result in sleep disturbance in nearby residential areas.

5 Although this assessment includes daytime and nighttime construction noise estimates, construction
 6 of the operable barriers, fish screens, and pumping plants would primarily occur during daytime
 7 hours. If nighttime construction of these facilities were to occur, noise levels could be the same as
 8 that generated during daytime hours.

9 The effect of exposing noise-sensitive land uses to noise increases above thresholds would be
 10 adverse. Mitigation Measures NOI-1a and NOI-1b are available to address this effect.

11 ***Truck Trips and Worker Commutes***

12 Project-generated heavy trucks and worker commutes are predicted to result in increased traffic
 13 noise levels at noise-sensitive land uses adjacent to local roadways. Project-generated vehicle traffic
 14 volumes for the Through Delta/Separate Corridors are predicted to have a maximum heavy truck
 15 composition of 96%, which was assumed to apply to any of the local roadways under a worst-case
 16 noise scenario. Future noise levels are shown in Table 23-82.

17 **Table 23-82. Predicted Future Traffic Noise Levels on Commuter Roads and Haul Routes, Through**
 18 **Delta/Separate Corridors**

Roadway	Segment	Existing Noise Level, dBA	Future With-Project Noise Level, dBA	Noise Level Increase, dB	Substantial Increase?
Byron Hwy	Contra Costa Co./ Alameda Co. Line to Alameda Co./San Joaquin Co. Line	58	74	16	yes
Brentwood Blvd	Delta Rd (Oakley City Limits) to Balfour Rd	61	76	15	yes
Brentwood Blvd	Balfour Rd to Brentwood City Limits (South)	60	76	16	yes
Balfour Rd	Brentwood Blvd to Brentwood City Limits	61	61	0	no
Bethel Island Rd	Oakley City Limits to End	55	55	0	no
Balfour Rd	Brentwood City Limits to Byron Hwy	54	54	0	no
Old SR 41	Brentwood City Limits (South) to Marsh Creek Rd	62	76	14	yes
Byron Hwy	Delta Rd to Old SR 4	53	53	0	no
Byron Hwy	SR 4 to Contra Costa Co./ Alameda Co. Line	59	74	15	yes
SR 160 (Freeport Blvd)	Sacramento City Limits to Freeport Bridge	59	59	0	no
SR 160 (Freeport Blvd/ River Rd)	Freeport Bridge to Scribner Rd	55	55	0	no

Roadway	Segment	Existing Noise Level, dBA	Future With-Project Noise Level, dBA	Noise Level Increase, dB	Substantial Increase?
SR 160	Scribner Rd to Hood Franklin Rd	53	53	0	no
SR 160	Hood Franklin Rd to Lambert Rd	55	55	0	no
SR 160	Lambert Rd to Paintersville Bridge	53	53	0	no
SR 160 (Paintersville Bridge)	Sutter Slough Bridge Rd to SR 160 (River Rd)	53	77	24	yes
SR 160	Paintersville Bridge to Walnut Grove Bridge	53	77	24	yes
SR 160	Walnut Grove Bridge to A St (Isleton)	59	77	18	yes
SR 160	A St (Isleton) to SR 12	58	77	19	yes
SR 160	SR 12 to Brannan Island Rd	62	78	16	yes
SR 84	West Sacramento City Limits to Courtland Rd	55	77	22	yes
SR 84 (Courtland Rd/ Ryer Ave)	Courtland Rd to Cache Slough Ferry	46	46	0	no
SR 12 EB	I-80 to Beck Ave	65	76	11	no
SR 12 WB	I-80 to Beck Ave	64	76	12	yes
SR 12	Beck Ave to Sunset Ave/ Grizzly Island Rd	68	79	11	no
SR 12	Sunset Ave/ Grizzly Island Rd to Walters Rd/	66	79	13	yes
SR 12	Walters Rd/ to SR 113	63	79	16	yes
SR 12	SR 113 to SR 84 (River Rd)	64	79	15	yes
SR 12 (Rio Vista Bridge)	SR 84 (River Rd) to SR 160 (River Rd)	64	79	15	yes
SR 12	SR 160 (River Rd) to Sacramento Co./ SJ Co. Line	62	68	6	no
SR 12	Sacramento Co./ SJ Co. Line to I-5	63	68	5	no
SR 113	I-80 to Dixon City Limits	64	79	15	yes
SR 113	Dixon City Limits to SR 12	57	78	21	yes
SR 4 (Marsh Creek Rd)	Vasco Rd to Byron Hwy	61	77	16	yes
SR 4	Marsh Creek Rd to Discovery Bay Blvd	63	78	15	yes
SR 4	Discovery Bay Blvd to Tracy Blvd	61	77	16	yes
SR 4	Tracy Blvd to I-5	64	78	14	yes

