APPENDIX F

NOISE

URBAN-E

Noise and Vibration Analysis

Hillwood Ethanac

(DPR22-00030)

NOISE AND VIBRATION ANALYSIS

CITY OF PERRIS

PREPARED BY:

Bill Lawson, PE, INCE
blawson@urbanxroads.com
(949) 584-3148

DECEMBER 7, 2023

TABLE OF CONTENTS

APPENDICES

LIST OF EXHIBITS

LIST OF TABLES

LIST OF ABBREVIATED TERMS

(1)	Reference
ANSI	American National Standards Institute
Calveno	California Vehicle Noise
CEQA	California Environmental Quality Act
CNEL	Community Noise Equivalent Level
dBA	A-weighted decibels
EPA	Environmental Protection Agency
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
INCE	Institute of Noise Control Engineering
L_{eq}	Equivalent continuous (average) sound level
L_{max}	Maximum level measured over the time interval
mph	Miles per hour
PPV	Peak Particle Velocity
Project	Hillwood Ethanac
REMEL	Reference Energy Mean Emission Level
RMS	Root-mean-square
VdB	Vibration Decibels

EXECUTIVE SUMMARY

Urban Crossroads, Inc. has prepared this Noise and Vibration Analysis to determine the potential noise and vibration impacts and the necessary noise mitigation measures, for the proposed Hillwood Ethanac development ("Project"). The Project site is located north of Ethanac Road between Trumble Road and Sherman Road in the City of Perris. The Project applicant proposes to construct a 412,372 square foot (sf) warehouse building. This study has been prepared to satisfy applicable City of Perris standards and thresholds of significance based on guidance provided by Appendix G of the Guidelines for Implementation of the California Environmental Quality Act (State CEQA Guidelines). (1)

The results of this Hillwood Ethanac Noise and Vibration Analysis are summarized below based on the significance criteria in Section 4 of this report. Table ES-1 shows the findings of significance for each potential noise and/or vibration impact under CEQA before and after any required mitigation measures.

TABLE ES-1: SUMMARY OF CEQA SIGNIFICANCE FINDINGS

Analysis	Report Section	Significance Findings	
		Unmitigated	Mitigated
Off-Site Traffic Noise	7	*Less Than Significant*	-
Operational Noise	9	*Potentially Significant*	*Less Than Significant*
Construction Noise	10	*Less Than Significant*	-
Nighttime Concrete Pour		*Less Than Significant*	-
Construction Vibration		*Less Than Significant*	-

This page intentionally left blank

1 INTRODUCTION

This Noise and Vibration Analysis has been completed to determine the noise and vibration impacts associated with the development of the proposed Hillwood Ethanac project ("Project"). This study briefly describes the proposed Project, provides information regarding noise fundamentals, sets out the local regulatory setting, presents the study methods and procedures for transportation related CNEL traffic noise analysis, and evaluates the future exterior noise environment. In addition, this study includes an analysis of the potential Project-related long-term stationary-source operational noise and short-term construction noise and vibration impacts.

1.1 SITE LOCATION

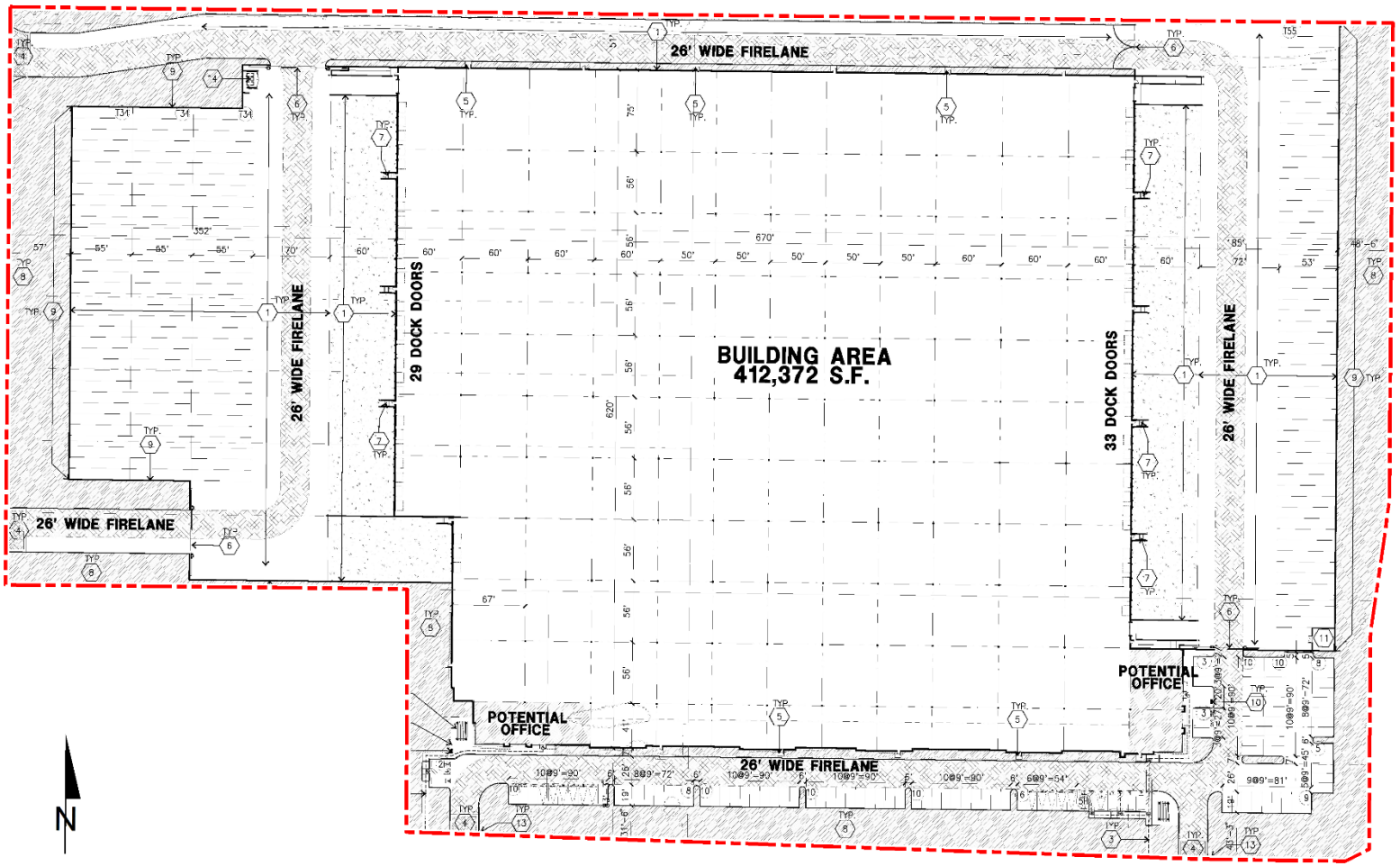
The proposed Project site is located north of Ethanac Road between Trumble Road and Sherman Road in the City of Perris as shown on Exhibit 1-A.

1.2 PROJECT DESCRIPTION

The Project is to consist of a 412,372 square-foot (sf) warehouse building. The Project is proposed to be developed in a single phase with an anticipated Opening Year of 2025. The on-site Project-related noise sources are expected to include: cold storage loading dock activity, dry goods loading dock/tractor trailer parking, roof-top air conditioning units, trash enclosure activity, parking lot vehicle movements, and truck movements. This noise analysis is intended to describe noise level impacts associated with the expected typical operational activities at the Project site.

EXHIBIT 1-A: LOCATION MAP

EXHIBIT 1-B: SITE PLAN



This page intentionally left blank

2 FUNDAMENTALS

Noise is simply defined as "unwanted sound." Sound becomes unwanted when it interferes with normal activities, when it causes actual physical harm or when it has adverse effects on health. Noise is measured on a logarithmic scale of sound pressure level known as a decibel (dB). A-weighted decibels (dBA) approximate the subjective response of the human ear to broad frequency noise source by discriminating against very low and very high frequencies of the audible spectrum. They are adjusted to reflect only those frequencies which are audible to the human ear. Exhibit 2-A presents a summary of the typical noise levels and their subjective loudness and effects that are described in more detail below.

EXHIBIT 2-A: TYPICAL NOISE LEVELS

COMMON OUTDOOR ACTIVITIES	COMMON INDOOR ACTIVITIES	A - WEIGHTED SOUND LEVEL dBA	SUBJECTIVE LOUDNESS	EFFECTS OF NOISE
THRESHOLD OF PAIN		140	INTOLERABLE OR DEAFENING	HEARING LOSS
NEAR JET ENGINE		130		
		120		
JET FLY-OVER AT 300m (1000 ft)	ROCK BAND	110		
LOUD AUTO HORN		100	VERY NOISY	
GAS LAWN MOWER AT 1m (3 ft)		90		
DIESEL TRUCK AT 15m (50 ft), at 80 km/hr (50 mph)	FOOD BLENDER AT 1m (3 ft)	80		SPEECH INTERFERENCE
NOISY URBAN AREA, DAYTIME	VACUUM CLEANER AT 3m (10 ft)	70	LOUD	
HEAVY TRAFFIC AT 90m (300 ft)	NORMAL SPEECH AT 1m (3 ft)	60		
QUIET URBAN DAYTIME	LARGE BUSINESS OFFICE	50	MODERATE	SLEEP DISTURBANCE
QUIET URBAN NIGHTTIME	THEATER, LARGE CONFERENCE ROOM (BACKGROUND)	40		
QUIET SUBURBAN NIGHTTIME	LIBRARY	30	FAINT	NO EFFECT
QUIET RURAL NIGHTTIME	BEDROOM AT NIGHT, CONCERT HALL (BACKGROUND)	20		
	BROADCAST/RECORDING STUDIO	10	VERY FAINT	
LOWEST THRESHOLD OF HUMAN HEARING	LOWEST THRESHOLD OF HUMAN HEARING	0		

Source: Environmental Protection Agency Office of Noise Abatement and Control, Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety (EPA/ONAC 550/9-74-004) March 1974.

2.1 RANGE OF NOISE

Since the range of intensities that the human ear can detect is so large, the scale frequently used to measure intensity is a scale based on multiples of 10, the logarithmic scale. The scale for measuring intensity is the decibel scale. Each interval of 10 decibels indicates a sound energy ten times greater than before, which is perceived by the human ear as being roughly twice as loud. (2) The most common sounds vary between 40 dBA (very quiet) to 100 dBA (very loud). Normal conversation at three feet is roughly at 60 dBA, while loud jet engine noises equate to 110 dBA

at approximately 1,000 feet, which can cause serious discomfort (3). Another important aspect of noise is the duration of the sound and the way it is described and distributed in time.

2.2 NOISE DESCRIPTORS

Environmental noise descriptors are generally based on averages, rather than instantaneous, noise levels. The most used metric is the equivalent level (L_{eq}). Equivalent sound levels are not measured directly but are calculated from sound pressure levels typically measured in A-weighted decibels (dBA). The equivalent sound level (L_{eq}) represents a steady state sound level containing the same total energy as a time varying signal over a given sample period and is commonly used to describe the "average" noise levels within the environment.

Peak hour or average noise levels, while useful, do not completely describe a given noise environment. Noise levels lower than peak hour may be disturbing if they occur during times when quiet is most desirable, namely evening and nighttime (sleeping) hours. To account for this, the Community Noise Equivalent Level (CNEL), representing a composite 24-hour noise level is utilized. The CNEL is the weighted average of the intensity of a sound, with corrections for time of day, and averaged over 24 hours. The time-of-day corrections require the addition of 5 decibels to dBA L_{eq} sound levels in the evening from 7:00 p.m. to 10:00 p.m., and the addition of 10 decibels to dBA L_{eq} sound levels at night between 10:00 p.m. and 7:00 a.m. These additions are made to account for the noise sensitive time periods during the evening and night hours when noise can become more intrusive. CNEL does not represent the actual sound level heard at any time, but rather represents the total sound exposure. The City of Perris relies on the 24-hour CNEL level to assess land use compatibility with transportation related noise sources.

2.3 SOUND PROPAGATION

When sound propagates over a distance, it changes in level and frequency content. The way noise reduces with distance depends on the following factors.

2.3.1 GEOMETRIC SPREADING

Sound from a localized source (i.e., a stationary point source) propagates uniformly outward in a spherical pattern. The sound level attenuates (or decreases) at a rate of 6 dB for each doubling of distance from a point source. Highways consist of several localized noise sources on a defined path and hence can be treated as a line source, which approximates the effect of several point sources. Noise from a line source propagates outward in a cylindrical pattern, often referred to as cylindrical spreading. Sound levels attenuate at a rate of 3 dB for each doubling of distance from a line source. (2)

2.3.2 GROUND ABSORPTION

The propagation path of noise from a highway to a receiver is usually very close to the ground. Noise attenuation from ground absorption and reflective wave canceling adds to the attenuation associated with geometric spreading. Traditionally, the excess attenuation has also been expressed in terms of attenuation per doubling of distance. This approximation is usually

sufficiently accurate for distances of less than 200 ft. For acoustically hard sites (i.e., sites with a reflective surface between the source and the receiver, such as a parking lot or body of water), no excess ground attenuation is assumed. For acoustically absorptive or soft sites (i.e., those sites with an absorptive ground surface between the source and the receiver such as soft dirt, grass, or scattered bushes and trees), an excess ground attenuation value of 1.5 dB per doubling of distance is normally assumed. When added to the cylindrical spreading, the excess ground attenuation results in an overall drop-off rate of 4.5 dB per doubling of distance from a line source. (4)

2.3.3 ATMOSPHERIC EFFECTS

Receivers located downwind from a source can be exposed to increased noise levels relative to calm conditions, whereas locations upwind can have lowered noise levels. Sound levels can be increased at large distances (e.g., more than 500 feet) due to atmospheric temperature inversion (i.e., increasing temperature with elevation). Other factors such as air temperature, humidity, and turbulence can also have significant effects. (2)

2.3.4 SHIELDING

A large object or barrier in the path between a noise source and a receiver can substantially attenuate noise levels at the receiver. The amount of attenuation provided by shielding depends on the size of the object and the frequency content of the noise source. Shielding by trees and other such vegetation typically only has an "out of sight, out of mind" effect. That is, the perception of noise impact tends to decrease when vegetation blocks the line-of-sight to nearby residents. However, for vegetation to provide a substantial, or even noticeable, noise reduction, the vegetation area must be at least 15 feet in height, 100 feet wide and dense enough to completely obstruct the line-of-sight between the source and the receiver. This size of vegetation may provide up to 5 dBA of noise reduction. The Federal Highway Administration (FHWA) does not consider the planting of vegetation to be a noise abatement measure. (5)

2.4 NOISE CONTROL

Noise control is the process of obtaining an acceptable noise environment for an observation point or receiver by controlling the noise source, transmission path, receiver, or all three. This concept is known as the source-path-receiver concept. In general, noise control measures can be applied to these three elements.

2.5 NOISE BARRIER ATTENUATION

Effective noise barriers can reduce noise levels by 10 to 15 dBA, cutting the loudness of traffic noise in half. A noise barrier is most effective when placed close to the noise source or receiver. Noise barriers, however, do have limitations. For a noise barrier to work, it must block the line-of-sight path of sound from the noise source.

2.6 LAND USE COMPATIBILITY WITH NOISE

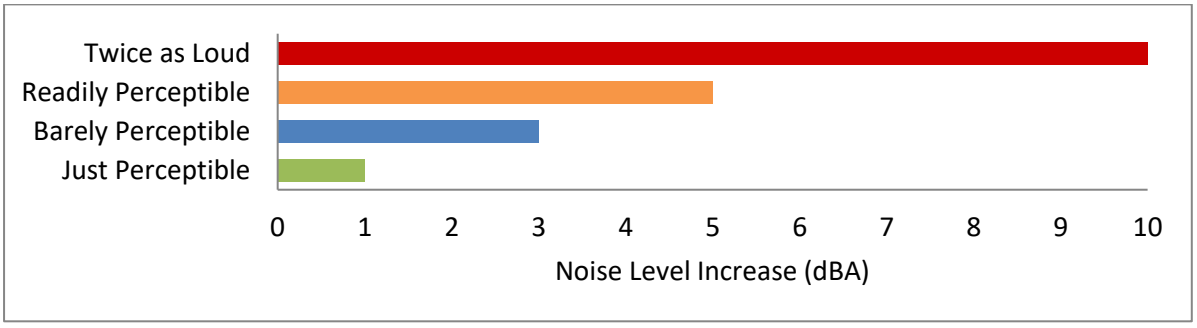
Some land uses are more tolerant of noise than others. For example, schools, hospitals, churches, and residences are more sensitive to noise intrusion than are commercial or industrial developments and related activities. As ambient noise levels affect the perceived amenity or livability of a development, so too can the mismanagement of noise impacts impair the economic health and growth potential of a community by reducing the area's desirability as a place to live, shop and work. For this reason, land use compatibility with the noise environment is an important consideration in the planning and design process. The FHWA encourages State and Local government to regulate land development in such a way that noise-sensitive land uses are either prohibited from being located adjacent to a highway, or that the developments are planned, designed, and constructed in such a way that noise impacts are minimized. (6)

2.7 COMMUNITY RESPONSE TO NOISE

Approximately sixteen percent of the population has a very low tolerance for noise and will object to any noise not of their making. Consequently, even in the quietest environment, some complaints may occur. Twenty to thirty percent of the population will not complain even in very severe noise environments. (7 pp. 8-6) Thus, a variety of reactions can be expected from people exposed to any given noise environment.

Surveys have shown that community response to noise varies from no reaction to vigorous action for newly introduced noises averaging from 10 dB below existing to 25 dB above existing. (8) According to research originally published in the Noise Effects Handbook (7), the percentage of high annoyance ranges from approximately 0 percent at 45 dB or less, 10 percent are highly annoyed around 60 dB, and increases rapidly to approximately 70 percent being highly annoyed at approximately 85 dB or greater. Despite this variability in behavior on an individual level, the population can be expected to exhibit the following responses to changes in noise levels as shown on Exhibit 2-B. A change of 3 dBA is considered barely perceptible, and changes of 5 dBA are considered readily perceptible. (4)

EXHIBIT 2-B: NOISE LEVEL INCREASE PERCEPTION



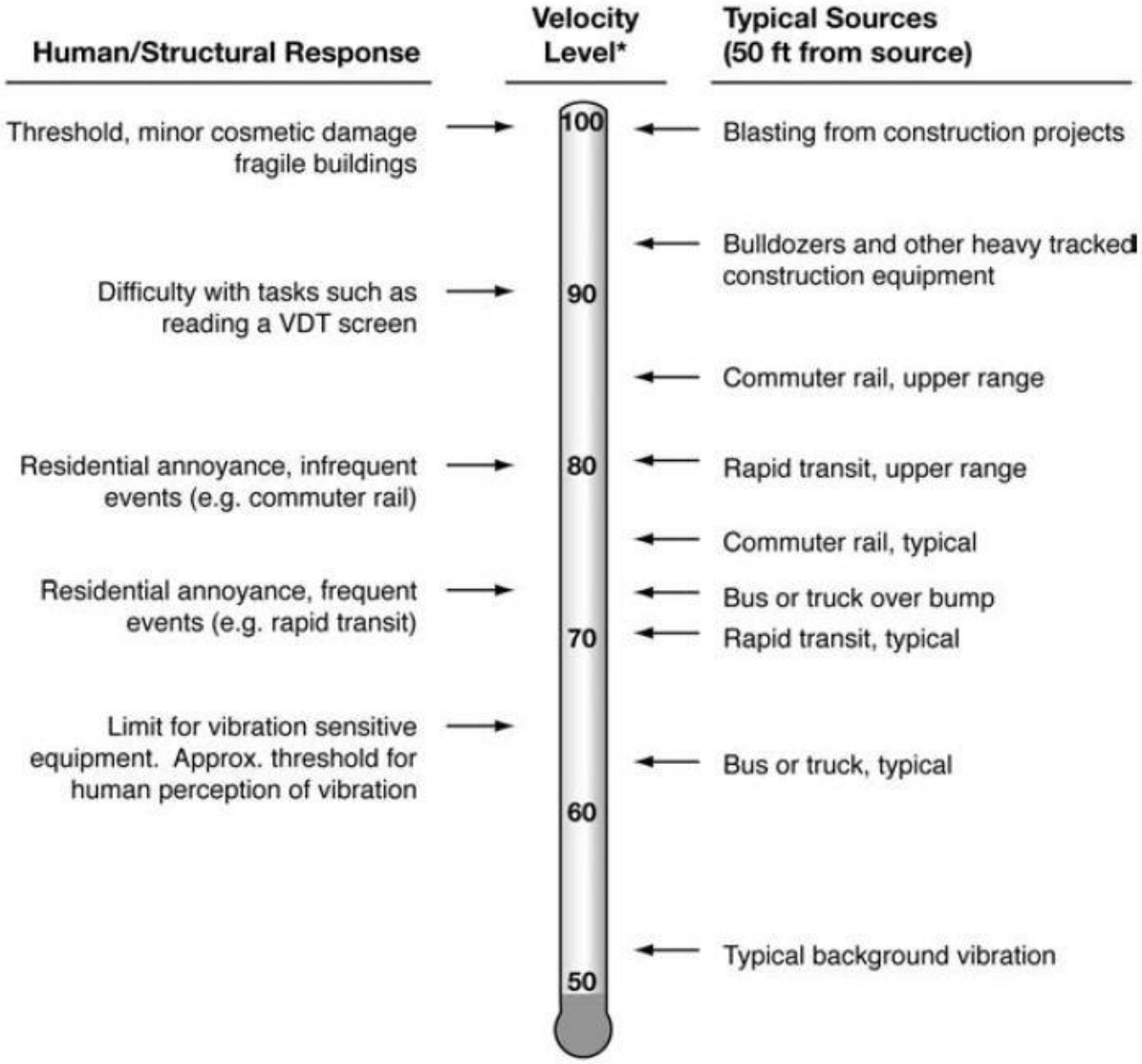
2.8 VIBRATION

Per the Federal Transit Administration (FTA) *Transit Noise Impact and Vibration Impact Assessment Manual* (8) , vibration is the periodic oscillation of a medium or object. The rumbling sound caused by the vibration of room surfaces is called structure-borne noise. Sources of ground-borne vibrations include natural phenomena (e.g., earthquakes, volcanic eruptions, sea waves, landslides) or human-made causes (e.g., explosions, machinery, traffic, trains, construction equipment). Vibration sources may be continuous, such as factory machinery, or transient, such as explosions. As is the case with airborne sound, ground-borne vibrations may be described by amplitude and frequency.

There are several different methods that are used to quantify vibration. The peak particle velocity (PPV) is defined as the maximum instantaneous peak of the vibration signal. The PPV is most frequently used to describe vibration impacts to buildings but is not always suitable for evaluating human response (annoyance) because it takes some time for the human body to respond to vibration signals. Instead, the human body responds to average vibration amplitude often described as the root mean square (RMS). The RMS amplitude is defined as the average of the squared amplitude of the signal and is most frequently used to describe the effect of vibration on the human body. Decibel notation (VdB) is commonly used to measure RMS. Decibel notation (VdB) serves to reduce the range of numbers used to describe human response to vibration. Typically, ground-borne vibration generated by man-made activities attenuates rapidly with distance from the source of the vibration. Sensitive receivers for vibration include structures (especially older masonry structures), people (especially residents, the elderly, and sick), and vibration-sensitive equipment and/or activities.

The background vibration-velocity level in residential areas is generally 50 VdB. Ground-borne vibration is normally perceptible to humans at approximately 65 VdB. For most people, a vibration-velocity level of 75 VdB is the approximate dividing line between barely perceptible and distinctly perceptible levels. Typical outdoor sources of perceptible ground-borne vibration are construction equipment, steel-wheeled trains, and traffic on rough roads. If a roadway is smooth, the ground-borne vibration 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. Exhibit 2-C illustrates common vibration sources and the human and structural response to ground-borne vibration.

EXHIBIT 2-C: TYPICAL LEVELS OF GROUND-BORNE VIBRATION



** RMS Vibration Velocity Level in VdB relative to 10^{-6} inches/second*

Source: Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual.

3 REGULATORY SETTING

To limit population exposure to physically and/or psychologically damaging as well as intrusive noise levels, the federal government, the State of California, various county governments, and most municipalities in the state have established standards and ordinances to control noise. In most areas, automobile and truck traffic is the major source of environmental noise. Traffic activity generally produces an average sound level that remains constant with time. Air and rail traffic, and commercial and industrial activities are also major sources of noise in some areas. Federal, state, and local agencies regulate different aspects of environmental noise. Federal and state agencies generally set noise standards for mobile sources such as aircraft and motor vehicles, while regulation of stationary sources is left to local agencies.

3.1 STATE OF CALIFORNIA NOISE REQUIREMENTS

The State of California regulates freeway noise, sets standards for sound transmission, provides occupational noise control criteria, identifies noise standards, and provides guidance for local land use compatibility. State law requires that each county and city adopt a General Plan that includes a Noise Element which is to be prepared per guidelines adopted by the Governor's Office of Planning and Research (OPR). (9) The purpose of the Noise and Safety Element is to *limit the exposure of the community to excessive noise levels*. In addition, the California Environmental Quality Act (CEQA) requires that all known environmental effects of a project be analyzed, including environmental noise impacts.

3.2 CITY OF PERRIS GENERAL PLAN NOISE ELEMENT

The City of Perris has adopted a Noise Element of the General Plan (10) to control and abate environmental noise, and to protect the citizens of Perris from excessive exposure to noise. The Noise Element specifies the maximum allowable unmitigated exterior noise levels for new developments impacted by transportation noise sources such as arterial roads, freeways, airports, and railroads. In addition, the Noise Element identifies noise polices and implementation measures designed to protect, create, and maintain an environment free from noise that may jeopardize the health or welfare of sensitive receptors, or degrade quality of life.

The noise standards identified in the City of Perris General Plan are guidelines to evaluate the acceptability of the transportation related noise level impacts. These standards are based on the Governor's Office of Planning and Research (OPR) and are used to assess the long-term traffic noise impacts on land uses. According to the City's Land Use Compatibility for Community Noise Exposure (Exhibit N-1), noise-sensitive land uses such as single-family residences are *normally acceptable* with exterior noise levels below 60 dBA CNEL and *conditionally acceptable* with noise levels below 65 dBA CNEL. Commercial uses are *normally acceptable* with exterior noise levels below 65 dBA CNEL and *conditionally acceptable* with noise levels below 75 dBA CNEL. Industrial uses are considered *normally acceptable* with exterior noise levels of up to 70 dBA CNEL, and *conditionally acceptable* with exterior noise levels between 70 to 80 dBA CNEL (10).

3.3 OPERATIONAL NOISE STANDARDS

To analyze noise impacts originating from a designated fixed location or private property such as the Hillwood Ethanac, operational noise such as the expected cold storage loading dock activity, dry goods loading dock/tractor trailer parking, roof-top air conditioning units, trash enclosure activity, parking lot vehicle movements, and truck movements are typically evaluated against standards established under a City's Municipal Code.

The City of Perris Municipal Code, Chapter 7.34 *Noise Control*, Section 7.34.040, establishes the permissible noise level at any point on the property line of the affected residential receivers. Therefore, for residential properties, the exterior noise level shall not exceed a maximum noise level of 80 dBA L_{max} during daytime hours (7:01 a.m. to 10:00 p.m.) and shall not exceed a maximum noise level of 60 dBA L_{max} during the nighttime hours (10:01 p.m. to 7:00 a.m.), as shown on Table 3-1. (11) The City of Perris Municipal Code is included in Appendix 3.1.

Additional exterior noise level standards are identified in the City of Perris General Plan Noise Element Implementation Measure V.A.1 which requires that new industrial facilities and large-scale commercial facilities within 160 feet of the property line of existing noise-sensitive land uses must demonstrate compliance with a 60 dBA CNEL exterior noise level standard. Table 3-1 shows the Municipal Code and General Plan standards used in this analysis to evaluate the potential operational noise levels from the Project.

TABLE 3-1: OPERATIONAL NOISE STANDARDS

Jurisdiction	Land Use	Time Period	Noise Level Standard (dBA)
City of Perris	Residential[1]	Daytime (7:01 a.m. - 10:00 p.m.)	80 dBA L_{max}
		Nighttime (10:01 p.m. - 7:00 a.m.)	60 dBA L_{max}
	Within 160 Feet of PL[2]	24-Hours	60 dBA CNEL

[1] City of Perris Municipal Code, Sections 7.34.040 & 7.34.050 (Appendix 3.1).
[2] City of Perris General Plan Noise Element, Implementation Measure V.A.1.

3.4 CONSTRUCTION NOISE STANDARDS

To analyze noise impacts originating from the construction of the Hillwood Ethanac site, noise from construction activities is typically evaluated against standards established under a City's Municipal Code. The City of Perris Municipal Code, Section 7.34.060, identifies the City's construction noise standards and permitted hours of construction activity (refer to Table 3-2). The City of Perris Municipal Code, Section 7.34.060, noise level standard of 80 dBA L_{max} applies to residential zones within the City of Perris. (11) Any nighttime construction noise activities shall not exceed a maximum operational noise level threshold of 60 dBA L_{max} in Section 7.34.040.

TABLE 3-2: CONSTRUCTION NOISE STANDARDS

Jurisdiction	Permitted Hours of Construction Activity	Construction Noise Level Standard
City of Perris[1]	7:00 a.m. to 7:00 p.m. on any day except Sundays and legal holidays (with the exception of Columbus Day and Washington's birthday).	80 dBA L_{max}

[1] City of Perris Municipal Code, Section 7.34.060 (Appendix 3.1).

3.5 CONSTRUCTION VIBRATION STANDARDS

Construction activity can result in varying degrees of ground-borne vibration, depending on the equipment and methods used, distance to the affected structures and soil type. Construction vibration is generally associated with pile driving and rock blasting. Other construction equipment such as air compressors, light trucks, hydraulic loaders, etc., generates little or no ground vibration (8). To analyze vibration impacts originating from the construction of the Hillwood Ethanac, vibration-generating activities are appropriately evaluated against standards established under a City's Municipal Code, if such standards exist. However, the City of Perris does not identify specific vibration level limits. Therefore, for analysis purposes, the Caltrans *Transportation and Construction Vibration Guidance Manual*, (12 p. 38) Table 19, vibration damage are used in this noise study to assess potential temporary construction-related impacts at adjacent building locations. The nearest noise sensitive buildings adjacent to the Project site can best be described as "older residential structures" with a maximum acceptable continuous vibration threshold of 0.3 PPV (in/sec).

3.6 CITY OF PERRIS GOOD NEIGHBOR GUIDELINES (GNG)

On August 17, 2022, the City of Perris adopted the Good Neighbor Guidelines (GNG) outlining goals and polices intended to mitigate the potential impacts associated with the logistics industry. The guidelines include the following goals to minimize the Project related noise impacts.

Goal #3: Eliminate diesel trucks from unnecessary traversing through residential neighborhoods.

Goal #4: Provide Buffers between Warehouse and Sensitive Receptors.

Goal #6: Implement Construction Requirements in Accordance with State Requirements to Limit Emissions and Noise Impacts from Building Demolition, Renovation and New Construction.

Goal #7 Ensure Compliance with the California Environmental Quality Act (CEQA) and State Environmental Agencies.

To satisfy Goal #3, it expected the Project related trucks trips will be limited approved City of Perris and City of Menifee truck routes consistent with the Project truck trip distributions used in the Project traffic analysis. To reduce the noise exposure to the noise sensitive residential areas

near the Project site, several design features were considered as part of the site planning process. These design features include the planned 14-foot-high screen walls around the loading docks. The planned screen walls will provide a buffer between the Project industrial use and the nearby sensitive receivers consistent with Goal #4. Section 10 of this study presents the construction noise and vibration analysis showing that the Project construction activities will not exceed the City of Perris requirements. In addition, this study has been prepared to satisfy Goal #7 by demonstrating compliance with the standards and thresholds of significance based on guidance provided by Appendix G of the Guidelines for Implementation of the California Environmental Quality Act (State CEQA Guidelines).

3.7 PERRIS VALLEY AIRPORT (PV)

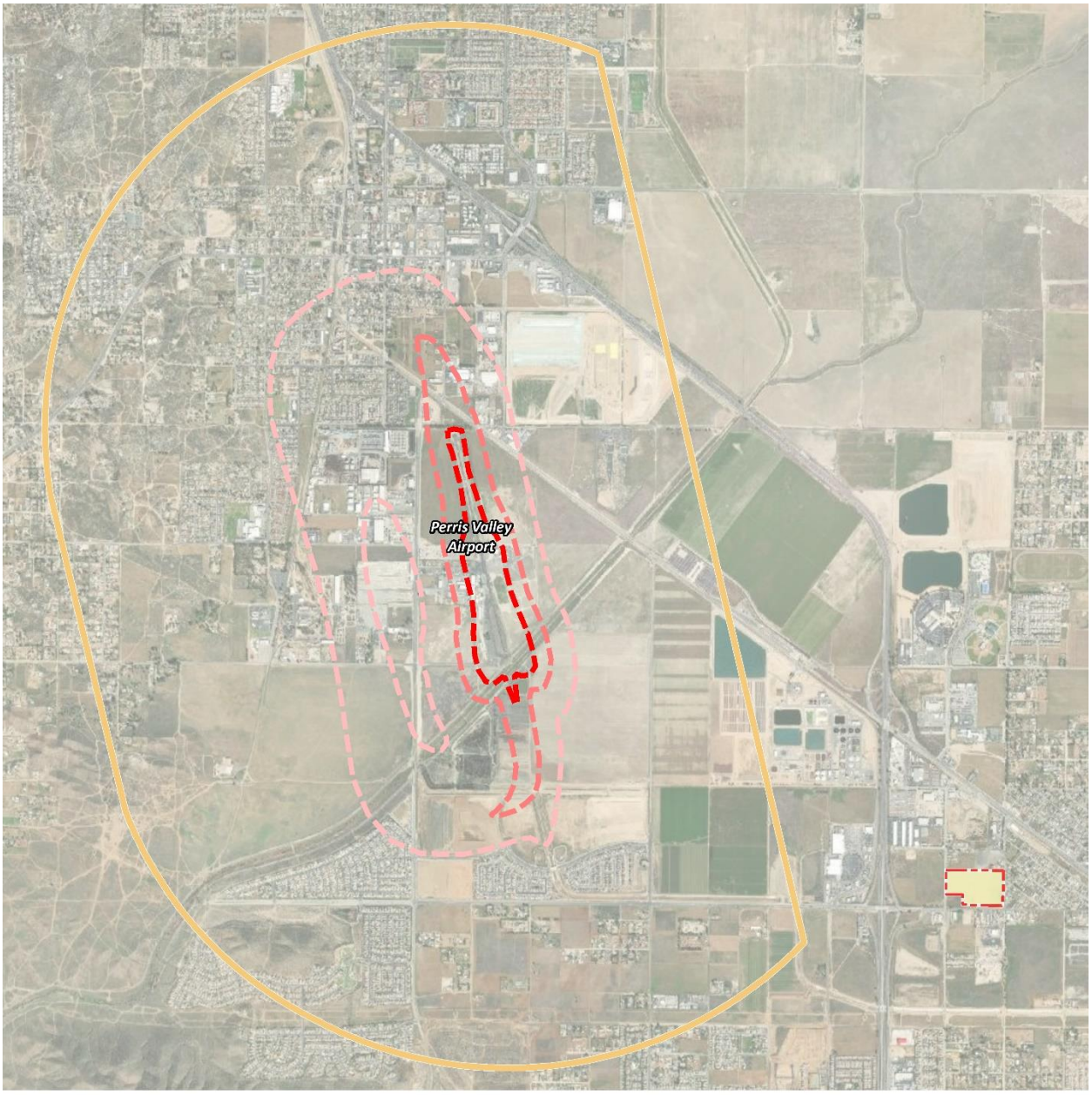
The Perris Valley Airport (PV) is located approximately 2 miles northwest of the Project Site. This places the Project site outside the limits of the Perris Valley Airport Influence Area as shown on Exhibit 3-A. Therefore, the Project is not subject to the *Riverside County Airport Land Use Compatibility Plan Policy Document* (RC ALUCP). As shown on Exhibit 3-A, the Project site is located well outside the 55 dBA CNEL noise level contour boundaries and the Project land use is considered *clearly acceptable.*

3.8 MARCH AIR RESERVE BASE/INLAND PORT AIRPORT (MARB/IPA)

The March Air Reserve Base/Inland Port Airport (MARB/IPA) runway is located approximately 9 miles northwest of the Project site. The *March Air Reserve Base/Inland Port Airport Land Use Compatibility Plan* (MARB/IPA ALUCP) includes the policies for determining the land use compatibility of the Project. (8) The MARB/IPA, Map MA-1, indicates that the Project site is located within the Flight Corridor Buffer (Compatibility Zone D), and the Table MA-1 Compatibility Zone Factors indicates that this area is considered to have a *moderate to low* noise impact, and is mostly within or near the 55 dBA CNEL noise level contour boundaries. Consistent with the Basic Compatibility Criteria, listed in Table MA-2 of the MARB/IPA ALUCP, only uses that attract very high concentrations of people in confined areas are discouraged. The MARB/IPA ALUCP does not identify industrial-use specific noise compatibility standards, and therefore, the Governor's Office of Planning and Research (OPR) Land Use Compatibility for Community Noise Exposure, previously discussed in Section 3.2, is used to assess potential aircraft-related noise levels at the Project site. The OPR guidelines indicate that industrial uses, such as the Project, are considered *normally acceptable* with exterior noise levels of up to 70 dBA CNEL and *conditionally acceptable* with exterior noise levels between 70 to 80 dBA CNEL. (4)

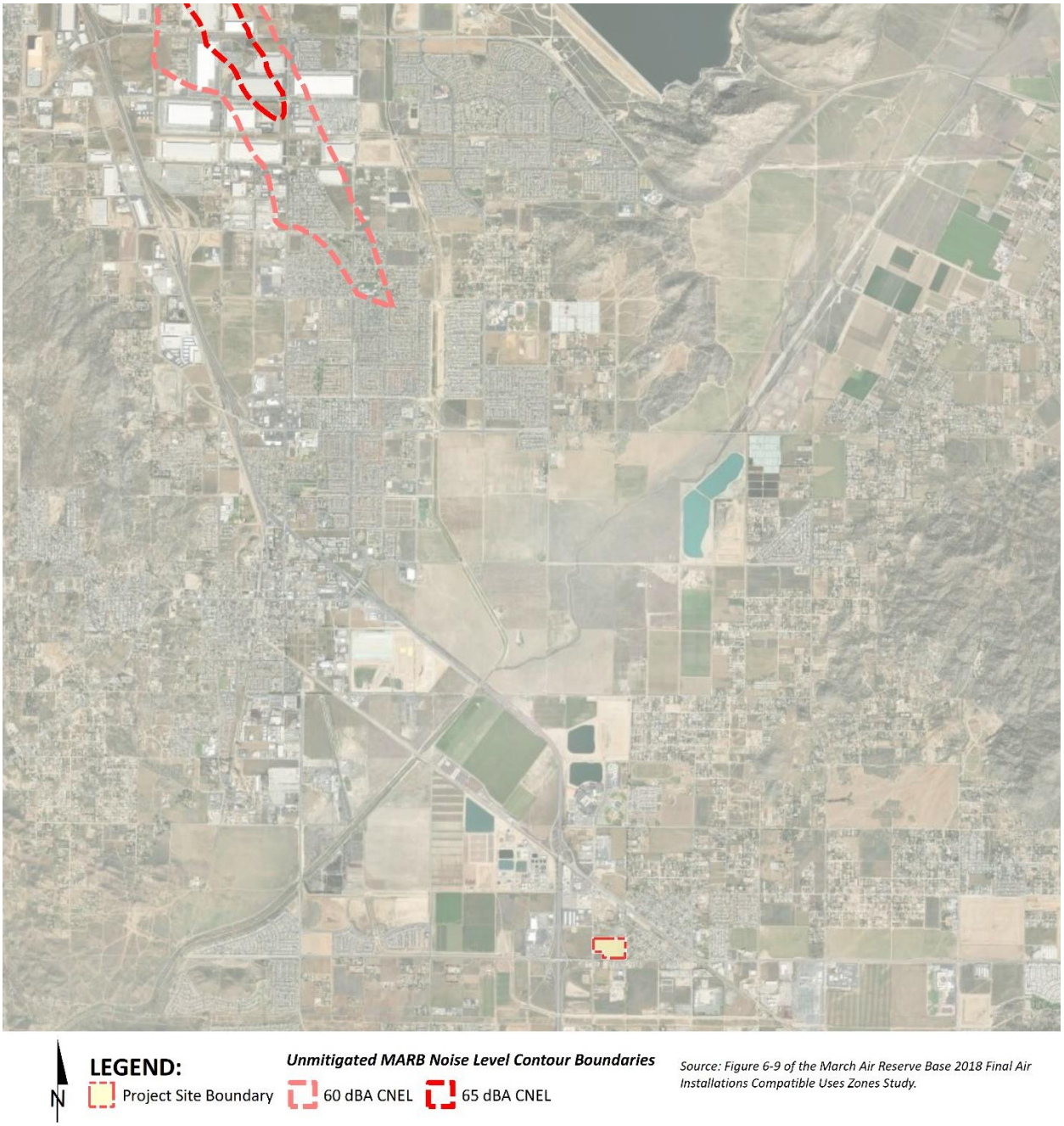
The noise contour boundaries used to determine the potential aircraft-related noise impacts at the Project site are found on Figure 6-9 of the March Air Reserve Base 2018 Final Air Installations Compatible Uses Zones Study and are presented on Exhibit 3-B of this report. Based on the 2018 noise level contours for the MARB/IPA, the Project development area is located outside the 55 dBA CNEL noise level contour boundaries and is considered *normally acceptable.*

EXHIBIT 3-A: PERRIS VALLEY AIRPORT (PV) NOISE CONTOURS



Source: Riverside County Airport Land Use Compatibility Plan Policy Document (July 2010)

EXHIBIT 3-B: MARB/IPA FUTURE AIRPORT NOISE CONTOURS



Source: Figure 6-9 of the March Air Reserve Base 2018 Final Air Installations Compatible Uses Zones Study.

