NOISE ANALYSIS REPORT

BDM MIXED-USE

San Diego, CA

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EXECUTIVE SUMMARY

This analysis evaluates noise associated with the implementation of the proposed BDM Mixed-Use project. The project proposes development of 430 multi-family residences in five buildings and 6,000 square feet of commercial space in one building. The project site is located between Otay Mesa Road and California State Route 905 (SR 905), between Emerald Crest Court and Corporate Center Drive, in the Otay Mesa community of the City of San Diego, California (Figure 1).

Future exterior noise levels would be 65 dBA CNEL or lower at all common open space areas in the project. Future exterior noise levels would exceed 60 dBA CNEL at some building façades. Therefore, interior noise levels in habitable rooms could exceed the City of San Diego General Plan Noise Compatibility Guidelines and CBC Section 1206.4 (Title 24) requirement of 45 dBA CNEL in residences. To comply with this requirement, upgraded building façade elements (windows, walls, doors, and/or exterior wall assemblies) with Sound Transmission Class (STC) ratings of 35 or higher may be necessary. If the interior noise limit can be achieved only with the windows closed, the building design must include mechanical ventilation that meets CBC requirements. Implementation of these measures would ensure that interior noise levels would be 45 dBA CNEL or below in residences, and the project would comply with the City of San Diego General Plan Noise Compatibility Guidelines and the CBC Section 1206.4 (Title 24) requirement. Transportation noise impacts affecting the project site would be less than significant.

Project traffic would result in a negligible noise increase at offsite land uses. Project-generated traffic noise impacts would be less than significant.

Project operation would generate noise levels up to 46 dBA Leq at its property lines. Project-generated operational noise impacts would be less than significant.

Project construction would generate noise levels up to 72 dBA Leq at residential property lines. Project construction noise impacts would be less than significant.

Construction and operation of the project would adhere to the MSCP Compliance Land Use Adjacency Guidelines regarding noise specified in the project biological letter [Alden Environmental, Inc. 2021].

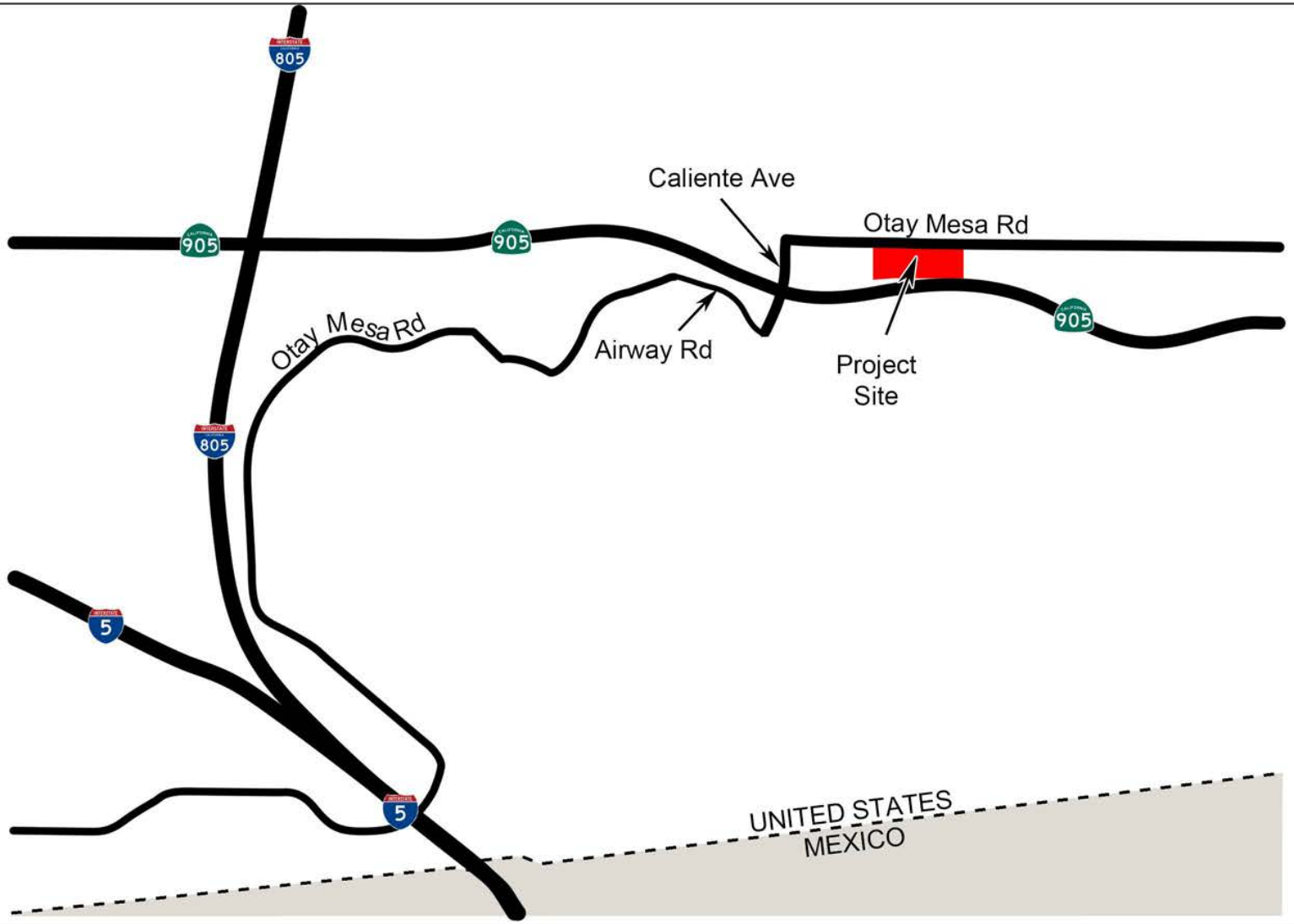

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FIGURE 1
Vicinity Map

1.0 PROJECT DESCRIPTION

The BDM Mixed-Use project is proposed for a 13.59-acre site, located on the south side of Otay Mesa Road, east of Emerald Crest Court, west of Corporate Center Drive, and north of State Route 905, within the Otay Mesa Community Plan area in the City of San Diego. The project site has been graded in accordance with a previously approved Vesting Tentative Map.

The project proposes 430 total multi-family residential dwelling units and approximately 6,000 square feet of commercial use. The multi-family residential use includes 378 market-rate dwelling units, situated in the northern portion of the site, and 52 affordable dwelling units (affordable to low-income households) situated in the western portion of the site. Commercial uses would be located in the northwestern portion of the site. Access to the project would be provided off Emerald Crest Court and by a new private drive off Otay Mesa Road. Parking would be provided in surface parking areas located throughout the project. The project requires an Amendment to the Otay Mesa Plan to change the land use designation from Community Commercial – Residential Prohibited to Community Commercial – Residential Permitted, Rezone from the existing CC-2-3 zone to CC-3-6, Vesting Tentative Map, Site Development Permit, Neighborhood Development Permit, and Public Right-of-Way Vacation to vacate Corporate Center Drive south of Otay Mesa Road.