Roadway	Segment	Existing Noise Level, dBA	Future With-Project Noise Level, dBA	Noise Level Increase, dB	Substantial Increase?
A St/4th St/ Jackson Blvd.	SR 160 to Isleton City Limits	48	48	0	no
Main Street (Old SR 4)	SR 160 to Cypress Rd	62	76	14	yes
Main Street (Old SR 4)	Cypress Rd to Delta Rd (Oakley City Limits)	61	76	15	yes
Cypress Rd	Main Street to Bethel Island Rd	58	58	0	no
Bethel Island Rd	Cypress Rd to Oakley City Limits	55	55	0	no
Delta Rd	Main Street to Byron Hwy	55	55	0	no
Pocket Rd	I-5 to Freeport Blvd	63	63	0	no
Freeport Blvd (Old SR 160)	Pocket Rd to Sacramento City Limits	56	56	0	no
Freeport Bridge	River Rd to SR 160 (Freeport Blvd)	55	55	0	no
Hood Franklin Rd	SR 160 (River Rd) to I-5	51	51	0	no
Lambert Rd	SR 160 (River Rd) to Herzog Rd	44	44	0	no
Lambert Rd	Herzog Rd to Franklin Blvd	46	46	0	no
Franklin Blvd	Lambert Rd to Twin Cities Rd	48	48	0	no
Twin Cities Rd	River Rd to I-5	53	70	17	yes
Twin Cities Rd	I-5 to Franklin Blvd	55	62	7	no
Sutter Slough Bridge Rd	Sacramento Co./ Yolo Co. Line to Paintersville Bridge	50	75	25	yes
River Rd	Paintersville Bridge to Twin Cities Rd	51	70	19	yes
River Rd	Twin Cities Rd to Walnut Grove Bridge	55	70	15	yes
Walnut Grove Rd/River Rd	Walnut Grove Bridge to Sacramento Co./ SJ Co. Line	55	70	15	yes
Isleton Rd	River Rd (Walnut Grove)/Isleton Rd Bridge to 1.5 miles west of Isleton Rd Bridge	54	67	13	yes
Race Track Rd/ Tyler Island Rd	Walnut Grove Rd to Southern End of Tyler Island	45	45	0	no
Tyler Island Rd	Southern End of Tyler Island to SR 160 (River Rd)	46	46	0	no
Jackson Slough Rd	Isleton City Limits to SR 12	47	47	0	no

Roadway	Segment	Existing Noise Level, dBA	Future With-Project Noise Level, dBA	Noise Level Increase, dB	Substantial Increase?
Jackson Slough Rd	Brannan Island Rd to SR 12	47	47	0	no
Walnut Grove Rd	Sacramento Co./ SJ Co. Line to I-5	53	70	17	yes
Peltier Rd	Blossom Rd to I-5	44	44	0	no
Tracy Blvd	SR 4 to Clifton Court Rd	53	73	20	yes
Tracy Blvd	Clifton Court Rd to Tracy City Limits	52	73	21	yes
Byron Hwy	Alameda Co./San Joaquin Co. Line to Mountain House Pkwy	59	74	15	yes
Mountain House Pkwy	Byron Hwy to Arnaudo Blvd	54	74	20	yes
Mountain House Pkwy	Arnaudo Blvd to I-205	58	74	16	yes
Eight Mile Rd	Stockton City Limits to I-5	58	58	0	no
Tracy Blvd	Tracy City Limits to I-205	58	73	15	yes
Harbor Blvd	Industrial Blvd to US 50	63	75	12	yes
Industrial Blvd/ Lake Washington Blvd	Harbor Blvd to Jefferson Blvd	62	75	13	yes
Jefferson Blvd (Old SR 84)	Lake Washington Blvd to Southport Pkwy	62	75	13	yes
Jefferson Blvd (Old SR 84)	Southport Pkwy to West Sacramento City Limits	51	75	24	yes
River Rd	Freeport Bridge to Courtland Rd	54	54	0	no
River Rd	Courtland Rd to Sacramento Co./ Yolo Co. Line	48	75	27	yes
Courtland Rd	SR 84 to River Rd	48	75	27	yes

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As shown in Table 23-82, predicted future traffic noise levels from project-generated worker commutes and truck trips would result in an increase of 12 dB or more compared to existing traffic noise levels along 43 project roadway segments. The increase in noise levels would exceed the project threshold for traffic noise and would be considered adverse. Mitigation Measures NOI-1a and NOI-1b are available to address this effect.