4 SIGNIFICANCE CRITERIA

The following significance criteria are based on currently adopted guidance provided by Appendix G of the California Environmental Quality Act (CEQA) Guidelines. (1) For the purposes of this report, impacts would be potentially significant if the Project results in or causes:

A. Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

B. Generation of excessive ground-borne vibration or ground-borne noise levels?

C. For a project located within the vicinity of a private airstrip or 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?

4.1 NOISE LEVEL INCREASES (THRESHOLD A)

Sensitive receivers are areas where humans are participating in activities that may be subject to the stress of significant interference from noise and often include residential dwellings, mobile homes, hotels, motels, hospitals, nursing homes, educational facilities, and libraries. Other receivers include office and industrial buildings, which are not considered as sensitive as single-family homes, but are still protected by City of Perris land use compatibility standards, as discussed below. The City of Perris does not consider noise increases to non-noise-sensitive uses to be significant. (13) Further, CEQA requires that consideration be given to the magnitude of the increase, the existing ambient noise levels, and the location of noise-sensitive receivers to determine if a noise increase represents a significant adverse environmental impact.

Noise level increases at the nearest receiver locations resulting from the Project are evaluated based on the Federal Interagency Committee on Noise (FICON) (14) guidance. The FICON recommendations are based on studies that relate aircraft noise levels to the percentage of persons highly annoyed by aircraft noise. Although the FICON recommendations were specifically developed to assess aircraft noise impacts, these recommendations are often used in environmental noise impact assessments involving the use of cumulative noise exposure metrics, such as the average-daily noise level (CNEL) and equivalent continuous noise level (L_{eq}).

The approach used in this noise study recognizes *that there is no single noise increase that renders the noise impact significant*, based on a 2008 California Court of Appeal ruling on Gray v. County of Madera. (15) For example, if the ambient noise environment is quiet (<60 dBA) and the new noise source greatly increases the noise levels, an impact may occur if the noise criteria may be exceeded. Therefore, for this analysis, a *readily perceptible* 5 dBA or greater project-related noise level increase is considered a significant impact when the without project noise levels are below 60 dBA. Per the FICON, in areas where the without project noise levels range from 60 to 65 dBA, a 3 dBA *barely perceptible* noise level increase appears to be appropriate for most people. When the without project noise levels already exceed 65 dBA, any increase in community noise louder than 1.5 dBA or greater is considered a significant impact if the noise criteria for a given land use is exceeded, since it likely contributes to an existing noise exposure

exceedance. The FICON guidance provides an established source of criteria to assess the impacts of substantial temporary or permanent increase in baseline ambient noise levels. Based on the FICON criteria, the amount to which a given noise level increase is considered acceptable is reduced when the without Project (baseline) noise levels are already shown to exceed certain land-use specific exterior noise level criteria. The specific levels are based on typical responses to noise level increases of 5 dBA or *readily perceptible*, 3 dBA or *barely perceptible*, and 1.5 dBA depending on the underlying without Project noise levels for noise-sensitive uses. These levels of increases and their perceived acceptance are consistent with guidance provided by both the Federal Highway Administration (4 p. 9) and Caltrans (16 p. 2_48).

4.2 VIBRATION (THRESHOLD B)

As described in Section 3.4, the vibration impacts originating from the construction of Hillwood Ethanac, vibration-generating activities are appropriately evaluated using the Caltrans vibration damage thresholds to assess potential temporary construction-related impacts at adjacent building locations. The nearest noise sensitive buildings adjacent to the Project site can best be described as "older residential structures" with a maximum acceptable continuous vibration threshold of 0.3 PPV (in/sec).

4.3 CEQA GUIDELINES NOT FURTHER ANALYZED (THRESHOLD C)

The closest airports which would require additional noise analysis under State CEQA Guideline Appendix G threshold C are the Perris Valley Airport and MARB/IPA. As previously described in Section 3.7, the Project site is located outside the 55 dBA CNEL noise contour for the Perris Valley Airport. The Project site is also located within the MARB/ IPA ALUCP 55 dBA CNEL noise contour as previously discussed in Section 3.8 where potential noise impacts from MARB/IPA are considered moderate to low with concerns focused primarily on individual loud events. The southernmost offsite areas of the Project consisting of roadway ROW are located beyond the 55 dBA CNEL noise contour where potential noise impacts from MARB/IPA are considered low with concerns focused primarily on occasional overflights that may be intrusive to some outdoor activities.

The City's noise compatibility standards in the Perris Municipal Code Section 19.51.080, prevents the establishment of noise-sensitive land uses such as new residences, schools, libraries, museums, hotels, motels, hospitals, nursing homes, places of worship, in portions of the airport environ that are exposed to significant levels of aircraft noise. The proposed Project use is not a noise sensitive land use. As such, the proposed Project would not expose people working in the Project area to excessive noise levels from aircraft operations. Therefore, the potential impacts under State CEQA Guidelines Appendix G Threshold C, would be *less than significant* and are not further analyzed in this noise study.

4.4 SIGNIFICANCE CRITERIA SUMMARY

Noise impacts shall be considered significant if any of the following occur as a direct result of the proposed development. Table 4-1 shows the significance criteria summary matrix.

TABLE 4-1: SIGNIFICANCE CRITERIA SUMMARY

Analysis	Condition(s)	Significance Criteria	
		Daytime	**Nighttime**
Off-Site Traffic[1]	if ambient is < 60 dBA CNEL	≥ 5 dBA CNEL Project increase	
	if ambient is 60 - 65 dBA CNEL	≥ 3 dBA CNEL Project increase	
	if ambient is > 65 dBA CNEL	≥ 1.5 dBA CNEL Project increase	
Operational	At residential land use[2]	80 dBA L_{max}	60 dBA L_{max}
	Within 160 Feet of noise-sensitive use[3]	60 dBA CNEL (exterior)	
	if ambient is < 60 dBA L_{eq}[1]	≥ 5 dBA L_{eq} Project increase	
	if ambient is 60 - 65 dBA L_{eq}[1]	≥ 3 dBA L_{eq} Project increase	
	if ambient is > 65 dBA L_{eq}[1]	≥ 1.5 dBA L_{eq} Project increase	
Construction	Noise Level Threshold	80 dBA L_{max}[4]	60 dBA L_{max}[2]
	Vibration Level Threshold[5]	0.3 PPV (in/sec)	

[1] FICON, 1992.
[2] City of Perris Municipal Code, Section 7.34.040 (Appendix 3.1).
[3] City of Perris General Plan Noise Element, Implementation Measure V.A.1.
[4] City of Perris Municipal Code, Section 7.34.060 (Appendix 3.1).
[5] Caltrans Transportation and Construction Vibration Guidance Manual, April 2020, Table 19.
"Daytime" = 7:01 a.m. - 10:00 p.m.; "Nighttime" = 10:01 p.m. - 7:00 a.m.

This page intentionally left blank

5 EXISTING NOISE LEVEL MEASUREMENTS

To assess the existing noise level environment, 24-hour noise level measurements were taken at six locations in the Project study area. The receiver locations were selected to describe and document the existing noise environment within the Project study area. Exhibit 5-A provides the boundaries of the Project study area and the noise level measurement locations. To fully describe the existing noise conditions, noise level measurements were collected by Urban Crossroads, Inc. on Wednesday, October 19th, 2022. Appendix 5.1 includes study area photos.

5.1 MEASUREMENT PROCEDURE AND CRITERIA

To describe the existing noise environment, the hourly noise levels were measured during typical weekday conditions over a 24-hour period. By collecting individual hourly noise level measurements, it is possible to describe the equivalent daytime and nighttime hourly noise levels and calculate the 24-hour CNEL. The long-term noise readings were recorded using Piccolo Type 2 integrating sound level meter and dataloggers. The Piccolo sound level meters were calibrated using a Larson-Davis calibrator, Model CAL 150. All noise meters were programmed in "slow" mode to record noise levels in "A" weighted form. The sound level meters and microphones were equipped with a windscreen during all measurements. All noise level measurement equipment satisfies the American National Standards Institute (ANSI) standard specifications for sound level meters ANSI S1.4-2014/IEC 61672-1:2013. (17)

5.2 NOISE MEASUREMENT LOCATIONS

The long-term noise level measurements were positioned as close to the nearest sensitive receiver locations as possible to assess the existing ambient hourly noise levels surrounding the Project site. Both Caltrans and the FTA recognize that it is not reasonable to collect noise level measurements that can fully represent every part of a private yard, patio, deck, or balcony normally used for human activity when estimating impacts for new development projects. This is demonstrated in the Caltrans general site location guidelines which indicate that, *sites must be free of noise contamination by sources other than sources of interest. Avoid sites located near sources such as barking dogs, lawnmowers, pool pumps, and air conditioners unless it is the express intent of the analyst to measure these sources*. (2) Further, FTA guidance states, t*hat it is not necessary nor recommended that existing noise exposure be determined by measuring at every noise-sensitive location in the project area. Rather, the recommended approach is to characterize the noise environment for clusters of sites based on measurements or estimates at representative locations in the community* (8).

Based on recommendations of Caltrans and the FTA, it is not necessary to collect measurements at each individual building or residence, because each receiver measurement represents a group of buildings that share acoustical equivalence (8). In other words, the area represented by the receiver shares similar shielding, terrain, and geometric relationship to the reference noise source. Receivers represent a location of noise sensitive areas and are used to estimate the future noise level impacts. Collecting reference ambient noise level measurements at the nearby sensitive receiver locations allows for a comparison of the before and after Project noise levels

and is necessary to assess potential noise impacts due to the Project's contribution to the ambient noise levels.

5.3 NOISE MEASUREMENT RESULTS

The noise measurements presented below focus on the equivalent or the energy average hourly sound levels (L_{eq}). The equivalent sound level (L_{eq}) represents a steady state sound level containing the same total energy as a time varying signal over a given sample period. Table 5-1 identifies the hourly daytime (7:00 a.m. to 10:00 p.m.) and nighttime (10:00 p.m. to 7:00 a.m.) noise levels at each noise level measurement location. Appendix 5.2 provides a summary of the existing hourly ambient noise levels.

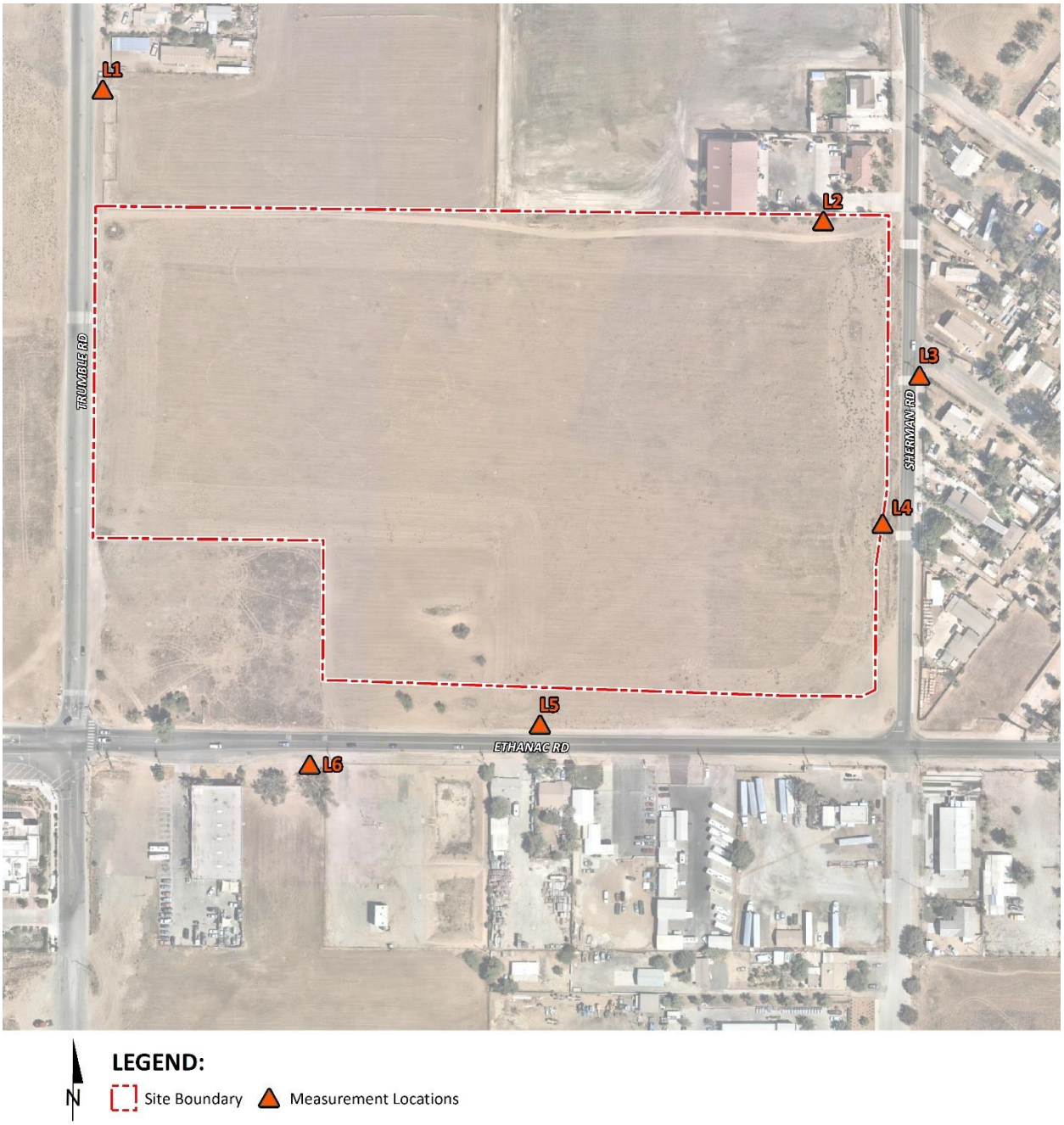
TABLE 5-1: 24-HOUR AMBIENT NOISE LEVEL MEASUREMENTS

Location[1]	Description	Energy Average Noise Level (dBA L_{eq})[2]	
		Daytime	Nighttime
L1	Located northwest of the Project site near the existing residence at 25870 Trumble Road.	65.2	62.0
L2	Located north of the Project site near the Lonsdale Trucking landscaping supply store.	51.8	51.9
L3	Located east of the Project site near the residence at 25898 Sherman Road.	64.1	62.8
L4	Located east of the Project site near the residence at 25940 Sherman Road.	58.4	57.7
L5	Located south of the Project site near the residence at 27391 Ethanac Road.	68.2	65.3
L6	Located south of the Project site in the vacant lot next to the non-residential use at 27271 Ethanac Road.	64.6	61.9

[1] See Exhibit 5-A for the noise level measurement locations.
[2] Energy (logarithmic) average levels. The long-term 24-hour measurement worksheets are included in Appendix 5.2.
"Daytime" = 7:00 a.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.

Table 5-1 provides the energy average noise levels used to describe the daytime and nighttime ambient conditions. These daytime and nighttime energy average noise levels represent the average of all hourly noise levels observed during these time periods expressed as a single number. Appendix 5.2 provides summary worksheets of the noise levels for each hour as well as the minimum, maximum, L_1, L_2, L_5, L_8, L_{25}, L_{50}, L_{90}, L_{95}, and L_{99} percentile noise levels observed during the daytime and nighttime periods.

EXHIBIT 5-A: NOISE MEASUREMENT LOCATIONS



This page intentionally left blank

6 TRAFFIC NOISE METHODS AND PROCEDURES

The following section outlines the methods and procedures used to estimate and analyze the future traffic noise environment. Consistent with the *Land Use Compatibility Criteria*, all transportation related noise levels are presented in terms of the 24-hour CNEL's.

6.1 FHWA TRAFFIC NOISE PREDICTION MODEL

The expected roadway noise level increases from vehicular traffic were calculated by Urban Crossroads, Inc. using a computer program that replicates the Federal Highway Administration (FHWA) Traffic Noise Prediction Model- FHWA-RD-77-108. (18) The FHWA Model arrives at a predicted noise level through a series of adjustments to the Reference Energy Mean Emission Level (REMEL). In California the national REMELs are substituted with the California Vehicle Noise (Calveno) Emission Levels. (19) Adjustments are then made to the REMEL to account for: the roadway classification (e.g., collector, secondary, major or arterial), the roadway active width (i.e., the distance between the center of the outermost travel lanes on each side of the roadway), the total average daily traffic (ADT), the travel speed, the percentages of automobiles, medium trucks, and heavy trucks in the traffic volume, the roadway grade, the angle of view (e.g., whether the roadway view is blocked), the site conditions ("hard" or "soft" relates to the absorption of the ground, pavement, or landscaping), and the percentage of total ADT which flows each hour throughout a 24-hour period. Research conducted by Caltrans has shown that the use of soft site conditions is appropriate for the application of the FHWA traffic noise prediction model used in this analysis. (20)

6.1.1 OFF-SITE TRAFFIC NOISE PREDICTION MODEL INPUTS

Table 6-1 presents the roadway parameters used to assess the Project's off-site dBA CNEL transportation noise impacts. Table 6-1 identifies the eight off-site study area roadway segments as shown on Exhibit 6-A, the distance from the centerline to adjacent land use based on the functional roadway classifications per the City of Perris General Plan Circulation Element, and the vehicle speeds. The ADT volumes used in this study area presented on Table 6-2 are based on the *Hillwood Ethanac Traffic Analysis*, prepared by Urban Crossroads, Inc. for the following traffic scenarios. (21)

- Existing (E)
- Existing plus Project (E+P)
- Existing plus Ambient Growth plus Cumulative (EAC) (2025) without Project Conditions
- Existing plus Ambient Growth plus Cumulative (EAC) (2025) with Project Conditions
- Horizon Year (2045) Without Project
- Horizon Year (2045) With Project

The ADT volumes vary for each roadway segment based on the existing traffic volumes and the combination of project traffic distributions. This analysis relies on a comparative evaluation of the off-site traffic noise impacts at the boundary of the right-of-way of the receiving adjacent land use, without and with project ADT traffic volumes from the Project traffic analysis.

Consistent with the *Hillwood Ethanac Traffic Analysis*, the Project is anticipated to generate a net total of 618 two-way trips per day (actual vehicles) that include 120 truck trips.

TABLE 6-1: OFF-SITE ROADWAY PARAMETERS

ID	Roadway	Segment	Receiving Land Use[1]	Classification[2]	Distance from Centerline to Receiving Land Use (Feet)[3]	Vehicle Speed (mph)
1	Trumble Rd.	n/o Ethanac Rd.	Non-Sensitive	Secondary	47'	45
2	Trumble Rd.	s/o Ethanac Rd.	Sensitive	Secondary	47'	45
3	Sherman Rd.	n/o Ethanac Rd.	Sensitive	Collector	33'	35
4	Sherman Rd.	s/o Ethanac Rd.	Sensitive	Collector	33'	35
5	Ethanac Rd.	w/o Trumble Rd.	Non-Sensitive	Expressway	92'	45
6	Ethanac Rd.	e/o Trumble Rd.	Sensitive	Expressway	92'	45
7	Ethanac Rd.	w/o Sherman Rd.	Non-Sensitive	Expressway	92'	45
8	Ethanac Rd.	e/o Sherman Rd.	Non-Sensitive	Expressway	92'	45

[1] Based on a review of existing aerial imagery. Noise sensitive uses limited to adjacent residential land uses.
[2] City of Perris General Plan Community Mobility and Circulation Element roadway functional classification.
[3] Distance to receiving land use is based upon the right-of-way distances.

To quantify the off-site noise levels, the Project related truck trips were added to the heavy truck category in the FHWA noise prediction model. The addition of the Project related truck trips increases the percentage of heavy trucks in the vehicle mix. This approach recognizes that the FHWA noise prediction model is significantly influenced by the number of heavy trucks in the vehicle mix.

Table 6-3 provides the time of day (daytime, evening, and nighttime) vehicle splits. The daily Project truck trip-ends were assigned to the individual off-site study area roadway segments based on the Project truck trip distribution percentages documented in the *Hillwood Ethanac Traffic Analysis*. Using the Project truck trips in combination with the Project trip distribution, Urban Crossroads, Inc. calculated the number of additional Project truck trips and vehicle mix percentages for each of the study area roadway segments. Table 6-4 shows the traffic flow by vehicle type (vehicle mix) used for all without Project traffic scenarios, and Tables 6-5 to 6-7 show the vehicle mixes used for the with Project traffic scenarios.

EXHIBIT 6-A: OFF-SITE STUDY AREA ROADWAY SEGMENTS

TABLE 6-2: AVERAGE DAILY TRAFFIC VOLUMES

ID	Roadway	Segment	Average Daily Traffic Volumes[1]					
			Existing		EAC (2025)		HY (2045)	
			Without Project	With Project	Without Project	With Project	Without Project	With Project
1	Trumble Rd.	n/o Ethanac Rd.	1,974	2,094	2,641	2,761	3,411	3,531
2	Trumble Rd.	s/o Ethanac Rd.	1,926	1,926	2,104	2,104	2,421	2,421
3	Sherman Rd.	n/o Ethanac Rd.	3,714	3,714	4,930	4,930	14,781	14,781
4	Sherman Rd.	s/o Ethanac Rd.	518	518	6,354	6,354	6,440	6,440
5	Ethanac Rd.	w/o Trumble Rd.	13,192	13,499	36,207	36,514	85,382	85,689
6	Ethanac Rd.	e/o Trumble Rd.	12,383	12,757	35,192	35,565	78,372	78,746
7	Ethanac Rd.	w/o Sherman Rd.	12,383	12,694	35,192	35,503	78,372	78,684
8	Ethanac Rd.	e/o Sherman Rd.	7,655	7,780	23,365	23,490	69,883	70,008

[1] Hillwood Ethanac Traffic Analysis, Urban Crossroads, Inc.

TABLE 6-3: TIME OF DAY VEHICLE SPLITS

Vehicle Type	Time of Day Splits[1]			Total of Time of Day Splits
	Daytime	Evening	Nighttime	
Autos	78.20%	9.01%	12.79%	100.00%
Medium Trucks	79.41%	5.00%	15.59%	100.00%
Heavy Trucks	75.16%	1.59%	23.25%	100.00%

[1] Based on the November 3, 2022, 24-hour directional vehicle classification count collected on Ethanac Road east of Trumble Road (Hillwood Ethanac Traffic Analysis, Urban Crossroads, Inc.)
"Daytime" = 7:00 a.m. to 7:00 p.m.; "Evening" = 7:00 p.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.

TABLE 6-4: WITHOUT PROJECT VEHICLE MIX

Classification	Total % Traffic Flow[1]			Total
	Autos	Medium Trucks	Heavy Trucks	
All Segments	94.72%	2.75%	2.54%	100.00%

[1] Based on the November 3, 2022, 24-hour directional vehicle classification count collected on Ethanac Road east of Trumble Road (Hillwood Ethanac Warehouse Traffic Analysis, Urban Crossroads, Inc.)

Due to the added Project truck trips, the increase in Project traffic volumes and the distributions of trucks on the study area road segments, the percentage of autos, medium trucks and heavy trucks will vary for each of the traffic scenarios. This explains why the existing and future traffic volumes and vehicle mixes vary between seemingly identical study area roadway segments.

TABLE 6-5: EXISTING PLUS PROJECT (E+P) VEHICLE MIX

ID	Roadway	Segment	With Project[1]			
			Autos	Medium Trucks	Heavy Trucks	Total[2]
1	Trumble Rd.	n/o Ethanac Rd.	89.29%	3.91%	6.80%	100.00%
2	Trumble Rd.	s/o Ethanac Rd.	94.72%	2.75%	2.54%	100.00%
3	Sherman Rd.	n/o Ethanac Rd.	94.72%	2.75%	2.54%	100.00%
4	Sherman Rd.	s/o Ethanac Rd.	94.72%	2.75%	2.54%	100.00%
5	Ethanac Rd.	w/o Trumble Rd.	93.95%	2.89%	3.16%	100.00%
6	Ethanac Rd.	e/o Trumble Rd.	94.87%	2.67%	2.46%	100.00%
7	Ethanac Rd.	w/o Sherman Rd.	94.85%	2.68%	2.47%	100.00%
8	Ethanac Rd.	e/o Sherman Rd.	94.80%	2.70%	2.50%	100.00%

[1] Hillwood Ethanac Traffic Analysis, Urban Crossroads, Inc.
[2] Total of vehicle mix percentage values rounded to the nearest one-hundredth.

TABLE 6-6: EAP (2025) WITH PROJECT VEHICLE MIX

ID	Roadway	Segment	With Project[1]			
			Autos	Medium Trucks	Heavy Trucks	Total[2]
1	Trumble Rd.	n/o Ethanac Rd.	90.60%	3.63%	5.77%	100.00%
2	Trumble Rd.	s/o Ethanac Rd.	94.72%	2.75%	2.54%	100.00%
3	Sherman Rd.	n/o Ethanac Rd.	94.72%	2.75%	2.54%	100.00%
4	Sherman Rd.	s/o Ethanac Rd.	94.72%	2.75%	2.54%	100.00%
5	Ethanac Rd.	w/o Trumble Rd.	94.43%	2.80%	2.77%	100.00%
6	Ethanac Rd.	e/o Trumble Rd.	94.77%	2.72%	2.51%	100.00%
7	Ethanac Rd.	w/o Sherman Rd.	94.76%	2.72%	2.51%	100.00%
8	Ethanac Rd.	e/o Sherman Rd.	94.75%	2.73%	2.52%	100.00%

[1] Hillwood Ethanac Traffic Analysis, Urban Crossroads, Inc.
[2] Total of vehicle mix percentage values rounded to the nearest one-hundredth.

TABLE 6-7: HY (2045) WITH PROJECT VEHICLE MIX

ID	Roadway	Segment	With Project[1]			
			Autos	Medium Trucks	Heavy Trucks	Total[2]
1	Trumble Rd.	n/o Ethanac Rd.	91.50%	3.43%	5.07%	100.00%
2	Trumble Rd.	s/o Ethanac Rd.	94.72%	2.75%	2.54%	100.00%
3	Sherman Rd.	n/o Ethanac Rd.	94.72%	2.75%	2.54%	100.00%
4	Sherman Rd.	s/o Ethanac Rd.	94.72%	2.75%	2.54%	100.00%
5	Ethanac Rd.	w/o Trumble Rd.	94.60%	2.77%	2.63%	100.00%
6	Ethanac Rd.	e/o Trumble Rd.	94.74%	2.73%	2.52%	100.00%
7	Ethanac Rd.	w/o Sherman Rd.	94.74%	2.74%	2.53%	100.00%
8	Ethanac Rd.	e/o Sherman Rd.	94.73%	2.74%	2.53%	100.00%

[1] Hillwood Ethanac Traffic Analysis, Urban Crossroads, Inc.

[2] Total of vehicle mix percentage values rounded to the nearest one-hundredth.

7 OFF-SITE TRAFFIC NOISE ANALYSIS

To assess the off-site transportation CNEL noise level impacts associated with the development of the proposed Project, noise contours were developed based on the *Hillwood Ethanac Traffic Analysis* prepared by Urban Crossroads, Inc. (21) Noise contour boundaries represent the equal levels of noise exposure and are measured in CNEL from the center of the roadway.

7.1 TRAFFIC NOISE CONTOURS

Noise contours were used to assess the Project's incremental 24-hour dBA CNEL traffic-related noise impacts at land uses adjacent to roadways conveying Project traffic. The noise contours represent the distance to noise levels of a constant value and are measured from the center of the roadway for the 70, 65, and 60 dBA CNEL noise levels. The noise contours do not consider the effect of any existing noise barriers or topography that may attenuate ambient noise levels. In addition, because the noise contours reflect modeling of vehicular noise on area roadways, they appropriately do not reflect noise contributions from the surrounding stationary noise sources within the Project study area. Tables 7-1 through 7-6 present a summary of the exterior dBA CNEL traffic noise levels for each traffic condition. Appendix 7.1 includes a summary of the dBA CNEL traffic noise level contour worksheets for each of the traffic conditions.

TABLE 7-1: EXISTING WITHOUT PROJECT NOISE CONTOURS

ID	Road	Segment	Receiving Land Use[1]	CNEL at Nearest Receiving Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Trumble Rd.	n/o Ethanac Rd.	Non-Sensitive	63.8	RW	RW	84
2	Trumble Rd.	s/o Ethanac Rd.	Sensitive	63.7	RW	RW	83
3	Sherman Rd.	n/o Ethanac Rd.	Sensitive	65.6	RW	36	78
4	Sherman Rd.	s/o Ethanac Rd.	Sensitive	57.1	RW	RW	RW
5	Ethanac Rd.	w/o Trumble Rd.	Non-Sensitive	68.6	RW	159	342
6	Ethanac Rd.	e/o Trumble Rd.	Sensitive	68.3	RW	152	328
7	Ethanac Rd.	w/o Sherman Rd.	Non-Sensitive	68.3	RW	152	328
8	Ethanac Rd.	e/o Sherman Rd.	Non-Sensitive	66.2	RW	111	238

[1] Based on a review of existing aerial imagery. Noise sensitive uses limited to existing residential land uses.
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest receiving land use.
"RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-2: EXISTING PLUS PROJECT (E+P) NOISE CONTOURS

ID	Road	Segment	Receiving Land Use[1]	CNEL at Nearest Receiving Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Trumble Rd.	n/o Ethanac Rd.	Non-Sensitive	66.8	RW	62	133
2	Trumble Rd.	s/o Ethanac Rd.	Sensitive	63.7	RW	RW	83
3	Sherman Rd.	n/o Ethanac Rd.	Sensitive	65.6	RW	36	78
4	Sherman Rd.	s/o Ethanac Rd.	Sensitive	57.1	RW	RW	RW
5	Ethanac Rd.	w/o Trumble Rd.	Non-Sensitive	69.2	RW	175	376
6	Ethanac Rd.	e/o Trumble Rd.	Sensitive	68.3	RW	154	331
7	Ethanac Rd.	w/o Sherman Rd.	Non-Sensitive	68.3	RW	153	330
8	Ethanac Rd.	e/o Sherman Rd.	Non-Sensitive	66.2	RW	111	239

[1] Based on a review of existing aerial imagery. Noise sensitive uses limited to existing residential land uses.
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest receiving land use.
"RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-3: EAC (2025) WITHOUT PROJECT NOISE CONTOURS

ID	Road	Segment	Receiving Land Use[1]	CNEL at Nearest Receiving Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Trumble Rd.	n/o Ethanac Rd.	Non-Sensitive	65.0	RW	47	102
2	Trumble Rd.	s/o Ethanac Rd.	Sensitive	64.1	RW	RW	88
3	Sherman Rd.	n/o Ethanac Rd.	Sensitive	66.9	RW	44	94
4	Sherman Rd.	s/o Ethanac Rd.	Sensitive	68.0	RW	52	112
5	Ethanac Rd.	w/o Trumble Rd.	Non-Sensitive	72.9	145	312	671
6	Ethanac Rd.	e/o Trumble Rd.	Sensitive	72.8	142	306	659
7	Ethanac Rd.	w/o Sherman Rd.	Non-Sensitive	72.8	142	306	659
8	Ethanac Rd.	e/o Sherman Rd.	Non-Sensitive	71.0	108	233	501

[1] Based on a review of existing aerial imagery. Noise sensitive uses limited to existing residential land uses.
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest receiving land use.
"RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-4: EAC (2025) WITH PROJECT NOISE CONTOURS

ID	Road	Segment	Receiving Land Use[1]	CNEL at Nearest Receiving Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Trumble Rd.	n/o Ethanac Rd.	Non-Sensitive	67.4	RW	68	147
2	Trumble Rd.	s/o Ethanac Rd.	Sensitive	64.1	RW	RW	88
3	Sherman Rd.	n/o Ethanac Rd.	Sensitive	66.9	RW	44	94
4	Sherman Rd.	s/o Ethanac Rd.	Sensitive	68.0	RW	52	112
5	Ethanac Rd.	w/o Trumble Rd.	Non-Sensitive	73.2	150	323	696
6	Ethanac Rd.	e/o Trumble Rd.	Sensitive	72.8	142	307	660
7	Ethanac Rd.	w/o Sherman Rd.	Non-Sensitive	72.8	142	306	660
8	Ethanac Rd.	e/o Sherman Rd.	Non-Sensitive	71.1	108	233	502

[1] Based on a review of existing aerial imagery. Noise sensitive uses limited to existing residential land uses.
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest receiving land use.
"RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-5: HORIZON YEAR (2045) WITHOUT PROJECT NOISE CONTOURS

ID	Road	Segment	Receiving Land Use[1]	CNEL at Nearest Receiving Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Trumble Rd.	n/o Ethanac Rd.	Non-Sensitive	66.2	RW	56	121
2	Trumble Rd.	s/o Ethanac Rd.	Sensitive	64.7	RW	RW	96
3	Sherman Rd.	n/o Ethanac Rd.	Sensitive	71.6	42	91	196
4	Sherman Rd.	s/o Ethanac Rd.	Sensitive	68.0	RW	52	113
5	Ethanac Rd.	w/o Trumble Rd.	Non-Sensitive	76.7	256	552	1189
6	Ethanac Rd.	e/o Trumble Rd.	Sensitive	76.3	242	521	1123
7	Ethanac Rd.	w/o Sherman Rd.	Non-Sensitive	76.3	242	521	1123
8	Ethanac Rd.	e/o Sherman Rd.	Non-Sensitive	75.8	224	483	1041

[1] Based on a review of existing aerial imagery. Noise sensitive uses limited to existing residential land uses.
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest receiving land use.
"RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-6: HORIZON YEAR (2045) WITH PROJECT NOISE CONTOURS

ID	Road	Segment	Receiving Land Use[1]	CNEL at Nearest Receiving Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Trumble Rd.	n/o Ethanac Rd.	Non-Sensitive	68.1	RW	76	163
2	Trumble Rd.	s/o Ethanac Rd.	Sensitive	64.7	RW	RW	96
3	Sherman Rd.	n/o Ethanac Rd.	Sensitive	71.6	42	91	196
4	Sherman Rd.	s/o Ethanac Rd.	Sensitive	68.0	RW	52	113
5	Ethanac Rd.	w/o Trumble Rd.	Non-Sensitive	76.8	260	561	1208
6	Ethanac Rd.	e/o Trumble Rd.	Sensitive	76.3	242	522	1125
7	Ethanac Rd.	w/o Sherman Rd.	Non-Sensitive	76.3	242	522	1124
8	Ethanac Rd.	e/o Sherman Rd.	Non-Sensitive	75.8	224	483	1041

[1] Based on a review of existing aerial imagery. Noise sensitive uses limited to existing residential land uses.
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest receiving land use.
"RW" = Location of the respective noise contour falls within the right-of-way of the road.

7.2 EXISTING PLUS PROJECT TRAFFIC NOISE LEVEL INCREASES

An analysis of existing traffic noise levels plus traffic noise generated by the proposed Project has been included in this report to fully analyze all the existing traffic scenarios identified in the *Hillwood Ethanac Traffic Analysis*. This condition is provided solely for informational purposes and will not occur, since the Project will not be fully developed and occupied under Existing conditions. Table 7-1 shows the Existing without Project conditions CNEL noise levels. The Existing without Project exterior noise levels are expected to range from 57.1 to 68.6 dBA CNEL, without accounting for any noise attenuation features such as noise barriers or topography. Table 7-2 shows the Existing with Project conditions will range from 57.1 to 69.2 dBA CNEL. Table 7-7 shows that the Project off-site traffic noise level impacts will range from 0.0 to 3.0 dBA CNEL. Based on the significance criteria for off-site traffic noise presented in Table 4-1, land uses adjacent to the study area roadway segments would experience *less than significant* noise level impacts due to unmitigated Project-related traffic noise levels.

TABLE 7-7: EXISTING WITH PROJECT TRAFFIC NOISE LEVEL INCREASES

ID	Road	Segment	Receiving Land Use[1]	CNEL at Receiving Land Use (dBA)[2]			Incremental Noise Level Increase Threshold[3]	
				No Project	With Project	Project Increment	Limit	Exceeded?
1	Trumble Rd.	n/o Ethanac Rd.	Non-Sensitive	63.8	66.8	3.0	n/a	No
2	Trumble Rd.	s/o Ethanac Rd.	Sensitive	63.7	63.7	0.0	3.0	No
3	Sherman Rd.	n/o Ethanac Rd.	Sensitive	65.6	65.6	0.0	1.5	No
4	Sherman Rd.	s/o Ethanac Rd.	Sensitive	57.1	57.1	0.0	5.0	No
5	Ethanac Rd.	w/o Trumble Rd.	Non-Sensitive	68.6	69.2	0.6	n/a	No
6	Ethanac Rd.	e/o Trumble Rd.	Sensitive	68.3	68.3	0.0	1.5	No
7	Ethanac Rd.	w/o Sherman Rd.	Non-Sensitive	68.3	68.3	0.0	n/a	No
8	Ethanac Rd.	e/o Sherman Rd.	Non-Sensitive	66.2	66.2	0.0	n/a	No

[1] Based on a review of existing aerial imagery. Noise sensitive uses limited to existing residential land uses.
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the receiving land use. The City of Perris does not consider noise increases to non-noise-sensitive uses to be significant.
[3] Does the Project create an incremental noise level increase exceeding the significance criteria (Table 4-1)?

7.3 EAC (2025) PROJECT TRAFFIC NOISE LEVEL INCREASES

Table 7-3 presents the Existing Plus Ambient Growth Plus Cumulative Projects (2025) without Project conditions CNEL noise levels. The Existing Plus Ambient Growth Plus Cumulative Projects (2025) without Project exterior noise levels are expected to range from 64.1 to 72.9 dBA CNEL, without accounting for any noise attenuation features such as noise barriers or topography. Table 7-4 shows the Existing Plus Ambient Growth Plus Cumulative Projects (2025) with Project conditions will range from 64.1 to 73.2 dBA CNEL. Table 7-8 shows that the Project off-site traffic noise level increases will range from 0.0 to 2.4 dBA CNEL. Based on the significance criteria for off-site traffic noise presented in Table 4-1, land uses adjacent to the study area roadway segments would experience *less than significant* noise level impacts due to unmitigated Project-related traffic noise levels.

TABLE 7-8: EAC (2024) WITH PROJECT TRAFFIC NOISE INCREASES

ID	Road	Segment	Receiving Land Use[1]	CNEL at Receiving Land Use (dBA)[2]			Incremental Noise Level Increase Threshold[3]	
				No Project	With Project	Project Increment	Limit	Exceeded?
1	Trumble Rd.	n/o Ethanac Rd.	Non-Sensitive	65.0	67.4	2.4	n/a	No
2	Trumble Rd.	s/o Ethanac Rd.	Sensitive	64.1	64.1	0.0	3.0	No
3	Sherman Rd.	n/o Ethanac Rd.	Sensitive	66.9	66.9	0.0	1.5	No
4	Sherman Rd.	s/o Ethanac Rd.	Sensitive	68.0	68.0	0.0	1.5	No
5	Ethanac Rd.	w/o Trumble Rd.	Non-Sensitive	72.9	73.2	0.3	3.0	No
6	Ethanac Rd.	e/o Trumble Rd.	Sensitive	72.8	72.8	0.0	1.5	No
7	Ethanac Rd.	w/o Sherman Rd.	Non-Sensitive	72.8	72.8	0.0	3.0	No
8	Ethanac Rd.	e/o Sherman Rd.	Non-Sensitive	71.0	71.1	0.1	3.0	No

[1] Based on a review of existing aerial imagery. Noise sensitive uses limited to existing residential land uses.
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the receiving land use. The City of Perris does not consider noise increases to non-noise-sensitive uses to be significant.
[3] Does the Project create an incremental noise level increase exceeding the significance criteria (Table 4-1)?

