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4.13 NOISE

This section discusses the Project's potential to expose the public to high noise levels due to construction, construction traffic operation and maintenance. To allow an understanding of the impact analysis, the setting section provides information on noise concepts and the existing noise environment. State and local noise policies are discussed as a basis for significance criteria.

IMPACTS EVALUATED IN OTHER SECTIONS

All impacts relating to noise are discussed in this section.

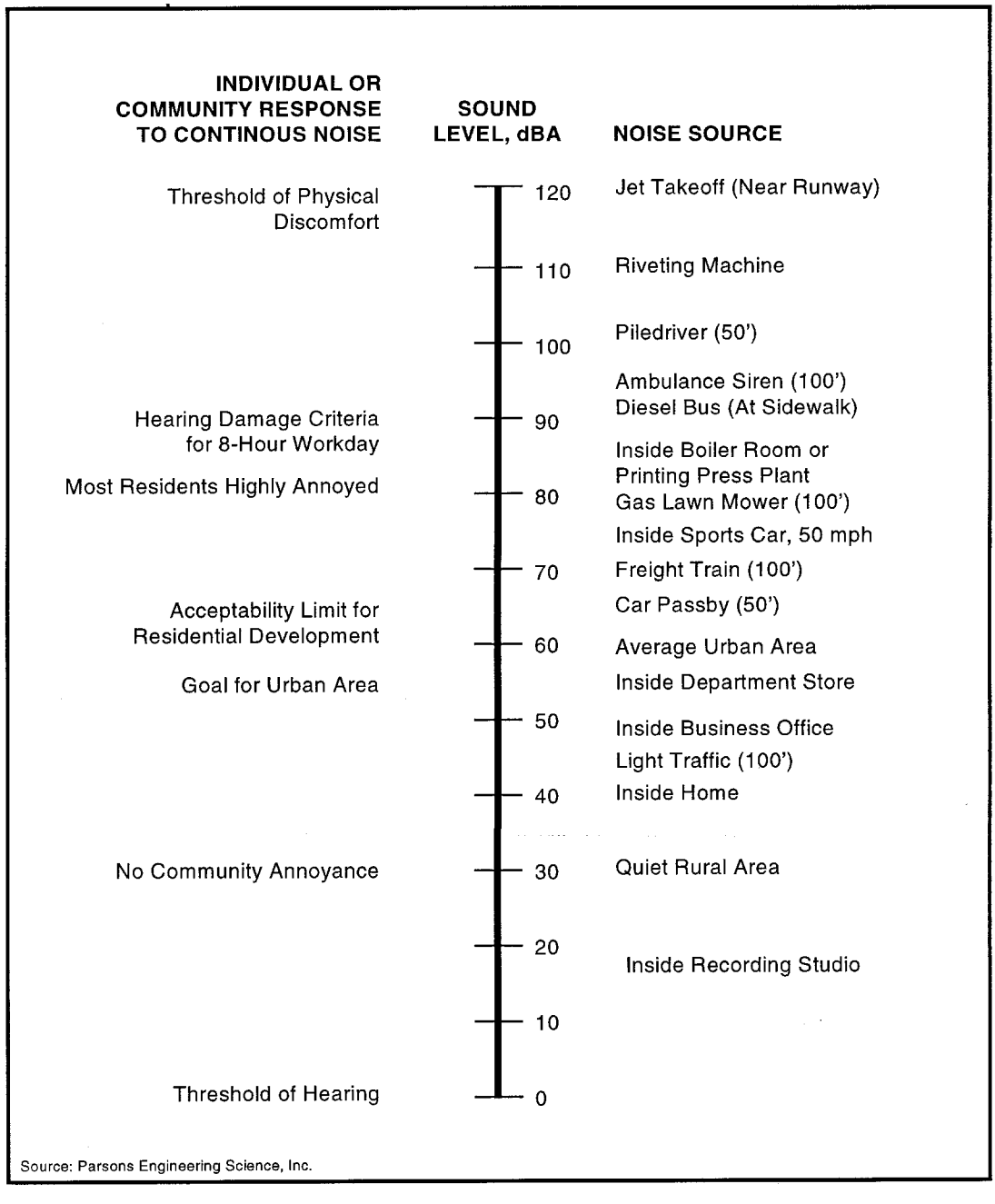
AFFECTED ENVIRONMENT (SETTING)

Noise is most often defined as unwanted sound. Sound levels can be easily measured; however, the variability is subjective and physical response to sound complicates the analysis of its impact on people. People judge the relative magnitude of sound sensation in subjective terms such as "loudness" or "noisiness." Physically, sound pressure magnitude is measured and quantified using a logarithmic ratio of pressures. The scale gives the level of sound in decibels (dB).

Noise Terminology

Different sounds have different frequency content. When describing sound and its effect on a human population, A-weighted (dBA) sound levels are typically used to account for the response of the human ear. The term "A-weighted" refers to a filtering of the noise signal to emphasize frequencies in the middle of the audible spectrum and to de-emphasize low and high frequencies in a manner corresponding to the way the human ear perceives sound. This filtering network has been established by the American National Standards Institute (ANSI 1983). The A-weighted noise level has been found to correlate well with people's judgments of the noisiness of different sounds and has been used for many years as a measure of community noise. Figure 4.13-1 illustrates typical A-weighted sound pressure levels for various sound sources and responses of people to these levels.

When sound levels are measured at distinct intervals over a period of time, they indicate the statistical distribution of the overall sound level in a community during that period. The most common nomenclature associated with such measurements is the energy equivalent sound level (L_{eq}). L_{eq} is a single-number noise descriptor representing the average sound level in a real environment, where the actual noise level varies with time.



Source: Parsons Engineering Science, Inc.

While the A-weighted scale is often used to quantify the sound level of an individual event and is related to subjective response, the degree of annoyance and other response effects depend on a number of factors such as magnitude of the sound level in relation to the background, or ambient sound level; duration of the sound event; repetitiveness of event occurrences; and time of day the event occurs.

Several methods have been devised to relate noise exposure over time to community response. The U.S. Environmental Protection Agency (EPA) developed the Day-Night Average sound level (L_{dn}) as the rating method to describe long-term annoyance from environmental noise. L_{dn} is similar to a 24-hour L_{eq} A-weighted level, but with a 10 dB penalty for nighttime (10 p.m. to 7 a.m.) sound levels to account for the increased annoyance that is generally felt during normal sleep hours.

The Community Noise Equivalent Level (CNEL) has been adopted by the California Aviation Department for airport noise impact studies and by the State of California for environmental noise monitoring purposes. CNEL is similar to the A-weighted L_{eq}, but includes a 5 dB penalty during the evening hours (7 p.m. to 10 p.m.), while nighttime hours (10 p.m. to 7 a.m.) are penalized 10 dB. For outdoor noise, the Day-Night Average Sound Level (L_{dn}) noise descriptor is usually 0.5 to 1 dB less than the CNEL in a given environment.

Construction Noise

Construction noise has its greatest effect on sensitive noise receptors, also known as noise sensitive land uses. The Sonoma County General Plan defines these uses as residences, schools, churches, rest homes, and long-term medical or mental care facilities. Table 4.13-1 presents an inventory of existing residential dwelling units, vacant parcels, and other sensitive receptors along pipeline routes throughout the Project area. Although not defined as sensitive receptors, parks and other recreational areas have been included in Table 4.13-1. Parks and recreational areas have been included in the inventory because the quality of the recreational activity can be greatly affected by noise.

Table 4.13-1

Sensitive Noise Receptors along Pipeline Routes

Pipeline	Approximate Number of Residential Dwelling Units	Vacant Parcels	Other Sensitive Receptors
Bennett Valley Irrigation	3,200	0	Lincoln Elementary School Burbank School Matanzas Elementary School Village Elementary School Bennett Valley School Montgomery High School Slater Junior High School Christ Church Latter Day Saints Church First Baptist Church Immanuel Baptist Church Veterans Memorial Building Jacob Park De Meo Park Julliard Park Doyle Park Howarth Park Bennett Valley Commands Park & Golf Course Jockey Club
Fountaingrove Irrigation	1,100	0	Kaiser Permanente Hospital Helen Lehman Elementary School Hilliard Comstock Junior High School Bethal Church Ellis Retirement Home Finley Community Center Finley Park Jennings Park Fountaingrove Golf Course
Adobe Road Irrigation and Reservoirs	500	12	Penngrove School Old Adobe School Waugh School Building Penngrove Community Church Adobe Christian Center Church Penngrove Community Club Petaluma Adobe State Historical Monument

Table 4.13-1

Sensitive Noise Receptors along Pipeline Routes

Pipeline	Approximate Number of Residential Dwelling Units	Vacant Parcels	Other Sensitive Receptors
Petaluma Hill Road/ Rohnert Park Irrigation	130	22	Sonoma State University Church of Christ- Petaluma Hill Road California Greens Family Golf Course
Lakeville Irrigation	90	28	Adobe Creek Golf Club
North Petaluma Valley Irrigation	50	19	KOA Campground
West County Irrigation and Reservoirs	850	98	Gravenstein Union School Mount Vernon School Durham School Two Rock Union School Two Rock Presbyterian Church Church of Christ - Roblar Road Emma Hershey Memorial Park U.S. Coast Guard Station - Two Rock
Sebastopol Irrigation	1,020	161	Apple Blossom School Pleasant Hill School Spring Hill School Willow Wood School Graton Church
Geysers Pipeline	1,055	62	Mattie Washburn School Olivet School Willowside Park Windsor Golf Course

Source: Harland Bartholomew & Associates, Inc., 1996

Existing Noise Environment

The noise environment within the study area varies significantly due to the large geographic area and various outdoor environments. Most of the Project components such as reservoirs, transmission pipelines, and pump stations are located in rural areas. The existing ambient noise environment in the study area is comprised of contributions from surface traffic on local streets and highways, aircraft flyovers from local airports, trains on various railroad tracks, and other individual activities in the area.

