4.8 NOISE

4.8 NOISE

Introduction

This section describes the existing noise environment in the area of the Proposed Project, and the potential of the Proposed Project to significantly increase noise levels due to project construction and operation. Information included in this section came from a field investigation to measure existing noise levels, and references used for this section include the noise standards in the City of Dixon General Plan, and the Federal Highway Administration (FHWA) Highway Traffic Noise Prediction model. Traffic inputs for the noise prediction model were provided by Fehr and Peers Associates (see separately bound Traffic Appendix).

As discussed in the Initial Study (see Appendix A), the Proposed Project site is not located within an airport land use plan area or within two miles of an airport or private airstrip. Development of the project area would not expose people within the project area to excessive airport noise levels, and this issue is not discussed in the EIR. No comments regarding noise were received during the NOP comment period.

Background Information on Noise

Fundamentals of Environmental Sound and Noise

Sound can be described in terms of amplitude (loudness) and frequency (pitch). The standard unit of sound amplitude measurement is the decibel (dB). The decibel scale is a logarithmic scale that describes the intensity of the pressure vibrations that make up a sound. The pitch of the sound is correlated to the frequency of the sound's pressure vibration. Because humans are not equally sensitive to a given sound level at all frequencies, a special scale has been devised that specifically relates noise to human sensitivity. The A- weighted decibel scale (dBA) does this by placing more importance on frequencies that are more noticeable to the human ear.

Noise is typically defined as unwanted sound. Typically, noise in any environment consists of a base of steady "background" noise made up of many distant and indistinguishable noise sources. Superimposed on this background noise is the sound from individual local sources. These sources can vary from an occasional aircraft or train passing by to virtually continuous noise from traffic on a major highway. Table 4.8-1 lists representative environmental noise levels.

Several rating scales have been developed to analyze the adverse effect of noise on people. Since environmental noise fluctuates over time, these scales consider that the effect of noise upon people is largely dependent upon the volume of the noise, as well as the time of day when the noise occurs. Those that are applicable to this analysis are as follows:

Table 4.8-1

Representative Environmental Noise Levels

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	--110--	Rock Band
Jet Fly-over at 100 feet		
	--100--	
Gas Lawnmower at 3 feet		
	--90--	
		Food Blender at 3 feet
Diesel Truck going 50 mph at 50 feet	--80--	Garbage Disposal at 3 feet
Noisy Urban Area during Daytime		
Gas Lawnmower at 100 feet	--70--	Vacuum Cleaner at 10 feet
Commercial Area		Normal Speech at 3 feet
Heavy Traffic at 300 feet	--60--	
		Large Business Office
Quiet Urban Area during Daytime	--50--	Dishwasher in Next Room
Quiet Urban Area during Nighttime	--40--	Theater, Large Conference Room (background)
Quiet Suburban Area during Nighttime		
	--30--	Library
Quiet Rural Area during Nighttime		Bedroom at Night, Concert Hall (background)
	--20--	
		Broadcast/Recording Studio
	--10--	
Lowest Threshold of Human Hearing	--0--	Lowest Threshold of Human Hearing

Source: California Department of Transportation, 1998.

- L_{eq}, the equivalent energy noise level, is the average acoustic energy content of noise for a stated period of time. Thus, the L_{eq} of a time-varying noise and that of a steady noise are the same if they deliver the same acoustic energy to the ear during exposure. For evaluating community impacts, this rating scale does not vary, regardless of whether the noise occurs during the day or the night.

- L_{dn}, the Day Night Average Level, is a 24-hour average L_{eq} with a 10 dBA "weighting" added to noise during the hours of 10:00 P.M. to 7:00 A.M. to account for noise sensitivity in the nighttime.

- L_{min}, the minimum instantaneous noise level experienced during a given period of time.

- L_{max}, the maximum instantaneous noise level experienced during a given period of time.

Noise caused by natural sources and human activities is usually well represented by median noise levels during the day, night, or over a 24-hour period. Environmental noise levels are generally considered low when the L_{eq} is below 60 dBA, moderate in the 60 to 70 dBA range, and high above 70 dBA. Examples of settings with low daytime background noise levels are isolated, natural settings that can provide noise levels as low as 20 dBA and quiet, suburban, residential streets that can provide noise levels around 40 dBA. Noise levels above 45 dBA at night can disrupt sleep. Examples of moderate-level noise settings are urban residential or semi-commercial areas (typically 55 to 60 dBA) and commercial locations (typically 60 dBA). People may consider louder environments adverse, but most people living or working in urban residential or residential-commercial areas (60 to 75 dBA) or dense urban or industrial areas (65 to 80 dBA) accept the higher noise levels commonly associated with these land uses.

When evaluating changes in 24-hour community noise levels, a difference of 3 dBA is a barely perceptible increase to most people. A 5 dBA increase is readily noticeable, while a difference of 10 dBA would be perceived as a doubling of loudness.

Noise levels from a particular source decline as distance to a receptor increases. Other factors, such as the weather and reflecting or shielding, also help intensify or reduce noise levels at any given location. A commonly used rule of thumb for roadway noise is that for every doubling of distance from the source, the noise level is reduced by about 3 dBA at acoustically "hard" locations (i.e., the area between the noise source and the receptor is nearly complete asphalt, concrete, hard-packed soil, or other solid materials) and 4.5 dBA at acoustically "soft" locations (i.e., the area between the source and receptor is normal earth or has vegetation, including grass). Noise from stationary or point sources is reduced by about 6 to 7.5 dBA for every doubling of distance at acoustically hard and soft locations, respectively. Noise levels may also be reduced by intervening structures; generally, a single row of buildings between the receptor and the noise source reduces the noise level by about 5 dBA, while a solid wall or berm reduces noise levels by 5 to 10 dBA. The manner in which older homes in California were constructed generally provides a reduction of exterior- to-interior noise levels of about 20 to 25 dBA with closed windows. The exterior-to-interior reduction of newer residential units is generally 30 dBA or more.

Fundamentals of Groundborne Vibration

Vibration is sound radiated through the ground. The rumbling sound caused by the vibration of room surfaces is called groundborne noise. The ground motion caused by vibration is measured in the U.S. as vibration decibels (VdB).

The background vibration velocity level in residential and educational areas is usually around 50 VdB. Groundborne vibration is normally perceptible to humans at approximately 65 VdB. A vibration velocity level of 75 VdB is the approximate dividing line between barely perceptible and distinctly perceptible levels for most people.

