Karve Ski Park Project

Acoustical Analysis Report

PDS2023-MUP-23-009

November 2024 | 08369.00002.001

Prepared for:

County of San Diego
Planning & Development Services
5510 Overland Avenue, Suite 310
San Diego, CA 92123

Project Proponent:

SD Ski Partners
9520 Pathway Street
Santee, CA 92071

Prepared by:

HELIX Environmental Planning, Inc.
Joanne M. Dramko
County-Approved Noise Consultant
7578 El Cajon Boulevard
La Mesa, CA 91942

This page intentionally left blank

Table of Contents

LIST OF APPENDICES

Table of Contents (cont.)

LIST OF FIGURES

LIST OF TABLES

Acronyms and Abbreviations

ADT	average daily trips
ANSI	American National Standards Institute
ASHRAE	American Society of Heating, Refrigeration, and Air Conditioning Engineers
CadnaA	Computer Aided Noise Abatement
Caltrans	California Department of Transportation
CNEL	Community Noise Equivalent Level
County	County of San Diego
CY	cubic yard
dB	decibel
dBA	A-weighted decibel
HELIX	HELIX Environmental Planning, Inc.
HP	horsepower
HVAC	heating, ventilation, and air conditioning
Hz	Hertz
in/sec	inches per second
kHz	kilohertz
L_{DN}	Day Night sound level
L_{EQ}	time-averaged noise level
L_{MAX}	maximum noise level
mPa	micro Pascal
NSLU	noise sensitive land use
PPV	peak particle velocity
RCNM	Roadway Construction Noise Model
RPM	Revolutions per minute
SANDAG	San Diego Association of Governments
SPL	sound pressure level
S_{WL}	sound power level
TNM	Traffic Noise Model
USDOT	U.S. Department of Transportation

This page intentionally left blank

EXECUTIVE SUMMARY

This report assesses the potential noise and vibration impacts associated with the proposed Karve Ski Park Project (project). The project proposes to develop a 10.45-acre synthetic ski park (also known as a dry ski slope) located at 26351 North Centre City Parkway in the unincorporated Jesmond Dene community north of the City of Escondido within the North County Metro community planning area of San Diego County. The ski park would be an outdoor, year-round synthetic snow sports facility and recreational park catering to all ages, abilities, and skill levels. The primary activities would be the ones that take place at the artificial ski slope which mimics the attributes of snow for both day and nighttime skiing and snowboarding. The park would also include live non-amplified music inside of project buildings. This report evaluates the potential for noise and vibration impacts during the construction and operation of the project.

Project construction noise would result in noise levels above the County of San Diego construction noise significance threshold measured at the eastern project boundary line. Ground-borne vibration impacts from construction would not exceed thresholds for annoyance of nearby building occupants. Mitigation measure NOI-1 would be required to reduce construction noise levels at neighboring noise-sensitive land uses.

On-site operational noise from the project would exceed the County standards at the eastern project property line between nearby residential land uses. Mitigation measure NOI-2 would be required to ensure project operational noise would not exceed the applicable 45 dBA L_{EQ} (1-hour average) nighttime noise limit for residential uses.

The project would not result in an increase in traffic that would result in substantial increases in noise levels. The addition of project generated traffic to future cumulative traffic on area streets would not result in a significant cumulative increase in ambient noise levels.

This page intentionally left blank

1.0 INTRODUCTION

This report analyzes potential noise and vibration impacts associated with the proposed Karve Ski Park Project (project). The report includes an evaluation of existing conditions in the project vicinity and an assessment of potential noise and vibration impacts associated with project construction and operation. The analysis provided in this report is prepared in accordance with the County of San Diego (County) Guidelines for Determining Significance (County 2009a) and Report Content and Format Requirements (County 2009b).

1.1 PROJECT LOCATION

The project site is located at 26351 North Centre City Parkway in the unincorporated Jesmond Dene community north of the City of Escondido within the North County Metro community planning area of the County. The project location lies east of Interstate 15 (I-15), south of the Deer Springs Road/ Mountain Meadow Road exit. The project area is bordered by Tierra Libertia Road to the north, Jesmond Dene Road to the south and southwest, North Centre City Parkway to the west, and residential parcels to the east. The approximately 10.45-acre project site consists of Assessor's Parcel Numbers 187-630-12-00 and 187-322-29-00. These parcels are zoned as A70–Limited Agriculture and have land use designations of Semi-Rural Residential (SR-1). See Figure 1, *Regional Location*, and Figure 2, *Aerial Photograph*.

1.2 PROJECT DESCRIPTION

The project proposes to construct an outdoor recreation facility consisting of a dry slope for skiing, snowboarding, and inner tubing. Proposed recreation features include three slopes of artificial synthetic material, a zipline and jump tower, a golf driving range, and a "magic carpet" lift station to transport guests to the top of the slopes. Four buildings totaling 9,525 square feet (SF) would provide associated amenities, including a box office, guest services, management offices, and a first aid station; a food court and bar with Americans with Disabilities Act (ADA)-compliant restrooms; an equipment rental and event room space; and a maintenance and storage shed. The northwestern portion of the property would be converted to a 146-space parking lot. See Figure 3, *Site Plan*.

2.0 ENVIRONMENTAL SETTING

2.1 NOISE AND SOUND LEVEL DESCRIPTORS AND TERMINOLOGY

All noise level or sound level values presented herein are expressed in terms of decibels (dB), with A-weighting (dBA) to approximate the hearing sensitivity of humans. Time-averaged noise levels are expressed by the symbol L_{EQ}, with a specified duration. The Community Noise Equivalent Level (CNEL) is a 24-hour average, where noise levels during the evening hours of 7:00 p.m. to 10:00 p.m. have an added 5 dBA weighting, and sound levels during the nighttime hours of 10:00 p.m. to 7:00 a.m. have an added 10 dBA weighting. This is similar to the Day Night sound level (L_{DN}), which is a 24-hour average with an added 10 dBA weighting on the same nighttime hours but no added weighting on the evening hours. Sound levels expressed in CNEL are always based on dBA. These metrics are used to express noise levels for both measurement and municipal regulations, as well as for land use guidelines and enforcement of noise ordinances.

Sound can be described as the mechanical energy of a vibrating object transmitted by pressure waves through a liquid or gaseous medium (e.g., air) to a hearing organ, such as a human ear. Noise is defined as loud, unexpected, or annoying sound.

In the science of acoustics, the fundamental model consists of a sound (or noise) source, a receiver, and the propagation path between the two. The loudness of the noise source and obstructions or atmospheric factors affecting the propagation path to the receiver contribute to the sound level and characteristics of the noise perceived by the receiver. The field of acoustics deals primarily with the propagation and control of sound.

Continuous sound can be described by frequency (pitch) and amplitude (loudness). A low-frequency sound is perceived as low in pitch. Frequency is expressed in terms of cycles per second, or Hertz (Hz) (e.g., a frequency of 250 cycles per second is referred to as 250 Hz). High frequencies are sometimes more conveniently expressed in kilohertz (kHz), or thousands of Hertz. The audible frequency range for humans is generally between 20 Hz and 20,000 Hz.

The amplitude of pressure waves generated by a sound source determines the loudness of that source. A logarithmic scale is used to describe sound pressure level (SPL) in terms of dBA units. The threshold of hearing for the human ear is about 0 dBA, which corresponds to 20 micro-Pascals.

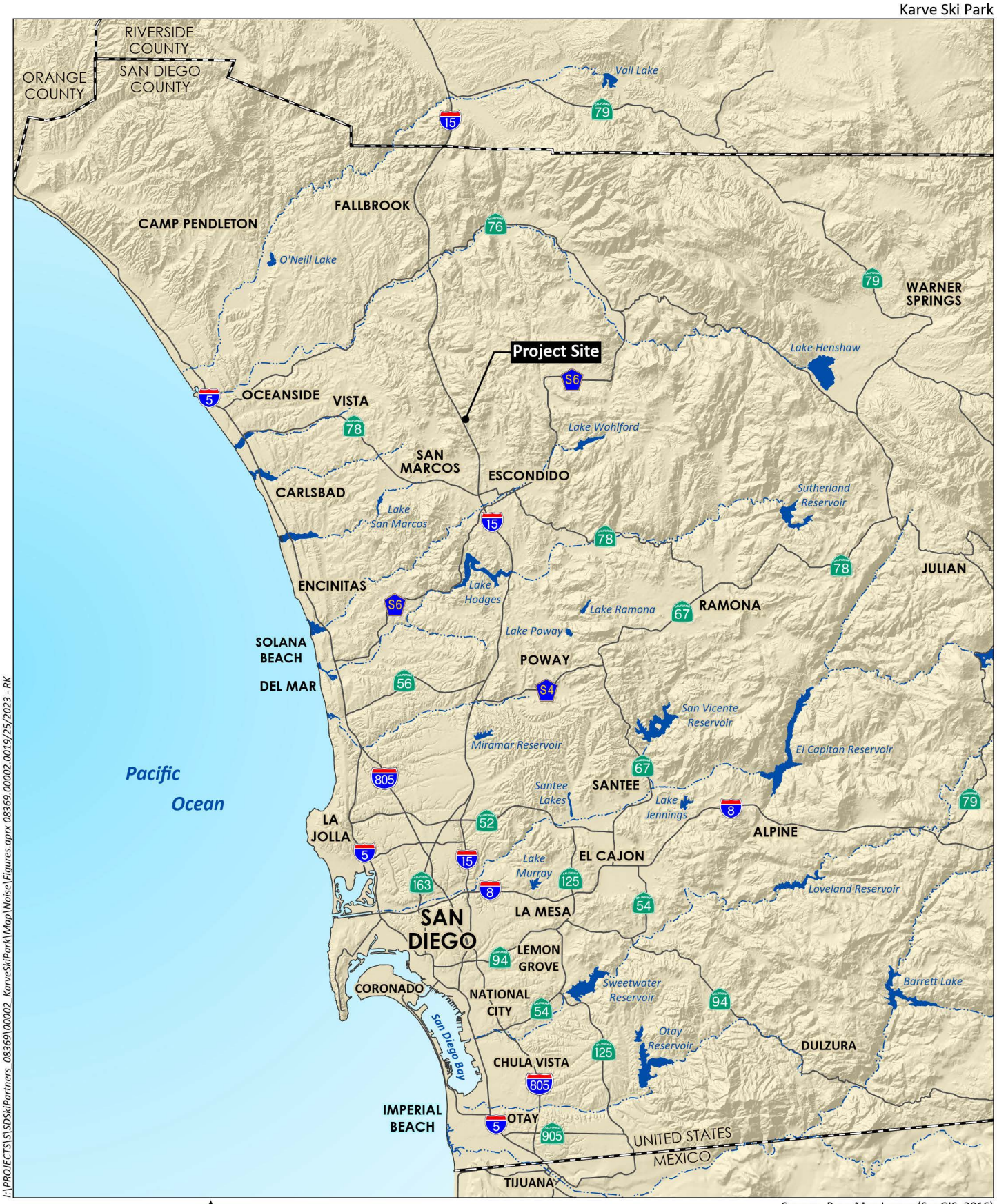
Under controlled conditions in an acoustical laboratory, the trained, healthy human ear is able to discern 1 dBA changes in sound levels, when exposed to steady, single-frequency (“pure-tone”) signals in the mid-frequency (1,000 Hz to 8,000 Hz) range. In typical noisy environments, changes in noise of 1 to 2 dBA are generally not perceptible. It is widely accepted, however, that people begin to detect sound level increases of 3 dBA in typical noisy environments. Further, a 5 dBA increase is generally perceived as a distinctly noticeable increase, and a 10 dBA increase is generally perceived as a doubling of loudness.