7

Noise exposure to workers at construction sites

8

9

10

Impact NOI-1 for Alternative 9 is the same as Impact NOI-1 for Alternative 1A in terms of noise exposure to on-site workers. On-site workers would be protected under OSHA requirements. No adverse impacts would occur to workers.

1 **CEQA Conclusion:** The impact of exposing noise-sensitive land uses during construction to noise
 2 levels above the daytime 60 dBA L_{eq} (1hr) daytime, the 50 dBA L_{max} nighttime, or the 12 dB traffic
 3 noise increase threshold would be considered significant. Based on reasonable worst-case modeling,
 4 Sensitive receptors within 1,400 feet of a construction activity could be exposed to construction
 5 noise in excess of the 60 dBA L_{eq} (1hr) daytime threshold. The nighttime threshold of 50 dBA L_{max}
 6 would be exceeded at a distance of 2,800 feet. As shown in Table 23-81, 212 residential parcels, 33
 7 natural/recreational parcels, and 624 agricultural parcels would be affected by daytime noise levels
 8 in excess of this threshold during construction. The nighttime threshold would be exceeded at 252
 9 residential parcels, 39 natural/recreational parcels, 1,048 agricultural parcels, and 1 school. Traffic
 10 noise from truck trips and worker commutes would result in an increase of 12 dB or more compared
 11 to existing traffic noise levels at residences and outdoor use areas along 43 project roadway
 12 segments in the study area as shown in Table 23-82. The increase in noise levels would exceed the
 13 project threshold for traffic noise.

14 Mitigation Measures NOI-1a and NOI-1b would reduce noise impacts to sensitive land uses.
 15 Although implementation of these measures will reduce the impact, it is not anticipated that feasible
 16 measures will be available in all situations to reduce construction noise to levels below the
 17 applicable thresholds. This impact would therefore be significant and unavoidable.

18 **Mitigation Measure NOI-1a: Employ Noise-Reducing Construction Practices during**
 19 **Construction**

20 Please see Mitigation Measure NOI-1a under Impact NOI-1 in the discussion of Alternative 1A.

21 **Mitigation Measure NOI-1b: Prior to Construction, Initiate a Complaint/Response**
 22 **Tracking Program**

23 Please see Mitigation Measure NOI-1b under Impact NOI-1 in the discussion of Alternative 1A.

24 **Impact NOI-2: Exposure of Sensitive Receptors to Vibration or Groundborne Noise from**
 25 **Construction of Water Conveyance Facilities**

26 **NEPA Effects:** Use of impact piles during construction of operable barriers and pumping plants
 27 would exceed the groundborne vibration threshold of 0.2 in/sec PPV within 70 feet of pile driving
 28 sites, as shown in Table 23-23. No residences are located within 70 feet of areas where operable
 29 barriers or pumping plants would be built under Alternative 9 and there would be no adverse effect.

30 **CEQA Conclusion:** As shown in Table 23-23, groundborne vibration during construction of the
 31 operable barriers and pumping plants would exceed the vibration threshold of 0.2 in/sec PPV within
 32 70 feet of pile driving sites. However, no residences are located within 70 feet of areas where
 33 operable barriers or pumping plants would be built. This impact would therefore be less-than-
 34 significant.

35 **Impact NOI-3: Exposure of Noise-Sensitive Land Uses to Noise from Operation of Water**
 36 **Conveyance Facilities**

37 **NEPA Effects:** Potential reasonable worst-case pump noise levels during operation of the intake
 38 structures were evaluated by calculating sound power levels of the pump based on horsepower
 39 (Hoover and Keith 2000). Under the pipeline/tunnel alignment, faceplate horsepower for vertical
 40 column type pumps is specified in pump selection appendix of the Conceptual Engineering Report.