Most perceptible indoor vibration is caused by sources within buildings, such as the operation of mechanical equipment, movement of people, or the slamming of doors. Typical outdoor sources of perceptible groundborne vibration are construction equipment, steel-wheeled trains, and traffic on rough roads. If a roadway is smooth, the groundborne vibration from traffic is rarely perceptible. The range of interest is from approximately 50 VdB, which is the typical background vibration velocity level, to 100 VdB, which is the general threshold where minor damage can occur in fragile buildings.

The general human response to different levels of groundborne vibration velocity levels is described in Table 4.8-2.

Table 4.8-2

Human Response to Different Levels of Groundborne Vibration

Vibration Velocity Level	Human Reaction
65 VdB	Approximate threshold of perception for many people.
75 VdB	Approximate dividing line between barely perceptible and distinctly perceptible. Many people find that transportation-related vibration at this level is unacceptable.
85 VdB	Vibration acceptable only if there are an infrequent number of events per day.

Source: Federal Railroad Administration, 1998.

Existing Conditions

Existing Noise Receptors

Some land uses are more sensitive to noise than others. These sensitive uses are commonly referred to as "sensitive receptors", and normally include single- and multi-family residences, hospitals, churches, libraries, schools, and retirement homes. Noise sensitive land uses are typically given special attention in order to achieve protection from excessive noise.

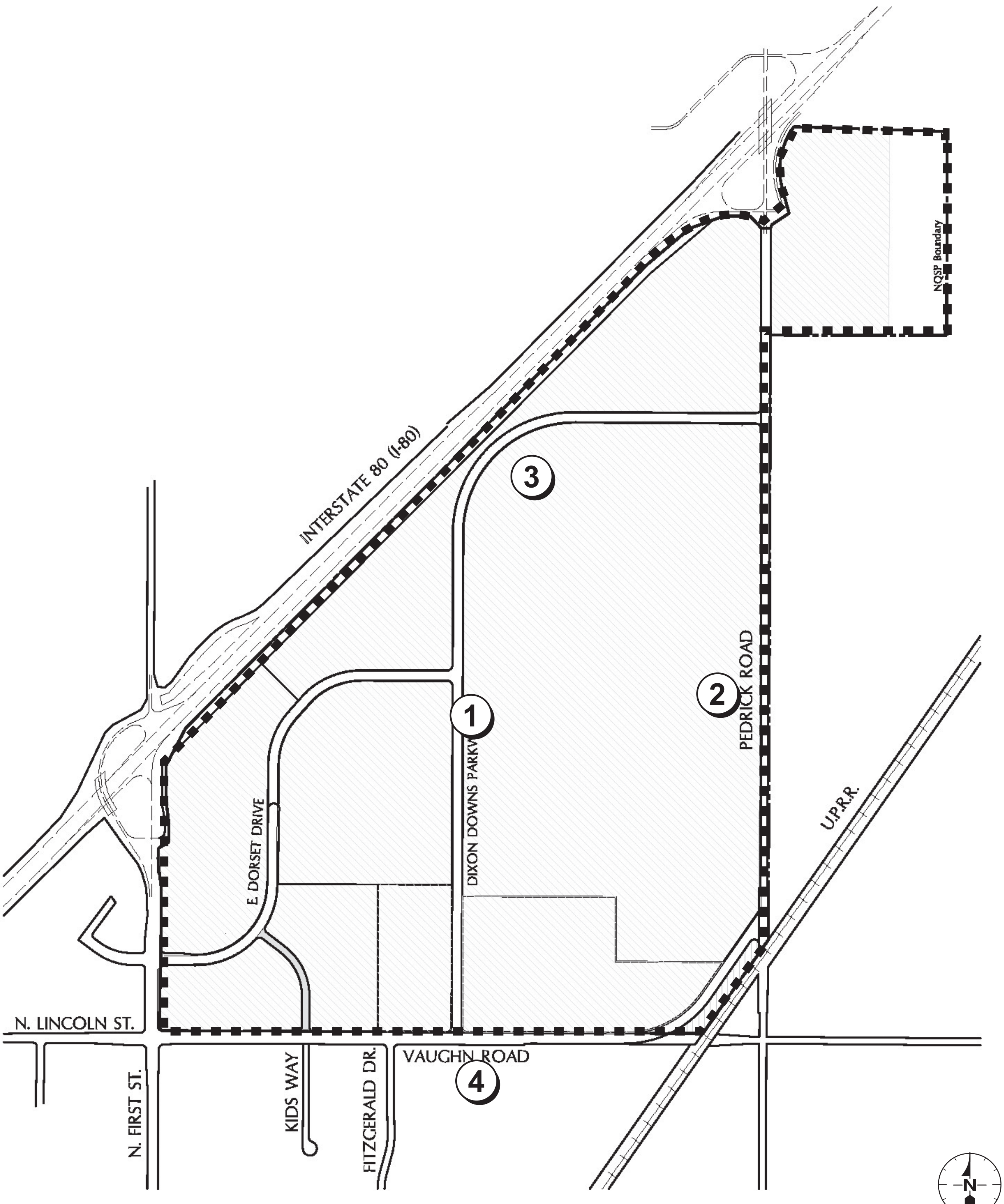
The Proposed Project would be developed on land that is currently undeveloped and used for agricultural purposes. Agricultural uses predominate in the area around the project site, although some industrial and big-box commercial uses also exist nearby, including the Campbell's Soup Supply Company plant to the east and a Wal-Mart to the west. The closest sensitive receptors to the project site are three residences located along Vaughn Road, between 100 and 150 feet to the south of the Proposed Project site and to the west of the intersection of Vaughn Road and the Union Pacific Railroad line.

Existing Ambient Daytime Noise Levels

The scientific instrument used to measure noise is a sound level meter. Sound level meters can accurately measure environmental noise levels to within about plus or minus 1 dBA.

Existing ambient daytime noise levels were measured at four selected locations in and around the project site on July 23, 2004. These locations are identified in Figure 4.8-1. The noise levels were measured using a Larson-Davis Model 814 precision sound level meter, which satisfies the American National Standards Institute (ANSI) for general environmental noise measurement instrumentation. The average noise levels and sources of noise measured at each location are identified in Table 4.8-3.

The major non-roadway noise affecting the site is the Campbell Soup Supply Company plant located across Pedrick Road to the east of the site. Limited noise is also produced at intervals from Dixon Truck and Tractor, just to the south of the Campbell's facility.



