ACOUSTICAL SITE ASSESSMENT VICTORIA ESTATES SUBDIVISION (TM 5431) SAN DIEGO, CA

Submitted to:

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INTRODUCTION AND DEFINITIONS

Existing Site Characterization

The proposed Victoria Estates Tentative Map 5431 project site (APN 403-160-15-00) consists of approximately 79 gross acres, located in the County of San Diego, as shown in Figure 1 on the following page. Regional access to the site is obtained from Country Meadows Road, via Victoria Circle and Interstate 8 (I-8) as shown in Figure 2 on Page 3 of this report. Surrounding land uses consist of single-family residential lots and undeveloped open space. These features, as well as the proposed site plan configuration, can be seen in Figure 3 on Page 4 of this report.

The project site resides as a fully undisturbed land use with past evidence of offroad vehicle activity. Elevations across the property range from approximately 1,990 feet to 2,300 feet above mean sea level (MSL).

Project Description

Tentative Map 5431 would construct 20 single-family residential lots (and various open space parcels) in two development phases, as shown in Figure 4 on Page 5 of this report. The project would also include necessary roadway and drainage improvements, as required by the County of San Diego.

Acoustical Definitions and Theory

Sound waves are generally described as linearly compressive mechanical waves, which propagate in solids, liquids, and gases. The medium transmitting the wave oscillates in the direction of propagation. All sound waves originate from a vibrating surface, which alternately compress, and then expand, the transmitting medium over a wide range of frequencies causing the sensation of hearing in humans. This nominal range spans from 20 Hz (Hertz, or cycles per second) to as high as 20,000 Hz.

The phenomenon known as 'noise' is defined as the superposition of multiple periodic sound waves each having a large number of frequency components. The principal response to environmental noise is annoyance. The type of noise, its perceived importance, the time of day, and the sensitivity of the individual hearing the sound influence the degree of annoyance. The human ear has a large dynamic range where sound can be detected. Because of this vast range, any attempt to represent the acoustic intensity of a particular sound on a linear scale becomes unwieldy. As a result, a logarithmic ratio, originally conceived for radio work, known as the decibel (dB), is commonly employed.¹

 $^{^1}$ The decibel is a unit used to express the relative magnitude of a sound wave. This level is defined as being equal to 20 times the common logarithm of the ratio of the pressure produced by a sound wave of interest, to a 'reference' pressure wave equal to 20 micro Pascal's (µPa) measured at a distance of one meter away. The reference level of 20 µPa is the smallest amount of pressure capable of producing the sensation of hearing in a human.



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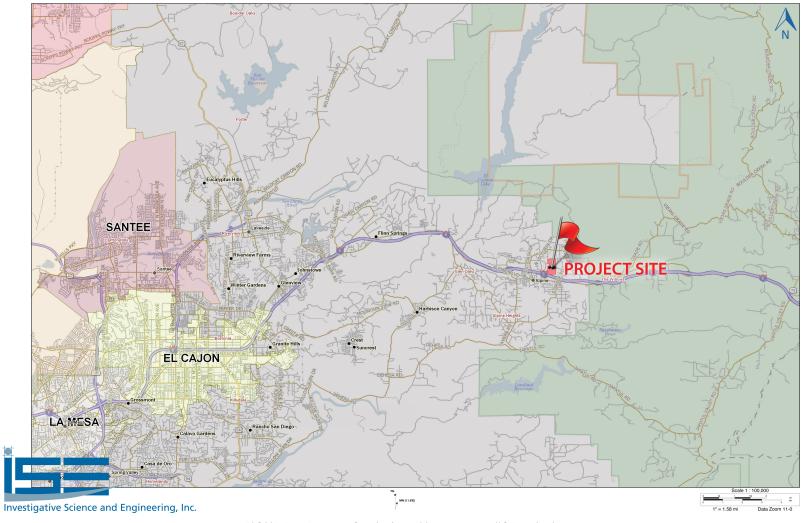


FIGURE 1: Project Study Area Vicinity Map (ISE 11/16)



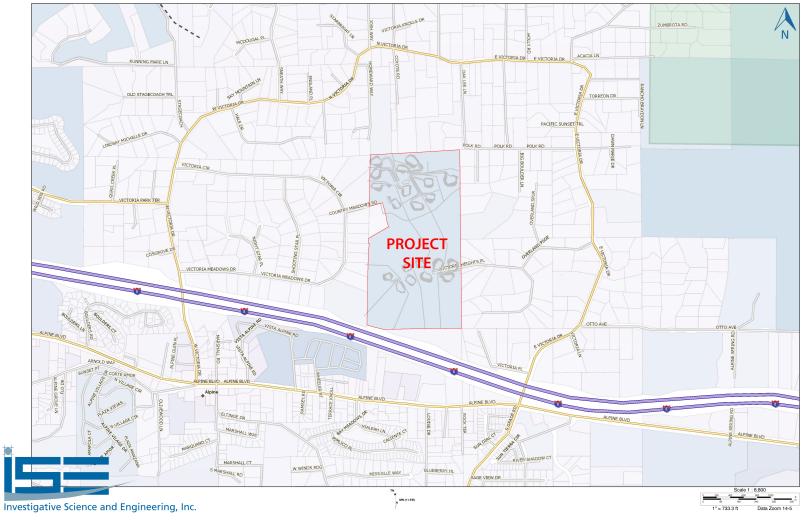


FIGURE 2: Project Study Area Parcel Map (ISE 11/16)



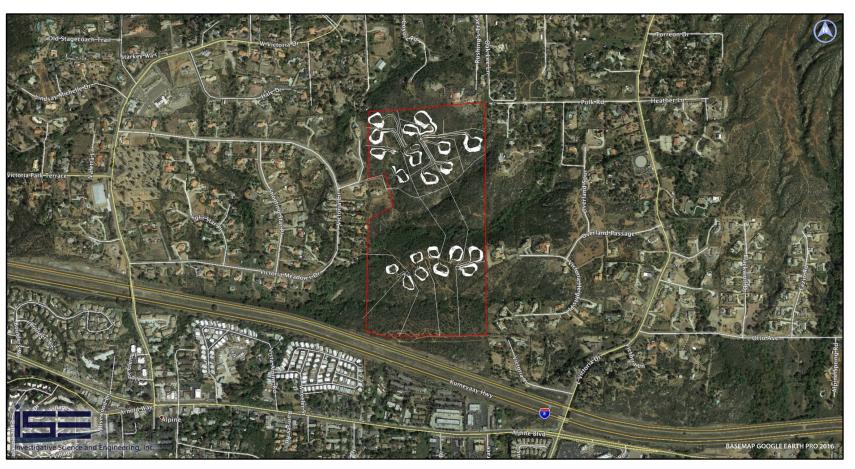


FIGURE 3: Aerial Image Showing Project Development and Surrounding Uses (ISE 11/16)



NORTH

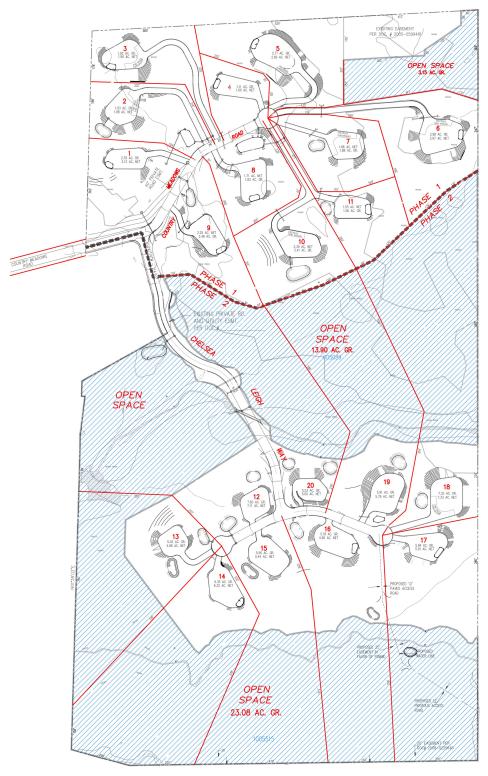


FIGURE 4: Proposed TM 5431 Site Development Map (Jones Engineers, Inc. 11/16)



A sound level of zero "0" dB is scaled such that it is defined as the threshold of human hearing, and would be barely audible to an 'average' person under extremely quiet listening conditions. Sound levels above 120 dB roughly correspond roughly to the threshold of pain, while the minimum change in sound level that the human ear can detect is approximately 3.0 dBA.² A pressure change of 10 dB is usually perceived by the average person as a doubling (or halving) of the sound's loudness.³

Most of the sounds we hear in any environmental setting do not consist of a single frequency, but rather are comprised of a broad band of frequencies differing in intensity. The intensities of each frequency add together to generate the sound we ultimately hear. The method used to quantify environmental sounds of this type, consists of aggregating the frequency spectrum of a sound according to a weighting system that mimics the nonlinear response characteristics of the human ear. This is called "A" weighting, and the decibel level measured is called the A-weighted sound level (or dBA).