Table 4.13-2

Summary of Estimated Existing Ambient Noise Levelsnear Pump Stations

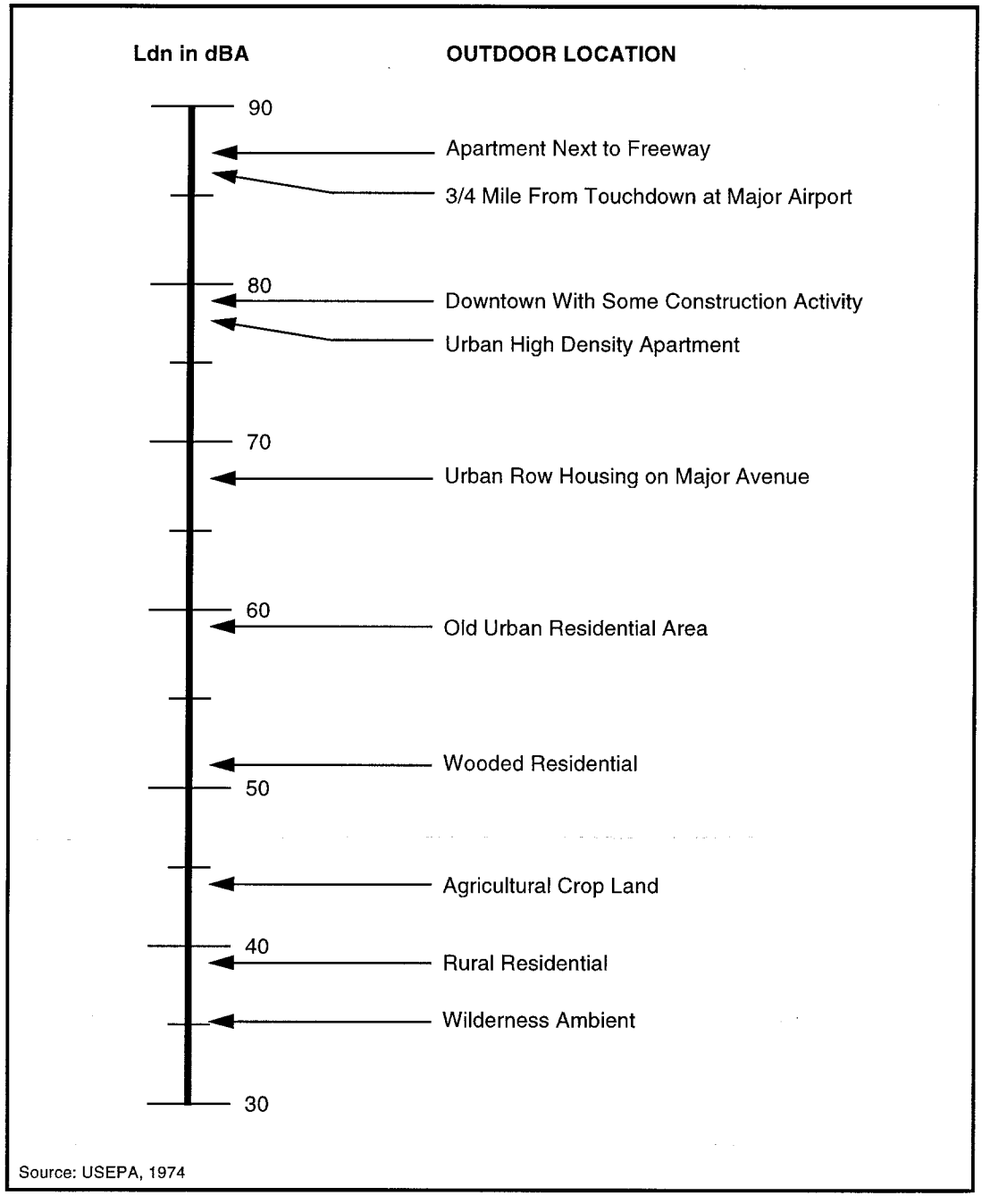
Pump Station	Nearest Sensitive Receptor, feet	Noise Sources	Ambient Noise Levels, L_{dn}	Jurisdiction	Notes
S - Meadowlane Ponds	2,000	Local surface traffic, the Laguna wastewater treatment plant, and other urban activities	50 - 60	Santa Rosa	The upper noise level range would be for receptors near major streets. Sparsely populated.
TASW - Tolay Backdam T - Tolay Dam AR - Adobe Road Dam TR - Two Rock Dam B - Bloomfield Dam VF - Valley Ford Dam CR - Carroll Road Dam G3 & G4 - on Pine Flat Road	Greater than 3,000	Traffic in the surrounding areas	35 - 45	Sonoma Co.	Located in a remote areas, no nearby residences.
TCSW - Tolay Confined Backdam	1,400	Local surface traffic	45 - 55	Sonoma Co.	The upper noise level range would be for receptors near local streets. Sparsely populated.
ARSW - Adobe Road Stormwater Dam	900	Local surface traffic	45 - 55	Sonoma Co.	The upper noise level range would be for receptors near local streets. Sparsely populated.
SP - Sears Point Dam	1,700	Local surface traffic	45 - 55	Sonoma Co.	The upper noise level range would be for receptors near local streets. Sparsely populated.
H - Huntley Dam	600	Local surface traffic	45 - 55	Sonoma Co.	The upper noise level range would be for receptors near local streets. Sparsely populated.
SEB & G1 - Delta Pond	Greater than 3,000	Traffic in the surrounding areas	35 - 45	Sonoma Co.	Located in a open areas, no nearby residences.

Table 4.13-2

Summary of Estimated Existing Ambient Noise Levelsnear Pump Stations

Pump Station	Nearest Sensitive Receptor, feet	Noise Sources	Ambient Noise Levels, L_{dn}	Jurisdiction	Notes
FGS & BVS - West College Pond	300	Local surface traffic, the Santa Rosa West College treatment plant, and other urban activities	50 - 60	Santa Rosa	The upper noise level range would be for receptors near major streets. Mostly residential to the south and the treatment plant to the north.
FGB - Redwood Hwy North of Fountaingrove Parkway	400	Local surface traffic	50 - 60	Santa Rosa	The upper noise level range would be for receptors near local streets. Sparsely populated.
BVB - Sonoma County Fair Ground	500	Local surface traffic	50 - 65	Santa Rosa	The upper noise level range would be for receptors near major streets. Mostly residential to the north and open spaces to the north.
G2 - Hwy 128 at Pine Flat Road	300	Local surface traffic	45 - 55	Sonoma Co.	The upper noise level range would be for receptors near local streets. Sparsely populated.
SBPS-2, SBPS-3, SBPS-7 through SBPS-12	300	Local surface traffic	45 - 65	Sonoma Co.	The upper noise level range would be for receptors near local streets.
WBPS-1 through WBPS-16	200	Local surface traffic	45 - 65	Sonoma Co.	The upper noise level range would be for receptors near local streets.
LBPS-1 through LBPS-4	400	Local surface traffic	45 - 65	Sonoma Co.	The upper noise level range would be for receptors near local streets.

Source: Parsons Engineering Science, Inc., 1996



Source: USEPA, 1974

The study area varies greatly in population density and accordingly in noise level. The noise levels are highest near transportation corridors and populated areas since primary noise sources are human related. The existing ambient noise in the study area has not been measured for the purposes of this study. Typical noise levels in similar environmental settings were used in estimating the existing ambient noise (U.S. EPA 1974). Figure 4.13-2 depicts typical noise levels in terms of L_{dn} for various outdoor environments. The estimated existing noise environment in the study area varies from an L_{dn} of approximately 35 dBA in remote rural areas to an L_{dn} of 65 dBA in an urban area with high density housing. Table 4.13-3 summarizes the existing noise setting in the vicinity of the pump stations. Because each of the reservoirs has a pump station located adjacent to it, Table 4.13-3 also represents the ambient noise levels at the reservoirs during the irrigation season.

Regulatory Context

This section identifies the local ordinances and other regulations and guidelines which comprise the regulatory context for noise. General plan policies related to the noise environment are identified in the next section titled "Noise Goals, Policies, and Objectives."

Marin County

The Marin County Noise Element does not quantify a noise standard for new development. It states that "*It is unlawful for any person to make, continue, or cause to be made or continued, any loud, unnecessary or unusual noise which either annoys, disturbs, injures or endangers the comfort, repose, health or peace of others*" (County of Marin 1994).

The Marin Countywide Plan Noise Element specifies noise standards for various land uses (County of Marin 1994). Residential, public, and institutional land uses should not be subjected to noise levels above 60 dBA L_{dn}. In commercial areas, the acceptable noise level is 65 dBA. In industrial and agricultural areas, the acceptable noise level is 70 dBA. Residential land uses within agricultural areas, including, for example, a family's home on a dairy ranch, are considered residential uses for noise level classification purpose. The County has also adopted separate standards for stationary noise sources such as mechanical equipment, quarries, kennels, or industrial facilities. The noise standards establish benchmarks for allowable noise levels in residential areas and for other noise-sensitive land uses. These standards will be applicable to new stationary noise sources proposed near existing residential areas or noise-sensitive land uses. Table 4.13-3 shows the standards for stationary noise sources.

Table 4.13-3

Marin County Allowable Noise Exposure From Stationary Noise Sources

	Daytime 7 a.m. to 10 p.m.	Nighttime 10 p.m. to 7 a.m.
Hourly, L_{eq}, dBA	50	45
Maximum Noise Level, dBA	70	65
Maximum Noise Level, dBA (Impulsive Noise)	65	60

Source: County of Marin, Marin Countywide Plan Noise Element, 1994

Sonoma County

The Sonoma County General Plan states that the "*noise level resulting from new sources and ambient noise shall not exceed the standards in Table 4.13-5 as measured at the exterior property line of any affected residential land uses.*" These standards also apply to other sensitive receptors such as schools, hospitals, rest homes, and long-term medical or mental care facilities. To implement the Noise Element, Sonoma County requires special permit review procedures to be established for projects that involve significant noise level generation, or that are located in noise impacted areas.

Table 4.13-4

Sonoma County Noise Level Performance Standards

Category	Cumulative Duration of Noise Event in Any 1-Hour Period	Maximum Exterior Noise Level Standards, dBA: Daytime 7 a.m. to 10 p.m.	Maximum Exterior Noise Level Standards, dBA: Nighttime 10 p.m. to 7 a.m.
1	30-60 minutes	50	45
2	15-30 minutes	55	50
3	5-15 minutes	60	55
4	1-5 minutes	65	60
5	0-1 minutes	70	65

Source: County of Sonoma, Sonoma County General Plan Noise Element, 1989 revised 1991

City of Santa Rosa

The noise standards used by the City of Santa Rosa include the Land Use Compatibility Standards for Community Noise Environment, State of California Noise Insulation Standards (California Code of Regulations, Title 24, Part 2), and applicable standards in the City's Noise Ordinance. Figure 4.13-3 shows the recommended noise levels associated with various land uses. The Noise Element of the City's General Plan includes the following policies:

- Apply a comprehensive program of noise prevention, using existing standards and procedures; and
- Cooperate with pertinent City of Santa Rosa, County of Sonoma, and State of California agencies, as well as private entities, to reduce noise from significant sources.

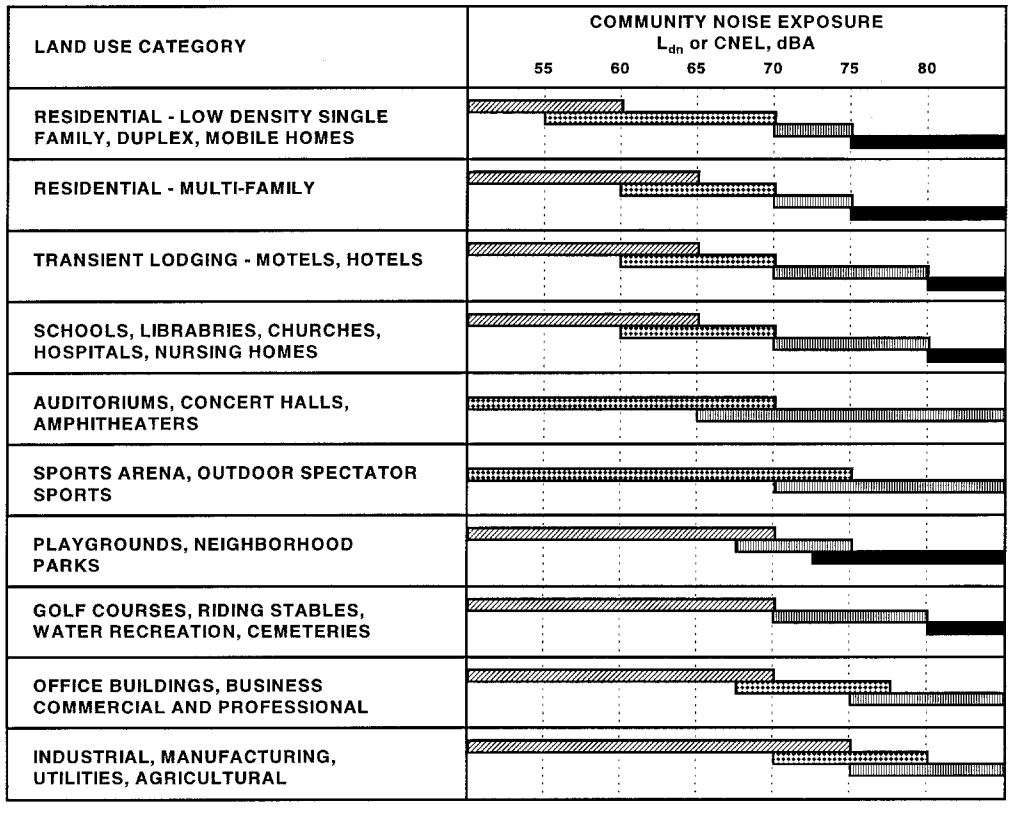
The City of Santa Rosa Municipal Code, Chapter 17-16, Ordinance No. 17-16.20 states that "*It is unlawful for any person to operate any machinery, equipment, pump, fan, air-conditioning apparatus or similar mechanical device in any manner so as to create any noise which would cause the noise level at the property line of any property to exceed the ambient base noise level by more than five decibels*" (Santa Rosa, 1989). Table 4.13-5 presents the City's ambient base noise levels.