Construction of the project is expected to begin in early 2023. The project would take approximately 30 months to complete, with estimated completion of summer 2025.

2.0 ENVIRONMENTAL NOISE BACKGROUND

Noise is generally defined as loud, unpleasant, unexpected, or undesired sound typically associated with human activity and that interferes with or disrupts normal activities. The human environment is characterized by a certain consistent noise level which varies with each area. This is called ambient noise. Although exposure to high noise levels has been demonstrated to cause hearing loss, the principal human response to environmental noise is annoyance. The response of individuals to similar noise events is diverse and influenced by the type of noise, perceived importance of the noise and its appropriateness in the setting, time of day and type of activity during which the noise occurs, and sensitivity of the individual.

Sound is a physical phenomenon consisting of minute vibrations that travel through a medium, such as air, and are sensed by the human ear. Sound is generally characterized by several variables, including frequency and intensity. Frequency describes the sound's pitch and is measured in cycles per second, or hertz (Hz), whereas intensity describes the sound's loudness and is measured in decibels (dB). Decibels are measured using a logarithmic scale. A sound level of 0 dB is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions. Normal speech has a sound level of approximately 60 dB. Sound levels above about 120 dB begin to be felt inside the human ear as discomfort and eventually as pain at still higher levels. Studies have shown that the smallest perceptible change in sound level for a person with normal hearing sensitivity is approximately 3 dBA. A change of at least 5 dBA would be noticeable and would likely evoke a community reaction. A 10-dBA increase is subjectively heard as a doubling in loudness and would cause a community response [Caltrans 2013a]. Sound levels of typical noise sources and environments are provided in Table 2.

Because of the logarithmic nature of the decibel unit, sound levels cannot be added or subtracted directly and are somewhat cumbersome to handle mathematically. A simple rule is useful, however, in dealing with sound levels. If a sound's intensity is doubled, the sound level increases by 3 dB, regardless of the initial sound level. Thus, for example, 60 dB + 60 dB = 63 dB, and 80 dB + 80 dB = 83 dB. The normal human ear can detect sounds that range in frequency from about 20 Hz to 20,000 Hz.

However, all sounds in this wide range of frequencies are not heard equally well by the human ear, which is most sensitive to frequencies in the range of 1,000 Hz to 4,000 Hz. This frequency dependence can be taken into account by applying a correction to each frequency range to approximate the human ear's sensitivity within each range. This is called A-weighting and is commonly used in measurements of community environmental noise. The A-weighted sound pressure level (abbreviated as dBA) is the sound level with the "A-weighting" frequency correction. In practice, the level of a noise source is conveniently measured using a sound level meter that includes a filter corresponding to the dBA curve.

Table 1. Sound Levels of Typical Noise Sources and Noise Environments

Noise Source (at Given Distance)	Noise Environment	A-Weighted Sound Level	Human Judgment of Noise Loudness (Relative to Reference Loudness of 70 Decibels*)
Military Jet Takeoff with Afterburner (50 ft)	Carrier Flight Deck	140 Decibels	128 times as loud
Civil Defense Siren (100 ft)		130	64 times as loud
Commercial Jet Take-off (200 ft)		120	32 times as loud **Threshold of Pain**
Pile Driver (50 ft)	Rock Music Concert Inside Subway Station (New York)	110	16 times as loud
Ambulance Siren (100 ft) Newspaper Press (5 ft) Gas Lawn Mower (3 ft)		100	8 times as loud **Very Loud**
Food Blender (3 ft) Propeller Plane Flyover (1,000 ft) Diesel Truck (150 ft)	Boiler Room Printing Press Plant	90	4 times as loud
Garbage Disposal (3 ft)	Noisy Urban Daytime	80	2 times as loud
Passenger Car, 65 mph (25 ft) Living Room Stereo (15 ft) Vacuum Cleaner (10 ft)	Commercial Areas	70	Reference Loudness **Moderately Loud**
Normal Speech (5 ft) Air Conditioning Unit (100 ft)	Data Processing Center Department Store	60	1/2 as loud
Light Traffic (100 ft)	Large Business Office Quiet Urban Daytime	50	1/4 as loud
Bird Calls (distant)	Quiet Urban Nighttime	40	1/8 as loud **Quiet**
Soft Whisper (5 ft)	Library and Bedroom at Night Quiet Rural Nighttime	30	1/16 as loud
	Broadcast and Recording Studio	20	1/32 as loud Just Audible
		0	1/64 as loud Threshold of Hearing

Source: Compiled by dBF Associates, Inc.

Because community noise fluctuates over time, a single measure called the Equivalent Sound Level (Leq) is often used to describe the time-varying character of community noise. The Leq is the energy-averaged A-weighted sound level during a measured time interval, and is equal to the level of a continuous steady sound containing the same total acoustical energy over the averaging time period as the actual time-varying sound. Additionally, it is often desirable to know the acoustic range of the noise source being measured. This is accomplished through the Lmax and Lmin indicators, which represent the root-mean-square maximum and minimum noise levels obtained during the measurement interval. The Lmin value obtained for a particular monitoring location is often called the "acoustic floor" for that location.

To describe the time-varying character of environmental noise, the statistical noise descriptors L10, L50, and L90 are commonly used. They are the noise levels equaled or exceeded during 10, 50, and 90 percent of a stated time, respectively. Sound levels associated with L10 typically describe transient or short-term events, whereas levels associated with L90 describe the steady-state (or most prevalent) noise conditions.

The Community Noise Equivalent Level (CNEL) is a descriptor representing a 24-hour, time-weighted, annual average noise level based on the "A-weighted" decibel. In the calculation process, noise occurring in the evening time period (7 p.m. to 10 p.m.) is penalized by adding 5 dB, while noise occurring in the nighttime period (10 p.m. to 7 a.m.) is penalized by adding 10 dB. These time periods and decibel increases are intended to reflect a typical person's increased sensitivity to noise during late-night and early morning hours. This descriptor is used by the State of California and the City of San Diego to evaluate land-use compatibility with regard to noise.

3.0 REGULATORY FRAMEWORK

3.1 City of San Diego

3.1.1 General Plan

The City of San Diego requires new projects to meet noise level standards as established in the Noise Element of the General Plan [City of San Diego 2008, Amended 2015: Policy NE-A.4]. These standards are shown in Table NE-3: Land Use – Noise Compatibility Guidelines (Table 2 of this report).

In the Residential – Multiple Dwelling Units land use category, noise levels up to 60 dBA CNEL are considered Compatible with outdoor use areas; noise levels up to 70 dBA CNEL are considered Conditionally Compatible. The building structure must attenuate exterior noise in occupied areas to 45 dBA CNEL or below.

