APPENDIX N
NOISE STUDY

NOISE STUDY

North River Road
Planned Block Development – Overlay District
City of Oceanside, CA

Prepared For:

REC Consultants
2442 Second Avenue
San Diego, CA 92101

Prepared By:

Ldn Consulting, Inc.
42428 Chisolm Trail
Murrieta, CA 92562

October 2, 2020

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ATTACHMENTS

GLOSSARY OF COMMON TERMS

Sound Pressure Level (SPL): a ratio of one sound pressure to a reference pressure (L_{ref}) of 20 µPa. Because of the dynamic range of the human ear, the ratio is calculated logarithmically by 20 log (L/L_{ref}).

A-weighted Sound Pressure Level (dBA): Some frequencies of noise are more noticeable than others. To compensate for this fact, different sound frequencies are weighted more.

Minimum Sound Level (L_{min}): Minimum SPL or the lowest SPL measured over the time interval using the A-weighted network and slow time weighting.

Maximum Sound Level (L_{max}): Maximum SPL or the highest SPL measured over the time interval the A-weighted network and slow time weighting.

Equivalent sound level (L_{eq}): the true equivalent sound level measured over the run time. Leq is the A-weighted steady sound level that contains the same total acoustical energy as the actual fluctuating sound level.

Day Night Sound Level (LDN): Representing the Day/Night sound level, this measurement is a 24 –hour average sound level where 10 dB is added to all the readings that occur between 10 pm and 7 am. This is primarily used in community noise regulations where there is a 10 dB "Penalty" for nighttime noise. Typically, LDN's are measured using A weighting.

Community Noise Exposure Level (CNEL): The accumulated exposure to sound measured in a 24-hour sampling interval and artificially boosted during certain hours. For CNEL, samples taken between 7 pm and 10 pm are boosted by 5 dB; samples taken between 10 pm and 7 am are boosted by 10 dB.

Octave Band: An octave band is defined as a frequency band whose upper band-edge frequency is twice the lower band frequency.

Third-Octave Band: A third-octave band is defined as a frequency band whose upper band-edge frequency is 1.26 times the lower band frequency.

Response Time (F,S,I): The response time is a standardized exponential time weighting of the input signal according to fast (F), slow (S) or impulse (I) time response relationships. Time response can be described with a time constant. The time constants for fast, slow and impulse responses are 1.0 seconds, 0.125 seconds and 0.35 milliseconds, respectively.

EXECUTIVE SUMMARY

This noise study has been completed to determine the noise impacts to and from the proposed residential development of a 25.6 acre Project site. The Project site consists of two separate parcels located at 4617 and 4665 North River Road (APNs 157-060-17 & 157-060-40) located along the south side of North River Road, 0.5 miles east of Douglas Drive in the North Valley Neighborhood in the City of Oceanside. The project is proposing a Planned Block Development (PBD) Overlay District consisting of a medium density residential in-fill development with a dwelling unit 'cap' with a maximum allowance of 400 dwelling units for the entire district overlay. A range of housing types can be provided as part of appropriately scaled medium density developments and may include small lot single-family homes, detached condominiums, townhomes, courtyard clusters, duplex homes, and garden apartments.

Transportation Noise Levels – Onsite

Based upon these findings, noise mitigation in the form of 7-foot barriers are necessary at the top of slope along North River Road for the units adjacent to roadway to comply with the City's 65 dBA Noise standards. The barriers must be constructed of a non-gapping material consisting of masonry, ½ inch thick glass, earthen berm or any combination of these materials.

The City of Oceanside as part of its noise guidelines also states, consistent with Title 24 of the California Code of Regulations (CCR), a project is required to perform an interior assessment on the portions of a project site where building façade noise levels are above 60 dBA CNEL in order to ensure a 45 dBA CNEL interior noise level. An interior noise assessment is required for the residential units along the roadways prior to the issuance of the first building permit once the architectural floor plans are available. This final report would identify the interior noise requirements to meet the City's established interior noise limit of 45 dBA CNEL. It should be noted:

Offsite Project Related Transportation Noise Levels

The Project does not create a direct noise increase of more than 3 dBA CNEL on any roadway segment. Therefore, the project's direct contributions to off-site roadway noise increases will not cause any significant impacts to any existing or future noise sensitive land uses. Therefore, the Project's contributions to off-site roadway noise increase would not be considered cumulatively considerable and would not cause any significant impacts.

