

4.4 NOISE

The information presented in this noise analysis is based on the Noise Study Report prepared by Illingworth & Rodkin in January 2003. The Noise Study Report is available for public review at the Solano Transportation Authority (STA), One Harbor Center, Suite 130, Suisun City, CA 94585, during regular business hours.

Methodology

Noise Terminology

Noise is characterized as unwanted sound. The primary unit for measurement of noise is the decibel (dB) which indicates the relative amplitude of a sound. As the range of sound levels is very large, dB is calculated logarithmically. An increase of 10 dB represents a ten-fold increase in acoustic energy while a 20 dB increase represents a 100-fold increase and so forth. Each 10 dB increase in sound level is perceived as an approximate doubling of noise. As dB is a logarithmic unit, sound levels are not added arithmetically. Two sounds of equal magnitude added together result in an increase of 3 dB, not a doubling of dB. For example, if the sound level is 70 dB when 100 cars pass by, the dB level would increase to 73 dB when 200 cars pass by. As the range of noise which the human ear can perceive is limited, dB is often A-weighted. The A weighted dB (dBA) gives greater weight to the frequencies of sound to which the human ear is most sensitive. Table 4.4-1 depicts noise levels in dBA for various activities.

Because sound levels can vary markedly over a short period of time, a method for describing either the average character of the sound or the statistical behavior of the variations must be utilized. Most commonly, environmental sounds are described in terms of an average level that has the same acoustical energy as the summation of all the time-varying events. This energy-equivalent sound/noise descriptor is called the Equivalent Noise Level, or L_{eq} . A common averaging period is hourly, expressed as $L_{eq(h)}$, but L_{eq} can describe any series of noise events of arbitrary duration.

Generally, noise studies prepared for local agency projects are often evaluated in terms of 24-hour noise metrics such as the day-night level (Ldn) or the community noise equivalent level (CNEL). Ldn is a noise metric that accounts for average A-weighted noise level over a 24-hour period that includes a 10 dBA penalty for nighttime hours (10:00 p.m. to 7:00 a.m.). Similarly, CNEL is a noise metric that measures average A-weighted noise level over a 24-hour period that includes a 10 dBA penalty during nighttime hours and a 5 dBA penalty during evening hours (7:00 p.m. to 10:00 p.m.) For purposes of this analysis, noise is described using the Ldn metric.

Noise Measurements and Modeling

Noise measurements were conducted at 11 noise receiver locations within the study area, including six locations on the West End and five locations on the East End. All noise measurements were taken at residential land uses identified through a review of mapping, aerial photographs, and site visits to the study area.

The noise measurements consist of long-term measurements (24-hours or more in duration) and short-term measurements (10 minutes in duration). Long-term noise measurements documented noise levels in hourly intervals. These measurements showed the trend in noise levels during a 24-hour period. Care was taken to select sites that were primarily affected by traffic noise and to avoid sites where noise from other sources may occur. While

conducting noise measurements, emphasizing traffic noise over other sources allows for an “apples to apples” comparison between the measured traffic noise and noise modeled to represent conditions under the North Connector Project (Project).

Table 4.4-1. Typical Noise Levels in the Environment

Common Outdoor Noise Sources	Noise Levels (dBA)	Common Indoor Noise Sources
	120 dBA	
Jet fly-over at 300 Meters (984 Feet)		Rock Concert
	110 dBA	
Pile Driver at 20 Meters (65 Feet)	100 dBA	
		Night Club with Live Music
	90 dBA	
Large Truck Pass-By at 15 Meters (49 Feet)		
	80 dBA	Noisy Restaurant
		Garbage Disposal at One Meter (Three Feet)
Gas Lawn Mower at 30 Meters (98 Feet)	70 dBA	Vacuum Cleaner at Three Meters (Ten Feet)
Commercial/Urban Area Daytime		Normal Speech at One Meter (Three Feet)
Suburban Expressway at 90 Meters	60 dBA	
Suburban Daytime		Active Office Environment
	50 dBA	
Urban Area Nighttime		Quiet Office Environment
	40 dBA	
Suburban Nighttime		
Quiet Rural Areas	30 dBA	Library
		Quiet Bedroom at Night
Wilderness Area	20 dBA	
Most Quiet Remote Areas	10 dBA	Quiet Recording Studio
Threshold of Human Hearing	0 dBA	Threshold of Human Hearing

Source: Illingworth & Rodkin, 2006.

Short-term measurements were conducted throughout the study area in 10 minute intervals at areas of frequent human activity or acoustically equivalent locations.