7.4 HY (2045) PROJECT TRAFFIC NOISE LEVEL INCREASES

Table 7-5 presents the Horizon Year (2045) without Project conditions CNEL noise levels. The Horizon Year (2045) without Project exterior noise levels are expected to range from 64.7 to 76.7 dBA CNEL, without accounting for any noise attenuation features such as noise barriers or topography. Table 7-6 shows the Horizon Year (2045) with Project conditions will range from 64.7 to 76.8 dBA CNEL. Table 7-9 shows that the Project off-site traffic noise level increases will range from 0.0 to 1.9 dBA CNEL. Based on the significance criteria for off-site traffic noise presented in Table 4-1, land uses adjacent to the study area roadway segments would experience *less than significant* noise level impacts due to unmitigated Project-related traffic noise levels.

TABLE 7-9: HORIZON YEAR (2045) WITH PROJECT TRAFFIC NOISE INCREASES

ID	Road	Segment	Receiving Land Use[1]	CNEL at Receiving Land Use (dBA)[2]			Incremental Noise Level Increase Threshold[3]	
				No Project	With Project	Project Increment	Limit	Exceeded?
1	Trumble Rd.	n/o Ethanac Rd.	Non-Sensitive	66.2	68.1	1.9	n/a	No
2	Trumble Rd.	s/o Ethanac Rd.	Sensitive	64.7	64.7	0.0	3.0	No
3	Sherman Rd.	n/o Ethanac Rd.	Sensitive	71.6	71.6	0.0	1.5	No
4	Sherman Rd.	s/o Ethanac Rd.	Sensitive	68.0	68.0	0.0	1.5	No
5	Ethanac Rd.	w/o Trumble Rd.	Non-Sensitive	76.7	76.8	0.1	3.0	No
6	Ethanac Rd.	e/o Trumble Rd.	Sensitive	76.3	76.3	0.0	1.5	No
7	Ethanac Rd.	w/o Sherman Rd.	Non-Sensitive	76.3	76.3	0.0	3.0	No
8	Ethanac Rd.	e/o Sherman Rd.	Non-Sensitive	75.8	75.8	0.0	3.0	No

[1] Based on a review of existing aerial imagery. Noise sensitive uses limited to existing residential land uses.
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the receiving land use. The City of Perris does not consider noise increases to non-noise-sensitive uses to be significant.
[3] Does the Project create an incremental noise level increase exceeding the significance criteria (Table 4-1)?

This page intentionally left blank

8 SENSITIVE RECEIVER LOCATIONS

To assess the potential for long-term operational and short-term construction noise impacts, the following sensitive receiver locations, as shown on Exhibit 8-A, were identified as representative locations for analysis. Sensitive receivers are generally defined as locations where people reside or where the presence of unwanted sound could otherwise adversely affect the use of the land. Noise-sensitive land uses are generally considered to include residential dwellings, mobile homes, hotels, motels, hospitals, nursing homes, educational facilities, and libraries. Other receivers include office and industrial buildings, which are not considered as sensitive as single-family homes, but are still protected by City of Perris land use compatibility standards.

To describe the potential off-site Project noise levels, five receiver locations in the vicinity of the Project site were identified. The selection of receiver locations is based on FHWA guidelines and is consistent with additional guidance provided by Caltrans and the FTA, as previously described in Section 5.2. Other sensitive land uses in the Project study area that are located at greater distances than those identified in this noise study will experience lower noise levels than those presented in this report due to the additional attenuation from distance and the shielding of intervening structures. Distance is measured in a straight line from the project boundary to the property line of each receiver location.

R1: Location R1 represents the property line of the existing residence at 25870 Trumble Road, approximately 218 feet north of the Project site within the City of Perris. A 24-hour noise measurement was taken near this location, L1, to describe the existing ambient noise environment.

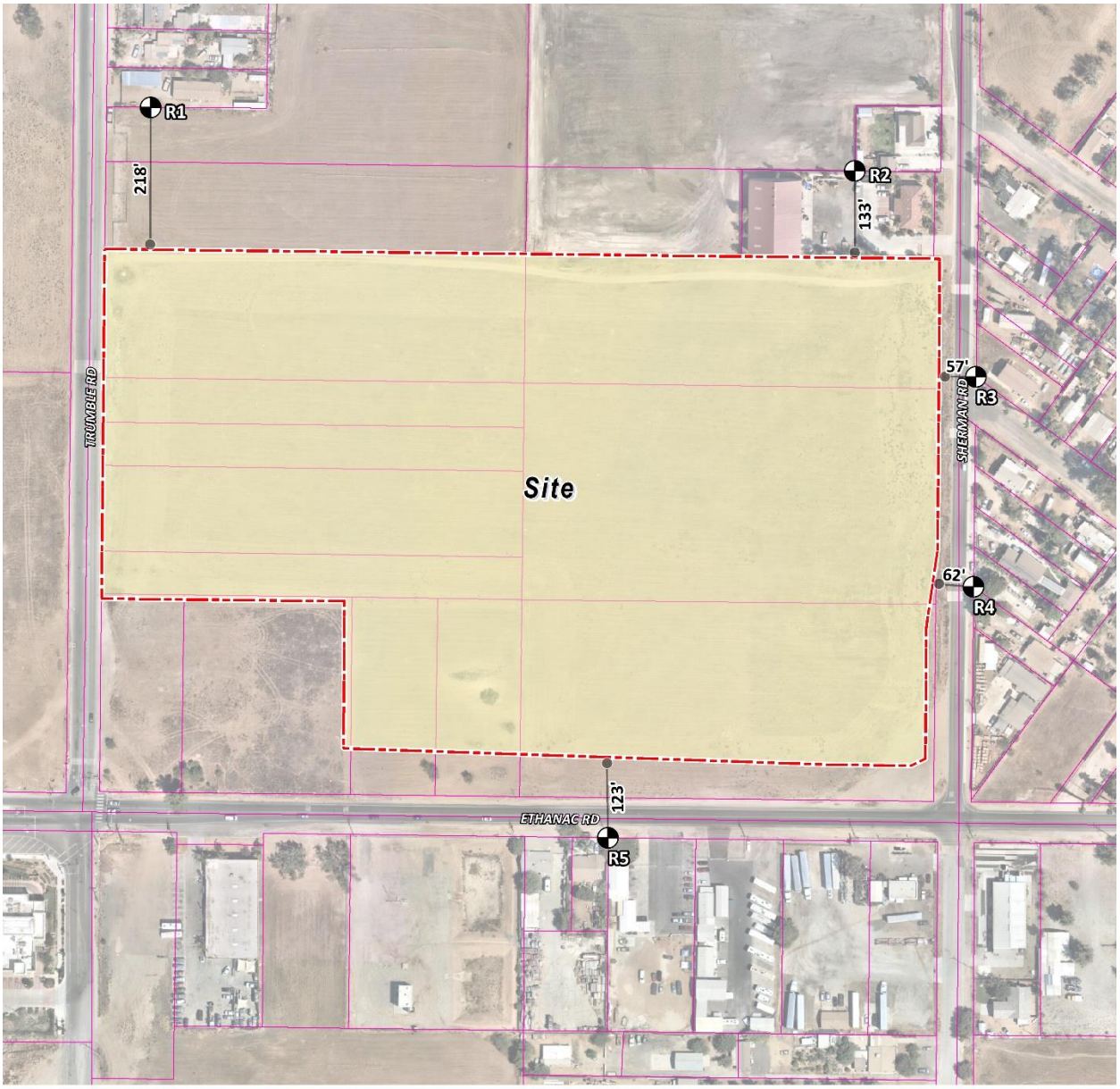
R2: Location R2 represents the property line of the existing noise sensitive residence at 3042 Sherman Road approximately 133 feet north of the Project site within the City of Perris. A 24-hour noise measurement was taken near this location, L2, to describe the existing ambient noise environment.

R3: Location R3 represents the property line of the existing noise sensitive residence at 25870 Tyler Avenue approximately 57 feet east of the Project site within the City of Perris. A 24-hour noise measurement was taken near this location, L3, to describe the existing ambient noise environment.

R4: Location R4 represents the property line of the existing noise sensitive residence at 25940 Sherman Road approximately 62 feet east of the Project site within the City of Perris. A 24-hour noise measurement was taken near this location, L4, to describe the existing ambient noise environment.

R5: Location R5 represents the property line of the existing noise sensitive residence at 27391 Ethanac Road, approximately 123 feet south of the Project site within the City of Menifee. A 24-hour noise measurement was taken near this location, L5, to describe the existing ambient noise environment.

EXHIBIT 8-A: SENSITIVE RECEIVER LOCATIONS



9 OPERATIONAL NOISE IMPACTS

This section analyzes the potential stationary-source operational noise impacts at the nearest receiver locations, identified in Section 8, resulting from the operation of the proposed Hillwood Ethanac Project. Exhibit 9-A identifies the representative noise source locations used to assess the operational noise levels. The operational noise analysis includes the planned 14-foot-high screen walls around the loading docks. The screen wall locations shown on Exhibit 9-A are designed for screening, privacy, noise control, and security.

9.1 OPERATIONAL NOISE SOURCES

This operational noise analysis is intended to describe noise level impacts associated with the expected typical of daytime and nighttime activities at the Project site. To present the potential worst-case noise conditions, this analysis assumes the Project warehouse use would be operational 24 hours per day, seven days per week. Consistent with similar warehouse and light industrial uses, the Project business operations would primarily be conducted within the enclosed buildings, except for traffic movement, parking, as well as loading and unloading of trucks at designated loading bays. The on-site Project-related noise sources are expected to include: cold storage loading dock activity, dry goods loading dock/tractor trailer parking, roof-top air conditioning units, trash enclosure activity, parking lot vehicle movements, and truck movements.

9.2 REFERENCE NOISE LEVELS

To estimate the Project operational noise impacts, reference noise level measurements were collected from similar types of activities to represent the noise levels expected with the development of the proposed Project. This section provides a detailed description of the reference noise level measurements shown on Table 9-1 used to estimate the Project operational noise impacts. Table 9-1 presents both the average hourly L_{eq} and the maximum permissible L_{max} reference noise levels. The average hour L_{eq} noise levels are used to calculate the 24-hour noise levels necessary to demonstrate compliance with the City of Perris 60 dBA CNEL exterior noise level standard for new industrial and large commercial facilities within 160 feet of the property line of existing noise-sensitive land uses. In addition, the average hourly L_{eq} noise levels are used to describe the Project related operational noise level increases.

The L_{max} reference noise levels shown on Table 9-1 are used to estimate the Project's maximum permissible exterior noise level consistent with the City's L_{max} noise level standards. It is important to note that the following projected noise levels assume the worst-case noise environment with the cold storage loading dock activity, dry goods loading dock/tractor trailer parking, roof-top air conditioning units, trash enclosure activity, parking lot vehicle movements, and truck movements all operating continuously. These sources of noise activity will likely vary throughout the day.

EXHIBIT 9-A: OPERATIONAL NOISE SOURCE LOCATIONS

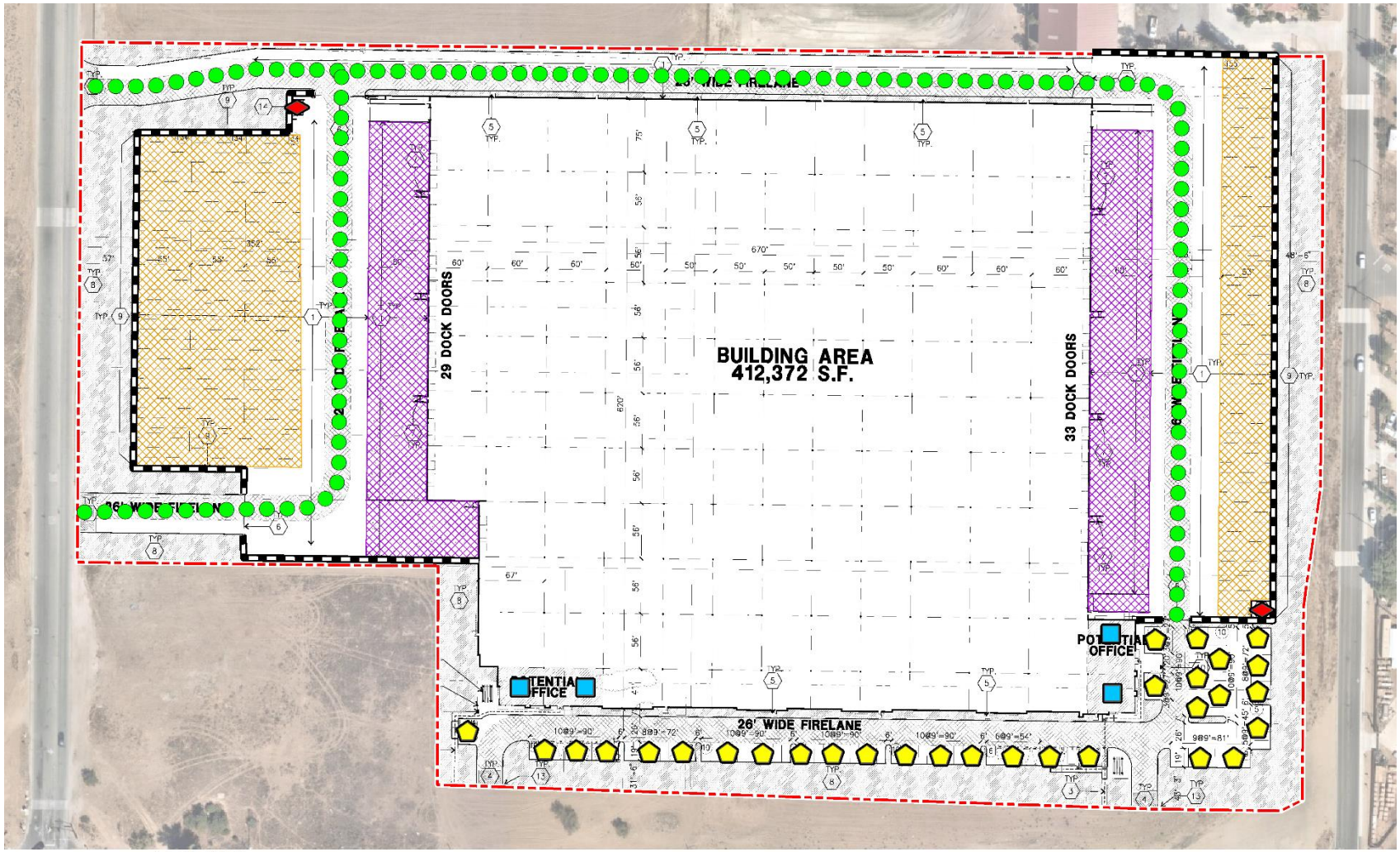


TABLE 9-1: REFERENCE NOISE LEVEL MEASUREMENTS

Noise Source[1]	Noise Source Height (Feet)	Min./Hour[2]		Reference Noise Level (dBA L_{eq})		Reference Noise Level (dBA L_{max})	
		Day	Night	@ Ref. Dist.	@ 50 Feet	@ Ref. Dist.	@ 50 Feet
Cold Storage Loading Dock Activity	8'	60	60	78.4	64.4	88.8	74.8
Dry Goods/Tractor Trailer Parking	8'	60	60	67.2	62.8	75.6	71.2
Roof-Top Air Conditioning Units	5'	39	28	77.2	57.2	77.7	57.7
Trash Enclosure Activity	5'	60	30	72.7	56.8	87.0	71.1
Parking Lot Vehicle Movements	5'	60	60	66.6	56.1	70.2	59.7
Truck Movements	8'	60'	60'	64.0	58.0	79.1	73.1

[1] As measured by Urban Crossroads, Inc.
[2] Anticipated duration (minutes within the hour) of noise activity during typical hourly conditions expected at the Project site. "Daytime" = 7:01 a.m. to 10:00 p.m.; "Nighttime" = 10:01 p.m. to 7:00 a.m.

9.2.1 MEASUREMENT PROCEDURES

The reference noise level measurements presented in this section were collected using a Larson Davis LxT Type 1 precisions sound level meter (serial number 01146). The LxT sound level meter was calibrated using a Larson-Davis calibrator, Model CAL 200, was programmed in "slow" mode to record noise levels in "A" weighted form and was located at approximately five feet above the ground elevation for each measurement. The sound level meters and microphones were equipped with a windscreen during all measurements. All noise level measurement equipment satisfies the American National Standards Institute (ANSI) standard specifications for sound level meters ANSI S1.4-2014/IEC 61672-1:2013. (17)

9.2.2 COLD STORAGE LOADING DOCK

The reference cold storage loading dock activities are intended to describe the typical operational noise activities associated with the Project. This includes truck idling, reefer activity (refrigerator truck/cold storage), deliveries, backup alarms, trailer docking including a combination of tractor trailer semi-trucks, two-axle delivery trucks, and background operation activities.

The reference loading dock activity noise level measurement was taken over a fourteen-minute period and represents multiple noise sources taken from the center of activity generating a reference noise level of 74.8 dBA L_{max} at a uniform reference distance of 50 feet. Specifically, the reference noise level measurement represents one truck located approximately 30 feet from the noise level meter with another truck passing by to park roughly 20 feet away, both with their engines idling. Throughout the reference noise level measurement, a separate docked and running reefer truck was located approximately 50 feet east of the measurement location. Additional background noise sources included truck pass-by noise, truck drivers talking to each other next to docked trucks, and air brake release noise when trucks parked.

9.2.3 DRY GOODS LOADING DOCK /TRACTOR TRAILER PARKING

The reference dry goods loading dock/tractor trailer parking activities are intended to describe the typical operational noise source levels associated with the Project. This includes truck idling, deliveries, backup alarms, unloading/loading, docking including a combination of tractor trailer semi-trucks, two-axle delivery trucks, and background forklift operations. To evaluate the noise levels associated with truck idling, backup alarms, trailer movements and storage activities, Urban Crossroads collected a reference noise level measurement at an existing parcel hub facility to describe the potential operational noise levels associated with Project tractor trailer parking activities. The measured reference noise level at 50 feet from activity was measured at 71.2 dBA L_{max}. The reference noise level measurement includes a semi-truck with trailer pass-by event, background switcher cab trailer towing, drop-off, idling, and backup alarm events.

9.2.4 ROOF-TOP AIR CONDITIONING UNITS

To assess the noise levels created by the roof-top air conditioning units, reference noise level measurements were collected from Lennox SCA120 series 10-ton model packaged air conditioning unit. At a uniform reference distance of 50 feet, the roof-top air conditioning units generate a reference noise level of 57.7 dBA L_{max}. Based on the typical operating conditions observed over a four-day measurement period, the roof-top air conditioning units are estimated to operate for and average 39 minutes per hour during the daytime hours, and 28 minutes per hour during the nighttime hours. For this noise analysis, the air conditioning units are expected to be located on the roof of the Project buildings.

9.2.5 TRASH ENCLOSURE ACTIVITY

To describe the noise levels associated with a trash enclosure activity, Urban Crossroads collected a reference noise level measurement at an existing trash enclosure containing two dumpster bins. The trash enclosure noise levels describe metal gates opening and closing, metal scraping against concrete floor sounds, dumpster movement on metal wheels, trash dropping into the metal dumpster. The reference noise levels describe trash enclosure noise activities when trash is dropped into an empty metal dumpster, as would occur at the Project site. The measured reference noise level at the uniform 50-foot reference distance is 71.1 dBA L_{max} and 56.8 dBA L_{eq} for the trash enclosure activity. The reference noise level describes the expected noise source activities associated with the trash enclosures for each of the Project buildings.

9.2.6 PARKING LOT VEHICLE MOVEMENTS

To describe the on-site parking lot activity a reference noise level of 59.7 dBA L_{max} at 50 feet is used. Parking activities are expected to take place during the full hour (60 minutes) throughout the daytime and evening hours. The parking lot noise levels are mainly due cars pulling in and out of parking spaces.

9.2.3 TRUCK MOVEMENTS

The truck movements reference noise level measurement was taken over a 15-minute period and represents multiple noise sources producing a reference noise level of 73.1 dBA L_{max} at 50

feet. The noise sources included at this measurement location account for the rattling and squeaking during normal opening and closing operations, the gate closure equipment, truck engines idling outside the entry gate, truck movements through the entry gate, and background truck court activities and forklift backup alarm noise.

9.3 CADNAA NOISE PREDICTION MODEL

To fully describe the exterior operational noise levels from the Project, Urban Crossroads, Inc. developed a noise prediction model using the CadnaA (Computer Aided Noise Abatement) computer program. CadnaA can analyze multiple types of noise sources using the spatially accurate Project site plan, georeferenced Nearmap aerial imagery, topography, buildings, and barriers in its calculations to predict outdoor noise levels. Using the ISO 9613-2 protocol, CadnaA will calculate the distance from each noise source to the noise receiver locations, using the ground absorption, distance, and barrier/building attenuation inputs to provide a summary of noise level at each receiver and the partial noise level contributions by noise source.

Consistent with the ISO 9613-2 protocol, the CadnaA noise prediction model relies on the reference sound power level (L_w) to describe individual noise sources. While sound pressure levels (e.g., L_{eq}) quantify in decibels the intensity of given sound sources at a reference distance, sound power levels (L_w) are connected to the sound source and are independent of distance. Sound pressure levels vary substantially with distance from the source and diminish because of intervening obstacles and barriers, air absorption, wind, and other factors. Sound power is the acoustical energy emitted by the sound source and is an absolute value that is not affected by the environment. The operational noise level calculations provided in this noise study account for the distance attenuation provided due to geometric spreading, when sound from a localized stationary source (i.e., a point source) propagates uniformly outward in a spherical pattern. A default ground attenuation factor of 0.5 was used in the noise analysis to account for mixed ground representing a combination of hard and soft surfaces. Appendix 9.1 includes the detailed noise dBA L_{max} model inputs including the planned 14-foot-high screen walls used to estimate the Project operational noise levels presented in this section.

9.4 PROJECT OPERATIONAL NOISE LEVELS

Using the reference noise levels to represent the proposed Project operations that include cold storage loading dock activity, dry goods loading dock/tractor trailer parking, roof-top air conditioning units, trash enclosure activity, parking lot vehicle movements, and truck movements, Urban Crossroads, Inc. calculated the operational source noise levels that are expected to be generated at the Project site and the Project-related noise level increases that would be experienced at each of the sensitive receiver locations. Table 9-2 shows the Project operational noise levels during the daytime hours of 7:01 a.m. to 10:00 p.m. The daytime hourly noise levels at the off-site receiver locations are expected to range from 54.8 to 62.2 dBA L_{max}.

TABLE 9-2: UNMITIGATED DAYTIME PROJECT OPERATIONAL NOISE LEVELS

Noise Source[1]	Operational Noise Levels by Receiver Location (dBA L_{max})				
	R1	R2	R3	R4	R5
Cold Storage Loading Dock Activity	59.0	56.6	60.8	60.7	41.7
Dry Goods/Tractor Trailer Parking	50.3	52.0	55.0	54.5	35.3
Roof-Top Air Conditioning Units	26.9	27.8	34.2	36.3	36.4
Trash Enclosure Activity	37.2	39.3	37.9	44.6	24.2
Parking Lot Vehicle Movements	22.9	28.2	39.9	52.1	54.5
Truck Movements	37.0	29.9	29.6	28.9	23.4
Total (All Noise Sources)	**59.6**	**58.0**	**61.9**	**62.2**	**54.8**

[1] See Exhibit 9-A for the noise source locations. CadnaA noise model calculations are included in Appendix 9.1.

Table 9-3 shows the Project operational noise levels during the nighttime hours of 10:01 p.m. to 7:00 a.m. The nighttime hourly noise levels at the off-site receiver locations are expected to range from 54.8 to 62.1 dBA L_{max}. The differences between the daytime and nighttime noise levels are largely related to the duration of noise activity (Table 9-1).

TABLE 9-3: UNMITIGATED NIGHTTIME PROJECT OPERATIONAL NOISE LEVELS

Noise Source[1]	Operational Noise Levels by Receiver Location (dBA L_{max})				
	R1	R2	R3	R4	R5
Cold Storage Loading Dock Activity	59.0	56.6	60.8	60.7	41.7
Dry Goods/Tractor Trailer Parking	50.3	52.0	55.0	54.5	35.3
Roof-Top Air Conditioning Units	24.5	25.4	31.8	33.9	33.9
Trash Enclosure Activity	33.2	35.3	33.9	40.6	20.2
Parking Lot Vehicle Movements	22.9	28.2	39.9	52.1	54.5
Truck Movements	37.0	29.9	29.6	28.9	23.4
Total (All Noise Sources)	**59.6**	**57.9**	**61.9**	**62.1**	**54.8**

[1] See Exhibit 9-A for the noise source locations. CadnaA noise model calculations are included in Appendix 9.1.

9.5 UNMITIGATED PROJECT OPERATIONAL NOISE LEVEL COMPLIANCE

To demonstrate compliance with local noise regulations, the Project-only operational noise levels are evaluated against exterior noise level thresholds based on the City of Perris exterior noise level standards at nearby noise-sensitive receiver locations. Table 9-4 shows the operational noise levels associated with Hillwood Ethanac Project will exceed the City of Perris 80 dBA L_{max} daytime and 60 dBA L_{max} nighttime exterior noise level standards at all nearby receiver locations east of the Project site (R3 and R4). Therefore, operational noise levels are considered *potentially significant* and noise mitigation measures are required to satisfy the City of Perris nighttime exterior noise level standards.

TABLE 9-4: UNMITIGATED OPERATIONAL NOISE LEVEL COMPLIANCE

Receiver Location[1]	Project Operational Noise Levels (dBA L_{max})[2]		Noise Level Standards (dBA L_{max})[3]		Noise Level Standards Exceeded?[4]	
	Daytime	Nighttime	Daytime	Nighttime	Daytime	Nighttime
R1	59.6	59.6	80	60	No	No
R2	58.0	57.9	80	60	No	No
R3	61.9	61.9	80	60	No	**Yes**
R4	62.2	62.1	80	60	No	**Yes**
R5	54.8	54.8	80	60	No	No

[1] See Exhibit 8-A for the receiver locations.
[2] Proposed Project operational noise levels as shown on Tables 9-2 and 9-3.
[3] Exterior noise level standards per the City of Perris Municipal Code, sections 7.34.040 (Appendix 3.1).
[4] Do the estimated Project operational noise source activities exceed the noise level standards?
"Daytime" = 7:01 a.m. to 10:00 p.m.; "Nighttime" = 10:01 p.m. to 7:00 a.m.

9.6 PROJECT OPERATIONAL NOISE MITIGATION MEASURES

To satisfy the City of Perris nighttime exterior noise level standards the Project shall provide the following operational noise mitigation measures as shown on Exhibit 9-B.

- Provide the planned 14-foot-high screen walls around the loading docks.
- Restrict all cold storage activity within the eastern loading dock area.

9.7 MITIGATED PROJECT OPERATIONAL NOISE LEVELS

. Table 9-5 shows the mitigated Project operational noise levels during the daytime hours of 7:00 a.m. to 10:00 p.m. The daytime hourly noise levels at the off-site receiver locations are expected to range from 53.9 to 59.6 dBA L_{max}.

TABLE 9-5: MITIGATED DAYTIME PROJECT OPERATIONAL NOISE LEVELS

Noise Source[1]	Operational Noise Levels by Receiver Location (dBA L_{max})				
	R1	R2	R3	R4	R5
Cold Storage Loading Dock Activity	59.0	36.6	34.7	34.7	37.9
Dry Goods/Tractor Trailer Parking	50.3	53.6	57.0	56.6	36.8
Roof-Top Air Conditioning Units	26.9	27.8	34.2	36.3	36.4
Trash Enclosure Activity	37.2	39.3	37.9	44.6	24.2
Parking Lot Vehicle Movements	22.9	28.2	39.9	52.1	54.5
Truck Movements	37.0	29.9	29.6	28.9	23.4
Total (All Noise Sources)	**59.6**	**53.9**	**57.2**	**58.2**	**54.7**

[1] See Exhibit 9-A for the noise source locations. CadnaA noise model calculations are included in Appendix 9.1.

Table 9-6 shows the mitigated Project operational noise levels during the nighttime hours of 10:00 p.m. to 7:00 a.m. The nighttime hourly noise levels at the off-site receiver locations are

expected to range from 53.8 to 59.6 dBA L_{max}. Appendix 9.2 includes the detailed noise model inputs used to estimate the mitigated Project operational noise levels.

TABLE 9-6: MITIGATED NIGHTTIME PROJECT OPERATIONAL NOISE LEVELS

Noise Source[1]	Operational Noise Levels by Receiver Location (dBA L_{max})				
	R1	R2	R3	R4	R5
Cold Storage Loading Dock Activity	59.0	36.6	34.7	34.7	37.9
Dry Goods/Tractor Trailer Parking	50.3	53.6	57.0	56.6	36.8
Roof-Top Air Conditioning Units	24.5	25.4	31.8	33.9	33.9
Trash Enclosure Activity	33.2	35.3	33.9	40.6	20.2
Parking Lot Vehicle Movements	22.9	28.2	39.9	52.1	54.5
Truck Movements	37.0	29.9	29.6	28.9	23.4
Total (All Noise Sources)	**59.6**	**53.8**	**57.1**	**58.0**	**54.7**

[1] See Exhibit 9-A for the noise source locations. CadnaA noise model calculations are included in Appendix 9.1.

9.8 MITIGATED PROJECT OPERATIONAL NOISE LEVEL COMPLIANCE

To demonstrate compliance with local noise regulations, the Project-only operational noise levels are evaluated against exterior noise level thresholds based on the City of Perris exterior noise level standards at nearby noise-sensitive receiver locations. Table 9-7 shows that with no cold storage activity in the eastern loading dock area, the mitigated nighttime operational noise levels associated with the Hillwood Ethanac Project will not exceed the City of Perris nighttime 60 dBA L_{max} exterior noise level standards at the nearest sensitive receiver locations. Therefore, the operational noise impacts are considered *less than significant* at the nearby noise-sensitive receiver locations.

TABLE 9-7: MITIGATED OPERATIONAL NOISE LEVEL COMPLIANCE

Receiver Location[1]	Project Operational Noise Levels (dBA L_{max})[2]		Noise Level Standards (dBA L_{max})[3]		Noise Level Standards Exceeded?[4]	
	Daytime	Nighttime	Daytime	Nighttime	Daytime	Nighttime
R1	59.6	59.6	80	60	No	No
R2	53.9	53.8	80	60	No	No
R3	57.2	57.1	80	60	No	No
R4	58.2	58.0	80	60	No	No
R5	54.7	54.7	80	60	No	No

[1] See Exhibit 8-A for the receiver locations.
[2] Proposed Project operational noise levels as shown on Tables 9-2 and 9-3.
[3] Exterior noise level standards per the City of Perris Municipal Code, sections 7.34.040 (Appendix 3.1).
[4] Do the estimated Project operational noise source activities exceed the noise level standards?
"Daytime" = 7:01 a.m. to 10:00 p.m.; "Nighttime" = 10:01 p.m. to 7:00 a.m.

Consistent with the City of Perris General Plan Noise Element, Implementation Measure V.A.1, Project operational noise levels at the nearest sensitive receiver locations cannot exceed 60 dBA CNEL. The CNEL metric is typically used to describe 24-hour transportation-related noise levels, however, the City of Perris General Plan Noise Element requires new industrial facilities and large commercial facilities to demonstrate compliance at any noise-sensitive land use within 160 feet of the Project site.

The CNEL is the weighted average of the intensity of a sound, with corrections for time of day, and averaged over 24 hours. The time-of-day corrections require the addition of 5 decibels to dBA L_{eq} sound levels in the evening from 7:00 p.m. to 10:00 p.m., and the addition of 10 decibels to dBA L_{eq} sound levels at night between 10:00 p.m. and 7:00 a.m. These additions are made to account for the noise sensitive time periods during the evening and night hours when noise can become more intrusive particularly for noise sensitive residential land use. CNEL does not represent the actual sound level heard at any time, but rather represents the total sound exposure.

Table 9-8 includes the evening and nighttime adjustments made to the operational noise levels during the applicable hours to convert the hourly operational noise levels (L_{eq}) to 24-hour CNELs. Table 9-8 indicates that the 24-hour noise levels associated with the Hillwood Ethanac at the nearest receiver locations are expected to range from 47.2 to 57.0 dBA CNEL. The Project-related operational noise levels shown on Table 7-5 will not exceed the City of Perris 60 dBA CNEL exterior noise level standards at the nearest receiver locations. The 24-hour noise level calculations are included in Appendix 9.3.

TABLE 9-8: MITIGATED OPERATIONAL NOISE LEVEL COMPLIANCE (CNEL)

Receiver Location[1]	Project Operational Noise Levels[2]			Exterior Noise Level Standards (CNEL)[3]	Noise Level Standards Exceeded?[4]
	Daytime (dBA L_{eq})	Nighttime (dBA L_{eq})	24-Hour (CNEL)		
R1	51.5	51.5	58.2	60	No
R2	45.7	45.7	52.3	60	No
R3	49.3	49.2	55.9	60	No
R4	51.6	51.6	58.2	60	No
R5	51.1	51.0	57.7	60	No

[1] See Exhibit 8-A for the receiver locations.
[2] Proposed Project operational noise level calculations are included in Appendix 9.3.
[3] City of Perris General Plan Noise Element Implementation Measure V.A.1
[4] Do the estimated Project operational noise source activities exceed the noise level standards?
"Daytime" = 7:01 a.m. to 10:00 p.m.; "Nighttime" = 10:01 p.m. to 7:00 a.m.

9.9 MITIGATED PROJECT OPERATIONAL NOISE LEVEL INCREASES (LEQ)

To describe the Project operational noise level increases, the Project operational noise levels are combined with the existing ambient noise levels measurements for the nearby receiver locations potentially impacted by Project operational noise sources. Since the units used to measure noise, decibels (dB), are logarithmic units, the Project-operational and existing ambient noise levels cannot be combined using standard arithmetic equations. (2) Instead, they must be logarithmically added using the following base equation:

$$SPL_{Total} = 10\log_{10}[10^{SPL1/10} + 10^{SPL2/10} + \ldots 10^{SPLn/10}]$$

Where "SPL1," "SPL2," etc. are equal to the sound pressure levels being combined, or in this case, the Project-operational and existing ambient noise levels. The difference between the combined Project and ambient noise levels describes the Project noise level increases to the existing ambient noise environment. Noise levels that would be experienced at receiver locations when Project-source noise is added to the daytime and nighttime ambient conditions are presented on Tables 9-9 and 9-10, respectively. As indicated on Tables 9-9, the Project will generate a daytime operational noise level increases ranging from 0.1 to 1.0 dBA L_{eq} at the nearest receiver locations. Table 9-9 shows that the Project will generate a nighttime operational noise level increases ranging from 0.2 to 1.0 dBA L_{eq} at the nearest receiver locations. Appendix 9.3 includes the detailed noise dBA L_{eq} model inputs including the planned 14-foot-high screen walls and the no cold storage restriction for the eastern loading dock area.

The Project-related operational noise level increases will not exceed the operational noise level increase significance criteria presented in Table 4-1, and the increases at the sensitive receiver locations will be *less than significant.*

EXHIBIT 9-B: OPERATIONAL NOISE MITIGATION MEASURES

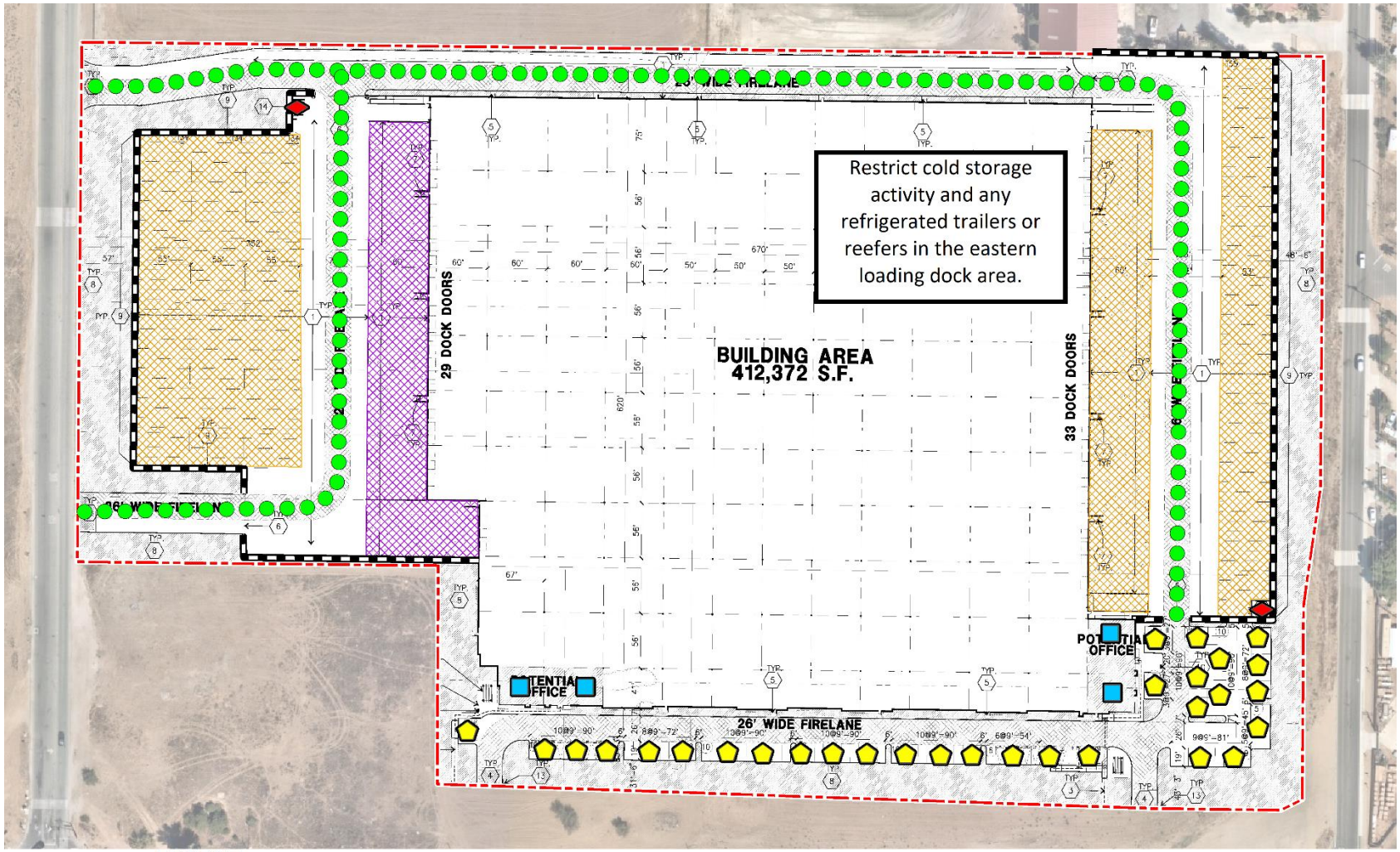


TABLE 9-9: MITIGATED DAYTIME PROJECT OPERATIONAL NOISE LEVEL INCREASES (LEQ)

Receiver Location[1]	Total Project Operational Noise Level[2]	Measurement Location[3]	Reference Ambient Noise Levels[4]	Combined Project and Ambient[5]	Project Increase[6]	Noise Sensitive Land Use?	Increase Criteria[7]	Increase Criteria Exceeded?[7]
R1	51.5	L1	65.2	65.4	0.2	Yes	1.5	No
R2	45.7	L2	51.8	52.8	1.0	Yes	5.0	No
R3	49.3	L3	64.1	64.2	0.1	Yes	5.0	No
R4	51.6	L4	58.4	59.2	0.8	Yes	5.0	No
R5	51.1	L5	68.2	68.3	0.1	Yes	1.5	No

[1] See Exhibit 8-A for the receiver locations.
[2] Total Project daytime operational noise levels as shown on Table 9-8.
[3] Reference noise level measurement locations as shown on Exhibit 5-A.
[4] Observed daytime ambient noise levels as shown on Table 5-1.
[5] Represents the combined ambient conditions plus the Project activities.
[6] The noise level increase expected with the addition of the proposed Project activities.
[7] Significance increase criteria as shown on Table 4-1.

TABLE 9-10: MITIGATED NIGHTTIME OPERATIONAL NOISE LEVEL INCREASES (LEQ)

Receiver Location[1]	Total Project Operational Noise Level[2]	Measurement Location[3]	Reference Ambient Noise Levels[4]	Combined Project and Ambient[5]	Project Increase[6]	Noise Sensitive Land Use?	Increase Criteria[7]	Increase Criteria Exceeded?[7]
R1	51.5	L1	62.0	62.4	0.4	Yes	5.0	No
R2	45.7	L2	51.9	52.8	0.9	Yes	5.0	No
R3	49.2	L3	62.8	63.0	0.2	Yes	5.0	No
R4	51.6	L4	57.7	58.7	1.0	Yes	5.0	No
R5	51.0	L5	65.3	65.5	0.2	Yes	1.5	No

[1] See Exhibit 8-A for the receiver locations.
[2] Total Project nighttime operational noise levels as shown on Table 9-8.
[3] Reference noise level measurement locations as shown on Exhibit 5-A.
[4] Observed nighttime ambient noise levels as shown on Table 5-1.
[5] Represents the combined ambient conditions plus the Project activities.
[6] The noise level increase expected with the addition of the proposed Project activities.
[7] Significance increase criteria as shown on Table 4-1.