Because decibels are logarithmic units, SPL cannot be added or subtracted through ordinary arithmetic. Under the decibel scale, a doubling of sound energy corresponds to a 3-dBA increase. In other words, when two identical sources are each producing sound of the same loudness, the resulting sound level at a given distance would be 3 dBA higher than one source under the same conditions.

2.2 NOISE AND VIBRATION SENSITIVE LAND USES

Noise-sensitive land uses (NSLUs) are land uses that may be subject to stress and/or interference from excessive noise, such as residential dwellings, schools, transient lodging (hotels), hospitals, and educational facilities. Industrial and commercial land uses are generally not considered sensitive to noise. The closest NSLUs to the project site are single-family residences located approximately 200 feet east of the project site (R1-S) and the single-family home located approximately 150 feet south of the project site (R4-S). See Figure 4, *Noise Receiver and Measurement Locations*.

Land uses in which ground-borne vibration could potentially interfere with operations or equipment, such as research, manufacturing, hospitals, and university research operations are considered “vibration-sensitive” (California Department of Transportation [Caltrans] 2020). The degree of sensitivity depends on the specific equipment that would be affected by the ground-borne vibration. In addition, excessive levels of ground-borne vibration of either a regular or an intermittent nature can result in annoyance to residential uses or schools.



I:\PROJECTS\S\SDSkiPartners_08369\00002_KarveSkiPark\Map\Noise\Figures.aprx 08369.00002.0019/25/2023 - RK

0 8 Miles

Source: Base Map Layers (SanGIS, 2016)

HELIX Environmental Planning

Regional Location

Figure 1

Karve Ski Park

I:\PROJECTS\S\SDSki\Partners_08369\00002_KarveSkiPark\Map\Noise\Figures.aprx 08369.00002.0019/27/2023 - RK

0 200 Feet

Source: Aerial (SanGIS 2023)

HELIX Environmental Planning

Aerial Photograph

Figure 2

Screening Shrubs and Trees at Perimeter
Exist. Residential Outbuildings
Building D
Vehicular Access Gates
Trash Enclosure screened with large shrubs
Well Area
Bunny Slope Magic Carpet
Bunny Slope
Graded Slope Revegetated with low, naturalized shrubs and grasses
Septic Dispersal Area
Maintenance Access Path
Screening Trees on Slope to Backdrop High Point of Runs
6' ht. Tubular Steel Fence
Food Truck Parking
Building C
4' wide, 18" ht. Accent Seat Walls
Artificial Turf Seating Area
Shade Canopy
Seating Patio for Food Trucks
Single Runs
Screening Shrubs along Street Frontage
Building B
Concrete Patio with Linear Score Pattern
Zip Line Tower
Accent Planter with 6" Raised Concrete Edge
Magic Carpet
Bicycle Rack
Building A
10' wide Artificial Turf Path of Return to Magic Carpet
Zip Line
Run # 1
TIERRA LIBERTIA ROAD
Bio-filtration Basins planted with grasses
Low Entry Walls
Run # 2
Sight Visibility Lines
Existing Natural Landscape to remain undisturbed
Tube Runs
JESMOND DENE ROAD
Existing Golf Netting
Sight Visibility Lines
Bio-filtration Basins planted with grasses
Light Pole Location (see Schematic Lighting Plan) Typical of 6 in parking lot
Screening Shrubs for Parking Areas
NORTH CENTRE CITY PARKWAY
0 20' 40' 120'
Scale 1" = 40'

I:\PROJECTS\S\SDSkiPartners_08369\00002_KarveSkiPark\Map\Noise\Fig3_SitePlan.indd 08369.00002.001 09/25/23 -RK

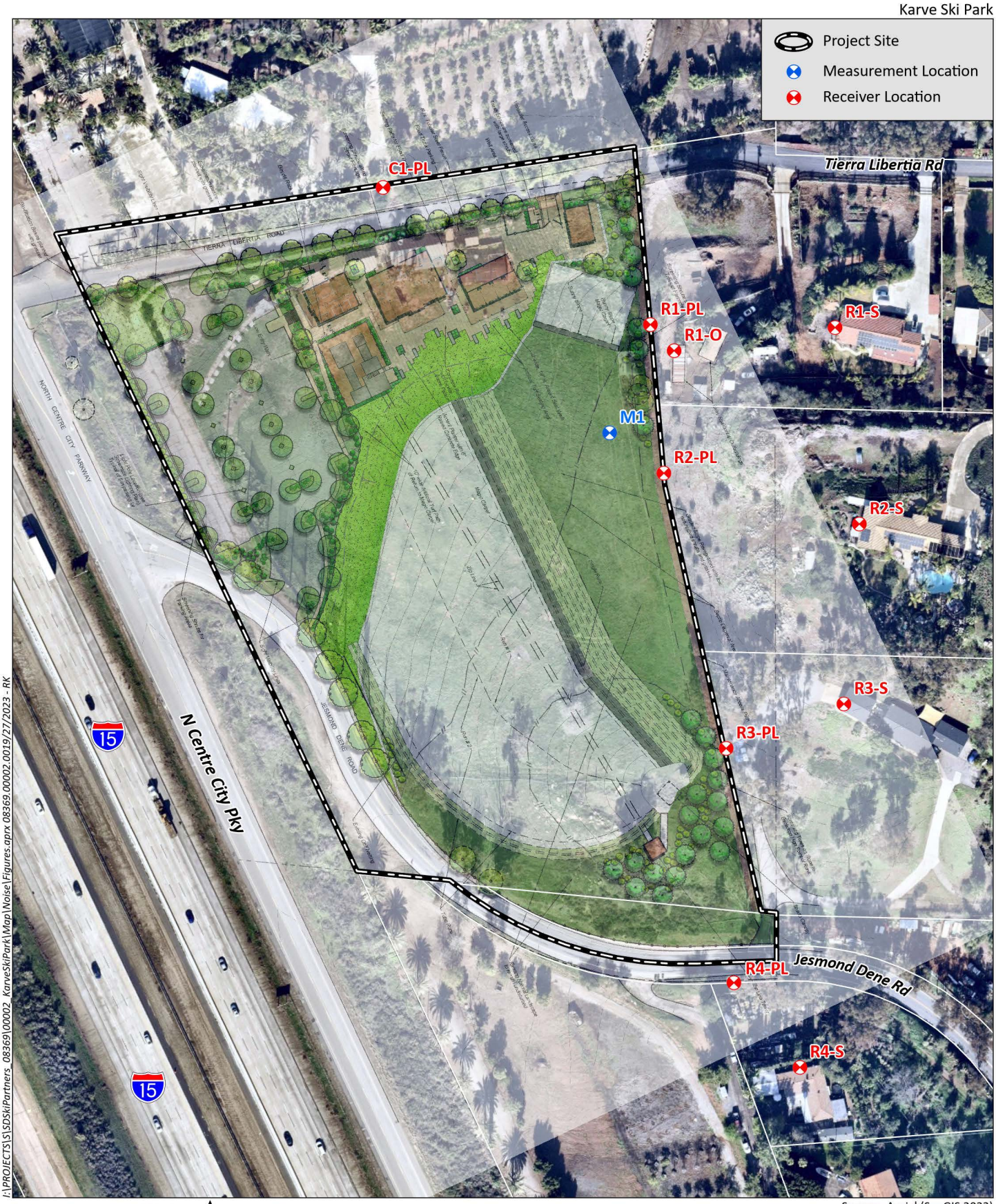
Source: Howard Associates 2023

HELIX Environmental Planning

Site Plan

Figure 3

Karve Ski Park



I:\PROJECTS\S\SDSkiPartners_08369\00002_KarveSkiPark\Map\Noise\Figures.aprx 08369.00002.00019/27/2023 - RK

0 150 Feet

Source: Aerial (SanGIS 2023)

HELIX Environmental Planning

Noise Receivers and Measurement Locations

Figure 4

Land uses in the project area that are subject to annoyance from vibration include the single-family residences 130 feet east of the project site and the single-family residence located approximately 230 feet south of the project site. No land uses containing vibration-sensitive equipment have been identified in the project vicinity.

2.3 REGULATORY FRAMEWORK

2.3.1 County of San Diego General Plan Noise Element

The Noise Element of the County General Plan includes guidelines for noise compatibility and establishes limitations on sound levels to be received by NSLUs (Tables N-1 and N-2 from the County General Plan), as detailed below in Table 1, *County of San Diego Noise Compatibility Guidelines*, and noise standards, as detailed in Table 2, *County of San Diego General Plan Noise Standards*. New development may cause an existing NSLU to be affected by noise caused by the new development, or it may locate an NSLU in such a place that it is affected by noise.

Table 1
COUNTY OF SAN DIEGO NOISE COMPATIBILITY GUIDELINES

Land Use Category		55*	60*	65*	70*	75*	80*
A	Residential—single family residences, mobile homes, senior housing, convalescent homes						
B	Residential—multi-family residences, mixed-use (commercial/residential)						
C	Transient lodging—motels, hotels, resorts						
D[(1)]	Schools, churches, hospitals, nursing homes, childcare facilities						
E[(1)]	Passive recreational parks, nature preserves, contemplative spaces, cemeteries						
F[(1)]	Active parks, golf courses, athletic fields, outdoor spectator sports, water recreation						
G[(1)]	Office/professional, government, medical/dental, commercial, retail, laboratories						
H[(1)]	Industrial, manufacturing, utilities, agriculture, mining, stables, ranching, warehouse, maintenance/repair						

	Acceptance Levels
	ACCEPTABLE—Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal construction, without any special noise insulation requirements.
	CONDITIONALLY ACCEPTABLE—New construction or development should be undertaken only after a detailed noise analysis is conducted to determine if noise reduction measures are necessary to achieve acceptable levels for land use. Criteria for determining exterior and interior noise levels are listed in Table N-2 [Table 2]. If a project cannot mitigate noise to a level deemed Acceptable, the appropriate County decision-maker must determine that mitigation has been provided to the greatest extent practicable or that extraordinary circumstances exist.
	UNACCEPTABLE—New construction or development shall not be undertaken.

Source: County 2011

(1) Denotes facilities used for part of the day; therefore, an hourly standard would be used rather than CNEL.

* Exterior Noise Level (CNEL)

Note: For projects located within an Airport Influence Area of an adopted Airport Land Use Compatibility Plan (ALUCP), additional Noise Compatibility Criteria restrictions may apply as specified in the ALUCP.

Table 2
COUNTY OF SAN DIEGO GENERAL PLAN NOISE STANDARDS

1.	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.
2.	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.
3.	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 that are provided for private or group usable open space purposes. "Private Usable Open Space" is defined as usable open space intended for use by 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.
7.	For noise sensitive land uses where people normally do not sleep at night, the exterior and interior noise standards 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.
9.	For Categories E and F, the exterior noise level standard shall not exceed the limit defined as "Acceptable" in Table N-1 [Table 1] or an equivalent one-hour noise standard.

Source: County 2011

Note: Exterior Noise Level compatibility guidelines are defined in Table 1.

2.3.2 County of San Diego Code of Regulatory Ordinances – Noise Ordinance

Sections 36.401 through 36.435 of the County of San Diego Code of Regulatory Ordinances discuss further County noise requirements. The purpose of the Noise Ordinance is to regulate noise in the unincorporated area of the County to promote the public health, safety, comfort, and convenience of the County's inhabitants and its visitors.