Source: City of Dixon Northeast Quadrant, 1995

Not to Scale

EIP ASSOCIATES

FIGURE **4.8-1**

Noise Monitoring Locations

10811-00

City of Dixon

Table 4.8-3

Existing Daytime Noise Levels at Selected On- and Off-Site Locations

Noise Measurement Location	Primary Noise Sources	Noise Level Statistics		
		L_{eq}	L_{min}	L_{max}
1. Center of Site	Campbell Soup Supply Co. factory	45.7	41.5	60.8
2. Just West of Pedrick Road	Constant noise levels from Campbell Soup Supply Co. factory, Max noise levels from traffic on Pedrick Road (especially trucks)	66.8	61.8	81.5
3. Northwest Corner of Site	Traffic on Interstate 80	48.0	45.7	51.8
4. Residence along Vaughn Road	Traffic on Vaughn Road	67.5	45.5	84.6

Source: EIP Associates, 2004.

Existing Roadway Noise Levels

The project site is currently used for agricultural purposes. Tomatoes, corn, and wheat are grown on portions of the site, and a large percentage of the site is fallow during portions of the year. There are no paved roads running through the project site, although some narrow dirt farm roads do traverse the property. Consequently, roadway noise at the project site is produced by roads bordering the property and other roads in the general vicinity. The Proposed Project's proximity to Interstate 80 (I-80) also produces relatively consistent noise levels on the property.

Because of the parcel's size and because no traffic runs through the site, roadway noise is low in the interior of the project site.

Existing roadway noise levels were also calculated for the roadway links in the vicinity of the project site that have noise sensitive uses fronting the roadways. This task was accomplished using the Federal Highway Administration Highway Noise Prediction Model (FHWA-RD-77-108) and traffic volumes from the project traffic analysis (see separately bound Traffic Appendix). The model calculates the average noise levels at specific locations based on traffic volumes, average speeds, roadway geometry, and site environmental conditions. The average vehicle noise rates (energy rates) utilized in the FHWA Model have been modified to reflect average vehicle noise rates identified for California by Caltrans. The Caltrans data show that California automobile noise is 0.8 to 1.0 dBA higher than national levels and that medium and heavy truck noise is 0.3 to 3.0 dBA lower than national levels. Average daily noise levels along these roadway segments are presented in the impact discussion.

Existing Groundborne Vibration

Usually the most likely existing source of groundborne vibration at a project site is roadway truck and bus traffic. Trucks and buses typically generate groundborne vibration velocity levels of around 63 VdB. These levels could reach 72 VdB where trucks and buses pass over bumps in the road. Loaded trucks can create even higher levels of VdB. Truck traffic is common on both Pedrick and Vaughn roads. Loaded truck traffic on Pedrick Road could create 86 VdB at 25 feet, meaning vibrations of approximately 86 VdB are experienced at the northern boundary of the project site. Vibration from truck traffic would diminish rapidly as distance from the road decreases, and would be 80 VdB at 50 feet and 74 VdB at 100 feet from Pedrick Road.

Aside from trucks, the Union Pacific railroad line traverses the northeast portion of the site. Trains run intermittently along this track. Normally, trains produce vibration levels that are not noticeable at 100 feet from the track, indicating that some noticeable vibration from trains occurs at the very northeast portion of the project site.

Regulatory Framework

Federal Regulations

There are no federal regulations related to noise that apply to the Proposed Project.

State Regulations

Title 24 of the California Code of Regulations codifies Sound Transmission Control requirements, which establishes uniform minimum noise insulation performance standards for new hotels, motels, dormitories, apartment houses, and dwellings other than detached single-family dwellings. Specifically, Title 24 states that interior noise levels attributable to exterior sources shall not exceed 45 dBA CNEL in any habitable room of new dwellings. Dwellings are required to be designed so that interior noise levels will meet this standard for at least ten years from the time of building permit application.

Local Regulations

City of Dixon General Plan Noise Element

The California Government Code requires that a noise element be included in the general plan of each county and city in the state. The purpose of the noise element is to ensure that noise control is incorporated into the planning process. The noise element can help City planners achieve and maintain consistent noise levels for existing and proposed land uses.

The City of Dixon's Noise Element is not addressed separately in the City's 1993 General Plan. Rather, noise is discussed within the six general topic headings in the General Plan. The acceptable levels of noise exposure for the City of Dixon are found on page 33 of the Dixon General Plan as Figure 10.

The General Plan also identifies five policies concerning noise in its Natural Environment section:

- The city shall protect existing noise sources from future noise-sensitive development.
- The city shall establish performance standards to limit noise generation.
- The city shall establish physical development patterns compatible with the noise environment of Dixon.
- The city shall, where feasible, mitigate traffic and other noise to the levels defined as "Acceptable Levels of Noise Exposure." Areas in which noise levels currently exceed, or as a result of future development, will exceed these levels of noise exposure are deemed inappropriate for the development in question.

Municipal Code – Noise Performance Standards

The City of Dixon Zoning Ordinance sections 12.24.03 through 12.24.06 deal with permitted noise levels. Section 12.24.03 provides maximum permitted levels of stationary source noise for various zoning districts. These permitted levels are shown in Table 4.8-4, below. Section 12.24.04 of the zoning ordinance also presents noise performance standards correction factors for certain operations. These correction factors are shown in Table 4.8-5. The Dixon Zoning Ordinance, section 12.24.05 provides exceptions to the noise performance standards. One of the exceptions is noise from temporary construction or demolition work.

Table 4.8-4

Noise Performance Standards

Zoning District	Maximum Sound Pressure Level in Decibels
Residential and Medical Districts	55 dB
Multi-Family Residential Districts	60 dB
"C" Districts	70 dB
"M" Districts	75 dB

Source: City of Dixon Zoning Ordinance, page 24.2. Adopted April 13, 1982, Updated February 25, 1999.

Table 4.8-5

Noise Performance Standards – Correction Factors

Time and Operation of Type of Noise	Correction in Maximum Permitted Decibels
Emission only between 7 am & 10 pm	Plus 5
Noise of unusual impulsive character such as hammering or drill pressing	Minus 5
Noise of unusual periodic character such as hammering or screeching	Minus 5

Source: City of Dixon Zoning Ordinance, page 24.2. Adopted April 13, 1982, Updated February 25, 1999.

Neither the Dixon Municipal Code nor the Dixon General Plan provide interior noise level standards. The State of California General Plan Guidelines, however, recommend an acceptable interior noise level of 45 dBA for residential uses.