Table 4.13-5

City of Santa Rosa Municipal Code Ambient Base Noise Levels

Zone	Daytime Level (dBA)	Evening Level (dBA)	Nighttime Level (dBA)
Single-family Residential	55	50	45
Multi-family Residential	55	55	50
Office and Commercial	60	60	55
Intensive Commercial	65	65	55
Industrial	70	70	70

Source: City of Santa Rosa, City of Santa Rosa Municipal Code 17-16.030, 1989



INTERPRETATION

NORMALLY ACCEPTABLE

Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

CONDITIONALLY ACCEPTABLE

New construction or development should be undertaken only after a detailed analysis of the noise reduction requirement is made and needed noise insulation features are included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.

NORMALLY UNACCEPTABLE

New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

CLEARLY UNACCEPTABLE

New construction or development should generally not be undertaken.

Source: Adapted from California State Dept. of Health Services,1990

City of Sebastopol

The City of Sebastopol General Plan does not contain a noise standard (City of Sebastopol 1994). It contains an objective (Objective N1): "to establish noise standards which protect public health, welfare, and safety, and which enhance the rural residential atmosphere of Sebastopol." Policy N1.1 states that the noise standards "will take into consideration" the recommendations of the State Department of Health and the Environmental Protection Agency. The Noise Hazards discussion in the General Plan recognizes that indoor sound levels should be 45 dBA and the outdoor sound level should not exceed 55 dBA.

City of Petaluma

The City of Petaluma has a noise ordinance. Noise standards set by the State of California for land use categories, Figure 4.13-3, define acceptable conditions for use in Petaluma. Outdoor and indoor noise standards are used to review new proposals and to delineate areas already exposed to high noise levels. For single- and multi-family residential buildings noise must be mitigated to provide an interior L_{dn} of 45 dBA. An L_{dn} of 60 dBA is established as the reasonable noise level for exterior use areas.

Construction Noise Limits

The City of Santa Rosa does not have quantitative noise limits for construction activities. However, the City limits construction activities to between the hours of 7 a.m. and 10 p.m. seven days a week. Any activity not in compliance with any provision of the Noise Ordinance will require a special condition permit.

The policy of the Marin County Noise Element is to minimize impacts from excessive noise due to construction activity. During all phases of construction, measures should be taken to minimize the exposure of neighboring properties to excessive noise from construction-related activity. The Community Development Agency reserves the right to set hours for construction-related activities involving the use of machinery, power tools, or hammering. The type of construction, site location and noise sensitivity of nearby land uses will determine the hours of construction.

The cities of Rohnert Park, Cotati, Sebastopol, Petaluma, and the County of Sonoma also do not have noise limits for construction activities. The State's Office of Noise Control *Model Community Noise Control Ordinance* includes noise limits for construction activities. Table 4.13-6 presents the construction noise limits recommended by the State's Office of Noise Control, which will be used as Project criteria for the construction noise study.

Table 4.13-6

Maximum Noise Limits for Construction and Stationary Equipment, L_{eq}

Time	Single-Family Residential	Multi-Family Residential	Mixed-Residential & Commercial
Daily, except Sundays and Legal Holidays, 7 a.m. to 7 p.m.	60 dBA	65 dBA	70 dBA
Daily, 7 p.m. to 7 a.m. and all day Sunday and Legal Holidays	50 dBA	55 dBA	60 dBA

Source: California Department of Health, Office of Noise Control, Mode Community Noise Control Ordinance, 1977

Airblast Limits

The construction of proposed reservoirs will require blasting for rock quarrying. Airblast is an impulsive sound generated by an explosive blast and resulting fragmentation and movement. There are three possible adverse effects of airblast: (1) damage to structures, (2) human health risk, and (3) human annoyance. To assess these adverse effects from airblasts, the air overpressures caused by the blast must be estimated.

Hearing damage from a single airblast has been shown to occur starting at peak overpressures of 178 dB, for single instance occurrences (Hirsch 1968). However, this level will not normally occur outside the restricted safety region of a blast area. Therefore, hearing damage criteria will not be addressed in this study, since it is assumed that there will be no unprotected humans within the restricted safety region of a blast site.

Studies have shown that building damage to glass and other fragile structural members is improbable when the peak overpressure of an airblast is below 140 dB (true-peak), although claims of damage may begin to occur at levels starting at 130 dB (Siskind et al. 1980).

The most likely impact from airblast is human annoyance. A “moderate” risk of human annoyance resulting in complaints will potentially occur when the peak overpressure is between 110 and 125 dB. The risk becomes “high” when the peak overpressure is between 125 and 140 dB (Schomer 1973).

It is recommended that airblast limits be applied to airblast noise associated with this Project, since the state and local criteria do not adequately address this type of noise. The recommended criterion for building damage due to airblast is 130 dB at building structures and the recommended criterion for annoyance due to

airblast noise is 110 dB at an occupied property line, below which there is a low risk of human complaint.

State Noise Policies

The State of California has compatibility guidelines for different land uses (California 1976). For each land use, the level of acceptability of the noise environment is dependent upon the activity that is conducted and the type of building construction (for indoor activities). Figure 4.13-3 illustrates the State of California land use compatibility standards for community noise environment. The land use compatibility guidelines are applicable for both CNEL and L_{dn}.

The California Department of Transportation (Caltrans) has established noise standards for traffic noise on highways. When these standards or Noise Abatement Criteria (NAC) are approached or exceeded, noise impacts occur. The Noise Abatement Criteria for most sensitive receptors (including parks, residences, schools, churches, libraries, and hospitals) are an L_{eq} of 67 dBA at areas with outdoor activities and an L_{eq} of 52 dBA at the interior of schools and residences (Caltrans 1987). Even though these standards only apply to state routes, they can be used as guidelines for a city street noise impact study.

Noise Goals, Objectives, and Policies

Table 4.13-7 identifies goals, objectives, and policies which provide guidance for development in relation to the noise environment in the Project area. The table also indicates which criteria in the Noise Section are responsive to each set of policies. No facilities are located in Rohnert Park or Cotati.

Table 4.13-7

General Plan Goals, Objectives, and Policies - Noise

Adopted Plan Document	Document Section	Document Numeric Reference	Policy	Relevant Evaluation Criteria[1]
Sonoma County General Plan	Noise Element	Goal NE-1 Objective NE-1.3 Policy NE-1a Policy NE-1c Policy NE-1f	Protect people from the harmful effects of exposure to excessive noise and achieve an environment in which people and land uses may function without impairment from noise by protecting the present noise environment and preventing intrusion of new noise sources which will substantially alter the noise environment	1.2

Table 4.13-7

General Plan Goals, Objectives, and Policies - Noise

Adopted Plan Document	Document Section	Document Numeric Reference	Policy	Relevant Evaluation Criteria[1]
Sonoma County General Plan	Noise Element	Goal NE-2 Objective NE-2.1	Confine the noise impacts from transportation facilities to the smallest feasible land area and design and manage such facilities to produce the lowest feasible noise levels and impacts on noise sensitive land uses	3
Marin Countywide Plan	Noise Element	Objective N-2 Policy N-2.1	Ensure that new development does not significantly increase noise levels within existing areas and ensure that noise from new development does not exceed County guidelines	2
Marin Countywide Plan	Noise Element	Policy N-2.4	During all phases of construction, measures should be taken to minimize the exposure of neighboring properties to excessive noise levels	1,3
Santa Rosa General Plan	Noise Element	Goal N-1	Reduce nuisance noise from stationary and moving sources to protect the health and comfort of people in Santa Rosa and require mitigation where necessary to meet stipulated noise standards	1.2.3
Petaluma General Plan	Community Health and Safety Element	Objective (m)	Minimize the amount of noise that future development creates and the amount of noise to which the community is exposed by strictly enforcing the noise standards and requiring mitigation measures to produce noise compatible land uses	1,2,3
Sebastopol General Plan	Safety Element	Policy 4 Policy 5	Protect existing noise environment in residential areas and reduce vehicular noise in residential areas	1,2,3

Table 4.13-7

General Plan Goals, Objectives, and Policies - Noise

Adopted Plan Document	Document Section	Document Numeric Reference	Policy	Relevant Evaluation Criteria[1]
Windsor General Plan	Public Health and Safety Element	Policy D.1 Policy D.1.1 Policy D.1.2	Encourage new development to be planned and designed to minimize noise impacts on noise sensitive areas, minimize noise interference from outside sources and maintain the ambient sound environment as much as possible	2
Windsor General Plan	Public Health and Safety Element	Policy D.2.4	Seek to restrict construction in a manner that allows for efficient construction mobilization and activities, while also protecting noise sensitive uses	1,3

Source: Harland Bartholomew & Associates, Inc., 1995

1. The evaluation criteria are in 4.13.8.

EVALUATION CRITERIA WITH POINT OF SIGNIFICANCE

State and local governments have established noise guidelines and policies for the purpose of protecting citizens from various adverse physiological, psychological, and sociological effects associated with noise. The appropriate criteria for different cities are described in the previous section.

In addition to being concerned about the absolute noise level that might occur when a new noise source is introduced into an area, it is also important to consider the change from the existing noise environment. If the existing noise environment is quite low and the new noise source greatly increases the noise exposure (even though a criterion level might not be exceeded), an impact may be perceived by the listener.

Changes in noise levels greater than 5 dBA are readily noticeable and will be considered a significant increase, while changes less than 3 dBA are generally not discernible to most people. Complaints may certainly be expected if the difference reaches 10 dBA or more. Therefore, the point of significance is set when noise levels increase by 5 dB or greater, even though they still fall within the local noise criteria.

The operation of Project components such as pump stations, reservoirs, and pipelines will be continuous over a 24-hour period, as the nighttime noise limits for residential areas

were used for the evaluation criteria, to represent the worst-case noise impacts. Sensitive receptors can be assumed to be residences.

Table 4.13-8

Evaluation Criteria with Point of Significance - Noise

Evaluation Criteria	As Measured by	Point of Significance	Justification
1. Will construction of the Project expose the public to high noise levels?	Projected noise levels at property line or "yard" line	Greater than L_{eq} of 60 dBA	California Office of Noise Control recommended construction noise limits
2. Will operation and maintenance of the Project expose the public to high noise levels?	Projected noise levels at property line or "yard" line	a. Greater than L_{eq} of 45 dBA, OR Greater than L_{eq} of 50 dBA b. Greater than 5 dBA increase in noise, L_{eq}	General Plan of Sonoma County and Noise Element of Marin County City of Santa Rosa Municipal Code An increase of 5 dBA or more will be readily noticeable.
3. Will construction of the Project cause high noise levels from construction traffic?	Projected traffic volume due to construction	Greater than 10 % increase in traffic volume	A 10 % increase in traffic volume will increase the noise by less than 1 dBA, which normally will not be noticeable.

Source: Parsons Engineering Science, Inc., 1996

METHODOLOGY

Noise Calculations

Outdoor sound transmission is influenced by three types of natural effects: distance effects, atmospheric effects, and terrain effects. For point sources, sound levels drop off with distance in accordance with the "inverse square law", which yields a 6 dB sound level reduction for each doubling of the distance from the source. A sound source can be treated as a "point source" when the distance from the source is large compared to the dimensions of the source.

In addition to the drop in noise levels as distance increases, noise also drops due to the atmospheric absorption and losses due to a barrier. Atmospheric absorption is dependent upon temperature and relative humidity. A barrier is a solid structure that intercepts the direct sound path from a source. It provides a reduction in sound level within its "shadow zone." A barrier can be a hill, earth berm, a wall, or a building. The noise analysis for this study is conservative because atmospheric absorption and barrier noise reduction were not considered in the calculation.

Construction Noise

Noise impacts from construction activity of the Project are a function of the noise generated by construction equipment, the location and sensitivity of nearby land uses, and the timing and duration of the noise-generating activities. Noise levels within and adjacent to the Project construction areas will increase during the construction period. Construction will not cause long-term impacts since it will be temporary and limited to 7 a.m. - 7 p.m.

The primary noise from the construction activities will be generated by vehicles and equipment involved in site clearing and grading, foundation preparation, facility construction, and finish work. Representative sound levels for most common types of construction equipment and usage factors (U.S. Army CERL 1978 and U.S. EPA 1971) were used to estimate construction noise levels. The usage factors represent the percentage of time that the equipment will be operating at full speed. Table 4.13-9 provides the noise data which are used in the assessment of construction noise during various stages of construction activities.