Although the A-weighted sound level may adequately indicate the level of environmental noise at any instant, community noise levels over a finite time period vary continuously. Most environmental noise we hear includes a conglomeration of sounds from distant sources that create a relatively steady background level in which no particular source is identifiable. For this type of noise, a single descriptor called the $L_{\rm eq}$ (or equivalent sound level) is used. 4 $L_{\rm eq}$ is the energy-mean A-weighted sound level during a specified time interval, and would be defined mathematically by the following continuous integral,

$$L_{eq} = 10Log_{10} \left[\frac{1}{T} \int_{0}^{T} SPL(t)^{2} dt \right]$$

Where the following variables are defined:

 L_{eq} = The energy equivalent sound level, 't' is the independent variable of time,

T = The total time interval of the event, and

SPL = The sound pressure level re. 20 μ Pa.

⁴ Thus, L_{eq} is the 'equivalent sound level' that would have to be produced by a constant source to equal the average of the fluctuating community noise. For most acoustical studies, the study interval is generally taken as one-hour and the abbreviation used is *Leq-h*; however, other time intervals are utilized depending on the jurisdictional preference.



² Every 3 dB equates to a 50% drop (or increase) in wave strength; therefore a 6 dB drop/increase = a loss/increase of 75% of total signal strength and so on.

³ This is a subjective reference based upon the nonlinear nature of the human ear. This change actually represents an approximate 90 percent change in the sound intensity, but only about a 50 percent change in the perceived loudness. This is due to the nonlinear response of the human ear to sound.

To describe the time-varying character of environmental noise, the statistical noise descriptors L_{10} and L_{90} are commonly used. They are the noise levels equaled or exceeded during 10 percent and 90 percent of a stated time. Sound levels associated with the L_{10} typically describe transient or short-term events, while levels associated with the L_{90} describe the steady state (or most prevalent) noise conditions. In addition, it is often desirable to know the acoustic range of the noise source being measured. This is accomplished through the maximum and minimum measured sound level (L_{max} and L_{min}) indicators. The L_{min} value obtained for a particular monitoring location is often called the acoustic floor for that location.

The time-weighted aggregate of all community noise events are typically averaged into a single value known as the *Community Noise Equivalent Level* (CNEL).⁵ Mathematically, CNEL can be derived based upon the hourly L_{eq} values, via the following expression:

$$CNEL = 10Log_{10} \frac{1}{n} \sum_{i=1}^{n} \left(10^{\frac{Leq(day)_{i}}{10}} + 10^{\frac{Leq(evening+5)_{i}}{10}} + 10^{\frac{Leq(night+10)_{i}}{10}} \right)$$

With the following variables:

 $L_{eq}(x)_i$ = The equivalent sound level during period 'x' at time interval 'i', and,

n = The number of time intervals.



ENVIRONMENTAL SIGNIFICANCE THRESHOLDS

County of San Diego General Plan Noise Regulations

Transportation noise levels, such as those produced by roadways, railroads, airports, heliports, are governed under the *County of San Diego's Noise Element of the 2020 General Plan*. Chapter 8, Tables N-1 and N-2 of the General Plan specify the following exterior noise compatibility guidelines as shown in Table 1 on the following page.

Thus, for the proposed Tentative Map 5431 project site, an exterior noise abatement standard of 60 dBA CNEL would be applicable as applied to areas previously identified under N-2(4).

⁵ The CNEL calculated by averaging all events over a specified time interval, and applying a 5-dBA penalty to any sounds occurring between 7:00 p.m. and 10:00 p.m., and a 10-dBA penalty to sounds that occur during nighttime hours (i.e., 10 p.m. to 7 a.m.). This artificial penalty is applied to compensate for the increased sensitivity to noise during the quieter nighttime hours.



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TABLE 1: County of San Diego General Plan 2020 Noise Element Compatibility Guidelines

		Exterior Noise Level (CNEL)									
	Land Use Category		55	60	65	70	75	80			
Α	Residential—single family residences, mobile homes, senior housing, convalescent homes										
В	Residential—multi-family residences, mixed-use (commercial/residential)										
С	Transient lodging—motels, hotels, resorts										
D*	Schools, churches, hospitals, nursing homes, child care facilities										
E*	Passive recreational parks, nature preserves, contemplative spaces, cemeteries										
F*	Active parks, golf courses, athletic fields, outdoor spectator sports, water recreation										
G*	Office\professional, government, medical\dental, commercial, retail, laboratories										
H*	Industrial, manufacturing, utilities, agriculture, mining, stables, ranching, warehouse, maintenance/repair										
	ACCEPTABLE—Specified land use is satisfact construction, without any special noise inst				on that any bu	ildings involv	ed are of no	rmal			
	CONDITIONALLY ACCEPTABLE—New constraints is conducted to determine if noise Criteria for determining exterior and interimitigate noise to a level deemed Acceptable been provided to the greatest extent pract	reduction or noise lev e, the app	measure els are li ropriate d	are necess sted in Tabl county decis	sary to achieve e N-2, Noise St sion-maker mu	acceptable le andards. If a ist determine	evels for lan project can	d use. not			

^{*} Denotes facilities used for part of the day; therefore, an hourly standard would be used rather than CNEL (refer to Table N-2).

Table N-2 Noise Standards

- The exterior noise level (as defined in Item 3) standard for Category A shall be 60 CNEL, and the interior noise level standard for indoor habitable rooms shall be 45 CNEL.
- The exterior noise level standard for Categories B and C shall be 65 CNEL, and the interior noise level standard for indoor habitable rooms shall be 45 CNEL.
- The exterior noise level standard for Categories D and G shall be 65 CNEL and the interior noise level standard shall be 50 dBA L_{eq} (one hour average).
- 4. For single-family detached dwelling units, "exterior noise level" is defined as the noise level measured at an outdoor living area which adjoins and is on the same lot as the dwelling, and which contains at least the following minimum net lot area: (i) for lots less than 4,000 square feet in area, the exterior area shall include 400 square feet, (ii) for lots between 4,000 square feet to 10 acres in area, the exterior area shall include 10 percent of the lot area; (iii) for lots over 10 acres in area, the exterior area shall include 1 acre.
- 5. For all other residential land uses, "exterior noise level" is defined as noise measured at exterior areas which are provided for private or group usable open space purposes. "Private Usable Open Space" is defined as usable open space intended for use of occupants of one dwelling unit, normally including yards, decks, and balconies. When the noise limit for Private Usable Open Space cannot be met, then a Group Usable Open Space that meets the exterior noise level standard shall be provided. "Group Usable Open Space" is defined as usable open space intended for common use by occupants of a development, either privately owned and maintained or dedicated to a public agency, normally including swimming pools, recreation courts, patios, open landscaped areas, and greenbelts with pedestrian walkways and equestrian and bicycle trails, but not including off-street parking and loading areas or driveways.
- 6. For non-residential noise sensitive land uses, exterior noise level is defined as noise measured at the exterior area provided for public use.
- For noise sensitive land uses where people normally do not sleep at night, the exterior and interior noise standard may be measured using either CNEL or the one-hour average noise level determined at the loudest hour during the period when the facility is normally occupied.
- 8. The exterior noise standard does not apply for land uses where no exterior use area is proposed or necessary, such as a library
- For Categories E and F the exterior noise level standard shall not exceed the limit defined as "Acceptable" in Table N-1 or an equivalent one-hour noise standard.



San Diego County Operational Noise Ordinance

San Diego County Noise Ordinance Section 36.404 governs operational noise as a function of the time of day, and applicable land use zone. The relevant standards are shown in Table 2 below. The proposed Victoria Estates Subdivision (TM 5431) site would be located within an A-70 agricultural zone.

TABLE 2: County of San Diego Noise Ordinance Limits

Land Use Zone ⁶	Time of Day	1-Hour Average Sound Level (dBA L _{eq})
RS, RD, RR, RMH, A70, A72, S80, S81, S87, S90, S92, RV, and RU w/ density less than 11 DU/AC	7 a.m. to 10 p.m. 10 p.m. to 7 a.m.	50 45
RRO, RC, RM, S86, V5, RV and RU w- density of 11 or more DU/AC	7 a.m. to 10 p.m. 10 p.m. to 7 a.m.	55 50
S94, V4, and all commercial zones	7 a.m. to 10 p.m. 10 p.m. to 7 a.m.	60 55
V1, V2	7 p.m. to 10 p.m. 10 p.m. to 7 a.m.	55 V1 = 55, V2 = 50
V3	7 a.m. to 10 p.m. 10 p.m. to 7 a.m.	70 65
M50, M52, and M54	Anytime	70
S82, M56, and M58	Anytime	75
S88		lanning Areas. Refer to the Specific for applicable standards.

Source: County of San Diego Noise Ordinance Section 36.404, 1981.7

Adjacent surrounding uses all have similar zoning, or consist of a local connecting roadway. For this type of land use, the applicable worst-case property line standard would be 45 dBA $L_{\text{eq-h}}$ between the hours of 10 p.m. to 7 a.m. This 45 dBA $L_{\text{eq-h}}$ level will be used for the purposes of fixed-source property line compliance within this report.