Future traffic noise levels were predicted for 2020 No Build and 2020 with Project Conditions using traffic volume inputs from the Project traffic operations report (See section 4.2, Traffic and Transportation). The traffic mix along the Project alignment was assumed to be 99 percent Light-Duty Vehicles and one percent Medium-Duty Trucks in the West End. Heavy-Duty Trucks were not included for this segment as their use would be prohibited in this area. For the East End, future traffic volumes were modeled as 98 percent Light-Duty Vehicles, one percent Medium-Duty Trucks, and one percent Heavy-Duty Trucks. For the purposes of traffic noise modeling for future year conditions, a free-flow speed of 45 mph was used for vehicles traveling along the Project alignment.

Truck percentage data compiled by Caltrans was used to estimate the future traffic mix along I-80. Future unconstrained traffic volumes were modeled as 94 percent Light-Duty Vehicles, two percent Medium-Duty Trucks, and four percent Heavy-Duty Trucks. For the purposes of traffic noise modeling for future year conditions and assuming the modification of I-80 that would be capable of accommodating projected traffic volumes, a free-flow speed of 65 mph was used.

Noise impacts were identified where noise levels would approach or exceed the standards established in the City of Fairfield (City) General Plan and the Solano County (County) General Plan Noise Elements. These standards are discussed in greater detail in the Regulatory Setting section below.

EXISTING CONDITIONS

West End

Table 4.4-2 presents noise measurement findings for the West and East ends. As described above, both long-term noise measurements and short-term noise measurements were conducted to represent noise levels generated by vehicular traffic at noise receivers south of SR12. Noise sensitive land uses in this area include semi-rural residential land uses south of SR12 and west of Red Top Road and residential subdivisions to the north along Venus Drive and Mural Lane off of Mangels Boulevard. The Nelda Mundy Elementary School is located just east of the residential subdivision at Mural Lane. Noise sensitive land uses located south of SR12 are primarily affected by noise generated by vehicular traffic using I-80 and SR12. Residential uses along Venus Drive and Mural Lane are primarily affected by noise generated by vehicular traffic using I-80 and Business Center Drive.

Long-term noise measurements were taken west of Red Top Road, approximately 0.25 miles from Westbound I-80 (LT-1) and at the westernmost end of Mangels Boulevard (LT-2). Noise levels measured at these locations were 67 dBA Ldn and 61 dBA Ldn, respectively. Noise levels west of Red Top Road generally resulted from traffic on I-80 and noise levels at the western end of Mangels Boulevard resulted from traffic noise generated along I-80 and SR12. Noise levels at these locations currently exceed local noise standards.

In addition to long-term noise measurements, short-term measurements were taken at two locations in the West End. Noise measurements were taken at the Ferrari Ranch, approximately 0.12 miles west of SR12. Noise level measurements at this location were 58 dBA Ldn. In addition, a short-term noise measurement was taken in a field south of Nelda Mundy Elementary School, approximately 0.15 miles from Business Center Drive. The noise level at this location was 62 dBA Ldn. Exterior noise levels primarily resulted from traffic along I-80, Green Valley Road, and Business Center Drive. The noise level at this location currently exceeds local noise standards.

East End

Noise sensitive receivers in the East End of the Project are generally rural-type residential receivers located north of I-80. The noise environment at receivers in the vicinity of the East End of the Project is dominated by vehicular traffic noise from I-80. Long-term noise measurements were made at the southernmost end of Kaiser Road (LT-3), approximately 0.10 miles from I-80, and along Russell Road (LT-4), approximately 0.25 miles from I-80. Noise level measurements at these locations were 72 dBA Ldn and 66 dBA Ldn, respectively. Short-term noise measurements were conducted near Solano Community College (ST-5) and at residential receivers along Russell Road (ST-6 and ST-7). The noise

Table 4.4-2. Existing Noise Levels (West and East ends)

Receiver	Location	Type of Development	Date	Time	Ldn (dBA)	Exceeds City/County Noise Thresholds?
West End						
LT-1	Northwest of Red Top Road, approximately 400 meters from westbound I-80	Residential	11/18/2003 to 11/19/2003	12:00 to 16:00	67	Yes
LT-2	West end of Mangels Boulevard	Residential	11/17/2003 to 11/19/2003	17:00 to 14:00	61	Yes
ST-1	Ferrari Estate. ~200 m from SR12	Residential	11/19/2003	12:50	58	No
ST-2	Field south of Mundy Elementary School. ~245 meters to Business Center Parkway. Representative of adjacent residential land uses.	Residential	11/18/2003	15:03	62	Yes
East End						
LT-3	South end of Kaiser Drive ~159 meters from I-80	Residential	11/17/2003 to 11/19/2003	17:00 to 16:00	72	Yes
LT-4	Russell Road. ~400 meters from westbound I-80	Residential	11/18/2003 to 11/19/2003	13:00 to 16:00	66	Yes
ST-5	Solano Community College Southernmost Boundary ~289 m to right lane of WB I-80	-	11/19/2003	15:39	67	Yes
ST-6	Russell Road ~100 m from Westbound I-80	Residential	11/18/2003	13:40	70	Yes
ST-7	Russell Road ~400 m from Westbound I-80	Residential	11/18/2003	14:10	66	Yes