2.3.2.1 Section 36.404, General Sound Level Limits

The Noise Ordinance sets limits pertaining to the generation of exterior noise, as follows:

(a) Except as provided in section 36.409 of this chapter, it shall be unlawful for any person to cause or allow the creation of any noise, which exceeds the one-hour average sound level limits in Table 36.404 (Table 3, *County of San Diego Noise Ordinance Exterior Sound Level Limits*), when the one-hour average sound level is measured at the property line of the property on which the noise is produced or at any location on a property that is receiving the noise.

Table 3
COUNTY OF SAN DIEGO NOISE ORDINANCE EXTERIOR SOUND LEVEL LIMITS

Zone	Time	One-Hour Average Sound Level Limits (dBA)
(1) R-S, R-D, R-R, R-MH, A-70, A-72, S-80, S-81, S-87, S-90, S-92 and R-V and R-U with a density of less than 11 dwelling units per acre.	7:00 a.m. to 10:00 p.m. 10:00 p.m. to 7:00 a.m.	50 45
(2) R-RO, R-C, R-M, S-86, V5 and R-V and R-U with a density of 11 or more dwelling units per acre.	7:00 a.m. to 10:00 p.m. 10:00 p.m. to 7:00 a.m.	55 50
(3) S-94, V4 and all other commercial zones.	7:00 a.m. to 10:00 p.m. 10:00 p.m. to 7:00 a.m.	60 55
(4) V1, V2	7:00 a.m. to 7:00 p.m.	60
V1, V2	7:00 p.m. to 10:00 p.m.	55
V1	10:00 p.m. to 7:00 a.m.	55
V2	10:00 p.m. to 7:00 a.m.	50
V3	7:00 a.m. to 10:00 p.m. 10:00 p.m. to 7:00 a.m.	70 65
(5) M-50, M-52, and M-54	Anytime	70
(6) S-82, M-56, and M-58	Anytime	75
(7) S-88 (see subsection (c) below)	-	-

Source: County of San Diego Code of Regulatory Ordinances Section 36.404.
Zoning Code Definitions: R-S = Single-Family Residential; R-D = Duplex Residential; R-R = Rural Residential; R-MH = Mobile Home Residential; A-70 = Limited Agriculture; A-72 = General Agriculture; S-80 = Open Space; S-90 = Holding Area; S-92 = General Rural; S-94 = Transportation and Utility Corridor; R-V = Variable-Family Residential; R-RO = Residential-Recreation Oriented; R-C = Residential-Commercial; R-M = Multi-Family Residential; S-86 = Parking; R-U = Urban Residential; V1, V2, V3, V4, and V5 = Village Designations; M-50 = Basic Industrial; M-52 = Limited Industrial; M-54 = General Impact Industrial; S-82 = Extractive Use; M-56 = Mixed Industrial; M-58 = High-Impact Industrial; S-88 = Specific Plan.

(b) Where a noise study has been conducted, and the noise mitigation measures recommended by that study have been made, conditions of approval of a Major Use Permit, which authorizes the noise-generating use or activity and the decision-making body approving the Major Use Permit determined that those mitigation measures reduce potential noise impacts to a level below significance, implementation and compliance with those noise mitigation measures shall constitute compliance with subsection (a) above.

(c) S-88 zones are Specific Planning Areas that allow for different uses. The sound level limits in [Table 3] above that apply in an S-88 zone depend on the use being made of the property. The limits in [Table 3], subsection (1) apply to property with a residential, agricultural, or civic use. The limits in subsection (3) apply to property with a commercial use. The limits in subsection (5) apply to property with an industrial use that would only be allowed in an M-50, M-52, or M-54 zone. The limits in subsection (6) apply to all property with an extractive use or a use that would only be allowed in an M-56 or M-58 zone.

(d) If the measured ambient level exceeds the applicable limit in [Table 3], the allowable one-hour average sound level shall be the ambient noise level, plus three dB. The ambient noise level shall be measured when the alleged noise violation source is not operating.

(e) The sound level limit at a location on a boundary between two zones is the arithmetic mean of the respective limits for the two zones; provided however, that the one-hour average sound level limit applicable to extractive industries, including but not limited to borrow pits and mines, shall be 75 dB at the property line regardless of the zone which the extractive industry is actually located.

(f) A fixed-location public utility distribution or transmission facility located on or adjacent to a property line shall be subject to the sound level limits of this section, measured at or beyond six feet from the boundary of the easement upon which the facility is located.

2.3.2.2 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 the hours of 7:00 p.m. and 7:00 a.m.

b. On a Sunday or a holiday. For the purposes of this section, a holiday means January 1, the last Monday in May, July 4, the first Monday in September, the fourth Thursday in November, and December 25. A person may, however, operate construction equipment on a Sunday or holiday between the hours of 10:00 a.m. and 5:00 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.

2.3.2.3 Section 36.409, Construction Noise

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 dB for an eight-hour period, between 7:00 a.m. and 7:00 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.

2.3.2.4 Section 36.410, Impulsive Noise

Section 36.410 provides additional limitation on construction equipment beyond Section 36.404 pertaining to impulsive noise. Section 36.410 states that 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 shown in Table 4*, County of San Diego Maximum Sound Levels (Impulsive)*, 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.

Table 4
COUNTY OF SAN DIEGO MAXIMUM SOUND LEVELS (IMPULSIVE)

Occupied Property Use	Decibels (dBA L_{MAX})
Residential, village zoning or civic use	82
Agricultural, commercial, or industrial use	85

Source: County of San Diego Municipal Code Section 36.410.
dBA = A-weighted decibel; L_{MAX} = maximum noise level.

The minimum measurement period for measurements conducted under Section 36.410 is one hour. During the measurement period, a measurement must be conducted every minute from a fixed location on an occupied property. The measurements must 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.

2.4 EXISTING CONDITIONS

2.4.1 Surrounding Land Uses

The project site is bounded by Tierra Libertia Road on the north, single-family residential land uses on the east, Jesmond Dene Road on the south, and Jesmond Dene Road and North Centre City Parkway on the west. A plant nursery is located north of Tierra Libertia Road and single-family residences and vacant land are located south of Jesmond Dene Road. I-15 is located directly west of North Centre City Parkway. Parcels surrounding the project site to the north, east, and south are zoned as A70 and have land use designations of Semi-Rural Residential (SR-1).

2.4.2 Existing Noise Conditions

A 24-hour noise measurement was conducted on the project site beginning at 10:45 a.m. on July 26, 2023. The noise measurement was taken in the eastern portion of the project site to be representative of the existing noise environment near the residences east of the project site. The measurement location is shown on Figure 4. During the 24-hour measurement period, hourly noise levels ranged from 59.7 dBA L_{EQ} to 67.2 dBA L_{EQ} and the CNEL was calculated to be 69.1 dBA. A graph depicting the hourly noise levels measured at the site is provided in Appendix A, *Site Visit Measurement Data*.

3.0 ANALYSIS METHODOLOGY AND ASSUMPTIONS

3.1 METHODOLOGY

3.1.1 Ambient Noise Survey

The following equipment was used to measure existing noise levels at the project site:

- Soft dB Piccolo II Integrating Sound Level Meter
- Larson Davis Model CAL250 Calibrator
- Microphone windscreen and tripod for the sound level meter

The sound-level meter was field-calibrated prior to the noise measurement to ensure accuracy. All measurements were made with meters that conform to the American National Standards Institute (ANSI) specifications for sound level meters (ANSI SI.4-1983 R2006). All instruments were maintained with the National Institute of Standards and Technology traceable calibration per the manufacturers' standards.

3.1.2 Noise Modeling Software

Modeling of the exterior noise environment for this report was accomplished using the Computer Aided Noise Abatement (CadnaA) version 2023. CadnaA is a model-based computer program developed by DataKustik for predicting noise impacts in a wide variety of conditions. CadnaA assists in the calculation, presentation, assessment, and mitigation of noise exposure. It allows for the input of project related information, such as noise source data, barriers, structures, and topography to create a detailed model, and uses the most up-to-date calculation standards to predict outdoor noise impacts. CadnaA traffic noise prediction is based on the data and methodology used in the Traffic Noise Model released by the U.S. Department of Transportation (USDOT).

Peak-hour traffic volumes are estimated based on the assumption that approximately 10 percent of the average daily traffic would occur during a peak hour. The one-hour noise level (L_{EQ}) is calculated utilizing peak-hour traffic. Peak hour L_{EQ} can be converted to CNEL using the following equation, where L_{EQ} *(h)pk* is the peak hour L_{EQ}, *P* is the peak hour volume percentage of the average daily trips (ADT), *d* and *e* are divisions of the daytime fraction of ADT to account for daytime and evening hours, and *N* is the nighttime fraction of ADT:

$$CNEL = L_{EQ}(h)pk + 10\log10\ 4.17/P + 10\log10(d + 4.77e + 10N)$$

The model-calculated one-hour L_{EQ} noise output is therefore approximately equal to the CNEL (Caltrans 2013). Project construction noise was analyzed using the Roadway Construction Noise Model (RCNM; USDOT 2008), which utilizes estimates of sound levels from standard construction equipment. Topography was not considered when using RCNM, and therefore the construction noise calculations are considered conservative.

3.2 ASSUMPTIONS

3.2.1 Construction Activities

Project construction would include site preparation and clearing, grading, physical building construction, paving, and application of architectural coatings. According to project engineers, 390 cubic yards of soil would be exported during site grading.

3.2.1.1 Construction Equipment Noise Levels

Construction equipment assumptions for each construction phase are based on the project's air quality report (HELIX Environmental Planning, Inc [HELIX] 2023). Table 5, *Anticipated Construction Equipment*, presents a summary of the heavy equipment anticipated to be used for project construction.

Table 5
ANTICIPATED CONSTRUCTION EQUIPMENT

Equipment	Number	Hours per Day	Use Percentage
Site Preparation			
Rubber Tired Dozer	3	8	40
Tractor/Loader/Backhoe	4	8	40
Grading/Excavation			
Excavators	2	8	40
Grader	1	8	40
Rubber Tired Dozer	1	8	40
Scraper	2	8	40
Tractor/Loader/Backhoe	2	8	40
Building Construction			
Cranes	1	7	40
Forklifts	3	8	40
Generator Set	1	8	50
Tractor/Loader/Backhoe	3	7	40
Welder	1	8	40
Paving			
Pavers	2	8	50
Paving Equipment	2	8	50
Rollers	2	8	20
Architectural Coating			
Air Compressors	1	6	40

Source: HELIX 2023; USDOT 2008

3.2.1.2 Construction Traffic

Construction trips were estimated as part of the project's air quality analysis. According to the air quality modeling, worker trips would peak at approximately 20 ADT during grading (HELIX 2023). No more than one haul trip per day would be required during the 65-day grading period.

3.2.2 Project Operations

The project's operational noise sources would include human activity when sliding down the ski slope, bunny hill, and zipline; mechanical noise from the Magic Carpet Lift System motor, live non-amplified music inside of Building B, and building mechanical systems; and vehicles on local streets.

3.2.2.1 Recreational Human Activity (Children)

The project is expected to generate noise from individuals skiing down the ski slope, bunny hill, and using the zipline. Multiple point sources were included in the model to represent noise generated from these activities at different areas throughout the project site. To provide a conservative analysis, a reference level based on children at play was used to represent this activity which was obtained from prior measurements of an outdoor playground area (HELIX 2020). Table 6, *Recreational Activity (Children) Noise Data* provides the sound power levels for this noise source.