⁷ Amended by Ord. No. 7094 (N.S.), effective 3-25-86; amended by Ord. No. 9478 (N.S.), effective 7-19-02; amended by Ord. No. 9621 (N.S.), effective 1-9-04; amended by Ord. No. 9962 (N.S.), effective 1-9-09.



⁶ For the purposes of compliance with nearby sensitive receptors, sound levels are measured at the boundary of the property, or properties, containing the noise source. In the case where two adjacent property lines differ in zoning, the applicable threshold would be the arithmetic average of the two standards.

San Diego County Construction Noise Ordinance

The County of San Diego Noise Ordinance Sections 36.408 through 36.410 governs construction noise emissions and allowable daily thresholds. The relevant parts are cited below.

Section 36.408: Hours of Operation of Construction Equipment Except for emergency work, it shall be unlawful for any person to operate or cause to be operated, construction equipment:

- (a) Between 7 p.m. and 7 a.m.
- (b) On a Sunday or a holiday. For purposes of this section, a holiday means January 1st, the last Monday in May, July 4th, the first Monday in September, December 25th and any day appointed by the President as a special national holiday or the Governor of the State as a special State holiday. A person may, however, operate construction equipment on a Sunday or holiday between the hours of 10 a.m. and 5 p.m. at the person's residence or for the purpose of constructing a residence for himself or herself, provided that the operation of construction equipment is not carried out for financial consideration or other consideration of any kind and does not violate the limitations in sections 36.409 and 36.410.

Section 36.409: Sound Level Limitations on Construction Equipment Except for emergency work, it shall be unlawful for any person to operate construction equipment or cause construction equipment to be operated, that exceeds an average sound level of 75 decibels for an eight-hour period (i.e., Leq_{8h}), between 7 a.m. and 7 p.m., when measured at the boundary line of the property where the noise source is located or on any occupied property where the noise is being received.

Section 36.410: Sound Level Limitations on Impulsive Noise

- (a) Except for emergency work or work on a public road project, no person shall produce or cause to be produced an impulsive noise that exceeds the maximum sound level... {of 82 dBA within a residential, village zoning or civic use area, or 85 dBA within an agricultural, commercial or industrial use zone}, ...when measured at the boundary line of the property where the noise source is located or on any occupied property where the noise is received, for 25 percent of the minutes in the measurement period.
- (b) Except for emergency work, no person working on a public road project shall produce or cause to be produced an impulsive noise that exceeds the maximum sound level... {of 85 dBA within a residential, village zoning or civic use area, or 90 dBA within an agricultural, commercial or industrial use zone}, ...when measured at the boundary line of the property where the noise source is located or on any occupied property where the noise is received, for 25 percent of the minutes in the measurement period.
- (c) The minimum measurement period for any measurements conducted under this section shall be one hour. During the measurement period a measurement shall be conducted every minute from a fixed location on an occupied property. The measurements shall measure the maximum sound level during each minute of the measurement period. If the sound level caused by construction equipment or the producer of the impulsive noise exceeds the maximum sound level for any portion of any minute, it will be deemed that the maximum sound level was exceeded during that minute.



State of California CCR Title 24

The California Code of Regulations (CCR), State Building Code, Part 2, Title 24, Appendix Chapter 35; "Noise Insulation Standards for Multifamily Housing" requires that multi-family dwellings, hotels, and motels located where the CNEL exceeds 60 dBA require an acoustical analysis showing that the proposed design will limit interior noise to less than 45 dBA CNEL for all residential spaces. Worst-case noise levels, either existing or future, must be used. The County of San Diego has adopted the CCR Title 24 regulations for all types of residential dwellings as codified under the General Plan guidelines N-2(1)(2).



APPROACH AND METHODOLOGY

Field Acoustical Reconnaissance

An independent monitoring location was selected adjacent to the proposed Tentative Map 5431 project site for the purpose of determining the ambient baseline community noise levels during normal free-flow weekday traffic conditions. The instrumentation location, denoted as Monitoring Location ML 1, is shown in Figure 5 on Page 13 of this report.

For the field monitoring effort, a Quest SoundPro SP-DL-2 ANSI Type 2 integrating sound level meter was used as the data collection device. The meter was affixed to a tripod five-feet above ground level, in order to simulate the noise exposure of an average-height human being, and was calibrated in accordance with ANSI S1-4 1983 Type 2 and IEC 651 Type 2 standards. Photos of the test setup are provided in Figure 6 on Page 14 of this report. Measurements were performed on December 6, 2016 between approximately 10:30 a.m. and 11:30 a.m.

Construction Noise Impact Assessment Approach

Major construction noise emission generators expected at the project site would consist predominately of diesel-powered earthwork equipment required for grading activities, underground work, and surface paving. Construction noise present at the project site was based upon EPA recommended values, and past levels measured by ISE. Cumulative (i.e., worst case aggregate) noise levels were calculated for a range of expected emissions from proposed equipment at the closest sensitive receptor, under spherically-soft ground propagation conditions, and compared against County Noise Ordinance Section 36.409 for project compliance.

Source: EPA PB 206717, Environmental Protection Agency, 12/31/71, "Noise from Construction Equipment and Operations"



⁸ All testing and calibration is performed by ISE's Acoustics and Vibration Laboratory using a LORAN-C and Rubidium atomic frequency and time standard traceable to National Institute of Standards & Technology (NIST). The time and frequency calibration signal has a long-term stability of 10⁻¹⁰. Specifications for traceability can be obtained at *www.nist.gov*.

Exterior Traffic Noise Impact Assessment Approach

The *Traffic Noise Model version 2.5* (TNM 2.5) based on FHWA-PD-96-010 and FHWA/CA/TL-87/03 standards was used to calculate future onsite vehicular traffic noise levels. 10 Currently, TNM 2.5 is the only noise-modeling program formally accepted for use within the State of California.

Dominant input to the acoustical model included the following:

- The proposed site development plan (Source: Jones Engineers, Inc., 11/16).
- A digitized line-of-sight representation of all major roadways affecting the project site under the worst-case future noise condition (i.e., Interstate 8).
- Future Average Daily Trips (ADT's) for the aforementioned roadway segments (Source: County of San Diego GP 2020 build out year 2030 Planning Commission Recommended Volumes GIS layer).
- A traffic mix of 88.4% LDA/LDT, 6.4% MDT, 4.7% HDT, and 0.5% MCY in accordance with the Caltrans ITS Transportation Protocols (Source: Caltrans Traffic Data Branch, 3/09).
- A peak hour traffic percentage of 8% of the ADT.¹²
- Receptor and topographic elevations (Source: USGS Digital Elevation Model).
- A composite pavement type, consisting of an average of Portland Cement Concrete (PCC) and Dense-Graded Asphaltic Concrete (DGAC) in accordance with TNM 2.5 test results (1998).

Modeled receptor areas consisting of useable space locations within the project footprint as well as exterior building façade points were sampled at various locations to determine the variation of all acoustic sources across, and affecting, the project site.

Operational Noise Impact Assessment Approach

Predicted onsite sound emanations from the proposed Victoria Estates Subdivision (TM 5431) project site would consist solely of 20 ground-based high-efficiency HVAC units located adjacent to each residential structure, as shown in Figure 7 on Page 16 of this report. These sources were modeled in a three-dimensional fashion using the ISE Industrial Source Model (IS3) v4.1. The IS3 model calculates the predicted acoustic field pattern using a vector-based summation of all source-receptor pairs. The resulting output consists of an isogram containing the predicted acoustic field.

¹² For values between approximately 8 and 12 percent, the energy-mean A-weighted sound level is equivalent to the CNEL.



¹⁰ The components of the TNM model are supported by a scientifically founded and experimentally calibrated acoustic computation methodology. The database is made up of over 6,000 individual pass-by events measured at forty sites across the country.

¹¹ The Caltrans vehicle classifications are as follows: LDA = Light Duty Automobile, LDT = Light Duty Truck, MDT = Medium Duty Truck, HDT = Heavy Duty Truck, and MCY = Motorcycle.



FIGURE 5: Ambient Noise Monitoring Location ML 1 (ISE 11/16)







FIGURE 6: Ambient Monitoring Photos for Station ML 1 (ISE 12/16)



For the analysis, proposed structural features and relevant topography were plotted in GIS using a SPCS coordinate system (CA Zone VI), and incorporated into the model. These features included all onsite structures as well as their applicable pad elevations. Receptor elevations were modeled at five (5) feet above any finished pad elevation.

Acoustical sources were modeled at their full measured and/or published levels, and identified lowest dominant emissive frequency (taken in this case at 250 Hz). A propagation rule consistent with a spherical point source close to the ground was applied. The resulting aggregate noise emission contours were compared against County Noise Ordinance Section 36.404 to ascertain property line compliance.