Table 2. City of San Diego Land Use – Noise Compatibility Guidelines

Land Use Category	Exterior Noise Exposure (dBA CNEL)				
	60	65	70	75	
Parks and Recreational					
Parks, Active and Passive Recreation					
Outdoor Spectator Sports, Golf Courses; Water Recreational Facilities; Indoor Recreation Facilities					
Agricultural					
Crop Raising & Farming; Community Gardens, Aquaculture, Dairies; Horticulture Nurseries & Greenhouses; Animal Raising, Maintain & Keeping; Commercial Stables					
Residential					
Single Dwelling Units; Mobile Homes		45			
Multiple Dwelling Units **For uses affected by aircraft noise, refer to Policies NE-D.2. & NE-D.3.*		45	45*		
Institutional					
Hospitals; Nursing Facilities; Intermediate Care Facilities; Kindergarten through Grade 12Educational Facilities; Libraries; Museums; Child Care Facilities		45			
Other Educational Facilities including Vocational/Trade Schools and Colleges and Universities		45	45		
Cemeteries					
Retail Sales					
Building Supplies/Equipment; Food, Beverages & Groceries; Pets & Pet Supplies; Sundries Pharmaceutical, & Convenience Sales; Wearing Apparel & Accessories			50	50	
Commercial Services					
Building Services; Business Support; Eating & Drinking; Financial Institutions; Maintenance & Repair; Personal Services; Assembly & Entertainment (includes public and religious assembly); Radio & Television Studios; Golf Course Support			50	50	
Visitor Accommodations		45	45	45	
Offices					
Business & Professional; Government; Medical, Dental & Health Practitioner; Regional & Corporate Headquarters			50	50	
Vehicle and Vehicular Equipment Sales and Services Use					
Commercial or Personal Vehicle Repair & Maintenance; Commercial or Personal Vehicle Sales & Rentals; Vehicle Equipment & Supplies Sales & Rentals; Vehicle Parking					
Wholesale, Distribution, Storage Use Category					
Equipment & Materials Storage Yards; Moving & Storage Facilities; Warehouse; Wholesale Distribution					
Industrial					
Heavy Manufacturing; Light Manufacturing; Marine Industry; Trucking & Transportation Terminals; Mining & Extractive Industries					
Research & Development				50	

	Compatible	**Indoor Uses**	Standard construction methods should attenuate exterior noise to an acceptable indoor noise level. Refer to Section I.
		Outdoor Uses	Activities associated with the land use may be carried out.
45, 50	**Conditionally Compatible**	**Indoor Uses**	Building structure must attenuate exterior noise to the indoor noise level indicated by the number (45 or 50) for occupied areas. Refer to Section I.
		Outdoor Uses	Feasible noise mitigation techniques should be analyzed and incorporated t make the outdoor activities acceptable. Refer to Section I.
	Incompatible	**Indoor Uses**	New construction should not be undertaken.
		Outdoor Uses	Severe noise interference makes outdoor activities unacceptable.

3.1.2 CEQA Significance Thresholds

The Development Services Department (DSD) California Environmental Quality Act (CEQA) Significance Determination Thresholds [City of San Diego 2011] addresses traffic noise, as specified in Table K-2: Traffic Noise Significance Thresholds (dB(A) CNEL). Relevant portions are reproduced in Table 3.

Table 3. City of San Diego Traffic Noise Significance Thresholds (dBA CNEL)

Structure or Proposed Use that would be impacted by Traffic Noise	Interior Space	Exterior Useable Space†
Single-family detached	45 dB	65 dB
Multi-family, schools, libraries, hospitals, day care, hotels, motels, parks, convalescent homes	Development Services Department (DSD) ensures 45 dB pursuant to Title 24	65 dB
Offices, Churches, Business, Professional Uses	n/a	70 dB
Commercial, Retail, Industrial, Outdoor Spectator Sports Uses	n/a	75 dB

† If a project is currently at or exceeds the significance thresholds for traffic noise described above and noise levels would result in less than a 3 dB increase, then the impact is not considered significant.

Table K-4 specifies noise land use compatibility. In the residential land use category, noise levels up to 65 dBA CNEL are considered compatible.

3.1.3 Municipal Code

3.1.3.1 Operational Noise

Operational noise within the City is governed by Municipal Code Section 59.5.401: Sound Level Limits.

> It shall be unlawful for any person to cause noise by any means to the extent that the one–hour average sound level exceeds the applicable limit given in the following table, at any location in the City of San Diego on or beyond the boundaries of the property on which the noise is produced. The noise subject to these limits is that part of the total noise at the specified location that is due solely to the action of said person.
>
> **TABLE OF APPLICABLE LIMITS**
>
Land Use	Time of Day	One-Hour Average Sound Level (decibels)
1. Single Family Residential	7 a.m. to 7 p.m. 7 p.m. to 10 p.m. 10 p.m. to 7 a.m.	50 45 40
2. Multi-Family Residential (up to a maximum density of 1/2000)	7 a.m. to 7 p.m. 7 p.m. to 10 p.m. 10 p.m. to 7 a.m.	55 50 45
3. All other Residential	7 a.m. to 7 p.m. 7 p.m. to 10 p.m. 10 p.m. to 7 a.m.	60 55 50
4. Commercial	7 a.m. to 7 p.m. 7 p.m. to 10 p.m. 10 p.m. to 7 a.m.	65 60 60
5. Industrial or Agricultural	any time	75
>
> The sound level limit at a location on a boundary between two zoning districts is the arithmetic mean of the respective limits for the two districts. Permissible construction noise level limits shall be governed by Section 59.5.0404 of this article.
> …
> *(Amended 9-11-1989 by O-17337 N.S.)*
> *(Amended 11-28-2005 by O-19446 N.S.; effective 2-9-2006.)*

The project site would primarily include multi-family residences, and would have a density higher than one unit per 2,000 square feet of lot area. Surrounding land uses include multi-family residences and commercial buildings. The development adjacent on the west, La Brisa, also has a density higher than one unit per 2,000 square feet of lot area. The development across Otay Mesa Road to the northwest, Greenfield Village Apartments, has a density lower than one unit per 2,000 square feet of lot area.

At the west project property line, the operational sound level limits are:

- 60 dBA Leq during daytime hours (7:00 a.m. to 7:00 p.m.),
- 55 dBA Leq during evening hours (7:00 p.m. to 10:00 p.m.), and
- 50 dBA Leq during nighttime hours (10:00 p.m. to 7:00 a.m.).

At the northwest property line corner, the operational sound level limits are:

- 57.5 dBA Leq during daytime hours (7:00 a.m. to 7:00 p.m.),
- 52.5 dBA Leq during evening hours (7:00 p.m. to 10:00 p.m.), and
- 47.5 dBA Leq during nighttime hours (10:00 p.m. to 7:00 a.m.).