Source: Illingworth & Rodkin, 2006.

level at Solano Community College was 67 dBA Ldn. At the two locations along Russell Road, noise levels were measured at 70 dBA Ldn (ST-4) and 66 dBA Ldn (ST-5). The noise levels at all these locations exceed local noise standards.

REGULATORY SETTING

City of Fairfield General Plan – Noise Policies

Health and Safety Element

The City of Fairfield’s General Plan Health and Safety Element includes the following objective and policy that pertain to the Project:

Objective HS 9 - Protect the citizens of Fairfield from the harmful and annoying effects of excessive noise and protect the City's economic base by preventing incompatible land uses from encroaching upon existing or planned noise-producing uses.

- Policy HS 9.1 - Ground transportation noise: The compatibility of proposed projects with existing and future noise levels due to ground transportation noise sources shall be evaluated by comparison to Table HS-1 where the existing or future noise level from ground transportation noise sources is determined to exceed the standards of Table HS-1. Noise levels in outdoor activity areas and interior spaces shall be mitigated to the levels shown in Table HS-1.

Table HS-1 is shown as Table 4.4-3 below.

Table 4.4-3. Maximum Allowable Noise Exposure to Ground Transportation Noise Sources

Land Use	Outdoor Activity Areas ^a	Interior Spaces	
	L _{dn} /CNEL, dB	L _{dn} /CNEL, dB	L _{eq} , dB ^b
Residential	60 ^c	45	--
Transient lodging	60 ^c	45	--
Hospitals, nursing homes	60 ^c	45	--
Theaters, auditoriums, music halls	--	--	35
Churches, meeting halls	60 ^c	--	40
Office buildings	--	--	45
Schools, libraries, museums	--	--	45
Playgrounds, neighborhood parks	70	--	--

Note: -- = not applicable.

- a Where the location of outdoor activity areas is unknown, the exterior noise-level standard shall be applied to the property line of the receiving land use.
- b As determined for a typical worst-case hour during periods of use.
- c Where it is not possible to reduce noise in outdoor activity areas to 60 db Ldn/CNEL or less using a practical application of the best-available noise reduction measures, an exterior noise level of up to 65 dB Ldn/CNEL may be allowed provided that available exterior noise-level reduction measures have been implemented and interior noise levels are in compliance with this table.

Source: Brown-Buntin Associates 1991.

Solano County General Plan - Noise Policies

Health and Safety Element

The Health and Safety Element of the Solano County General Plan contains policies to guide development and protect citizens from the harmful and annoying effects of excessive noise. These policies include standards for regulating noise levels affecting residential land uses. Outdoor activity areas of residential land uses are acceptable in noise environments of 60 dBA Ldn or less. Table 4.4-4 illustrates the Solano County General Plan noise thresholds by land use. According to Table 4.4-4, severe noise impacts for noise sensitive land uses (i.e., residential, school, church, and hospital) are generally impermissible in noise environments exceeding 75 dBA CNEL.

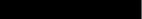
Table 4.4-4. Solano County General Plan Noise Thresholds

Exterior Noise Level Ranges (CNEL)
and Related Land Use Policies

Measured, Estimated, or Projected dBA

Land Use Category	50	55	60	65	70	75	80	85	90
Residential. All dwellings incl. single-family, multi-family, group quarters, mobile homes, etc.									
Transient Lodging. Hotels, motels.									
School classrooms, libraries, churches.									
Hospitals, convalescent homes, etc.									
Auditoriums, concert halls, amphitheaters, music shells.									
Playgrounds, neighborhood parks.									
Golf courses, riding stables, water-based recreation.									
Office buildings. Personal business and professional services.									
Commercial. Retail, movie theaters, restaurants.									
Commercial. Wholesale, industrial, manufacturing, utilities, etc.									
Noise-sensitive manufacturing and communications.									