This page intentionally left blank

10 CONSTRUCTION IMPACTS

This section analyzes potential impacts resulting from the short-term construction activities associated with the development of the Project. Exhibit 10-A shows the on-site construction noise source activity including the site adjacent off-site roadway improvement locations in relation to the nearest sensitive receiver locations previously described in Section 8.

It is expected that the off-site construction activities would not take place at one location for the entire duration of construction. Construction noise from this off-site work would, therefore, be relatively short term and the noise levels would be reduced as construction work moves linearly along the existing public right-of-way and farther from sensitive uses. To prevent high levels of construction noise from impacting noise-sensitive land uses, City of Perris Municipal Code Section 7.34.060 limits construction activities to the hours of 7:00 a.m. to 7:00 p.m. on any day except Sundays and legal holidays (with the exception of Columbus Day and Washington's birthday).

10.1 CONSTRUCTION NOISE LEVELS

Noise generated by the Project construction equipment will include a combination of trucks, power tools, concrete mixers, and portable generators that when operating at the project site boundaries closest the nearest sensitive receiver locations can reach high levels. The number and mix of construction equipment are expected to occur in the following stages:

- Site Preparation
- Grading
- Building Construction
- Architectural Coating
- Paving
- Landscaping

10.2 CONSTRUCTION REFERENCE NOISE LEVELS

This construction noise analysis was prepared using reference construction equipment noise levels from the Federal Highway Administration (FHWA) published the Roadway Construction Noise Model (RCNM), which includes a national database of construction equipment reference noise emission levels. (22) The RCNM equipment database, provides a comprehensive list of the noise generating characteristics for specific types of construction equipment including reference L_{max} noise levels measured at 50 feet.

Noise levels generated by heavy construction equipment can range from approximately 68 dBA to more than 85 dBA L_{max} when measured at 50 feet. However, these noise levels diminish with distance from the construction site at a rate of 6 dBA per doubling of distance. For example, a noise level of 85 dBA L_{max} measured at 50 feet from the noise source to the receiver would be reduced to 79 dBA L_{max} at 100 feet from the source to the receiver and would be further reduced to 73 dBA L_{max} at 200 feet from the source to the receiver. Table 10-1 provides a summary of the construction reference noise levels expected with the Project construction activities.

EXHIBIT 10-A: CONSTRUCTION NOISE SOURCE LOCATIONS

TABLE 10-1: CONSTRUCTION REFERENCE NOISE LEVELS

Construction Stage	Construction Activity	Reference Noise Level @ 50 Feet (dBA L_{max})[1]	Highest Reference Noise Level (dBA L_{max})
Site Preparation	Crawler Tractors	82	82
	Rubber Tired Dozers	79	
Grading	Crawler Tractors	82	85
	Excavators	81	
	Graders	85	
	Rubber Tired Dozers	79	
	Scrapers	84	
Building Construction	Cranes	81	85
	Forklifts	85	
	Generator Sets	73	
	Backhoes	78	
	Welders	74	
Arch. Coating	Air Compressors	78	78
Paving	Pavers	77	85
	Paving Equipment	85	
	Rollers	80	
Landscaping	Cranes	81	85
	Forklifts	85	
	Backhoes	78	
	Welders	74	

[1] FHWA's Roadway Construction Noise Model, January 2006.

10.3 CONSTRUCTION NOISE ANALYSIS

Using the reference RCNM L_{max} construction equipment noise levels and the CadnaA noise prediction model, calculations of the Project construction noise level impacts with multiple pieces of equipment operating simultaneously at the nearest receiver locations were completed. To assess the worst-case construction noise levels, the Project construction noise analysis relies on the highest noise level impacts when the equipment with the highest reference noise level is operating at the closest point from the edge of primary construction activity (Project site boundary) to each receiver location.

As shown on Table 10-2, the construction noise levels are expected to range from 54.2 to 79.6 dBA L_{max} at the nearby receiver locations. Appendix 10.1 includes the detailed CadnaA construction noise model inputs.

TABLE 10-2: UNMITIGATED CONSTRUCTION EQUIPMENT NOISE LEVEL SUMMARY

Receiver Location[1]	Highest Construction Noise Levels (dBA L_{max})						
	Site Preparation	Grading	Building Construction	Arch. Coating	Paving	Landscaping	Highest Levels[2]
R1	58.2	61.2	61.2	54.2	61.2	61.2	61.2
R2	71.0	74.0	74.0	67.0	74.0	74.0	74.0
R3	76.5	79.5	79.5	72.5	79.5	79.5	79.5
R4	76.6	79.6	79.6	72.6	79.6	79.6	79.6
R5	70.6	73.6	73.6	66.6	73.6	73.6	73.6

[1] Construction noise source and receiver locations are shown on Exhibit 10-A.
[2] Construction noise level calculations based on distance from the construction activity area to nearby receiver locations. CadnaA construction noise model inputs are included in Appendix 10.1.

10.4 CONSTRUCTION NOISE LEVEL COMPLIANCE

To demonstrate compliance with local noise regulations, the Project-only construction noise levels are evaluated against exterior noise level thresholds established by Section 7.34.060 of City of Perris Municipal Code at the adjacent property line. As shown on Table 10-3, the estimated construction noise levels at the adjacent noise sensitive receiver locations will satisfy the 80 dBA L_{max} construction noise level standard. Therefore, the unmitigated noise impact due to Project construction activities is considered *less than significant* at all receiver locations.

TABLE 10-3: UNMITIGATED CONSTRUCTION NOISE LEVEL COMPLIANCE

Receiver Location[1]	Construction Noise Levels (dBA L_{max})		
	Highest Construction Noise Levels[2]	Threshold[3]	Threshold Exceeded?[4]
R1	61.2	80	No
R2	74.0	80	No
R3	79.5	80	No
R4	79.6	80	No
R5	73.6	80	No

[1] Construction noise source and receiver locations are shown on Exhibit 10-A.
[2] Highest construction noise level calculations based on distance from the construction noise source activity to nearby receiver locations as shown on Table 10-2.
[3] Construction noise level thresholds are limited to the noise sensitive receiver locations (Section 3.5).
[4] Do the estimated Project construction noise levels exceed the construction noise level threshold?

10.5 NIGHTTIME CONCRETE POUR NOISE ANALYSIS

It is our understanding that nighttime concrete pouring activities will occur as a part of Project building construction activities. Nighttime concrete pouring activities are often used to support reduced concrete mixer truck transit times and lower air temperatures than during the daytime hours and are generally limited to the actual building pad and loading dock areas as shown on Exhibit 10-B. Since the nighttime concrete pours will take place outside the permitted City of Perris Municipal Code Section 7.34.060 hours of 7:00 a.m. to 7:00 p.m. on any day except Sundays

and legal holidays (with the exception of Columbus Day and Washington's birthday), the Project Applicant will be required to obtain authorization for nighttime work from the City of Perris.

EXHIBIT 10-B: NIGHTTIME CONCRETE POUR CONSTRUCTION ACTIVITY

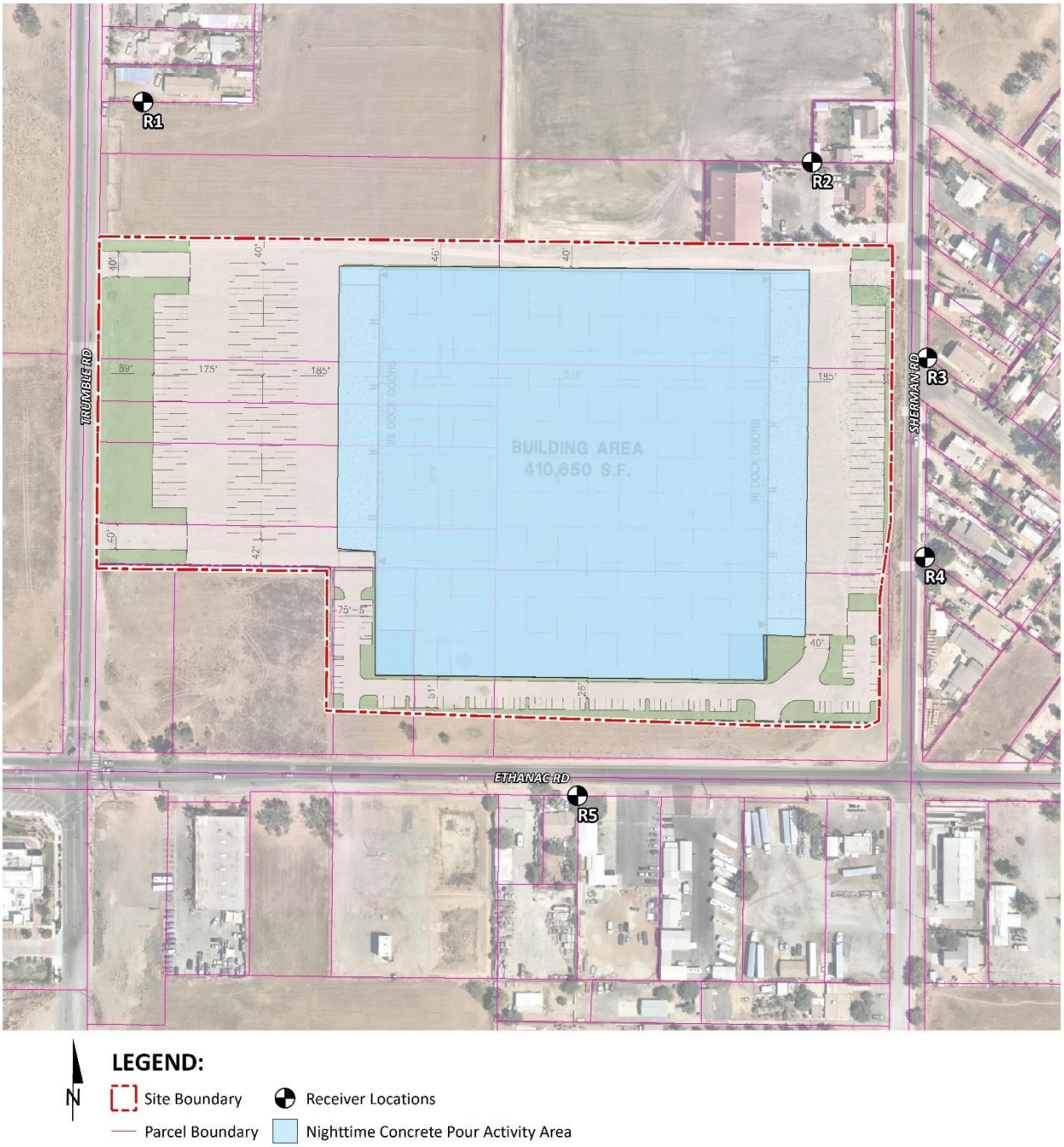


Table 10-4 shows the concrete pour activities noise levels will range from 49.2 to 59.5 dBA L_{max} at the nearby receiver locations. With prior authorization from the City of Perris, the nighttime concrete pour activities will satisfy the 60 dBA L_{max} operational noise level standard in Section

7.34.040. Therefore, the nighttime concrete pour noise levels are considered *less than significant* at the nearby noise-sensitive receiver locations.

TABLE 10-4: NIGHTTIME CONCRETE POUR NOISE LEVEL COMPLIANCE

Receiver Location[1]	Construction Noise Levels (dBA L_{max})		
	Exterior Noise Levels[2]	Threshold[3]	Threshold Exceeded?[4]
R1	49.2	60	No
R2	57.4	60	No
R3	59.1	60	No
R4	59.5	60	No
R5	59.2	60	No

[1] Noise receiver locations are shown on Exhibit 10-A.
[2] Nighttime Concrete Pour noise model inputs are included in Appendix 10.3.
[3] City of Perris Municipal Code, Section 7.34.040 (Appendix 3.1).
[4] Do the estimated Project construction noise levels exceed the construction noise level threshold?

10.6 CONSTRUCTION VIBRATION ANALYSIS

Construction activity can result in varying degrees of ground vibration, depending on the equipment and methods employed. Operation of construction equipment causes ground vibrations that spread through the ground and diminish in strength with distance. Ground vibration levels associated with various types of construction equipment are summarized on Table 10-5. Based on the representative vibration levels presented for various construction equipment types, it is possible to estimate the potential for human response (annoyance) and building damage using the following vibration assessment methods defined by the FTA. To describe the vibration impacts the FTA provides the following equation: $PPV_{equip} = PPV_{ref} \times (25/D)^{1.5}$

TABLE 10-5: VIBRATION SOURCE LEVELS FOR CONSTRUCTION EQUIPMENT

Equipment	PPV (in/sec) at 25 feet
Small bulldozer	0.003
Jackhammer	0.035
Loaded Trucks	0.076
Large bulldozer	0.089
Vibratory Roller	0.210

Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual

Using the vibration source level of construction equipment provided on Table 10-5 and the construction vibration assessment methodology published by the FTA, it is possible to estimate

the Project vibration building damage impacts. Table 10-6 presents the expected Project related vibration levels at the nearby building structure locations. At distances ranging from 57 to 218 feet from the Project construction boundary to the receiver building locations, construction vibration velocity levels are estimated to be between 0.008 and 0.061 PPV (in/sec). Based on maximum acceptable continuous vibration threshold of 0.3 PPV (in/sec), the typical Project construction vibration levels will fall below the building damage thresholds at all the noise sensitive receiver locations. Therefore, the Project-related vibration impacts are considered *less than significant* during typical construction activities at the Project site.

In addition, the typical construction vibration levels are unlikely to be sustained during the entire construction period but will occur rather only during the times that heavy construction equipment is operating.

TABLE 10-6: CONSTRUCTION EQUIPMENT VIBRATION LEVELS

Location[1]	Distance to Const. Activity (Feet)[2]	Typical Construction Vibration Levels PPV (in/sec)[3]						Thresholds PPV (in/sec)[4]	Thresholds Exceeded?[5]
		Small bulldozer	Jackhammer	Loaded Trucks	Large bulldozer	Vibratory Roller	Highest Vibration Level		
R1	218'	0.000	0.001	0.003	0.003	0.008	0.008	0.3	No
R2	133'	0.000	0.003	0.006	0.007	0.017	0.017	0.3	No
R3	57'	0.001	0.010	0.022	0.026	0.061	0.061	0.3	No
R4	62'	0.001	0.009	0.019	0.023	0.054	0.054	0.3	No
R5	123'	0.000	0.003	0.007	0.008	0.019	0.019	0.3	No

[1] Construction noise source and receiver locations are shown on Exhibit 10-A.
[2] Distance from receiver building facade to Project construction boundary (Project site boundary).
[3] Based on the Vibration Source Levels of Construction Equipment (Table 10-5).
[4] Caltrans Transportation and Construction Vibration Guidance Manual, April 2020, Table 19, p. 38.
[5] Does the peak vibration exceed the acceptable vibration thresholds?
"PPV" = Peak Particle Velocity

This page intentionally left blank

11 REFERENCES

1. **California Natural Resources Agency.** *2023 California Environmental Quality Act (CEQA) Statue and Guidelines.* s.l. : Association of Environmental Professionals.
2. **California Department of Transportation.** *Technical Noise Supplement - A Technical Supplement to the Traffic Noise Analysis Protocol.* Sacramento, CA : s.n., September 2013.
3. **U.S. Environmental Protection Agency Office of Noise Abatement and Control.** *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety.* March 1974. EPA/ONAC 550/9/74-004.
4. **U.S. Department of Transportation, Federal Highway Administration, Office of Environment and Planning, Noise and Air Quality Branch.** *Highway Traffic Noise Analysis and Abatement Policy and Guidance.* December 2011.
5. **U.S. Department of Transportation Federal Highway Administration.** *Highway Noise Barrier Design Handbook.* 2001.
6. **U.S. Department of Transportation, Federal Highway Administration.** *Highway Traffic Noise in the United States, Problem and Response.* April 2000. p. 3.
7. **U.S. Environmental Protection Agency Office of Noise Abatement and Control.** *Noise Effects Handbook-A Desk Reference to Health and Welfare Effects of Noise.* October 1979 (revised July 1981). EPA 550/9/82/106.
8. **U.S. Department of Transportation, Federal Transit Administration.** *Transit Noise and Vibration Impact Assessment Manual.* September 2018.
9. **Office of Planning and Research.** *State of California General Plan Guidelines.* 2019.
10. **City of Perris.** *General Plan Noise Element.* August 2005.
11. —. *Municipal Code, Chapter 7.34 Noise Control.*
12. **California Department of Transportation.** *Transportation and Construction Vibration Guidance Manual.* April 2020.
13. **Riverside County Airport Land Use Commission.** *March Air Reserve Base/Inland Port Airport Land Use Compatibility Plan.* November 2014.
14. **Urban Crossroads, Inc.** *Ramona Gate Noise Impact Analysis Comments.* May 2022.
15. **Federal Interagency Committee on Noise.** *Federal Agency Review of Selected Airport Noise Analysis Issues.* August 1992.
16. **California Court of Appeal.** *Gray v. County of Madera, F053661.* 167 Cal.App.4th 1099; - Cal.Rptr.3d, October 2008.
17. **California Department of Transportation.** *Technical Noise Supplement.* November 2009.
18. **American National Standards Institute (ANSI).** *Specification for Sound Level Meters ANSI S1.4-2014/IEC 61672-1:2013.*
19. **U.S. Department of Transportation, Federal Highway Administration.** *FHWA Highway Traffic Noise Prediction Model.* December 1978. FHWA-RD-77-108.
20. **California Department of Transportation Environmental Program, Office of Environmental Engineering.** *Use of California Vehicle Noise Reference Energy Mean Emission Levels (Calveno REMELs) in FHWA Highway Traffic Noise Prediction.* September 1995. TAN 95-03.

21. **California Department of Transportation.** *Traffic Noise Attenuation as a Function of Ground and Vegetation Final Report.* June 1995. FHWA/CA/TL-95/23.

22. **Urban Crossroads, Inc.** *Hillwood Ethanac Traffic Analysis.* January 2022.

23. **U.S. Department of Transportation, Federal Highway Administration, Office of Environment and Planning.** *FHWA Roadway Construction Noise Model.* January, 2006.

12 CERTIFICATION

The contents of this noise study report represent an accurate depiction of the noise environment and impacts associated with the proposed Hillwood Ethanac Project. The information contained in this noise study report is based on the best available data at the time of preparation. If you have any questions, please contact me directly at (949) 584-3148.

Bill Lawson, P.E., INCE
Principal
URBAN CROSSROADS, INC.
1133 Camelback #8329
Newport Beach, CA 92658
(949) 581-3148
blawson@urbanxroads.com

EDUCATION

Master of Science in Civil and Environmental Engineering
California Polytechnic State University, San Luis Obispo • December, 1993

Bachelor of Science in City and Regional Planning
California Polytechnic State University, San Luis Obispo • June, 1992

PROFESSIONAL REGISTRATIONS

PE – Registered Professional Traffic Engineer – TR 2537 • January, 2009
AICP – American Institute of Certified Planners – 013011 • June, 1997–January 1, 2012
PTP – Professional Transportation Planner • May, 2007 – May, 2013
INCE – Institute of Noise Control Engineering • March, 2004

PROFESSIONAL AFFILIATIONS

ASA – Acoustical Society of America
ITE – Institute of Transportation Engineers

PROFESSIONAL CERTIFICATIONS

Certified Acoustical Consultant – County of San Diego • March, 2018
Certified Acoustical Consultant – County of Orange • February, 2011
FHWA-NHI-142051 Highway Traffic Noise Certificate of Training • February, 2013

This page intentionally left blank

APPENDIX 3.1:

CITY OF PERRIS MUNICIPAL CODE

This page intentionally left blank

CHAPTER 7.34. - NOISE CONTROL

Sec. 7.34.010. - Declaration of policy.

Excessive noise levels are detrimental to the health and safety of individuals. Noise is considered a public nuisance, and the city discourages unnecessary, excessive or annoying noises from all sources. Creating, maintaining, causing, or allowing to be created, caused or maintained, any noise or vibration in a manner prohibited by the provisions of the ordinance codified in this chapter is a public nuisance and shall be punishable as a misdemeanor.

(Code 1972, § 7.34.010; Ord. No. 1082, § 2(part), 2000)

Sec. 7.34.020. - Definitions.

(a) *General.* The following words, terms and phrases, when used in this chapter, shall have the meanings ascribed to them in this section, except where the context clearly indicates a different meaning:

Ambient noise means the all-encompassing noise associated with a given environment usually being composed of sounds from many sources near and far. For the purpose of this chapter, ambient noise level is the level obtained when the noise level is averaged over a period of five minutes without inclusion of noise from isolated identifiable sources at the location and time of day near that at which a comparison is to be made.

Decibel (dB) means an intensity unit which denotes the ratio between two quantities which are proportional to power; the number of decibels corresponding to the ratio is ten times the common logarithm of this ratio.

Sound amplifying equipment means any machine or device for the amplification of the human voice, music or any other sound. The term "sound amplifying equipment" does not include standard vehicle radios when used and heard only by the occupants of the vehicle in which the vehicle radio is installed. The term "sound amplifying equipment," as used in this chapter, does not include warning devices on any vehicle used only for traffic safety purposes and shall not include communications equipment used by public or private utilities when restoring utility service following a public emergency or when doing work required to protect person or property from an imminent exposure to danger.

Sound level (noise level) in decibels is the value of a sound measurement using the "A" weighting network of a sound level meter. Slow response of the sound level meter needle shall be used except where the sound is impulsive or rapidly varying in nature, in which case, fast response shall be used.

Sound level meter means an instrument, including a microphone, an amplifier, an output meter and frequency weighting networks, for the measurement of sound levels, which satisfies the pertinent requirements in American National Standards Institute's specification S1.4-1971 or the most recent revision for type S-2A general purpose sound level meters.

(b) *Supplementary definitions of technical terms.* Definitions of technical terms not defined in this section shall be obtained from the American National Standards Institute's Acoustical Terminology S1-1971 or the most recent revision thereof.

(Code 1972, § 7.34.020; Ord. No. 1082, § 2(part), 2000)

Sec. 7.34.030. - Measurement methods.

(a) Sound shall be measured with a sound level meter as defined in section 7.34.020.

(b) Unless otherwise provided, outdoor measurements shall be taken with the microphone located at any point on the property line of the noise source but no closer than five feet from any wall or vertical obstruction and three to five feet above ground level whenever possible.

(c) Unless otherwise provided, indoor measurements shall be taken inside the structure with the microphone located at any point as follows:

(1) No less than three feet above floor level;

(2) No less than five feet from any wall or vertical obstruction; and

(3) Not under common possession and control with the building or portion of the building from which the sound is emanating.

(Code 1972, § 7.34.030; Ord. No. 1082, § 2(part), 2000)

Sec. 7.34.040. - Sound amplification.

No person shall amplify sound using sound amplifying equipment contrary to any of the following:

(1) The only amplified sound permitted shall be either music or the human voice, or both.

(2) The volume of amplified sound shall not exceed the noise levels set forth in this subsection when measured outdoors at or beyond the property line of the property from which the sound emanates.

Time Period	Maximum Noise Level
10:01 p.m.—7:00 a.m.	60 dBA
7:01 a.m.—10:00 p.m.	80 dBA

(Code 1972, § 7.34.040; Ord. No. 1082, § 2(part), 2000)

Sec. 7.34.050. - General prohibition.

(a) It unlawful for any person to willfully make, cause or suffer, or permit to be made or caused, any loud excessive or offensive noises or sounds which unreasonably disturb the peace and quiet of any residential neighborhood or which are physically annoying to persons of ordinary sensitivity or which are so harsh, prolonged or unnatural or unusual in their use, time or place as to occasion physical discomfort to the inhabitants of the city, or any section thereof. The standards for dBA noise level in section 7.34.040 shall apply to this section. To the extent that the noise created causes the noise level at the property line to exceed the ambient noise level by more than 1.0 decibels, it shall be presumed that the noise being created also is in violation of this section.

(b) The characteristics and conditions which should be considered in determining whether a violation of the provisions of this section exists should include, but not be limited to, the following:

(1) The level of the noise;

(2) Whether the nature of the noise is usual or unusual;

(3) Whether the origin of the noise is natural or unnatural;

(4) The level of the ambient noise;

(5) The proximity of the noise to sleeping facilities;

(6) The nature and zoning of the area from which the noise emanates and the area where it is received;

(7) The time of day or night the noise occurs;

(8) The duration of the noise; and

(9) Whether the noise is recurrent, intermittent or constant.

(Code 1972, § 7.34.050; Ord. No. 1082, § 2(part), 2000)

Sec. 7.34.060. - Construction noise.

It is unlawful for any person between the hours of 7:00 p.m. of any day and 7:00 a.m. of the following day, or on a legal holiday, with the exception of Columbus Day and Washington's birthday, or on Sundays to erect, construct, demolish, excavate, alter or repair any building or structure in such a manner as to create disturbing, excessive or offensive noise. Construction activity shall not exceed 80 dBA in residential zones in the city.

(Code 1972, § 7.34.060; Ord. No. 1082, § 2(part), 2000)

Sec. 7.34.070. - Refuse vehicles and parking lot sweepers.

No person shall operate or permit to be operated a refuse compacting, processing or collection vehicle or parking lot sweeper between the hours of 7:00 p.m. to 7:00 a.m. in any residential area unless a permit has been applied for and granted by the city.

(Code 1972, § 7.34.070; Ord. No. 1082, § 2(part), 2000)

Sec. 7.34.080. - Disturbing, excessive, offensive noises; declaration of certain acts constituting.

The following activities, among others, are declared to cause loud, disturbing, excessive or offensive noises in violation of this section and are unlawful, namely:

(1) *Horns, signaling devices, etc.* Unnecessary use or operation of horns, signaling devices or other similar devices on automobiles, motorcycles or any other vehicle.

(2) *Radios, television sets, phonographs, loud speaking amplifiers and similar devices.* The use or operation of any sound production or reproduction device, radio receiving set, musical instrument, drums, phonograph, television set, loudspeakers, sound amplifier, or other similar machine or device for the producing or reproducing of sound, in such a manner as to disturb the peace, quiet or comfort of any reasonable person of normal sensitivity in any area of the city is prohibited. This provision shall not apply to any participant in a licensed parade or to any person who has been otherwise duly authorized by the city to engage in such conduct.

(3) *Animals.*

a. The keeping or maintenance, or the permitting to be kept or maintained, upon any premises owned, occupied or controlled by any person of any animal or animals which by any frequent or long-continued noise shall cause annoyance or discomfort to a reasonable person of normal sensitiveness

in the vicinity.

b. The noise from any such animal or animals that disturbs two or more residents residing in separate residences adjacent to any part of the property on which the subject animal or animals are kept or maintained, or three or more residents residing in separate residences in close proximity to the property on which the subject animal or animals are kept or maintained, shall be prima facie evidence of a violation of this section.

(4) *Hospitals, schools, libraries, rest homes, long-term medical or mental care facilities.* To make loud, disturbing, excessive noises adjacent to a hospital, school, library, rest home or long-term medical or mental care facility, which noise unreasonably interferes with the workings of such institutions or which disturbs or unduly annoys occupants in said institutions.

(5) *Playing of radios on buses and trolleys.* The operation of any radio, phonograph or tape player on an urban transit bus or trolley so as to emit noise that is audible to any other person in the vehicle is prohibited.

(6) *Playing of radios, phonographs and other sound production or reproduction devices in public parks and public parking lots and streets adjacent thereto.* The operation of any radio, phonograph, television set or any other sound production or reproduction device in any public park or any public parking lot, or street adjacent to such park or beach, without the prior written approval of the city manager or the administrator, in such a manner that such radio, phonograph, television set or sound production or reproduction device emits a sound level exceeding those found in the table in section 7.34.040.

(7) *Leaf blowers.*

a. The term "leaf blower" means any portable, hand-held or backpack, engine-powered device with a nozzle that creates a directable airstream which is capable of and intended for moving leaves and light materials.

b. No person shall operate a leaf blower in any residential zoned area between the hours of 7:00 p.m. and 8:00 a.m. on weekdays and 5:00 p.m. and 9:00 a.m. on weekends or on legal holidays.

c. No person may operate any leaf blower at a sound level in excess of 80 decibels measured at a distance of 50 feet or greater from the point of noise origin.

d. Leaf blowers shall be equipped with functional mufflers and an approved sound limiting device required to ensure that the leaf blower is not capable of generating a sound level exceeding any limit prescribed in this section.

(Code 1972, § 7.34.080; Ord. No. 1082, § 2(part), 2000)

Sec. 7.34.090. - Burglar alarms.

(a) Audible burglar alarms for structures or motor vehicles are prohibited unless the operation of such burglar alarm can be terminated within 20 minutes of being activated.

(b) Notwithstanding the requirements of this provision, any member of the county sheriff's department, Perris Division, shall have the right to take such steps as may be reasonable and necessary to disconnect any such alarm installed in any building, dwelling or motor vehicle at any time during the period of its activation. On or after 30 days from the effective date of the ordinance codified in this chapter, any building, dwelling or motor vehicle upon which a burglar alarm has been installed shall prominently display the telephone number at which communication may be made with the owner of such building, dwelling or motor vehicle.

(Code 1972, § 7.34.090; Ord. No. 1082, § 2(part), 2000)

Sec. 7.34.100. - Motor vehicles.

(a) Off-highway.

(1) Except as otherwise provided for in this chapter, it shall be unlawful to operate any motor vehicle of any type on any site, other than on a public street or highway as defined in the California Vehicle Code, in any manner so as to cause noise in excess of those noise levels permitted for on-highway motor vehicles as specified in the table for "45-mile-per-hour or less speed limits" contained in section 23130 of the California Vehicle Code and as corrected for distances set forth in subsection (a)(2) of this section.

(2) The maximum noise level as the on-highway vehicle passes may be measured at a distance of other than 50 feet from the centerline of travel, provided the measurement is further adjusted by adding algebraically the application correction as follows:

Distance (feet)	Correction (decibels)
25	−6
28	−5
32	−4
35	−3
40	−2
45	−1
50 (preferred distance)	0
56	+1
63	+2
70	+3
80	+4
90	+5

100	+6

(b) Nothing in this section shall apply to authorized emergency vehicles when being used in emergency situations including the blowing of sirens and/or horns.

(Code 1972, § 7.34.100; Ord. No. 1082, § 2(part), 2000)

APPENDIX 5.1:

STUDY AREA PHOTOS

This page intentionally left blank

JN:15109

15109_L1_A 1.North
33, 44' 45.310000"117, 11' 5.190000"

15109_L1_A 2.South
33, 44' 45.020000"117, 11' 5.220000"

15109_L1_A 3.East
33, 44' 44.980000"117, 11' 5.190000"

15109_L1_A 4.West
33, 44' 44.990000"117, 11' 5.250000"

JN:15109

15109_L2_B 1.North
33, 44' 42.790000"117, 10' 51.080000"

15109_L2_B 2.South
33, 44' 42.770000"117, 10' 51.100000"

15109_L2_B 3.East
33, 44' 42.750000"117, 10' 51.100000"

15109_L2_B 4.West
33, 44' 42.750000"117, 10' 51.100000"

JN:15109

15109_L3_D 1.North
33, 44' 40.550000"117, 10' 49.430000"

15109_L3_D 2.South
33, 44' 40.440000"117, 10' 49.480000"

15109_L3_D 3.East
33, 44' 40.610000"117, 10' 49.480000"

15109_L3_D 4.West
33, 44' 40.580000"117, 10' 49.540000"

JN:15109

15109_L4_G 1.North
33, 44' 38.290000"117, 10' 50.090000"

15109_L4_G 2.South
33, 44' 38.220000"117, 10' 50.090000"

15109_L4_G 3.East
33, 44' 38.210000"117, 10' 50.090000"

15109_L4_G 4.West
33, 44' 38.210000"117, 10' 50.140000"

JN:15109

15109_L5_C 1.North
33, 44' 34.910000"117, 10' 56.570000"

15109_L5_C 2.South
33, 44' 34.920000"117, 10' 56.600000"

15109_L5_C 3.East
33, 44' 34.870000"117, 10' 56.460000"

15109_L5_C 4.West
33, 44' 34.860000"117, 10' 56.540000"

15109_L6_H 1.North
33, 44' 34.390000"117, 11' 0.830000"

15109_L6_H 2.South
33, 44' 34.390000"117, 11' 0.860000"

15109_L6_H 3.East
33, 44' 34.440000"117, 11' 0.830000"

15109_L6_H 4.West
33, 44' 34.370000"117, 11' 1.320000"

APPENDIX 5.2:

NOISE LEVEL MEASUREMENT WORKSHEETS

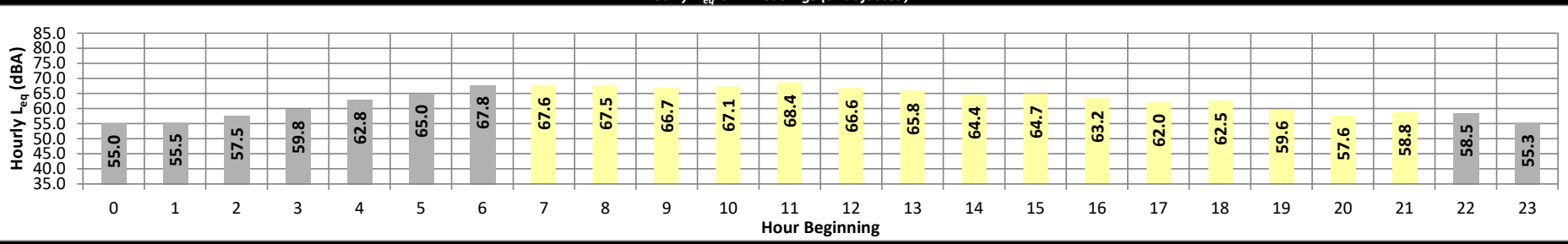
This page intentionally left blank

24-Hour Noise Level Measurement Summary

Date: Wednesday, October 19, 2022 *Location:* L1 - Located northwest of the Project near the existing *Meter:* Piccolo II *JN:* 15109

Project: Hillwood Ethanac *Source:* residence at 25870 Trumble Road. *Analyst:* B. Lawson

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	55.0	64.4	49.5	64.1	63.4	60.8	59.0	54.1	52.5	50.5	50.1	49.6	55.0	10.0	65.0
	1	55.5	63.8	50.5	63.4	62.9	60.7	58.9	55.3	53.6	51.5	51.0	50.6	55.5	10.0	65.5
	2	57.5	65.6	52.6	65.4	64.9	62.7	60.9	57.2	55.6	53.6	53.2	52.7	57.5	10.0	67.5
	3	59.8	69.5	54.5	69.2	68.5	65.6	63.4	58.8	57.0	55.3	55.0	54.6	59.8	10.0	69.8
	4	62.8	74.6	56.0	74.2	73.5	70.0	66.4	59.6	58.0	56.6	56.4	56.1	62.8	10.0	72.8
	5	65.0	75.1	59.4	74.8	74.2	71.4	69.2	63.1	61.5	60.0	59.8	59.5	65.0	10.0	75.0
	6	67.8	78.8	60.0	78.4	77.6	75.0	72.6	65.7	62.3	60.6	60.4	60.1	67.8	10.0	77.8
Day	7	67.6	77.3	59.8	76.9	76.1	73.7	72.2	67.1	63.8	61.1	60.4	59.9	67.6	0.0	67.6
	8	67.5	78.9	53.4	78.5	77.8	75.1	73.0	65.7	58.8	54.2	53.8	53.5	67.5	0.0	67.5
	9	66.7	77.7	51.2	77.3	76.6	74.3	72.4	65.3	58.3	52.3	51.7	51.3	66.7	0.0	66.7
	10	67.1	78.7	50.1	78.2	77.4	74.6	72.3	65.4	59.2	52.1	51.3	50.4	67.1	0.0	67.1
	11	68.4	81.2	48.7	80.6	79.5	75.7	73.6	65.2	57.7	50.3	49.5	48.9	68.4	0.0	68.4
	12	66.6	79.3	48.9	78.8	77.5	73.9	71.7	64.1	56.9	50.2	49.5	49.0	66.6	0.0	66.6
	13	65.8	77.0	48.5	76.7	75.8	73.3	71.4	64.4	56.9	49.8	49.3	48.6	65.8	0.0	65.8
	14	64.4	75.8	48.3	75.5	74.9	72.0	69.6	62.7	55.4	49.4	48.8	48.5	64.4	0.0	64.4
	15	64.7	76.7	47.0	76.3	75.6	72.5	69.8	62.6	55.6	48.2	47.7	47.1	64.7	0.0	64.7
	16	63.2	75.1	46.7	74.7	73.8	70.7	68.5	61.3	54.0	48.0	47.4	46.8	63.2	0.0	63.2
	17	62.0	72.8	47.4	72.4	71.7	69.1	67.4	61.4	54.7	48.4	47.9	47.5	62.0	0.0	62.0
	18	62.5	73.8	48.1	73.5	72.9	70.6	68.3	60.1	54.2	49.2	48.7	48.3	62.5	0.0	62.5
	19	59.6	69.9	52.2	69.7	69.1	66.5	64.1	58.1	55.6	53.0	52.6	52.3	59.6	5.0	64.6
	20	57.6	68.1	51.6	67.6	66.8	64.4	62.0	55.8	53.8	52.2	52.0	51.7	57.6	5.0	62.6
	21	58.8	67.4	54.1	67.0	66.5	64.3	62.3	58.3	56.7	54.9	54.6	54.2	58.8	5.0	63.8
Night	22	58.5	69.0	52.6	68.5	67.9	64.5	61.9	57.3	55.7	53.6	53.2	52.8	58.5	10.0	68.5
	23	55.3	65.3	49.3	64.9	64.3	61.7	59.2	53.9	52.2	50.2	49.9	49.5	55.3	10.0	65.3

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	57.6	67.4	46.7	67.0	66.5	64.3	62.0	55.8	53.8	48.0	47.4	46.8
	Max	68.4	81.2	59.8	80.6	79.5	75.7	73.6	67.1	63.8	61.1	60.4	59.9
Energy Average		65.2	Average:		74.9	74.1	71.4	69.2	62.5	56.8	51.5	51.0	50.5
Night	Min	55.0	63.8	49.3	63.4	62.9	60.7	58.9	53.9	52.2	50.2	49.9	49.5
	Max	67.8	78.8	60.0	78.4	77.6	75.0	72.6	65.7	62.3	60.6	60.4	60.1
Energy Average		62.0	Average:		69.2	68.6	65.8	63.5	58.3	56.5	54.7	54.3	53.9

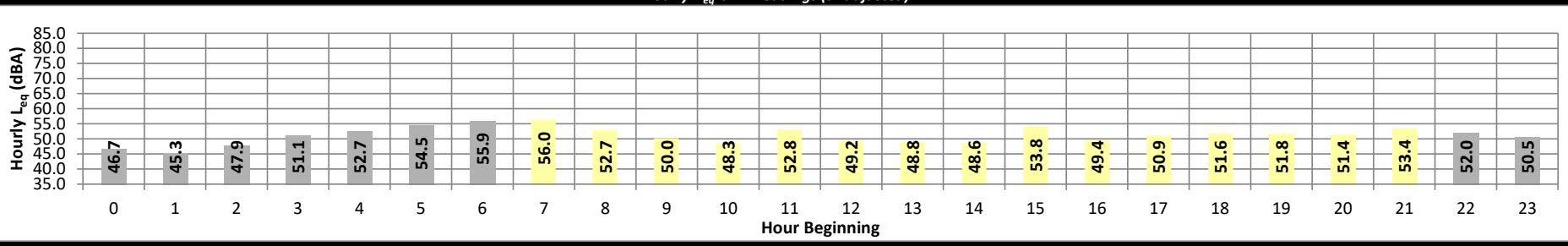
24-Hour CNEL	Leq (dBA) Daytime (7am-10pm)	Leq (dBA) Nighttime (10pm-7am)
69.2	**65.2**	**62.0**

24-Hour Noise Level Measurement Summary

Date: Wednesday, October 19, 2022 *Location:* L2 - Located north of the Project near the Lonsdale Trucking *Meter:* Piccolo II *JN:* 15109

Project: Hillwood Ethanac *Source:* landscaping supply store. *Analyst:* B. Lawson