Table 4.13-9

Typical Construction Equipment Noise Levels

Equipment	Noise Levels at 50 Feet, (dBA)
Backhoe	85
Compactor	89
Concrete Truck	88
Crane	83
Dozer	80
Dump Truck Export	91
Dump Truck Import	91
Excavator	85
Flat Bed Truck	80
Front End Loader	85
Generator	78
Grader	85
Paver	89
Pick Up Truck	70
Ripper	80
Scraper	85
Water Truck	87

Table 4.13-9

Typical Construction Equipment Noise Levels

Equipment	Noise Levels at 50 Feet, (dBA)
Welding Machine	74
Worker Vehicles	70

Source: U.S. Army Construction Engineering Research Laboratory, Construction Site Noise Control Cost-Benefit Estimating Procedures, 1978. U.S. Environmental Protection Agency, Noise from Construction Equipment and Operation, Building Equipment, and Home Appliances, 1971.

Vibration

There are no established criteria for vibration due to construction, and aside from the potential for blasting at the Two Rock and Adobe Road reservoir sites, construction methods are not expected to generate substantial vibrations. Blasting is discussed in the section on reservoir construction impacts. Time-of-day restrictions, which are part of the mitigation program for noise, will also address any minor vibration impacts. Therefore, vibration is not discussed further in the impact analysis.

Pump Station Operation Noise

The noise generated by equipment operations at the pump stations has been predicted using noise measurements conducted at existing pump stations located at the Delta Ponds and the Denner Ranch. The existing Delta Pond pump station is an enclosed pump station containing two 350 HP and one 75 HP pumps. At the Denner Ranch pump station, there were three pumps, two 150 HP and one 75 HP, located in an outdoor environment. Both pumps were operating during the measurement. At the Delta Pond pump station, the measured noise levels range from 72 to 88 dBA at a distance of 15 feet from the enclosed pump station. The noise ranges represent the noise levels surrounding the pump station. The upper noise levels are due to an opening, for ventilation, on one side of the building wall. At the Denner Ranch pump station, the measured noise levels were 78 to 71 dBA at distances of 15 and 50 feet, respectively.

In calculating the noise generated by the pump stations, the measured noise data were adjusted to reflect the differences in pump power rating. The estimated noise levels for the indoor pump station represent the worst-case scenario, that is the noise at the side of the pump building with the ventilation openings. At the side with no openings, the noise due to the pumps will be approximately 16 dBA lower. The booster and main

distribution pump stations will be operated on a 24-hour basis during the irrigation season.

Noise due to pump stations was calculated at the nearest existing sensitive receptor as well as nearest future sensitive receptor. The nearest future sensitive receptor was assumed to be located at the property line of the pump stations. With the exception of the pump stations for reservoirs, the pump noise at future sensitive receptors was calculated for a distance of 10 feet from the pump stations. This is the minimum required distance from the future building structure to the property line per County zoning code. For the reservoirs, the pump noise at future sensitive receptors was calculated at the construction limit line.

ENVIRONMENTAL CONSEQUENCES (IMPACTS) AND RECOMMENDED MITIGATION

No Action (No Project) Alternative

Impact: **13.1.1-3. Will the No Action Alternative impact noise based on evaluation criteria 1 through 3?**

Analysis: *No Impact; Alternative 1.*

The No Action Alternative will not have any noise impacts as it involves no construction.

Mitigation: No mitigation is needed.

Headworks Expansion Component

Table 4.13-10

Noise Impacts by Component - Headworks Expansion

Evaluation Criteria	Point of Significance	Impact	Type of Impact[1]	Level of Significance[2]
13.2.1. Will construction of the headworks expansion component expose the public to high noise levels?	Greater than L_{eq} of 60 dBA	Less than L_{eq} of 60 dBA	C	❍

Table 4.13-10

Noise Impacts by Component - Headworks Expansion

Evaluation Criteria	Point of Significance	Impact	Type of Impact[1]	Level of Significance[2]
13.2.2. Will operation of the headworks expansion component expose the public to high noise levels?	a. Greater than L_{eq} of 45 dBA Sonoma & Marin Co. Greater than L_{eq} of 50 dBA Santa Rosa	Less than L_{eq} of 45 dBA	O&M	❍
	b. Greater than or equal to 5 dBA increase in noise, L_{eq}	Less than a 5 dBA increase in L_{eq}	O&M	❍
13.2.3. Will construction of the headworks expansion component cause high noise levels from construction traffic?	Greater than 10 % increase in traffic volume	Less than 10% increase	C	❍

Source: Parsons Engineering Science, Inc., 1996

Notes: 1. Type of Impact:
C Construction
O&M Operation and Maintenance

2. Level of Significance:
❍ Less than significant impact; no mitigation proposed

Impact: 13.2.1. Will construction of the headworks expansion component expose the public to high noise levels?

Analysis: *Less than Significant; Alternatives 2, 3, 4, and 5.*

The new influent pumps will be located inside an existing facility at the Laguna Plant. With the exception of removing and replacing the existing pump systems, there will not be any new construction. The closest sensitive receptor, a dwelling, is about 1,100 feet to the north across Llano Road. Construction equipment, required for the removal and installation of the pump system, will be a small crane and delivery trucks. Construction noise impacts at the nearest sensitive receptor are expected to be less than significant.

No Impact; Alternative 1.

Alternative 1 does not have a headworks expansion component.

Mitigation: No mitigation is proposed.

Impact: **13.2.2. Will operation of the headworks expansion component expose the public to high noise levels?**

Analysis: *Less than Significant; Alternatives 2, 3, 4, and 5.*

Because the new influent pumps will be located in an enclosed underground facility and the closest sensitive receptor is about 1,100 feet away, operation noise impacts are expected to be less than significant.

No Impact; Alternative 1.

Alternative 1 does not have a headworks expansion component.

Mitigation: No mitigation is proposed.

Impact: **13.2.3. Will construction of the headworks expansion component cause high noise levels from construction traffic?**

Analysis: *Less than Significant; Alternatives 2, 3, 4, and 5.*

The daily traffic volume associated with construction of the Laguna Plant headworks expansion will include worker vehicles traveling to and from the Project site. The increase in traffic volume on local streets will be less than 10 percent. Therefore, the noise generated by the construction traffic will not produce significant noise impacts, considering the existing traffic volumes.

No Impact; Alternative 1.

Alternative 1 does not have a headworks expansion component.

Mitigation: No mitigation is proposed.

Urban Irrigation Component

Impact: **13.3.1-3. Will the urban irrigation component impact noise based on evaluation criteria 1 through 3?**

Analysis: *No Impact; All Alternatives.*

Irrigation facilities used in this component already exist; no new construction is necessary. Also, use of reclaimed water rather than the existing water supply in the irrigation systems will not increase noise levels over those currently experienced. There will be no construction or operation noise impacts.

Alternatives 1, 4 and 5, do not have an urban irrigation component.

Mitigation: No mitigation is needed.

Pipeline Component

Table 4.13-11

Noise Impacts by Component - Pipelines

Evaluation Criteria	Point of Significance	Impact	Type of Impact[1]	Level of Significance[2]
13.4.1. Will construction of the pipeline component expose the public to high noise levels?	Greater than L_{eq} of 60 dBA	96 dBA	C	●
13.4.2. Will operation of the pipeline component expose the public to high noise levels?	a. Greater than L_{eq} of 45 dBA Sonoma & Marin Co. Greater than L_{eq} of 50 dBA Santa Rosa	Less that L_{eq} of 45 dBA	O&M	❍
	b. Greater than or equal to 5 dBA increase in noise, L_{eq}	Less than 5 dBA increase in L_{eq}	O&M	❍
13.4.3. Will construction of the pipeline component cause high noise levels from construction traffic?	Greater than 10 % increase in traffic volume	Up to 1,250 %	C	●

Source: Harland Bartholomew & Associates, Inc. 1996

Notes:
1. Type of Impact:
C Construction
O&M Operation and Maintenance
2. Level of Significance:
❍ Less than significant impact; no mitigation proposed
● Significant impact before and after mitigation

Impact: 13.4.1. Will construction of the pipeline component expose the public to high noise levels?

Analysis: *Significant. Alternatives 2, 3, 4, and 5A.*

Table 4.13-12 presents the quantity of the equipment and its usage factors for various stages of construction for the pipelines. The usage factors represent the percentage of time that the equipment will be operating at full speed. In addition, the analysis assumes that all equipment will be operating simultaneously to represent a worst-case scenario. The highest

level of construction noise is expected to be generated during the excavation stage. An L_{eq} as high as 90 dBA at 50 feet from the center of construction activity will be generated during specific periods of heavy excavation. During other stages of construction, the L_{eq} will be lower and will vary depending on the amount of activity and the types of equipment in use.

There are residences located approximately 25 feet away from the pipeline construction routes. These receptors will experience an L_{eq} as high as 96 dBA from construction activities. Noise levels at 50 feet away from construction will be 90 dBA. This will exceed the noise criteria, and significant noise impacts will occur. At a distance of 1,600 feet or greater, the construction noise is expected to be below 60 dBA, the construction noise criterion.

Even though pipeline construction extends over many miles, the noise impacts due to pipeline construction will be short-term. The pipeline construction is anticipated to proceed at a pace of approximately 160 linear feet per day. Therefore, a worst-case noise impact for the nearest sensitive receptor will be exposure to the construction noise of 96 dBA for approximately one construction day. Based on the construction pace of 160 feet per day, a typical noise impact for receptors that are located along the pipeline routes will be between 74 and 96 dBA over a one-week period.

No Impact; Alternatives 1 and 5B.

Alternatives 1 and 5B do not have pipeline component.

Mitigation: *Alternatives 2, 3, 4, and 5A.*

2.4.9. Construction Noise Control Measures

Alternatives 1 and 5B. No mitigation is needed.

After Mitigation: *Significant after Mitigation; Alternatives 2, 3, 4, and 5A.*

The construction noise impacts will be reduced substantially with implementation of both the equipment noise control and administrative measures specified in the Construction Measures Section of this document. Application of the construction noise control measures will reduce the construction noise impacts nearby sensitive receptors; however, it will not reduce these to a less than significant level.

Table 4.13-12

Estimated Construction Noise Levels for Pipelines

Equipment	Quantity	Construction Usage Factors[1]			
		Clearing	Excavation	Rough	Finish
Backhoe	1	4%	40%	0%	16%
Compactor	1	0%	30%	0%	30%
Crane	1	0%	0%	16%	0%
Dump Truck Export	1	16%	16%	0%	16%
Dump Truck Import	1	16%	16%	0%	0%
Excavator	1	0%	10%	0%	0%
Flat Bed Truck	1	16%	16%	40%	16%
Front End Loader	1	16%	16%	0%	4%
Generator	1	40%	40%	0%	2%
Paver	1	0%	0%	0%	12%
Pick Up Truck	1	16%	16%	40%	16%
Ripper	1	4%	40%	0%	16%
Water Truck	1	26%	26%	0%	0%
Welding Machine	2	0%	0%	30%	0%
Worker Vehicles	20	16%	16%	40%	16%
L_{eq} at 50 feet from construction site		**88 dBA**	**90 dBA**	**80 dBA**	**88 dBA**

Source: U.S. Army Construction Engineering Research Laboratory, Construction Site Noise Control Cost-Benefit Estimating Procedures, 1978. U.S. Environmental Protection Agency, Noise from Construction Equipment and Operation, Building Equipment, and Home Appliances, 1971

Note:
1. Usage factors represent the percentage of time the equipment will be operating at full speed

Impact: **13.4.2. Will operation of the pipeline component expose the public to high noise levels?**

Analysis: *Less than Significant; Alternatives 2, 3, 4, and 5A.*

During the operation of the pipelines, the potential for noise exists due to pressurized water flow in the pipelines. Generally, noise is caused by high velocity water turbulence, water surge or thrust, and water hammering. The pipeline systems will be buried three feet below the ground surface

along their routes, which will provide a natural noise barrier. The operation of pipelines will not produce significant noise impacts.