At project property lines shared with commercial uses, the operational sound level limits are:

- 60 dBA Leq during daytime hours (7:00 a.m. to 7:00 p.m.),
- 55 dBA Leq during evening hours (7:00 p.m. to 10:00 p.m.), and
- 52.5 dBA Leq during nighttime hours (10:00 p.m. to 7:00 a.m.).

3.1.3.2 Construction Noise

Construction noise within the City is governed by Municipal Code Section 59.5.0404: Construction Noise.

> It shall be unlawful for any person, between the hours of 7:00 p.m. of any day and 7:00 a.m. of the following day, or on legal holidays as specified in Section 21.04 of the San Diego Municipal Code, with exception of Columbus Day and Washington's Birthday, or on Sundays, to erect, construct, demolish, excavate for, alter or repair any building or structure in such a manner as to create disturbing, excessive or offensive noise unless a permit has been applied for and granted beforehand by the Noise Abatement and Control Administrator. In granting such permit, the Administrator shall consider whether the construction noise in the vicinity of the proposed work site would be less objectionable at night than during the daytime because of different population densities or different neighboring activities; whether obstruction and interference with traffic particularly on streets of major importance, would be less objectionable at night than during the daytime; whether the type of work to be performed emits noises at such a low level as to not cause significant disturbances in the vicinity of the work site; the character and nature of the neighborhood of the proposed work site; whether great economic hardship would occur if the work were spread over a longer time; whether proposed night work is in the general public interest; and he shall prescribe such conditions, working times, types of construction equipment to be used, and permissible noise levels as he deems to be required in the public interest.
>
> Except as provided in subsection C. hereof, it shall be unlawful for any person, including The City of San Diego, to conduct any construction activity so as to cause, at or beyond the property lines of any property zoned residential, an average sound level greater than 75 decibels during the 12-hour period from 7:00 a.m. to 7:00 p.m.
>
> The provisions of subsection B. of this section shall not apply to construction equipment used in connection with emergency work, provided the Administrator is notified within 48 hours after commencement of work.
>
> *(Amended 1-3-1984 by O-16100 N.S.)*

3.1.3.3 Refuse Vehicles and Parking Lot Sweepers

Refuse vehicle and parking lot sweeper noise within the City is governed by Municipal Code Section 59.5.0406: Refuse Vehicles and Parking Lot Sweepers.

> No person shall operate or permit to be operated a refuse compacting, processing, or collection vehicle between the hours of 7:00 p.m. to 6:00 a.m. or a parking lot sweeper between the hours of 7:00 p.m. to 7:00 a.m. in any residential area unless a permit has been applied for and granted by the Administrator.
>
> ("Refuse Vehicles" added 9-18-1973 by O-11122 N.S.; amended 9-22-1976 by O-11916 N.S.) (Amended 6-9-2010 by O-19960 N.S.; effective 7-9-2010.)

3.2 State of California

3.2.1 Residential

California Building Code (CBC), Chapter 12: Interior Environment, Section 1206: Sound Transmission regulates noise levels in buildings with multiple habitable units [State of California 2019]. Relevant portions are reproduced below.

> 1206.4 Allowable interior noise levels. Interior noise levels attributable to exterior sources shall not exceed 45 dB in any habitable room. The noise metric shall be either the day-night average sound level (Ldn) or the community noise equivalent level (CNEL), consistent with the noise element of the local general plan.

3.3 Otay Mesa Community Plan Update

Noise impacts associated with the Otay Mesa Community Plan Update (CPU) were addressed in the Final Program Environmental Impact Report for the Otay Mesa Community Plan Update (Otay Mesa CPU FEIR; Project Number 30330/304032, SCH No. 2004651076) approved by the City in 2013 [City of San Diego 2013]. The following noise mitigation framework applies to the project:

NOI-1: Prior to the issuance of building permits, site-specific exterior noise analyses that demonstrate that the project would not place residential receptors in locations where the exterior existing or future noise levels would exceed the noise compatibility standards of the City's General Plan shall be required as part of the review of future residential development proposals. Noise reduction measures, including but not limited to building noise barriers, increased building setbacks, speed reductions on surrounding roadways, alternative pavement surfaces, or other relevant noise attenuation measures, may be used to achieve the noise compatibility standards. Exact noise mitigation measures and their effectiveness shall be determined by the site-specific exterior noise analyses.

NOI-2: Prior to the issuance of building permits, site specific interior noise analyses demonstrating compliance with the interior noise compatibility standards of the City's General Plan and other applicable regulations shall be prepared for noise sensitive land uses located in areas where the exterior noise levels exceed the noise compatibility standards of the City's General Plan. Noise control measures, including but not limited to increasing roof, wall, window, and door sound attenuation ratings, placing HVAC in noise reducing enclosures, or designing buildings so that no windows face freeways or major roadways may be used to achieve the noise compatibility standards. Exact noise mitigation measures and their effectiveness shall be determined by the site specific exterior noise analyses.

NOI-3: Prior to the issuance of a building permit, a site-specific acoustical/noise analysis of any on-site generated noise sources, including generators, mechanical equipment, and trucks, shall be prepared which identifies all noise-generating equipment, predicts noise levels at property lines from all identified equipment, and recommends mitigation to be implemented (e.g., enclosures, barriers, site orientation), to ensure compliance with the City's Noise Abatement and Control

Ordinance. Noise reduction measures shall include building noise-attenuating walls, reducing noise at the source by requiring quieter machinery or limiting the hours of operation, or other attenuation measures. Additionally, future projects shall be required to buffer sensitive receptors from noise sources through the use of open space and other separation techniques as recommended after thorough analysis by a qualified acoustical engineer. Exact noise mitigation measures and their effectiveness shall be determined by the site specific noise analyses.

NOI-4: For projects that exceed daily construction noise thresholds established by the City of San Diego, best construction management practices shall be used to reduce construction noise levels to comply with standards established by the Municipal Code in Chapter 5, Article 9.5, Noise Abatement and Control. Project applicant shall prepare and implement a Construction Noise Management Plan. Appropriate management practices shall be determined on a project-by-project basis, and are specific to the location. Control measures shall include:

a. Minimizing simultaneous operation of multiple construction equipment units;

b. Locating stationary equipment as far as reasonable from sensitive receptors;

c. Requiring all internal combustion-engine-driven equipment to be equipped with mufflers that are in good operating condition and appropriate for the equipment; and

d. Construction of temporary noise barriers around construction sites that block the line-of-sight to surrounding receptors.

4.0 ENVIRONMENTAL SETTING AND EXISTING CONDITIONS

Noise-sensitive land uses are locations where people reside or where the presence of unwanted sound could adversely affect the use of the land. Residences, schools, hospitals, guest lodging, libraries, and some passive recreation areas would each be considered noise-sensitive and may warrant unique measures for protection from intruding noise.

4.1 Existing Conditions

The project site is currently vacant. Noise-sensitive land uses in the project area include the multi-family residences to the west. The primary existing noise source in the vicinity of the project is vehicular traffic on SR 905 and Otay Mesa Road.