Construction Noise Levels

None of the proposed construction equipment will exceed the City of Oceanside 85 dBA standard at 100 feet from the source. The project will meet the City of Oceanside's 85 dBA standard at 100

feet from the source for all proposed equipment and no impacts are anticipated. No impacts will occur and no mitigation measures are required.

Construction Vibration Levels

Given attenuation of vibration velocities with distance, the RMS vibration velocity and peak particle velocity at the nearest existing residence would be about 78 VdB and 0.03 inch per second, respectively. Based on the construction vibration human annoyance criterion of 80 VdB published by the FTA, the vibration levels for the construction activity on nearby residential structures will not be significant.

Operational Project Related Noise Levels

Based upon the operational noise levels none of the proposed noise sources are anticipated to exceed the property line standards at the surround property lines. Therefore, the proposed development related operational noise levels comply with the City's noise standards. No impacts are anticipated and no mitigation is required.

1.0 PROJECT INTRODUCTION

1.1 Purpose of this Study

The purpose of this Noise study is to determine noise impacts, if any, to the Project from off-site sources (i.e. vehicular traffic along adjacent roadways) and impacts from the Project operations (i.e. traffic generated from Project). Should impacts be determined, the intent of this study would be to recommend suitable mitigation measures to reduce impacts to below a level of significance.

1.2 Project Location

The proposed North River Road Planned Block Development Overlay District includes two (2) separate parcels located at 4617 and 4665 North River Road (APNs 157-060-17 & 157-060-40). These properties comprise approximately 25.6 acres of land located on the south side of North River Road generally between Avenida Descanso and Calle Montecito in the North Valley Neighborhood of Oceanside.

Parcel A, the eastern parcel, is approximately 9.7 total acres in size and currently developed with a small office/warehouse facility. The facility on site has historically (dating to the 1960's) served as a packing warehouse utilized for produce shipping and storage operations. The offices were added at a later date to support administrative functions. The property remains today as a remnant agricultural support use with a small office and very limited shipping/warehousing operations.

Parcel B, the western parcel, comprises approximately 15.9 total acres with roughly 75% of the land area in agricultural cultivation. Several small warehouse buildings used primarily for agricultural storage and a single-family dwelling occupy remaining portions of the property. A general Project vicinity map is shown in Figure 1-A.

1.3 Project Description

This proposed Project seeks a Planned Block Development Plan (PBDP) for the Overlay District. The intended purpose of the PBD Planned Block Development Overlay District (PBD Overlay District) is to permit flexibility in land-use regulation and site development standards under control of the Planning Commission and City Council where flexibility or coordinated planning for a large site or a site under multiple ownership will enhance the potential for superior urban design.

Figure 1-A: Project Vicinity Map

Source: Google Maps, 2020

The PBDP establishes the land use and development standards that will regulate future residential development proposals for the property. The PBDP also presents site planning and architectural design criteria intended to promote development of a well thought-out, highly livable residential community which is compatible with the surrounding neighborhood. Detailed site layouts and residential building designs will ultimately be identified as part of future development plans specifically proposed for the property. While a comprehensive Project may be proposed for the entire Overlay Area, it is recognized that each parcel exists under separate ownership and that multiple development plans may also be considered.

The PBDP Property is currently designated as Limited Industrial (LI) by the City of Oceanside General Plan and allows a Floor Area Ratio (FAR) of 1.0 and a Max Lot Coverage of 75%. The site is 25.6 acres, but 1.8 acres are part of dedicated rights-of-way which are not included in density or site intensity calculations. So, the technical gross site area is only 23.8 acres and could accommodate a facility consisting of roughly 1,000,000 SF.

The Project proposes to establish the PBD Overlay District on this property, amend its land use designation to Medium Density - C Residential (MDC-R) and rezone the property to Medium Density Residential C (RM-C) to allow for future residential development of the site.

A medium-density residential use on this property would complement the existing residential uses located to the north and west while providing a transition from light industrial uses located to the east. Infill residential development represents an opportunity to repurpose this underutilized site by providing future housing opportunities for the Oceanside community.

A range of housing types can be provided as part of appropriately scaled medium density developments. These residential building types may include small lot single-family homes, detached condominiums, townhomes, courtyard clusters, duplex homes and garden apartments, along with various other product configurations.