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	*Hour*	*L_{eq}*	*L_{max}*	*L_{min}*	*L1%*	*L2%*	*L5%*	*L8%*	*L25%*	*L50%*	*L90%*	*L95%*	*L99%*	*L_{eq}*	*Adj.*	*Adj. L_{eq}*
Night	0	46.7	52.1	43.6	51.7	51.3	50.3	49.4	47.0	45.7	44.3	44.0	43.7	46.7	10.0	56.7
	1	45.3	51.1	42.0	50.8	50.3	49.2	48.2	45.6	44.4	42.7	42.5	42.1	45.3	10.0	55.3
	2	47.9	53.0	44.7	52.6	52.2	51.1	50.4	48.4	47.2	45.4	45.1	44.8	47.9	10.0	57.9
	3	51.1	57.2	47.8	56.9	56.5	54.7	53.6	51.5	50.3	48.5	48.2	47.9	51.1	10.0	61.1
	4	52.7	56.7	50.5	56.4	56.0	54.9	54.4	53.2	52.3	51.1	50.9	50.6	52.7	10.0	62.7
	5	54.5	59.4	52.4	59.0	58.6	57.2	56.4	54.7	53.9	52.9	52.7	52.5	54.5	10.0	64.5
	6	55.9	61.2	53.7	60.9	60.5	59.3	58.2	56.0	55.2	54.2	54.0	53.8	55.9	10.0	65.9
Day	7	56.0	61.9	53.9	61.5	61.0	59.5	58.2	56.0	55.2	54.3	54.1	53.9	56.0	0.0	56.0
	8	52.7	59.0	49.7	58.5	58.0	56.4	55.3	53.0	51.7	50.2	50.1	49.8	52.7	0.0	52.7
	9	50.0	56.5	45.9	56.1	55.7	54.5	53.5	50.6	48.7	46.5	46.3	46.0	50.0	0.0	50.0
	10	48.3	56.9	40.1	56.5	56.0	54.1	52.8	48.4	45.9	41.3	40.7	40.3	48.3	0.0	48.3
	11	52.8	65.0	42.0	64.6	64.0	59.6	56.1	50.4	47.2	43.4	42.8	42.2	52.8	0.0	52.8
	12	49.2	57.3	41.2	56.9	56.3	54.3	53.3	50.1	46.6	42.8	42.1	41.5	49.2	0.0	49.2
	13	48.8	56.4	42.9	55.9	55.4	53.9	52.7	49.6	46.7	43.7	43.3	43.0	48.8	0.0	48.8
	14	48.6	56.1	43.6	55.7	55.0	53.4	52.1	48.9	46.9	44.5	44.2	43.7	48.6	0.0	48.6
	15	53.8	61.5	44.3	61.2	60.6	59.1	57.8	54.7	52.5	46.5	45.2	44.4	53.8	0.0	53.8
	16	49.4	57.9	43.4	57.3	56.6	54.7	53.3	49.6	47.1	44.4	43.9	43.5	49.4	0.0	49.4
	17	50.9	59.1	45.2	58.6	58.1	56.3	54.8	51.1	48.7	46.3	45.9	45.4	50.9	0.0	50.9
	18	51.6	60.0	46.0	59.6	59.1	58.0	56.0	51.2	49.1	46.9	46.5	46.1	51.6	0.0	51.6
	19	51.8	58.8	46.8	58.3	57.8	56.6	55.5	52.6	49.9	47.6	47.3	46.9	51.8	5.0	56.8
	20	51.4	60.6	45.9	60.1	59.3	57.3	55.5	50.9	48.9	46.7	46.4	46.1	51.4	5.0	56.4
	21	53.4	62.8	47.5	62.3	61.8	60.3	57.6	52.5	50.3	48.3	48.0	47.7	53.4	5.0	58.4
Night	22	52.0	58.8	47.6	58.5	58.2	57.1	56.0	52.1	50.2	48.3	48.0	47.7	52.0	10.0	62.0
	23	50.5	57.3	46.5	56.8	56.4	55.0	53.4	50.9	49.3	47.3	46.9	46.6	50.5	10.0	60.5

Timeframe	*Hour*	*L_{eq}*	*L_{max}*	*L_{min}*	*L1%*	*L2%*	*L5%*	*L8%*	*L25%*	*L50%*	*L90%*	*L95%*	*L99%*
Day	Min	48.3	56.1	40.1	55.7	55.0	53.4	52.1	48.4	45.9	41.3	40.7	40.3
	Max	56.0	65.0	53.9	64.6	64.0	60.3	58.2	56.0	55.2	54.3	54.1	53.9
Energy Average		51.8	Average:		58.9	58.3	56.5	55.0	51.3	49.0	46.2	45.8	45.4
Night	Min	45.3	51.1	42.0	50.8	50.3	49.2	48.2	45.6	44.4	42.7	42.5	42.1
	Max	55.9	61.2	53.7	60.9	60.5	59.3	58.2	56.0	55.2	54.2	54.0	53.8
Energy Average		51.9	Average:		56.0	55.5	54.3	53.3	51.0	49.8	48.3	48.0	47.7

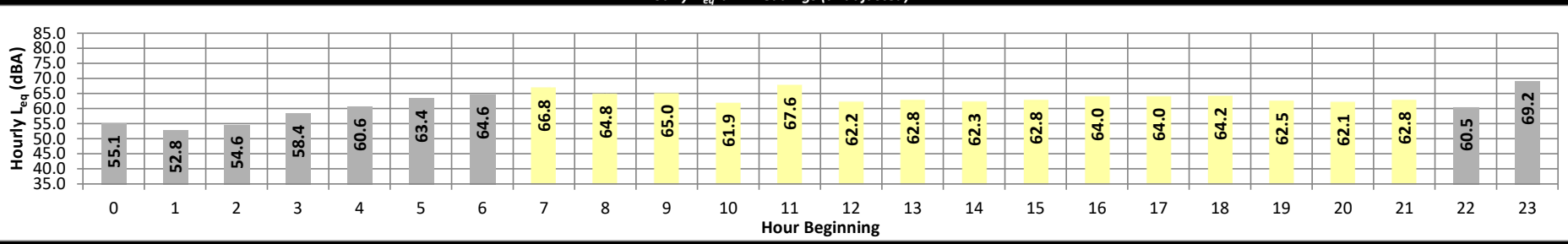
24-Hour CNEL	*Leq (dBA) Daytime (7am-10pm)*	*Leq (dBA) Nighttime (10pm-7am)*
58.6	**51.8**	**51.9**

24-Hour Noise Level Measurement Summary

Date: Wednesday, October 19, 2022 *Location:* L3 - Located east of the Project near the residence at 25898 *Meter:* Piccolo II *JN:* 15109

Project: Hillwood Ethanac *Source:* Sherman Road. *Analyst:* B. Lawson

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	55.1	67.5	46.0	66.8	65.6	62.5	59.8	51.5	48.8	46.8	46.5	46.1	55.1	10.0	65.1
	1	52.8	65.3	44.4	64.6	63.5	60.2	57.0	48.8	47.2	45.3	45.0	44.5	52.8	10.0	62.8
	2	54.6	67.2	46.7	66.5	65.3	61.9	58.6	50.7	49.2	47.5	47.2	46.8	54.6	10.0	64.6
	3	58.4	71.0	50.6	70.3	69.0	65.5	62.4	55.1	53.0	51.4	51.1	50.7	58.4	10.0	68.4
	4	60.6	72.7	52.7	71.9	70.7	67.8	65.3	57.4	54.7	53.3	53.0	52.8	60.6	10.0	70.6
	5	63.4	75.9	55.0	75.2	74.1	70.5	67.8	60.0	56.9	55.5	55.3	55.1	63.4	10.0	73.4
	6	64.6	76.0	56.2	75.3	74.2	71.5	69.6	62.8	58.4	56.7	56.5	56.3	64.6	10.0	74.6
Day	7	66.8	79.0	56.5	78.3	77.3	74.0	71.6	64.8	59.6	57.0	56.8	56.5	66.8	0.0	66.8
	8	64.8	75.4	51.5	74.7	73.8	71.7	70.3	64.7	58.1	52.6	52.0	51.6	64.8	0.0	64.8
	9	65.0	77.2	46.5	76.7	76.1	73.1	70.2	61.7	53.8	47.5	47.1	46.6	65.0	0.0	65.0
	10	61.9	73.9	42.6	73.1	71.9	69.4	67.6	60.1	52.0	44.4	43.6	42.8	61.9	0.0	61.9
	11	67.6	81.4	44.7	80.8	79.5	75.0	71.9	62.4	55.7	48.2	45.9	44.9	67.6	0.0	67.6
	12	62.2	73.6	44.3	72.9	71.9	69.6	68.0	61.2	53.5	45.7	45.0	44.4	62.2	0.0	62.2
	13	62.8	74.0	45.3	73.3	72.3	69.9	68.3	62.3	55.4	47.3	46.2	45.5	62.8	0.0	62.8
	14	62.3	73.9	44.7	73.1	72.1	69.6	67.9	61.6	53.4	46.0	45.5	44.9	62.3	0.0	62.3
	15	62.8	74.5	46.1	73.7	72.7	70.0	68.2	61.8	54.8	48.2	47.2	46.3	62.8	0.0	62.8
	16	64.0	75.5	45.4	74.7	73.6	70.8	69.2	63.6	56.8	47.5	46.4	45.6	64.0	0.0	64.0
	17	64.0	75.2	46.5	74.4	73.2	70.8	69.4	63.9	57.2	48.0	47.3	46.7	64.0	0.0	64.0
	18	64.2	76.5	47.0	75.8	74.7	71.6	69.3	62.3	55.3	48.4	47.6	47.2	64.2	0.0	64.2
	19	62.5	73.4	49.0	72.6	71.7	69.5	68.0	61.9	56.0	50.1	49.7	49.2	62.5	5.0	67.5
	20	62.1	74.1	47.8	73.4	72.4	69.9	67.7	59.7	53.2	48.7	48.3	47.9	62.1	5.0	67.1
	21	62.8	74.8	50.3	74.3	73.5	70.7	68.1	59.5	54.9	51.1	50.8	50.4	62.8	5.0	67.8
Night	22	60.5	74.9	50.1	73.8	71.2	66.8	64.3	56.4	52.9	51.0	50.6	50.2	60.5	10.0	70.5
	23	69.2	83.7	45.4	83.5	82.2	76.5	71.2	55.2	48.9	46.2	45.9	45.5	69.2	10.0	79.2

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	61.9	73.4	42.6	72.6	71.7	69.4	67.6	59.5	52.0	44.4	43.6	42.8
	Max	67.6	81.4	56.5	80.8	79.5	75.0	71.9	64.8	59.6	57.0	56.8	56.5
Energy Average		64.1	Average:		74.8	73.8	71.0	69.0	62.1	55.3	48.7	48.0	47.4
Night	Min	52.8	65.3	44.4	64.6	63.5	60.2	57.0	48.8	47.2	45.3	45.0	44.5
	Max	69.2	83.7	56.2	83.5	82.2	76.5	71.2	62.8	58.4	56.7	56.5	56.3
Energy Average		62.8	Average:		72.0	70.6	67.0	64.0	55.3	52.2	50.4	50.1	49.8

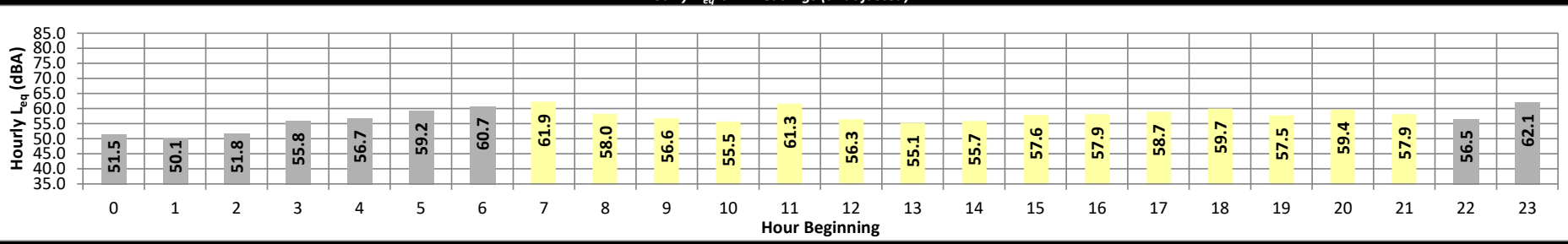
24-Hour CNEL	*Leq (dBA) Daytime (7am-10pm)*	*Leq (dBA) Nighttime (10pm-7am)*
69.6	**64.1**	**62.8**

24-Hour Noise Level Measurement Summary

Date: Wednesday, October 19, 2022 *Location:* L4 - Located east of the Project near the residence at 25940 *Meter:* Piccolo II *JN:* 15109

Project: Hillwood Ethanac *Source:* Sherman Road. *Analyst:* B. Lawson

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	51.5	58.8	47.3	58.3	57.7	56.3	55.2	51.5	49.9	48.1	47.8	47.4	51.5	10.0	61.5
	1	50.1	57.3	45.7	57.0	56.6	55.1	53.7	50.0	48.4	46.5	46.2	45.8	50.1	10.0	60.1
	2	51.8	59.5	47.9	59.1	58.6	56.9	55.4	51.3	50.1	48.6	48.3	48.0	51.8	10.0	61.8
	3	55.8	64.4	51.6	64.0	63.4	61.8	59.7	55.0	53.6	52.2	51.9	51.7	55.8	10.0	65.8
	4	56.7	64.3	53.1	63.8	63.1	61.3	59.7	56.6	55.2	53.8	53.5	53.2	56.7	10.0	66.7
	5	59.2	66.7	55.5	66.3	65.8	64.0	62.6	59.0	57.5	56.1	55.9	55.6	59.2	10.0	69.2
	6	60.7	68.5	56.8	68.1	67.5	65.7	64.4	60.8	58.7	57.3	57.1	56.9	60.7	10.0	70.7
Day	7	61.9	70.8	57.4	70.4	69.9	67.5	65.5	61.5	59.4	58.0	57.7	57.5	61.9	0.0	61.9
	8	58.0	66.4	52.1	66.0	65.4	63.8	62.3	58.3	55.2	52.8	52.5	52.2	58.0	0.0	58.0
	9	56.6	67.5	47.0	66.9	66.2	63.3	61.1	55.8	51.6	47.9	47.5	47.1	56.6	0.0	56.6
	10	55.5	65.5	44.5	65.1	64.4	62.2	60.5	55.5	50.8	45.8	45.3	44.7	55.5	0.0	55.5
	11	61.3	74.1	46.0	73.6	72.8	68.9	66.9	56.6	51.9	47.3	46.7	46.2	61.3	0.0	61.3
	12	56.3	66.3	45.8	65.6	64.8	63.4	61.6	55.8	51.7	46.9	46.4	45.9	56.3	0.0	56.3
	13	55.1	63.9	46.9	63.4	62.8	61.1	60.0	55.4	51.8	47.9	47.3	47.0	55.1	0.0	55.1
	14	55.7	65.7	46.7	65.1	64.4	62.2	60.6	55.5	51.6	47.7	47.3	46.8	55.7	0.0	55.7
	15	57.6	67.2	48.0	66.8	66.2	64.2	62.6	57.6	53.7	49.3	48.9	48.1	57.6	0.0	57.6
	16	57.9	67.6	47.7	67.2	66.5	64.5	62.7	57.8	53.7	49.0	48.5	47.9	57.9	0.0	57.9
	17	58.7	68.5	49.2	68.0	67.3	65.6	63.7	58.3	54.9	50.7	50.0	49.3	58.7	0.0	58.7
	18	59.7	71.6	50.1	71.0	69.7	66.9	64.2	57.8	54.3	51.3	50.8	50.3	59.7	0.0	59.7
	19	57.5	65.4	51.0	65.0	64.5	62.9	61.8	58.1	54.9	52.0	51.6	51.2	57.5	5.0	62.5
	20	59.4	70.6	49.8	70.2	69.5	66.7	64.5	57.7	53.3	50.7	50.3	50.0	59.4	5.0	64.4
	21	57.9	66.4	50.9	66.0	65.5	64.3	63.0	58.0	54.0	51.6	51.3	51.0	57.9	5.0	62.9
Night	22	56.5	65.2	50.3	64.8	64.3	62.8	61.1	56.1	53.2	51.1	50.7	50.4	56.5	10.0	66.5
	23	62.1	76.9	46.9	75.6	74.3	69.2	65.5	53.5	50.5	47.8	47.4	47.0	62.1	10.0	72.1

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	55.1	63.9	44.5	63.4	62.8	61.1	60.0	55.4	50.8	45.8	45.3	44.7
	Max	61.9	74.1	57.4	73.6	72.8	68.9	66.9	61.5	59.4	58.0	57.7	57.5
Energy Average		58.4	Average:		67.4	66.7	64.5	62.7	57.3	53.5	49.9	49.5	49.0
Night	Min	50.1	57.3	45.7	57.0	56.6	55.1	53.7	50.0	48.4	46.5	46.2	45.8
	Max	62.1	76.9	56.8	75.6	74.3	69.2	65.5	60.8	58.7	57.3	57.1	56.9
Energy Average		57.7	Average:		64.1	63.5	61.5	59.7	54.9	53.0	51.3	51.0	50.7

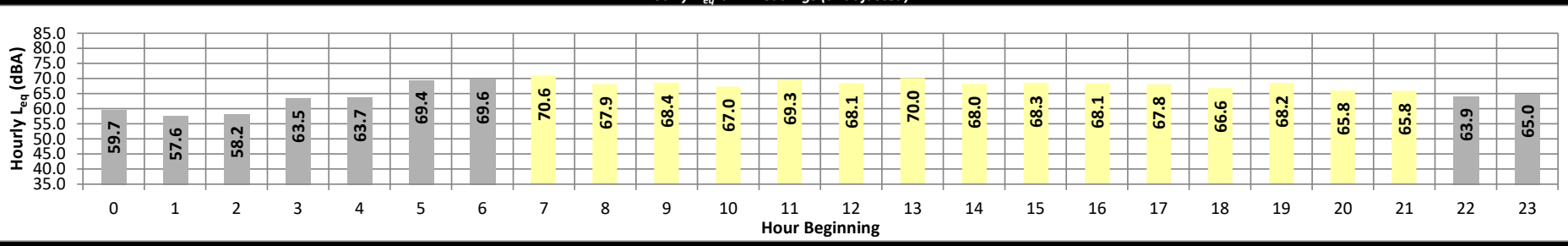
24-Hour CNEL	Leq (dBA) Daytime (7am-10pm)	Leq (dBA) Nighttime (10pm-7am)
64.5	**58.4**	**57.7**

24-Hour Noise Level Measurement Summary

Date: Wednesday, October 19, 2022 *Location:* L5 - Located south of the Project site near the residence at *Meter:* Piccolo II *JN:* 15109

Project: Hillwood Ethanac *Source:* 27391 Ethanac Road. *Analyst:* B. Lawson

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	59.7	71.1	47.5	70.7	69.8	67.0	65.0	58.2	52.9	48.5	48.0	47.6	59.7	10.0	69.7
	1	57.6	70.0	45.9	69.5	68.6	65.3	62.3	53.6	49.7	46.9	46.4	46.0	57.6	10.0	67.6
	2	58.2	70.6	47.6	70.2	69.3	65.8	62.9	54.0	50.7	48.5	48.1	47.7	58.2	10.0	68.2
	3	63.5	76.3	50.6	76.0	75.1	70.8	67.6	59.8	55.2	51.6	51.1	50.7	63.5	10.0	73.5
	4	63.7	74.4	52.2	74.0	73.3	70.9	69.0	62.7	57.0	53.2	52.8	52.4	63.7	10.0	73.7
	5	69.4	81.4	55.6	81.0	79.9	76.4	74.0	68.0	62.7	56.9	56.2	55.8	69.4	10.0	79.4
	6	69.6	79.7	56.3	79.2	78.4	75.9	74.4	69.9	65.3	57.7	57.0	56.5	69.6	10.0	79.6
Day	7	70.6	80.6	57.9	80.1	79.3	76.9	75.4	70.8	67.0	60.2	58.9	58.1	70.6	0.0	70.6
	8	67.9	78.0	54.7	77.7	76.9	74.2	72.5	68.1	64.0	56.9	55.4	54.9	67.9	0.0	67.9
	9	68.4	78.8	51.0	78.4	77.6	75.0	73.3	68.5	63.4	53.6	52.3	51.2	68.4	0.0	68.4
	10	67.0	77.7	49.7	77.2	76.2	73.6	71.9	67.3	62.2	52.6	51.2	49.9	67.0	0.0	67.0
	11	69.3	81.2	50.5	80.7	79.9	76.5	73.7	67.8	63.3	53.9	52.1	50.7	69.3	0.0	69.3
	12	68.1	78.7	52.2	78.2	77.4	74.6	72.6	68.2	64.1	55.6	53.8	52.4	68.1	0.0	68.1
	13	70.0	82.2	52.4	81.6	80.3	77.3	74.6	68.4	64.1	55.4	54.0	52.5	70.0	0.0	70.0
	14	68.0	78.2	51.0	77.7	76.8	74.6	72.9	68.2	63.8	54.1	52.5	51.3	68.0	0.0	68.0
	15	68.3	78.8	53.0	78.3	77.5	74.8	73.0	68.0	64.3	56.0	54.6	53.2	68.3	0.0	68.3
	16	68.1	78.6	52.3	78.0	77.1	74.5	72.6	68.0	64.5	55.6	53.8	52.5	68.1	0.0	68.1
	17	67.8	77.7	52.5	77.3	76.5	74.0	72.2	68.2	64.5	55.6	53.9	52.7	67.8	0.0	67.8
	18	66.6	76.5	51.4	75.9	75.1	72.5	70.9	67.3	63.4	54.4	52.7	51.6	66.6	0.0	66.6
	19	68.2	80.1	51.5	79.7	78.9	75.1	72.4	66.9	62.7	53.8	52.6	51.7	68.2	5.0	73.2
	20	65.8	76.7	49.0	76.3	75.6	72.7	70.8	65.5	59.5	51.1	50.0	49.1	65.8	5.0	70.8
	21	65.8	77.6	50.0	77.2	76.3	73.0	70.3	64.3	58.3	51.3	50.7	50.1	65.8	5.0	70.8
Night	22	63.9	76.4	49.0	75.9	75.0	71.3	68.6	61.4	55.2	50.2	49.6	49.1	63.9	10.0	73.9
	23	65.0	78.8	44.6	78.1	77.1	72.5	68.3	60.1	53.0	46.0	45.3	44.8	65.0	10.0	75.0

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	65.8	76.5	49.0	75.9	75.1	72.5	70.3	64.3	58.3	51.1	50.0	49.1
	Max	70.6	82.2	57.9	81.6	80.3	77.3	75.4	70.8	67.0	60.2	58.9	58.1
Energy Average		68.2	Average:		78.3	77.4	74.6	72.6	67.7	63.3	54.7	53.2	52.1
Night	Min	57.6	70.0	44.6	69.5	68.6	65.3	62.3	53.6	49.7	46.0	45.3	44.8
	Max	69.6	81.4	56.3	81.0	79.9	76.4	74.4	69.9	65.3	57.7	57.0	56.5
Energy Average		65.3	Average:		75.0	74.0	70.6	68.0	60.9	55.7	51.0	50.5	50.1

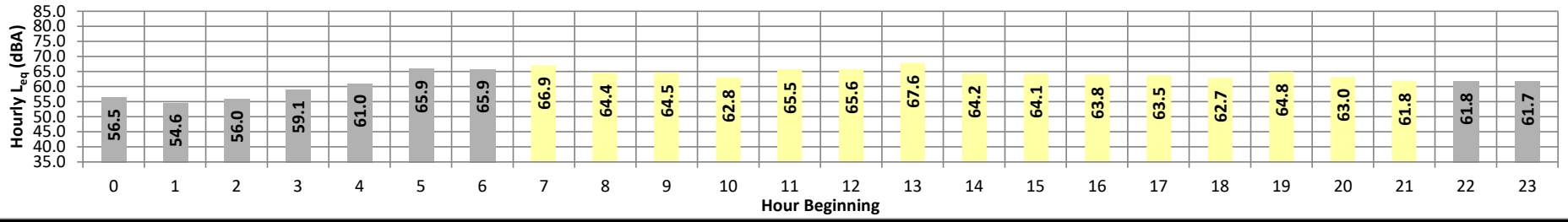
24-Hour CNEL	Leq (dBA) Daytime (7am-10pm)	Leq (dBA) Nighttime (10pm-7am)
72.6	**68.2**	**65.3**

24-Hour Noise Level Measurement Summary

Date: Wednesday, October 19, 2022 *Location:* L6 - Located south of the Project site in the vacant lot next to *Meter:* Piccolo II *JN:* 15109

Project: Hillwood Ethanac *Source:* the non-residential use at 27271 Ethanac Road. *Analyst:* B. Lawson

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	56.5	65.4	47.7	65.1	64.6	62.8	61.4	56.5	52.9	48.7	48.2	47.8	56.5	10.0	66.5
	1	54.6	64.7	46.4	64.4	64.0	61.6	59.4	53.4	50.3	47.4	47.0	46.5	54.6	10.0	64.6
	2	56.0	66.5	48.5	66.2	65.6	63.2	60.8	53.8	51.3	49.3	49.0	48.6	56.0	10.0	66.0
	3	59.1	69.1	51.2	68.7	68.2	65.8	63.8	58.4	54.9	52.2	51.8	51.3	59.1	10.0	69.1
	4	61.0	69.6	53.2	69.4	68.9	67.2	65.7	61.5	57.4	54.0	53.5	53.2	61.0	10.0	71.0
	5	65.9	76.3	56.1	76.0	75.4	72.8	70.4	65.3	61.6	57.0	56.5	56.2	65.9	10.0	75.9
	6	65.9	74.3	57.2	74.0	73.5	71.5	70.3	66.5	63.3	58.2	57.6	57.3	65.9	10.0	75.9
Day	7	66.9	75.5	58.0	75.2	74.6	72.6	71.1	67.3	64.4	59.5	58.8	58.2	66.9	0.0	66.9
	8	64.4	73.4	54.6	73.1	72.6	70.7	68.9	64.6	61.2	56.0	55.2	54.7	64.4	0.0	64.4
	9	64.5	73.9	50.9	73.6	73.1	71.1	69.3	64.7	60.7	52.8	51.7	51.0	64.5	0.0	64.5
	10	62.8	72.3	49.0	71.9	71.2	69.2	67.6	63.2	59.2	51.7	50.5	49.2	62.8	0.0	62.8
	11	65.5	75.9	49.5	75.7	75.3	73.0	70.5	64.4	60.6	52.7	51.1	49.8	65.5	0.0	65.5
	12	65.6	77.8	50.2	76.8	75.7	72.4	69.7	64.4	60.5	53.3	51.6	50.3	65.6	0.0	65.6
	13	67.6	78.1	51.7	77.7	77.2	75.8	73.1	65.9	61.0	54.3	53.2	52.1	67.6	0.0	67.6
	14	64.2	73.0	50.6	72.7	72.2	70.2	68.9	64.9	61.2	53.6	52.2	50.8	64.2	0.0	64.2
	15	64.1	73.4	51.6	73.0	72.4	70.3	68.7	64.5	61.1	54.0	52.8	51.8	64.1	0.0	64.1
	16	63.8	72.9	51.4	72.5	71.9	69.7	68.2	64.2	61.0	53.8	52.6	51.5	63.8	0.0	63.8
	17	63.5	72.1	51.5	71.8	71.3	69.4	67.9	64.3	61.1	53.8	52.7	51.7	63.5	0.0	63.5
	18	62.7	71.4	50.6	71.0	70.5	68.3	66.7	63.6	60.2	53.1	51.8	50.8	62.7	0.0	62.7
	19	64.8	76.2	51.2	75.8	74.9	71.8	69.3	63.3	59.9	53.1	52.2	51.3	64.8	5.0	69.8
	20	63.0	73.8	49.3	73.6	73.1	70.4	67.9	62.0	57.2	50.8	50.0	49.4	63.0	5.0	68.0
	21	61.8	72.6	49.9	72.1	71.4	68.8	66.7	61.1	56.9	51.2	50.5	50.0	61.8	5.0	66.8
Night	22	61.8	74.4	49.5	73.8	72.8	68.9	65.7	59.5	54.9	50.6	50.1	49.6	61.8	10.0	71.8
	23	61.7	74.7	45.8	74.2	73.2	69.8	66.1	57.5	52.8	47.1	46.4	45.9	61.7	10.0	71.7

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	61.8	71.4	49.0	71.0	70.5	68.3	66.7	61.1	56.9	50.8	50.0	49.2
	Max	67.6	78.1	58.0	77.7	77.2	75.8	73.1	67.3	64.4	59.5	58.8	58.2
Energy Average		64.6	Average:		73.8	73.2	70.9	69.0	64.2	60.4	53.6	52.5	51.5
Night	Min	54.6	64.7	45.8	64.4	64.0	61.6	59.4	53.4	50.3	47.1	46.4	45.9
	Max	65.9	76.3	57.2	76.0	75.4	72.8	70.4	66.5	63.3	58.2	57.6	57.3
Energy Average		61.9	Average:		70.2	69.6	67.1	64.8	59.1	55.5	51.6	51.1	50.7

24-Hour CNEL	Leq (dBA) Daytime (7am-10pm)	Leq (dBA) Nighttime (10pm-7am)
69.2	**64.6**	**61.9**

APPENDIX 7.1:

OFF-SITE TRAFFIC NOISE CONTOURS

This page intentionally left blank

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: Existing(2022) | *Project Name:* Hillwood Ethanac
Road Name: Trumble Rd. | *Job Number:* 15109
Road Segment: n/o Ethanac Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	1,974 vehicles
Peak Hour Percentage:	8.30%
Peak Hour Volume:	164 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	47.0 feet
Centerline Dist. to Observer:	47.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.2%	9.0%	12.8%	94.72%
Medium Trucks:	79.4%	5.0%	15.6%	2.75%
Heavy Trucks:	75.2%	1.6%	23.2%	2.54%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	40.112
Medium Trucks:	39.891
Heavy Trucks:	39.913

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	-9.93	1.33	-1.20	*-4.63*	0.000	0.000
Medium Trucks:	79.45	-25.31	1.37	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-25.65	1.36	-1.20	*-5.46*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	58.7	57.6	54.2	51.0	59.0	59.4
Medium Trucks:	54.3	53.3	47.3	47.5	55.1	55.3
Heavy Trucks:	58.8	57.5	46.8	53.7	60.7	60.7
Vehicle Noise:	62.4	61.3	55.7	56.2	63.6	63.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	18	38	82	176
CNEL:	18	39	84	181

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: E+P | *Project Name:* Hillwood Ethanac
Road Name: Trumble Rd. | *Job Number:* 15109
Road Segment: n/o Ethanac Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,094 vehicles
Peak Hour Percentage:	8.30%
Peak Hour Volume:	174 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	47.0 feet
Centerline Dist. to Observer:	47.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.2%	9.0%	12.8%	89.29%
Medium Trucks:	79.4%	5.0%	15.6%	3.91%
Heavy Trucks:	75.2%	1.6%	23.2%	6.80%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	40.112
Medium Trucks:	39.891
Heavy Trucks:	39.913

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	-9.93	1.33	-1.20	*-4.63*	0.000	0.000
Medium Trucks:	79.45	-23.52	1.37	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-21.11	1.36	-1.20	*-5.46*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	58.7	57.6	54.2	51.0	59.0	59.4
Medium Trucks:	56.1	55.1	49.1	49.3	56.9	57.1
Heavy Trucks:	63.3	62.1	51.4	58.2	65.2	65.3
Vehicle Noise:	65.2	64.0	56.9	59.4	66.6	66.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	28	60	130	280
CNEL:	29	62	133	286

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: EAC(2025) | *Project Name:* Hillwood Ethanac
Road Name: Trumble Rd. | *Job Number:* 15109
Road Segment: n/o Ethanac Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,641 vehicles
Peak Hour Percentage:	8.30%
Peak Hour Volume:	219 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	47.0 feet
Centerline Dist. to Observer:	47.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.2%	9.0%	12.8%	94.72%
Medium Trucks:	79.4%	5.0%	15.6%	2.75%
Heavy Trucks:	75.2%	1.6%	23.2%	2.54%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	40.112
Medium Trucks:	39.891
Heavy Trucks:	39.913

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	-8.66	1.33	-1.20	*-4.63*	0.000	0.000
Medium Trucks:	79.45	-24.04	1.37	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-24.39	1.36	-1.20	*-5.46*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	59.9	58.9	55.5	52.3	60.3	60.6
Medium Trucks:	55.6	54.6	48.6	48.8	56.4	56.6
Heavy Trucks:	60.0	58.8	48.1	55.0	61.9	62.0
Vehicle Noise:	63.7	62.6	56.9	57.5	64.9	65.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	21	46	99	213
CNEL:	22	47	102	220

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: EAC+P(2025) | *Project Name:* Hillwood Ethanac
Road Name: Trumble Rd. | *Job Number:* 15109
Road Segment: n/o Ethanac Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,761 vehicles
Peak Hour Percentage:	8.30%
Peak Hour Volume:	229 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	47.0 feet
Centerline Dist. to Observer:	47.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.2%	9.0%	12.8%	90.60%
Medium Trucks:	79.4%	5.0%	15.6%	3.63%
Heavy Trucks:	75.2%	1.6%	23.2%	5.77%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	40.112
Medium Trucks:	39.891
Heavy Trucks:	39.913

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	-8.66	1.33	-1.20	*-4.63*	0.000	0.000
Medium Trucks:	79.45	-22.64	1.37	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-20.62	1.36	-1.20	*-5.46*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	59.9	58.9	55.5	52.3	60.3	60.6
Medium Trucks:	57.0	56.0	50.0	50.2	57.8	58.0
Heavy Trucks:	63.8	62.6	51.9	58.7	65.7	65.8
Vehicle Noise:	65.9	64.7	57.8	60.1	67.3	67.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	31	67	144	311
CNEL:	32	68	147	317

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: HY(2045) | *Project Name:* Hillwood Ethanac
Road Name: Trumble Rd. | *Job Number:* 15109
Road Segment: n/o Ethanac Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	3,411 vehicles
Peak Hour Percentage:	8.30%
Peak Hour Volume:	283 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	47.0 feet
Centerline Dist. to Observer:	47.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.2%	9.0%	12.8%	94.72%
Medium Trucks:	79.4%	5.0%	15.6%	2.75%
Heavy Trucks:	75.2%	1.6%	23.2%	2.54%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	40.112
Medium Trucks:	39.891
Heavy Trucks:	39.913

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	-7.55	1.33	-1.20	*-4.63*	0.000	0.000
Medium Trucks:	79.45	-22.93	1.37	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-23.28	1.36	-1.20	*-5.46*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	61.0	60.0	56.6	53.4	61.4	61.7
Medium Trucks:	56.7	55.7	49.7	49.9	57.5	57.7
Heavy Trucks:	61.1	59.9	49.2	56.1	63.1	63.1
Vehicle Noise:	64.8	63.7	58.0	58.6	66.0	66.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	25	55	117	253
CNEL:	26	56	121	260

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: HY+P(2045) | *Project Name:* Hillwood Ethanac
Road Name: Trumble Rd. | *Job Number:* 15109
Road Segment: n/o Ethanac Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	3,531 vehicles
Peak Hour Percentage:	8.30%
Peak Hour Volume:	293 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	47.0 feet
Centerline Dist. to Observer:	47.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.2%	9.0%	12.8%	91.50%
Medium Trucks:	79.4%	5.0%	15.6%	3.43%
Heavy Trucks:	75.2%	1.6%	23.2%	5.07%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	40.112
Medium Trucks:	39.891
Heavy Trucks:	39.913

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	-7.55	1.33	-1.20	*-4.63*	0.000	0.000
Medium Trucks:	79.45	-21.81	1.37	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-20.12	1.36	-1.20	*-5.46*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	61.0	60.0	56.6	53.4	61.4	61.7
Medium Trucks:	57.8	56.8	50.8	51.0	58.6	58.8
Heavy Trucks:	64.3	63.1	52.4	59.2	66.2	66.3
Vehicle Noise:	66.6	65.5	58.8	60.7	68.0	68.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	34	74	160	344
CNEL:	35	76	163	352

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: Existing(2022) | *Project Name:* Hillwood Ethanac
Road Name: Trumble Rd. | *Job Number:* 15109
Road Segment: s/o Ethanac Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	1,926 vehicles
Peak Hour Percentage:	8.30%
Peak Hour Volume:	160 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	47.0 feet
Centerline Dist. to Observer:	47.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.2%	9.0%	12.8%	94.72%
Medium Trucks:	79.4%	5.0%	15.6%	2.75%
Heavy Trucks:	75.2%	1.6%	23.2%	2.54%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	40.112
Medium Trucks:	39.891
Heavy Trucks:	39.913

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	-10.04	1.33	-1.20	*-4.63*	0.000	0.000
Medium Trucks:	79.45	-25.41	1.37	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-25.76	1.36	-1.20	*-5.46*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	58.6	57.5	54.1	50.9	58.9	59.3
Medium Trucks:	54.2	53.2	47.2	47.4	55.0	55.2
Heavy Trucks:	58.7	57.4	46.7	53.6	60.6	60.6
Vehicle Noise:	62.3	61.2	55.6	56.1	63.5	63.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	17	37	80	173
CNEL:	18	38	83	178

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: E+P | *Project Name:* Hillwood Ethanac
Road Name: Trumble Rd. | *Job Number:* 15109
Road Segment: s/o Ethanac Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	1,926 vehicles
Peak Hour Percentage:	8.30%
Peak Hour Volume:	160 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	47.0 feet
Centerline Dist. to Observer:	47.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.2%	9.0%	12.8%	94.72%
Medium Trucks:	79.4%	5.0%	15.6%	2.75%
Heavy Trucks:	75.2%	1.6%	23.2%	2.54%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	40.112
Medium Trucks:	39.891
Heavy Trucks:	39.913

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	-10.04	1.33	-1.20	*-4.63*	0.000	0.000
Medium Trucks:	79.45	-25.41	1.37	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-25.76	1.36	-1.20	*-5.46*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	58.6	57.5	54.1	50.9	58.9	59.3
Medium Trucks:	54.2	53.2	47.2	47.4	55.0	55.2
Heavy Trucks:	58.7	57.4	46.7	53.6	60.6	60.6
Vehicle Noise:	62.3	61.2	55.6	56.1	63.5	63.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	17	37	80	173
CNEL:	18	38	83	178

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: EAC(2025) | *Project Name:* Hillwood Ethanac
Road Name: Trumble Rd. | *Job Number:* 15109
Road Segment: s/o Ethanac Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,104 vehicles
Peak Hour Percentage:	8.30%
Peak Hour Volume:	175 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	47.0 feet
Centerline Dist. to Observer:	47.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.2%	9.0%	12.8%	94.72%
Medium Trucks:	79.4%	5.0%	15.6%	2.75%
Heavy Trucks:	75.2%	1.6%	23.2%	2.54%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	40.112
Medium Trucks:	39.891
Heavy Trucks:	39.913

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	-9.65	1.33	-1.20	*-4.63*	0.000	0.000
Medium Trucks:	79.45	-25.03	1.37	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-25.37	1.36	-1.20	*-5.46*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	58.9	57.9	54.5	51.3	59.3	59.7
Medium Trucks:	54.6	53.6	47.6	47.8	55.4	55.6
Heavy Trucks:	59.0	57.8	47.1	54.0	61.0	61.0
Vehicle Noise:	62.7	61.6	55.9	56.5	63.9	64.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	18	40	85	183
CNEL:	19	41	88	189

Monday, January 23, 2023

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: EAC+P(2025) | *Project Name:* Hillwood Ethanac
Road Name: Trumble Rd. | *Job Number:* 15109
Road Segment: s/o Ethanac Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,104 vehicles
Peak Hour Percentage:	8.30%
Peak Hour Volume:	175 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	47.0 feet
Centerline Dist. to Observer:	47.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.2%	9.0%	12.8%	94.72%
Medium Trucks:	79.4%	5.0%	15.6%	2.75%
Heavy Trucks:	75.2%	1.6%	23.2%	2.54%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	40.112
Medium Trucks:	39.891
Heavy Trucks:	39.913

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	-9.65	1.33	-1.20	*-4.63*	0.000	0.000
Medium Trucks:	79.45	-25.03	1.37	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-25.37	1.36	-1.20	*-5.46*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	58.9	57.9	54.5	51.3	59.3	59.7
Medium Trucks:	54.6	53.6	47.6	47.8	55.4	55.6
Heavy Trucks:	59.0	57.8	47.1	54.0	61.0	61.0
Vehicle Noise:	62.7	61.6	55.9	56.5	63.9	64.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	18	40	85	183
CNEL:	19	41	88	189

Monday, January 23, 2023

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: HY(2045) | *Project Name:* Hillwood Ethanac
Road Name: Trumble Rd. | *Job Number:* 15109
Road Segment: s/o Ethanac Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,421 vehicles
Peak Hour Percentage:	8.30%
Peak Hour Volume:	201 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	47.0 feet
Centerline Dist. to Observer:	47.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.2%	9.0%	12.8%	94.72%
Medium Trucks:	79.4%	5.0%	15.6%	2.75%
Heavy Trucks:	75.2%	1.6%	23.2%	2.54%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	40.112
Medium Trucks:	39.891
Heavy Trucks:	39.913

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	-9.04	1.33	-1.20	*-4.63*	0.000	0.000
Medium Trucks:	79.45	-24.42	1.37	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-24.77	1.36	-1.20	*-5.46*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	59.6	58.5	55.1	51.9	59.9	60.3
Medium Trucks:	55.2	54.2	48.2	48.4	56.0	56.2
Heavy Trucks:	59.7	58.4	47.7	54.6	61.6	61.6
Vehicle Noise:	63.3	62.2	56.5	57.1	64.5	64.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	20	43	93	201
CNEL:	21	45	96	207