SR 905 is a six-lane freeway adjacent to the project site on the south. SR 905 carries an existing (year 2019) average daily traffic (ADT) volume of 89,000 vehicles [Caltrans 2020]. Its posted speed limit is 65 miles per hour (mph). The vehicle mix is approximately 3.5% medium trucks and 4.5% heavy trucks [Caltrans 2019].

Otay Mesa Road is a six-lane Prime Arterial, divided by a median. Otay Mesa Road carries an existing (year 2021) ADT volume of 15,855 vehicles between Emerald Crest Court and Corporate Center Drive [CR Associates 2022]. Its posted speed limit is 50 mph. The vehicle mix is assumed to be 3% medium trucks and 1% heavy trucks, based on observations conducted during the site visit.

4.2 Ambient Sound Level Measurements

Ambient sound level measurements were conducted to estimate the existing acoustical environment on the project site. A RION Model NL-31 American National Standards Institute (ANSI) Type 1 Integrating Sound Level Meter (SLM) and a RION Model NA-28 ANSI Type 1 SLM were used as the data-collection devices. The meter was mounted on a tripod roughly 5 feet above ground to simulate the average height of the human ear, or attached to an extension pole to measure the sound level at a higher elevation. The microphones were fitted with windscreens. The measurements were performed on Friday, December 17, 2021. The sound level meters were calibrated before the measurement periods. Simultaneous traffic counts were conducted during the measurement periods. The measurement results are summarized in Table 4 and correspond to the locations depicted on Figure 2.

Table 4. Sound Level Measurements (dBA)

Measurement Location			Date / Time	Leq	Lmin	Lmax	L10	L50	L90	Traffic
ML1A	La Brisa development, ~225' north of SR 905 CL	25' AGL	9:45 – 9:55	76.5	71.0	80.9	78.4	76.0	73.6	SR 905 EB: 356 cars, 32 trucks SR 905 WB: 260 cars, 64 trucks
ML1B		5' AGL	10:00 – 10:10	73.3	66.1	76.3	74.9	73.0	71.0	SR 905 EB: 336 cars, 29 trucks SR 905 WB: 236 cars, 80 trucks
ML2A	South façade of Building 2 ~300' north of SR 905 CL	30' AGL	10:30 – 10:40	72.2	65.6	77.5	74.3	71.9	68.5	SR 905 EB: 304 cars, 59 trucks SR 905 WB: 290 cars, 65 trucks
ML2B		5' AGL		58.7	52.8	71.4	60.5	57.6	55.4	
ML3A	South façade of Building 4 ~325' north of SR 905 CL	30' AGL	11:15 – 11:25	72.9	67.6	84.6	74.2	72.4	70.0	SR 905 EB: 363 cars, 45 trucks SR 905 WB: 353 cars, 62 trucks
ML3B		5' AGL		58.7	54.4	69.6	59.9	58.0	56.3	
ML4A	South façade of Building 5 ~310' north of SR 905 CL	30' AGL	11:50 – 12:00	72.2	65.8	76.1	73.8	72.0	70.0	SR 905 EB: 358 cars, 43 trucks SR 905 WB: 364 cars, 63 trucks
ML4B		5' AGL		61.2	56.9	67.2	63.3	60.6	58.5	
ML5	Outdoor use area between Buildings 3 & 5 ~115 feet south of Otay Mesa Road CL	5' AGL	12:15 – 12:25	62.3	51.3	73.3	65.3	60.1	55.5	Otay Mesa Road EB: 360 cars, 12 medium trucks, 3 heavy trucks Otay Mesa Road WB: 294 cars, 12 medium trucks, 3 heavy trucks

Notes:

See Figure 2.

All measurements conducted on Friday, December 17, 2021.

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FIGURE 2

Sound Level Measurement Locations

5.0 POTENTIAL NOISE IMPACTS

5.1 Vehicular Traffic Noise

The Federal Highway Administration (FHWA) Traffic Noise Model (TNM) version 2.5 was used to estimate traffic noise levels. The modeling effort considered the peak-hour traffic volume, average estimated vehicle speed, and estimated vehicle mix, i.e., percentage of cars, medium trucks, heavy trucks, buses, and motorcycles. The peak hour traffic noise level was considered equivalent to the CNEL [24 CFR §51.106]. The model was calibrated using actual traffic counts and sound level measurements; modeled sound levels were within 1 dBA of measured sound levels. Future vehicular traffic calculations are summarized in Appendix A.

Sound levels caused by line sources (i.e., variable or moving sound sources such as traffic) generally decrease at a rate of 3 to 4.5 dBA when the distance from the road is doubled, depending on the ground surface hardness between the source and the receiving property [Caltrans 2013a]. The model assumed "hard soil" propagation conditions, which corresponds to a drop-off rate of approximately 3 dBA per doubling of distance. The actual sound level at any receptor location is dependent upon such factors as the source-to-receptor distance and the presence of intervening structures (walls and buildings), barriers, and topography. The noise attenuating effects of changes in elevation, topography, and intervening structures were not included in the model. Therefore, the modeling effort is considered a worst-case representation of the roadway noise.

5.1.1 Traffic Noise Affecting the Project Site

The future noise environment would a result of vehicular traffic on SR 905 and Otay Mesa Road.

Arithmetic calculations were used to estimate noise levels on the project site as a result of vehicular traffic on SR 905. The future (year 2050) ADT volume on SR 905 is projected to be 126,900 vehicles [SANDAG 2022].

The loudest roadway traffic noise hour is generally characterized by free-flowing traffic during peak hour at the roadway design speed (i.e., Level of Service [LOS] C or better) [Caltrans 2015]. Freeways in Caltrans District 11 have a capacity of 1,800 vehicles per lane per hour at LOS C [Caltrans 2015]. Therefore, the maximum SR 905 hourly traffic volume at LOS C is 10,800 vehicles for six through lanes. The speed limit and traffic mix on SR 905 is not expected to change in the future.

To determine the future noise levels from SR 905, the measured noise levels and simultaneous traffic counts were compared to the future projected traffic volumes. Refer to Table 5 for details.