City of Dixon Northeast Quadrant Specific Plan

The City's Northeast Quadrant Specific Plan (NQSP) does not include any policies or regulations that do not already exist in the General Plan or the Municipal Code. However, the NQSP Draft EIR does include four mitigation measures that apply to the entire NQSP area to reduce potential noise impacts from development of the NQSP. These mitigation measures are as follows:

N-A: All contractors shall comply with local, state and federal noise regulations, including fitting all equipment with mufflers according to the manufacturer's specifications.

N-B: Construction activities shall not take place between 7:00 p.m. and 7:00 a.m. on weekdays and Saturday, and shall not be permitted on Sunday or on federal holidays.

N-C: Future development shall comply with the City of Dixon. Development criteria in the NQSP shall be required to demonstrate conformance with the City's noise standard or site specific mitigation measures to ensure that noise thresholds are not exceeded.

N-D: Commercial and office uses located within the proposed year 2010 70 CNEL noise contour, and industrial uses proposed within the 75 CNEL noise contour shall be sited and designed to be sensitive to the adjacent I-80 noise source by incorporating appropriate building materials and design techniques to improve both the interior and exterior noise environment. In addition, the use of landscape barriers shall be explored to reduce noise levels adjacent to I-80.

Standards of Significance

For purposes of this EIR, impacts to noise are considered significant if the Proposed Project would:

- Permanently expose nearby sensitive uses to excessive groundborne vibration levels. While CEQA states that the potential for any excessive groundborne vibration levels must be analyzed, it does not define "excessive", and there are no federal, State or local standards for groundborne vibration. Consequently, this analysis uses the Federal Railway Administration's vibration impact thresholds for sensitive buildings, residences, and institutional land uses. These thresholds are 80 VdB at residences and buildings where people normally sleep (e.g., nearby residences and day care facility) and 83 VdB at institutional buildings;
- Create vibration that would cause structural damage to existing buildings;
- Cause non-transportation maximum noise levels at surrounding uses to exceed the noise performance standards specified in Section 12.24.03 of the City of Dixon Zoning Ordinance, (shown in Tables 4.8-4 and 4.8-5);
- Cause transportation noise levels at surrounding uses to exceed the Community Noise Exposure Levels found in Figure 10 of the City of Dixon General Plan on page 33; or
- Increase interior noise levels at residential areas above 45 dB L_{dn}, consistent with the State of California General Plan Guidelines.

Methods of Analysis

Traffic Noise Impact Assessment Methodology

The analysis of the existing and future noise environments presented in this analysis is based on noise level monitoring, noise prediction modeling, and empirical observations. Existing noise levels were monitored by EIP Associates at selected locations within the project vicinity using a Larson-Davis Model 814 precision sound level meter, which satisfies the American National Standards Institute (ANSI) for general environmental noise measurement instrumentation. Noise modeling procedures involved the calculation of existing and future vehicular noise levels along individual roadway segments in the project vicinity. This task was accomplished using the Federal Highway Administration (FHWA) Highway Noise Prediction Model (FHWA-RD-77-108). The FHWA Model calculates the average noise level at specific locations based on traffic volumes, average speeds, roadway geometry, and site environmental conditions. The average vehicle noise rates (energy rates) utilized in the FHWA Model have been modified to reflect average vehicle noise rates identified for California by Caltrans. The Caltrans data show that California automobile noise is 0.8 to 1.0 dBA higher than national levels and that medium and heavy truck noise is 0.3 to 3.0 dBA lower than national levels. Traffic volumes utilized as data inputs in the noise prediction model were provided by the project traffic engineer.

Construction Noise and Vibration Impact Methodology

Construction noise was analyzed using data compiled by the US Environmental Protection Agency that lists typical noise levels at 50 feet for construction equipment and various construction activities. Vibration from construction was evaluated using data from the Federal Railroad Administration that lists typical vibration decibels at various distances for common construction equipment.

Phase 1

During construction of Phase 1, noise from construction activities would add to the existing ambient noise environment in the immediate project vicinity. In this case, existing noise at the project site is primarily generated by traffic on I-80, traffic on local roads, and the industrial uses to the east of Pedrick Road.

Impacts and Mitigation Measures

Impact 4.8-1	**Construction activities could create noise that may exceed noise level standards.**	
Applicable Policies and Regulations	Dixon Municipal Code Section 12.24.03 – 12.24.05	
Significance with Policies and Regulations	Phase 1: Phases 1 and 2:	Significant Significant
Applicable NQSP Mitigation Measures	N-A and N-B	
Mitigation Measures	Phase 1: Phases 1 and 2:	4.8-1 4.8-1
Significance After Mitigation	Phase 1: Phases 1 and 2:	Less than Significant Less than Significant

Phase 1

Construction of Phase 1 would require the use of heavy equipment for site grading and excavation, installation of utilities, paving, and building fabrication. Construction activities would also involve the use of smaller power tools, generators, and other sources of noise. During each stage of construction there would be a different mix of equipment operating and noise levels would vary based on the amount of equipment in operation and the location of the activity. These activities would be of temporary duration. Normally, temporary construction noise is only an issue if it occurs during hours when people are trying to sleep (e.g., after 10 p.m.).

The US EPA has compiled data regarding the noise generating characteristics of specific types of construction equipment and typical construction activities. These data are presented in Table 4.8-6 and 4.8-7.

Table 4.8-6

Noise Ranges of Typical Construction Equipment

Construction Equipment	Noise Levels in dBA L_{eq} at 50 feet[1]
Front Loader	73-86
Trucks	82-95
Cranes (moveable)	75-88
Cranes (derrick)	86-89
Vibrator	68-82
Saws	72-82
Pneumatic Impact Equipment	83-88
Jackhammers	81-98
Pumps	68-72
Generators	71-83
Compressors	75-87
Concrete Mixers	75-88
Concrete Pumps	81-85
Back Hoe	73-95
Pile Driving (peaks)	95-107
Tractor	77-98
Scraper/Grader	80-93
Paver	85-88

Note:
1. Machinery equipped with noise control devices or other noise-reducing design features does not generate the same level of noise emissions as that shown in this table.
Source: U.S. EPA, 1971.

Table 4.8-7

Typical Outdoor Construction Noise Levels

Construction Phase	Noise Levels at 50 Feet (dBA L_{eq})	Noise Levels at 50 Feet with Mufflers (dBA L_{eq})
Ground Clearing	84	82
Excavation, Grading	89	86
Foundations	78	77
Structural	85	83
Finishing	89	86

Source: U.S. EPA, 1971.