FINDINGS AND RECOMMENDATIONS

Field Acoustical Reconnaissance Findings

The results of the field reconnaissance sound level monitoring are shown in Table 3 below with the field data record provided as an attachment to this report. The values for the equivalent sound level (L_{eq-h}), the maximum and minimum measured sound levels (L_{max} and L_{min}), and the statistical indicators L_{10} and L_{90} , are given for the monitoring location examined.

TABLE 3: Measured Ambient Sound Levels – Tentative Map 5431

		One-Hour Noise Level Descriptors in dBA									
Location	Start Time	L _{eq}	L _{max}	L _{min}	L ₁₀	L ₉₀					
ML 1	10:19 a.m.	45.1	60.5	39.3	47.5	41.8					

Monitoring Location:

Location ML 1: Near Proposed Lots #1 and #9. GPS: CA-VI 6405450.6 1886795.7

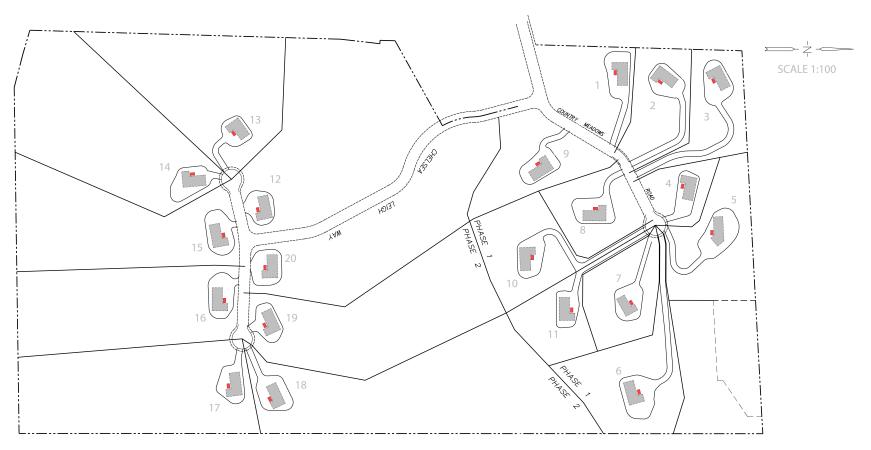
Measurements performed by ISE on 12/6/16.

EPE = Estimated GPS Position Error = 16 ft.

Temperature = 68.4 °F. Relative Humidity = 36.0 %. Barometric Pressure = 29.99 in-Hg.

Measurements collected reflect the ambient daytime community sound levels in the vicinity of the proposed project site. As can be seen, the hourly average sound level (or $L_{\text{eq-h}}$) recorded over the monitoring period was 45.1 dBA, and was observed to be entirely due to distant traffic noise along Interstate 8 (I-8). These levels were found to be currently in compliance with the County's 60 dBA CNEL compatibility standards for the observed community setting.





HVAC PAD AREAS SHOWN IN RED

FIGURE 7: Proposed Ground-Based HVAC Locations (ISE 1/19)



Estimated Construction Noise Emission Levels

The estimated worst-case onsite construction vehicle noise emissions are provided in Table 4 on the following page. Construction within the proposed project area would typically occur between the hours of 7:00 a.m. and 3:00 p.m. Monday through Friday.

As can be seen, predicted worst-case construction noise levels could be as high as 77.4 dBA Leq_{8h} at 50-feet as shown in Figures 8a and -b starting on Page 19 of this report. As a result, selected areas shown in Figures 8a and -b where the 75 dBA Leq_{8h} contour encroaches on adjacent residential parcels would be in excess of County Noise Ordinance Section 36.409 standards, and would require remedial mitigation measures.

Since final construction means-and-methods are not in place, it is recommended that onsite acoustical monitoring of construction activities occur, and remedial engineering practices be implemented on a case-by-case basis. Such measures could include, but not be limited to, temporary construction noise barriers (for example plywood barriers with a minimum surface density of 3.5 pounds per square foot), reoperation of construction means-and-methods, and selected isolation of noise generating equipment. Thus, prior to issuance of any construction permits, the applicant shall ensure that the above referenced monitoring and abatement plan is implemented to ensure that construction noise levels do not exceed 75 dBA Leg_{8h} per County ordinance.

Future Traffic Noise Impacts to Proposed Development

Traffic noise affecting the proposed Tentative Map 5431 project site is currently, and would continue to be, the aggregation of traffic along Interstate 8 (I-8). Figure 9 on Page 21 identifies future year 2030 worst-case average daily traffic (ADT) volumes along I-8, as well as adjoining roadways. As can be seen, all other surrounding roadways produce negligible traffic contributions.

Interstate 8 currently has a posted speed of 70 MPH for automobiles and motorcycles, and a 55 MPH posted limit for medium and heavy-duty trucks. The eastbound travel lanes are significantly depressed, with respect to the westbound lanes, by approximately 10 to 15 feet. Given these traffic volumes, Table 5 on Page 22 shows the predicted TNM receptor ID corresponding to the proposed physical lot number and whether or not mitigation measures are indicated. The complete model runs are provided as an attachment to this report.

Based upon the findings, no exterior noise levels within sensitive usable space areas are identified which would exceed the County's noise abatement standards. No significant exterior acoustical impacts are identified. Future first- and second-floor building façade noise levels were found to be below the CCR Title 24 Noise Insulation threshold of 60 dBA CNEL and would not require mitigation measures pursuant to State code.



TABLE 4: Aggregate Predicted Construction Noise Levels

Equipment Type Model	Source Level at 50 ment Type Model Quantity Used (#) Feet at Full Load Factor (%)				Cumulative Effect at 50 Feet (dBA Leq _{8h})
Generic Water Truck (2000 Gal)	1	70	50	6	65.7
CAT 320 Hydraulic Excavator	2	75	50	6	73.8
CAT D9L	1	75	50	6	70.7
CAT 420D Rubber Tire Backhoe	1	70	50	6	65.7
CAT 950 Loader	1	75	6	70.7	
			Worst-Case Aggr	egate Sum @ 50 Ft. (Σ):	77.4

Source: EPA PB 206717, Environmental Protection Agency, 12/31/71, "Noise from Construction Equipment and Operations" Ordinance Averaging Time = 8 hours.



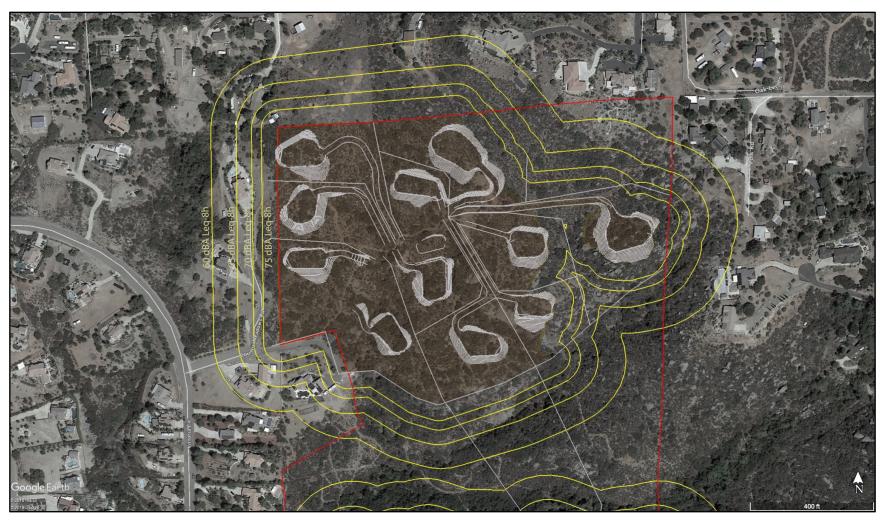


FIGURE 8a: Expected Northerly Construction Noise Exposure Map (ISE 1/19)





FIGURE 8b: Expected Southerly Construction Noise Exposure Map (ISE 1/19)



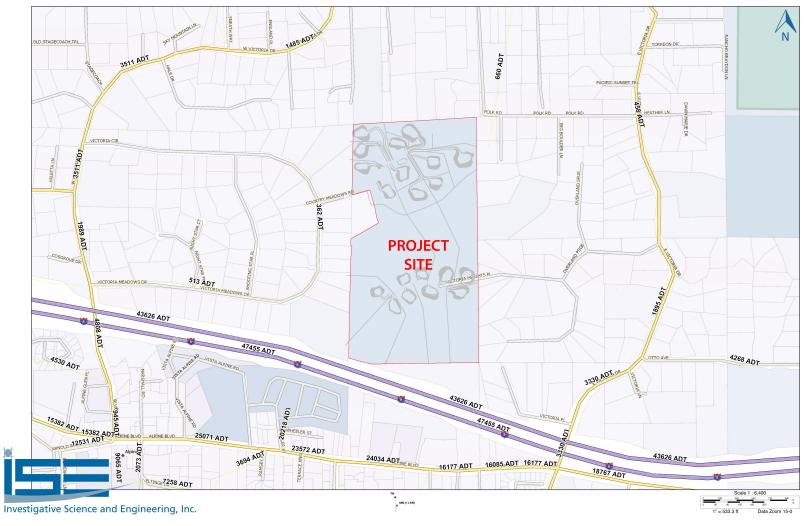


FIGURE 9: GP 2020 Future Year 2030 Traffic Volumes (ISE 11/16)