1 Pump specifications are shown in Table 23-83. Combined source noise levels assume that pump
 2 enclosures (including buildings) provide a nominal 15 dB of noise attenuation. This analysis
 3 assumes that pumps are operating 24 hours a day.

4 **Table 23-83. Pump Specifications—Alternative 9**

Pump Location	Quantity	Pumping Plant Capacity (cfs)	Pump Horsepower	Individual Pump Source Level (dBA)	Combined Source Level (dBA)	Assumed Attenuation (dB)	Combined Source Level with Attenuation (dBA)
Old River	3	3,000	500	87	92	15	77
Middle River	3	3,000	400	86	91	15	76

cfs = cubic feet per second.
 dB = decibels.
 dBA = A-Weighted Sound Level in Decibels.

5
 6 The estimated sound levels from pump operation as a function of distance based on calculated
 7 point-source attenuation over “soft” (i.e., acoustically absorptive) ground are shown in Table 23-84.

8 **Table 23-84. Predicted Noise Levels from Pump Operation, Intakes, Alternative 9**

Distance Between Source and Receiver (Feet)	Old River Plant Calculated L_{eq} Sound Level (dBA)	Middle River Plant Calculated L_{eq} Sound Level (dBA)
50	81	80
100	73	72
200	65	64
400	57	56
600	53	52
700	51	50
750	50	49
1,000	47	46
1,100	46	45
1,200	45	44
1,300	44	43

Notes: Calculations are based on Federal Transit Administration 2006. Calculation do not include the effects, if any, of local shielding from walls, topography, or other barriers that may reduce sound levels further.

Noise levels assume a nominal pump enclosure attenuation of 15 dB.

Bold denotes daytime and nighttime maximum noise thresholds.

dBA = A-weighted sound level in decibels.

9
 10 The results shown in Table 23-84 indicate that operating noise from pumping plants would exceed
 11 the nighttime threshold of 45 dBA at noise-sensitive land uses within a distance of up to 1,200 feet
 12 from pumping plant locations. Noise from operation of pumping plants is predicted to exceed
 13 daytime and nighttime noise thresholds at nearby residences and outdoor parks in areas indicated
 14 in Table 23-85.

1 **Table 23-85. Land Use Affected by Noise from Operation of Pumping Plants, Alternative 9**

Location	Zoning	50 dBA L_{eq} Daytime Operations Threshold	45 dBA L_{eq} Nighttime Operations Threshold
		Total Affected Parcels	Total Affected Parcels
San Joaquin County	Agricultural/Other ^a	7	9

^a Includes agricultural or unclassified use that permits residential use.

2
3 Operation of pumping plants under Alternative 9 would expose persons to noise levels greater than
4 the threshold for project operations. While noise levels in excess of applicable thresholds could
5 occur throughout the affected area, the highest noise levels are expected at those land uses most
6 adjacent to the pumping plants. The effect of exposing noise-sensitive land uses to operational noise
7 levels above thresholds would be adverse. Mitigation Measure NOI-3 is available to reduce this
8 effect.

9 ***Noise exposure to workers at conveyance facilities***

10 Impact NOI-3 for Alternative 9 is the same as Impact NOI-3 for Alternative 1A in terms of noise
11 exposure to on-site workers. On-site workers would be protected under OSHA requirements. No
12 adverse impacts would occur to workers.

13 ***CEQA Conclusion:*** The impact of exposing noise-sensitive land uses during pumping plant
14 operations to noise levels above the daytime (50 dBA L_{max}) or nighttime (45 dBA L_{max}) noise
15 thresholds would be significant. Based on reasonable worst-case modeling, 7 agricultural parcels
16 would be affected by daytime noise levels in excess of the operational threshold. The nighttime
17 threshold would be exceeded at 9 agricultural parcels (see Table 23-85). The impact of exposing
18 these receptors to noise increases above thresholds would be significant. Mitigation Measure NOI-3
19 would reduce operational noise levels below applicable thresholds, thus resulting in a less-than-
20 significant level.