Table 6
RECREATIONAL ACTIVITY (CHILDREN) NOISE DATA

31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	Overall Noise Level in A-Weighted Scale (dBA)
67.7	67.6	65.2	64.0	72.8	80.0	76.7	69.1	55.9	82.6

Source: HELIX 2020
Note: Sound Power Levels (S_{WL}) in decibels (dB) measured at octave frequencies.
Hz = Hertz; kHz = kilohertz; dBA = A-weighted decibels.

3.2.2.2 Magic Carpet Lift System Motor

The project would utilize a Magic Carpet™ Lift System to transport individuals from the bottom to the top of the main ski slope and the bunny hill ski slope. The noise source associated with the Magic Carpet Lift System is a motor that outputs 30 horsepower (HP) at 450 revolutions per minute (RPM). Sound pressure levels for the motors were estimated to be 80 dB at 3 feet.[1] Table 7, *Magic Carpet Lift System Motor Noise Data* provides the calculated sound power level data and octave band spectrum for the motors.

Table 7
MAGIC CARPET LIFT SYSTEM MOTOR NOISE DATA

31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	Overall Noise Level in A-Weighted Scale (dBA)
73.1	73.1	76.1	78.1	81.1	80.1	75.1	75.1	67.1	84.2

Source: Hoover & Keith 1999
Note: Sound Power Levels (S_{WL}) in decibels (dB) measured at octave frequencies.
Hz = Hertz; kHz = kilohertz; dBA = A-weighted decibels.

[1] Noise Control for Buildings, Manufacturing Plants, Equipment and Products, Hoover & Keith, 1999
Equation 7-18: Sound Pressure Level at *3 ft = 15 + 17Log(HP) + 15Log(rpm) = 15 + 17Log(30) + 15Log(450) = 80 dB.*
Table 7-24: Frequency adjustments in dB for TEFC electric motors to obtain octave band A-weighted sound pressure levels.

3.2.2.3 Live Music

Non-amplified live music would be played at the project inside Building B and would end no later than 10:00 p.m. Sunday through Thursday and extend to 11:00 p.m. on Friday and Saturday evenings. The Building B doors would be kept open during the music events. Reference sound levels for typical non-amplified music was used; 60 dBA L_{EQ} at 50 feet (Bollard Acoustical Consultants 2019). Table 8, *Non-Amplified Live Music Noise Data* provides the sound power level spectrum used for this source.

Table 8
NON-AMPLIFIED LIVE MUSIC NOISE DATA

63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	Overall Noise Level in A-Weighted Scale (dBA)
55.1	84.6	92	92.2	92.3	87.4	71.1	83.7	95.6

Note: Sound Power Levels (S_{WL}) in decibels (dB) measured at octave frequencies.
Hz = Hertz; kHz = kilohertz; dBA = A-weighted decibels

3.2.2.4 Heating, Ventilation, and Air Conditioning

The project building mechanical systems would consist of commercial-sized heating, ventilation, and air conditioning (HVAC) units located on the rooftop of the building. Specific planning data for the future HVAC systems was not available at the time of this analysis. Standard HVAC planning assumes approximately one ton of HVAC for every 350 to 500 SF of occupied office space (American Society of Heating, Refrigeration, and Air Conditioning Engineers [ASHRAE] 2012). For the purposes of this analysis, two Carrier 50PG-28 HVAC units, which have a sound power level (S_{WL}) of 84.9 dBA, were assumed for Buildings A and C. Four Carrier 50PG-28 HVAC units were assumed for Building B. The HVAC systems would be mounted on the building roofs. The manufacturer's noise data for the HVAC units is provided below in Table 9, *HVAC Noise Data*, and included in Appendix C, *Mechanical System Noise Specifications*, to this report.

Table 9
HVAC NOISE DATA

63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	Overall Noise Level in A-weighted Scale (dBA)
90.0	86.3	83.6	82.9	80.3	74.9	71.4	66.5	84.9

Source: Appendix C
Note: Sound Power Levels (S_{WL}) in decibels (dB) measured at octave frequencies.
Hz = Hertz; kHz = kilohertz; dBA = A-weighted decibels

3.2.2.5 Traffic Generation

Information related to the project's trip generation was provided by the traffic analysis prepared by CR Associates (2023). The project is estimated to generate 526 ADT consisting of 29 a.m. peak hour trips and 42 p.m. peak hour trips. Access to the project site would be provided via two driveways, one from

Tierra Libertia Road and one from Jesmond Dene Road. Table 10, *Traffic Volumes by Segment*, summarizes the ADT data for the roadway segments that would carry project-generated traffic. Existing and future traffic volumes on roads in the project vicinity are based on San Diego Association of Governments' (SANDAG's) Traffic Forecast Information Center, ABM2+ 2021 RP forecasts (SANDAG 2023). Modeling assumes the peak hour traffic would be 10 percent of the ADT (typical of urban/suburban streets in California) and traffic would be traveling at the posted speed limit. A traffic distribution of 96 percent automobiles, 3 percent medium trucks, and 1 percent heavy trucks was used in this analysis for local roadways.

Table 10
TRAFFIC VOLUMES BY SEGMENT

Roadway Segment	Project ADT	2025 ADT	2035 ADT
Deer Springs/Mountain Meadow Road			
I-15 Southbound Ramps to I-15 Northbound Ramps	211	14,200	19,500
I-15 Northbound Ramps to North Centre City Parkway	342	9,300	11,400
I-15 Northbound			
Deer Springs Road to Mesa Rock Road	N/A	67,100	72,600
I-15 Southbound			
Deer Springs Road to Mesa Rock Road	N/A	65,300	70,600
Jesmond Dene			
North Centre City Parkway to East of North Centre City Parkway	263	800	900
North Centre City Road			
Jesmond Dene Road to Deer Springs Road	421	5,600	5,600
South of Jesmond Dene Road	105	4,900	4,900

Source: CR Associates 2023; SANDAG 2023
ADT = average daily trips, N/A = Not Applicable

4.0 GUIDELINES FOR THE DETERMINATION OF SIGNIFICANCE

The following thresholds are based on the County of San Diego Guidelines for Determining Significance – Noise (County 2009a) and the County of San Diego Report Format and Content Requirements – Noise (County 2009b), as applicable to the project.

4.1 CONSTRUCTION NOISE

A temporary or periodic increase in ambient noise levels due to on-site construction activity would be considered significant if noise from non-emergency construction activity exceeds 75 dBA for an eight-hour period between 7:00 a.m. and 7:00 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; if impulsive noise exceeds 82 dBA L_{MAX} at an occupied residential use or 85 dBA L_{MAX} at an occupied agricultural, commercial, or industrial use; or if noise is generated between the hours of 7:00 p.m. and 7:00 a.m. on weekdays, or any time on Sundays or holidays.

A significant temporary noise impact would occur if the project off-site construction traffic noise, combined with existing traffic noise levels, would double the noise levels (an increase of 3 dBA CNEL or greater).

4.2 OPERATION NOISE

Impacts would be significant if the project's operations would:

1. Result in the exposure of any on- or off-site, existing, or reasonably foreseeable future NSLU to exterior or interior noise in excess of the following:
    a. Exterior[2] Locations:
        i. 60 dBA CNEL; or
        ii. An increase of 10 dBA CNEL over existing noise in areas where ambient noise levels are 49 dBA CNEL are less; or
        iii. An increase of 3 dBA CNEL over existing noise in areas where ambient noise levels are 60 dBA CNEL or more.
    b. Interior Locations:
        i. 45 dBA CNEL.
2. Result in one-hour average noise levels in excess of 50 dBA from 7:00 a.m. to 10:00 p.m. or 45 dBA from 10:00 p.m. to 7:00 a.m. at the property line of the project site, per County of San Diego Noise Ordinance, Section 36.404.

A 45 dBA CNEL interior limit would be achieved if exterior locations achieve a 60 dBA CNEL or less noise level, based on an assumed attenuation of 15 dBA by standard residential building construction. As such, the following analysis relies on the 60 dBA CNEL exterior noise limit as the applicable threshold and does not analyze interior noise levels separately.

4.2.1 Cumulative Noise

A cumulatively considerable impact would occur if a project would contribute to a cumulative scenario (existing noise plus noise from anticipated growth) that would result in the exposure of any on- or off-site, existing, or reasonably foreseeable future NSLU, to:

- An increase of 10 dBA (CNEL) over pre-existing noise levels resulting in a combined exterior noise level of 60 dBA CNEL or greater; or
- An increase of 3 dBA CNEL in Cumulative + Project conditions if that total is above 60 dBA CNEL.

A "cumulatively considerable" project contribution to an identified significant cumulative noise impact would occur if the project would contribute more than a 1 dBA increase to the cumulative noise level.

[2] Exterior noise shall be measured at all exterior areas provided for group or private usable open space (County 2009a).

4.3 VIBRATION

Impacts associated with ground-borne vibration and noise would be significant if project implementation would expose the uses listed in Table 4, *Guidelines for Determining the Significance of Ground-borne Vibration and Noise Impacts*, and Table 5, *Guidelines for Determining the Significance of Ground-borne Vibration and Noise Impacts for Special Buildings*, of the County Noise Guidelines (County 2009a) to ground-borne vibration or noise levels equal to or in excess of the levels. Attachment D of the County Guidelines for Determining Significance for Noise, *Screening Criteria for Potential Adverse Ground-borne Vibration and Noise Effects*, includes a note that states that "non-transportation vibration sources such as construction equipment and other activities may be reviewed on a site-specific basis by the County using criteria developed by Caltrans (2004) for structures and potential annoyance." Caltrans updated its Vibration Guidance Manual in April 2020, and vibration threshold values included in that guidance are used herein to determine the significance of the project's vibration impact. The annoyance potential criteria provided by Caltrans is shown in Table 11, *Caltrans Vibration Annoyance Potential Criteria*. Impacts would be significant if the construction or operation of the project would result in the exposure of persons to ground-borne vibration equal to or in excess of Caltrans' distinctly perceptible human response threshold of 0.04 inch per second (in/sec) peak particle velocity (PPV) for continuous/frequent intermittent sources or 0.25 in/sec PPV for transient sources.

Table 11
CALTRANS VIBRATION ANNOYANCE POTENTIAL CRITERIA

Human Response	Maximum PPV (in/sec) Transient Sources	Maximum PPV (in/sec) Continuous/Frequent Intermittent Sources
Barely perceptible	0.04	0.01
Distinctly perceptible	0.25	0.04
Strongly perceptible	0.9	0.1
Severe	2.0	0.4

Source: Caltrans 2020.
PPV = peak particle velocity; in/sec = inches per second

5.0 IMPACTS

5.1 CONSTRUCTION NOISE

5.1.1 Impact Analysis

5.1.1.1 On-Site Construction Noise

Construction of the project is anticipated to occur during daytime hours, as allowed by County Code of Regulatory Ordinances Section 36.408, and no conflicts with this section of the County Code of Regulatory Ordinances would occur. The quantitative threshold of 75 dBA L_{EQ} (8 hour) established in County Code of Regulatory Ordinances Section 36.409 is considered in the following analysis for at the project property boundary.