TABLE 5: Predicted Future Transportation Noise Levels - Tentative Map 5431

TNM Calculation Receptor ID	Ground Receptor Sound Levels in dBA	Elevated Receptor Sound Levels in dBA	GP 2020 Exterior Mitigation Required?	CCR Title 24 Interior Mitigation Required?
1	50.5	50.6	No	No
2	49.9	50.0	No	No
3	49.4	49.5	No	No
4	50.5	50.6	No	No
5	50.2	50.2	No	No
6	51.2	51.2	No	No
7	51.4	51.4	No	No
8	51.8	51.8	No	No
9	52.5	52.5	No	No
10	53.0	53.0	No	No
11	52.3	52.3	No	No
12	57.7	57.7	No	No
13	58.9	58.8	No	No
14	59.7	59.8	No	No
15	58.8	58.9	No	No
16	57.9	58.0	No	No
17	57.1	57.1	No	No
18	55.9	55.9	No	No
19	56.5	56.5	No	No
20	57.0	57.0	No	No

Operational Noise Impact Findings

The Victoria Estates Subdivision (TM 5431) project site would operate 20 Mitsubishi Electric Model MXZ-3C24NAHZ2 multi-indoor inverter heat-pump systems as previously shown in Figure 7. Each of these units produces a maximum (heating mode) source level of 58 dBA at 10 feet per AHRI Test Standard 270. 13 Each unit was modeled using the ISE Industrial Source Model (IS3) v4.1 with the results shown in Figure 10 on the following page. The IS3 input model decks, and color output contour plot in SPCS CA VI coordinates, are provided as attachments to this report.

As can be seen in the figure, the requisite worst-case 45 dBA Leq-h noise contour, which is the impact threshold delineator per County Noise Ordinance Section 36.404 is contained entirely within the source properties. Closest property line noise levels were found to approach 40 dBA. Thus, no operational noise impacts are expected due to proposed HVAC operation within the Victoria Estates Subdivision (TM 5431) site.

¹³ Source: Air conditioning, Heating, and Refrigeration Institute (AHRI) Standard Test 270, Sound Performance Rating of Outdoor Unitary Equipment, 2015.



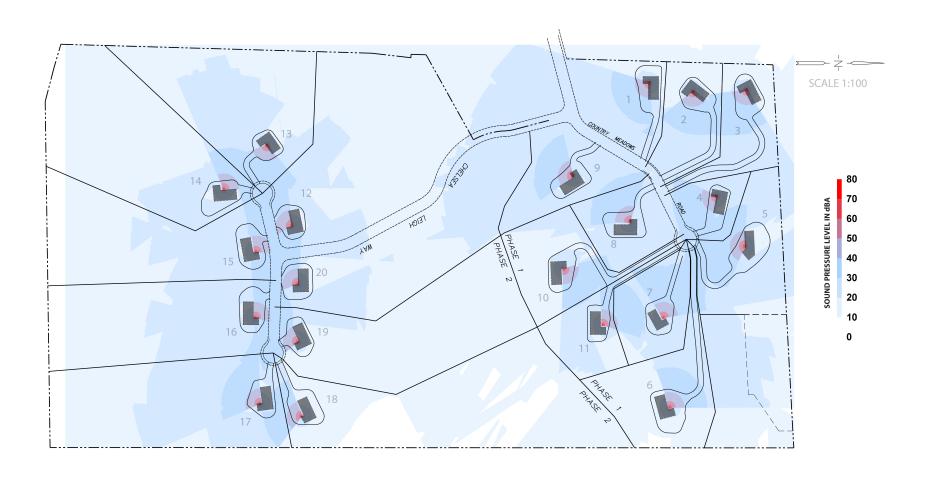


FIGURE 10: Expected Noise Exposure from HVAC Units at Ground Level (ISE 1/19)





CERTIFICATION OF ACCURACY AND QUALIFICATIONS

This report was prepared by Investigative Science and Engineering, Inc. (ISE). The members of its professional staff contributing to the report are listed below:

Rick Tavares Ph.D. Civil Engineering (rtavares@ise.us) M.S. Structural Engineering

M.S. Mechanical Engineering

B.S. Aerospace Engineering / Engineering Mechanics

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B.S. Electrical Engineering

ISE affirms to the best of its knowledge and belief that the statements and information contained herein are in all respects true and correct as of the date of this report. Content and information contained within this report is intended only for the subject project and is protected under 17 U.S.C. §§ 101 through 810.

Should the reader have any questions regarding the findings and conclusions presented in this report, please do not hesitate to contact ISE at (760) 787-0016.

Approved as to Form and Content:

Rick Tavares, Ph.D.

Project Principal

Investigative Science and Engineering, Inc. (ISE)





APPENDICES AND SUPPLEMENTAL INFORMATION

APP 1 – Field Reconnaissance Measurement Results

Victoria Estates (TM 5431)

Information Panel

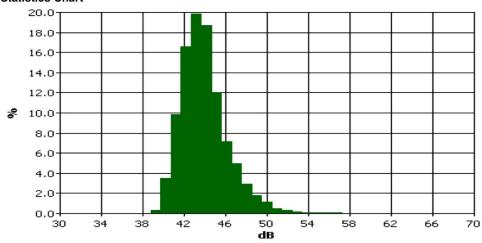
Name Start Time Stop Time Device Model Type Comments

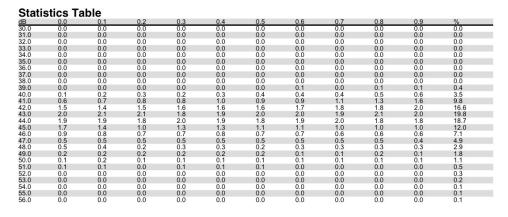
S008 Tuesday, December 06, 2016 10:19:39 Tuesday, December 06, 2016 11:19:28 SoundPro DL

General Data Panel

Description	<u>Meter</u>	<u>Value</u>	Description	<u>Meter</u>	<u>Value</u>
Leq	1	45 dB	Exchange Rate	1	3 dB
Weighting	1	Α	Response	1	SLOW
Bandwidth	1	OFF	Exchange Rate	2	3 dB
Weighting	2	С	Response	2	FAST

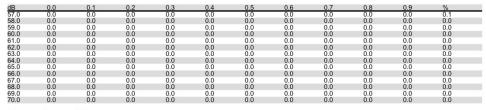
Statistics Chart



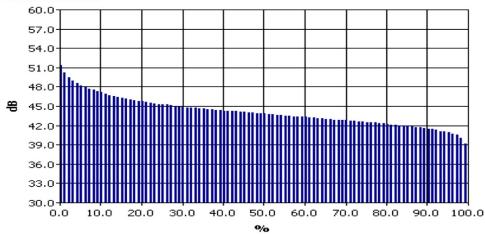




Statistics Table (cont'd)



Exceedance Chart

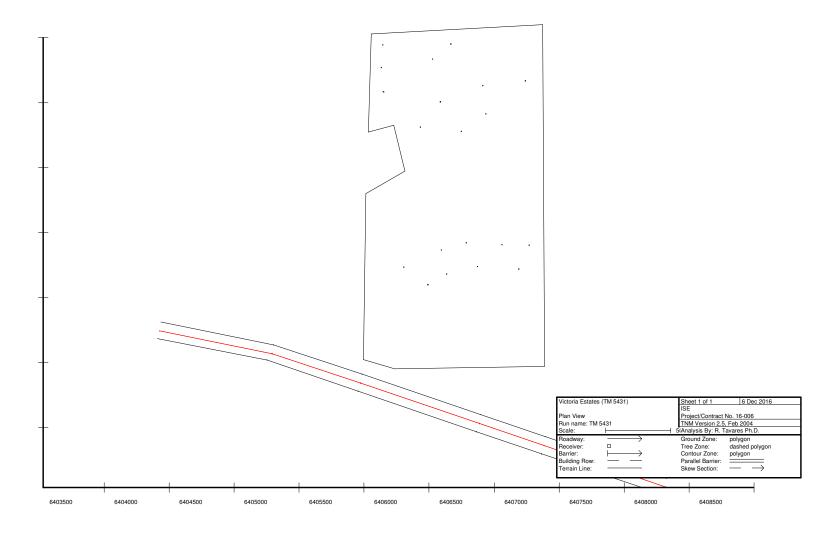


Exceedance Table

	0%	1%	2%	3%	4%	5%	6%	7%	8%	9%
0%		51.4	50.2	49.5	48.9	48.6	48.2	47.9	47.7	47.5
10%	47.3	47.1	46.9	46.7	46.5	46.4	46.3	46.1	46.0	45.9
20%	45.8	45.7	45.6	45.5	45.4	45.3	45.2	45.2	45.1	45.0
30%	44.9	44.9	44.8	44.8	44.7	44.6	44.6	44.5	44.5	44.4
40%	44.4	44.3	44.3	44.2	44.2	44.1	44.1	44.0	44.0	43.9
50%	43.8	43.8	43.7	43.7	43.6	43.6	43.5	43.5	43.4	43.4
60%	43.3	43.3	43.2	43.2	43.1	43.1	43.0	43.0	42.9	42.9
70%	42.8	42.8	42.7	42.7	42.6	42.6	42.5	42.5	42.4	42.3
80%	42.3	42.2	42.1	42.1	42.0	41.9	41.9	41.8	41.7	41.7
90%	41.6	41.5	41.4	41.3	41.1	41.0	40.9	40.7	40.5	40.1
100%	39.2									