21 **Mitigation Measure NOI-3: Design and Construct Intake Facilities and Other Pump
22 Facilities Such That Operational Noise Does Not Exceed 50 dBA (One-Hour L_{eq}) during
23 Daytime Hours (7:00 A.M. to 10:00 P.M.) or 45 dBA (One-Hour L_{eq}) during Nighttime
24 Hours (10:00 P.M. to 7:00 A.M.) or the Applicable Local Noise Standard (Whichever Is
25 Less) at Nearby Noise Sensitive Land Uses**

26 Please see Mitigation Measure NOI-3 under Impact NOI-3 in the discussion of Alternative 1A.

27 **Impact NOI-4: Exposure of Noise-Sensitive Land Uses to Noise from Implementation of
28 Proposed Conservation Measures 2-10**

29 ***NEPA Effects:*** Although locations or target acreages may vary for proposed conservation measures,
30 at the program level of development, the amount and location of restoration actions under this
31 alternative would be the same as Alternative 1A, and therefore the effect would be the same as
32 under Alternative 1A. Noise levels during implementation of these conservation measures are
33 expected to vary according to the type of construction equipment and techniques used, but are likely
34 to be similar to noise levels shown in Table 23-15 (see Impact NOI-1 in Alternative 1A). The results
35 shown in Table 23-15 indicate that residences within 1,200 feet of an active restoration work area
36 could be exposed to construction noise in excess of the daytime (7 a.m. to 10 p.m.) noise threshold of

1 60 dBA L_{eq} (1hr). The nighttime threshold of 50 dBA L_{max} would be exceeded within a distance of
2 2,800 feet.

3 The effect of exposing sensitive land uses to increases in construction noise levels above thresholds
4 would be adverse. Mitigation Measures NOI-1a and NOI-1b are available to address this effect.

5 **CEQA Conclusion:** The impact of exposing noise-sensitive land uses during construction to noise
6 increases above the daytime (60 dBA L_{eq}) and nighttime (50 dBA L_{max}) thresholds would be
7 significant. Noise levels during implementation of these conservation measures are expected to vary
8 according to the type of construction equipment and techniques used, but are likely to be similar to
9 noise levels shown in Table 23-15 (see Impact NOI-1 in Alternative 1A). The results shown in Table
10 23-15 indicate that residences within 1,200 feet of an active restoration work area could be exposed
11 to construction noise in excess of the daytime (7 a.m. to 10 p.m.) noise threshold of 60 dBA L_{eq} (1hr).
12 The nighttime threshold of 50 dBA L_{max} would be exceeded within a distance of 2,800 feet. The
13 impact of exposing these receptors to noise increases above thresholds would be significant.
14 Although Mitigation Measures NOI-1a and NOI-1b will reduce the impact, it is not anticipated that
15 feasible measures will be available in all situations to reduce construction noise to levels below the
16 applicable thresholds. This impact would be considered significant and unavoidable.

17 **Mitigation Measure NOI-1a: Employ Noise-Reducing Construction Practices during**
18 **Construction**

19 Please see Mitigation Measure NOI-1a under Impact NOI-1 in the discussion of Alternative 1A.

20 **Mitigation Measure NOI-1b: Prior to Construction, Initiate a Complaint/Response**
21 **Tracking Program**

22 Please see Mitigation Measure NOI-1b under Impact NOI-1 in the discussion of Alternative 1A.

23 **23.3.3.17 Cumulative Analysis**

24 Implementation of the BDCP will result in noise and vibration effects associated with construction
25 and operation of new intake and conveyance facilities and conservation measures. To assess the
26 contribution of the BDCP project alternatives to cumulative noise and vibration conditions, noise
27 and vibration from construction and operation of the BDCP is evaluated in conjunction with noise
28 and vibration potentially generated by past, present, and reasonably foreseeable future projects
29 within the Plan Area. The following list includes projects considered for this cumulative effects
30 section; for a complete list of such projects, consult Appendix 3D, *Defining Existing Conditions, No*
31 *Action Alternative, No Project Alternative, and Cumulative Impact Conditions.*

32 **Table 23-86. Noise Effects from the Plans, Policies, and Programs Considered for Cumulative Analysis**

Project/Program	Agency	Project Elements Related to Noise	Potential Noise Effect
Levee Repair- Levee Evaluation Program	California Department of Water Resources	Identification and repair of levee sites throughout the Central Valley.	Increases in short term noise levels during levee repair. Potential increase in short term groundborne vibration.
Oroville Facilities Relicensing	California Department of Water Resources	Relicensing of the Oroville Facilities	Increases in long-term ambient noise levels as a result of continued hydropower operations.