Table 5. SR 905 Noise Levels

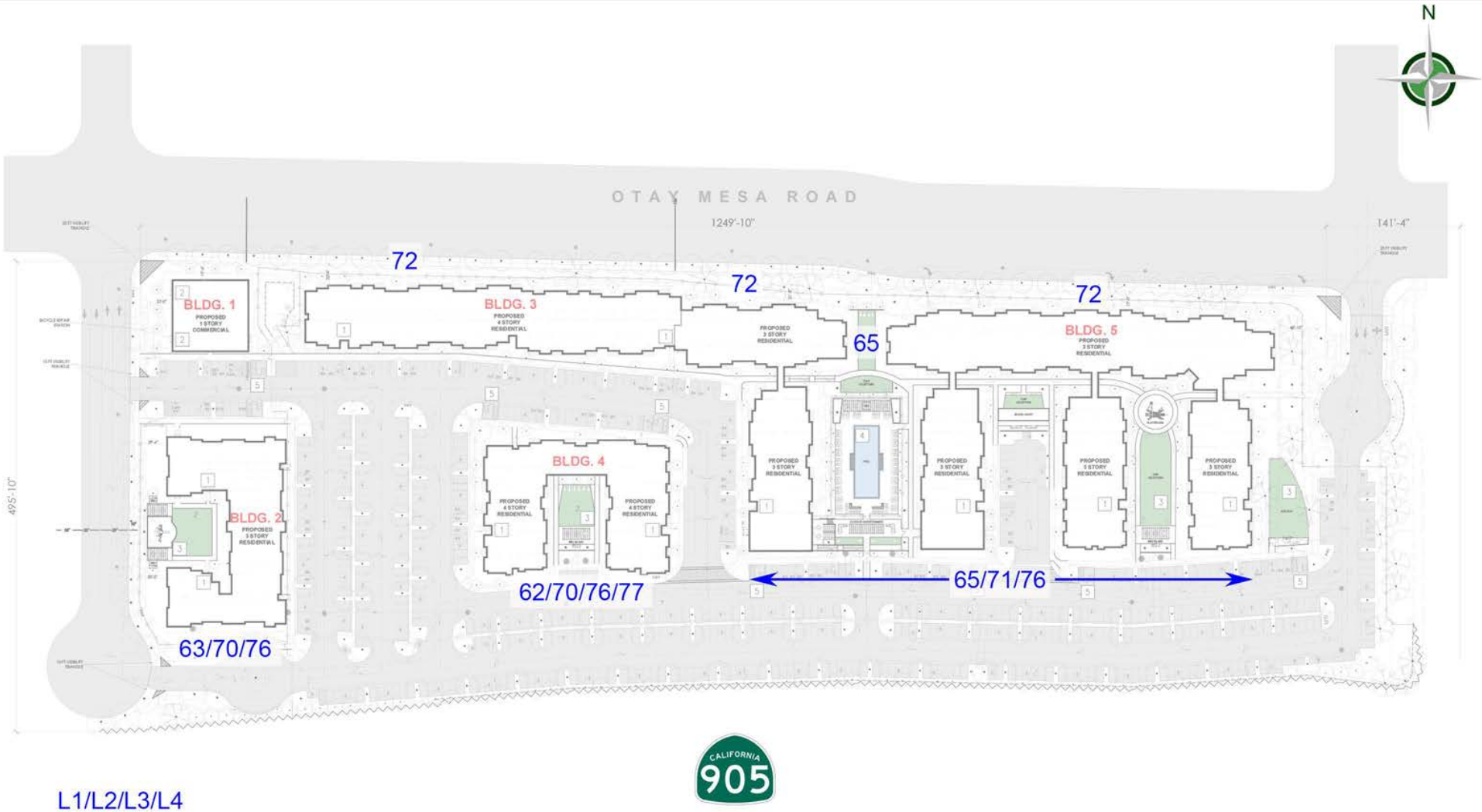
Location	Measured Leq	Vehicles Counted	Future Traffic Volume	Traffic Noise Increase	Resultant CNEL
Building 2 south facade, ground floor	58.7	718	1,800	+ 4.0 dBA	62.7 dBA
Building 2 south facade, second floor *	66.0				70.0 dBA
Building 2 south facade, third floor	72.2				76.2 dBA
Building 4 south façade, ground floor	58.7	823	1,800	+ 3.4 dBA	62.1 dBA
Building 4 south facade, second floor *	66.5				69.9 dBA
Building 4 south facade, third floor	72.9				76.3 dBA
Building 4 south facade, fourth floor *	73.5				76.9 dBA
Building 5 south facade, ground floor	61.2	828	1,800	+ 3.4 dBA	64.6 dBA
Building 5 south facade, second floor *	67.5				70.9 dBA
Building 5 south facade, third floor	72.2				75.6 dBA

* interpolated

The future ADT volume on Otay Mesa Road is projected to be 34,688 vehicles in the Horizon Year with Project Conditions scenario [CR Associates 2022]. TNM was used to estimate future noise levels from Otay Mesa Road.

There are various common open space areas in the project: courtyards at Buildings 2 & 4, a pool / courtyard between Buildings 3 & 5, a bocce court, play structure, and courtyard at Building 5, and a dog run east of Building 5. There would be a 7-foot-high sound wall at the north end of the courtyard between Buildings 3 & 5. Noise levels at the outdoor use areas would range from below 60 dBA CNEL in the courtyards to approximately 65 dBA CNEL at the dog run. Refer to Figure 3 for details.

The impact of traffic noise affecting the outdoor use areas of the project site would be less than significant.



dBF Associates, Inc.

FIGURE 3

Future Exterior Noise Levels (CNEL)

5.1.2 Interior Noise

Because future exterior noise levels would exceed 60 dBA CNEL at some building façades, interior noise levels in habitable rooms could exceed the City of San Diego General Plan Noise Compatibility Guidelines and CBC Section 1206.4 requirement of 45 dBA CNEL in residences.

To comply with this requirement, upgraded building façade elements (windows, walls, doors, and/or exterior wall assemblies) with Sound Transmission Class (STC) ratings of 35 or higher may be necessary.

If the interior noise limit can be achieved only with the windows closed, the building design must include mechanical ventilation that meets CBC requirements.

Implementation of these measures would ensure that interior noise levels would be 45 dBA CNEL or below in residences, and the project would comply with the City of San Diego General Plan Noise Compatibility Guidelines and the CBC Section 1206.4 requirement.

The project would result in a less than significant interior noise impact with project features incorporated in accordance with the interior noise analysis.

5.1.3 Project-Generated Traffic

The proposed project would generate an ADT volume of 2,114 vehicles on Otay Mesa Road between Caliente Avenue and Emerald Crest Court [CR Associates 2021]. The existing ADT volume on this roadway segment is 16,454 vehicles. The project would result in a traffic noise increase of approximately 0.5 dBA CNEL along this segment. The project would generate fewer absolute and relative trips along all other roadway segments.

The impact of project-generated traffic noise would be less than significant.

5.2 Operational (Non-Construction) Noise

The residential project buildings are expected to have rooftop HVAC units. It is anticipated that there would be one unit per residence, plus approximately 10% additional units for common areas. It was assumed that the units would be screened with parapet walls at least as tall as the units. The unit sizes are not currently specified; however, it was assumed that 3-ton units would be used. A typical 3-ton HVAC condenser produces a sound power level of approximately 77 dBA [Carrier].

The commercial project building is expected to have two 10-ton rooftop HVAC units, each of which produce a sound power of approximately 86 dBA [Lennox].

The Datakustik Cadna/A industrial noise prediction model was used to estimate operational noise levels. The locations of project buildings were imported from the project CAD files. It was assumed that the units could operate continuously.