The MDC-R designation establishes a density range of 15.1 – 20.9 dwelling units per acre with a potential overall development range of between 359 and 497 dwelling units. However, this PBDP institutes a dwelling unit 'cap' with a maximum allowance of only 400 dwelling units for the entire overlay district. The proposed PBDP area is shown on Figure 1-B.

Figure 1-B: Proposed PBD Overlay District

Source: Google Earth, 2020

2.0 ACOUSTICAL FUNDAMENTALS

2.1 Acoustical Fundamentals

Noise is defined as unwanted or annoying sound which interferes with or disrupts normal activities. Exposure to high noise levels has been demonstrated to cause hearing loss. The individual human response to environmental noise is based on the sensitivity of that individual, the type of noise that occurs, and when the noise occurs.

Sound is measured on a logarithmic scale consisting of sound pressure levels known as a decibel (dB). The sounds heard by humans typically do not consist of a single frequency but of a broadband of frequencies having different sound pressure levels. The method for evaluating all the frequencies of the sound is to apply an A-weighting to reflect how the human ear responds to the different sound levels at different frequencies. The A-weighted sound level adequately describes the instantaneous noise whereas the equivalent sound level depicted as Leq represents a steady sound level containing the same total acoustical energy as the actual fluctuating sound level over a given time interval.

The Community Noise Equivalent Level (CNEL) is the 24-hour A-weighted average for sound, with corrections for evening and nighttime hours. The corrections require an addition of 5 decibels to sound levels in the evening hours between 7 p.m. and 10 p.m. and an addition of 10 decibels to sound levels at nighttime hours between 10 p.m. and 7 a.m. These additions are made to account for the increased sensitivity during the evening and nighttime hours when sound appears louder.

A vehicles noise level is a combination of the noise produced by a vehicle's engine, exhaust, and tires. The cumulative traffic noise levels along a roadway segment are based on three primary factors: the amount of traffic, the travel speed of the traffic, and the vehicle mix ratio or number of medium and heavy trucks. The intensity of traffic noise is increased by higher traffic volumes, greater speeds, and increased number of trucks.

Because mobile/traffic noise levels are calculated on a logarithmic scale, a doubling of the traffic noise or acoustical energy results in a noise level increase of 3 dBA. Therefore, the doubling of the traffic volume, without changing the vehicle speeds or mix ratio, results in a noise increase of 3 dBA. Mobile noise levels radiate in an almost oblique fashion from the source and drop off at a rate of 3 dBA for each doubling of distance under hard site conditions and at a rate of 4.5 dBA for soft site conditions. Hard site conditions consist of concrete, asphalt, and hard pack dirt while soft site conditions exist in areas having slight grade changes, landscaped areas, and vegetation. Alternately, fixed/point sources radiate outward uniformly as it travels away from the source. Their sound levels attenuate or drop off at a rate of 6 dBA for each doubling of

distance.

The most effective noise reduction methods consist of controlling the noise at the source and blocking the noise transmission with barriers. Any or all of these methods may be required to reduce noise levels to an acceptable level. To be effective, a noise barrier must have enough mass to prevent significant noise transmission through it and high enough and long enough to shield the receiver from the noise source. A safe minimum surface weight for a noise barrier is 3.5 pounds/square foot (equivalent to 3/4-inch plywood), and the barrier must be carefully constructed so that there are no cracks or openings.

Barriers constructed of wood or as a wooden fence must have minimum design considerations as follows: the boards must be ¾ inch thick and free of any gaps or knot holes. The design must also incorporate either overlapping the boards at least 1 inch or utilizing a tongue-and-grove design for this to be achieved.

2.2 Vibration Fundamentals

Vibration is a trembling or oscillating motion of the ground. Like noise, vibration is transmitted in waves, but in this case through the ground or solid objects. Unlike noise, vibration is typically felt rather than heard. Vibration can be either natural as in the form of earthquakes, volcanic eruptions; or manmade as from explosions, or heavy machinery. Both natural and manmade vibration may be continuous, such as from operating machinery; or infrequent, as from an explosion.