There will be air relief valves located periodically along the geysers pipeline from Pump Station G2 to G4. There are no sensitive receptors near the relief valve locations. The relief valves will not produce significant noise impacts. At the G2, G3, and G4 pump stations, there will be a surge tank located outside of the pump building to allow draining of the pipeline in the event of a failure. Noise will be produced due to the water surge into the tank and air relief valves. Since the surge tank will be located behind the pump station building, which will serve as a noise barrier, and the water surge will only occur on an emergency basis, significant noise impacts due to the surge tank will not occur.

No Impact; Alternatives 1 and 5B.

These alternatives have no pipeline component.

Mitigation: No mitigation is proposed.

Impact: 13.4.3. Will construction of the pipeline component cause high noise levels from construction traffic?

Analysis: *Significant; Alternatives 2, 3, 4, and 5A.*

The daily traffic volume associated with construction of the pipelines will include worker vehicles traveling to and from the Project site. The traffic volume on local public streets will be increased by up to 250 percent. The increase in traffic volume will translate to a noise increase of approximately 5 dBA. For the private driveways approaching the reservoir sites, the increase in construction traffic will be approximately 1,250 percent. The noise due to this increase in traffic volume will be approximately 11 dBA. Therefore, significant noise impacts will be expected from construction of the pipelines.

The noise impacts due to pipeline construction will be short-term. The pipeline construction will typically last for 31 days for a 1-mile segment.

No Impact; Alternative 1 and 5B.

These alternatives have no pipeline component.

Mitigation: *Alternatives 2, 3, 4, and 5A.*

2.4.9. Construction Noise Control Measures

Alternative 1 and 5B. No mitigation is needed.

After Mitigation: *Significant after Mitigation; Alternatives 2, 3, 4, and 5A.*

The construction noise impacts due to traffic will be reduced through the administrative measures specified in the Construction Measures Section of this document. Application of the construction noise control measures will reduce the traffic noise at nearby sensitive receptors; however, it will not be reduced to a level of less than significant.

Storage Reservoir Component

Table 4.13-13

Noise Impacts by Component - Storage Reservoirs

Evaluation Criteria	Point of Significance	Impact	Type of Impact[1]	Level of Significance[2]
13.5.1. Will construction of the storage reservoir component expose the public to high noise levels?	Greater than L_{eq} of 60 dBA			
• Tolay Extended		62 dBA	C	⊙
• Adobe Road		Air blast criteria may be exceeded 55 dBA or less	C	●
• Tolay Confined		62 dBA	C	⊙
• Lakeville Hillside		68 dBA	C	●
• Sears Point		60 dBA	C	●
• Two Rock		Air blast criteria may be exceeded 55 dBA or less	C	●
• Bloomfield		55 dBA or less	C	❍
• Carroll Road		55 dBA or less	C	❍
• Valley Ford		55 dBA or less	C	❍
• Huntley		69 dBA	C	●

Table 4.13-13

Noise Impacts by Component - Storage Reservoirs

Evaluation Criteria	Point of Significance	Impact	Type of Impact[1]	Level of Significance[2]
13.5.2. Will operation of the storage reservoir component expose the public to high noise levels?	a. Greater than L_{eq} of 45 dBA Sonoma Co. Greater than L_{eq} of 50 dBA Santa Rosa	None	O&M	==
	b. Greater than or equal to 5 dBA increase in noise, L_{eq}	None	O&M	==
13.5.3. Will construction of the storage reservoir component cause high noise levels from construction traffic?	Greater than 10 % increase in traffic volume	Up to 1,250 %	C	●

Source: Harland Bartholomew & Associates, Inc., 1996

Notes:
1. Type of Impact:
C Construction
O&M Operation and Maintenance

2. Level of Significance:
● Significant impact before and after mitigation
⊙ Significant impact before mitigation; less than significant impact after mitigation
◑ Less than significant impact; no mitigation proposed
== No Impact

Impact: 13.5.1. Will construction of the storage reservoir component expose the public to high noise levels?

Analysis: *Significant; Alternatives 2, 3A, and 3E.*

Tolay Extended, Adobe Road, Tolay Confined, Lakeville Hillside, Sears Point, Two Rock, Huntley. Construction noise at the reservoirs will result in significant impacts. The greatest impact is projected to occur at Huntley where estimated construction noise exceeds the noise criteria by up to 9 dBA. At the Two Rock and Adobe Road sites, the recommended airblast criteria may be exceeded which will result in significant impacts.

The number of equipment pieces listed in Table 4.13-14 is for a typical reservoir including Valley Ford, Carroll Road, Bloomfield, Huntley, Two Rock, Adobe Road, and Sears Point. The Tolay Reservoir is larger in magnitude and spread out more with multiple structures. Even though larger, construction noise for the Tolay Reservoir will be similar to that of other reservoirs mentioned above, because the construction equipment will be spread out over a wider area. Even though the Lakeville Hillside reservoir is significantly smaller, the construction noise for the Lakeville Hillside reservoir will not be significantly lower. However, the construction duration will be significantly shorter.

The highest level of construction noise is expected to be generated during the excavation stage. An L_{eq} as high as 91 dBA at 50 feet from the center of construction activity will be generated during specific periods of heavy excavation. During other stages of construction, the L_{eq} will be lower and will vary depending on the amount of activity and the types of equipment in use. Table 4.13-15 summarizes the construction noise impacts for the reservoirs.

Construction of the reservoir at the Two Rock and Adobe Road sites will require blasting for a rock quarry. Blasting noise is dependent on several factors: (1) the type of explosive material and method of detonation; (2) the amount or weight of explosive material; (3) the type of rock and earth material to be blasted; and (4) the depth in which the charge is placed in the ground. Because of the variability of these factors, and the fact that detailed information regarding the blasting is not available, it is not possible to precisely assess blast noise impacts. Depending on the blast-charge weight, it is possible that the recommended airblast criteria may be exceeded at the Two Rock and Adobe Road sites.

Table 4.13-14

Estimated Construction Noise Levels for Reservoirs

		Construction Usage Factors[1]			
Equipment	Quantity	Clearing	Excavation	Rough	Finish
Backhoe	3	4%	40%	0%	16%
Compactor	3	0%	30%	0%	0%
Dozer	5	4%	40%	0%	16%
Dump Truck Export	1	16%	16%	0%	16%
Dump Truck Import	5	16%	16%	0%	0%
Grader	2	40%	40%	0%	2%
Scraper	8	4%	40%	0%	16%
Water Truck	3	26%	26%	0%	0%

Table 4.13-14

Estimated Construction Noise Levels for Reservoirs

Equipment	Quantity	Construction Usage Factors[1]			
		Clearing	Excavation	Rough	Finish
Worker Vehicles	20	16%	16%	40%	16%
L_{eq} at 50 feet from construction site		**89 dBA**	**91 dBA**	**90 dBA**	**88 dBA**

Source: U.S. Army Construction Engineering Research Laboratory, Construction Site Noise Control Cost-Benefit Estimating Procedures, 1978. U.S. Environmental Protection Agency, Noise from Construction Equipment and Operation, Building Equipment, and Home Appliances, 1971

Note:
1. Usage factors represent the percentage of time the equipment will be operating at full speed

Table 4.13-15

Summary of Construction Noise Impacts for Storage Reservoirs

Storage Reservoir	Distance to Nearest Sensitive Receptor, feet	Construction Noise Levels, L_{eq} (dBA)[1]		Jurisdiction
		at 50 feet	at Nearest Sensitive Receptor	
Tolay Extended	1,400	91	62	Sonoma County
Adobe Road	> 3,000	91	55 or less	Sonoma County
Tolay Confined	1,400	91	62	Sonoma County
Lakeville Hillside	700	91	68	Sonoma County
Sears Point	1,700	91	60	Sonoma County
Two Rock	> 3,000	91	55 or less	Sonoma County
Bloomfield	> 3,000	91	55 or less	Sonoma County
Carroll Road	> 3,000	91	55 or less	Sonoma County
Valley Ford	> 3,000	91	55 or less	Sonoma County
Huntley	600	91	69	Sonoma County

Source: Parsons Engineering Science, Inc. 1996

Note:
1. Excluding blast noise

Less than Significant; Alternatives 3B, 3C, and 3D.

Bloomfield, Carroll Road, Valley Ford. At these reservoirs, the nearest sensitive receptor is located more than 3,000 feet from the construction site, and the estimated construction noise levels are below the noise criteria. Construction noise impacts at the nearest sensitive receptor are expected to be less than significant.

No Impact; Alternatives 1, 4, and 5.

These alternatives do not have a storage reservoir component.

Mitigation: *Alternatives 2, 3A, and 3E.*

2.4.9. Construction Noise Control Measures

Alternatives 3B, 3C, and 3D. No mitigation is proposed.

Alternatives 1, 4, and 5. No mitigation is needed.

After Mitigation: *Significant after Mitigation; Alternatives 2, 3A, and 3E.*

The construction noise impacts will be reduced substantially with implementation of both the equipment noise control and administrative measures specified in the Construction Measures Section of this document. Application of the construction noise control measures will reduce the construction noise impacts at nearby sensitive receptors; however, at most reservoir sites it will not be reduced to a level of less than significant.

Impact: 13.5.2. Will operation of the storage reservoir component expose the public to high noise levels?

Analysis: *No Impact; All Alternatives.*

With the exception of pump stations that will be required to distribute stored water from the reservoirs to the irrigation areas and in some cases handle the volume of runoff water and divert it around the reservoirs, there will not be any mechanical noise sources associated with the operation of the reservoirs. No significant noise impacts will be expected from the reservoir component. Noise associated with the pump stations at each of the reservoirs is discussed under the pump station component.

Alternatives 1, 4, and 5, do not have a storage reservoir component.

Mitigation: No mitigation is needed.

Impact: **13.5.3. Will construction of the storage reservoir component cause high noise levels from traffic?**

Analysis: *Significant; Alternatives 2 and 3.*

The daily traffic volume associated with construction of the reservoirs includes 100 truck trips per day for hauling material from each reservoir to available quarries and 230 trips for workers traveling to and from the Project site. The traffic volume on local streets will be increased by up to 700 percent. The increase in traffic volume will translate to a noise increase of approximately 8 dBA. For the private driveways approaching the reservoir sites, the increase in construction traffic will be approximately 1,250 percent. The increase in noise due to this increase in traffic volume will be approximately 11 dBA. Therefore, significant noise impacts will be expected from the traffic generated by construction of the reservoirs.

No Impact; Alternatives 1, 4 and 5.

These alternatives have no storage reservoir component.

Mitigation: *Alternatives 2 and 3.*

2.4.9. Construction Noise Control Measures.

Alternatives 1, 4 and 5. No mitigation is needed.

After Mitigation: *Significant after Mitigation*; *Alternatives 2 and 3.*

The construction noise impacts due to traffic will be reduced substantially through administrative measures specified in the Construction Measures Section of this document. Application of the construction noise control measures will reduce the traffic noise at nearby sensitive receptors; however, it will not be reduced to a level of less than significant.

Pump Station Component

Pump stations are scattered within Sonoma County, Marin County, and the City of Santa Rosa. There will not be any pump stations in the Cities of Rohnert Park, Sebastopol, Cotati, or Petaluma. The Alternative Projects Facilities Plan illustrates the location of the proposed pump stations; the capacity and features of these stations are listed in Appendix D-32.