The nearest sensitive receptors to the project site are three existing residences located south of the project site, north of Vaughn Road. This portion of the site would be dedicated to soccer and baseball fields, a parking lot, and approximately 97,170 square feet of buildings for groom's quarters. Consequently, many of the construction activities listed in Table 4.8-6 and 4.8-7 would not occur near the existing residences. However, grading activities can be expected throughout the property, including the southernmost portion. This would mean that grading equipment would operate 100-150 feet from the residences for at least a portion of the overall construction period. According to Table 4.8-6 and 4.8-7, noise levels at the adjacent residences are likely to temporarily increase up to 84 dBA L_{eq} during ground-clearing, and up to 89 dBA L_{eq} during grading at 50 feet. Mitigation measure N-A of the NQSP EIR requires contractors to fit all their equipment with mufflers. As shown in Table 4.8-7, mufflers would reduce maximum noise levels to 86 dBA at 50 feet during grading. Since noise reduces by approximately 6 dBA per doubling of distance, muffled equipment would produce between 75 to 80 dBA at the nearest residences on Vaughn Road. These noise levels would be temporarily in excess of Dixon's maximum sound level of 55 dB for residential uses. However, Section 12.24.05 of the Dixon Municipal Code states that temporary construction and demolition work may exceed the maximum sound pressure levels in Section 12.24.03. Therefore, according to the Dixon Municipal Code, construction could exceed the maximum sound level of 55 dBA without adversely impacting residences. However, prior to mitigation the impact associated with project construction would be ***significant***.

Phases 1 and 2

Phase 2 would result in the construction of office and retail space, and a hotel conference center. Since there would be additional construction associated with Phase 2, including possible pile-driving, more construction-related noise would be generated under Phases 1 and 2 than under Phase 1 alone. If pile-driving does occur, this additional construction activity noise could affect the existing nearby sensitive receptors even though it would not occur close to the southernmost border of the project site. Structures (horse barns and storage facilities) would shield residences on Vaughn Road from Phase 2 construction activity, attenuating the noise levels somewhat, although they may not be able to attenuate pile-driving noise below the City's 55 dBA maximum noise level for residential uses. As discussed under Phase 1, however, Mitigation Measures N-A and N-B of the NQSP EIR would reduce construction noise and limit the time for construction activities. Also, Section 12.24.05 of the Municipal Code exempts construction noise from having to comply with the requirements of Section 12.24.03. However, prior to mitigation the impact is considered ***significant***.

Mitigation Measures

Compliance with Mitigation Measure 4.8-1 would ensure that noise associated with project construction for either phase would be reduced to a *less-than-significant level*.

4.8-1 *(Phases 1 and 2)*

Implement Mitigation Measures N-A and N-B from the NQSP EIR:

N-A All contractors shall comply with local, state and federal noise regulations, including fitting all equipment with mufflers according to the manufacturer's specifications.

The following mitigation measure from the NQSP EIR, including the proposed revision, would ensure that no loud construction activities take place between 7:00 p.m. and 7:00 a.m. during the weekdays.

N-B *Loud ~~C~~construction activities shall not take place between 7:00 p.m. and 7:00 a.m. on weekdays and Saturday, and shall not be permitted on Sundays ~~or on federal holidays~~.*

Impact 4.8-2	**The Proposed Project would create temporary groundborne vibration that could affect nearby receptors, but would not create permanent sources of groundborne vibration.**
Applicable Policies and Regulations	None
Significance with Policies and Regulations	Phase 1: Less than Significant Phases 1 and 2: Less than Significant
Applicable NQSP Mitigation Measures	N-B
Mitigation Measures	Phase 1: None required Phases 1 and 2: None required
Significance after Mitigation	Phase 1: Less than Significant Phases 1 and 2: Less than Significant

Phase 1

Phase 1 of the Proposed Project would create the infrastructure necessary for horse-racing and concert events, including a race-track, horse barns, grooms' and jockey's quarters, parking lots and the Finish Line Pavilion building. Recreational uses, including a soccer field and baseball field, would also be developed as part of Phase 1. Only one potential source of vibration would be expected after construction of Phase 1. This would be the vibration generated by the horses as they race on the track. This vibration could potentially be felt in the vicinity of the track, but the distance (at least 500 feet) is too great between the track and the existing receptors on Vaughn Road to be noticed at these receptors.

Apart from vibration that would occur after Phase 1 is built, construction activities would have the potential to generate groundborne vibration. Table 4.8-8 identifies vibration velocity levels at various distances for some of the construction equipment that could operate during site grading activities.

Table 4.8-8

Vibration Source Levels for Construction Equipment

Construction Equipment	Approximate VdB				
	25 Feet	50 Feet	60 Feet	75 Feet	100 Feet
Large Bulldozer	87	81	79	77	75
Loaded Trucks	86	80	78	76	74
Jackhammer	79	73	71	69	67
Small Bulldozer	58	52	50	48	46

Source: Federal Railroad Administration, 1998; and EIP Associates, 2004.

Nearby residences already experience groundborne vibration from existing traffic, which includes large trucks and delivery vehicles, traveling on Pedrick and Vaughn roads. As discussed in Impact 4.8-1, grading activity could occur within 100 - 150 feet of these residences that are located adjacent to the southernmost portion of the project site. According to Table 4.8-8, bulldozers operating on the site would generate levels of 81 VdB at 50 feet. At 100 feet or more, VdB from bulldozers would diminish, so it is unlikely that adjacent residences would experience vibration that would exceed the significance criteria of 80 VdB at buildings where people sleep. The groundborne vibration would not be permanent and would only last as long as the grading that would occur on this portion of the site. Pile-driving may also occur during construction of the Finish Line Pavilion. Pile-driving generates higher levels of groundborne vibration than grading activities. However, the Finish Line Pavilion would be located towards the center of the project site. Consequently, no pile driving would be required at the southern portion of the site, near existing residences. Distances between pile-driving at the Finish Line Pavilion and existing residences would be such that groundborne vibration from the pile-driving would not be noticeable at these residences.

Maximum construction-generated groundborne vibration, since it would not be above thresholds of significance, would not cause annoyance at receptors on Vaughn Road, especially because low levels of vibration are rarely annoying unless they occur during sleep hours. Mitigation Measure N-B of the NQSP EIR would limit construction to between 7 a.m. and 7 p.m. Grading along the eastern boundary of the project site would also be temporary in nature.