The project would produce operational noise levels up to approximately 46 dBA Leq at the property lines of the residences to the west, and approximately 39 dBA Leq at the northeast property line, toward the commercial land use.

The project would produce operational noise levels less than 60 dBA Leq in the coastal California gnatcatcher habitat in the Multi-Habitat Planning Area (MHPA) within the property adjacent on the east.

The operation of the commercial building HVAC units would produce noise levels up to approximately 49 dBA Leq at the nearest residential building façade. This sound level is negligible compared to the traffic noise level of approximately 70 dBA at this location.

Project operation would not exceed the property line sound levels allowed by the City of San Diego Municipal Code. Project operation noise impacts would be less than significant.

5.3 Construction Noise

The primary noise source from project construction would be from site preparation. Grading could require the use of heavy equipment such as bulldozers, loaders, and scrapers. No blasting would be necessary. Haul trucks could be used to import or export fill to or from the project sites.

Construction of the project would generate a short-term temporary increase in noise in the project area. The increase in noise level would be primarily experienced close to the noise source. The magnitude of the impact would depend on the type of construction activity, noise level generated by various pieces of construction equipment, duration of the construction phase, acoustical shielding and distance between the noise source and receiver.

Construction activity and delivery of construction materials and equipment would be limited to between 7:00 a.m. and 7:00 p.m., except on Sundays or holidays.

This project would implement conventional construction techniques and equipment. Standard equipment such as scrapers, graders, backhoes, loaders, tractors, cranes, and miscellaneous trucks would be used for construction of most project facilities. Sound levels of typical construction equipment range from approximately 65–95 dBA at 50 feet from the source (U.S. Environmental Protection Agency [U.S. EPA] 1971). Worst-case noise levels are typically associated with grading. Noise sources associated with grading of the proposed project, and associated noise levels, are shown in Table 6.

Table 6. Grading Noise Source Levels

Noise Source	Noise Level	Number
Bulldozer	86 dBA at 10 meters	1
Scraper	82 dBA at 10 meters	1
Backhoe	69 dBA at 10 meters	1
Water Truck	81 dBA at 10 meters	1
Roller	84 dBA at 10 meters	1

Source: DEFRA 2005

The Datakustik Cadna/A industrial noise prediction model was used to estimate construction noise levels. Elevations of the project site and surrounding areas were imported from the project grading CAD files. It was assumed that up to five pieces of equipment at any given time would operate continuously within the grading area boundary. No correction was applied for downtime associated with equipment maintenance, breaks, or similar situations.

The closest occupied residential properties are located adjacent to the project site on the west and northwest. Construction of the project would produce noise levels ranging from approximately 69-72 dBA Leq (12 hours) at the property lines of the residences.

Construction of the project would adhere to the MSCP Compliance Land Use Adjacency Guidelines regarding noise specified in the project biological letter [Alden Environmental, Inc. 2021].

Construction would occur during the days and hours proscribed by the City of San Diego Municipal Code. Construction noise levels at residential property lines would not exceed the 75 dBA Leq (12 hour) sound level allowed by the City of San Diego Municipal Code. Project construction noise impacts would be less than significant.

6.0 RECOMMENDATIONS

6.1 Vehicular Traffic Noise

No recommendations are required.

6.2 Operational (Non-Construction) Noise

No recommendations are required.

6.3 Construction Noise

No recommendations are required. However, minimization of disturbance from construction noise is often desired. The following measures should be considered:

- Select equipment capable of performing the necessary tasks with the lowest sound level and the lowest acoustic height possible.
- Implement alternatives to the standard backup beepers as feasible. These alternatives include strobe lights or products such as the Brigade Electronics, Inc. Broadband Sound system, which is equally effective while generating a lower noise level.
- Use specially-quieted equipment, such as quieted and enclosed air compressors and properly-working manufacturer-recommended mufflers on all engines.
- Construct enclosures around noise-producing stationary sources such as generators used for night lighting.
- Perform construction vehicle maintenance as far from any residential land use as possible.
- Place the laydown area as far as possible from the closest noise sensitive receptors.
- Limit the delivery of material to the hours between 7:00 a.m. and 7:00 p.m.

7.0 REFERENCES

24 CFR §51.106. 2019. April 1.

Alden Environmental, Inc. 2021. BDM Mixed-Use Project Biological Letter. December 20.

Carrier. 24ABC6 Product Data.

City of San Diego. 2008, Amended 2015. General Plan. Noise Element. March.

2011. Development Services Department (DSD) California Environmental Quality Act (CEQA) Significance Determination Thresholds.

2006 / 2010. Municipal Code.

CR Associates. 2022. BDM Mixed Use Traffic Analysis Memorandum. March 10.

Department for Environment, Food, and Rural Affairs (DEFRA). 2005. Update of Noise Database for Prediction of Noise on Construction and Open Sites.

Federal Highway Administration (FHWA). 2004. Traffic Noise Model, Version 2.5. February.

2011. Highway Traffic Noise: Analysis and Abatement Guidance. December.

Harris, Cyril M. 1998. Handbook of Acoustical Measurements and Noise Control, Third Edition. Acoustical Society of America. Woodbury, NY.

International Organization for Standardization (ISO). 1996a. ISO 1996/1. Acoustics – Description and Measurement of Environmental Noise – Part 1: Basic Quantities and Procedures.

1996b. ISO 1996-2. Acoustics – Description and Measurement of Environmental Noise – Part 2: Acquisition of Data Pertinent to Land Use.

1996c. ISO 1996-3. Acoustics – Description and Measurement of Environmental Noise – Part 3: Application to Noise Limits.

Joseph Wong Design Associates. 2021. BDM Mixed-Use Discretionary Submittal Set. September.

San Diego Association of Governments (SANDAG). 2020. Transportation Forecast Information Center. Forecast Series 13 & 14.

State of California. 2019. California Code of Regulations, Title 24, Part 2: California Building Standards Code. July.

State of California Department of Transportation (Caltrans). 2013. Transportation and Construction Vibration Guidance Manual. September.