Land Use Policies Legend

-  Acceptable land use. No special noise insulation requirements.
-  New construction or development allowed only after detailed noise analysis of construction requirements is made and needed noise-abatement features are included in design.
-  New construction or development should generally be avoided. If development does proceed, a detailed analysis of noise reduction requirements must be made and needed noise-abatement features included in design.
-  New construction or development generally not allowed.

Source: Criteria developed with consideration of Federal Environmental Protection Agency findings on noise levels required for uninterrupted sleep or speech, from statistics on hearing loss in the population at large due to noise, from Highway Research Board findings, and from knowledge of planning area ambient noise levels.

NOISE IMPACTS ANALYSIS

Significance Criteria

California Environmental Quality Act (CEQA)

CEQA contains general guidelines to evaluate the significance of effects of environmental noise attributable to a proposed project. Under CEQA, a project would lead to a significant impact if it causes:

- Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies
- Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels
- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project
- For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels
- For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels

Issues Not Discussed Further

Location within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport, a public use airport, or a private airstrip, and exposure of people residing or working in the Project area to excessive noise levels.

The Project is not located within an airport land use plan nor is it located within 2 miles of a public or private airport. The closest airport to the Project site is Travis Air Force Base, over 4 miles to the east of the Project area. Therefore, no impacts related to location within an airport land use plan or proximity to a public or private airport are anticipated.

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Less than Significant Impacts

Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.

East End

The East End extends from Suisun Creek to the Chadbourne Road undercrossing of SR12 East. As shown in Table 4.4-5, existing noise levels range between 67 dBA Ldn and 80 dBA Ldn, which are in exceedance of County noise standards. Under 2020 No Build conditions, noise levels would continue to exceed County and City noise standards. However, under 2020 with Project conditions, traffic noise contributed by the North Connector combined with future traffic noise from I-80 would cause noise levels to increase by only one dBA at one receiver location, E9 (Orcivoli). While the noise analysis completed

for the Project identified the Orcivoli property as having a residence, further investigation of the property, including a field survey and review of County records, determined that the structures on this property are not residential in nature. The remaining receiver locations; E7 and E8 (Valine Residence), E10 (Gonzalez Residence North), E11 (Gonzalez Residence South), E12 (Loney Residence), and E13 (Lorraine Residence), would continue to experience noise levels in exceedance of County and City standards; however, noise produced by the Project would not be a contributing factor as the existing noise levels have already exceeded such standards. Therefore, impacts related to exposure of persons to or generation of noise levels in excess of standards in the East End, are considered less than significant.

West End

Three residences are located on the west side of Red Top Road and south of SR12. Ambient noise measurements were taken to characterize noise conditions at these locations. Under existing conditions, traffic on I-80 and SR12 is the most significant steady source of traffic noise in this area. Under both 2020 No Project and 2020 with Project conditions, noise levels at the three residences in this area are not calculated to increase even though traffic volumes are projected to change on local roadways due to the proposed Project and other planned roadway improvements.

Along Venus Drive, north of the existing western terminus of Business Center Drive, the primary source of existing traffic noise originates on I-80. Under existing conditions, traffic on I-80 produces noise levels of 62 dBA Ldn at all receiver locations on the West End, which is in exceedance of City of Fairfield noise standards contained in the City Code § 25.1403. These noise standards limit noise levels to a maximum of 60 dBA Ldn at outdoor activity areas of residential land uses. However, where it is not possible to reduce noise in outdoor activity areas to 60 dBA Ldn or less using a practical application of the best-available noise reduction measures, an exterior noise level of up to 65 dBA Ldn may be allowed provided that available noise-level reduction measures have been implemented and interior noise levels are in compliance with City noise standards of 45 dBA. As shown in Table 4.4-5, under either 2020 No Build and 2020 with Project conditions, noise generated by traffic on I-80 is expected to increase by two dBA to 64 dBA Ldn. Traffic noise resulting from the Project combined with future traffic noise from I-80 would cause noise levels to increase an additional one dBA, to 65 dBA Ldn. Residences on Venus Drive are already abutted by an approximately 6 to 8 foot wall along the rear of the properties between the residences and proposed Project. The existing wall provides little attenuation of traffic noise from I-80 as noise passes above the wall. Increasing the height of this wall would not reduce noise levels to less than 60 dBA. Furthermore, constructing a new wall along the Project in this area would also not reduce exterior noise levels at these residences to 60 dBA or less. As a result, the best-available noise reduction measures have already been implemented and there are no other practical measures that would reduce exterior noise levels to 60 dBA or less. However, assuming standard construction of the residences in this area, including forced-air mechanical ventilation, interior noise levels at these residences would be less than 45 dBA Ldn, in compliance with City standards. Therefore, impacts related to exposure of persons to or generation of noise levels in excess of City standards in the West End, are considered less than significant.