As with noise, vibration can be described by both its amplitude and frequency. Amplitude may be characterized in three ways: displacement, velocity, and acceleration. Particle displacement is a measure of the distance that a vibrated particle travels from its original position and for the purposes of soil displacement is typically measured in inches or millimeters. Particle velocity is the rate of speed at which soil particles move in inches per second or millimeters per second. Particle acceleration is the rate of change in velocity with respect to time and is measured in inches per second or millimeters per second. Typically, particle velocity (measured in inches or millimeters per second) and/or acceleration (measured in gravities) are used to describe vibration. Table 2-1 shows the human reaction to various levels of peak particle velocity.

Vibrations also vary in frequency and this affects perception. Typical construction vibrations fall in the 10 to 30 Hz range and usually occurring around 15 Hz. Traffic vibrations exhibit a similar range of frequencies; however, due to their suspension systems, it is less common, to measure traffic frequencies above 30 Hz.

Propagation of ground-borne vibrations is complicated and difficult to predict because of the endless variations in the soil through which the waves travel. There are three main types of

vibration propagation: surface, compression, and shear waves. Surface waves, or Rayleigh waves, travel along the ground's surface. These waves carry most of their energy along an expanding circular wave front, similar to ripples produced by dropping an object into water. P-waves, or compression waves, are waves that carry their energy along an expanding spherical wave front. The particle motion in these waves is longitudinal. S-waves, or shear waves, are also body waves that carry energy along an expanding spherical wave front. However, unlike P-waves, the particle motion is transverse, or side-to-side and perpendicular to the direction of propagation.

As vibration waves propagate from a source, the energy is spread over an ever-increasing area such that the energy level is reduced with the distance from the energy source. This geometric spreading loss is inversely proportional to the square of the distance. Wave energy is also reduced with distance as a result of material damping in the form of internal friction, soil layering, and special voids. The amount of attenuation provided by material damping varies with soil type and condition as well as the frequency of the wave.

Table 2-1: Human Reaction to Typical Vibration Levels

Vibration Level Peak Particle Velocity (in/sec)	Human Reaction	Effect on Buildings
0.006–0.019	Threshold of perception, possibility of intrusion	Vibrations unlikely to cause damage of any type
0.08	Vibrations readily perceptible	Recommended upper level of vibration to which ruins and ancient monuments should be subjected
0.10	Level at which continuous vibration begins to annoy people	Virtually no risk of "architectural" (i.e., not structural) damage to normal buildings
0.20	Vibrations annoying to people in buildings	Threshold at which there is a risk to "architectural" damage to normal dwelling – houses with plastered walls and ceilings
0.4–0.6	Vibrations considered unpleasant by people subjected to continuous vibrations and unacceptable to some people walking on bridges	Vibrations at a greater level than normally expected from traffic, but would cause "architectural" damage and possibly minor structural damage
Source: Caltrans, Division of Environmental Analysis, *Transportation Related Earthborne Vibration, Caltrans Experiences*, Technical Advisory, Vibration, TAV-02-01-R9601, 2002.		

3.0 SIGNIFICANCE THRESHOLDS AND STANDARDS

3.1 Transportation Related Noise

The City of Oceanside's Noise Element requires that all exterior sensitive areas shall limit noise exposure. For noise sensitive residential land uses, the City has adopted a policy which has established a "normally acceptable" exterior noise level goal of 65 dBA CNEL for the outdoor areas and an interior noise level of less than 45 dBA CNEL.

Interior noise levels should be mitigated to a maximum of 45 dBA CNEL in all habitual rooms when the exterior of the residence are exposed to levels of 60 dBA CNEL or more. If windows and doors are required to be closed to meet the interior noise standard, then mechanical ventilation shall be provided per City requirements.

3.2 Construction Noise and Vibration

The City of Oceanside Noise Element controls noise levels due to construction operations. It shall be unlawful for any person to operate construction equipment at any construction site, except as outlined in subsections (a) and (b) below:

(a) It shall be unlawful for any person to operate any construction equipment at a level in excess of 85 dBA at 100 feet from the source.

(b) It should be unlawful for any person to engage in construction activities between 6 PM and 7 AM when such activities exceed the ambient noise level by 5 dBA. A special permit may be granted by the Director of Public Works if extenuating circumstances exist.