The only construction activity that could create groundborne vibration levels great enough to cause permanent structural damage would be pile-driving. Existing structures can be potentially damaged if they are within 50 feet of pile-driving activity. As discussed above, pile driving under Phase 1 is expected to occur during construction of the Finish Line Pavilion. The Pavilion is located towards the center of the project site, much more than 50 feet from existing residences. Consequently, groundborne vibration from pile-driving experienced at the residences would not be great enough to cause annoyance, or permanent structural damage.

Operation of the Proposed Project would not create levels of groundborne vibration close enough to the southern boundary of the site to affect existing residences. As discussed above, groundborne vibration during Phase 1 construction would be temporary and no activity would occur that would expose existing residences to groundborne vibration great enough to cause structural damage. Consequently, this is considered a ***less-than-significant impact***.

Phases 1 and 2

It is assumed that the entire project site would be graded under Phase 1. Construction activities under Phase 2 that could produce vibration would be limited to pile-driving, truck hauling and possibly the use of jackhammers. Pile-driving is the activity that would cause the highest levels of vibration during Phases 1 and 2. However, since pile-driving is only expected to occur during construction of the Finish Line Pavilion and the on-site hotel, it would occur far enough from existing residences on Vaughn Road that there would be no impact. Since all grading would occur under Phase 1, Phase 2 would not require grading to be performed near the southernmost border of the project site. Consequently, Phases 1 and 2 would not create any more vibration impacts than Phase 1 alone, and there would be a ***less-than-significant impact*** for Phases 1 and 2.

<u>Mitigation Measures</u>

None required.

Impact 4.8-3	**Traffic generated by the Proposed Project would increase levels of roadway noise along roads in the vicinity of the project site.**
Applicable Policies and Regulations	Dixon General Plan, Figure 10 – Acceptable Levels of Noise Exposure
Significance with Policies and Regulations	Phase 1: Less than Significant Phases 1 and 2: Less than Significant
Applicable NQSP Mitigation Measures	None
Mitigation Measures	Phase 1: None required Phases 1 and 2: None required
Significance after Mitigation	Phase 1: Less than Significant Phases 1 and 2: Less than Significant

Phase 1

The Proposed Project is located in an area where there are few sensitive receptors. The closest sensitive receptors include three residences on the north side of Vaughn Road. Industrial, large commercial, and agricultural uses predominate. Increased traffic associated with operation of Phase 1, especially during large events, would increase noise at these receptors. Table 4.8-9 shows existing traffic noise levels along Vaughn Road during the weekend hours that would be most affected by project events, as identified in the project traffic report. Table 4.8-9 uses L_{eq} versus L_{dn} to measure noise because L_{eq} is more representative of any noise increases associated with a specific event. L_{dn} averages sound over a 24-hour period so it would not reflect any noise increase associated with a specific event. Table 4.8-9 also shows projected traffic noise levels for this same roadway during the peak hour after a capacity horseracing event, and after a concert event. As shown in the tables, traffic noise levels would increase by a maximum of 6.6 dBA at the residences along Vaughn Road during these hours. While this may appear to be significant, it should be noted that these maximum traffic noise levels would occur only during the peak hour after a large event (i.e., a horse racing event or concert event. Throughout the rest of the event day, traffic volumes should be close to normal conditions. The applicable noise standards for single family residences in the City of Dixon requires traffic noise to be evaluated in terms of L_{dn} or CNEL, both of which are 24-hour averages. For residential uses, the upper boundary of the "Normally Acceptable" noise level range is 60 L_{dn} or CNEL. When existing conditions are modeled for Vaughn Road, traffic noise is approximately 55 L_{dn} at the residences on Vaughn Road. When averaged over 24 hours, traffic volumes on event days are not likely to exceed the City of Dixon community noise exposure levels for residential single family homes, even though traffic noise may be higher during the peak post-event hour Consequently, this is considered a ***less-than-significant impact***.

Phases 1 and 2

Table 4.8-9 shows projected noise levels along Vaughn Road for the peak hour after a capacity horseracing event and after a concert event once Phases 1 and 2 are completed. As with Phase 1 alone, traffic volumes would increase during the peak hour after the events. When compared to existing conditions, traffic noise levels would increase by 6.6 to 7.5 dBA during the peak hour as a result of the increased traffic. As with Phase 1, when averaged over 24 hours, this would not exceed the acceptable level of noise exposure for residential uses found in the City of Dixon General Plan. This is a ***less-than-significant impact***.

Table 4.8-9

Comparison of Peak Hour Event Traffic Noise on Vaughn Rd – Existing/Phase 1/Phases 1 & 2

	L_{eq}	Difference from Existing Conditions (L_{eq})
Existing Conditions		
Peak Hour	56.3	--
Existing Plus Phase 1		
Horserace Event (Peak Hour)	62.2	+ 5.9
Concert Event (Peak Hour)	62.0	+ 5.7
Existing Plus Phase 1&2		
Horserace Event (Peak Hour)	63.8	+ 7.5
Concert Event (Peak Hour)	62.9	+ 6.6

Source: EIP Associates, 2004.

Mitigation Measures

None required.

Impact 4.8-4	**Large events could increase noise levels in the vicinity of the project site.**
Applicable Policies and Regulations	City of Dixon Zoning Code, Section 12.24.03, 12.24.04.
Significance with Policies and Regulations	Phase 1: Significant Phases 1 and 2: Significant
Applicable NQSP Mitigation Measures	None
Mitigation Measures	Phase 1: 4.8-4 (a) and (b) Phases 1 and 2: 4.8-4 (a) and (b)
Significance after Mitigation	Phase 1: Significant and Unavoidable Phases 1 and 2: Significant and Unavoidable

Phase 1

As discussed in Chapter 3, Project Description, it is anticipated that large events would occur at the Proposed Project. These events would primarily be horseracing and concert events, each of which would generate noise. While there are not many sensitive noise receptors in the vicinity of the project site, there are several residences along Vaughn Road that could be affected by this noise.

Horseracing Events

Horseracing events would occur on the racetrack in the middle of the project site. Spectators would sit around the perimeter of the track in stands west of the track at the finish line. Most of the larger horseracing events would be attended by a maximum of 6,800 people with approximately 5,000 inside, with one larger annual or bi-annual Tier 3 event where a maximum of 50,000 people could be in attendance.