As discussed in Section 3.2.1, project construction would require site preparation and clearing, grading, physical building construction, paving, and architectural coating application. These construction activities would generate elevated noise levels at the residential NSLUs east and south of the project site. The magnitude of the impact would depend on the type of construction activity, equipment used, duration of each construction phase, distance between the noise source and receiver(s), and any intervening structures. Construction equipment would not all operate at the same time or location. Furthermore, construction equipment would not be in constant use during the eight-hour operating day. Project construction work and mobile equipment operation would occur throughout the project site and certain phases of construction would require work within a specific portion of the project site.

Therefore, for noise analysis purposes, mobile construction equipment that would be used across the site was modeled near the center of the project site, approximately 180 feet from the closest residential property boundary east of the project on Tierra Libertia Road. Construction equipment required for site preparation, the majority of site grading, building construction, and architectural coating application was modeled at this distance to represent the assumed average distance from the NSLU that construction equipment would be operating over the course of a workday. Grading of the bunny hill and paving would require concentrated activities and a distance of 70 feet was used for these phases to represent the distance from the bunny hill to the nearest residential property boundary.

The loudest combination of equipment anticipated to be used simultaneously during each construction activity was modeled in RCNM at the applicable distance. The calculated noise level for each construction phase is shown in Table 12, *Construction Noise Levels*, and the complete RCNM output reports are included as Appendix B to this report.

Table 12
CONSTRUCTION NOISE LEVELS

Construction Phase/Activity	Equipment Used Simultaneously	Average Distance to Nearest Property Boundary Line (feet)	Resulting 1-Hour L_{EQ} at Nearest Property Boundary Line (dBA)
Site Preparation	Bulldozer, Backhoe	180	68.0
Bunny Hill Grading/Excavation	Excavator, Grader	70	79.5
Remaining Site Grading/Excavation	Excavator, Grader	180	71.3
Building Construction	Front End Loader[1], Generator	180	68.4
Paving	Paver, Roller	70	73.7
Architectural Coating	Air Compressor	180	62.6

Source: RCNM (USDOT 2008).

[1] Forklifts are not included in the RCNM equipment list. Therefore, forklifts were modeled as front-end loaders, which perform similar multi-task functions but are typically larger and noisier than forklifts.

NSLU = noise-sensitive land use; dBA = A-weighted decibels; L_{EQ} = time-averaged noise level

As shown in Table 12, the project is anticipated to generate noise levels exceeding the County's standard of 75 dBA L_{EQ} (8-hour) during the Grading/Excavation phase of the bunny hill. Remaining construction phases are not anticipated to generate noise levels exceeding the County's standard of 75 dBA L_{EQ} (8-hour). The project noise level calculations presented in Table 12 are one-hour average noise levels. These noise levels, therefore, provide a conservative estimate of the eight-hour average

noise level for comparison with the County construction noise limit, as it is unlikely that the loudest equipment, a bulldozer, would be used for all eight hours during any single construction workday. Regardless of actual equipment use time per day, all of the calculated one-hour project construction equipment noise levels would be less than the County eight-hour average limit of 75 dBA.

5.1.2 Significance of Impacts

On-site project construction noise would be generated during the allowable daytime hours and would exceed the County standard of 75 dBA L_{EQ} (8-hour) during grading of the bunny hill. The impact would be potentially significant.

5.1.3 Mitigation Measures

The following mitigation measure would be required to reduce construction noise levels to within County limits.

NOI-1 Construction Noise Management Plan. Noise levels from project-related construction activities shall not exceed the noise limit specified in Section 36.409 of the County of San Diego Code of Regulatory Ordinances of 75 dBA L_{EQ} (8-hour), when measured at the boundary line of the property where the noise is located or any occupied property where noise is being received. A Construction Management Plan that describes the measures included on the construction plans to ensure compliance with the noise limit shall be prepared by the project applicant and submitted to the County for approval prior to issuance of the construction permit. The following measures may be included to reduce construction noise:

- Construction equipment to be properly outfitted and maintained with manufacturer-recommended noise-reduction devices.
- Diesel equipment to be operated with closed engine doors and equipped with factory-recommended mufflers.
- Mobile or fixed “package” equipment (e.g., arc-welders and air compressors) to be equipped with shrouds and noise control features that are readily available for that type of equipment.
- Electrically powered equipment to be used instead of pneumatic or internal-combustion powered equipment, where feasible.
- Unnecessary idling of internal combustion engines (e.g., in excess of 5 minutes) to be prohibited.
- Material stockpiles and mobile equipment staging, parking, and maintenance areas to be located as far as practicable from noise sensitive receptors.
- The use of noise-producing signals, including horns, whistles, alarms, and bells, shall be for safety warning purposes only.
- No project-related public address of music system shall be audible at any adjacent sensitive receptor.

- Temporary sound barriers or sound blankets may be installed between construction operations and adjacent noise-sensitive receptors. Due to equipment exhaust pipes being approximately 7 to 8 feet above ground, a sound wall at least 10 feet in height above grade, to block the line-of-sight between project construction activities and residences along the eastern property lines. These barriers would mitigate noise levels to acceptable levels. To effectively reduce noise levels, the sound barrier should be constructed of a material with an STC rating of 22 or 23 with no gaps or perforations and remain in place until the conclusion of construction activities.

- The project applicant shall notify residences within 100 feet of the project's property line in writing within one week of any construction activity. The notification shall describe the activities anticipated, provide dates and hours, and provide contact information with a description of a complaint and response procedure.

- The on-site construction supervisor shall have the responsibility and authority to receive and resolve noise complaints. A clear appeal process for the affected resident shall be established prior to construction commencement to allow for resolution of noise problems that cannot be immediately solved by the site supervisor.

5.1.4 Significance After Mitigation

Impacts would be less than significant with the incorporation of mitigation measure NOI-1.

5.2 OPERATION NOISE

5.2.1 Impact Analysis

5.2.1.1 On-Site Operation Noise

As discussed in Section 3.2.2, the project would generate noise associated with human activity when skiing down the ski slope, bunny hill, and gliding along the zipline. Mechanical noise is anticipated to be generated by the motor of the Magic Carpet™ lift system, live non-amplified music inside of Building B, and building mechanical systems, such as commercial-sized HVAC units mounted on the building roofs. Noise sources were modeled using CadnaA, as discussed in Section 3.1 above, assuming continuous operation of all project noise sources. Receivers were placed in the CadnaA model at five feet above ground level at the north, east and south property lines. Receivers were placed at 5 and 15 feet above ground level at the residential structures to the east and south to represent first and second floor windows. See Figure 5, *Noise Levels from On-Site Operations – Unmitigated,* for the modeled receiver locations. Because all park activities are expected to occur beyond 10 p.m., the results of the on-site operational model are compared to the nighttime County standard in Table 13, *On-site Operational Noise - Unmitigated*.

Table 13
ON-SITE OPERATIONAL NOISE - UNMITIGATED

Receiver ID[1]	Receiver Description[2]	Project Operational Noise, 1-hr L_{EQ} (dBA)[3]	County Noise Limit[4]	*Exceeds Standard?*
C1-PL	Plant Nursery Property Line	53.4	55 dBA L_{EQ}	*No*
R1-PL	Residential Property Line	**48.6**	45 dBA L_{EQ}	***Yes***
R1-O	Residential Outback Building	**49.4**	45 dBA L_{EQ}	***Yes***
R1-S	Residential Structure/Second Floor Window	41.9	45 dBA L_{EQ}	*No*
R2-PL	Residential Property Line	**48.3**	45 dBA L_{EQ}	***Yes***
R2-S	Residential Structure/Second Floor Window	44.7	45 dBA L_{EQ}	*No*
R3-PL	Residential Property Line	**50.2**	45 dBA L_{EQ}	***Yes***
R3-S	Residential Structure/Second Floor Window	42.0	45 dBA L_{EQ}	*No*
R4-PL	Residential Property Line	36.3	45 dBA L_{EQ}	*No*
R4-S	Residential Structure/Second Floor Window	33.5	45 dBA L_{EQ}	*No*

Source: CadnaA

[1] "-PL": receiver at property line, "-S": receiver at residential structure, "-O": receiver at outback building.

[2] Noise levels provided at the second floor window as they result in higher noise levels than at the first floor.

[3] Bold font indicates exceedance of applicable noise limit.

[4] More restrictive nighttime property line standard applied.

As shown in Table 13, noise from the project operations would exceed the County noise standards at residential property lines adjacent to the project site on the east.

5.2.1.2 Off-Site Operation Noise

As discussed in Section 3.2.2.2, the project would add 526 ADT to local streets. The 2025 SANDAG traffic volumes of I-15 were used to determine the existing noise levels and were assumed to be the "Existing" scenario since the project is expected to commence construction in 2025. Off-site traffic noise levels were modeled using CadnaA and 10 percent of ADT, as discussed in Section 3.1.2. The increase in traffic noise resulting from the addition of project-generated vehicle trips to projected traffic in the project's opening year of 2025 was calculated at nearby residential NSLUs. Receivers were placed at NSLUs at a height of five feet at the locations shown in Figure 4. The calculated traffic noise levels are shown in Table 14, *2025 Traffic Noise*.

I:\PROJECTS\S\SDSkiPartners_08369\00002_KarveSkiPark\Map\Noise\Figures.aprx 08369.00002.00019/26/2023 - RK

0 150 Feet

Source: Aerial (SanGIS 2023)

HELIX Environmental Planning

Noise Levels From On-site Operations - Unmitigated

Figure 5

Table 14
2025 TRAFFIC NOISE

Receiver[1]	Traffic Noise Exposure (CNEL)			Direct Impact?
	Existing – No Project (2025)	Existing Plus Project (2025)	Change From Existing	
R1-S	63.6	63.6	+0.0	No
R2-S	67.6	67.6	+0.0	No
R3-S	66.0	66.0	+0.0	No
R4-S	66.3	66.3	+0.0	No

Source: CadnaA

[1] "-S": receiver at residential structure.

As shown in Table 14, traffic noise levels under opening year conditions would exceed 60 CNEL. Therefore, the project's contribution to traffic noise would be significant if the project would result in a 3 dBA CNEL increase. As shown in Table 14, the project would not result in increased traffic noise levels and no perceptible (3 dBA) increase in traffic noise levels would occur.

5.2.2 Significance of Impacts

On-site operational noise sources from the project would result in noise levels exceeding the County nighttime noise standard of 45 dBA L_{EQ} (1-hour average) measured at the eastern property line. The impact from on-site operational noise sources would be significant.

The addition of project-generated traffic to streets in the project vicinity would not exceed the 3 dBA increase in ambient noise level threshold and impacts from project-generated traffic would be less than significant.

5.2.3 Mitigation Measures

NOI-2 **Acoustic Barrier.** An acoustic barrier shall be installed along the eastern property line between the project site and the adjacent residential properties to reduce noise levels from on-site operational noise sources associated with the project to 45 dBA L_{EQ} (1-hour), when measured at the property line. The acoustic barrier shall be 855 feet long and have a height of 10 feet above ground level. Figure 6, *Barrier Location and Specifications*, provides the location and specifications of the recommended acoustic fence/barrier. It can be constructed of masonry, wood, plastic, fiberglass, steel, or a combination of those materials, as long as there are no cracks or gaps, through or below the wall. Any seams or cracks must be filled or caulked. If wood is used, it can be tongue and groove and must be at least one-inch total thickness or have a Sound Transmission Class (STC) rating of at least 22.

5.2.4 Significance After Mitigation

Table 15, *On-site Operational Noise – Mitigated,* and Figure 7, *Noise Levels From On-Site Operations – Mitigated*, provide the modeled noise levels at each receiver location with inclusion of the noise barrier required by mitigation measure NOI-2.