Table 4.13-16

Noise Impacts by Component - Pump Stations

Evaluation Criteria	Point of Significance	Impact	Type of Impact[1]	Level of Significance[2]
13.6.1. Will construction of the pump station component expose the public to high noise levels?	Greater than L_{eq} of 60 dBA			
• All South County alternatives		50-71 dBA	C	●
• All West County alternatives		50-75 dBA	C	●
• Geysers Recharge Alternative		37-71 dBA	C	●
13.6.2. Will operation of the pump station component expose the public to high noise levels?				
• Alternative 2 (including Sebastopol)	a. Greater than L_{eq} of 45 dBA Sonoma & Marin Co.	62-99 dBA	O&M	●
	Greater than L_{eq} of 50 dBA Santa Rosa	81-92 dBA	O&M	●
	b. Greater than or equal to 5 dBA increase in noise, L_{eq}	Greater than 5 dBA increase in noise	O&M	●
• Alternative 3A	a. Greater than L_{eq} of 45 dBA Sonoma & Marin Co.	69-94 dBA	O&M	●
	Greater than L_{eq} of 50 dBA Santa Rosa	81-92 dBA	O&M	●
	b. Greater than or equal to 5 dBA increase in noise, L_{eq}	Greater than 5 dBA increase in noise	O&M	●
• Alternative 3B	a. Greater than L_{eq} of 45 dBA Sonoma & Marin Co.	56-94 dBA	O&M	●
	Greater than L_{eq} of 50 dBA Santa Rosa	81-92 dBA	O&M	●

Table 4.13-16

Noise Impacts by Component - Pump Stations

Evaluation Criteria	Point of Significance	Impact	Type of Impact[1]	Level of Significance[2]
	b. Greater than or equal to 5 dBA increase in noise, L_{eq}	Greater than 5 dBA increase in noise	O&M	●
• Alternative 3C	a. Greater than L_{eq} of 45 dBA Sonoma & Marin Co.	69-94 dBA	O&M	●
	Greater than L_{eq} of 50 dBA Santa Rosa	81-92 dBA	O&M	●
	b. Greater than or equal to 5 dBA increase in noise, L_{eq}	Greater than 5 dBA increase in noise	O&M	●
• Alternative 3D	a. Greater than L_{eq} of 45 dBA Sonoma & Marin Co.	64-94 dBA	O&M	●
	Greater than L_{eq} of 50 dBA Santa Rosa	81-92 dBA	O&M	●
	b. Greater than or equal to 5 dBA increase in noise, L_{eq}	Greater than 5 dBA increase in noise	O&M	●
• Alternative 3E	a. Greater than or equal to L_{eq} of 45 dBA Sonoma & Marin Co.	59-94 dBA	O&M	●
	Greater than or equal to L_{eq} of 50 dBA Santa Rosa	81-92 dBA	O&M	●
	b. Greater than or equal to 5 dBA increase in noise, L_{eq}	Greater than 5 dBA increase in noise	O&M	●
• Alternative 4	a. Greater than L_{eq} of 45 dBA Sonoma & Marin Co.	89-101 dBA increase in noise	O&M	●
	Greater than L_{eq} of 50 dBA Santa Rosa	None		==
	b. Greater than or equal to 5 dBA increase in noise, L_{eq}	Greater than 5 dBA increase in noise	O&M	●

Table 4.13-16

Noise Impacts by Component - Pump Stations

Evaluation Criteria	Point of Significance	Impact	Type of Impact[1]	Level of Significance[2]
13.6.3. Will construction of the pump station component cause high noise levels from construction traffic?	Greater than 10% increase in traffic volume	< 10% increase	C	❍

Source: Harland Bartholomew & Associates, Inc. 1996

Notes:
1. Type of Impact:
C Construction
O&M Operation and Maintenance
2. Level of Significance:
● Significant impact before and after mitigation
❍ Less than significant impact; no mitigation proposed
== No impact

Impact: 13.6.1. Will construction of the pump station component expose the public to high noise levels?

Analysis: *Significant; Alternatives 2, 3, and 4.*

Table 4.13-17 presents the quantity of the equipment and its usage factors for various stages of construction for the pump stations. The highest level of construction noise is expected to be generated during the excavation stage. An L_{eq} as high as 87 dBA at 50 feet from the center of construction activity will be generated during specific periods of heavy excavation. During other stages of construction, the L_{eq} will be lower and will vary depending on the amount of activity and the types of equipment in use.

Table 4.13-17

Estimated Construction Noise Levels for Pump Stations

Equipment	Quantity	Construction Usage Factors[1]			
		Clearing	Excavation	Rough	Finish
Backhoe	1	4%	40%	0%	16%
Compactor	1	30%	30%	0%	0%
Concrete Truck	1	0%	0%	4%	0%
Crane	1	0%	0%	8%	4%

Table 4.13-17

Estimated Construction Noise Levels for Pump Stations

Equipment	Quantity	Construction Usage Factors[1]			
		Clearing	Excavation	Rough	Finish
Dozer	1	4%	40%	0%	16%
Dump Truck Export	1	16%	16%	0%	16%
Dump Truck Import	1	16%	16%	0%	0%
Excavator	1	0%	10%	0%	0%
Flat Bed Truck	1	16%	16%	40%	16%
Front End Loader	1	4%	40%	0%	16%
Generator	1	40%	40%	0%	2%
Paver	1	0%	0%	0%	12%
Pick Up Truck	1	16%	16%	40%	16%
Water Truck	1	26%	26%	0%	0%
Welding Machine	2	0%	0%	30%	0%
Worker Vehicles	20	16%	16%	40%	16%
L_{eq} at 50' from construction site, dBA		**84**	**87**	**82**	**82**

Source: U.S. Army Construction Engineering Research Laboratory, Construction Site Noise Control Cost-Benefit Estimating Procedures, 1978. U.S. Environmental Protection Agency, Noise from Construction Equipment and Operation, Building Equipment, and Home Appliances, 1971. Parsons Engineering Science, Inc. 1996

Notes:
1. Usage factors represent the percentage of time the equipment will be operating at full speed

Table 4.13-18

Summary of Construction Noise Impacts for Pump Stations

Pump Station	Distance to Nearest Sensitive Receptor, feet	Construction Noise Levels, L_{eq} (dBA)		Jurisdiction
		at 50 feet	at Nearest Sensitive Receptor	
S - Meadowlane Ponds	2,000	87	55	Santa Rosa
TASW - Tolay A Backdam	Greater than 3,000	87	51 or less	Sonoma Co.
TCSW - Tolay C Backdam	1,400	87	58	Sonoma Co.

Table 4.13-18

Summary of Construction Noise Impacts for Pump Stations

Pump Station	Distance to Nearest Sensitive Receptor, feet	Construction Noise Levels, L_{eq} (dBA) at 50 feet	Construction Noise Levels, L_{eq} (dBA) at Nearest Sensitive Receptor	Jurisdiction
ARSW - Adobe Road Stormwater	900	87	62	Sonoma Co.
T - Tolay Dam	Greater than 3,000	87	51 or less	Sonoma Co.
SP - Sears Point Dam	1,700	87	56	Sonoma Co.
L - Lakeville Dam	700	87	64	Sonoma Co.
AR - Adobe Road Dam	Greater than 3,000	87	51 or less	Sonoma Co.
TR - Two Rock Dam	Greater than 3,000	87	51 or less	Sonoma Co.
B - Bloomfield Dam	Greater than 3,000	87	51 or less	Sonoma Co.
CR - Carroll Road Dam	Greater than 3,000	87	51 or less	Sonoma Co.
VF - Valley Ford Dam	Greater than 3,000	87	51 or less	Sonoma Co.
H - Huntley Dam	600	87	65	Sonoma Co.
ASR-2 - Petaluma. Hill Rd at Rohnert Park Expressway	Greater than 1,000	87	61 or less	Sonoma Co.
SEB - Delta Pond	Greater than 3,000	87	51 or less	Sonoma Co.
FGS & BVS - West College Ponds	300	87	71	Santa Rosa
FGB - Redwood Hwy. North at Fountaingrove Parkway	400	87	69	Santa Rosa
BVB - Sonoma County Fairground	500	87	67	Santa Rosa
G1 - Delta Pond	Greater than 3,000	87	51 or less	Sonoma Co.
G2 - Hwy 128 at Pine Flat Road	300	87	71	Sonoma Co.
G3 & G4 - Pine Flat Rd.	Greater than 15,000	87	37 or less	Sonoma Co.
SBPS-2 - Petaluma Hill Rd.	Greater than 1,000	87	61 or less	Sonoma Co.
SBPS-3 - Petaluma Hill Rd.	600	87	65	Sonoma Co.
SBPS-7 - Petaluma Hill Rd.	Greater than 1,000	87	61 or less	Sonoma Co.
SBPS-8 - Petaluma Hill Rd.	500	87	67	Sonoma Co.
SBPS-9 - E. Railroad Ave.	Greater than 1,000	87	61 or less	Sonoma Co.
SBPS-10 - Adobe Road	300	87	71	Sonoma Co.
SBPS-11 - Adobe Road	Greater than 1,000	87	61 or less	Sonoma Co.
SBPS-12 - Lakeville Road	600	87	65	Sonoma Co.
WBPS-1 - Martinoni Road	Greater than 1,000	87	61 or less	Marin Co.

Table 4.13-18

Summary of Construction Noise Impacts for Pump Stations

Pump Station	Distance to Nearest Sensitive Receptor, feet	Construction Noise Levels, L_{eq} (dBA) at 50 feet	Construction Noise Levels, L_{eq} (dBA) at Nearest Sensitive Receptor	Jurisdiction
WBPS-3 - Seavey Road	400	87	69	Sonoma Co.
WBPS-4 - Spring Hill Rd.	Greater than 1,000	87	61 or less	Sonoma Co.
WBPS-5 - Pepper Road	Greater than 1,000	87	61 or less	Sonoma Co.
WBPS-6 - Valley Ford Rd.	Greater than 1,000	87	61 or less	Sonoma Co.
WBPS-7 - Canfield Road	200	87	75	Sonoma Co.
WBPS-8 - Valley Ford Rd.	700	87	64	Sonoma Co.
WBPS-9 - Valley Ford Rd.	Greater than 1,000	87	61 or less	Sonoma Co.
WBPS-10 - Bloomfield Rd.	300	87	71	Sonoma Co.
WBPS-11 - Carroll Road	600	87	65	Sonoma Co.
WBPS-12 - Hwy 1	Greater than 1,000	87	61 or less	Marin Co.
WBPS-13 - Valley Ford Rd,	Greater than 1,000	87	61 or less	Sonoma Co.
WBPS-16 - Meachum Rd.	Greater than 1,000	87	61 or less	Sonoma Co.
LBPS-1 - Green Valley	Greater than 1,000	87	61 or less	Sonoma Co.
LBPS-2 - Graton Road	500	87	67	Sonoma Co.
LBPS-3 - Bodega Hwy.	400	87	69	Sonoma Co.
LBPS-4 - Burnside Road	Greater than 1,000	87	61 or less	Sonoma Co.

Source: Parsons Engineering Science, Inc., 1996

No Impact; Alternatives 1 and 5.

These alternatives have no new pump station component.

Mitigation: *Alternatives 2, 3, and 4.*

2.4.9. Construction Noise Control Measures

Alternatives 1 and 5. No mitigation is needed.

After Mitigation: *Significant after Mitigation; Alternatives 2, 3, and 4.*

The construction noise impacts will be reduced substantially with implementation of both the equipment noise control and administrative measures specified in the Construction Measures Section of this document. Application of the construction noise control measures will reduce the construction noise impacts at nearby sensitive receptors; however, it will not be reduced to a level of less than significant.

Impact: 13.6.2. Will operation of the pump station component expose the public to high noise levels?

Analysis: *Significant; Alternatives 2, 3, and 4.*

Table 4.13-19 presents the results of the analysis for noise impacts associated with operation of the pump stations before implementation of mitigation. Also shown in Table 4.13-19 is the distance from the pumps at which pump noise will be less than 45 dBA. During the irrigation season (typically May through October) pumps are assumed to operate 24 hours a day. During the winter months, the pump station at the Laguna Plant will be operating to send reclaimed water to reservoirs; during the winter, pump stations serving the irrigation areas will only be used when the contingency winter irrigation program is operating.

No Impact; Alternatives 1 and 5.

These alternatives have no new pump station component.

Mitigation: *Alternatives 2, 3, and 4.*

2.3.17. Pump Station Noise Control

Alternatives 1 and 5. No mitigation is needed.

After Mitigation: *Significant after Mitigation; Alternatives 2, 3, and 4.*

The noise generated during operation of the pump stations will be greatly reduced through implementation of this measure. Pump noise will be reduced using various combinations of techniques such as a noise barrier between the pump station and sensitive receptors, fully enclosed underground facility for the pump stations, pump station lay out so that ventilation and door will be facing away from the sensitive receptors, acoustical louvers for the building air ventilation openings, and low noise motor for the pump systems. These noise control features can reduce noise levels up to 20 to 30 dBA, if facilities are placed underground, with

additional noise reduction features decreasing noise by 3 to 15 dBA. Noise reduction for each mitigation feature is discussed in Measure 2.3.17. Implementation of the noise control measure will significantly reduce the operational noise impacts at the existing sensitive receptors. However, significant noise impacts will still occur, even after mitigation measures are applied.