Table 4.4-5. Noise Modeling Results – Year 2020

Receiver	Location						Day-Night Average Sound Levels (Ldn, dBA)	
		Existing Conditions	North Connector	I-80	North Connector + I-80	2020 with Project vs. Existing Conditions	2020 with Project vs. 2020 No Build	
West End								
W9	Venus Drive	62	57	64	65	3	1	
W10	Venus Drive	62	57	64	65	3	1	
W11	Venus Drive	62	59	64	65	3	1	
W12	Venus Drive	62	59	64	65	3	1	
W13	Venus Drive	62	58	64	65	3	1	
East End								
E7	Valine North	67	58	69	69	2	0	
E8	Valine North	80	60	82	82	2	0	
E9	Orcivoli	70	64	72	73	2	1	
E10	Gonzales North	66	56	68	68	3	0	
E11	Gonzales South	66	57	68	68	3	0	
E12	Loney	70	60	72	72	2	0	
E13	Lorraine	66	57	68	68	2	0	

Source: Illingworth & Rodkin, 2007.

Significant and Potentially Significant Impacts and Mitigation Measures

- 4.4-1: The Project could potentially result in the exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels associated with construction activities. This is considered a potentially significant adverse impact.**

Groundborne noise and vibration is generally caused by use of heavy construction equipment and operation of heavy-duty trucks on roadways. However, the number of heavy-duty trucks projected to use the North Connector would be minimal. Construction may result in the use of equipment that could generate groundborne vibration and noise, including pile driving activities during the construction of the bridge across Suisun Creek.

Therefore, construction activities may result in temporary impacts throughout the Project area. The following mitigation measures would reduce groundborne vibration and noise levels resulting from construction equipment.

Mitigation Measure 4.4-1: Groundborne vibration and noise-generating construction activities, including use of heavy-duty trucks, shall be limited to daytime hours of 7:00 a.m. to 7:00 p.m., Monday through Friday, and 8:00 a.m. to 5:00 p.m. on Saturdays. Construction activities shall not occur on Sundays or holidays except in circumstances where STA deems it necessary.

Significance after Mitigation: Less than significant.

- 4.4-2: Construction of the Project could potentially cause a substantial temporary increase in ambient noise levels in the Project vicinity above levels existing without the Project due to construction activities. This is considered a potentially significant adverse impact.**

The Project involves construction of a new road with grading, paving and ancillary facilities such as traffic signals, lighting, signs, landscaping and fencing. A new bridge would also be constructed across Suisun Creek.

Construction activities would differ by section. The West End would require grading for the proposed connection to SR12 and the Red Top Road intersection would have to be improved under traffic. Most of the East End is on level agricultural land with the road just above the existing ground. There would be limited grading and minor access requirements for the intersecting farm roads. In addition, a bridge would be constructed across Suisun Creek, requiring pile driving. The Project roadway merges with Abernathy Road on the East End, which would require staging and traffic control for construction. The construction for each section is estimated to take approximately six to nine months and the construction time would vary depending upon the final staging plan for the work. Total construction for both sections is anticipated to take 18 to 24 months.

Roadway construction activities do not typically stay in one location for long periods. Noise sensitive receivers in a given location should not be exposed to noise generated by construction for extended periods. Activity from construction would increase noise levels at locations immediately adjacent to the Project. Noise generated by construction equipment drops off at a rate of six dBA per doubling of distance between the noise source and

receiver. Any construction noise would be temporary. Implementation of the following mitigation measures would reduce impacts from construction to a less-than-significant level.

Mitigation Measure 4.4-2a: Noise-generating activities at the construction site or in areas adjacent to the construction site associated with the Project shall be restricted to daytime hours of 7:00 a.m. to 7:00 p.m., Monday through Friday, and 8:00 a.m. to 5:00 p.m. on Saturdays. Construction activities shall not occur on Sundays or holidays except in circumstances where STA deems it necessary.

Mitigation Measure 4.4-2b: All internal combustion engine driven equipment shall be equipped with intake and exhaust mufflers which are in good condition and appropriate for the equipment.

Mitigation Measure 4.4-2c: Unnecessary idling of internal combustion engines within 100 feet of residences shall be strictly prohibited.

Mitigation Measure 4.4-2d: All construction equipment shall be staged at least 200 feet from residences and all stationary noise-generating construction equipment, such as air compressors and portable power generators, shall be located as far as practical from noise sensitive residences.

Significance after Mitigation: Less than significant.