Table 15
ON-SITE OPERATIONAL NOISE - MITIGATED

Receiver ID[1]	Receiver Description[2]	Project Operational Noise (dBA L_{EQ})[3]	County Noise Limit[4]	*Exceeds Standard?*
C1-PL	Plant Nursery Property Line	53.4	55 dBA L_{EQ}	*No*
R1-PL	Residential Property Line	36.0	45 dBA L_{EQ}	*No*
R1-O	Residential Outback Building	41.5	45 dBA L_{EQ}	*No*
R1-S	Residential Structure/Second Floor Window	39.3	45 dBA L_{EQ}	*No*
R2-PL	Residential Property Line	34.8	45 dBA L_{EQ}	*No*
R2-S	Residential Structure/Second Floor Window	42.3	45 dBA L_{EQ}	*No*
R3-PL	Residential Property Line	33.7	45 dBA L_{EQ}	*No*
R3-S	Residential Structure/Second Floor Window	36.3	45 dBA L_{EQ}	*No*
R4-PL	Residential Property Line	36.3	45 dBA L_{EQ}	*No*
R4-S	Residential Structure/Second Floor Window	33.5	45 dBA L_{EQ}	*No*

Source: CadnaA
1 "-PL": receiver at property line, "-S": receiver at residential structure, "-O": receiver at outback building.
2 Noise levels provided at the second floor window as they result in higher noise levels than at the first floor.
3 Project noise sources assumed to operate continuously.
4 More restrictive nighttime property line standard applied.

5.3 CUMULATIVE OFF-SITE NOISE

5.3.1 Impact Analysis

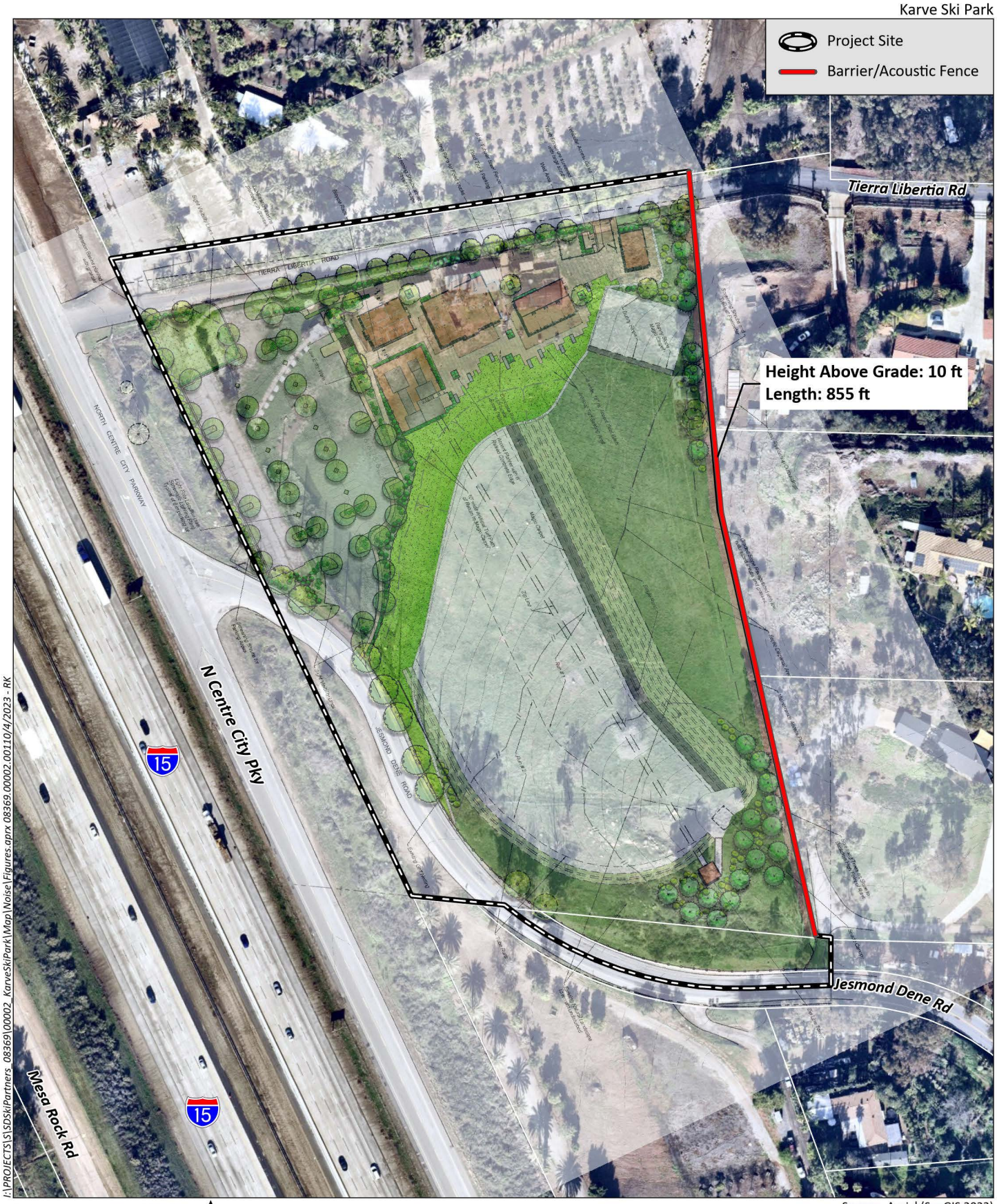
Off-site traffic noise levels resulting from the addition of project-generated vehicle trips to the 2035 forecast traffic resulting from cumulative regional growth anticipated by SANDAG were modeled using CadnaA. Receivers were placed at NSLUs as described in Section 5.2.1.2 and shown in Figure 5. The calculated increase in traffic noise resulting from cumulative traffic compared to existing conditions is shown in Table 16, *2035 Cumulative Traffic Noise*.

Table 16
2035 CUMULATIVE TRAFFIC NOISE

Receiver	Traffic Noise Exposure (CNEL)			Cumulative Impact?[2]
	Existing – No Project (2025)	Cumulative + Project (2035)	Increase in Noise Level	
R1-S	63.6	63.9	+0.3	No
R2-S	67.6	67.9	+0.3	No
R3-S	66.0	66.3	+0.3	No
R4-S	66.3	66.7	+0.4	No

Source: CadnaA
1 "-S": receiver at residential structure.
2 A cumulative impact would occur if the increase is 3 dBA or greater.

Karve Ski Park



I:\PROJECTS\S\SDSkiPartners_08369\00002_KarveSkiPark\Map\Noise\Figures.aprx 08369.00002.00110/4/2023 - RK

0 150 Feet

Source: Aerial (SanGIS 2023)

HELIX Environmental Planning

Barrier Location and Specifications

Figure 6

HELIX Environmental Planning

Noise Levels From On-site Operations - Mitigated

Figure 7

As noted in Section 4.2.1 of this report, according to the County guidelines, a cumulative noise impact is more likely to occur in locations where existing noise levels are elevated or approach the applicable criterion of 60 CNEL for an exterior NSLU. A doubling of noise (a 3 dBA increase) based on cumulative growth would result in a significant cumulative impact. If this occurs, the project's contribution to the cumulative impact would be "cumulatively considerable" if more than a 1 dBA increase from the project was identified in the model analysis.

As shown in Table 16, existing traffic noise levels (2025) without the project would be above 60 CNEL at the analyzed receiver locations. Future conditions in 2035, including project-added traffic, would not result in a 3 dBA increase; therefore, cumulative impacts are considered less than significant.

5.3.2 Significance of Impacts

Cumulative noise impacts would be less than significant.

5.3.3 Mitigation Measures

Impacts would be less than significant, and no mitigation would be required.

5.3.4 Significance after Mitigation

The project would not result in a cumulative noise increase exceeding County standards, and the impact would be less than significant.

5.4 VIBRATION

5.4.1 Impact Analysis

5.4.1.1 Construction Vibration

The construction equipment with highest potential for vibration generation during general project construction activities would be a vibratory roller, which may be used for compaction of soil beneath building foundations and could be used within 140 feet of the closest off-site residence east of the project site. Most usage of a vibratory roller, however, would occur at distances greater than 140 feet from any residence due to the mobile nature of its use across the project site. A vibratory roller creates approximately 0.210 in/sec PPV at a distance of 25 feet (Caltrans 2020). A vibratory roller would generate a vibration level of approximately 0.032 in/sec PPV at a distance of 140 feet.[3] This would be lower than the structural damage impact threshold to older structures of 0.5 inch per second PPV, and the Caltrans distinctly perceptible human response threshold of 0.04 in/sec PPV for continuous/frequent intermittent sources. Therefore, impacts associated with use of a vibratory roller (and other potential equipment) would be less than significant.

[3] Equipment PPV = Reference PPV * $(25/D)^n$ (inches per second), where Reference PPV is PPV at 25 feet, D is distance from equipment to the receiver in feet, and n = 1.5. L_V = Reference L_V – 30*log (D/25) (VdB), where Reference L_V is L_V at 25 feet and D is distance from equipment to the receiver in feet. Formulas from FTA 2018.

5.4.1.2 Operational Vibration

Land uses that may generate substantial ground-borne operational vibrations include heavy industrial or mining operations that require the use of vibratory equipment. The project does not include equipment that would generate substantial vibration.

5.4.2 Significance of Impacts

The project would not generate vibration during construction that would exceed the Caltrans annoyance criteria for human receptors and long-term operation of the project would not be a source of substantial ground-borne vibrations. The impact would be less than significant.

5.4.3 Mitigation Measures

Impacts would be less than significant, and no mitigation would be required.

5.4.4 Significance after Mitigation

Impacts related to vibration would be less than significant.

6.0 LIST OF PREPARERS

Jafar Al-Khalaf	Senior Noise Specialist
Shelby Bocks	Noise Analyst
Joanne M. Dramko, AICP	Principal Noise Specialist, County-approved Noise Consultant, QA/QC

HELIX Environmental Planning, Inc.
7578 El Cajon Boulevard
La Mesa, CA 91942

7.0 REFERENCES

ASHRAE. 2012. Heating, Ventilating, and Air-Conditioning Systems and Equipment.

CR Associates. 2023. Karve Ski Park – Vehicle Miles Traveled Analysis

Bollard Acoustical Consultants, Inc. 2019. Environmental Noise Assessment, Placer County Winery & Farm Brewery Zoning Text Amendment. April 16.

California Department of Transportation (Caltrans). 2020. Transportation and Construction Vibration Guidance Manual. April. Available at: https://dot.ca.gov/programs/environmental-analysis/noise-vibration/guidance-manuals.

2004. Transportation- and Construction-induced Vibration Guidance Manual. June.

County of San Diego. 2011. General Plan. August. Available at: https://www.sandiegocounty.gov/content/dam/sdc/pds/gpupdate/docs/GP/NoiseElement.pdf.

2009a. County of San Diego Guidelines for Determining Significance – Noise. January 27.

2009b. County of San Diego Report Format and Content Requirements – Noise. January 27.

HELIX Environmental Planning, Inc. (HELIX). 2023. Karve Ski Park Project Air Quality Technical Report. August.

2020. The Junipers Project Acoustical Analysis Report. January.

Hoover & Keith. 1999. Noise Control for Buildings, Manufacturing Plants, Equipment and Products.

San Diego Association of Governments (SANDAG). 2023. Traffic Forecast Information Center. Available at: https://tfic.sandag.org/. Accessed August 1.