APP 2 - TNM Model Input/Output Data





NPUT: ROADWAYS						16-006									
ISE R. Tavares Ph.D.		6 December 2016 TNM 2.5													
NPUT: ROADWAYS PROJECT/CONTRACT: RUN:	16-006 Victoria E	Estates (T	M 5431)				a State h	pavement typ ighway agenc rent type with	y substant	iates the us	se				
Roadway		Points													
Name	Width	Name	No.	Coordinates	(pavement)		Flow Cor	ntrol		Segment					
				X	Υ	Z	Control Device	Speed Constraint	Percent Vehicles Affected	Pvmt Type	On Struct?				
	ft			ft	ft	ft		mph	%						
INTERSTATE 8 (WB)	24.0	WB-1	80	6,403,938.0	1,885,316.0	1,924.00				Average					
		WB-2	81	6,404,805.0	1,885,142.0	1,908.20				Average					
		WB-3	82	6,405,484.0	1,884,916.0	1,992.80				Average					
		WB-4	83	6,406,397.0	1,884,605.0	2,045.00				Average					
		WB-5	84	-,,						Average					
		WB-6	85	-,,	.,,										
INTERSTATE 8 (EB)	24.0		86	-,,						Average					
		EB-2	87							Average					
		EB-3	88	-, ,						Average					
		EB-4	89	-11						Average					
		EB-5	90	-,,						Average					
		EB-6	91	6,407,777.0	1,883,998.0	2,050.60									



INPUT: TRAFFIC FOR LAeq1h Volumes						16	-006						
ISE R. Tavares Ph.D.			6 Dece TNM 2	mber 20 .5	16								
INPUT: TRAFFIC FOR LAeq1h Volumes													
PROJECT/CONTRACT:	16-006												
RUN:	Victoria Estates (TM 5431)												
Roadway	Points												
Name	Name	No.	Segmen	t									
			Autos MTrucks		3	HTrucks	Buses		Motorcy	cles			
			V	S	V	S	٧	S	V	S	٧	S	
			veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph	
INTERSTATE 8 (WB)	WB-1	80	3085	70	223	55	164	55	1	55	17	70	
	WB-2	81	3085	70	223	55	164	55	1	55	17	70	
	WB-3	82	3085	70	223	55	164	55	1	55	17	70	
	WB-4	83	3085	70	223	55	164	55	1	55	17	70	
	WB-5	84	3085	70	223	55	164	55	1	55	17	70	
	WB-6	85											
INTERSTATE 8 (EB)	EB-1	86	3356	70	243	55	178	55	1	55	19	70	
	EB-2	87	3356	70						55			
	EB-3	88								55			
	EB-4	89	3356							55			
	EB-5	90	3356	70	243	55	178	55	1	55	19	70	
	EB-6	91											



INPUT: RECEIVERS								16-006									
ISE R. Tavares Ph.D.								6 December 2016 TNM 2.5									
INPUT: RECEIVERS PROJECT/CONTRACT: RUN:	16-006 Victor		tes (TM 5431)	İ													
Receiver																	
Name	No.	#DUs	Coordinates	(ground)		Hei	ight	Input Sou	nd Levels a	and Criteria	a	Active					
			X	Y	Z		ove ound	Existing LAeq1h	Impact Cri	iteria Sub'l	NR Goal	in Calc.					
			ft	ft	ft	ft		dBA	dBA	dB	dB						
LOT 1 (L)	189	1	6,405,647.0	1,887,085.0	2,14	2.00	5.00	45.00	60	20.0	3.0) Y					
LOT 2 (L)	190	1	6,405,631.0	1,887,270.0	2,16	6.00	5.00	45.00	60	20.0	3.0) Y					
LOT 3 (L)	191	1	6,405,643.0	1,887,445.0	2,19	2.00	5.00	45.00	60	20.0	3.0) Y					
LOT 4 (L)	192	1	6,406,025.0	1,887,335.0	2,17	2.00	5.00	45.00	60	20.0	3.0) Y					
LOT 5 (L)	193	1	6,406,164.0	1,887,451.0	2,21	2.00	5.00	45.00	60	20.0	3.0) Y					
LOT 6 (L)	194	1	6,406,736.0	1,887,168.0	2,24	2.00	5.00	45.00	60	20.0	3.0) Y					
LOT 7 (L)	195	1	6,406,409.0	1,887,131.0	2,17	8.00	5.00	45.00	60	20.0	3.0) Y					
LOT 8 (L)	196	1	6,406,082.0	1,887,007.0	2,13	2.00	5.00	45.00	60	20.0	3.0) Y					
LOT 9 (L)	197	1	6,405,931.0	1,886,814.0	2,08	2.00	5.00	45.00	60	20.0	3.0) Y					
LOT 10 (L)	198	1	6,406,243.0	1,886,781.0	2,12	6.00	5.00	45.00	60	20.0	3.0) Y					
LOT 11 (L)	199	1	6,406,432.0	1,886,914.0	2,14	0.00	5.00	45.00	60	20.0	3.0) Y					
LOT 12 (L)	200	1	6,406,092.0	1,885,871.0	2,05	2.00	5.00	45.00	60	20.0	3.0) Y					
LOT 13 (L)	201	1	6,405,803.0	1,885,738.0	2,01	2.00	5.00	45.00	60	20.0	3.0) Y					
LOT 14 (L)	202	1	6,405,988.0	1,885,603.4	2,03	0.00	5.00	45.00	60	20.0	3.0) Y					
LOT 15 (L)	203	1	6,406,132.0	1,885,686.0	2,05	0.00	5.00	45.00	60	20.0	3.0) Y					
LOT 16 (L)	204	1	6,406,367.0	1,885,744.0	2,07	8.00	5.00	45.00	60	20.0	3.0) Y					
LOT 17 (L)	205	1	6,406,685.0	1,885,724.0	2,09	2.00	5.00	45.00	60	20.0	3.0) Y					
LOT 18 (L)	206	1	6,406,765.0	1,885,906.0	2,11	4.00	5.00	45.00	60	20.0	3.0						
LOT 19 (L)	207	1	6,406,557.0	1,885,910.0	2,09	2.00	5.00	45.00	60	20.0	3.0) Y					
LOT 20 (L)	208	1	6,406,283.0	1,885,926.0	2,06	4.00	5.00	45.00	60	20.0	3.0) Y					
LOT 1 (U)	213	1	6,405,650.0	1,887,088.0	2,15	2.00	5.00	45.00	60	20.0	3.0) Y					
LOT 2 (U)	214	1	6,405,634.0	1,887,273.0	2,17	6.00	5.00	45.00	60	20.0	3.0) Y					



INPUT: RECEIVERS							16	-006			
LOT 3 (U)	215	1	6,405,646.0	1,887,448.0	2,202.00	5.00	45.00	60	20.0	3.0	Υ
LOT 4 (U)	216	1	6,406,028.0	1,887,338.0	2,182.00	5.00	45.00	60	20.0	3.0	Υ
LOT 5 (U)	217	1	6,406,167.0	1,887,454.0	2,222.00	5.00	45.00	60	20.0	3.0	Υ
LOT 6 (U)	218	1	6,406,739.0	1,887,171.0	2,252.00	5.00	45.00	60	20.0	3.0	Υ
LOT 7 (U)	219	1	6,406,412.0	1,887,134.0	2,188.00	5.00	45.00	60	20.0	3.0	Υ
LOT 8 (U)	220	1	6,406,085.0	1,887,010.0	2,142.00	5.00	45.00	60	20.0	3.0	Υ
LOT 9 (U)	221	1	6,405,934.0	1,886,817.0	2,092.00	5.00	45.00	60	20.0	3.0	Υ
LOT 10 (U)	222	1	6,406,246.0	1,886,784.0	2,136.00	5.00	45.00	60	20.0	3.0	Υ
LOT 11 (U)	223	1	6,406,435.0	1,886,917.0	2,150.00	5.00	45.00	60	20.0	3.0	Υ
LOT 12 (U)	224	1	6,406,095.0	1,885,874.0	2,062.00	5.00	45.00	60	20.0	3.0	Υ
LOT 13 (U)	225	1	6,405,806.0	1,885,741.0	2,022.00	5.00	45.00	60	20.0	3.0	Υ
LOT 14 (U)	226	1	6,405,991.0	1,885,606.4	2,040.00	5.00	45.00	60	20.0	3.0	Υ
LOT 15 (U)	227	1	6,406,135.0	1,885,689.0	2,060.00	5.00	45.00	60	20.0	3.0	Υ
LOT 16 (U)	228	1	6,406,370.0	1,885,747.0	2,088.00	5.00	45.00	60	20.0	3.0	Υ
LOT 17 (U)	229	1	6,406,688.0	1,885,727.0	2,102.00	5.00	45.00	60	20.0	3.0	Υ
LOT 18 (U)	230	1	6,406,768.0	1,885,909.0	2,124.00	5.00	45.00	60	20.0	3.0	Υ
LOT 19 (U)	231	1	6,406,560.0	1,885,913.0	2,102.00	5.00	45.00	60	20.0	3.0	Υ
LOT 20 (U)	232	1	6,406,286.0	1,885,929.0	2,074.00	5.00	45.00	60	20.0	3.0	Υ