Impact: **13.6.3. Will construction of the pump station component cause high noise levels from construction traffic?**

Analysis: *Less than Significant; Alternatives 2, 3, and 4.*

The daily traffic volume associated with construction of the pump stations will include worker vehicles traveling to and from the Project site. The increase in traffic volume on local streets will be less than 10 percent. Therefore, the noise generated by the construction traffic will be less than significant.

No Impact; Alternatives 1 and 5.

These alternatives have no new pump station component.

Mitigation: *Alternatives 2, 3, and 4.* No mitigation is proposed.

Alternatives 1 and 5. No mitigation is needed.

Table 4.13-19

Estimated Noise Impacts from Operation of Pump Stations
(Before Mitigation)

Pump Station	System Data		Distance to Nearest Sensitive Receptor		Pump Noise Level at Nearest Sensitive Receptor		Noise Criteria[3]	Distance at Which Pump Noise Would be Less than 45 dBA (ft)
	No.[1]	Size (HP[2])	Existing (ft)	Potential Future (ft)	Existing, L_{eq} (dBA)	Potential Future, L_{eq} (dBA)	L_{eq} (dBA)	
S - Meadowlane Ponds[4]	3	750	2,000	10	50	92	50	Greater than 4,000
TASW - Tolay Extended Backdam	2	400	Greater than 3,000	375	42 or less	62	45	Greater than 2,500
TCSW - Tolay Confined Backdam	2	1,000	1,400	500	53	64	45	Greater than 4,000
ARSW - Adobe Road Stormwater	2	550	900	250	54	67	45	Greater than 2,700
T - Tolay Dam	4	750	Greater than 3,000	125	47 or less	88	45	Greater than 4,100
SP - Sears Point Dam	4	900	1,700	200	54	75	45	Greater than 4,500
L - Lakeville Dam	3	215	700	125	54	73	45	Greater than 2,100
AR - Adobe Road Dam	4	325	Greater than 3,000	125	44 or less	76	45	Greater than 2,900
TR - Two Rock Dam	3	160	Greater than 3,000	125	39 or less	72	45	Greater than 1,700
B - Bloomfield Dam	3	340	Greater than 3,000	875	43 or less	56	45	Greater than 2,700

Table 4.13-19

Estimated Noise Impacts from Operation of Pump Stations
(Before Mitigation)

Pump Station	System Data		Distance to Nearest Sensitive Receptor		Pump Noise Level at Nearest Sensitive Receptor		Noise Criteria[3]	Distance at Which Pump Noise Would be Less than 45 dBA (ft)
	No.[1]	Size (HP[2])	Existing (ft)	Potential Future (ft)	Existing, L_{eq} (dBA)	Potential Future, L_{eq} (dBA)	L_{eq} (dBA)	
CR - Carroll Road Dam	3	340	Greater than 3,000	125	43 or less	75	45	Greater than 2,700
VF - Valley Ford Dam	3	400	Greater than 3,000	375	43 or less	64	45	Greater than 2,700
H - Huntley Dam	3	300	600	625	57	59	45	Greater than 2,500
ASR-2 - Petaluma Hill Rd at Rohnert Park Expressway	2	140	Greater than 1,000	10	47 or less	87	45	Greater than 1,300
SEB - Delta Pond[4]	3	400	Greater than 3,000	10	43 or less	90	45	Greater than 2,700
FGS - West College Ponds[4]	1	150	300	10	58	85	50	Greater than 1,500
BVS - West College Ponds[4]	1	350	300	10	54	81	50	Greater than 1,000
FGB - Redwood Hwy. North of Fountaingrove Parkway	1	125	400	10	52	83	50	Greater than 1,000
BVB - Sonoma County Fairground	1	75	500	10	47	81	50	Greater than 700
G1 Delta Pond[4]	3	900	Greater than 3,000	10	42 or less	89	45	Greater than 2,500

Table 4.13-19

Estimated Noise Impacts from Operation of Pump Stations
(Before Mitigation)

Pump Station	System Data		Distance to Nearest Sensitive Receptor		Pump Noise Level at Nearest Sensitive Receptor		Noise Criteria[3]	Distance at Which Pump Noise Would be Less than 45 dBA (ft)
	No.[1]	Size (HP[2])	Existing (ft)	Potential Future (ft)	Existing, L_{eq} (dBA)	Potential Future, L_{eq} (dBA)	L_{eq} (dBA)	
G2 - Hwy 128 at Pine Flat Road	4	1,500	300	10	71	100	45	Greater than 5,700
G3 - Pine Flat Road	4	1,250	Greater than 15,000	10	36 or less	99	45	Greater than 5,700
G4 - Pine Flat Road	4	1,750	Greater than 20,000	10	35 or less	101	45	Greater than 6,400
SBPS-2 - Petaluma Hill Road	1	40	Greater than 1,000	10	39 or less	78	45	Greater than 500
SBPS-3 - Petaluma Hill Road	1	60	600	10	45	80	45	Greater than 600
SBPS-7 - Petaluma Hill Road	4	225	Greater than 1,000	10	52 or less	91	45	Greater than 2,500
SBPS-8 - Petaluma Hill Road	1	130	500	10	50	83	45	Greater than 1,000
SBPS-9 - E. Railroad Ave.	1	25	Greater than 1,000	10	37 or less	76	45	Greater than 400
SBPS-10 - Adobe Road	5	900	300	10	70	99	45	Greater than 5,100
SBPS-11 - Adobe Road	3	40	Greater than 1,000	10	43 or less	83	45	Greater than 800
SBPS-12 - Lakeville Road	3	500	600	10	59	94	45	Greater than 3,000

Table 4.13-19

Estimated Noise Impacts from Operation of Pump Stations
(Before Mitigation)

Pump Station	System Data		Distance to Nearest Sensitive Receptor		Pump Noise Level at Nearest Sensitive Receptor		Noise Criteria[3]	Distance at Which Pump Noise Would be Less than 45 dBA (ft)
	No.[1]	Size (HP[2])	Existing (ft)	Potential Future (ft)	Existing, L_{eq} (dBA)	Potential Future, L_{eq} (dBA)	L_{eq} (dBA)	
WBPS-1 - Martinoni Road	1	5	Greater than 1,000	10	30 or less	69	45	Greater than 200
WBPS-3 - Seavey Road	1	15	400	10	42	74	45	Greater than 300
WBPS-4 - Spring Hill Road	1	110	Greater than 1,000	10	43 or less	83	45	Greater than 800
WBPS-5 - Pepper Road	3	475	Greater than 1,000	10	54 or less	94	45	Greater than 3,000
WBPS-6 - Valley Ford Road	1	20	Greater than 1,000	10	36 or less	75	45	Greater than 400
WBPS-7 - Canfield Road	1	40	200	10	53	78	45	Greater than 500
WBPS-8 - Valley Ford Road	1	10	700	10	36	72	45	Greater than 300
WBPS-9 - Valley Ford Road	1	1	Greater than 1,000	10	23 or less	62	45	Greater than 100
WBPS-10 - Bloomfield Road	1	50	300	10	50	79	45	Greater than 600
WBPS-11 - Carroll Road	1	10	600	10	39	72	45	Greater than 300
WBPS-12 - Hwy 1	1	5	Greater than 1,000	10	30 or less	69	45	Greater than 200

Table 4.13-19

Estimated Noise Impacts from Operation of Pump Stations
(Before Mitigation)

Pump Station	System Data		Distance to Nearest Sensitive Receptor		Pump Noise Level at Nearest Sensitive Receptor		Noise Criteria[3]	Distance at Which Pump Noise Would be Less than 45 dBA (ft)
	No.[1]	Size (HP[2])	Existing (ft)	Potential Future (ft)	Existing, L_{eq} (dBA)	Potential Future, L_{eq} (dBA)	L_{eq} (dBA)	
WBPS-13 - Valley Ford Road	1	140	Greater than 1,000	10	44 or less	84	45	Greater than 1000
WBPS-16 - Meachum Road	1	20	Greater than 1,000	10	36 or less	75	45	Greater than 400
LBPS-1 - Green Valley	1	5	Greater than 1,000	10	30 or less	69	45	Greater than 200
LBPS-2 - Graton Road	2	175	500	10	54	88	45	Greater than 1,500
LBPS-3 - Bodega Highway	1	35	400	10	46	78	45	Greater than 500
LBPS-4 - Burnside Road	1	35	Greater than 1,000	10	38 or less	78	45	Greater than 500

Source: Parsons Engineering Science, Inc. 1996

Notes:
1. Number of pumps; does not includes standby pump systems
2. Horsepower
3. Lowest noise criteria applicable to affected sensitive receptors
4. Pumps are located outdoors

Agricultural Irrigation Component

Table 4.13-20

Noise Impacts by Component- Agricultural Irrigation

Evaluation Criteria	Point of Significance	Impact	Type of Impact[1]	Level of Significance[2]
13.7.1. Will construction of the agricultural irrigation component expose the public to high noise levels?	Greater than L_{eq} of 60 dBA	90 dBA	C	●
13.7.2. Will operation of the agricultural irrigation component expose the public to high noise levels?	a. Greater than L_{eq} of 45 dBA Sonoma & Marin Co. Greater than L_{eq} of 50 dBA Santa Rosa	Less than L_{eq} of 45 dBA	O&M	❍
	b. Greater than or equal to 5 dBA increase in noise, L_{eq}	Less than L_{eq} of 5 dBA increase	O&M	❍
13.7.3. Will construction of the agricultural irrigation component cause high noise levels from construction traffic?	Greater than 10 % increase in traffic volume	Less than 10 % increase	C	❍

Source: Parsons Engineering Science, Inc., 1995

Notes:
1. Type of Impact:
C Construction
O&M Operation and Maintenance
O&M-CP Operation & Maintenance - Contingency Plan

2. Level of Significance:
❍ Less than significant impact; no mitigation proposed
● Significant impact before and after mitigation

Impact: 13.7.1. Will construction of the agricultural irrigation component expose the public to high noise levels?

Analysis: *Significant; Alternatives 2 and 3.*

The agricultural irrigation component includes installation of pipe from public rights-of-way to undivided parcels receiving irrigation water.

The noise generated by the construction of this part of agricultural irrigation component will be similar to that of pipeline construction. The highest level of construction noise is expected to be generated during the

excavation stage. An L_{eq} as high as 90 dBA at 50 feet from the center of the construction activity will be generated during specific periods of heavy excavation. During other stages of construction, the L_{eq} will be lower and will vary depending on the amount of activity and the types of equipment in use. The specific location of the local distribution system pipelines has not been determined. Therefore, noise impacts at specific sensitive receptors were not analyzed. However, construction noise will be significant if a sensitive receptor is located within 1,600 feet of the construction site.

No Impact; Alternatives 1, 4, and 5.

These alternatives do not have an agricultural irrigation component.

Mitigation: *Alternatives 2 and 3.*

2.4.9. Construction Noise Control Measures

Alternatives 1, 4, and 5. No mitigation is needed.

After Mitigation: *Significant after Mitigation; Alternatives 2 and 3.*

The construction noise impacts will be reduced substantially with implementation of both the equipment noise control and administrative measures specified in the Construction Measures Section of this document. Application of the construction noise control measures will reduce the construction noise impacts at nearby sensitive receptors; however, it will not be reduced to a level of less than significant.

Impact: 13.7.2. Will operation of the agricultural irrigation component expose the public to high noise levels?

Analysis: *Less than Significant; Alternatives 2 and 3.*

The operation of the agricultural irrigation component will include operation of small pumps (50 hp or less), pipelines, and drip, or spray irrigation system. Impacts of pipelines are similar to those described under the pipeline component. The pumps will be located on the private property of irrigation users, and have thus not been sited at this time. Impacts will be essentially the same as discussed above for pump stations. Please refer to the discussion of pump stations for impacts and mitigation measures. The pipelines and sprinklers used for agricultural irrigation will not produce significant noise impacts. This applies to winter irrigation under the Contingency Plan as well.

No Impact; Alternatives 1, 4, and 5.

These alternatives do not have an agricultural irrigation component.