U.S. Department of Transportation (USDOT). 2008. Roadway Construction Noise Model Version 1.1. Available at: https://www.fhwa.dot.gov/environment/noise/construction_noise/rcnm/.

2004. Traffic Noise Model Version 2.5. Available at: https://www.fhwa.dot.gov/environment/noise/traffic_noise_model/tnm_v25/.

This page intentionally left blank

Appendix A

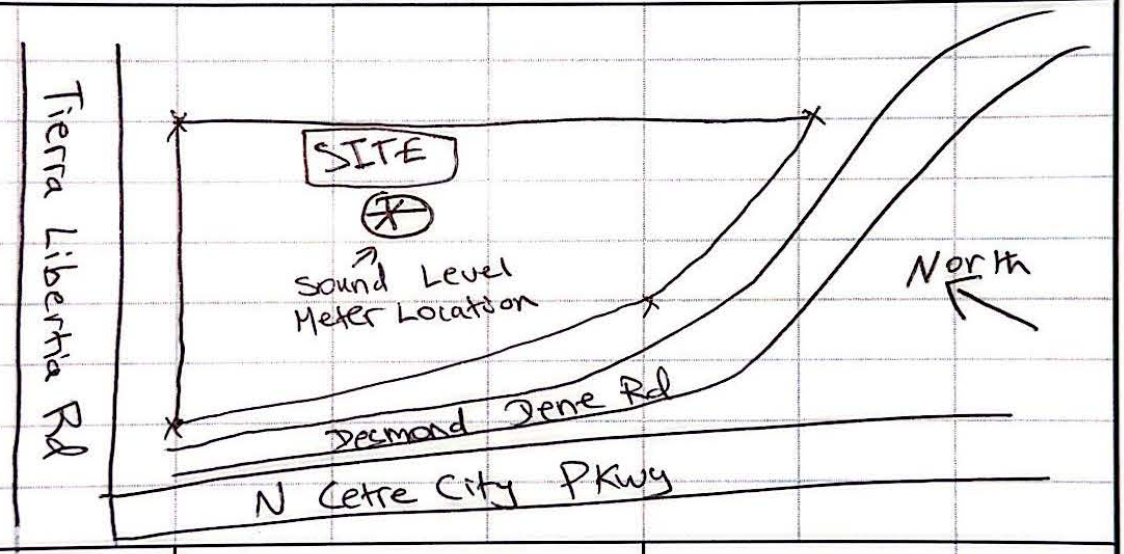
Site Visit Measurement Data

Site Survey

Job # 08369.00002.001	Project Name: SD Ski Partners		
Date: 7/26/2023	Site #:	Engineer: *Jafar Al-Khalaf*	
Address: 26351 North Centre City Parkway, Escondido, CA 92026			
Meter: Picollo	Serial #: P022205060	Calibrator: CAL250	Serial #: 1544

Notes: Primary source of noise is traffic on I-15

Sketch:



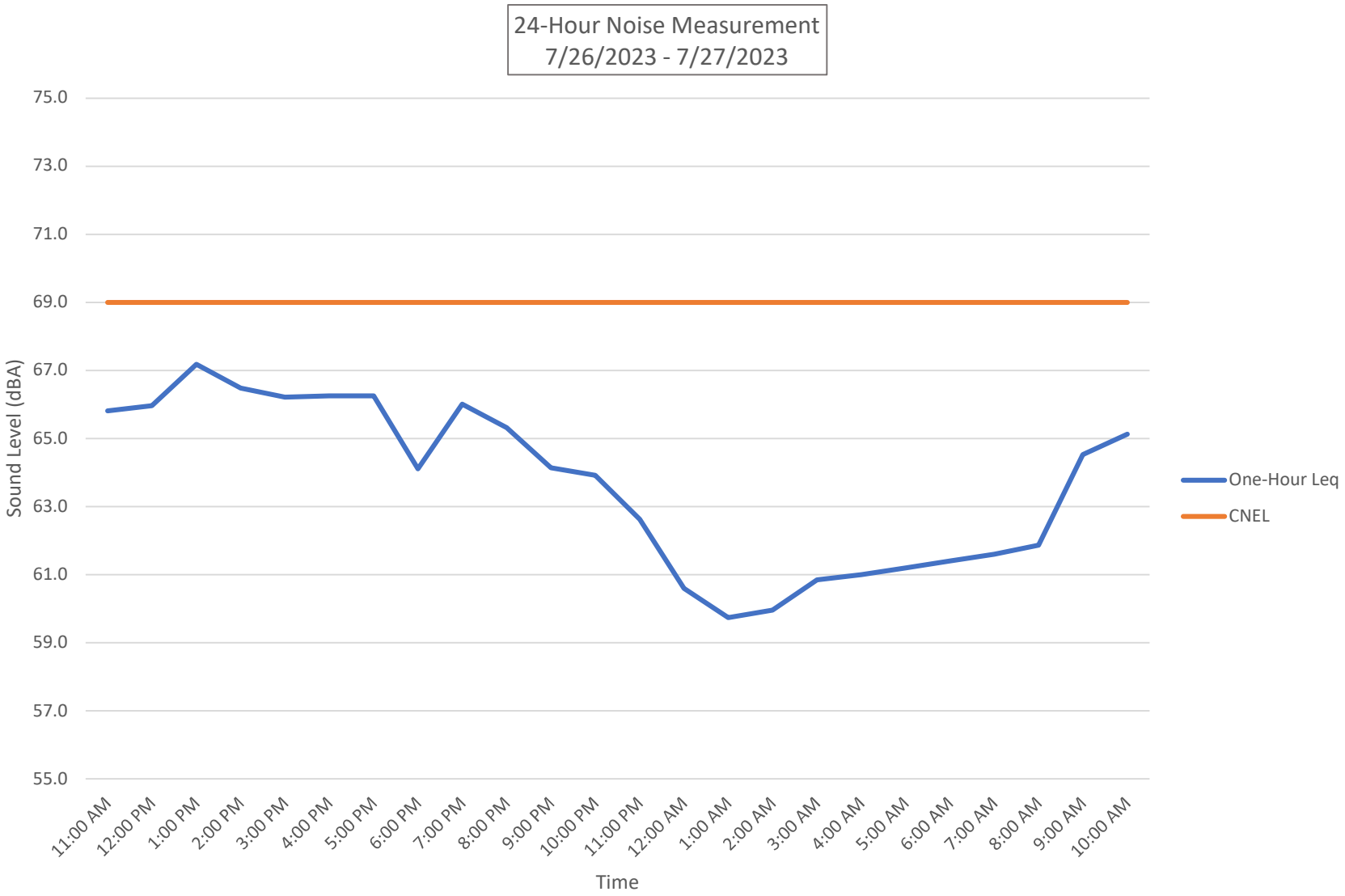
Temp:	79°F	Wind Spd:	7 mph	Humidity:	62 %
Start of Measurement: 10:43 AM		End of Measurement: 10:45 AM		64.8	dBA L_{EQ}

Cars (tally per 5 cars)	Medium Trucks (MT)	Heavy Trucks (HT)

Noise Measurement for Information Only

No Through Roadways

No Calibration Analysis Will Be Provided


24-Hour Noise Measurement
7/26/2023 - 7/27/2023
75.0
73.0
71.0
69.0
67.0
65.0
63.0
61.0
59.0
57.0
55.0
Sound Level (dBA)
11:00 AM
12:00 PM
1:00 PM
2:00 PM
3:00 PM
4:00 PM
5:00 PM
6:00 PM
7:00 PM
8:00 PM
9:00 PM
10:00 PM
11:00 PM
12:00 AM
1:00 AM
2:00 AM
3:00 AM
4:00 AM
5:00 AM
6:00 AM
7:00 AM
8:00 AM
9:00 AM
10:00 AM
Time
One-Hour Leq
CNEL

Appendix B

Construction Noise Model Outputs

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 8/11/2023
Case Description: Karve Ski Park - Construction Noise Analysis

Phase 1 - Site Preparation

		Baselines (dBA)	---- Receptor #1 ----
Description	Land Use	Daytime	
R1	Residential	75	

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Dozer	No	40		81.7	180	0
Backhoe	No	40		77.6	180	0

	Results Calculated (dBA)	
Equipment	*Lmax	Day Leq
Dozer	70.5	66.6
Backhoe	66.4	62.5
Total	70.5	68

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 8/11/2023
Case Description: Karve Ski Park - Construction Noise Analysis

Phase 2 - Grading - Remaining Site Locations

			---- Receptor #1 ----				
		Baselines (dBA)					
Description	Land Use	Daytime					
R1	Residential	75					

			Equipment			
			Spec	Actual	Receptor	Estimated
	Impact		Lmax	Lmax	Distance	Shielding
Description	Device	Usage(%)	(dBA)	(dBA)	(feet)	(dBA)
Excavator	No	40		80.7	180	0
Grader	No	40	85		180	0

		Results	
		Calculated (dBA)	
			Day
Equipment		*Lmax	Leq
Excavator		69.6	65.6
Grader		73.9	69.9
	Total	73.9	71.3

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 10/4/2023
Case Description:
Phase 2 - Grading - Bunny Slope

				---- Receptor #1 ----			
		Baselines (dBA)					
Description	Land Use	Daytime					
R1-PL	Residential	75					

			Equipment			
			Spec	Actual	Receptor	Estimated
	Impact		Lmax	Lmax	Distance	Shielding
Description	Device	Usage(%)	(dBA)	(dBA)	(feet)	(dBA)
Excavator	No	40		80.7	70	0
Grader	No	40	85		70	0

		Results	
		Calculated (dBA)	
Equipment		*Lmax	Leq
Excavator		77.8	73.8
Grader		82.1	78.1
	Total	82.1	79.5

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 8/11/2023
Case Description: Karve Ski Park - Construction Noise Analysis

Phase 3 - Building Construction

			---- Receptor #1 ----				
		Baselines (dBA)					
Description	Land Use	Daytime					
R1	Residential	75					

				Equipment			
				Spec	Actual	Receptor	Estimated
		Impact		Lmax	Lmax	Distance	Shielding
Description		Device	Usage(%)	(dBA)	(dBA)	(feet)	(dBA)
Front End Loader		No	40		79.1	180	0
Generator		No	50		80.6	180	0

		Results	
		Calculated (dBA)	
			Day
Equipment		*Lmax	Leq
Front End Loader		68	64
Generator		69.5	66.5
	Total	69.5	68.4

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 10/4/2023
Case Description:
Phase 4 - Paving

			---- Receptor #1 ----			
		Baselines (dBA)				
Description	Land Use	Daytime				
R1-PL	Residential	75				

			Equipment			
			Spec	Actual	Receptor	Estimated
	Impact		Lmax	Lmax	Distance	Shielding
Description	Device	Usage(%)	(dBA)	(dBA)	(feet)	(dBA)
Paver	No	50		77.2	70	0
Roller	No	20		80	70	0

Results
Calculated (dBA)

Equipment		*Lmax	Leq
Paver		74.3	71.3
Roller		77.1	70.1
	Total	77.1	73.7

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 8/11/2023
Case Description: Karve Ski Park - Construction Noise Analysis

Phase 5 - Architectural Coating

			---- Receptor #1 ----				
		Baselines (dBA)					
Description	Land Use	Daytime					
R1	Residential	75					

				Equipment			
				Spec	Actual	Receptor	Estimated
		Impact		Lmax	Lmax	Distance	Shielding
Description		Device	Usage(%)	(dBA)	(dBA)	(feet)	(dBA)
Compressor (air)		No	40		77.7	180	0

		Results	
		Calculated (dBA)	
			Day
Equipment		*Lmax	Leq
Compressor (air)		66.5	62.6
	Total	66.5	62.6

*Calculated Lmax is the Loudest value.