C:\TNM25\TM 5431 2 6 December 2016



INPUT: GROUND ZONES									
ISE	SE 6 December								
R. Tavares Ph.D.				TNM 2.5					
INPUT: GROUND ZONES									
PROJECT/CONTRACT:	16-006								
RUN:	Victoria Es	tates (TM 5431)							
Ground Zone			Points	3					
Name	Type	Flow	No.	Coordinates					
		Resistivity		X	Y				
		cgs rayls		ft	ft				
TM 5431 SITE BDY	Hard Soil	5000	67	6,405,552.0	1,887,533.0				
			68	6,406,871.0	1,887,603.0				
			69	6,406,887.0	1,884,974.0				
			70	6,405,734.0	1,884,956.0				
			71	6,405,493.0	1,885,028.0				
			72	6,405,511.0	1,886,304.0				
			73	6,405,812.0	1,886,478.0				
			74	6,405,726.0	1,886,830.0				
			75	6,405,531.0	1,886,778.0				

C:\TNM25\TM 5431 1 6 December 2016



INPUT: BARRIERS									16-006										
ISE					6 Decer	nber 20	16												
R. Tavares Ph.D.					TNM 2.5	5													
INPUT: BARRIERS																			
PROJECT/CONTRACT:	16-00	6																	
RUN:	Victor	ia Estat	es (TM 5	431)															
Barrier									Points										
Name	Туре	Height		If Wall	If Berm Add'tnl		Add'tnl	Name No	No.	Coordinates	coordinates (bottom)			Segme	ent				
		Min	Max	\$ per	\$ per	Тор	Run:Rise	\$ per			x	Υ	Z	at	Seg H	t Perti	urbs	On	Important
				Unit	Unit	Width		Unit						Point	Incre-	e- #Up #Dn Struct? Re	Reflec-		
				Area	Vol.			Length							ment				tions?
		ft	ft	\$/sq ft	\$/cu yd	ft	ft:ft	\$/ft			ft	ft	ft	ft	ft				
I-8 CENTER MEDIAN	В	0.00	99.99		0.00	0.0	2.0:1.0	0.00	MEDIAN-1	446	6,403,926.5	1,885,248.2	1,927.00	0.00	0.00	0	0		
									MEDIAN-2	447	6,404,793.5	1,885,074.2	1,911.20	0.00	0.00	0	0		
									MEDIAN-3	448	6,405,472.5	1,884,848.2	1,995.80	0.00	0.00	0	0		
									MEDIAN-4	449	6,406,385.5	1,884,537.2	2,048.00	0.00	0.00	0	0		
									MEDIAN-5	450	6,406,879.5	1,884,370.2	2,033.50	0.00	0.00	0	0		
									MEDIAN-6	454	6,407,813.5	4 004 040 0	0.000.00	0.00					

C:\TNM25\TM 5431 1 6 December 2016



RESULTS: SOUND LEVELS 16-006 ISE 6 December 2016 R. Tavares Ph.D. TNM 2.5 Calculated with TNM 2.5 RESULTS: SOUND LEVELS PROJECT/CONTRACT: 16-006 RUN: Victoria Estates (TM 5431) BARRIER DESIGN: INPUT HEIGHTS Average pavement type shall be used unless a State highway agency substantiates the use ATMOSPHERICS: 68 deg F, 50% RH of a different type with approval of FHWA. Receiver Name #DUs Existing No Barrier With Barrier LAeq1h Increase over existing Calculated LAeq1h Type Calculated Crit'n Calculated Crit'n LAeq1h Calculated Goal Calculated Sub'l Inc minus Goal dBA dBA dBA dB dB dBA dB dB dB LOT 1 (L) 189 45.0 50.5 60 5.5 20 50.5 0.0 -3.0 LOT 2 (L) 190 45.0 49.9 60 4.9 20 49.9 0.0 -3.0 LOT 3 (L) 191 45.0 49.4 60 4.4 20 49.4 0.0 -3.0 LOT 4 (L) 192 45.0 50.5 20 50.5 0.0 -3.0 LOT 5 (L) 193 45.0 50.2 60 5.2 20 50.2 0.0 -3.0 LOT 6 (L) 194 45.0 51.2 60 6.2 20 51.2 0.0 -3.0 LOT 7 (L) 195 45.0 51.4 60 6.4 20 51.4 0.0 -3.0 LOT 8 (L) 51.8 196 45.0 51.8 60 6.8 20 0.0 -3.0 LOT 9 (L) 197 45.0 52.5 20 52.5 0.0 -3.0 LOT 10 (L) 198 45.0 53.0 60 8.0 20 53.0 0.0 -3.0 LOT 11 (L) 199 45.0 52.3 60 7.3 20 52.3 0.0 -3.0 LOT 12 (L) 200 45.0 57.7 60 57.7 12.7 20 0.0 -3.0 LOT 13 (L) 201 45.0 58.9 60 13.9 20 58.9 0.0 -3.0 ----LOT 14 (L) 202 45.0 59.7 60 14.7 20 59.7 0.0 -3.0 LOT 15 (L) 203 45.0 58.8 60 13.8 20 58.8 0.0 -3.0 LOT 16 (L) 204 45.0 57.9 60 12.9 20 57.9 0.0 -3.0 ---LOT 17 (L) 205 60 57.1 45.0 57.1 12.1 20 0.0 -3.0 LOT 18 (L) 206 45.0 55.9 60 10.9 20 55.9 0.0 -3.0 LOT 19 (L) 207 45.0 56.5 60 11.5 20 56.5 0.0 -3.0 LOT 20 (L) 208 45.0 57.0 60 12.0 20 57.0 0.0 3 -3.0 LOT 1 (U) 213 45.0 50.6 60 5.6 20 50.6 0.0 3 -3.0 LOT 2 (U) 214 45.0 50.0 60 5.0 20 50.0 -3.0 0.0 LOT 3 (U) 215 45.0 49.5 60 4.5 49.5 -3.0

20

0.0

C:\TNM25\TM 5431 1 6 December 2016



RESULTS: SOUND LEVELS						16	6-006				
LOT 4 (U)	216	1	45.0	50.	6 60	5.6	20	 50.6	0.0	3	-3.0
LOT 5 (U)	217	1	45.0	50	2 60	5.2	20	 50.2	0.0	3	-3.0
LOT 6 (U)	218	1	45.0	51.	2 60	6.2	20	 51.2	0.0	3	-3.0
LOT 7 (U)	219	1	45.0	51.	4 60	6.4	20	 51.4	0.0	3	-3.0
LOT 8 (U)	220	1	45.0	51.	8 60	6.8	20	 51.8	0.0	3	-3.0
LOT 9 (U)	221	1	45.0	52	5 60	7.5	20	 52.5	0.0	3	-3.0
LOT 10 (U)	222	1	45.0	53.	0 60	8.0	20	 53.0	0.0	3	-3.0
LOT 11 (U)	223	1	45.0	52	3 60	7.3	20	 52.3	0.0	3	-3.0
LOT 12 (U)	224	1	45.0	57.	7 60	12.7	20	 57.7	0.0	3	-3.0
LOT 13 (U)	225	1	45.0	58.	8 60	13.8	20	 58.8	0.0	3	-3.0
LOT 14 (U)	226	1	45.0	59.	8 60	14.8	20	 59.8	0.0	3	-3.0
LOT 15 (U)	227	1	45.0	58	9 60	13.9	20	 58.9	0.0	3	-3.0
LOT 16 (U)	228	1	45.0	58.	0 60	13.0	20	 58.0	0.0	3	-3.0
LOT 17 (U)	229	1	45.0	57.	1 60	12.1	20	 57.1	0.0	3	-3.0
LOT 18 (U)	230	1	45.0	55.	9 60	10.9	20	 55.9	0.0	3	-3.0
LOT 19 (U)	231	1	45.0	56.	5 60	11.5	20	 56.5	0.0	3	-3.0
LOT 20 (U)	232	1	45.0	57.	0 60	12.0	20	 57.0	0.0	3	-3.0
Dwelling Units		# DUs	Noise Re	duction							
3			Min	Avg	Max						
			dB	dB	dB						
All Selected		40	0.0	0.	0 0.0						
All Impacted		0	0.0	0	0.0						
All that meet NR Goal		0	0.0	0.	0 0.0						

C:\tTNM25\tTM 5431 2 6 December 2016



APP 3 - Proposed HVAC Manufacturer Specification Data



Outdoor Unit: MXZ-3C24NAHZ2

ACCESSORIES

- 3/8" × 1/2" Port Adapter (MAC-A454JP-E)
 1/2" × 3/8" Port Adapter (MAC-A455JP-E)
 1/2" × 5/8" Port Adapter (MAC-A456JP-E)
 M-NET Adapter (PAC-IF01MNT-E)
 Airflow Guide (PAC-SH96SG-E)

(For data on specific indoor units, see the MXZ-C Technical and Service Manual.)