Monday, January 23, 2023

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: HY+P(2045) | *Project Name:* Hillwood Ethanac
Road Name: Trumble Rd. | *Job Number:* 15109
Road Segment: s/o Ethanac Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,421 vehicles
Peak Hour Percentage:	8.30%
Peak Hour Volume:	201 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	47.0 feet
Centerline Dist. to Observer:	47.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.2%	9.0%	12.8%	94.72%
Medium Trucks:	79.4%	5.0%	15.6%	2.75%
Heavy Trucks:	75.2%	1.6%	23.2%	2.54%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	40.112
Medium Trucks:	39.891
Heavy Trucks:	39.913

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	-9.04	1.33	-1.20	*-4.63*	0.000	0.000
Medium Trucks:	79.45	-24.42	1.37	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-24.77	1.36	-1.20	*-5.46*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	59.6	58.5	55.1	51.9	59.9	60.3
Medium Trucks:	55.2	54.2	48.2	48.4	56.0	56.2
Heavy Trucks:	59.7	58.4	47.7	54.6	61.6	61.6
Vehicle Noise:	63.3	62.2	56.5	57.1	64.5	64.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	20	43	93	201
CNEL:	21	45	96	207

Monday, January 23, 2023

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: Existing(2022) | *Project Name:* Hillwood Ethanac
Road Name: Sherman Rd. | *Job Number:* 15109
Road Segment: n/o Ethanac Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	3,714 vehicles
Peak Hour Percentage:	8.30%
Peak Hour Volume:	308 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	33.0 feet
Centerline Dist. to Observer:	33.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.2%	9.0%	12.8%	94.72%
Medium Trucks:	79.4%	5.0%	15.6%	2.75%
Heavy Trucks:	75.2%	1.6%	23.2%	2.54%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	32.833
Medium Trucks:	32.562
Heavy Trucks:	32.589

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	64.30	-6.09	2.64	-1.20	*-4.52*	0.000	0.000
Medium Trucks:	75.75	-21.47	2.69	-1.20	*-4.86*	0.000	0.000
Heavy Trucks:	81.57	-21.82	2.69	-1.20	*-5.69*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	59.6	58.6	55.2	52.0	60.0	60.4
Medium Trucks:	55.8	54.8	48.8	49.0	56.6	56.8
Heavy Trucks:	61.2	60.0	49.3	56.2	63.1	63.2
Vehicle Noise:	64.2	63.1	56.9	58.1	65.5	65.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	16	35	76	164
CNEL:	17	36	78	169

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: E+P | *Project Name:* Hillwood Ethanac
Road Name: Sherman Rd. | *Job Number:* 15109
Road Segment: n/o Ethanac Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	3,714 vehicles
Peak Hour Percentage:	8.30%
Peak Hour Volume:	308 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	33.0 feet
Centerline Dist. to Observer:	33.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.2%	9.0%	12.8%	94.72%
Medium Trucks:	79.4%	5.0%	15.6%	2.75%
Heavy Trucks:	75.2%	1.6%	23.2%	2.54%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	32.833
Medium Trucks:	32.562
Heavy Trucks:	32.589

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	64.30	-6.09	2.64	-1.20	*-4.52*	0.000	0.000
Medium Trucks:	75.75	-21.47	2.69	-1.20	*-4.86*	0.000	0.000
Heavy Trucks:	81.57	-21.82	2.69	-1.20	*-5.69*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	59.6	58.6	55.2	52.0	60.0	60.4
Medium Trucks:	55.8	54.8	48.8	49.0	56.6	56.8
Heavy Trucks:	61.2	60.0	49.3	56.2	63.1	63.2
Vehicle Noise:	64.2	63.1	56.9	58.1	65.5	65.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	16	35	76	164
CNEL:	17	36	78	168

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: EAC(2025) | *Project Name:* Hillwood Ethanac
Road Name: Sherman Rd. | *Job Number:* 15109
Road Segment: n/o Ethanac Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,930 vehicles
Peak Hour Percentage:	8.30%
Peak Hour Volume:	409 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	33.0 feet
Centerline Dist. to Observer:	33.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.2%	9.0%	12.8%	94.72%
Medium Trucks:	79.4%	5.0%	15.6%	2.75%
Heavy Trucks:	75.2%	1.6%	23.2%	2.54%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	32.833
Medium Trucks:	32.562
Heavy Trucks:	32.589

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	64.30	-4.86	2.64	-1.20	*-4.52*	0.000	0.000
Medium Trucks:	75.75	-20.24	2.69	-1.20	*-4.86*	0.000	0.000
Heavy Trucks:	81.57	-20.59	2.69	-1.20	*-5.69*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	60.9	59.8	56.5	53.2	61.2	61.6
Medium Trucks:	57.0	56.0	50.0	50.2	57.8	58.0
Heavy Trucks:	62.5	61.2	50.5	57.4	64.4	64.4
Vehicle Noise:	65.4	64.3	58.2	59.4	66.7	66.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	20	43	92	199
CNEL:	20	44	94	204

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: EAC+P(2025) | *Project Name:* Hillwood Ethanac
Road Name: Sherman Rd. | *Job Number:* 15109
Road Segment: n/o Ethanac Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,930 vehicles
Peak Hour Percentage:	8.30%
Peak Hour Volume:	409 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	33.0 feet
Centerline Dist. to Observer:	33.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.2%	9.0%	12.8%	94.72%
Medium Trucks:	79.4%	5.0%	15.6%	2.75%
Heavy Trucks:	75.2%	1.6%	23.2%	2.54%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	32.833
Medium Trucks:	32.562
Heavy Trucks:	32.589

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	64.30	-4.86	2.64	-1.20	*-4.52*	0.000	0.000
Medium Trucks:	75.75	-20.24	2.69	-1.20	*-4.86*	0.000	0.000
Heavy Trucks:	81.57	-20.59	2.69	-1.20	*-5.69*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	60.9	59.8	56.5	53.2	61.2	61.6
Medium Trucks:	57.0	56.0	50.0	50.2	57.8	58.0
Heavy Trucks:	62.5	61.2	50.5	57.4	64.4	64.4
Vehicle Noise:	65.4	64.3	58.2	59.4	66.7	66.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	20	43	92	199
CNEL:	20	44	94	204

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: HY(2045) | *Project Name:* Hillwood Ethanac
Road Name: Sherman Rd. | *Job Number:* 15109
Road Segment: n/o Ethanac Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	14,781 vehicles
Peak Hour Percentage:	8.30%
Peak Hour Volume:	1,227 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	33.0 feet
Centerline Dist. to Observer:	33.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.2%	9.0%	12.8%	94.72%
Medium Trucks:	79.4%	5.0%	15.6%	2.75%
Heavy Trucks:	75.2%	1.6%	23.2%	2.54%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	32.833
Medium Trucks:	32.562
Heavy Trucks:	32.589

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	64.30	-0.09	2.64	-1.20	*-4.52*	0.000	0.000
Medium Trucks:	75.75	-15.47	2.69	-1.20	*-4.86*	0.000	0.000
Heavy Trucks:	81.57	-15.82	2.69	-1.20	*-5.69*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	65.6	64.6	61.2	58.0	66.0	66.4
Medium Trucks:	61.8	60.8	54.8	55.0	62.6	62.8
Heavy Trucks:	67.2	66.0	55.3	62.2	69.1	69.2
Vehicle Noise:	70.2	69.1	62.9	64.1	71.5	71.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	41	89	192	413
CNEL:	42	91	196	423

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: HY+P(2045) | *Project Name:* Hillwood Ethanac
Road Name: Sherman Rd. | *Job Number:* 15109
Road Segment: n/o Ethanac Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	14,781 vehicles
Peak Hour Percentage:	8.30%
Peak Hour Volume:	1,227 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	33.0 feet
Centerline Dist. to Observer:	33.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.2%	9.0%	12.8%	94.72%
Medium Trucks:	79.4%	5.0%	15.6%	2.75%
Heavy Trucks:	75.2%	1.6%	23.2%	2.54%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	32.833
Medium Trucks:	32.562
Heavy Trucks:	32.589

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	64.30	-0.09	2.64	-1.20	*-4.52*	0.000	0.000
Medium Trucks:	75.75	-15.47	2.69	-1.20	*-4.86*	0.000	0.000
Heavy Trucks:	81.57	-15.82	2.69	-1.20	*-5.69*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	65.6	64.6	61.2	58.0	66.0	66.4
Medium Trucks:	61.8	60.8	54.8	55.0	62.6	62.8
Heavy Trucks:	67.2	66.0	55.3	62.2	69.1	69.2
Vehicle Noise:	70.2	69.1	62.9	64.1	71.5	71.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	41	89	192	413
CNEL:	42	91	196	423

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: Existing(2022) | *Project Name:* Hillwood Ethanac
Road Name: Sherman Rd. | *Job Number:* 15109
Road Segment: s/o Ethanac Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	518 vehicles
Peak Hour Percentage:	8.30%
Peak Hour Volume:	43 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	33.0 feet
Centerline Dist. to Observer:	33.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.2%	9.0%	12.8%	94.72%
Medium Trucks:	79.4%	5.0%	15.6%	2.75%
Heavy Trucks:	75.2%	1.6%	23.2%	2.54%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	32.833
Medium Trucks:	32.562
Heavy Trucks:	32.589

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	64.30	-14.65	2.64	-1.20	*-4.52*	0.000	0.000
Medium Trucks:	75.75	-30.03	2.69	-1.20	*-4.86*	0.000	0.000
Heavy Trucks:	81.57	-30.37	2.69	-1.20	*-5.69*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	51.1	50.0	46.7	43.4	51.4	51.8
Medium Trucks:	47.2	46.2	40.2	40.4	48.0	48.2
Heavy Trucks:	52.7	51.5	40.7	47.6	54.6	54.6
Vehicle Noise:	55.6	54.5	48.4	49.6	56.9	57.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	4	10	21	44
CNEL:	5	10	21	45

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: E+P | *Project Name:* Hillwood Ethanac
Road Name: Sherman Rd. | *Job Number:* 15109
Road Segment: s/o Ethanac Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	518 vehicles
Peak Hour Percentage:	8.30%
Peak Hour Volume:	43 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	33.0 feet
Centerline Dist. to Observer:	33.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.2%	9.0%	12.8%	94.72%
Medium Trucks:	79.4%	5.0%	15.6%	2.75%
Heavy Trucks:	75.2%	1.6%	23.2%	2.54%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	32.833
Medium Trucks:	32.562
Heavy Trucks:	32.589

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	64.30	-14.65	2.64	-1.20	*-4.52*	0.000	0.000
Medium Trucks:	75.75	-30.03	2.69	-1.20	*-4.86*	0.000	0.000
Heavy Trucks:	81.57	-30.37	2.69	-1.20	*-5.69*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	51.1	50.0	46.7	43.4	51.4	51.8
Medium Trucks:	47.2	46.2	40.2	40.4	48.0	48.2
Heavy Trucks:	52.7	51.5	40.7	47.6	54.6	54.6
Vehicle Noise:	55.6	54.5	48.4	49.6	56.9	57.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	4	10	21	44
CNEL:	5	10	21	45

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: EAC(2025) | *Project Name:* Hillwood Ethanac
Road Name: Sherman Rd. | *Job Number:* 15109
Road Segment: s/o Ethanac Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	6,354 vehicles
Peak Hour Percentage:	8.30%
Peak Hour Volume:	527 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	33.0 feet
Centerline Dist. to Observer:	33.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.2%	9.0%	12.8%	94.72%
Medium Trucks:	79.4%	5.0%	15.6%	2.75%
Heavy Trucks:	75.2%	1.6%	23.2%	2.54%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	32.833
Medium Trucks:	32.562
Heavy Trucks:	32.589

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	64.30	-3.76	2.64	-1.20	*-4.52*	0.000	0.000
Medium Trucks:	75.75	-19.14	2.69	-1.20	*-4.86*	0.000	0.000
Heavy Trucks:	81.57	-19.48	2.69	-1.20	*-5.69*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	62.0	60.9	57.6	54.3	62.3	62.7
Medium Trucks:	58.1	57.1	51.1	51.3	58.9	59.1
Heavy Trucks:	63.6	62.3	51.6	58.5	65.5	65.5
Vehicle Noise:	66.5	65.4	59.3	60.5	67.8	68.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	24	51	109	235
CNEL:	24	52	112	241

Monday, January 23, 2023

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: EAC+P(2025) | *Project Name:* Hillwood Ethanac
Road Name: Sherman Rd. | *Job Number:* 15109
Road Segment: s/o Ethanac Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	6,354 vehicles
Peak Hour Percentage:	8.30%
Peak Hour Volume:	527 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	33.0 feet
Centerline Dist. to Observer:	33.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.2%	9.0%	12.8%	94.72%
Medium Trucks:	79.4%	5.0%	15.6%	2.75%
Heavy Trucks:	75.2%	1.6%	23.2%	2.54%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	32.833
Medium Trucks:	32.562
Heavy Trucks:	32.589

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	64.30	-3.76	2.64	-1.20	*-4.52*	0.000	0.000
Medium Trucks:	75.75	-19.14	2.69	-1.20	*-4.86*	0.000	0.000
Heavy Trucks:	81.57	-19.48	2.69	-1.20	*-5.69*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	62.0	60.9	57.6	54.3	62.3	62.7
Medium Trucks:	58.1	57.1	51.1	51.3	58.9	59.1
Heavy Trucks:	63.6	62.3	51.6	58.5	65.5	65.5
Vehicle Noise:	66.5	65.4	59.3	60.5	67.8	68.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	24	51	109	235
CNEL:	24	52	112	241

Monday, January 23, 2023

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: HY(2045) | *Project Name:* Hillwood Ethanac
Road Name: Sherman Rd. | *Job Number:* 15109
Road Segment: s/o Ethanac Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	6,440 vehicles
Peak Hour Percentage:	8.30%
Peak Hour Volume:	534 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	33.0 feet
Centerline Dist. to Observer:	33.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.2%	9.0%	12.8%	94.72%
Medium Trucks:	79.4%	5.0%	15.6%	2.75%
Heavy Trucks:	75.2%	1.6%	23.2%	2.54%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	32.833
Medium Trucks:	32.562
Heavy Trucks:	32.589

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	64.30	-3.70	2.64	-1.20	*-4.52*	0.000	0.000
Medium Trucks:	75.75	-19.08	2.69	-1.20	*-4.86*	0.000	0.000
Heavy Trucks:	81.57	-19.43	2.69	-1.20	*-5.69*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	62.0	61.0	57.6	54.4	62.4	62.7
Medium Trucks:	58.2	57.2	51.2	51.4	59.0	59.2
Heavy Trucks:	63.6	62.4	51.7	58.6	65.5	65.6
Vehicle Noise:	66.6	65.5	59.3	60.5	67.8	68.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	24	51	110	237
CNEL:	24	52	113	243

Monday, January 23, 2023

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: HY+P(2045) | *Project Name:* Hillwood Ethanac
Road Name: Sherman Rd. | *Job Number:* 15109
Road Segment: s/o Ethanac Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	6,440 vehicles
Peak Hour Percentage:	8.30%
Peak Hour Volume:	534 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	33.0 feet
Centerline Dist. to Observer:	33.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.2%	9.0%	12.8%	94.72%
Medium Trucks:	79.4%	5.0%	15.6%	2.75%
Heavy Trucks:	75.2%	1.6%	23.2%	2.54%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	32.833
Medium Trucks:	32.562
Heavy Trucks:	32.589

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	64.30	-3.70	2.64	-1.20	*-4.52*	0.000	0.000
Medium Trucks:	75.75	-19.08	2.69	-1.20	*-4.86*	0.000	0.000
Heavy Trucks:	81.57	-19.43	2.69	-1.20	*-5.69*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	62.0	61.0	57.6	54.4	62.4	62.7
Medium Trucks:	58.2	57.2	51.2	51.4	59.0	59.2
Heavy Trucks:	63.6	62.4	51.7	58.6	65.5	65.6
Vehicle Noise:	66.6	65.5	59.3	60.5	67.8	68.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	24	51	110	237
CNEL:	24	52	113	243

Monday, January 23, 2023

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: Existing(2022) | *Project Name:* Hillwood Ethanac
Road Name: Ethanac Rd. | *Job Number:* 15109
Road Segment: w/o Trumble Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	13,192 vehicles
Peak Hour Percentage:	8.30%
Peak Hour Volume:	1,095 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	124 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	92.0 feet
Centerline Dist. to Observer:	92.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.2%	9.0%	12.8%	94.72%
Medium Trucks:	79.4%	5.0%	15.6%	2.75%
Heavy Trucks:	75.2%	1.6%	23.2%	2.54%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	68.154
Medium Trucks:	68.024
Heavy Trucks:	68.037

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	-1.68	-2.12	-1.20	*-4.76*	0.000	0.000
Medium Trucks:	79.45	-17.06	-2.11	-1.20	*-4.88*	0.000	0.000
Heavy Trucks:	84.25	-17.40	-2.11	-1.20	*-5.18*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	63.5	62.4	59.0	55.8	63.8	64.2
Medium Trucks:	59.1	58.1	52.1	52.3	59.9	60.1
Heavy Trucks:	63.5	62.3	51.6	58.5	65.5	65.5
Vehicle Noise:	67.2	66.1	60.5	61.0	68.4	68.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	72	154	333	717
CNEL:	74	159	342	738

Monday, January 23, 2023

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: E+P | *Project Name:* Hillwood Ethanac
Road Name: Ethanac Rd. | *Job Number:* 15109
Road Segment: w/o Trumble Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	13,499 vehicles
Peak Hour Percentage:	8.30%
Peak Hour Volume:	1,120 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	124 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	92.0 feet
Centerline Dist. to Observer:	92.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.2%	9.0%	12.8%	93.95%
Medium Trucks:	79.4%	5.0%	15.6%	2.89%
Heavy Trucks:	75.2%	1.6%	23.2%	3.16%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	68.154
Medium Trucks:	68.024
Heavy Trucks:	68.037

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	-1.61	-2.12	-1.20	*-4.76*	0.000	0.000
Medium Trucks:	79.45	-16.74	-2.11	-1.20	*-4.88*	0.000	0.000
Heavy Trucks:	84.25	-16.34	-2.11	-1.20	*-5.18*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	63.5	62.5	59.1	55.9	63.9	64.2
Medium Trucks:	59.4	58.4	52.4	52.6	60.2	60.4
Heavy Trucks:	64.6	63.4	52.7	59.5	66.5	66.6
Vehicle Noise:	67.8	66.7	60.7	61.7	69.0	69.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	79	170	367	790
CNEL:	81	175	376	811

Monday, January 23, 2023

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: EAC(2025) | *Project Name:* Hillwood Ethanac
Road Name: Ethanac Rd. | *Job Number:* 15109
Road Segment: w/o Trumble Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	36,207 vehicles
Peak Hour Percentage:	8.30%
Peak Hour Volume:	3,005 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	124 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	92.0 feet
Centerline Dist. to Observer:	92.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.2%	9.0%	12.8%	94.72%
Medium Trucks:	79.4%	5.0%	15.6%	2.75%
Heavy Trucks:	75.2%	1.6%	23.2%	2.54%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	68.154
Medium Trucks:	68.024
Heavy Trucks:	68.037

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	2.71	-2.12	-1.20	*-4.76*	0.000	0.000
Medium Trucks:	79.45	-12.67	-2.11	-1.20	*-4.88*	0.000	0.000
Heavy Trucks:	84.25	-13.02	-2.11	-1.20	*-5.18*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	67.8	66.8	63.4	60.2	68.2	68.6
Medium Trucks:	63.5	62.5	56.5	56.7	64.3	64.5
Heavy Trucks:	67.9	66.7	56.0	62.9	69.8	69.9
Vehicle Noise:	71.6	70.5	64.8	65.4	72.8	72.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	141	303	652	1,406
CNEL:	145	312	671	1,446

Monday, January 23, 2023

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: EAC+P(2025) | *Project Name:* Hillwood Ethanac
Road Name: Ethanac Rd. | *Job Number:* 15109
Road Segment: w/o Trumble Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	36,514 vehicles
Peak Hour Percentage:	8.30%
Peak Hour Volume:	3,031 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	124 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	92.0 feet
Centerline Dist. to Observer:	92.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.2%	9.0%	12.8%	94.43%
Medium Trucks:	79.4%	5.0%	15.6%	2.80%
Heavy Trucks:	75.2%	1.6%	23.2%	2.77%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	68.154
Medium Trucks:	68.024
Heavy Trucks:	68.037

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	2.73	-2.12	-1.20	*-4.76*	0.000	0.000
Medium Trucks:	79.45	-12.55	-2.11	-1.20	*-4.88*	0.000	0.000
Heavy Trucks:	84.25	-12.60	-2.11	-1.20	*-5.18*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	67.9	66.8	63.5	60.2	68.2	68.6
Medium Trucks:	63.6	62.6	56.6	56.8	64.4	64.6
Heavy Trucks:	68.3	67.1	56.4	63.3	70.3	70.3
Vehicle Noise:	71.8	70.7	64.9	65.6	73.0	73.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	146	314	677	1,459
CNEL:	150	323	696	1,499

Monday, January 23, 2023

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: HY(2045) | *Project Name:* Hillwood Ethanac
Road Name: Ethanac Rd. | *Job Number:* 15109
Road Segment: w/o Trumble Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	85,382 vehicles
Peak Hour Percentage:	8.30%
Peak Hour Volume:	7,087 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	124 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	92.0 feet
Centerline Dist. to Observer:	92.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.2%	9.0%	12.8%	94.72%
Medium Trucks:	79.4%	5.0%	15.6%	2.75%
Heavy Trucks:	75.2%	1.6%	23.2%	2.54%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	68.154
Medium Trucks:	68.024
Heavy Trucks:	68.037

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	6.43	-2.12	-1.20	*-4.76*	0.000	0.000
Medium Trucks:	79.45	-8.95	-2.11	-1.20	*-4.88*	0.000	0.000
Heavy Trucks:	84.25	-9.29	-2.11	-1.20	*-5.18*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	71.6	70.5	67.2	63.9	71.9	72.3
Medium Trucks:	67.2	66.2	60.2	60.4	68.0	68.2
Heavy Trucks:	71.7	70.4	59.7	66.6	73.6	73.6
Vehicle Noise:	75.3	74.2	68.6	69.1	76.5	76.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	249	536	1,156	2,490
CNEL:	256	552	1,189	2,562

Monday, January 23, 2023

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: HY+P(2045) | *Project Name:* Hillwood Ethanac
Road Name: Ethanac Rd. | *Job Number:* 15109
Road Segment: w/o Trumble Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	85,689 vehicles
Peak Hour Percentage:	8.30%
Peak Hour Volume:	7,112 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	124 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	92.0 feet
Centerline Dist. to Observer:	92.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.2%	9.0%	12.8%	94.60%
Medium Trucks:	79.4%	5.0%	15.6%	2.77%
Heavy Trucks:	75.2%	1.6%	23.2%	2.63%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	68.154
Medium Trucks:	68.024
Heavy Trucks:	68.037

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	6.44	-2.12	-1.20	*-4.76*	0.000	0.000
Medium Trucks:	79.45	-8.90	-2.11	-1.20	*-4.88*	0.000	0.000
Heavy Trucks:	84.25	-9.11	-2.11	-1.20	*-5.18*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	71.6	70.5	67.2	63.9	71.9	72.3
Medium Trucks:	67.2	66.3	60.3	60.4	68.1	68.3
Heavy Trucks:	71.8	70.6	59.9	66.8	73.7	73.8
Vehicle Noise:	75.4	74.3	68.6	69.2	76.6	76.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	253	545	1,174	2,530
CNEL:	260	561	1,208	2,602

Monday, January 23, 2023

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: Existing(2022) | *Project Name:* Hillwood Ethanac
Road Name: Ethanac Rd. | *Job Number:* 15109
Road Segment: e/o Trumble Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	12,383 vehicles
Peak Hour Percentage:	8.30%
Peak Hour Volume:	1,028 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	124 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	92.0 feet
Centerline Dist. to Observer:	92.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.2%	9.0%	12.8%	94.72%
Medium Trucks:	79.4%	5.0%	15.6%	2.75%
Heavy Trucks:	75.2%	1.6%	23.2%	2.54%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	68.154
Medium Trucks:	68.024
Heavy Trucks:	68.037

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	-1.95	-2.12	-1.20	*-4.76*	0.000	0.000
Medium Trucks:	79.45	-17.33	-2.11	-1.20	*-4.88*	0.000	0.000
Heavy Trucks:	84.25	-17.68	-2.11	-1.20	*-5.18*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	63.2	62.1	58.8	55.5	63.5	63.9
Medium Trucks:	58.8	57.8	51.8	52.0	59.6	59.8
Heavy Trucks:	63.3	62.0	51.3	58.2	65.2	65.2
Vehicle Noise:	67.0	65.8	60.2	60.7	68.1	68.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	69	148	319	687
CNEL:	71	152	328	707

Monday, January 23, 2023

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: E+P | *Project Name:* Hillwood Ethanac
Road Name: Ethanac Rd. | *Job Number:* 15109
Road Segment: e/o Trumble Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	12,757 vehicles
Peak Hour Percentage:	8.30%
Peak Hour Volume:	1,059 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	124 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	92.0 feet
Centerline Dist. to Observer:	92.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.2%	9.0%	12.8%	94.87%
Medium Trucks:	79.4%	5.0%	15.6%	2.67%
Heavy Trucks:	75.2%	1.6%	23.2%	2.46%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	68.154
Medium Trucks:	68.024
Heavy Trucks:	68.037

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	-1.82	-2.12	-1.20	*-4.76*	0.000	0.000
Medium Trucks:	79.45	-17.33	-2.11	-1.20	*-4.88*	0.000	0.000
Heavy Trucks:	84.25	-17.68	-2.11	-1.20	*-5.18*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	63.3	62.3	58.9	55.7	63.7	64.0
Medium Trucks:	58.8	57.8	51.8	52.0	59.6	59.8
Heavy Trucks:	63.3	62.0	51.3	58.2	65.2	65.2
Vehicle Noise:	67.0	65.9	60.3	60.7	68.1	68.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	69	149	321	692
CNEL:	71	154	331	713

Monday, January 23, 2023

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: EAC(2025) *Project Name:* Hillwood Ethanac
Road Name: Ethanac Rd. *Job Number:* 15109
Road Segment: e/o Trumble Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	35,192 vehicles
Peak Hour Percentage:	8.30%
Peak Hour Volume:	2,921 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	124 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	92.0 feet
Centerline Dist. to Observer:	92.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.2%	9.0%	12.8%	94.72%
Medium Trucks:	79.4%	5.0%	15.6%	2.75%
Heavy Trucks:	75.2%	1.6%	23.2%	2.54%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	68.154
Medium Trucks:	68.024
Heavy Trucks:	68.037

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	2.58	-2.12	-1.20	*-4.76*	0.000	0.000
Medium Trucks:	79.45	-12.80	-2.11	-1.20	*-4.88*	0.000	0.000
Heavy Trucks:	84.25	-13.14	-2.11	-1.20	*-5.18*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	67.7	66.7	63.3	60.1	68.1	68.4
Medium Trucks:	63.3	62.4	56.4	56.5	64.2	64.4
Heavy Trucks:	67.8	66.6	55.9	62.7	69.7	69.8
Vehicle Noise:	71.5	70.4	64.7	65.2	72.6	72.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	138	297	640	1,379
CNEL:	142	306	659	1,419

Monday, January 23, 2023

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: EAC+P(2025) *Project Name:* Hillwood Ethanac
Road Name: Ethanac Rd. *Job Number:* 15109
Road Segment: e/o Trumble Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	35,565 vehicles
Peak Hour Percentage:	8.30%
Peak Hour Volume:	2,952 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	124 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	92.0 feet
Centerline Dist. to Observer:	92.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.2%	9.0%	12.8%	94.77%
Medium Trucks:	79.4%	5.0%	15.6%	2.72%
Heavy Trucks:	75.2%	1.6%	23.2%	2.51%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	68.154
Medium Trucks:	68.024
Heavy Trucks:	68.037

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	2.63	-2.12	-1.20	*-4.76*	0.000	0.000
Medium Trucks:	79.45	-12.80	-2.11	-1.20	*-4.88*	0.000	0.000
Heavy Trucks:	84.25	-13.14	-2.11	-1.20	*-5.18*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	67.8	66.7	63.4	60.1	68.1	68.5
Medium Trucks:	63.3	62.4	56.4	56.5	64.2	64.4
Heavy Trucks:	67.8	66.6	55.9	62.7	69.7	69.8
Vehicle Noise:	71.5	70.4	64.7	65.3	72.7	72.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	138	298	642	1,383
CNEL:	142	307	660	1,423

Monday, January 23, 2023

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: HY(2045) *Project Name:* Hillwood Ethanac
Road Name: Ethanac Rd. *Job Number:* 15109
Road Segment: e/o Trumble Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	78,372 vehicles
Peak Hour Percentage:	8.30%
Peak Hour Volume:	6,505 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	124 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	92.0 feet
Centerline Dist. to Observer:	92.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.2%	9.0%	12.8%	94.72%
Medium Trucks:	79.4%	5.0%	15.6%	2.75%
Heavy Trucks:	75.2%	1.6%	23.2%	2.54%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	68.154
Medium Trucks:	68.024
Heavy Trucks:	68.037

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	6.06	-2.12	-1.20	*-4.76*	0.000	0.000
Medium Trucks:	79.45	-9.32	-2.11	-1.20	*-4.88*	0.000	0.000
Heavy Trucks:	84.25	-9.66	-2.11	-1.20	*-5.18*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	71.2	70.1	66.8	63.5	71.5	71.9
Medium Trucks:	66.8	65.8	59.9	60.0	67.6	67.8
Heavy Trucks:	71.3	70.1	59.3	66.2	73.2	73.2
Vehicle Noise:	75.0	73.9	68.2	68.7	76.1	76.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	235	507	1,092	2,352
CNEL:	242	521	1,123	2,420

Monday, January 23, 2023

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: HY+P(2045) *Project Name:* Hillwood Ethanac
Road Name: Ethanac Rd. *Job Number:* 15109
Road Segment: e/o Trumble Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	78,746 vehicles
Peak Hour Percentage:	8.30%
Peak Hour Volume:	6,536 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	124 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	92.0 feet
Centerline Dist. to Observer:	92.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.2%	9.0%	12.8%	94.74%
Medium Trucks:	79.4%	5.0%	15.6%	2.73%
Heavy Trucks:	75.2%	1.6%	23.2%	2.52%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	68.154
Medium Trucks:	68.024
Heavy Trucks:	68.037

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	6.08	-2.12	-1.20	*-4.76*	0.000	0.000
Medium Trucks:	79.45	-9.32	-2.11	-1.20	*-4.88*	0.000	0.000
Heavy Trucks:	84.25	-9.66	-2.11	-1.20	*-5.18*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	71.2	70.2	66.8	63.6	71.6	71.9
Medium Trucks:	66.8	65.8	59.9	60.0	67.6	67.8
Heavy Trucks:	71.3	70.1	59.3	66.2	73.2	73.2
Vehicle Noise:	75.0	73.9	68.2	68.7	76.1	76.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	235	507	1,093	2,355
CNEL:	242	522	1,125	2,423

Monday, January 23, 2023

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: Existing(2022) | *Project Name:* Hillwood Ethanac
Road Name: Ethanac Rd. | *Job Number:* 15109
Road Segment: w/o Sherman Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	12,383 vehicles
Peak Hour Percentage:	8.30%
Peak Hour Volume:	1,028 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	124 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	92.0 feet
Centerline Dist. to Observer:	92.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.2%	9.0%	12.8%	94.72%
Medium Trucks:	79.4%	5.0%	15.6%	2.75%
Heavy Trucks:	75.2%	1.6%	23.2%	2.54%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	68.154
Medium Trucks:	68.024
Heavy Trucks:	68.037

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	-1.95	-2.12	-1.20	*-4.76*	0.000	0.000
Medium Trucks:	79.45	-17.33	-2.11	-1.20	*-4.88*	0.000	0.000
Heavy Trucks:	84.25	-17.68	-2.11	-1.20	*-5.18*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	63.2	62.1	58.8	55.5	63.5	63.9
Medium Trucks:	58.8	57.8	51.8	52.0	59.6	59.8
Heavy Trucks:	63.3	62.0	51.3	58.2	65.2	65.2
Vehicle Noise:	67.0	65.8	60.2	60.7	68.1	68.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	69	148	319	687
CNEL:	71	152	328	707

Monday, January 23, 2023

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: E+P | *Project Name:* Hillwood Ethanac
Road Name: Ethanac Rd. | *Job Number:* 15109
Road Segment: w/o Sherman Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	12,694 vehicles
Peak Hour Percentage:	8.30%
Peak Hour Volume:	1,054 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	124 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	92.0 feet
Centerline Dist. to Observer:	92.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.2%	9.0%	12.8%	94.85%
Medium Trucks:	79.4%	5.0%	15.6%	2.68%
Heavy Trucks:	75.2%	1.6%	23.2%	2.47%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	68.154
Medium Trucks:	68.024
Heavy Trucks:	68.037

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	-1.84	-2.12	-1.20	*-4.76*	0.000	0.000
Medium Trucks:	79.45	-17.33	-2.11	-1.20	*-4.88*	0.000	0.000
Heavy Trucks:	84.25	-17.68	-2.11	-1.20	*-5.18*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	63.3	62.2	58.9	55.6	63.6	64.0
Medium Trucks:	58.8	57.8	51.8	52.0	59.6	59.8
Heavy Trucks:	63.3	62.0	51.3	58.2	65.2	65.2
Vehicle Noise:	67.0	65.9	60.3	60.7	68.1	68.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	69	149	321	692
CNEL:	71	153	330	712

Monday, January 23, 2023

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: EAC(2025) | *Project Name:* Hillwood Ethanac
Road Name: Ethanac Rd. | *Job Number:* 15109
Road Segment: w/o Sherman Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	35,192 vehicles
Peak Hour Percentage:	8.30%
Peak Hour Volume:	2,921 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	124 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	92.0 feet
Centerline Dist. to Observer:	92.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.2%	9.0%	12.8%	94.72%
Medium Trucks:	79.4%	5.0%	15.6%	2.75%
Heavy Trucks:	75.2%	1.6%	23.2%	2.54%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	68.154
Medium Trucks:	68.024
Heavy Trucks:	68.037

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	2.58	-2.12	-1.20	*-4.76*	0.000	0.000
Medium Trucks:	79.45	-12.80	-2.11	-1.20	*-4.88*	0.000	0.000
Heavy Trucks:	84.25	-13.14	-2.11	-1.20	*-5.18*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	67.7	66.7	63.3	60.1	68.1	68.4
Medium Trucks:	63.3	62.4	56.4	56.5	64.2	64.4
Heavy Trucks:	67.8	66.6	55.9	62.7	69.7	69.8
Vehicle Noise:	71.5	70.4	64.7	65.2	72.6	72.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	138	297	640	1,379
CNEL:	142	306	659	1,419

Monday, January 23, 2023

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: EAC+P(2025) | *Project Name:* Hillwood Ethanac
Road Name: Ethanac Rd. | *Job Number:* 15109
Road Segment: w/o Sherman Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	35,503 vehicles
Peak Hour Percentage:	8.30%
Peak Hour Volume:	2,947 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	124 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	92.0 feet
Centerline Dist. to Observer:	92.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.2%	9.0%	12.8%	94.76%
Medium Trucks:	79.4%	5.0%	15.6%	2.72%
Heavy Trucks:	75.2%	1.6%	23.2%	2.51%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	68.154
Medium Trucks:	68.024
Heavy Trucks:	68.037

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	2.62	-2.12	-1.20	*-4.76*	0.000	0.000
Medium Trucks:	79.45	-12.80	-2.11	-1.20	*-4.88*	0.000	0.000
Heavy Trucks:	84.25	-13.14	-2.11	-1.20	*-5.18*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	67.8	66.7	63.3	60.1	68.1	68.5
Medium Trucks:	63.3	62.4	56.4	56.5	64.2	64.4
Heavy Trucks:	67.8	66.6	55.9	62.7	69.7	69.8
Vehicle Noise:	71.5	70.4	64.7	65.2	72.7	72.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	138	298	642	1,382
CNEL:	142	306	660	1,422

Monday, January 23, 2023

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: HY(2045) *Project Name:* Hillwood Ethanac
Road Name: Ethanac Rd. *Job Number:* 15109
Road Segment: w/o Sherman Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	78,372 vehicles
Peak Hour Percentage:	8.30%
Peak Hour Volume:	6,505 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	124 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	92.0 feet
Centerline Dist. to Observer:	92.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.2%	9.0%	12.8%	94.72%
Medium Trucks:	79.4%	5.0%	15.6%	2.75%
Heavy Trucks:	75.2%	1.6%	23.2%	2.54%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	68.154
Medium Trucks:	68.024
Heavy Trucks:	68.037

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	6.06	-2.12	-1.20	*-4.76*	0.000	0.000
Medium Trucks:	79.45	-9.32	-2.11	-1.20	*-4.88*	0.000	0.000
Heavy Trucks:	84.25	-9.66	-2.11	-1.20	*-5.18*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	71.2	70.1	66.8	63.5	71.5	71.9
Medium Trucks:	66.8	65.8	59.9	60.0	67.6	67.8
Heavy Trucks:	71.3	70.1	59.3	66.2	73.2	73.2
Vehicle Noise:	75.0	73.9	68.2	68.7	76.1	76.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	235	507	1,092	2,352
CNEL:	242	521	1,123	2,420

Monday, January 23, 2023

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: HY+P(2045) *Project Name:* Hillwood Ethanac
Road Name: Ethanac Rd. *Job Number:* 15109
Road Segment: w/o Sherman Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	78,684 vehicles
Peak Hour Percentage:	8.30%
Peak Hour Volume:	6,531 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	124 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	92.0 feet
Centerline Dist. to Observer:	92.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.2%	9.0%	12.8%	94.74%
Medium Trucks:	79.4%	5.0%	15.6%	2.74%
Heavy Trucks:	75.2%	1.6%	23.2%	2.53%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	68.154
Medium Trucks:	68.024
Heavy Trucks:	68.037

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	6.08	-2.12	-1.20	*-4.76*	0.000	0.000
Medium Trucks:	79.45	-9.32	-2.11	-1.20	*-4.88*	0.000	0.000
Heavy Trucks:	84.25	-9.66	-2.11	-1.20	*-5.18*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	71.2	70.2	66.8	63.6	71.6	71.9
Medium Trucks:	66.8	65.8	59.9	60.0	67.6	67.8
Heavy Trucks:	71.3	70.1	59.3	66.2	73.2	73.2
Vehicle Noise:	75.0	73.9	68.2	68.7	76.1	76.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	235	507	1,093	2,354
CNEL:	242	522	1,124	2,422

Monday, January 23, 2023

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: Existing(2022) *Project Name:* Hillwood Ethanac
Road Name: Ethanac Rd. *Job Number:* 15109
Road Segment: e/o Sherman Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,655 vehicles
Peak Hour Percentage:	8.30%
Peak Hour Volume:	635 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	124 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	92.0 feet
Centerline Dist. to Observer:	92.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.2%	9.0%	12.8%	94.72%
Medium Trucks:	79.4%	5.0%	15.6%	2.75%
Heavy Trucks:	75.2%	1.6%	23.2%	2.54%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	68.154
Medium Trucks:	68.024
Heavy Trucks:	68.037

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	-4.04	-2.12	-1.20	*-4.76*	0.000	0.000
Medium Trucks:	79.45	-19.42	-2.11	-1.20	*-4.88*	0.000	0.000
Heavy Trucks:	84.25	-19.77	-2.11	-1.20	*-5.18*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	61.1	60.0	56.7	53.4	61.4	61.8
Medium Trucks:	56.7	55.7	49.7	49.9	57.5	57.7
Heavy Trucks:	61.2	60.0	49.2	56.1	63.1	63.1
Vehicle Noise:	64.9	63.8	58.1	58.6	66.0	66.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	50	107	232	499
CNEL:	51	111	238	513

Monday, January 23, 2023

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: E+P *Project Name:* Hillwood Ethanac
Road Name: Ethanac Rd. *Job Number:* 15109
Road Segment: e/o Sherman Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,780 vehicles
Peak Hour Percentage:	8.30%
Peak Hour Volume:	646 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	124 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	92.0 feet
Centerline Dist. to Observer:	92.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.2%	9.0%	12.8%	94.80%
Medium Trucks:	79.4%	5.0%	15.6%	2.70%
Heavy Trucks:	75.2%	1.6%	23.2%	2.50%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	68.154
Medium Trucks:	68.024
Heavy Trucks:	68.037

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	-3.97	-2.12	-1.20	*-4.76*	0.000	0.000
Medium Trucks:	79.45	-19.42	-2.11	-1.20	*-4.88*	0.000	0.000
Heavy Trucks:	84.25	-19.77	-2.11	-1.20	*-5.18*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	61.2	60.1	56.8	53.5	61.5	61.9
Medium Trucks:	56.7	55.7	49.7	49.9	57.5	57.7
Heavy Trucks:	61.2	60.0	49.2	56.1	63.1	63.1
Vehicle Noise:	64.9	63.8	58.1	58.6	66.0	66.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	50	108	232	501
CNEL:	52	111	239	515