The City of has not yet adopted vibration criteria. The United States Department of Transportation Federal Transit Administration (FTA) provides criteria for acceptable levels of groundborne vibration for various types of special buildings that are sensitive to vibration. For purposes of identifying potential project-related vibration impacts, the FTA criteria will be used. The human reaction to various levels of vibration is highly subjective. The upper end of the range shown for the threshold of perception, or roughly 65 VdB, may be considered annoying by some people. Vibration below 65 VdB may also cause secondary audible effects, such as a slight rattling of doors, suspended ceilings/fixtures, windows, and dishes, any of which may result in additional annoyance. Table 3-1 shows the FTA groundborne vibration and noise impact criteria for human annoyance.

Table 3-1: Groundborne Vibration and Noise Impact Criteria (Human Annoyance)

	Groundborne Vibration Impact Levels (VdB re 1 microinch/second)			Groundborne Noise Impact Levels (dB re 20 micropascals)		
	Frequent Events[1]	Occasional Events[2]	Infrequent Events[3]	Frequent Events[1]	Occasional Events[2]	Infrequent Events[3]
Category 1: Buildings where low ambient vibration is essential for interior operations.	65 VdB[4]	65 VdB[4]	65 VdB[4]	N/A[4]	N/A[4]	N/A[4]
Category 2: Residences and buildings where people normally sleep.	72 VdB	75 VdB	80 VdB	35 dBA	38 dBA	43 dBA
Category 3: Institutional land uses with primarily daytime use.	75 VdB	78 VdB	83 VdB	40 dBA	43 dBA	48 dBA

Source: United States Department of Transportation Federal Transit Administration (FTA), *Transit Noise and Vibration Impact Assessment,* June 2006.

[1] "Frequent Events" are defined as more than 70 vibration events per day. Most rapid transit projects fall into this category.

[2] "Occasional Events" are defined as between 30 and 70 vibration events of the same source per day. Most commuter truck lines have this many operations.

[3] "Infrequent Events" are defined as fewer than 30 vibration events of the same kind per day. This category includes most commuter rail branch lines

[4] This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration-sensitive manufacturing or research will require detailed evaluation to define the acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the HVAC systems and stiffened floors.

[5] Vibration-sensitive equipment is not sensitive to groundborne noise.

In addition to the vibration annoyance standards presented above, the FTA also applies the following standards for construction vibration damage. Table 3-2 on the following page, structural damage is possible for typical residential construction when the peak particle velocity (PPV) exceeds 0.2 inch per second (in/sec). This criterion is the threshold at which there is a risk of damage to normal dwellings.

In the context of this analysis, the noise and vibration impacts associated with the construction operations and blasting operations will be conditioned to comply with the thresholds stated above. The potential noise and vibration impacts are analyzed separately below.

Table 3-2: Groundborne Vibration Impact Criteria (Structural Damage)

Building Category	PPV (in/sec)	VdB
I. Reinforced-concrete, steel, or timber (no plaster)	0.5	102
II. Engineered concrete and masonry (no plaster)	0.3	98
III. Non-engineered timber and masonry buildings	0.2	94
IV. Buildings extremely susceptible to vibration damage	0.12	90

Source: United States Department of Transportation Federal Transit Administration (FTA), *Transit Noise and Vibration Impact Assessment,* June 2006.

3.3 Operational Noise

Fixed sources and operational noise standards are governed by the City of Oceanside Noise Ordinance Section 38.12. Except for exempted activities and sounds as provided in this chapter or exempted properties as referenced in Section 38.15, it shall be unlawful for any person to cause or allow the creation of any noise to the extent that the one-hour average sound level, at any point on or beyond the boundaries of the property in the applicable base district zone on which the sound is produced exceeds the applicable limits set forth below in Table 3-3.

Table 3-3: Operational Noise Level Limits

Base District Zone	7:00 a.m. to 9:59 p.m.	10:00 p.m. to 6:59 a.m.
(1) Residential Districts:		
RE (Residential Estate)	50	45
RS (Single-Family)	50	45
RM (Medium Density)	50	45
RH (High Density)	55	50
RT (Residential Tourist)	55	50
(2) C (Commercial)	65	60
(3) I (Industrial)	70	65
(4) D (Downtown)	65	55
(5) A (Agricultural)	50	45
(6) OS (Open Space)	50	45

In addition to the sound level limits established above, there are established sound level limits for PD (planned development) base district zones. For any residential land use within a PD zone, the sound level limit is that limit which would be otherwise applicable in the residential district zone (RE, RS, RM, RH or RT) corresponding to density of the residential development in that PD zone.