Project/Program	Agency	Project Elements Related to Noise	Potential Noise Effect
South Delta Temporary Barriers Project	California Department of Water Resources	Installation of four rock barriers across the South Delta channels	Increases in short term noise levels during construction. Potential increase in groundborne vibration.
North Bay Aqueduct Alternative Intake Project	California Department of Water Resources and Solano County Water Agency	Construction and operation of an alternative intake on the Sacramento River	Increases in short term noise levels during construction; increases in long-term ambient noise levels as a result of intake operation.
Altamont Corridor Rail Project	California High Speed Rail Authority and Federal Railroad Administration	Upgrades to the Altamont Commuter Express System as part of the statewide High Speed Rail Initiative on a separate, dedicated passenger track	Increases in short term noise levels during construction; increases in long-term ambient noise levels as a result of increased rail service; increases in groundborne vibration.
California High-Speed Rail System Sacramento to Merced Section	California High Speed Rail Authority and Federal Railroad Administration	Construction of a new rail corridor between Merced and Sacramento, with various alignments under study including alignments adjacent to the existing Union Pacific Railroad and Burlington Northern Santa Fe (BNSF) railroad routes	Increases in short term noise levels during construction; increases in long-term ambient noise levels as a result of increased rail service; increases in groundborne vibration.
Contra Costa Canal Fish Screen Project	Contra Costa Water District	Installation of fish screens at the Rock Slough diversion	Increases in short term noise levels during construction. Potential increase in short term groundborne vibration.
Los Vaqueros Reservoir Expansion Project	Contra Costa Water District and U.S. Bureau of Reclamation	Construction of a new diversion on Old River; increased reservoir capacity to 275,000 acre-feet and addition of a new 470 cfs connection	Increases in short term noise levels during construction. Potential increase in short term groundborne vibration.
Alternative Intake Project	Contra Costa Water District, U.S. Bureau of Reclamation, and California Department of Water Resources	Location of a new drinking water intake at Victoria Canal	Increases in short term noise levels during construction. Potential increase in short term groundborne vibration.
Davis-Woodland Water Supply Project	Davis, Woodland, and University of California, Davis	Construction and operation of a water intake/diversion, conveyance, and water treatment facilities.	Increases in short term noise levels during construction; increases in long-term ambient noise levels as a result of intake operation
Freeport Regional Water Project	Freeport Regional Water Authority and U.S. Bureau of Reclamation	Construction of a new water intake facility/pumping plant and 17-mile underground water pipeline within Sacramento County	Increases in short term noise levels during construction; increases in long-term ambient noise levels as a result of intake operation

Project/Program	Agency	Project Elements Related to Noise	Potential Noise Effect
Eastern San Joaquin Integrated Conjunctive Use Program	Northeastern San Joaquin County Groundwater Banking Authority (NSJCGBA)	Development of approximately 140,000 to 160,000 acre-feet per year (AF/yr) of new surface water supply for the basin	Increases in short term noise levels during construction; increases in long-term ambient noise levels as a result of intake operation
American River Pump Station and Restoration Project	Placer County Water Agency and U.S. Bureau of Reclamation	Includes a permanent pump station to replace a temporary pumping facility on the American River that was installed in anticipation of construction of Auburn Dam.	Increases in short term noise levels during construction; increases in long-term ambient noise levels as a result of pump operation
Sacramento International Airport Master Plan	Sacramento County	Development of facilities at the Airport over the next 20 years	Increases in short term noise levels during construction; increases in long-term ambient noise levels associated with new development; increases in short and long-term groundborne vibration
Delta Water Supply Project	Stockton	Development of a new supplemental water supply for the Stockton Metropolitan Area	Increases in short term noise levels during construction; increases in long-term ambient noise levels associated with new development; potential for increases in short and long-term groundborne vibration
Suisun Bay Channel Operations and Maintenance	U.S. Army Corps of Engineers	Annual maintenance dredging of the main channel from the Carquinez Strait at Martinez to Pittsburg (called Suisun Bay Channel), and maintenance dredging of New York Slough Channel farther upstream to Antioch	Increases in short term noise levels during construction
Suisun Channel (Slough) Operation and Maintenance	U.S. Army Corps of Engineers	Maintenance dredging of an entrance channel in Suisun Bay 200 feet wide and -8 feet deep, and thence a channel 100 to 125 feet wide and -8 feet deep for 13 miles to the head of navigation at City of Suisun, with a turning basin	Increases in short term noise levels during construction
Delta-Mendota Canal/California Aqueduct Intertie	U.S. Bureau of Reclamation	Construction and operations of a pumping plant and pipeline connection between the Delta Mendota Canal (DMC) and the California Aqueduct	Increases in short term noise levels during construction; increases in long-term ambient noise levels as a result of pump operation