	Specifications		Model Name				
	MXZ-3C24NAHZ2						
	Rated Capacity	Btu/h	22,000 / 23,600				
Cooling* (Non-ducted / Ducted)	Capacity Range	Btu/h	6,000 - 23,600				
(Non addica / Bactica)	Rated Total Input	w	1,630 / 2,360				
	Rated Capacity	Btu/h	25,000 / 24,600				
Heating at 47°F* (Non-ducted / Ducted)	Capacity Range	Btu/h	7,200 - 30,600				
(Non-addica / Bucica)	Rated Total Input	w	1,725 / 1,871				
	Rated Capacity	Btu/h	14,000 / 14,000				
Heating at 17°F* (Non-ducted/Ducted)	Maximum Capacity	Btu/h	25,000 / 24, 600				
(Non-aucteu/Ducteu)	Rated Total Input	w	1,622 / 1,635				
Heating at 5°F*	Maximum Capacity	Btu/h	25,000				
Energy Star® (ENERGY STAR pro	Yes						
	Power Supply	Voltage, Phase, Hertz	208 / 230V, 1-Phase, 60 Hz				
Electrical Requirements	Recommended Fuse/Breaker Size	Α	40				
•	MCA	Α	30.5				
Valtana	Indoor - Outdoor S1-S2	V	AC 208 / 230				
Voltage	Indoor - Outdoor S2-S3	V	DC ±24				
Compressor			DC INVERTER-driven Twin Rotary				
Fan Motor (ECM)		F.L.A.	2.43				
Sound Pressure Level	Cooling	dB(A)	54				
(Non-ducted/Ducted)	Heating	GB(A)	58				
External Dimensions (H x W x	(D)	In / mm	41-9/32 x 37-13/32 x 13 1048 x 950 x 330				
Net Weight		Lbs / kg	189 / 86				
External Finish			Munsell No. 3Y 7.8/11				
Refrigerant Pipe Size O.D. —	Liquid (High Pressure)	In / mm	1/4 / 6.35				
Eight Ports	Gas (Low Pressure)] "'' / """	A:1/2 / 12.7 ; B,C: 3/8 / 9.52				
Max. Refrigerant Line Length		Ft / m	230 / 70				
Max. Piping Length for Each I		Ft/m	82 / 25				
Max. Refrigerant Pipe Height	If IDU is Above ODU	Ft/m	49 / 15				
Difference	If IDU is Below ODU	FUTIN	49 / 15				
Connection Method			Flared/Flared				
Refrigerant	·		R410A				

^{*} Rating Conditions per AHRI Standard:

Cooling | Indoor: 80° F (27° C) DB / 67° F (19° C) WB Cooling | Outdoor: 95° F (35° C) DB / W.B. 23.9° C (75° F) Heating at 47°F | Indoor: 70° F (21° C) DB / 60° F (16° C) WB Heating at 47°F | Outdoor: 47° F (8° C) DB / 43° F (6° C) WB

Heating at 17° F | Indoor: 70° F (21° C) DB

Heating at 17° F | Outdoor: 17° F (-8° C) DB / 15° F (-9° C) WB



APP 4 – IS3 Model Input/Output Results for Proposed HVAC Units

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IS3 PROGRAM INPUT DECK - (C) 2018 INVESTIGATIVE SCIENCE & ENGINEERING INC.
GLOBAL VARIABLE DECLARATION
   PROBLEM STATEMENT: TM 5431 HVAC MODELING
   STARTING POINT (XY IN FEET): 6405486.6,1885032.0
  ENDING POINT (XY IN FEET): 6406870.2,1887605.2
   ANALYSIS FREQUENCY (HZ): 250
   REFERENCE DISTANCE FOR SOUND (D IN FEET): 10
   SOUND PROPAGATION COEFF XLOG10: 25
   EXCESS ATTENUATION (DB): 0
   COMPUTATIONAL STEP DISTANCE (IN FEET): 1
   RECEPTOR ELEVATION (IN FEET): 5
ACOUSTIC SOURCE DECLARATION (XYZ - SOUND LEVEL - LABEL)
   NUMBER OF SOURCE POINTS: 20
   6405640.5,1887438.25,3,58,HVAC UNIT 1
   6405646,1887247.375,3,58,HVAC UNIT 2
   6405616.5,1887095.125,3,58,HVAC UNIT 3
   6406007,1887332.125,3,58,HVAC UNIT 4
   6406180.5,1887431.125,3,58,HVAC UNIT 5
   6406426,1887143,3,58,HVAC UNIT 6
   6406095,1887026,3,58,HVAC UNIT 7
   6406451,1886929.375,3,58,HVAC UNIT 8
   6406257,1886791.375,3,58,HVAC UNIT 9
   6405937.5,1886824.375,3,58,HVAC UNIT 10
   6406734.5,1887165.25,3,58,HVAC UNIT 11
   6405831.5,1885744,3,58,HVAC UNIT 12
   6406109.5,1885831.875,3,58,HVAC UNIT 13
   6406309.5,1885852.75,3,58,HVAC UNIT 14
   6405984,1885590.875,3,58,HVAC UNIT 15
   6406199.5,1885703.75,3,58,HVAC UNIT 16
   6406425.5,1885701.5,3,58,HVAC UNIT 17
   6406508.5,1885853.25,3,58,HVAC UNIT 18
   6406765,1885866.5,3,58,HVAC UNIT 19
   6406721.5.1885720.375.3.58.HVAC UNIT 20
BARRIER SEGMENT DECLARATION (START XY - END XY - HEIGHT - STC - LABEL)
   NUMBER OF BARRIER PAIRS: 120
   6405586.5,1887080.875,6405586.5,1887136.5,30,0,LOT 1 STRUCTURE
   6405586.5,1887136.5,6405666.5,1887135.875,30,0,LOT 1 STRUCTURE
   6405666.5,1887135.875,6405666.5,1887099.125,30,0,LOT 1 STRUCTURE
   6405666.5,1887099.125,6405611.5,1887099.5,30,0,LOT 1 STRUCTURE
   6405611.5,1887099.5,6405612,1887080.625,30,0,LOT 1 STRUCTURE
   6405612,1887080.625,6405586.5,1887080.625,30,0,LOT 1 STRUCTURE
   6405596.5,1887249.75,6405645,1887313.875,30,0,LOT 2 STRUCTURE
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   6405595.5,1887461.125,6405666.5,1887497.625,30,0,LOT 3 STRUCTURE
   6405666.5,1887497.625,6405682.5,1887465.25,30,0,LOT 3 STRUCTURE
   6405682.5,1887465.25,6405635,1887439.875,30,0,LOT 3 STRUCTURE
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   6406000.5,1887318.75,6405975,1887323.875,30,0,LOT 4 STRUCTURE
   6406118,1887468.125,6406203,1887471.875,30,0,LOT 5 STRUCTURE
   6406203,1887471.875,6406220.5,1887449.5,30,0,LOT 5 STRUCTURE
   6406220.5,1887449.5,6406193.5,1887425.5,30,0,LOT 5 STRUCTURE
   6406193.5,1887425.5,6406181.5,1887436.875,30,0,LOT 5 STRUCTURE
   6406181.5,1887436.875,6406120.5,1887434.5,30,0,LOT 5 STRUCTURE
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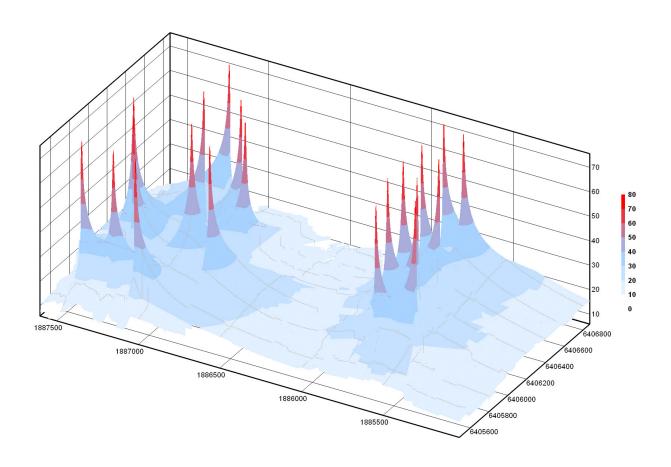


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