For any nonresidential land use within a PD zone, the sound level limit is that limit corresponding to the C (commercial) or I (industrial) zone which would be applicable to that use if not subject to the PD zone. For the purposes of this section, a land use shall be that use shown on a duly approved planned development plan or specific plan. When property lines form the joint boundary of two (2) base district zones, the sound level limit shall be the arithmetic mean of the limit applicable to each of the two (2) zones.

4.0 NOISE ENVIRONMENT

4.1 Existing Noise Environment Onsite

Noise measurements were taken November 5, 2020 in the morning hours using a Larson-Davis Model LxT Type 1 precision sound level meter, programmed, in "slow" mode, to record noise levels in "A" weighted form. The sound level meter and microphone were mounted on a tripod, five feet above the ground and equipped with a windscreen during all measurements. The sound level meter was calibrated before and after the monitoring using a Larson-Davis calibrator, Model CAL 200.

Monitoring location 1 (ML1) was located along North River Road. The result of the noise level measurements are presented in Table 4-1. The noise measurements were monitored for a time period of 15 minutes during normal traffic conditions. The existing noise levels in the project area consisted primarily of traffic from adjacent North River Road. The ambient Leq noise level measured in the area of the project during the morning hours was found to be roughly 66 dBA Leq. The statistical indicators Lmax, Lmin, L10, L50 and L90, are given for the monitoring location. As can be seen from the L90 data, 90% of the time the noise level is 52 dBA from North River Road. The noise monitoring location is provided graphically in Figure 4-A on the following page.

Table 4-1: Measured Ambient Noise Levels

Measurement Identification	Main Noise Source	Time	Noise Levels (dBA)					
			Leq	Lmin	Lmax	L10	L50	L90
M1	North River Road	9:15–9:45 a.m.	65.9	47.7	75.3	70.7	61.6	51.9
Source: Ldn Consulting, Inc. November 5, 2019								

Figure 4-A: Ambient Noise Monitoring Location

4.2 Onsite Roadway Noise

The primary source of noise impacts to the project site is from vehicular noise from North River Road. The projected roadway noise levels from vehicular traffic were calculated using the methods in the Highway Noise Model published by the Federal Highway Administration (FHWA, 1978). The FHWA Model uses the traffic volume, vehicle mix, speed, and roadway geometry to compute the equivalent noise level. Table 4-2 presents the roadway parameters used in the analysis including the average daily traffic volumes, speeds and the traffic flow distribution (vehicle mix). The vehicle mix provides the distribution percentages of automobile, medium and heavy trucks for input into the FHWA Model.

Table 4-2: Traffic Parameters

Roadway	Year	Average Daily Traffic (ADT)	Peak Hour Volume	Modeled Speeds (MPH)	Vehicle Mix %		
					Auto	Medium Trucks	Heavy Trucks
North River Road	2035	26,300[1]	2,630	45	96	2	2

[1] Source: LOS Engineering, Draft Vehicle Miles Traveled and Local Transportation Study, 2020

Based on the exterior noise model for the roadways, the worst-case exterior noise level at the building facades nearest the roadways is 73.4 dBA CNEL along North River Road at a distance of 50-feet from the centerline. The model does not take into account any noise reductions for existing or proposed structures, barriers or topographic features. According to the City of Oceanside General Plan Noise Element, North River Road is considered a 4-lane Major Arterial with raised center median and a right-of-way width of 100-feet. Minimum site perimeter setback is 20-feet from North River Road according to the PBD Plan. Therefore, proposed residential rear yards would be set back a minimum 80 feet from the centerline of North River Road. Based on the increased distance from the roadway, the noise level would be reduced to a worst case exterior noise level of 71.4 dBA CNEL. The modeling results are provided as ***Attachment A***.

Based upon these findings noise mitigation is necessary to comply with the City's 65 dBA Noise standards. It was determined that noise mitigation in the form of 7-foot barriers are necessary at the top of slope along North River Road for the proposed units adjacent to the roadway. The location and height of the required barrier is shown in Figure 4-B. The barrier should be constructed of a non-gapping material consisting of masonry, ½ inch thick glass, earthen berm or any combination of these materials.