Project/Program	Agency	Project Elements Related to Noise	Potential Noise Effect
Red Bluff Diversion Dam Fish Passage Project	U.S. Bureau of Reclamation and Tehama Colusa Canal Authority	Modification of the Red Bluff Diversion Dam, including new pumping plant and fish screen	Increases in short term noise levels during construction; increases in long-term ambient noise levels as a result of pump operation
American Basin Fish Screen and Habitat Improvement Project	U.S. Bureau of Reclamation, California Department of Fish and Wildlife, and Natomas Central Mutual Water Company	Modification to the Natomas Mutual's water diversion and distribution system adjacent to the Sacramento River and Natomas Cross Canal in Sacramento and Sutter counties, California.	Increases in short term noise levels during construction; increases in long-term ambient noise levels as a result of pump/intake operation
Folsom Dam Safety and Flood Damage Reduction Project	U.S. Bureau of Reclamation, U.S. Army Corps of Engineers, Sacramento Area Flood Control Agency, and Central Valley Flood Protection Board	Includes the Joint Federal Project Auxiliary Spillway, seismic improvements to the Main Concrete Dam and Mormon Island Auxiliary Dam (MIAD), static improvements to earthen structures, security upgrades, replacement of the Main Concrete Dam spillway gates, and a 3.5-foot (ft) raise to all Folsom Facility structures	Increases in short term noise levels during construction. Potential increase in short term groundborne vibration.
West Sacramento Levee Improvements Program	West Sacramento Area Flood Control Agency and U.S. Army Corps of Engineers	Construction of improvements to the levees protecting West Sacramento to meet local and federal flood protection criteria.	Increases in short term noise levels during levee repair. Potential increase in short term groundborne vibration.
Yolo County General Plan Update	Yolo County	Provides for growth and development in the unincorporated area through 2010	Increases in short term noise levels during construction; increases in long-term ambient noise levels associated with new development; increases in short and long-term groundborne vibration
South Bay Aqueduct Improvement and Enlargement Project	Zone 7 Water Agency and Department of Water Resources	Improvement and expansion of the existing South Bay Aqueduct.	Increases in short term noise levels during construction. Potential increase in short term groundborne vibration.

1

2 The above list of related projects evaluated for cumulative impacts includes a number of projects
3 that would affect existing and/or future noise levels in the Plan Area. The proposed BDCP, in
4 conjunction with other projects that affect noise levels, would expose sensitive land uses in the Plan
5 Area to increased noise levels that could exceed applicable thresholds. Increases in ambient noise
6 levels could occur during project construction, or through the long-term operation of new noise-
7 generating facilities (e.g., pumping plants, rail lines, etc.). The actual increase in ambient noise
8 expected as result of the projects shown in Table 23-86 is not known.

1 **Impact NOI-5: Cumulative Effects of Increased Noise and Vibration from Construction**
 2 **Activities and Operation of Conveyance Facilities Occurring Within the Delta**

3 **No Action Alternative**

4 Implementation of the BDCP No Action Alternative would result in no project-related noise. Noise
 5 effects from Plans, Policies and Programs identified in Table 23-86 would affect noise levels in the
 6 Plan Area. There would be no cumulative effect due to noise from the no action alternative.

7 The Delta and vicinity are within a highly active seismic area, with a generally high potential for
 8 major future earthquake events along and/or nearby regional faults, with the probability for such
 9 events increasing over time. Based on the location, extent and non-engineered nature of many
 10 existing levee structures in the Delta area, the potential for significant damage to, or failure of, these
 11 structures during a major local seismic event is generally moderate to high. (See Appendix 3E,
 12 *Potential Seismic and Climate Change Risks to SWP/CVP Water Supplies* for more detailed discussion).
 13 To reclaim land or rebuild levees after a catastrophic event due to climate change or a seismic event
 14 would introduce considerable heavy equipment and associated vehicles, including dozers,
 15 excavators, pumps, water trucks, and haul trucks, which would create adverse noise effects. While
 16 similar risks would occur under implementation of the action alternatives, these risks may be
 17 reduced by BDCP-related levee improvements along with those projects identified for the purposes
 18 of flood protection in Table 23-86.