While the activity of horseracing itself would not generate noticeable noise beyond the property line of the project site, there would be other racing-related noise associated with the public address system, and crowd noise. Both crowd noise and noise from public address systems have been measured at events similar in size and type to the events that would be held at the Proposed Project. Sound levels within the audience area were found to vary between 85 dBA and 105 dBA. These levels would diminish with distance. Sound decreases by about 6 dBA at 50 feet and at every doubling of distance thereafter. The residences on Vaughn Road are approximately 1500 feet from the race-track that would be developed as part of Phase 1. Consequently, if crowd noise and noise from the public address system reach 105 within the racetrack area, residences at Vaughn road could conceivably experience unattenuated noise levels of 69 dBA. This would be in excess of the 55 dBA noise performance standard for residential uses as found in the City of Dixon Zoning Ordinance. Section 12.24.04 of the Dixon Zoning Ordinance allows an additional 5 dBA added to the maximum noise performance level if noise from a source is generated only between 7 a.m. and 10 p.m. If horse-racing events end before 10 p.m., the noise performance standard for single family residential would be 60 dBA. The 69 dBA generated by crowd noise and public address systems would still exceed this standard.

Crowd noise can be attenuated by constructing a solid barrier between the racetrack and the noise receptors. Sound levels from public address systems can potentially be attenuated by constructing barriers and by directing the public address speakers away from sensitive receptors. The commonly used rule of thumb is that a solid wall or barrier reduces noise levels by five to 10 dBA. Because the racetrack would be in an outdoor arena type of setting, noise from crowds and the public address system would be partially attenuated by surrounding seating areas. Stables and groom's quarters would also be built between the track and Vaughn Road as part of Phase 1. This would help to attenuate noise, although not as much as a solid barrier. The site plan for the Proposed Project shows that four rows of barns 25-feet tall would be constructed between the racetrack and Vaughn Road. One row of buildings between a noise source and a receptor can reduce noise levels by 5 dBA. Additional rows can reduce sound by 1.5 dBA each.[1] Assuming that there is no "line of sight" between the PA system speakers and the residences on Vaughn Road, noise levels could be reduced by a total of 9.5 dBA due to the intervening barns. Consequently, sound levels generated during events, however, could still exceed standards at residences on Vaughn Road even with this attenuation, if noise is produced in the 85 to 105 dBA range at the racetrack and the event lasts past 10 p.m. If the event ended prior to 10 p.m., the 60 dBA standard would not likely be exceeded.

Tier 3 Events

The Proposed Project is also expected to host one "Tier 3" Breeder's Cup-type event either annually or bi-annually that could attract between 15,000 and 50,000 spectators, although it is unlikely that an event of this type would actually attract 50,000 attendees. At large events such as this, crowd noise would be greater than that associated with the smaller horseracing events that would attract approximately 6,800 attendees. However, the greatest source of noise would be expected to be the P.A. system. Noise from the P.A. system would not be expected to be greater during Tier 3 events than during other smaller events or concert events. Tier 3 events would occur no more than once a year, and are expected to be

1 FHWA Highway Traffic Noise Prediction Model, 1978.

only three to four hours in duration during weekend afternoons. Consequently, these Tier 3 events would not be expected to add significantly to overall average noise levels.

Concert Events

Apart from horse-racing events, noise would also be produced during concert events held at the race-track. The stage would be set up in the parking lot area or along the perimeter of the racetrack. For this analysis, it is assumed the largest concert events that would be held at the facility could accommodate up to 15,000 concert-goers.

Contemporary outdoor concert venues typically stage a broad spectrum of entertainment types whose acoustical characteristics are similarly varied. Based on the particular type of performance, variables exist that would cause both the sound levels and the overall character of the sound to fluctuate. These variables include a wide range in both the average and peak sound levels and different audio frequencies associated with a particular music type and/or performance.

Most concerts featuring current commercial, popular music usually average sound levels of approximately 105 dBA L_{eq} in order to satisfy audience expectations. Some genres of popular music produce higher average sound levels (110 to 115 dBA) in the "very low" and "low" (bass) frequency ranges. Typical maximum sound levels (L_{max}) for all performance types would be 5 to 10 dBA higher than the average sound levels and occasionally may reach 15 dBA above average levels, meaning that maximum sound levels could reach 120 to 130 dBA, depending on the genre of music.

Individual performers or groups may have a characteristic "sound" with unique audio frequencies. For instance, a group consisting predominantly of female voices and brass/string instruments may produce the highest sound levels in the mid to mid-high audio frequency range, whereas male voices, synthesizer, and percussion instruments would generally produce the highest sound levels in the low and low-mid frequency range.

In many concert venues, there is no permanently installed concert sound amplifier system. Instead, the sound system for each performance is provided, installed, and operated by an outside audio systems specialist contractor. It is not unusual for an entertainer or group to engage a specific audio systems specialist to tour with the group and to provide and set up their preferred sound system at each venue.

Since there are many options and preferences for the type of loudspeaker systems that may be utilized within a given facility, the sound levels heard outside the facility can (and likely would) vary over a wide range. Most concert loudspeaker systems use "long-throw" speaker systems that can produce higher volumes over greater distances for the purpose of projecting music to an audience. Loudspeakers are also required on-stage to project sound to the performers. However, these are normally "short-throw" speakers that would produce initial sound levels equal to "long-throw" speakers, but would not project these sound levels at nearly so great a distance.

A prediction of the precise sound levels that would occur at specific locations along the property boundary is not possible since there are simply too many variables associated with each individual performance. Since the nearest receptors on Vaughn Road are approximately 1500 feet away from the race-track, if concert sound levels reach the upper boundary of 120 to 130 dBA along the perimeter of the track, maximum sound levels of approximately 84 dBA could be experienced at the residences on Vaughn Road if long-throw speakers were directed toward these residences. However, concert noise would be somewhat attenuated by the seating stands bordering the performance area, and by intervening structures. As stated earlier, the four rows of barns that are proposed to be built between the racetrack and Vaughn Road would attenuate noise by approximately 9.5 dBA. Consequently, maximum noise levels from concert events would be reduced to 74.5 dBA at residences on Vaughn Road. This would still be in excess of City standards.

Other Events

It is possible that other events could occur at the facility apart from horseracing and concert events. Potential events could include fairs and tractor pulls. Events like tractor pulls would generate the most noise. However, it is not known at this time whether these types of events would actually occur at the facility, and noise data for similar events is very limited.