Monday, January 23, 2023

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: EAC(2025) *Project Name:* Hillwood Ethanac
Road Name: Ethanac Rd. *Job Number:* 15109
Road Segment: e/o Sherman Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	23,365 vehicles
Peak Hour Percentage:	8.30%
Peak Hour Volume:	1,939 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	124 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	92.0 feet
Centerline Dist. to Observer:	92.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.2%	9.0%	12.8%	94.72%
Medium Trucks:	79.4%	5.0%	15.6%	2.75%
Heavy Trucks:	75.2%	1.6%	23.2%	2.54%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	68.154
Medium Trucks:	68.024
Heavy Trucks:	68.037

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	0.80	-2.12	-1.20	*-4.76*	0.000	0.000
Medium Trucks:	79.45	-14.57	-2.11	-1.20	*-4.88*	0.000	0.000
Heavy Trucks:	84.25	-14.92	-2.11	-1.20	*-5.18*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	65.9	64.9	61.5	58.3	66.3	66.7
Medium Trucks:	61.6	60.6	54.6	54.8	62.4	62.6
Heavy Trucks:	66.0	64.8	54.1	61.0	67.9	68.0
Vehicle Noise:	69.7	68.6	62.9	63.5	70.9	71.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	105	226	487	1,050
CNEL:	108	233	501	1,080

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: EAC+P(2025) *Project Name:* Hillwood Ethanac
Road Name: Ethanac Rd. *Job Number:* 15109
Road Segment: e/o Sherman Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	23,490 vehicles
Peak Hour Percentage:	8.30%
Peak Hour Volume:	1,950 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	124 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	92.0 feet
Centerline Dist. to Observer:	92.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.2%	9.0%	12.8%	94.75%
Medium Trucks:	79.4%	5.0%	15.6%	2.73%
Heavy Trucks:	75.2%	1.6%	23.2%	2.52%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	68.154
Medium Trucks:	68.024
Heavy Trucks:	68.037

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	0.83	-2.12	-1.20	*-4.76*	0.000	0.000
Medium Trucks:	79.45	-14.57	-2.11	-1.20	*-4.88*	0.000	0.000
Heavy Trucks:	84.25	-14.92	-2.11	-1.20	*-5.18*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	66.0	64.9	61.6	58.3	66.3	66.7
Medium Trucks:	61.6	60.6	54.6	54.8	62.4	62.6
Heavy Trucks:	66.0	64.8	54.1	61.0	67.9	68.0
Vehicle Noise:	69.7	68.6	63.0	63.5	70.9	71.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	105	226	488	1,051
CNEL:	108	233	502	1,081

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: HY(2045) *Project Name:* Hillwood Ethanac
Road Name: Ethanac Rd. *Job Number:* 15109
Road Segment: e/o Sherman Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	69,883 vehicles
Peak Hour Percentage:	8.30%
Peak Hour Volume:	5,800 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	124 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	92.0 feet
Centerline Dist. to Observer:	92.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.2%	9.0%	12.8%	94.72%
Medium Trucks:	79.4%	5.0%	15.6%	2.75%
Heavy Trucks:	75.2%	1.6%	23.2%	2.54%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	68.154
Medium Trucks:	68.024
Heavy Trucks:	68.037

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	5.56	-2.12	-1.20	*-4.76*	0.000	0.000
Medium Trucks:	79.45	-9.82	-2.11	-1.20	*-4.88*	0.000	0.000
Heavy Trucks:	84.25	-10.16	-2.11	-1.20	*-5.18*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	70.7	69.7	66.3	63.0	71.0	71.4
Medium Trucks:	66.3	65.3	59.4	59.5	67.1	67.3
Heavy Trucks:	70.8	69.6	58.8	65.7	72.7	72.7
Vehicle Noise:	74.5	73.4	67.7	68.2	75.6	75.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	218	469	1,011	2,179
CNEL:	224	483	1,041	2,242

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: HY+P(2045) *Project Name:* Hillwood Ethanac
Road Name: Ethanac Rd. *Job Number:* 15109
Road Segment: e/o Sherman Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	70,008 vehicles
Peak Hour Percentage:	8.30%
Peak Hour Volume:	5,811 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	124 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	92.0 feet
Centerline Dist. to Observer:	92.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.2%	9.0%	12.8%	94.73%
Medium Trucks:	79.4%	5.0%	15.6%	2.74%
Heavy Trucks:	75.2%	1.6%	23.2%	2.53%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	68.154
Medium Trucks:	68.024
Heavy Trucks:	68.037

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	5.57	-2.12	-1.20	*-4.76*	0.000	0.000
Medium Trucks:	79.45	-9.82	-2.11	-1.20	*-4.88*	0.000	0.000
Heavy Trucks:	84.25	-10.16	-2.11	-1.20	*-5.18*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	70.7	69.7	66.3	63.0	71.0	71.4
Medium Trucks:	66.3	65.3	59.4	59.5	67.1	67.3
Heavy Trucks:	70.8	69.6	58.8	65.7	72.7	72.7
Vehicle Noise:	74.5	73.4	67.7	68.2	75.6	75.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	218	470	1,012	2,180
CNEL:	224	483	1,041	2,243

APPENDIX 9.1:

UNMITIGATED CADNAA OPERATIONAL NOISE MODEL INPUTS (LMAX)

This page intentionally left blank

15109 - Hillwood Ethanac

CadnaA Noise Prediction Model: 15109-02c.cna
Date: 03.02.23
Analyst: B. Lawson

Calculation Configuration

Configuration	
Parameter	**Value**
General	
Max. Error (dB)	**0.00**
Max. Search Radius (#(Unit,LEN))	**2000.01**
Min. Dist Src to Rcvr	**0.00**
Partition	
Raster Factor	**0.50**
Max. Length of Section (#(Unit,LEN))	**999.99**
Min. Length of Section (#(Unit,LEN))	**1.01**
Min. Length of Section (%)	**0.00**
Proj. Line Sources	**On**
Proj. Area Sources	**On**
Ref. Time	
Reference Time Day (min)	**960.00**
Reference Time Night (min)	**480.00**
Daytime Penalty (dB)	**0.00**
Recr. Time Penalty (dB)	**5.00**
Night-time Penalty (dB)	**10.00**
DTM	
Standard Height (m)	**0.00**
Model of Terrain	**Triangulation**
Reflection	
max. Order of Reflection	**2**
Search Radius Src	**100.00**
Search Radius Rcvr	**100.00**
Max. Distance Source - Rcvr	**1000.00 1000.00**
Min. Distance Rvcr - Reflector	**1.00 1.00**
Min. Distance Source - Reflector	**0.10**
Industrial (ISO 9613)	
Lateral Diffraction	**some Obj**
Obst. within Area Src do not shield	**On**
Screening	**Incl. Ground Att. over Barrier**
	Dz with limit (20/25)
Barrier Coefficients C1,2,3	**3.0 20.0 0.0**
Temperature (#(Unit,TEMP))	**10**
rel. Humidity (%)	**70**
Ground Absorption G	**0.50**
Wind Speed for Dir. (#(Unit,SPEED))	**3.0**
Roads (TNM)	
Railways (FTA/FRA)	
Aircraft (???)	
Strictly acc. to AzB	

Receiver Noise Levels

Name	M.	ID	Level Lr			Limit. Value			Land Use			Height		Coordinates		
			Day	Night	CNEL	Day	Night	CNEL	Type	Auto	Noise Type			X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)				(ft)		(ft)	(ft)	(ft)
RECEIVERS		R1	59.6	59.6	66.3	80.0	60.0	0.0				5.00	a	6277581.87	2216314.31	5.00
RECEIVERS		R2	58.0	57.9	64.6	80.0	60.0	0.0				5.00	a	6278656.85	2216217.54	5.00
RECEIVERS		R3	61.9	61.9	68.6	80.0	60.0	0.0				5.00	a	6278841.71	2215903.14	5.00
RECEIVERS		R4	62.1	62.1	68.8	80.0	60.0	0.0				5.00	a	6278837.88	2215582.82	5.00
RECEIVERS		R5	54.8	54.8	61.5	80.0	60.0	0.0				5.00	a	6278280.15	2215199.54	5.00

Point Source(s)

Name	M.	ID	Result. PWL			Lw / Li			Operating Time			Height		Coordinates		
			Day	Evening	Night	Type	Value	norm.	Day	Special	Night			X	Y	Z
			(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)	(ft)		(ft)	(ft)	(ft)
POINTSOURCE		AC01	89.4	89.4	89.4	Lw	89.4		585.00	0.00	252.00	5.00	g	6278569.32	2215429.79	53.00
POINTSOURCE		AC02	89.4	89.4	89.4	Lw	89.4		585.00	0.00	252.00	5.00	g	6278567.57	2215490.85	53.00
POINTSOURCE		AC03	89.4	89.4	89.4	Lw	89.4		585.00	0.00	252.00	5.00	g	6278028.52	2215435.90	53.00
POINTSOURCE		AC04	89.4	89.4	89.4	Lw	89.4		585.00	0.00	252.00	5.00	g	6277961.36	2215435.90	53.00
POINTSOURCE		CAR01	91.4	91.4	91.4	Lw	91.4					5.00	a	6278613.88	2215485.50	5.00
POINTSOURCE		CAR02	91.4	91.4	91.4	Lw	91.4					5.00	a	6278613.25	2215437.68	5.00
POINTSOURCE		CAR03	91.4	91.4	91.4	Lw	91.4					5.00	a	6278656.73	2215486.74	5.00
POINTSOURCE		CAR04	91.4	91.4	91.4	Lw	91.4					5.00	a	6278679.71	2215465.62	5.00
POINTSOURCE		CAR05	91.4	91.4	91.4	Lw	91.4					5.00	a	6278656.73	2215446.37	5.00
POINTSOURCE		CAR06	91.4	91.4	91.4	Lw	91.4					5.00	a	6278679.71	2215428.36	5.00
POINTSOURCE		CAR07	91.4	91.4	91.4	Lw	91.4					5.00	a	6278656.73	2215415.32	5.00
POINTSOURCE		CAR08	91.4	91.4	91.4	Lw	91.4					5.00	a	6278718.83	2215487.36	5.00
POINTSOURCE		CAR09	91.4	91.4	91.4	Lw	91.4					5.00	a	6278718.83	2215458.79	5.00

Name	M.	ID	Result. PWL			Lw / Li			Operating Time			Height		Coordinates		
			Day	Evening	Night	Type	Value	norm.	Day	Special	Night			X	Y	Z
			(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)	(ft)		(ft)	(ft)	(ft)
POINTSOURCE		CAR10	91.4	91.4	91.4	Lw	91.4					5.00	a	6278718.21	2215432.09	5.00
POINTSOURCE		CAR11	91.4	91.4	91.4	Lw	91.4					5.00	a	6278718.83	2215394.82	5.00
POINTSOURCE		CAR12	91.4	91.4	91.4	Lw	91.4					5.00	a	6278693.99	2215364.39	5.00
POINTSOURCE		CAR13	91.4	91.4	91.4	Lw	91.4					5.00	a	6278659.83	2215363.77	5.00
POINTSOURCE		CAR14	91.4	91.4	91.4	Lw	91.4					5.00	a	6278545.56	2215365.64	5.00
POINTSOURCE		CAR15	91.4	91.4	91.4	Lw	91.4					5.00	a	6278505.19	2215365.01	5.00
POINTSOURCE		CAR16	91.4	91.4	91.4	Lw	91.4					5.00	a	6278467.31	2215365.64	5.00
POINTSOURCE		CAR17	91.4	91.4	91.4	Lw	91.4					5.00	a	6278425.70	2215366.26	5.00
POINTSOURCE		CAR18	91.4	91.4	91.4	Lw	91.4					5.00	a	6278393.41	2215366.26	5.00
POINTSOURCE		CAR19	91.4	91.4	91.4	Lw	91.4					5.00	a	6278357.39	2215366.88	5.00
POINTSOURCE		CAR20	91.4	91.4	91.4	Lw	91.4					5.00	a	6278317.64	2215367.50	5.00
POINTSOURCE		CAR21	91.4	91.4	91.4	Lw	91.4					5.00	a	6278282.86	2215368.12	5.00
POINTSOURCE		CAR22	91.4	91.4	91.4	Lw	91.4					5.00	a	6278249.95	2215368.12	5.00
POINTSOURCE		CAR23	91.4	91.4	91.4	Lw	91.4					5.00	a	6278210.82	2215368.12	5.00
POINTSOURCE		CAR24	91.4	91.4	91.4	Lw	91.4					5.00	a	6278174.80	2215369.36	5.00
POINTSOURCE		CAR25	91.4	91.4	91.4	Lw	91.4					5.00	a	6278128.84	2215369.98	5.00
POINTSOURCE		CAR26	91.4	91.4	91.4	Lw	91.4					5.00	a	6278094.07	2215369.98	5.00
POINTSOURCE		CAR27	91.4	91.4	91.4	Lw	91.4					5.00	a	6278050.59	2215370.60	5.00
POINTSOURCE		CAR28	91.4	91.4	91.4	Lw	91.4					5.00	a	6278019.54	2215371.22	5.00
POINTSOURCE		CAR29	91.4	91.4	91.4	Lw	91.4					5.00	a	6277987.25	2215371.85	5.00
POINTSOURCE		CAR30	91.4	91.4	91.4	Lw	91.4					5.00	a	6277907.75	2215391.10	5.00
POINTSOURCE		TRASH01	102.8	102.8	102.8	Lw	102.8		900.00	0.00	270.00	5.00	a	6277732.83	2216030.77	5.00
POINTSOURCE		TRASH02	102.8	102.8	102.8	Lw	102.8		900.00	0.00	270.00	5.00	a	6278722.84	2215515.27	5.00

Line Source(s)

Name	M.	ID	Result. PWL			Result. PWL'			Lw / Li			Operating Time			Moving Pt. Src				Height	
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Special	Night	Number			Speed		
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)	Day	Evening	Night	(mph)	(ft)	
LINESOURCE		TRUCK01	91.4	91.4	91.4	64.4	64.4	64.4	Lw	91.4									8	a
LINESOURCE		TRUCK02	91.4	91.4	91.4	68.1	68.1	68.1	Lw	91.4									8	a

Name	ID	Height				Coordinates			
		Begin		End		x	y	z	Ground
		(ft)		(ft)		(ft)	(ft)	(ft)	(ft)
LINESOURCE	TRUCK01	8.00	a			6278635.22	2215509.38	8.00	0.00
						6278640.73	2216008.22	8.00	0.00
						6278640.57	2216015.55	8.00	0.00
						6278639.22	2216022.76	8.00	0.00
						6278636.71	2216029.65	8.00	0.00
						6278633.10	2216036.04	8.00	0.00
						6278628.51	2216041.75	8.00	0.00
						6278623.05	2216046.64	8.00	0.00
						6278616.86	2216050.58	8.00	0.00
						6278610.11	2216053.45	8.00	0.00
						6278602.98	2216055.18	8.00	0.00
						6278595.67	2216055.73	8.00	0.00
						6278588.37	2216055.07	8.00	0.00
						6277688.53	2216070.23	8.00	0.00
						6277581.04	2216052.32	8.00	0.00
						6277512.14	2216052.32	8.00	0.00
LINESOURCE	TRUCK02	8.00	a			6277778.12	2216068.72	8.00	0.00
						6277775.34	2215665.10	8.00	0.00
						6277775.73	2215658.74	8.00	0.00
						6277775.11	2215652.40	8.00	0.00
						6277773.48	2215646.24	8.00	0.00
						6277770.90	2215640.41	8.00	0.00
						6277767.42	2215635.08	8.00	0.00
						6277763.13	2215630.36	8.00	0.00
						6277758.15	2215626.39	8.00	0.00
						6277752.60	2215623.26	8.00	0.00
						6277746.62	2215621.06	8.00	0.00
						6277740.37	2215619.83	8.00	0.00
						6277734.00	2215619.62	8.00	0.00
						6277506.63	2215615.49	8.00	0.00

Area Source(s)

Name	M.	ID	Result. PWL			Result. PWL''			Lw / Li			Operating Time			Height	
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Special	Night	(ft)	
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)		
AREASOURCE		DRY01	111.6	111.6	111.6	74.4	74.4	74.4	Lw	111.6					8	a
AREASOURCE		DRY02	111.6	111.6	111.6	77.1	77.1	77.1	Lw	111.6					8	a
AREASOURCE		COLD01	119.7	119.7	119.7	85.2	85.2	85.2	Lw	119.7					8	a
AREASOURCE		COLD02	119.7	119.7	119.7	85.2	85.2	85.2	Lw	119.7					8	a

Name	ID	Height				Coordinates			
		Begin		End		x	y	z	Ground
		(ft)		(ft)		(ft)	(ft)	(ft)	(ft)
AREASOURCE	DRY01	8.00	a			6277735.76	2216003.15	8.00	0.00
						6277737.40	2215661.70	8.00	0.00
						6277566.88	2215663.75	8.00	0.00
						6277570.17	2216002.31	8.00	0.00
AREASOURCE	DRY02	8.00	a			6278682.69	2216081.56	8.00	0.00
						6278735.16	2216081.56	8.00	0.00
						6278731.63	2215526.52	8.00	0.00
						6278710.94	2215526.02	8.00	0.00
						6278710.44	2215505.33	8.00	0.00
						6278677.64	2215505.84	8.00	0.00
AREASOURCE	COLD01	8.00	a			6277807.04	2216016.04	8.00	0.00
						6277868.27	2216014.85	8.00	0.00
						6277865.19	2215627.19	8.00	0.00
						6277918.19	2215627.60	8.00	0.00
						6277918.60	2215566.79	8.00	0.00
						6277803.55	2215568.43	8.00	0.00
AREASOURCE	COLD02	8.00	a			6278548.65	2216007.95	8.00	0.00
						6278611.07	2216007.42	8.00	0.00
						6278606.50	2215512.39	8.00	0.00
						6278544.94	2215514.92	8.00	0.00

Barrier(s)

Name	Sel.	M.	ID	Absorption		Z-Ext.	Cantilever		Height			Coordinates			
				left	right		horz.	vert.	Begin		End	x	y	z	Ground
						(ft)	(ft)	(ft)	(ft)		(ft)	(ft)	(ft)	(ft)	(ft)
BARRIERPLANNED			0						14.00	a		6278548.97	2216087.61	14.00	0.00
												6278737.18	2216084.08	14.00	0.00
												6278734.15	2215504.32	14.00	0.00
												6278649.38	2215505.84	14.00	0.00
BARRIERPLANNED			0						14.00	a		6277724.49	2216004.86	14.00	0.00
												6277568.58	2216004.86	14.00	0.00
												6277564.54	2215660.74	14.00	0.00
												6277678.58	2215659.73	14.00	0.00
												6277678.07	2215634.50	14.00	0.00
BARRIERPLANNED			0						14.00	a		6277677.06	2215592.12	14.00	0.00
												6277678.07	2215568.91	14.00	0.00
												6277919.26	2215565.88	14.00	0.00
BARRIERPLANNED			0						14.00	a		6277724.49	2216004.86	14.00	0.00
												6277725.00	2216045.23	14.00	0.00
												6277751.23	2216045.23	14.00	0.00
BARRIERPLANNED			0						14.00	a		6278621.50	2215505.30	14.00	0.00
												6278593.61	2215504.98	14.00	0.00
BARRIERPLANNED			0						14.00	a		6277806.73	2216042.28	14.00	0.00
												6277800.86	2216042.14	14.00	0.00

Building(s)

Name	Sel.	M.	ID	RB	Residents	Absorption	Height		Coordinates			
							Begin		x	y	z	Ground
							(ft)		(ft)	(ft)	(ft)	(ft)
BUILDING			BUILDING00001	x	0		48.00	a	6277806.75	2216042.04	48.00	0.00
									6278611.26	2216033.54	48.00	0.00
									6278611.07	2216007.42	48.00	0.00
									6278548.65	2216007.95	48.00	0.00
									6278544.07	2215505.67	48.00	0.00
									6278589.86	2215505.45	48.00	0.00
									6278592.86	2215408.02	48.00	0.00
									6278047.02	2215414.27	48.00	0.00
									6277941.47	2215417.04	48.00	0.00
									6277936.61	2215458.71	48.00	0.00
									6277920.63	2215458.71	48.00	0.00
									6277918.19	2215627.60	48.00	0.00
									6277865.19	2215627.19	48.00	0.00
									6277869.07	2216016.17	48.00	0.00
									6277806.37	2216017.23	48.00	0.00
BUILDING			BUILDING00002	x	0		15.00	a	6278494.90	2216203.03	15.00	0.00
									6278575.00	2216203.03	15.00	0.00
									6278573.80	2216090.41	15.00	0.00
									6278494.30	2216090.41	15.00	0.00
BUILDING			BUILDING00003	x	0		15.00	a	6278726.16	2216194.59	15.00	0.00
									6278761.09	2216194.59	15.00	0.00
									6278761.09	2216131.96	15.00	0.00
									6278726.16	2216132.56	15.00	0.00
									6278726.16	2216149.43	15.00	0.00
									6278716.53	2216149.43	15.00	0.00
									6278717.13	2216174.72	15.00	0.00

Name	Sel.	M.	ID	RB	Residents	Absorption	Height		Coordinates			
							Begin		x	y	z	Ground
							(ft)		(ft)	(ft)	(ft)	(ft)
									6278725.56	2216175.32	15.00	0.00
BUILDING			BUILDING00004	x	0		15.00	a	6278693.64	2216237.96	15.00	0.00
									6278718.33	2216238.56	15.00	0.00
									6278718.94	2216218.08	15.00	0.00
									6278696.05	2216217.48	15.00	0.00
BUILDING			BUILDING00005	x	0		15.00	a	6278898.98	2216093.87	15.00	0.00
									6278923.72	2216076.42	15.00	0.00
									6278919.55	2216070.95	15.00	0.00
									6278930.23	2216062.88	15.00	0.00
									6278921.37	2216051.94	15.00	0.00
									6278913.56	2216056.37	15.00	0.00
									6278907.83	2216047.77	15.00	0.00
									6278880.23	2216066.78	15.00	0.00
BUILDING			BUILDING00006	x	0		15.00	a	6278878.14	2215999.60	15.00	0.00
									6278932.57	2215996.47	15.00	0.00
									6278931.53	2215973.82	15.00	0.00
									6278876.84	2215976.42	15.00	0.00
BUILDING			BUILDING00007	x	0		15.00	a	6278873.45	2215902.20	15.00	0.00
									6278890.38	2215924.08	15.00	0.00
									6278937.52	2215889.44	15.00	0.00
									6278921.37	2215866.00	15.00	0.00
BUILDING			BUILDING00008	x	0		15.00	a	6278888.30	2215778.24	15.00	0.00
									6278911.74	2215761.84	15.00	0.00
									6278906.53	2215753.76	15.00	0.00
									6278919.81	2215744.13	15.00	0.00
									6278906.53	2215724.08	15.00	0.00
									6278868.25	2215749.60	15.00	0.00
BUILDING			BUILDING00009	x	0		15.00	a	6278891.42	2215643.61	15.00	0.00
									6278909.91	2215630.59	15.00	0.00
									6278913.56	2215636.84	15.00	0.00
									6278950.02	2215609.75	15.00	0.00
									6278931.01	2215582.41	15.00	0.00
									6278875.28	2215618.61	15.00	0.00
BUILDING			BUILDING00010	x	0		15.00	a	6278891.42	2215471.47	15.00	0.00
									6278953.92	2215427.98	15.00	0.00
									6278937.52	2215406.37	15.00	0.00
									6278875.02	2215448.29	15.00	0.00
BUILDING			BUILDING00011	x	0		15.00	a	6278914.08	2215418.35	15.00	0.00
									6278934.91	2215402.98	15.00	0.00
									6278906.01	2215362.62	15.00	0.00
									6278876.32	2215385.79	15.00	0.00
									6278895.59	2215412.10	15.00	0.00
									6278905.23	2215405.85	15.00	0.00

Ground Absorption(s)

Name	Sel.	M.	ID	G	Coordinates	
					x	y
					(ft)	(ft)
GROUND			0	0.5	6277536.73	2216310.27
					6277766.73	2216309.28
					6277777.63	2216487.73
					6278154.35	2216482.77
					6278152.37	2216099.11
					6277526.81	2216103.07
GROUND			0	0.5	6278160.21	2216549.13
					6278791.71	2216544.04
					6278789.16	2216318.68
					6278647.84	2216317.41
					6278649.11	2216221.92
					6278468.32	2216219.38
					6278474.69	2216095.88
					6278158.94	2216102.24
GROUND			0	0.5	6277506.77	2215551.76
					6277871.86	2215551.76
					6277870.13	2215323.36
					6278759.50	2215302.60
					6278757.77	2215245.50
					6277518.88	2215266.26

APPENDIX 9.2:

MITIGATED CADNAA OPERATIONAL NOISE MODEL INPUTS (LMAX)

This page intentionally left blank

15109 - Hillwood Ethanac

CadnaA Noise Prediction Model: 15109-02c_Mitigated.cna
Date: 03.02.23
Analyst: B. Lawson

Calculation Configuration

Configuration	
Parameter	**Value**
General	
Max. Error (dB)	**0.00**
Max. Search Radius (#(Unit,LEN))	**2000.01**
Min. Dist Src to Rcvr	**0.00**
Partition	
Raster Factor	**0.50**
Max. Length of Section (#(Unit,LEN))	**999.99**
Min. Length of Section (#(Unit,LEN))	**1.01**
Min. Length of Section (%)	**0.00**
Proj. Line Sources	**On**
Proj. Area Sources	**On**
Ref. Time	
Reference Time Day (min)	**960.00**
Reference Time Night (min)	**480.00**
Daytime Penalty (dB)	**0.00**
Recr. Time Penalty (dB)	**5.00**
Night-time Penalty (dB)	**10.00**
DTM	
Standard Height (m)	**0.00**
Model of Terrain	**Triangulation**
Reflection	
max. Order of Reflection	**2**
Search Radius Src	**100.00**
Search Radius Rcvr	**100.00**
Max. Distance Source - Rcvr	**1000.00 1000.00**
Min. Distance Rvcr - Reflector	**1.00 1.00**
Min. Distance Source - Reflector	**0.10**
Industrial (ISO 9613)	
Lateral Diffraction	**some Obj**
Obst. within Area Src do not shield	**On**
Screening	**Incl. Ground Att. over Barrier**
	Dz with limit (20/25)
Barrier Coefficients C1,2,3	**3.0 20.0 0.0**
Temperature (#(Unit,TEMP))	**10**
rel. Humidity (%)	**70**
Ground Absorption G	**0.50**
Wind Speed for Dir. (#(Unit,SPEED))	**3.0**
Roads (TNM)	
Railways (FTA/FRA)	
Aircraft (???)	
Strictly acc. to AzB	

Receiver Noise Levels

Name	M.	ID	Level Lr			Limit. Value			Land Use			Height		Coordinates		
			Day	Night	CNEL	Day	Night	CNEL	Type	Auto	Noise Type			X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)				(ft)		(ft)	(ft)	(ft)
RECEIVERS		R1	59.6	59.6	66.3	80.0	60.0	0.0				5.00	a	6277581.87	2216314.31	5.00
RECEIVERS		R2	53.9	53.8	60.5	80.0	60.0	0.0				5.00	a	6278656.85	2216217.54	5.00
RECEIVERS		R3	57.2	57.2	63.9	80.0	60.0	0.0				5.00	a	6278841.71	2215903.14	5.00
RECEIVERS		R4	58.2	58.1	64.7	80.0	60.0	0.0				5.00	a	6278837.88	2215582.82	5.00
RECEIVERS		R5	54.7	54.7	61.4	80.0	60.0	0.0				5.00	a	6278280.15	2215199.54	5.00

Point Source(s)

Name	M.	ID	Result. PWL			Lw / Li			Operating Time			Height		Coordinates		
			Day	Evening	Night	Type	Value	norm.	Day	Special	Night			X	Y	Z
			(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)	(ft)		(ft)	(ft)	(ft)
POINTSOURCE		AC01	89.4	89.4	89.4	Lw	89.4		585.00	0.00	252.00	5.00	g	6278569.32	2215429.79	53.00
POINTSOURCE		AC02	89.4	89.4	89.4	Lw	89.4		585.00	0.00	252.00	5.00	g	6278567.57	2215490.85	53.00
POINTSOURCE		AC03	89.4	89.4	89.4	Lw	89.4		585.00	0.00	252.00	5.00	g	6278028.52	2215435.90	53.00
POINTSOURCE		AC04	89.4	89.4	89.4	Lw	89.4		585.00	0.00	252.00	5.00	g	6277961.36	2215435.90	53.00
POINTSOURCE		CAR01	91.4	91.4	91.4	Lw	91.4					5.00	a	6278613.88	2215485.50	5.00
POINTSOURCE		CAR02	91.4	91.4	91.4	Lw	91.4					5.00	a	6278613.25	2215437.68	5.00
POINTSOURCE		CAR03	91.4	91.4	91.4	Lw	91.4					5.00	a	6278656.73	2215486.74	5.00
POINTSOURCE		CAR04	91.4	91.4	91.4	Lw	91.4					5.00	a	6278679.71	2215465.62	5.00
POINTSOURCE		CAR05	91.4	91.4	91.4	Lw	91.4					5.00	a	6278656.73	2215446.37	5.00
POINTSOURCE		CAR06	91.4	91.4	91.4	Lw	91.4					5.00	a	6278679.71	2215428.36	5.00
POINTSOURCE		CAR07	91.4	91.4	91.4	Lw	91.4					5.00	a	6278656.73	2215415.32	5.00
POINTSOURCE		CAR08	91.4	91.4	91.4	Lw	91.4					5.00	a	6278718.83	2215487.36	5.00
POINTSOURCE		CAR09	91.4	91.4	91.4	Lw	91.4					5.00	a	6278718.83	2215458.79	5.00

Name	M.	ID	Result. PWL			Lw / Li			Operating Time			Height		Coordinates		
			Day	Evening	Night	Type	Value	norm.	Day	Special	Night			X	Y	Z
			(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)	(ft)		(ft)	(ft)	(ft)
POINTSOURCE		CAR10	91.4	91.4	91.4	Lw	91.4					5.00	a	6278718.21	2215432.09	5.00
POINTSOURCE		CAR11	91.4	91.4	91.4	Lw	91.4					5.00	a	6278718.83	2215394.82	5.00
POINTSOURCE		CAR12	91.4	91.4	91.4	Lw	91.4					5.00	a	6278693.99	2215364.39	5.00
POINTSOURCE		CAR13	91.4	91.4	91.4	Lw	91.4					5.00	a	6278659.83	2215363.77	5.00
POINTSOURCE		CAR14	91.4	91.4	91.4	Lw	91.4					5.00	a	6278545.56	2215365.64	5.00
POINTSOURCE		CAR15	91.4	91.4	91.4	Lw	91.4					5.00	a	6278505.19	2215365.01	5.00
POINTSOURCE		CAR16	91.4	91.4	91.4	Lw	91.4					5.00	a	6278467.31	2215365.64	5.00
POINTSOURCE		CAR17	91.4	91.4	91.4	Lw	91.4					5.00	a	6278425.70	2215366.26	5.00
POINTSOURCE		CAR18	91.4	91.4	91.4	Lw	91.4					5.00	a	6278393.41	2215366.26	5.00
POINTSOURCE		CAR19	91.4	91.4	91.4	Lw	91.4					5.00	a	6278357.39	2215366.88	5.00
POINTSOURCE		CAR20	91.4	91.4	91.4	Lw	91.4					5.00	a	6278317.64	2215367.50	5.00
POINTSOURCE		CAR21	91.4	91.4	91.4	Lw	91.4					5.00	a	6278282.86	2215368.12	5.00
POINTSOURCE		CAR22	91.4	91.4	91.4	Lw	91.4					5.00	a	6278249.95	2215368.12	5.00
POINTSOURCE		CAR23	91.4	91.4	91.4	Lw	91.4					5.00	a	6278210.82	2215368.12	5.00
POINTSOURCE		CAR24	91.4	91.4	91.4	Lw	91.4					5.00	a	6278174.80	2215369.36	5.00
POINTSOURCE		CAR25	91.4	91.4	91.4	Lw	91.4					5.00	a	6278128.84	2215369.98	5.00
POINTSOURCE		CAR26	91.4	91.4	91.4	Lw	91.4					5.00	a	6278094.07	2215369.98	5.00
POINTSOURCE		CAR27	91.4	91.4	91.4	Lw	91.4					5.00	a	6278050.59	2215370.60	5.00
POINTSOURCE		CAR28	91.4	91.4	91.4	Lw	91.4					5.00	a	6278019.54	2215371.22	5.00
POINTSOURCE		CAR29	91.4	91.4	91.4	Lw	91.4					5.00	a	6277987.25	2215371.85	5.00
POINTSOURCE		CAR30	91.4	91.4	91.4	Lw	91.4					5.00	a	6277907.75	2215391.10	5.00
POINTSOURCE		TRASH01	102.8	102.8	102.8	Lw	102.8		900.00	0.00	270.00	5.00	a	6277732.83	2216030.77	5.00
POINTSOURCE		TRASH02	102.8	102.8	102.8	Lw	102.8		900.00	0.00	270.00	5.00	a	6278722.84	2215515.27	5.00

Line Source(s)

Name	M.	ID	Result. PWL			Result. PWL'			Lw / Li			Operating Time			Moving Pt. Src				Height	
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Special	Night	Number			Speed		
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)	Day	Evening	Night	(mph)	(ft)	
LINESOURCE		TRUCK01	91.4	91.4	91.4	64.4	64.4	64.4	Lw	91.4									8	a
LINESOURCE		TRUCK02	91.4	91.4	91.4	68.1	68.1	68.1	Lw	91.4									8	a

Name	ID	Height				Coordinates			
		Begin		End		x	y	z	Ground
		(ft)		(ft)		(ft)	(ft)	(ft)	(ft)
LINESOURCE	TRUCK01	8.00	a			6278635.22	2215509.38	8.00	0.00
						6278640.73	2216008.22	8.00	0.00
						6278640.57	2216015.55	8.00	0.00
						6278639.22	2216022.76	8.00	0.00
						6278636.71	2216029.65	8.00	0.00
						6278633.10	2216036.04	8.00	0.00
						6278628.51	2216041.75	8.00	0.00
						6278623.05	2216046.64	8.00	0.00
						6278616.86	2216050.58	8.00	0.00
						6278610.11	2216053.45	8.00	0.00
						6278602.98	2216055.18	8.00	0.00
						6278595.67	2216055.73	8.00	0.00
						6278588.37	2216055.07	8.00	0.00
						6277688.53	2216070.23	8.00	0.00
						6277581.04	2216052.32	8.00	0.00
						6277512.14	2216052.32	8.00	0.00
LINESOURCE	TRUCK02	8.00	a			6277778.12	2216068.72	8.00	0.00
						6277775.34	2215665.10	8.00	0.00
						6277775.73	2215658.74	8.00	0.00
						6277775.11	2215652.40	8.00	0.00
						6277773.48	2215646.24	8.00	0.00
						6277770.90	2215640.41	8.00	0.00
						6277767.42	2215635.08	8.00	0.00
						6277763.13	2215630.36	8.00	0.00
						6277758.15	2215626.39	8.00	0.00
						6277752.60	2215623.26	8.00	0.00
						6277746.62	2215621.06	8.00	0.00
						6277740.37	2215619.83	8.00	0.00
						6277734.00	2215619.62	8.00	0.00
						6277506.63	2215615.49	8.00	0.00

Area Source(s)

Name	M.	ID	Result. PWL			Result. PWL''			Lw / Li			Operating Time			Height	
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Special	Night	(ft)	
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)		
AREASOURCE		DRY01	111.6	111.6	111.6	74.4	74.4	74.4	Lw	111.6					8	a
AREASOURCE		DRY02	111.6	111.6	111.6	77.1	77.1	77.1	Lw	111.6					8	a
AREASOURCE		COLD01	119.7	119.7	119.7	85.2	85.2	85.2	Lw	119.7					8	a
AREASOURCE		DRY03	111.6	111.6	111.6	77.1	77.1	77.1	Lw	111.6					8	a

Name	ID	Height				Coordinates			
		Begin		End		x	y	z	Ground
		(ft)		(ft)		(ft)	(ft)	(ft)	(ft)
AREASOURCE	DRY01	8.00	a			6277735.76	2216003.15	8.00	0.00
						6277737.40	2215661.70	8.00	0.00
						6277566.88	2215663.75	8.00	0.00
						6277570.17	2216002.31	8.00	0.00
AREASOURCE	DRY02	8.00	a			6278682.69	2216081.56	8.00	0.00
						6278735.16	2216081.56	8.00	0.00
						6278731.63	2215526.52	8.00	0.00
						6278710.94	2215526.02	8.00	0.00
						6278710.44	2215505.33	8.00	0.00
						6278677.64	2215505.84	8.00	0.00
AREASOURCE	COLD01	8.00	a			6277807.04	2216016.04	8.00	0.00
						6277868.27	2216014.85	8.00	0.00
						6277865.19	2215627.19	8.00	0.00
						6277918.19	2215627.60	8.00	0.00
						6277918.60	2215566.79	8.00	0.00
						6277803.55	2215568.43	8.00	0.00
AREASOURCE	DRY03	8.00	a			6278548.65	2216007.95	8.00	0.00
						6278611.07	2216007.42	8.00	0.00
						6278606.50	2215512.39	8.00	0.00
						6278544.94	2215514.92	8.00	0.00

Barrier(s)

Name	Sel.	M.	ID	Absorption		Z-Ext.	Cantilever		Height			Coordinates			
				left	right		horz.	vert.	Begin		End	x	y	z	Ground
						(ft)	(ft)	(ft)	(ft)		(ft)	(ft)	(ft)	(ft)	(ft)
BARRIERPLANNED			0						14.00	a		6278548.97	2216087.61	14.00	0.00
												6278737.18	2216084.08	14.00	0.00
												6278734.15	2215504.32	14.00	0.00
												6278649.38	2215505.84	14.00	0.00
BARRIERPLANNED			0						14.00	a		6277724.49	2216004.86	14.00	0.00
												6277568.58	2216004.86	14.00	0.00
												6277564.54	2215660.74	14.00	0.00
												6277678.58	2215659.73	14.00	0.00
												6277678.07	2215634.50	14.00	0.00
BARRIERPLANNED			0						14.00	a		6277677.06	2215592.12	14.00	0.00
												6277678.07	2215568.91	14.00	0.00
												6277919.26	2215565.88	14.00	0.00
BARRIERPLANNED			0						14.00	a		6277724.49	2216004.86	14.00	0.00
												6277725.00	2216045.23	14.00	0.00
												6277751.23	2216045.23	14.00	0.00
BARRIERPLANNED			0						14.00	a		6278621.50	2215505.30	14.00	0.00
												6278593.61	2215504.98	14.00	0.00
BARRIERPLANNED			0						14.00	a		6277806.73	2216042.28	14.00	0.00
												6277800.86	2216042.14	14.00	0.00

Building(s)

Name	Sel.	M.	ID	RB	Residents	Absorption	Height		Coordinates			
							Begin		x	y	z	Ground
							(ft)		(ft)	(ft)	(ft)	(ft)
BUILDING			BUILDING00001	x	0		48.00	a	6277806.75	2216042.04	48.00	0.00
									6278611.26	2216033.54	48.00	0.00
									6278611.07	2216007.42	48.00	0.00
									6278548.65	2216007.95	48.00	0.00
									6278544.07	2215505.67	48.00	0.00
									6278589.86	2215505.45	48.00	0.00
									6278592.86	2215408.02	48.00	0.00
									6278047.02	2215414.27	48.00	0.00
									6277941.47	2215417.04	48.00	0.00
									6277936.61	2215458.71	48.00	0.00
									6277920.63	2215458.71	48.00	0.00
									6277918.19	2215627.60	48.00	0.00
									6277865.19	2215627.19	48.00	0.00
									6277869.07	2216016.17	48.00	0.00
									6277806.37	2216017.23	48.00	0.00
BUILDING			BUILDING00002	x	0		15.00	a	6278494.90	2216203.03	15.00	0.00
									6278575.00	2216203.03	15.00	0.00
									6278573.80	2216090.41	15.00	0.00
									6278494.30	2216090.41	15.00	0.00
BUILDING			BUILDING00003	x	0		15.00	a	6278726.16	2216194.59	15.00	0.00
									6278761.09	2216194.59	15.00	0.00
									6278761.09	2216131.96	15.00	0.00
									6278726.16	2216132.56	15.00	0.00
									6278726.16	2216149.43	15.00	0.00
									6278716.53	2216149.43	15.00	0.00
									6278717.13	2216174.72	15.00	0.00