19 **Alternatives 1A through 9**

20 **NEPA Effects:** Implementation of the BDCP action alternatives would involve construction and
 21 operation of new facilities related to water extraction and transport including intake facilities,
 22 pipelines, tunnels, and canals. The project also includes implementation of conservation measures.
 23 Some of these conservation measures include construction activities related to grading, levee
 24 modifications, modifications of existing infrastructure, and construction of new infrastructure. As
 25 stated in the impact discussion above, construction activities will generate noise and vibration.
 26 Operation of facilities related to the extraction and transport of water will also generate noise.

27 Other past, present, and probable future projects and programs in the region that are identified in
 28 Table 20-5 and Appendix 3D, *Defining Existing Conditions, the No Action/No Project Alternative, and*
 29 *Cumulative Impact Conditions* have the potential to adversely affect noise and vibration effects.
 30 However, construction noise and vibration are temporary and highly localized effects. This reduces
 31 the potential for construction noise and vibration to contribute meaningfully to cumulative noise
 32 and vibration effects associated with other projects. Operational noise on the other hand is
 33 permanent and thus has more potential to contribute to cumulative noise effects on an on-going
 34 basis. However, BMPs for reducing noise related to operation and maintenance would reduce the
 35 potential for conveyance facility operations to contribute to cumulative noise effects.

36 BDCP project components are located primarily in rural agricultural areas including the primary
 37 zone of the Delta where there is little potential for project-related construction and operational
 38 noise and vibration to occur concurrently with or in proximity to noise and vibration from other
 39 development projects. There may, however, be situations in which noise and vibration from one or
 40 more projects identified in Table 23-86 could occur concurrently or in proximity to project
 41 components. Therefore, there could be a cumulative effect. Implementation of BMPs and other
 42 design measures incorporated into the project and Mitigation Measures NOI-1a, NOI-1b, NOI-2, and
 43 NOI-3 identified for project-specific effects would reduce noise and vibration impacts from

1 construction. However, there may be situations where construction noise and vibration effects
 2 would remain adverse. If these situations occur concurrently or in proximity to other noise- and
 3 vibration-generating projects, the BDCP's incremental contribution to adverse noise and vibration
 4 effects would be cumulatively considerable.

5 **CEQA Conclusion:** Because implementation of BMPs and other design measures incorporated into
 6 the project, and mitigation measures identified for project-specific effects may not reduce significant
 7 construction noise and vibration impacts and operational noise impacts to less-than-significant
 8 levels in all cases, the project's incremental contribution to significant cumulative noise impacts is
 9 cumulatively considerable. This impact would be considered significant and unavoidable. Mitigation
 10 Measures NOI-1a, NOI-1b, NOI-2, and NOI-3 are designed to address project-level effects and would
 11 reduce the impact, but not to a less-than-significant level.

12 **Mitigation Measure NOI-1a: Employ Noise-Reducing Construction Practices during**
 13 **Construction**

14 Please see Mitigation Measure NOI-1a under Impact NOI-1 in the discussion of Alternative 1A.

15 **Mitigation Measure NOI-1b: Prior to Construction, Initiate a Complaint/Response**
 16 **Tracking Program**

17 Please see Mitigation Measure NOI-1b under Impact NOI-1 in the discussion of Alternative 1A.

18 **Mitigation Measure NOI-2: Employ Vibration-Reducing Construction Practices during**
 19 **Construction of Water Conveyance Facilities**

20 Please see Mitigation Measure NOI-2 under Impact NOI-2 in the discussion of Alternative 1A.

21 **Mitigation Measure NOI-3: Design and Construct Intake Facilities and Other Pump**
 22 **Facilities Such That Operational Noise Does Not Exceed 50 dBA (One-Hour L_{eq}) during**
 23 **Daytime Hours (7:00 A.M. to 10:00 P.M.) or 45 dBA (One-Hour L_{eq}) during Nighttime**
 24 **Hours (10:00 P.M. to 7:00 A.M.) or the Applicable Local Noise Standard (Whichever Is**
 25 **Less) at Nearby Noise Sensitive Land Uses**

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