Appendix C

Mechanical System Noise Specifications

50PG03–28
Ultra High Efficiency Single Package Electric Cooling with Optional Electric Heat Commercial Rooftop Units with PURON® (R–410A) Refrigerant, Optional EnergyX™ (Energy Recovery Ventilator)

Carrier®
Turn to the Experts.℠

Product Data

CENTURION

EnergyX model shown

DEALER DESIGN AWARDS
theNEWS | GOLD

BUILDINGS magazine
Editors' Choice
TOP 100 PRODUCTS
2005

Puron
the environmentally sound refrigerant

Operation Air Quantity Limits

50PG03-16 Units

UNIT 50PG	COOLING (cfm)		HEATING (cfm) ELECTRIC HEAT	
	Min	Max	Min	Max
03	600	1000	600	1000
04	900	1500	900	1500
05	1200	2000	1200	2000
06	1500	2500	1500	2500
07	1800	3000	1800	3000
08	2250	3750	2250	3750
09	2550	4250	2550	4250
12	3000	5000	3000	5000
14	3750	6250	3750	6250
16	4500	7500	4500	7500

50PG20-28 Units

50PG	COOLING		ELECTRIC HEAT	ELECTRIC HEAT (Vertical)	ELECTRIC HEAT (Horizontal)
	Minimum Cfm	Maximum Cfm		Minimum Cfm	Minimum Cfm
20	5000	9,000	High Heat (75 kW)	4,500	5,400
			Medium Heat (50 kW)	3,750	4,800
			Low Heat (25 kW)	3,750	3,750
24	5500	10,000	High Heat (75 kW)	4,500	5,400
			Medium Heat (50 kW)	3,750	4,800
			Low Heat (25 kW)	3,750	3,750
28	6500	12,000	High Heat (75 kW)	4,500	5,400
			Medium Heat (50 kW)	3,750	4,800
			Low Heat (25 kW)	3,750	3,750

Outdoor Sound Power (Total Unit)

UNIT 50PG	A-WEIGHTED* (dB)	OCTAVE BAND LEVELS dB							
		63	125	250	500	1000	2000	4000	8000
03	75.0	82.6	79.9	75.7	73.3	70.0	64.3	58.4	50.5
04	73.2	79.8	77.2	74.1	70.1	68.0	63.6	58.4	51.9
05	71.9	79.7	79.6	72.6	69.6	66.0	61.4	56.4	48.5
06	78.5	82.2	82.6	79.5	75.7	73.9	68.6	64.0	56.3
07	78.5	87.5	83.0	78.5	76.3	73.8	68.4	63.8	56.5
08	80.0	91.7	83.6	81.0	77.9	75.0	69.9	66.0	59.3
09	79.9	89.1	82.7	80.0	77.7	75.0	70.2	66.3	57.8
12	80.0	90.4	83.1	80.9	77.8	75.2	70.0	66.1	57.6
14	83.3	86.4	85.9	85.3	81.8	78.2	72.2	67.9	59.9
16	84.0	90.3	85.2	83.5	81.1	79.0	73.7	70.5	65.4
20	81.7	90.2	84.8	80.7	79.0	77.6	71.4	66.7	60.7
24	84.9	90.0	86.3	83.6	82.9	80.3	74.9	71.4	66.5
28	84.9	90.0	86.3	83.6	82.9	80.3	74.9	71.4	66.5

LEGEND

db – Decibel

*Sound Rating ARI or Tone Adjusted, A–Weighted Sound Power Level in dB. For sizes 03–12, the sound rating is in accordance with ARI Standard 270–1995. For sizes 14–28, the sound rating is in accordance with ARI 370–2001.

Outdoor Sound Power (Total Unit)
with High CFM EnergyX

UNIT 50PG w/ERV	A−WEIGHTED* (dB)	OCTAVE BAND LEVELS dB							
		63	125	250	500	1000	2000	4000	8000
03	83.0	82.8	81.4	79.7	78.1	77.9	76.5	72.5	70.1
04	82.7	80.2	79.6	79.1	77.3	77.6	76.5	72.5	70.1
05	82.6	80.1	81.1	78.8	77.2	77.4	76.4	72.4	70.0
06	83.8	82.4	83.4	81.6	79.1	78.8	76.9	72.9	70.2
07	83.8	87.6	83.8	81.1	79.3	78.8	76.9	72.9	70.2
08	87.3	92.0	86.8	84.5	82.4	81.8	80.5	78.0	74.2
09	87.2	89.6	86.4	84.1	82.4	81.8	80.5	78.1	74.2
12	87.3	90.8	86.5	84.5	82.4	81.8	80.5	78.0	74.2
14	88.2	87.2	88.0	87.0	84.2	82.7	80.8	78.2	74.3
16	91.4	93.2	92.8	88.2	86.3	85.5	84.4	83.4	78.4
20	91.2	93.1	92.7	87.4	85.8	85.2	84.2	83.3	78.3
24	91.7	93.0	93.0	88.2	86.9	85.8	84.5	83.5	78.5
28	91.7	93.0	93.0	88.2	86.9	85.8	84.5	83.5	78.5

LEGEND
dB − Decibel
***** Sound Rating ARI or tone Adjusted, A−Weighted Sound Power Level in dB. For sizes 03−12, the sound rating is in accordance with ARI Standard 270−1995. For sizes 14−28, the sound rating is in accordance with ARI 370−2001.

PHYSICAL DATA

50PG03-07

BASE UNIT 50PG		03	04	05	06	07
NOMINAL CAPACITY (Tons)		2	3	4	5	6
OPERATING WEIGHT (lb)						
Unit*		704	704	775	829	874
Economizer						
Vertical		40	40	40	40	40
Horizontal		50	50	50	50	50
Humidi-MiZer™ Adaptive Dehumidification System		22	22	31	27	26
Roof Curb						
14-in.		122	122	122	122	122
24-in.		184	184	184	184	184
COMPRESSOR		Fully Hermetic Scroll				
Quantity		1	1	1	1	1
Oil Type		Copeland 3MA				
Number of Refrigerant Circuits		1	1	1	1	1
Oil (oz)		38	42	42	66	56
REFRIGERANT TYPE		R-410A (Puron® Refrigerant)				
Expansion Device		TXV	TXV	TXV	TXV	TXV
Operating Charge (lb) — Standard Unit		7.3	9.0	15.7	16.6	19.0
Operating Charge (lb) — Unit with Humidi-MiZer System		11.75	13.50	25.00	22.00	22.70
CONDENSER COIL		Enhanced Copper Tubes, Aluminum Lanced Fins				
Condenser A (Outer)						
Rows...Fins/in.		1…17	1…17	2…17	2…17	2…17
Face Area (sq ft)		12.6	12.6	12.6	12.6	12.6
Condenser B (Inner)						
Rows...Fins/in.		—	1…17	2…17	2…17	2…17
Face Area (sq ft)		—	12.6	12.6	12.6	12.6
HUMIDI–MIZER COIL		Enhanced Copper Tubes, Aluminum Lanced Fins				
Rows...Fins/in.		1...17	1...17	1...17	1...17	1...17
Face Area (sq ft)		6.4	6.4	9.3	9.3	9.3
CONDENSER FAN		Propeller				
Quantity…Diameter (in.)		1…24	1…24	1…24	1…24	1…24
Nominal Cfm (Total, all fans)		3500	3500	3500	4500	4500
Motor Hp		1/8	1/8	1/8	1/4	1/4
Nominal Rpm — High Speed		825	825	825	1100	1100
Nominal Rpm — Low Speed		300	300	300	300	300
EVAPORATOR COIL		Enhanced Copper Tubes, Aluminum Double-Wavy Fins, Face Split				
Rows…Fins/in.		2…15	2…15	2…15	3…15	4…15
Face Area (sq ft)		9.3	9.3	9.3	9.3	9.3
EVAPORATOR FAN		Centrifugal Type, Belt Drive				
Quantity…Size (in.)	Low	1...12 x 9	1...12 x 9	1...12 x 9	1...12 x 9	1...12 x 9
	High	1...12 x 9	1...12 x 9	1...12 x 9	1...12 x 9	1...12 x 9
Type Drive	Low	Belt	Belt	Belt	Belt	Belt
	High	Belt	Belt	Belt	Belt	Belt
Nominal Cfm		800	1200	1600	2000	2400
Maximum Continuous Bhp	Low	0.85	0.85	0.85	0.85/2.40†	2.40
	High	0.85	0.85	1.60/2.40†	1.60/2.40†	3.10
Motor Nominal Rpm		1620	1620	1620	1725	1725
Motor Frame Size	Low	48Y	48Y	48Y	56Y	56Y
	High	48Y	48Y	56Y	56Y	56Y
Fan Rpm Range	Low	482-736	482-736	596-910	690-978	796-1128
	High	656-1001	796-1128	828-1173	929-1261	1150-1438
Motor Bearing Type		Ball	Ball	Ball	Ball	Ball
Maximum Fan Rpm		2000	2000	2000	2000	2000
Motor Pulley Pitch Diameter Range (in.)	Low	1.9-2.9	1.9-2.9	1.9-2.9	2.4-3.4	2.4-3.4
	High	1.9-2.9	2.4-3.4	2.4-3.4	2.8-3.8	4.0-5.0
Fan Pulley Pitch Diameter (in.)	Low	6.8	6.8	5.5	6.0	5.2
	High	5.0	5.2	5.0	5.2	6.0
Nominal Motor Shaft Diameter (in.)	Low	1/2	1/2	1/2	5/8	5/8
	High	1/2	1/2	5/8	5/8	7/8
Belt…Pitch Length (in.)	Low	49.3	49.3	49.3	49.3	49.3
	High	49.3	49.3	49.3	49.3	52.3
Belt…Type	Low	AX	AX	AX	AX	AX
	High	AX	AX	AX	AX	AX
Pulley Center Line Distance Min. (in.)	Low	16.2	16.2	16.2	16.2	16.2
	High	16.2	16.2	16.2	16.2	16.2
Pulley Center Line Distance Max. (in.)	Low	20.2	20.2	20.2	20.2	20.2
	High	20.2	20.2	20.2	20.2	20.2
Speed Change per Full Turn of Movable Pulley Flange (rpm)	Low	48	48	59	58	66
	High	65	62	69	66	58
Movable Pulley Maximum Full Turns from Closed Position	Low	5	5	5	5	5
	High	5	5	5	5	5
Factory Pulley Setting (rpm)	Low	482	482	596	690	796
	High	656	796	828	929	1150
Fan Shaft Diameter at Pulley (in.)		3/4	3/4	3/4	3/4	3/4
HIGH-PRESSURE SWITCH (psig)						
Cutout		660 ± 10	660 ± 10	660 ± 10	660 ± 10	660 ± 10
Reset (Auto.)		505 ± 20	505 ± 20	505 ± 20	505 ± 20	505 ± 20
RETURN-AIR FILTERS		Throwaway				
Quantity…Size (in.)		4…16 x 20 x 2	4…16 x 20 x 2	4…16 x 20 x 2	4…16 x 20 x 2	4…16 x 20 x 2

LEGEND

TXV – Thermostatic Expansion Valve

*Aluminum evaporator coil/aluminum condenser coil.

† Single phase/three phase