Name	Sel.	M.	ID	RB	Residents	Absorption	Height		Coordinates			
							Begin		x	y	z	Ground
							(ft)		(ft)	(ft)	(ft)	(ft)
									6278725.56	2216175.32	15.00	0.00
BUILDING			BUILDING00004	x	0		15.00	a	6278693.64	2216237.96	15.00	0.00
									6278718.33	2216238.56	15.00	0.00
									6278718.94	2216218.08	15.00	0.00
									6278696.05	2216217.48	15.00	0.00
BUILDING			BUILDING00005	x	0		15.00	a	6278898.98	2216093.87	15.00	0.00
									6278923.72	2216076.42	15.00	0.00
									6278919.55	2216070.95	15.00	0.00
									6278930.23	2216062.88	15.00	0.00
									6278921.37	2216051.94	15.00	0.00
									6278913.56	2216056.37	15.00	0.00
									6278907.83	2216047.77	15.00	0.00
									6278880.23	2216066.78	15.00	0.00
BUILDING			BUILDING00006	x	0		15.00	a	6278878.14	2215999.60	15.00	0.00
									6278932.57	2215996.47	15.00	0.00
									6278931.53	2215973.82	15.00	0.00
									6278876.84	2215976.42	15.00	0.00
BUILDING			BUILDING00007	x	0		15.00	a	6278873.45	2215902.20	15.00	0.00
									6278890.38	2215924.08	15.00	0.00
									6278937.52	2215889.44	15.00	0.00
									6278921.37	2215866.00	15.00	0.00
BUILDING			BUILDING00008	x	0		15.00	a	6278888.30	2215778.24	15.00	0.00
									6278911.74	2215761.84	15.00	0.00
									6278906.53	2215753.76	15.00	0.00
									6278919.81	2215744.13	15.00	0.00
									6278906.53	2215724.08	15.00	0.00
									6278868.25	2215749.60	15.00	0.00
BUILDING			BUILDING00009	x	0		15.00	a	6278891.42	2215643.61	15.00	0.00
									6278909.91	2215630.59	15.00	0.00
									6278913.56	2215636.84	15.00	0.00
									6278950.02	2215609.75	15.00	0.00
									6278931.01	2215582.41	15.00	0.00
									6278875.28	2215618.61	15.00	0.00
BUILDING			BUILDING00010	x	0		15.00	a	6278891.42	2215471.47	15.00	0.00
									6278953.92	2215427.98	15.00	0.00
									6278937.52	2215406.37	15.00	0.00
									6278875.02	2215448.29	15.00	0.00
BUILDING			BUILDING00011	x	0		15.00	a	6278914.08	2215418.35	15.00	0.00
									6278934.91	2215402.98	15.00	0.00
									6278906.01	2215362.62	15.00	0.00
									6278876.32	2215385.79	15.00	0.00
									6278895.59	2215412.10	15.00	0.00
									6278905.23	2215405.85	15.00	0.00

Ground Absorption(s)

Name	Sel.	M.	ID	G	Coordinates	
					x	y
					(ft)	(ft)
GROUND			0	0.5	6277536.73	2216310.27
					6277766.73	2216309.28
					6277777.63	2216487.73
					6278154.35	2216482.77
					6278152.37	2216099.11
					6277526.81	2216103.07
GROUND			0	0.5	6278160.21	2216549.13
					6278791.71	2216544.04
					6278789.16	2216318.68
					6278647.84	2216317.41
					6278649.11	2216221.92
					6278468.32	2216219.38
					6278474.69	2216095.88
					6278158.94	2216102.24
GROUND			0	0.5	6277506.77	2215551.76
					6277871.86	2215551.76
					6277870.13	2215323.36
					6278759.50	2215302.60
					6278757.77	2215245.50
					6277518.88	2215266.26

APPENDIX 9.3:

CADNAA OPERATIONAL NOISE MODEL INPUTS (LEQ)

This page intentionally left blank

15109 - Hillwood Ethanac

CadnaA Noise Prediction Model: 15109-02c_CNEL.cna
Date: 03.02.23
Analyst: B. Lawson

Calculation Configuration

Configuration	
Parameter	**Value**
General	
Max. Error (dB)	**0.00**
Max. Search Radius (#(Unit,LEN))	**2000.01**
Min. Dist Src to Rcvr	**0.00**
Partition	
Raster Factor	**0.50**
Max. Length of Section (#(Unit,LEN))	**999.99**
Min. Length of Section (#(Unit,LEN))	**1.01**
Min. Length of Section (%)	**0.00**
Proj. Line Sources	**On**
Proj. Area Sources	**On**
Ref. Time	
Reference Time Day (min)	**960.00**
Reference Time Night (min)	**480.00**
Daytime Penalty (dB)	**0.00**
Recr. Time Penalty (dB)	**5.00**
Night-time Penalty (dB)	**10.00**
DTM	
Standard Height (m)	**0.00**
Model of Terrain	**Triangulation**
Reflection	
max. Order of Reflection	**2**
Search Radius Src	**100.00**
Search Radius Rcvr	**100.00**
Max. Distance Source - Rcvr	**1000.00 1000.00**
Min. Distance Rvcr - Reflector	**1.00 1.00**
Min. Distance Source - Reflector	**0.10**
Industrial (ISO 9613)	
Lateral Diffraction	**some Obj**
Obst. within Area Src do not shield	**On**
Screening	**Incl. Ground Att. over Barrier**
	Dz with limit (20/25)
Barrier Coefficients C1,2,3	**3.0 20.0 0.0**
Temperature (#(Unit,TEMP))	**10**
rel. Humidity (%)	**70**
Ground Absorption G	**0.50**
Wind Speed for Dir. (#(Unit,SPEED))	**3.0**
Roads (TNM)	
Railways (FTA/FRA)	
Aircraft (???)	
Strictly acc. to AzB	

Receiver Noise Levels

Name	M.	ID	Level Lr			Limit. Value			Land Use			Height		Coordinates		
			Day	Night	CNEL	Day	Night	CNEL	Type	Auto	Noise Type			X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)				(ft)		(ft)	(ft)	(ft)
RECEIVERS		R1	51.5	51.5	58.2	80.0	60.0	0.0				5.00	a	6277581.87	2216314.31	5.00
RECEIVERS		R2	45.7	45.7	52.3	80.0	60.0	0.0				5.00	a	6278656.85	2216217.54	5.00
RECEIVERS		R3	49.3	49.2	55.9	80.0	60.0	0.0				5.00	a	6278841.71	2215903.14	5.00
RECEIVERS		R4	51.6	51.6	58.2	80.0	60.0	0.0				5.00	a	6278837.88	2215582.82	5.00
RECEIVERS		R5	51.1	51.0	57.7	80.0	60.0	0.0				5.00	a	6278280.15	2215199.54	5.00

Point Source(s)

Name	M.	ID	Result. PWL			Lw / Li			Operating Time			Height		Coordinates		
			Day	Evening	Night	Type	Value	norm.	Day	Special	Night			X	Y	Z
			(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)	(ft)		(ft)	(ft)	(ft)
POINTSOURCE		AC01	88.9	88.9	88.9	Lw	88.9		585.00	0.00	252.00	5.00	g	6278569.32	2215429.79	53.00
POINTSOURCE		AC02	88.9	88.9	88.9	Lw	88.9		585.00	0.00	252.00	5.00	g	6278567.57	2215490.85	53.00
POINTSOURCE		AC03	88.9	88.9	88.9	Lw	88.9		585.00	0.00	252.00	5.00	g	6278028.52	2215435.90	53.00
POINTSOURCE		AC04	88.9	88.9	88.9	Lw	88.9		585.00	0.00	252.00	5.00	g	6277961.36	2215435.90	53.00
POINTSOURCE		CAR01	87.8	87.8	87.8	Lw	87.8					5.00	a	6278613.88	2215485.50	5.00
POINTSOURCE		CAR02	87.8	87.8	87.8	Lw	87.8					5.00	a	6278613.25	2215437.68	5.00
POINTSOURCE		CAR03	87.8	87.8	87.8	Lw	87.8					5.00	a	6278656.73	2215486.74	5.00
POINTSOURCE		CAR04	87.8	87.8	87.8	Lw	87.8					5.00	a	6278679.71	2215465.62	5.00
POINTSOURCE		CAR05	87.8	87.8	87.8	Lw	87.8					5.00	a	6278656.73	2215446.37	5.00
POINTSOURCE		CAR06	87.8	87.8	87.8	Lw	87.8					5.00	a	6278679.71	2215428.36	5.00
POINTSOURCE		CAR07	87.8	87.8	87.8	Lw	87.8					5.00	a	6278656.73	2215415.32	5.00
POINTSOURCE		CAR08	87.8	87.8	87.8	Lw	87.8					5.00	a	6278718.83	2215487.36	5.00
POINTSOURCE		CAR09	87.8	87.8	87.8	Lw	87.8					5.00	a	6278718.83	2215458.79	5.00

Name	M.	ID	Result. PWL			Lw / Li			Operating Time			Height		Coordinates		
			Day	Evening	Night	Type	Value	norm.	Day	Special	Night			X	Y	Z
			(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)	(ft)		(ft)	(ft)	(ft)
POINTSOURCE		CAR10	87.8	87.8	87.8	Lw	87.8					5.00	a	6278718.21	2215432.09	5.00
POINTSOURCE		CAR11	87.8	87.8	87.8	Lw	87.8					5.00	a	6278718.83	2215394.82	5.00
POINTSOURCE		CAR12	87.8	87.8	87.8	Lw	87.8					5.00	a	6278693.99	2215364.39	5.00
POINTSOURCE		CAR13	87.8	87.8	87.8	Lw	87.8					5.00	a	6278659.83	2215363.77	5.00
POINTSOURCE		CAR14	87.8	87.8	87.8	Lw	87.8					5.00	a	6278545.56	2215365.64	5.00
POINTSOURCE		CAR15	87.8	87.8	87.8	Lw	87.8					5.00	a	6278505.19	2215365.01	5.00
POINTSOURCE		CAR16	87.8	87.8	87.8	Lw	87.8					5.00	a	6278467.31	2215365.64	5.00
POINTSOURCE		CAR17	87.8	87.8	87.8	Lw	87.8					5.00	a	6278425.70	2215366.26	5.00
POINTSOURCE		CAR18	87.8	87.8	87.8	Lw	87.8					5.00	a	6278393.41	2215366.26	5.00
POINTSOURCE		CAR19	87.8	87.8	87.8	Lw	87.8					5.00	a	6278357.39	2215366.88	5.00
POINTSOURCE		CAR20	87.8	87.8	87.8	Lw	87.8					5.00	a	6278317.64	2215367.50	5.00
POINTSOURCE		CAR21	87.8	87.8	87.8	Lw	87.8					5.00	a	6278282.86	2215368.12	5.00
POINTSOURCE		CAR22	87.8	87.8	87.8	Lw	87.8					5.00	a	6278249.95	2215368.12	5.00
POINTSOURCE		CAR23	87.8	87.8	87.8	Lw	87.8					5.00	a	6278210.82	2215368.12	5.00
POINTSOURCE		CAR24	87.8	87.8	87.8	Lw	87.8					5.00	a	6278174.80	2215369.36	5.00
POINTSOURCE		CAR25	87.8	87.8	87.8	Lw	87.8					5.00	a	6278128.84	2215369.98	5.00
POINTSOURCE		CAR26	87.8	87.8	87.8	Lw	87.8					5.00	a	6278094.07	2215369.98	5.00
POINTSOURCE		CAR27	87.8	87.8	87.8	Lw	87.8					5.00	a	6278050.59	2215370.60	5.00
POINTSOURCE		CAR28	87.8	87.8	87.8	Lw	87.8					5.00	a	6278019.54	2215371.22	5.00
POINTSOURCE		CAR29	87.8	87.8	87.8	Lw	87.8					5.00	a	6277987.25	2215371.85	5.00
POINTSOURCE		CAR30	87.8	87.8	87.8	Lw	87.8					5.00	a	6277907.75	2215391.10	5.00
POINTSOURCE		TRASH01	89.0	89.0	89.0	Lw	89		900.00	0.00	270.00	5.00	a	6277732.83	2216030.77	5.00
POINTSOURCE		TRASH02	89.0	89.0	89.0	Lw	89		900.00	0.00	270.00	5.00	a	6278722.84	2215515.27	5.00

Line Source(s)

Name	M.	ID	Result. PWL			Result. PWL'			Lw / Li			Operating Time			Moving Pt. Src				Height	
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Special	Night	Number			Speed		
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)	Day	Evening	Night	(mph)	(ft)	
LINESOURCE		TRUCK01	89.7	89.7	89.7	62.7	62.7	62.7	Lw	89.7									8	a
LINESOURCE		TRUCK02	89.7	89.7	89.7	66.4	66.4	66.4	Lw	89.7									8	a

Name	ID	Height				Coordinates			
		Begin		End		x	y	z	Ground
		(ft)		(ft)		(ft)	(ft)	(ft)	(ft)
LINESOURCE	TRUCK01	8.00	a			6278635.22	2215509.38	8.00	0.00
						6278640.73	2216008.22	8.00	0.00
						6278640.57	2216015.55	8.00	0.00
						6278639.22	2216022.76	8.00	0.00
						6278636.71	2216029.65	8.00	0.00
						6278633.10	2216036.04	8.00	0.00
						6278628.51	2216041.75	8.00	0.00
						6278623.05	2216046.64	8.00	0.00
						6278616.86	2216050.58	8.00	0.00
						6278610.11	2216053.45	8.00	0.00
						6278602.98	2216055.18	8.00	0.00
						6278595.67	2216055.73	8.00	0.00
						6278588.37	2216055.07	8.00	0.00
						6277688.53	2216070.23	8.00	0.00
						6277581.04	2216052.32	8.00	0.00
						6277512.14	2216052.32	8.00	0.00
LINESOURCE	TRUCK02	8.00	a			6277778.12	2216068.72	8.00	0.00
						6277775.34	2215665.10	8.00	0.00
						6277775.73	2215658.74	8.00	0.00
						6277775.11	2215652.40	8.00	0.00
						6277773.48	2215646.24	8.00	0.00
						6277770.90	2215640.41	8.00	0.00
						6277767.42	2215635.08	8.00	0.00
						6277763.13	2215630.36	8.00	0.00
						6277758.15	2215626.39	8.00	0.00
						6277752.60	2215623.26	8.00	0.00
						6277746.62	2215621.06	8.00	0.00
						6277740.37	2215619.83	8.00	0.00
						6277734.00	2215619.62	8.00	0.00
						6277506.63	2215615.49	8.00	0.00

Area Source(s)

Name	M.	ID	Result. PWL			Result. PWL''			Lw / Li			Operating Time			Height	
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Special	Night	(ft)	
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)		
AREASOURCE		DRY01	103.4	103.4	103.4	66.2	66.2	66.2	Lw	103.4					8	a
AREASOURCE		DRY02	103.4	103.4	103.4	68.9	68.9	68.9	Lw	103.4					8	a
AREASOURCE		COLD01	111.5	111.5	111.5	77.0	77.0	77.0	Lw	111.5					8	a
AREASOURCE		DRY03	103.4	103.4	103.4	68.9	68.9	68.9	Lw	103.4					8	a

Name	ID	Height				Coordinates			
		Begin		End		x	y	z	Ground
		(ft)		(ft)		(ft)	(ft)	(ft)	(ft)
AREASOURCE	DRY01	8.00	a			6277735.76	2216003.15	8.00	0.00
						6277737.40	2215661.70	8.00	0.00
						6277566.88	2215663.75	8.00	0.00
						6277570.17	2216002.31	8.00	0.00
AREASOURCE	DRY02	8.00	a			6278682.69	2216081.56	8.00	0.00
						6278735.16	2216081.56	8.00	0.00
						6278731.63	2215526.52	8.00	0.00
						6278710.94	2215526.02	8.00	0.00
						6278710.44	2215505.33	8.00	0.00
						6278677.64	2215505.84	8.00	0.00
AREASOURCE	COLD01	8.00	a			6277807.04	2216016.04	8.00	0.00
						6277868.27	2216014.85	8.00	0.00
						6277865.19	2215627.19	8.00	0.00
						6277918.19	2215627.60	8.00	0.00
						6277918.60	2215566.79	8.00	0.00
						6277803.55	2215568.43	8.00	0.00
AREASOURCE	DRY03	8.00	a			6278548.65	2216007.95	8.00	0.00
						6278611.07	2216007.42	8.00	0.00
						6278606.50	2215512.39	8.00	0.00
						6278544.94	2215514.92	8.00	0.00

Barrier(s)

Name	Sel.	M.	ID	Absorption		Z-Ext.	Cantilever		Height			Coordinates			
				left	right		horz.	vert.	Begin		End	x	y	z	Ground
						(ft)	(ft)	(ft)	(ft)		(ft)	(ft)	(ft)	(ft)	(ft)
BARRIERPLANNED			0						14.00	a		6278548.97	2216087.61	14.00	0.00
												6278737.18	2216084.08	14.00	0.00
												6278734.15	2215504.32	14.00	0.00
												6278649.38	2215505.84	14.00	0.00
BARRIERPLANNED			0						14.00	a		6277724.49	2216004.86	14.00	0.00
												6277568.58	2216004.86	14.00	0.00
												6277564.54	2215660.74	14.00	0.00
												6277678.58	2215659.73	14.00	0.00
												6277678.07	2215634.50	14.00	0.00
BARRIERPLANNED			0						14.00	a		6277677.06	2215592.12	14.00	0.00
												6277678.07	2215568.91	14.00	0.00
												6277919.26	2215565.88	14.00	0.00
BARRIERPLANNED			0						14.00	a		6277724.49	2216004.86	14.00	0.00
												6277725.00	2216045.23	14.00	0.00
												6277751.23	2216045.23	14.00	0.00
BARRIERPLANNED			0						14.00	a		6278621.50	2215505.30	14.00	0.00
												6278593.61	2215504.98	14.00	0.00
BARRIERPLANNED			0						14.00	a		6277806.73	2216042.28	14.00	0.00
												6277800.86	2216042.14	14.00	0.00

Building(s)

Name	Sel.	M.	ID	RB	Residents	Absorption	Height		Coordinates			
							Begin		x	y	z	Ground
							(ft)		(ft)	(ft)	(ft)	(ft)
BUILDING			BUILDING00001	x	0		48.00	a	6277806.75	2216042.04	48.00	0.00
									6278611.26	2216033.54	48.00	0.00
									6278611.07	2216007.42	48.00	0.00
									6278548.65	2216007.95	48.00	0.00
									6278544.07	2215505.67	48.00	0.00
									6278589.86	2215505.45	48.00	0.00
									6278592.86	2215408.02	48.00	0.00
									6278047.02	2215414.27	48.00	0.00
									6277941.47	2215417.04	48.00	0.00
									6277936.61	2215458.71	48.00	0.00
									6277920.63	2215458.71	48.00	0.00
									6277918.19	2215627.60	48.00	0.00
									6277865.19	2215627.19	48.00	0.00
									6277869.07	2216016.17	48.00	0.00
									6277806.37	2216017.23	48.00	0.00
BUILDING			BUILDING00002	x	0		15.00	a	6278494.90	2216203.03	15.00	0.00
									6278575.00	2216203.03	15.00	0.00
									6278573.80	2216090.41	15.00	0.00
									6278494.30	2216090.41	15.00	0.00
BUILDING			BUILDING00003	x	0		15.00	a	6278726.16	2216194.59	15.00	0.00
									6278761.09	2216194.59	15.00	0.00
									6278761.09	2216131.96	15.00	0.00
									6278726.16	2216132.56	15.00	0.00
									6278726.16	2216149.43	15.00	0.00
									6278716.53	2216149.43	15.00	0.00
									6278717.13	2216174.72	15.00	0.00

Name	Sel.	M.	ID	RB	Residents	Absorption	Height		Coordinates			
							Begin		x	y	z	Ground
							(ft)		(ft)	(ft)	(ft)	(ft)
									6278725.56	2216175.32	15.00	0.00
BUILDING			BUILDING00004	x	0		15.00	a	6278693.64	2216237.96	15.00	0.00
									6278718.33	2216238.56	15.00	0.00
									6278718.94	2216218.08	15.00	0.00
									6278696.05	2216217.48	15.00	0.00
BUILDING			BUILDING00005	x	0		15.00	a	6278898.98	2216093.87	15.00	0.00
									6278923.72	2216076.42	15.00	0.00
									6278919.55	2216070.95	15.00	0.00
									6278930.23	2216062.88	15.00	0.00
									6278921.37	2216051.94	15.00	0.00
									6278913.56	2216056.37	15.00	0.00
									6278907.83	2216047.77	15.00	0.00
									6278880.23	2216066.78	15.00	0.00
BUILDING			BUILDING00006	x	0		15.00	a	6278878.14	2215999.60	15.00	0.00
									6278932.57	2215996.47	15.00	0.00
									6278931.53	2215973.82	15.00	0.00
									6278876.84	2215976.42	15.00	0.00
BUILDING			BUILDING00007	x	0		15.00	a	6278873.45	2215902.20	15.00	0.00
									6278890.38	2215924.08	15.00	0.00
									6278937.52	2215889.44	15.00	0.00
									6278921.37	2215866.00	15.00	0.00
BUILDING			BUILDING00008	x	0		15.00	a	6278888.30	2215778.24	15.00	0.00
									6278911.74	2215761.84	15.00	0.00
									6278906.53	2215753.76	15.00	0.00
									6278919.81	2215744.13	15.00	0.00
									6278906.53	2215724.08	15.00	0.00
									6278868.25	2215749.60	15.00	0.00
BUILDING			BUILDING00009	x	0		15.00	a	6278891.42	2215643.61	15.00	0.00
									6278909.91	2215630.59	15.00	0.00
									6278913.56	2215636.84	15.00	0.00
									6278950.02	2215609.75	15.00	0.00
									6278931.01	2215582.41	15.00	0.00
									6278875.28	2215618.61	15.00	0.00
BUILDING			BUILDING00010	x	0		15.00	a	6278891.42	2215471.47	15.00	0.00
									6278953.92	2215427.98	15.00	0.00
									6278937.52	2215406.37	15.00	0.00
									6278875.02	2215448.29	15.00	0.00
BUILDING			BUILDING00011	x	0		15.00	a	6278914.08	2215418.35	15.00	0.00
									6278934.91	2215402.98	15.00	0.00
									6278906.01	2215362.62	15.00	0.00
									6278876.32	2215385.79	15.00	0.00
									6278895.59	2215412.10	15.00	0.00
									6278905.23	2215405.85	15.00	0.00

Ground Absorption(s)

Name	Sel.	M.	ID	G	Coordinates	
					x	y
					(ft)	(ft)
GROUND			0	0.5	6277536.73	2216310.27
					6277766.73	2216309.28
					6277777.63	2216487.73
					6278154.35	2216482.77
					6278152.37	2216099.11
					6277526.81	2216103.07
GROUND			0	0.5	6278160.21	2216549.13
					6278791.71	2216544.04
					6278789.16	2216318.68
					6278647.84	2216317.41
					6278649.11	2216221.92
					6278468.32	2216219.38
					6278474.69	2216095.88
					6278158.94	2216102.24
GROUND			0	0.5	6277506.77	2215551.76
					6277871.86	2215551.76
					6277870.13	2215323.36
					6278759.50	2215302.60
					6278757.77	2215245.50
					6277518.88	2215266.26

APPENDIX 10.1:

CADNAA CONSTRUCTION NOISE MODEL INPUTS

This page intentionally left blank

15109 - Hillwood Ethanac

CadnaA Noise Prediction Model: 15109-02c_Construction.cna
Date: 06.02.23
Analyst: B. Lawson

Calculation Configuration

Configuration	
Parameter	**Value**
General	
Max. Error (dB)	**0.00**
Max. Search Radius (#(Unit,LEN))	**2000.01**
Min. Dist Src to Rcvr	**0.00**
Partition	
Raster Factor	**0.50**
Max. Length of Section (#(Unit,LEN))	**999.99**
Min. Length of Section (#(Unit,LEN))	**1.01**
Min. Length of Section (%)	**0.00**
Proj. Line Sources	**On**
Proj. Area Sources	**On**
Ref. Time	
Reference Time Day (min)	**960.00**
Reference Time Night (min)	**480.00**
Daytime Penalty (dB)	**0.00**
Recr. Time Penalty (dB)	**5.00**
Night-time Penalty (dB)	**10.00**
DTM	
Standard Height (m)	**0.00**
Model of Terrain	**Triangulation**
Reflection	
max. Order of Reflection	**2**
Search Radius Src	**100.00**
Search Radius Rcvr	**100.00**
Max. Distance Source - Rcvr	**1000.00 1000.00**
Min. Distance Rvcr - Reflector	**1.00 1.00**
Min. Distance Source - Reflector	**0.10**
Industrial (ISO 9613)	
Lateral Diffraction	**some Obj**
Obst. within Area Src do not shield	**On**
Screening	**Incl. Ground Att. over Barrier**
	Dz with limit (20/25)
Barrier Coefficients C1,2,3	**3.0 20.0 0.0**
Temperature (#(Unit,TEMP))	**10**
rel. Humidity (%)	**70**
Ground Absorption G	**0.50**
Wind Speed for Dir. (#(Unit,SPEED))	**3.0**
Roads (TNM)	
Railways (FTA/FRA)	
Aircraft (???)	
Strictly acc. to AzB	

Receiver Noise Levels

Name	M.	ID	Level Lr			Limit. Value			Land Use			Height		Coordinates		
			Day	Night	CNEL	Day	Night	CNEL	Type	Auto	Noise Type			X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)				(ft)		(ft)	(ft)	(ft)
RECEIVERS		R1	61.2	61.2	67.8	80.0	60.0	0.0				5.00	a	6277581.87	2216314.31	5.00
RECEIVERS		R2	74.0	74.0	80.6	80.0	60.0	0.0				5.00	a	6278656.85	2216217.54	5.00
RECEIVERS		R3	79.5	79.5	86.2	80.0	60.0	0.0				5.00	a	6278841.71	2215903.14	5.00
RECEIVERS		R4	79.6	79.6	86.3	80.0	60.0	0.0				5.00	a	6278837.88	2215582.82	5.00
RECEIVERS		R5	73.6	73.6	80.3	80.0	60.0	0.0				5.00	a	6278280.15	2215199.54	5.00

Point Source(s)

Name	M.	ID	Result. PWL			Lw / Li			Operating Time			Height		Coordinates		
			Day	Evening	Night	Type	Value	norm.	Day	Special	Night			X	Y	Z
			(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)	(ft)		(ft)	(ft)	(ft)
		CONS01	116.7	116.7	116.7	Lw	116.7					8.00	a	6278657.28	2216079.93	8.00
		CONS02	116.7	116.7	116.7	Lw	116.7					8.00	a	6278767.52	2215910.44	8.00
		CONS03	116.7	116.7	116.7	Lw	116.7					8.00	a	6278766.76	2215593.98	8.00
		CONS04	116.7	116.7	116.7	Lw	116.7					8.00	a	6278287.51	2215337.03	8.00

Area Source(s)

Name	M.	ID	Result. PWL			Result. PWL''			Lw / Li			Operating Time			Height	
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Special	Night	(ft)	
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)		
SITEBOUNDARY		CONSTRUCTION	116.7	116.7	116.7	67.5	67.5	67.5	Lw	116.7					8	a

Name	ID	Height			Coordinates			
		Begin		End	x	y	z	Ground
		(ft)		(ft)	(ft)	(ft)	(ft)	(ft)
SITEBOUNDARY	CONSTRUCTION	8.00	a		6277511.82	2216097.86	8.00	0.00
					6278786.23	2216082.85	8.00	0.00
					6278783.05	2215641.18	8.00	0.00
					6278765.57	2215519.70	8.00	0.00
					6278764.26	2215320.43	8.00	0.00
					6278742.41	2215309.50	8.00	0.00
					6278610.01	2215311.25	8.00	0.00
					6277876.64	2215336.27	8.00	0.00
					6277877.57	2215560.49	8.00	0.00
					6277507.19	2215564.53	8.00	0.00

Building(s)

Name	Sel.	M.	ID	RB	Residents	Absorption	Height		Coordinates			
							Begin		x	y	z	Ground
							(ft)		(ft)	(ft)	(ft)	(ft)
BUILDING			BUILDING00002	x	0		15.00	a	6278494.90	2216203.03	15.00	0.00
									6278575.00	2216203.03	15.00	0.00
									6278573.80	2216090.41	15.00	0.00
									6278494.30	2216090.41	15.00	0.00
BUILDING			BUILDING00003	x	0		15.00	a	6278726.16	2216194.59	15.00	0.00
									6278761.09	2216194.59	15.00	0.00
									6278761.09	2216131.96	15.00	0.00
									6278726.16	2216132.56	15.00	0.00
									6278726.16	2216149.43	15.00	0.00
									6278716.53	2216149.43	15.00	0.00
									6278717.13	2216174.72	15.00	0.00
									6278725.56	2216175.32	15.00	0.00
BUILDING			BUILDING00004	x	0		15.00	a	6278693.64	2216237.96	15.00	0.00
									6278718.33	2216238.56	15.00	0.00
									6278718.94	2216218.08	15.00	0.00
									6278696.05	2216217.48	15.00	0.00
BUILDING			BUILDING00005	x	0		15.00	a	6278898.98	2216093.87	15.00	0.00
									6278923.72	2216076.42	15.00	0.00
									6278919.55	2216070.95	15.00	0.00
									6278930.23	2216062.88	15.00	0.00
									6278921.37	2216051.94	15.00	0.00
									6278913.56	2216056.37	15.00	0.00
									6278907.83	2216047.77	15.00	0.00
									6278880.23	2216066.78	15.00	0.00
BUILDING			BUILDING00006	x	0		15.00	a	6278878.14	2215999.60	15.00	0.00
									6278932.57	2215996.47	15.00	0.00
									6278931.53	2215973.82	15.00	0.00
									6278876.84	2215976.42	15.00	0.00
BUILDING			BUILDING00007	x	0		15.00	a	6278873.45	2215902.20	15.00	0.00
									6278890.38	2215924.08	15.00	0.00
									6278937.52	2215889.44	15.00	0.00
									6278921.37	2215866.00	15.00	0.00
BUILDING			BUILDING00008	x	0		15.00	a	6278888.30	2215778.24	15.00	0.00
									6278911.74	2215761.84	15.00	0.00
									6278906.53	2215753.76	15.00	0.00
									6278919.81	2215744.13	15.00	0.00
									6278906.53	2215724.08	15.00	0.00
									6278868.25	2215749.60	15.00	0.00
BUILDING			BUILDING00009	x	0		15.00	a	6278891.42	2215643.61	15.00	0.00
									6278909.91	2215630.59	15.00	0.00
									6278913.56	2215636.84	15.00	0.00
									6278950.02	2215609.75	15.00	0.00
									6278931.01	2215582.41	15.00	0.00
									6278875.28	2215618.61	15.00	0.00
BUILDING			BUILDING00010	x	0		15.00	a	6278891.42	2215471.47	15.00	0.00
									6278953.92	2215427.98	15.00	0.00
									6278937.52	2215406.37	15.00	0.00
									6278875.02	2215448.29	15.00	0.00
BUILDING			BUILDING00011	x	0		15.00	a	6278914.08	2215418.35	15.00	0.00
									6278934.91	2215402.98	15.00	0.00
									6278906.01	2215362.62	15.00	0.00
									6278876.32	2215385.79	15.00	0.00
									6278895.59	2215412.10	15.00	0.00
									6278905.23	2215405.85	15.00	0.00

Ground Absorption(s)

Name	Sel.	M.	ID	G	Coordinates	
					x	y
					(ft)	(ft)
GROUND			0	0.5	6277536.73	2216310.27

Name	Sel.	M.	ID	G	Coordinates	
					x	y
					(ft)	(ft)
					6277766.73	2216309.28
					6277777.63	2216487.73
					6278154.35	2216482.77
					6278152.37	2216099.11
					6277526.81	2216103.07
GROUND			0	0.5	6278160.21	2216549.13
					6278791.71	2216544.04
					6278789.16	2216318.68
					6278647.84	2216317.41
					6278649.11	2216221.92
					6278468.32	2216219.38
					6278474.69	2216095.88
					6278158.94	2216102.24
GROUND			0	0.5	6277506.77	2215551.76
					6277871.86	2215551.76
					6277870.13	2215323.36
					6278759.50	2215302.60
					6278757.77	2215245.50
					6277518.88	2215266.26

This page intentionally left blank

APPENDIX 10.2:

CADNAA CONCRETE POUR NOISE MODEL INPUTS

This page intentionally left blank

15109 - Hillwood Ethanac

CadnaA Noise Prediction Model: 15109-02c_Concrete.cna
Date: 06.02.23
Analyst: B. Lawson

Calculation Configuration

Configuration	
Parameter	**Value**
General	
Max. Error (dB)	**0.00**
Max. Search Radius (#(Unit,LEN))	**2000.01**
Min. Dist Src to Rcvr	**0.00**
Partition	
Raster Factor	**0.50**
Max. Length of Section (#(Unit,LEN))	**999.99**
Min. Length of Section (#(Unit,LEN))	**1.01**
Min. Length of Section (%)	**0.00**
Proj. Line Sources	**On**
Proj. Area Sources	**On**
Ref. Time	
Reference Time Day (min)	**960.00**
Reference Time Night (min)	**480.00**
Daytime Penalty (dB)	**0.00**
Recr. Time Penalty (dB)	**5.00**
Night-time Penalty (dB)	**10.00**
DTM	
Standard Height (m)	**0.00**
Model of Terrain	**Triangulation**
Reflection	
max. Order of Reflection	**2**
Search Radius Src	**100.00**
Search Radius Rcvr	**100.00**
Max. Distance Source - Rcvr	**1000.00 1000.00**
Min. Distance Rvcr - Reflector	**1.00 1.00**
Min. Distance Source - Reflector	**0.10**
Industrial (ISO 9613)	
Lateral Diffraction	**some Obj**
Obst. within Area Src do not shield	**On**
Screening	**Incl. Ground Att. over Barrier**
	Dz with limit (20/25)
Barrier Coefficients C1,2,3	**3.0 20.0 0.0**
Temperature (#(Unit,TEMP))	**10**
rel. Humidity (%)	**70**
Ground Absorption G	**0.50**
Wind Speed for Dir. (#(Unit,SPEED))	**3.0**
Roads (TNM)	
Railways (FTA/FRA)	
Aircraft (???)	
Strictly acc. to AzB	

Receiver Noise Levels

Name	M.	ID	Level Lr			Limit. Value			Land Use			Height		Coordinates		
			Day	Night	CNEL	Day	Night	CNEL	Type	Auto	Noise Type			X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)				(ft)		(ft)	(ft)	(ft)
RECEIVERS		R1	49.2	49.2	55.8	80.0	60.0	0.0				5.00	a	6277581.87	2216314.31	5.00
RECEIVERS		R2	57.4	57.4	64.1	80.0	60.0	0.0				5.00	a	6278656.85	2216217.54	5.00
RECEIVERS		R3	59.1	59.1	65.7	80.0	60.0	0.0				5.00	a	6278841.71	2215903.14	5.00
RECEIVERS		R4	59.5	59.5	66.2	80.0	60.0	0.0				5.00	a	6278837.88	2215582.82	5.00
RECEIVERS		R5	59.2	59.2	65.9	80.0	60.0	0.0				5.00	a	6278280.15	2215199.54	5.00

Point Source(s)

Name	M.	ID	Result. PWL			Lw / Li			Operating Time			Height		Coordinates		
			Day	Evening	Night	Type	Value	norm.	Day	Special	Night			X	Y	Z
			(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)	(ft)		(ft)	(ft)	(ft)
		CONS02	105.4	105.4	105.4	Lw	105.4					8.00	a	6278634.56	2215975.91	8.00
		CONS03	105.4	105.4	105.4	Lw	105.4					8.00	a	6278633.80	2215584.81	8.00
		CONS04	105.4	105.4	105.4	Lw	105.4					8.00	a	6278286.39	2215402.73	8.00

Area Source(s)

Name	M.	ID	Result. PWL			Result. PWL''			Lw / Li			Operating Time			Height	
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Special	Night	(ft)	
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)		
CONCRETE		CONCRETE	105.4	105.4	105.4	58.9	58.9	58.9	Lw	105.4					8	a

Name	ID	Height				Coordinates			
		Begin		End		x	y	z	Ground
		(ft)		(ft)		(ft)	(ft)	(ft)	(ft)
CONCRETE	CONCRETE	8.00	a			6277896.89	2216050.83	8.00	0.00
						6278652.43	2216044.05	8.00	0.00
						6278645.66	2215454.52	8.00	0.00
						6278577.90	2215457.91	8.00	0.00
						6278579.59	2215385.07	8.00	0.00
						6277954.49	2215393.54	8.00	0.00
						6277954.49	2215591.74	8.00	0.00
						6277893.50	2215596.82	8.00	0.00

Building(s)

Name	Sel.	M.	ID	RB	Residents	Absorption	Height		Coordinates			
							Begin		x	y	z	Ground
							(ft)		(ft)	(ft)	(ft)	(ft)
BUILDING			BUILDING00002	x	0		15.00	a	6278494.90	2216203.03	15.00	0.00
									6278575.00	2216203.03	15.00	0.00
									6278573.80	2216090.41	15.00	0.00
									6278494.30	2216090.41	15.00	0.00
BUILDING			BUILDING00003	x	0		15.00	a	6278726.16	2216194.59	15.00	0.00
									6278761.09	2216194.59	15.00	0.00
									6278761.09	2216131.96	15.00	0.00
									6278726.16	2216132.56	15.00	0.00
									6278726.16	2216149.43	15.00	0.00
									6278716.53	2216149.43	15.00	0.00
									6278717.13	2216174.72	15.00	0.00
									6278725.56	2216175.32	15.00	0.00
BUILDING			BUILDING00004	x	0		15.00	a	6278693.64	2216237.96	15.00	0.00
									6278718.33	2216238.56	15.00	0.00
									6278718.94	2216218.08	15.00	0.00
									6278696.05	2216217.48	15.00	0.00
BUILDING			BUILDING00005	x	0		15.00	a	6278898.98	2216093.87	15.00	0.00
									6278923.72	2216076.42	15.00	0.00
									6278919.55	2216070.95	15.00	0.00
									6278930.23	2216062.88	15.00	0.00
									6278921.37	2216051.94	15.00	0.00
									6278913.56	2216056.37	15.00	0.00
									6278907.83	2216047.77	15.00	0.00
									6278880.23	2216066.78	15.00	0.00
BUILDING			BUILDING00006	x	0		15.00	a	6278878.14	2215999.60	15.00	0.00
									6278932.57	2215996.47	15.00	0.00
									6278931.53	2215973.82	15.00	0.00
									6278876.84	2215976.42	15.00	0.00
BUILDING			BUILDING00007	x	0		15.00	a	6278873.45	2215902.20	15.00	0.00
									6278890.38	2215924.08	15.00	0.00
									6278937.52	2215889.44	15.00	0.00
									6278921.37	2215866.00	15.00	0.00
BUILDING			BUILDING00008	x	0		15.00	a	6278888.30	2215778.24	15.00	0.00
									6278911.74	2215761.84	15.00	0.00
									6278906.53	2215753.76	15.00	0.00
									6278919.81	2215744.13	15.00	0.00
									6278906.53	2215724.08	15.00	0.00
									6278868.25	2215749.60	15.00	0.00
BUILDING			BUILDING00009	x	0		15.00	a	6278891.42	2215643.61	15.00	0.00
									6278909.91	2215630.59	15.00	0.00
									6278913.56	2215636.84	15.00	0.00
									6278950.02	2215609.75	15.00	0.00
									6278931.01	2215582.41	15.00	0.00
									6278875.28	2215618.61	15.00	0.00
BUILDING			BUILDING00010	x	0		15.00	a	6278891.42	2215471.47	15.00	0.00
									6278953.92	2215427.98	15.00	0.00
									6278937.52	2215406.37	15.00	0.00
									6278875.02	2215448.29	15.00	0.00
BUILDING			BUILDING00011	x	0		15.00	a	6278914.08	2215418.35	15.00	0.00
									6278934.91	2215402.98	15.00	0.00
									6278906.01	2215362.62	15.00	0.00
									6278876.32	2215385.79	15.00	0.00
									6278895.59	2215412.10	15.00	0.00
									6278905.23	2215405.85	15.00	0.00

Ground Absorption(s)

Name	Sel.	M.	ID	G	Coordinates	
					x	y
					(ft)	(ft)
GROUND			0	0.5	6277536.73	2216310.27
					6277766.73	2216309.28
					6277777.63	2216487.73

Name	Sel.	M.	ID	G	Coordinates	
					x	y
					(ft)	(ft)
					6278154.35	2216482.77
					6278152.37	2216099.11
					6277526.81	2216103.07
GROUND			0	0.5	6278160.21	2216549.13
					6278791.71	2216544.04
					6278789.16	2216318.68
					6278647.84	2216317.41
					6278649.11	2216221.92
					6278468.32	2216219.38
					6278474.69	2216095.88
					6278158.94	2216102.24
GROUND			0	0.5	6277506.77	2215551.76
					6277871.86	2215551.76
					6277870.13	2215323.36
					6278759.50	2215302.60
					6278757.77	2215245.50
					6277518.88	2215266.26

This page intentionally left blank