8.0 LIST OF PREPARERS

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APPENDICES

APPENDIX A
ROADWAY TRAFFIC CALCULATIONS

dBF Associates, Inc.					**13 January 2022**						
SPF					**TNM 2.5**						
INPUT: ROADWAYS							**Average pavement type shall be used unless**				
PROJECT/CONTRACT:	**BDM Mixed-Use**						**a State highway agency substantiates the use**				
RUN:	**Measured**						**of a different type with the approval of FHWA**				
Roadway		**Points**									
Name	**Width**	**Name**	**No.**	**Coordinates (pavement)**			**Flow Control**			**Segment**	
				X	**Y**	**Z**	**Control Device**	**Speed Constraint**	**Percent Vehicles Affected**	**Pvmt Type**	**On Struct?**
	ft			ft	ft	ft		mph	%		
Otay Mesa Road EB1	12.0	point1	1	1,000.0	19.0	0.00				Average	
		point2	2	-1,000.0	19.0	0.00					
Otay Mesa Road EB2	12.0	point3	3	1,000.0	31.0	0.00				Average	
		point4	4	-1,000.0	31.0	0.00					
Otay Mesa Road EB3	12.0	point5	5	1,000.0	43.0	0.00				Average	
		point6	6	-1,000.0	43.0	0.00					
Otay Mesa Road WB1	30.0	point7	7	-1,000.0	-8.0	0.00				Average	
		point8	8	1,000.0	-8.0	0.00					
Otay Mesa Road WB2	12.0	point9	9	-1,000.0	-20.0	0.00				Average	
		point10	10	1,000.0	-20.0	0.00					
Otay Mesa Road WB3	25.0	point11	11	-1,000.0	-32.0	0.00				Average	
		point12	12	1,000.0	-32.0	0.00					

dBF Associates, Inc. **13 January 2022**
SPF **TNM 2.5**

INPUT: TRAFFIC FOR LAeq1h Volumes
PROJECT/CONTRACT: **BDM Mixed-Use**
RUN: **Measured**

Roadway Name	Points Name	No.	Segment									
			Autos		MTrucks		HTrucks		Buses		Motorcycles	
			V	S	V	S	V	S	V	S	V	S
			veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph
Otay Mesa Road EB1	point1	1	120	50	4	50	1	50	0	0	0	0
	point2	2										
Otay Mesa Road EB2	point3	3	120	50	4	50	1	50	0	0	0	0
	point4	4										
Otay Mesa Road EB3	point5	5	120	50	4	50	1	50	0	0	0	0
	point6	6										
Otay Mesa Road WB1	point7	7	98	50	3	50	1	50	0	0	0	0
	point8	8										
Otay Mesa Road WB2	point9	9	98	50	3	50	1	50	0	0	0	0
	point10	10										
Otay Mesa Road WB3	point11	11	98	50	3	50	1	50	0	0	0	0
	point12	12										

dBF Associates, Inc.						**13 January 2022**					
SPF						**TNM 2.5**					
INPUT: RECEIVERS											
PROJECT/CONTRACT:	**BDM Mixed-Use**										
RUN:	**Measured**										
Receiver											
Name	**No.**	**#DUs**	**Coordinates (ground)**			**Height**	**Input Sound Levels and Criteria**				**Active**
			X	**Y**	**Z**	**above**	**Existing**	**Impact Criteria**		**NR**	**in**
						Ground	**LAeq1h**	**LAeq1h**	**Sub'l**	**Goal**	**Calc.**
			ft	ft	ft	ft	dBA	dBA	dB	dB	
ML5	1	1	0.0	-120.0	0.00	4.92	62.30	66	10.0	8.0	Y

dBF Associates, Inc.
SPF
13 January 2022
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: BDM Mixed-Use
RUN: Measured
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h		Increase over existing		Type Impact	With Barrier Calculated LAeq1h	Noise Reduction		
				Calculated	Crit'n	Calculated	Crit'n Sub'l Inc			Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
ML5	1	1	62.3	63.2	66	0.9	10	----	63.2	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction		
		Min	Avg	Max
		dB	dB	dB
All Selected	1	0.0	0.0	0.0
All Impacted	0	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

dBF Associates, Inc. **13 January 2022**
SPF **TNM 2.5**

INPUT: TRAFFIC FOR LAeq1h Volumes
PROJECT/CONTRACT: **BDM Mixed-Use**
RUN: **Future**

Roadway Name	Points Name	No.	Segment Autos V	Autos S	MTrucks V	MTrucks S	HTrucks V	HTrucks S	Buses V	Buses S	Motorcycles V	Motorcycles S
			veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph
Otay Mesa Road EB1	point1	1	1041	50	34	50	11	50	0	0	0	0
	point2	2										
Otay Mesa Road EB2	point3	3	1041	50	34	50	11	50	0	0	0	0
	point4	4										
Otay Mesa Road EB3	point5	5	1041	50	34	50	11	50	0	0	0	0
	point6	6										
Otay Mesa Road WB1	point7	7	1041	50	34	50	11	50	0	0	0	0
	point8	8										
Otay Mesa Road WB2	point9	9	1041	50	34	50	11	50	0	0	0	0
	point10	10										
Otay Mesa Road WB3	point11	11	1041	50	34	50	11	50	0	0	0	0
	point12	12										

dBF Associates, Inc.						**13 January 2022**					
SPF						**TNM 2.5**					
INPUT: RECEIVERS											
PROJECT/CONTRACT:	**BDM Mixed-Use**										
RUN:	**Future**										
Receiver											
Name	**No.**	**#DUs**	**Coordinates (ground)**			**Height**	**Input Sound Levels and Criteria**				**Active**
			X	**Y**	**Z**	**above**	**Existing**	**Impact Criteria**		**NR**	**in**
						Ground	**LAeq1h**	**LAeq1h**	**Sub'l**	**Goal**	**Calc.**
			ft	ft	ft	ft	dBA	dBA	dB	dB	
Park	1	1	100.0	-120.0	0.00	4.92	0.00	66	10.0	8.0	Y
Facade	2	1	-100.0	-90.0	0.00	4.92	0.00	66	10.0	8.0	Y

dBF Associates, Inc. 13 January 2022
SPF TNM 2.5

INPUT: BARRIERS
PROJECT/CONTRACT: BDM Mixed-Use
RUN: Future

Barrier									Points										
Name	Type	Height		If Wall	If Berm			Add'tnl	Name	No.	Coordinates (bottom)			Height	Segment				
		Min	Max	$ per Unit Area	$ per Unit Vol.	Top Width	Run:Rise	$ per Unit Length			X	Y	Z	at Point	Seg Ht Increment	Perturbs #Up	#Dn	On Struct?	Important Reflections?
		ft	ft	$/sq ft	$/cu yd	ft	ft:ft	$/ft			ft	ft	ft	ft	ft				
Barrier4	W	0.00	99.99	0.00				0.00	point1	1	50.0	-110.0	0.00	7.00	0.00	0	0		
									point2	2	150.0	-110.0	0.00	7.00					

dBF Associates, Inc. 13 January 2022
SPF TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: BDM Mixed-Use
RUN: Future
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver												
Name	No.	#DUs	Existing	No Barrier		Increase over existing		Type	With Barrier			
			LAeq1h	LAeq1h					Calculated	Noise Reduction		
				Calculated	Crit'n	Calculated	Crit'n	Impact	LAeq1h	Calculated	Goal	Calculated
							Sub'l Inc					minus
												Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Park	1	1	0.0	65.0	66	65.0	10	----	65.0	0.0	8	-8.0
Facade	2	1	0.0	74.7	66	74.7	10	Snd Lvl	74.7	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction		
		Min	Avg	Max
		dB	dB	dB
All Selected	2	0.0	0.0	0.0
All Impacted	1	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0