Mitigation: No mitigation is proposed.

Impact: 13.7.3. Will construction of the agricultural irrigation component cause high noise levels from construction traffic?

Analysis: *Less than Significant; Alternatives 2 and 3.*

The daily traffic volume associated with construction of the agricultural irrigation component will include worker vehicles traveling to and from the Project site. The increase in traffic volume on local streets will be less than 10 percent. Therefore, the noise generated by the construction traffic will be less than significant.

No Impact; Alternatives 1, 4, and 5.

These alternatives do not have an agricultural irrigation component.

Mitigation: No mitigation is proposed.

Geysers Steamfield Component

Table 4.13-21

Noise Impacts by Component - Geysers Steamfield

Evaluation Criteria	Point of Significance	Impact	Type of Impact[1]	Level of Significance[2]
13.8.1. Will construction of the geysers steamfield component expose the public to high noise levels?	Greater than L_{eq} of 60 dBA	Less than 60 L_{eq} of 60 (dBA)	C	❍
13.8.2. Will operation of the geysers steamfield component expose the public to high noise levels?	a. Greater than L_{eq} of 45 dBA Sonoma & Marin County Greater than L_{eq} of 50 dBA Santa Rosa	Less than an L_{eq} of 45 dBA	O&M	❍
	b. Greater than or equal to 5 dBA increase in noise, L_{eq}	Less than 5 dBA increase in L_{eq}	O&M	❍

Table 4.13-21

Noise Impacts by Component - Geysers Steamfield

Evaluation Criteria	Point of Significance	Impact	Type of Impact[1]	Level of Significance[2]
13.8.3. Will construction of the geysers steamfield component cause high noise levels from construction traffic?	Greater than 10 % increase in traffic volume	Less than 10 % increase	C	●

Source: Harland Bartholomew & Associates, Inc., 1996

Notes:
1. Type of Impact:
C Construction
O&M Operation and Maintenance
2. Level of Significance:
○ Less than significant impact; no mitigation proposed
● Significant impact before and after mitigation

Impact: **13.8.1. Will construction of the geysers steamfield component expose the public to high noise levels?**

Analysis: *Less than Significant; Alternative 4.*

The nearest sensitive receptor to the holding tanks for the geyser steamfield is several miles away. Therefore, the construction of the holding tanks is not expected to produce significant noise impacts. Construction of the pipelines within the geysers reserve is within an industrial area with no sensitive receptors.

No Impact; Alternatives 1, 2, 3, and 5.

These alternatives do not have a geysers steamfield component.

Mitigation: No mitigation is proposed.

Impact: **13.8.2. Will operation of the geysers steamfield component expose the public to high noise levels?**

Analysis: *Less than Significant; Alternative 4.*

Flow of reclaimed water into the pipes within the geysers reserve is via gravity; "injection" of water into the geothermal wells is also via gravity. There will not be any mechanical noise sources associated with the operation of the geysers steamfield component. There may be some water turbulence as the holding tanks operate.

No Impact; Alternatives 1, 2, 3, and 5.

These alternatives do not have a geysers steamfield component.

Mitigation: No mitigation is proposed.

Impact: 13.8.3. Will construction of the geysers steamfield component cause high noise levels from construction traffic?

Analysis: *Significant; Alternative 4.*

The daily traffic volume associated with construction of the geysers steamfield component will include worker vehicles traveling to and from the site. The increase in traffic volume on Pine Flat Road will be greater than 10 percent. Therefore, the noise generated by the construction traffic will be significant.

No Impact; Alternatives 1, 2, 3, and 5.

These alternatives do not have a geysers steamfield component.

Mitigation: *Alternative 4.* No feasible mitigation has been identified.

Alternatives 1, 2, 3, and 5. No mitigation is needed.

Discharge Component

Table 4.13-22

Noise Impacts by Component - Discharge

Evaluation Criteria	Point of Significance	Impact	Type of Impact[1]	Level of Significance[2]
13.9.1. Will construction of the discharge component expose the public to high noise levels?	Greater than L_{eq} of 60 dBA			
• Russian River		Less than an L_{eq} of 60 dBA	C	❍
• Laguna		None	C	==

Table 4.13-22

Noise Impacts by Component - Discharge

Evaluation Criteria	Point of Significance	Impact	Type of Impact[1]	Level of Significance[2]
13.9.2. Will operation of the discharge component expose the public to high noise levels?	a. Greater than L_{eq} of 45 dBA Sonoma & Marin County	Less than an L_{eq} of 45 dBA	O&M	❍
	Greater than L_{eq} of 50 dBA Santa Rosa		O&M	❍
	b. Greater than or equal to 5 dBA increase in noise, L_{eq}	Less than a 5 dBA increase in L_{eq}		
13.9.3. Will construction of the discharge component cause high noise levels from construction traffic?	Greater than 10 % increase in traffic volume			
• Russian River		Less than 10% increase	C	❍
• Laguna		None	C	==

Source: Harland Bartholomew & Associates, Inc., 1996

Notes:
1. Type of Impact:
C Construction
O&M Operation and Maintenance
2. Level of Significance:
❍ Less than significant impact; no mitigation proposed
== No impact

Impact: 13.9.1. Will construction of the discharge component expose the public to high noise levels?

Analysis: *Less than Significant; Alternative 5A.*

The nearest sensitive receptor to the discharge outfall location is approximately 1,800 feet away on the west side of the river. On the east side of the river, the nearest sensitive receptor is approximately 2,600 feet away. The noise generated by construction activities is estimated to be 87 dBA at a distance of 50 feet during the heaviest construction period. At the sensitive receptor distances of 1,800 and 2,600 feet way, the noise due to construction activities will be less than 60 dBA. Therefore, noise impacts due to construction will be less than significant.

No Impact. Alternatives 1, 2, 3, 4, and 5B.

No construction is required for discharge at the Laguna.

Mitigation: No mitigation is proposed.

Impact: 13.9.2. Will operation of the discharge component expose the public to high noise levels?

Analysis: *Less than Significant; All Alternatives*

There will be noise generated by the water leaving the discharge pipeline into the Russian River and Laguna de Santa Rosa. However, there are no nearby sensitive receptors in the vicinity of the discharge. Therefore, the operation of the discharge component will not produce significant noise impacts.

Mitigation: No mitigation is proposed.

Impact: 13.9.3. Will construction of the discharge component cause high noise levels from construction traffic?

Analysis: *Less than Significant; Alternative 5A.*

The daily traffic volume associated with construction of the discharge outfall will include worker vehicles traveling to and from the site. The increase in traffic volume on local streets will be less than 10 percent. Therefore, the noise generated by the construction traffic will be less than significant.

No Impact; Alternatives 1, 2, 3, 4, and 5B.

No construction is required for discharge at the Laguna.

Mitigation: No mitigation is proposed.

CUMULATIVE IMPACTS

There are three impacts -- all significant -- identified in the Noise section:

Impact: 13.1C. Will the Project plus cumulative projects expose the public to high noise levels?

Analysis: *Alternatives 2, 3, 4, and 5A.*

While already significant, construction noise impacts could be exacerbated even further if construction either overlaps with, or is closely followed by other construction projects. Construction of the City of Petaluma reclaimed water storage reservoir and pipelines could increase

construction noise levels in the South County area or could extend the length of time that high noise levels are experienced at particular sites. This may be of particular concern where pipelines from the Petaluma and Subregional projects are being built in the same streets, such as Lakeville Highway. These impacts may be reduced somewhat by coordination of the two construction contracts (it may be possible to install both pipelines at the same time). Mitigation for noise impacts is already in place, and there are no additional feasible measures that could be implemented to lessen noise impacts.

Impact: 13.2C. Will the Project plus cumulative projects expose the public to high noise levels?

Analysis: *Alternatives 2, 3, and 4.*

Noise from pump stations will contribute to the overall increase in noise levels in the Project area. As population in the area increases, and more intensive land uses occur in the Project area, the existing quiet character of many areas will unavoidably change. New pump stations for the Petaluma reclamation project and for the proposed Healdsburg reservoir will increase noise levels in their vicinity. A variety of noise attenuation features are proposed to be included in pump stations for the Project, and there are no additional feasible measures that could be imposed to lessen cumulative effects.

Impact: 13.3C. Will the Project plus cumulative projects cause high noise levels from construction traffic?

Analysis: *Alternatives 2, 3, 4, and 5A.*

Noise from construction traffic. Construction of all new pipelines (Alternatives 2, 3, 4, and 5A) and reservoirs (Alternatives 2 and 3) will generate significant noise from traffic. This will contribute to the cumulative traffic noise in the Project area, but impacts will be limited to the construction period. Mitigation for construction traffic is included in the Project, and there is no further feasible mitigation that could lessen cumulative impacts.

SUMMARY OF SIGNIFICANT IMPACTS AND MITIGATION

Table 4.13-23

Summary of Significant Impacts and Mitigation Measures- Noise

Impact	Level of Significance[1]	Mitigation Measure
Pipelines		
13.4.1. Construction of pipeline component may expose the public to high noise levels.	Alt 2 - ● Alt 3 - ● Alt 4 - ● Alt 5A - ●	2.4.9. Construction Noise Control Measures
13.4.3. Construction of the pipeline component may cause high noise levels from the construction traffic.	Alt 2 - ● Alt 3 - ● Alt 4 - ● Alt 5A - ●	2.4.9. Construction Noise Control Measures
Storage Reservoirs		
13.5.1. Construction of the storage reservoir component may expose the public to high noise levels.	Alt 2A - ⊙ Alt 2B - ● Alt 2C - ⊙ Alt 2D - ● Alt 3A - ● Alt 3E - ●	2.4.9. Construction Noise Control Measures
13.5.3. Construction of the storage reservoir component may cause high noise levels from the construction traffic.	Alt 2 - ● Alt 3 - ●	2.4.9. Construction Noise Control Measures
Pump Stations		
13.6.1. Construction of the pump station component may expose the public to high noise levels.	Alt 2 - ● Alt 3 - ● Alt 4 - ●	2.4.9. Construction Noise Control Measures
13.6.2. Operation of the pump station component may expose the public to high noise levels.	Alt 2 - ● Alt 3 - ● Alt 4 - ●	2.3.17. Incorporate Noise Control Measures into the Final Design of the Pump Station.
Agricultural Irrigation		
13.7.1. Construction of the agricultural irrigation component may expose the public to high noise levels.	Alt 2 - ● Alt 3 - ●	2.4.9. Construction Noise Control Measures

Table 4.13-23

Summary of Significant Impacts and Mitigation Measures- Noise

Impact	Level of Significance[1]	Mitigation Measure
Geysers Steamfield		
13.8.3. Construction of the geysers steamfield component may cause high noise levels from construction traffic.	Alt 4 - ●	No feasible mitigation has been identified.

Source: Parsons Engineering Science, Inc., 1996

Notes: Level of Significance:

● Significant impact before and after mitigation

⊙ Significant impact before mitigation; less than significant impact after mitigation

SUMMARY OF IMPACTS BY ALTERNATIVE

Table 4.13-24

Summary of Impacts by Alternative -Noise

Component	Alt 1	Alt 2A	Alt 2B	Alt 2C	Alt 2D	Alt 3A	Alt 3B	Alt 3C	Alt 3D	Alt 3E	Alt 4	Alt 5A	Alt 5B
No Action (No Project) Alternative	==	--	--	--	--	--	--	--	--	--	--	--	--
Headworks Expansion	--	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
Urban Irrigation	--	==	==	==	==	==	==	==	==	==	--	--	--
Pipelines	--	●	●	●	●	●	●	●	●	●	●	●	--
Storage Reservoirs	--	●	●	●	●	●	●	●	●	●	--	--	--
Pump Stations	--	●	●	●	●	●	●	●	●	●	●	--	--
Agricultural Irrigation	--	●	●	●	●	●	●	●	●	●	--	--	--
Geysers Steamfield	--	--	--	--	--	--	--	--	--	--	●	--	--
Discharge	--	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍

Source: Parsons Engineering Science, Inc., 1996

Notes: Level of Significance Codes

-- Not applicable

== No impact

❍ Less than significant impact; no mitigation proposed

● Significant impact before and after mitigation

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HBA Team Documents

None

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