Pre and Post Event Noise

A final potential source of noise related to project events is pre- and post-event activities taking place in the parking areas outside the facility. The sound-producing activities may include "tailgate parties," car stereos, and people talking and yelling. However, this is not traditional at horse racing events and would be discouraged at any concert events. This is especially an issue given that the project description shows some parking lots located in the southernmost portion of the project site approximately 300 feet from where residences are located. Any pre- or post-event activity occurring in these lots would be in close proximity to the existing residences on Vaughn Road and would not be attenuated by intervening structures.

Traffic along Vaughn Road already contributes noise at residences. However, the Proposed Project has the potential to generate sound levels during events from a number of different sources, including crowd noise, the public address system, and amplified music, that could be significantly greater than ambient traffic noise when measured at existing sensitive noise receptors. This would be considered a ***significant impact***, especially considering that large events would often occur on weekends when residents are more likely to be at home.

Phases 1 and 2

Phases 1 and 2 would differ from Phase 1 in that more retail and commercial space would be built at the facility. This additional commercial space would add traffic on a daily basis, but would not contribute to maximum noise levels during events. Noise levels from large events would be approximately the same under Phases 1 and 2 as under Phase 1. Mitigation Measure 4.8-4 would be implemented under Phases 1 and 2, but residences could still be exposed to high sound levels. Consequently, this would be considered a ***significant impact.***

Mitigation Measures

Walls or other solid barriers constructed between the noise source and the noise receptor are the most effective mitigation for attenuating noise. However, constructing walls near existing homes would have a visual impact and would most likely not be acceptable to residents. The following mitigation measure would help to reduce sound levels from large events, but the sound level impact would still be considered a *significant and unavoidable impact* because noise levels produced during concert events could exceed the maximum noise performance standards for residential uses as found in the Dixon Zoning Ordinance.

4.8-4(a) *(Phases 1 and 2)*

Long-throw speakers used in an outdoor setting for projecting amplified sound shall not be directed to the south. This shall include public address speakers and speakers used during concert and race events.

4.8-4(b) *(Phases 1 and 2)*

Performances during concert events shall not continue past 11:00 p.m.

Cumulative Impacts and Mitigation Measures

The Proposed Project's cumulative context for noise would be different for stationary, mobile, and construction noise.

Stationary noise (noise created by sources that do not move) that would be created by the Proposed Project would be confined to the area in and around the Proposed Project site. Therefore, the cumulative context for stationary sources is the immediate vicinity of the site.

Mobile sources, essentially those vehicles driving to and from a project, can create noise in the vicinity of the project site and, depending on the size of the project, can create noise outside the immediate project area as well. Since no residential uses will be created, few vehicle trips will originate from the Proposed Project site. Instead, most vehicle trips will be those generated by customers attending concert and horseracing events, and patronizing retail establishments that are developed as part of the Proposed Project. Since the project site is near the freeway, it is likely that most of these customers will arrive via the freeway. Therefore, the cumulative context for mobile source roadway noise is the network of roads in the vicinity of the Proposed Project, and the receptors near these roads.

Construction noise and vibration are limited to the area in which the construction occurs. Construction noise and vibration is also temporary, lasting only as long as the construction activity itself. Consequently, unless there will be other construction taking place in the vicinity at the same time as the Proposed Project construction, there would be no cumulative impact. The Flying J truck stop is scheduled to be developed, but it may not be developed concurrently with the Proposed Project. Construction activity associated with the Flying J would also occur farther from the nearest sensitive receptors on Vaughn Road than construction associated with the Proposed Project. Any construction noise or vibration from the Flying J would be imperceptible to sensitive receptors on Vaughn Road if it were to occur concurrently with construction from the Proposed Project. Thus, there is no cumulative context for construction noise, and no cumulative analysis needed.

Impact 4.8-5	**Implementation of the Proposed Project could result in a cumulative noise increase in the project vicinity.**	
Applicable Policies and Regulations	Dixon General Plan, Figure 10 – Acceptable Levels of Noise Exposure	
Significance with Policies and Regulations	Phase 1: Phases 1 and 2:	Significant Significant
Applicable NQSP Mitigation Measures	None	
Mitigation Measures	Phase 1: Phases 1 and 2:	None available None available
Significance after Mitigation	Phase 1: Phases 1 and 2:	Significant and Unavoidable Significant and Unavoidable

Phases 1 and 2

For purposes of a cumulative analysis, the cumulative context would be noise from existing and future noise sources in the vicinity of the project, and future traffic volumes that would operate on local roadways. Since the cumulative evaluation examines the impact of the Proposed Project in combination with existing and future development, the cumulative discussion assumes buildout of the Proposed Project. Therefore, separate discussions for Phase 1 and Phases 1 and 2 are not necessary. Noise generated by horse-racing and concert events are not analyzed because they are single-event noise sources that occur for a limited time, and do not contribute consistently to the noise environment. Cumulative vibration is not analyzed because, as discussed in Impact 4.8-2, no permanent vibration of any significance would be created by the Proposed Project.

As shown in Table 4.8-10, traffic noise levels along Vaughn Road would exceed Dixon's "acceptable" 60_{Ldn} level of exposure threshold for single family residential uses without the Proposed Project. Year 2015 noise levels along Vaughn Road would be above 60 Ldn on a daily basis. The Proposed Project increases these daily levels by 3.7 dBA Ldn. This is greater than the three dBA that is normally considered to be a noticeable change to the human ear. Consequently, the Proposed Project would be a significant contributor to 2015 daily traffic noise levels along Vaughn Road. On event days, when large traffic volumes during pre and post event peak hours would add to 24-hour noise levels, the Proposed Project's contribution to roadway noise levels would be much more considerable. As discussed in Impact 4.8-3, there are no feasible mitigation measures available to reduce an impact from traffic noise. Barriers would have to be constructed between the residences and Vaughn Road to attenuate the increased roadway noise during peak hours. This is not feasible because it is most likely not acceptable to the home owners on Vaughn Road. Noise barriers would obstruct views from the front of the home and would encroach on the front yard of the residences. There are no other methods available for the attenuation of increased roadway noise. Consequently, the contribution to significant noise levels is likely to be considerable. Therefore, this is considered a ***significant cumulative impact***.

Table 4.8-10

2015 Weekday Traffic Noise Levels (With and Without Project Buildout)

Condition	Traffic Noise Levels in L_{dn}
NQSP Without Project	62.0
NQSP With Phases 1 & 2	65.7
Difference	3.7

Source: EIP Associates, 2004.

Mitigation Measures

There are no mitigation measures available to reduce this impact to a less-than-significant level; therefore, this would be considered a *significant and unavoidable cumulative impact*.

None available.