Figure 4-B: Noise Barrier Locations and Heights

The City of Oceanside as part of its noise guidelines also states, consistent with Title 24 of the California Code of Regulations (CCR), a project is required to perform an interior assessment on the portions of a project site where building façade noise levels are above 60 dBA CNEL in order to ensure a 45 dBA CNEL interior noise level. As determined above, façades noise levels along North River Road are above 60 dBA CNEL. Therefore, the proposed project site will require a final noise study be prepared prior to the issuance of the first building permit for all lots. This final noise report would identify the interior noise requirements based upon the architectural floor plans showing the room dimensions and window, door and wall details.

4.3 Offsite Project Related Transportation Noise Levels

The off-site project-related roadway segment noise levels projected in this report were calculated using the methods in the Highway Noise Model published by the Federal Highway Administration (FHWA Highway Traffic Noise Prediction Model, FHWA-RD-77-108, December, 1978). The FHWA Model uses the traffic volume, vehicle mix, speed, and roadway geometry to compute the equivalent noise level. A spreadsheet calculation was used which computes equivalent noise levels for each of the time periods used in the calculation of CNEL. Weighting these equivalent noise levels and summing them gives the CNEL for the traffic projections. The noise contours are then established by iterating the equivalent noise level over many distances until the distance to the desired noise contour(s) are found.

Because mobile/traffic noise levels are calculated on a logarithmic scale, a doubling of the traffic noise or acoustical energy results in a noise level increase of 3 dBA. Therefore, the doubling of the traffic volume, without changing the vehicle speeds or mix ratio, results in a noise increase of 3 dBA. Hard site conditions consist of concrete, asphalt, and hard pack dirt, while soft site conditions exist in areas having slight grade changes, landscaped areas, and vegetation. Hard site conditions, to be conservative, were used to develop the identified noise contours and analyze noise impacts along all roadway segments.

Community noise level changes greater than 3 dBA are often identified as audible and considered potential significant, while changes less than 1 dBA will not be discernible to local residents. In the range of 1 to 3 dBA, residents who are very sensitive to noise may perceive a slight change. There is no scientific evidence available to support the use of 3 dBA as the significance threshold; community noise exposures are typically over a long time period rather than the immediate comparison made in a laboratory situation. Therefore, the level at which changes in community noise levels become discernible is likely greater than 1 dBA and 3 dBA appears to be appropriate for most people. For the purposes for this analysis, a direct roadway noise impacts would be considered significant if the project increases noise levels for a noise sensitive land use by 3 dBA CNEL and if the project increases noise levels above an unacceptable noise level per the City's General Plan in the area adjacent to the roadway segment.

Direct Traffic Noise Impacts

To determine if direct off-site noise level increases associated with the development of the project will create noise impacts, the noise levels for the near term conditions were compared with the noise level increase from when the project is full built. Utilizing the project's traffic assessment (Source: LOS Engineering, Inc., 2020), noise contours were developed for the following traffic scenarios:

Existing: Current day noise conditions without construction of the project.
Existing Plus Project: Current day noise conditions plus the completion of the project.
Existing vs. Existing Plus Project: Comparison of the project related noise level increases.

The noise levels and reference distances to the 65 dBA CNEL contours for the roadways in the vicinity of the Project site are given in Table 4-3 for the Existing Scenario and in Table 4-4 for the Existing Plus Project Scenario.

Table 4-3: Existing Noise Levels without Project

Roadway Segment	ADT[1]	Vehicle Speeds (MPH)[1]	Noise Level @ 50-Feet (dBA CNEL)	65 dBA CNEL Contour Distance (Feet)
Douglas Drive				
N. River Rd to Rainier Way	35,915	50	75.8	264
Rainier Way to Pala Rd	36,579	50	75.9	267
Pala Rd to El Camino Real	37,080	50	76.0	270
El Camino Real to Mission Ave	23,305	40	71.8	142
Mission Ave to SR-76	20,142	40	71.1	129
North River Road				
Douglas Dr to Avenida Descanso	20,223	45	72.3	153
Avenida Descanso to Riverview Way	18,195	45	71.8	143
Riverview Way to Calle Montecito	19,589	45	72.2	150
Calle Montecito to Redondo Dr	20,485	45	72.4	155
Redondo Dr to College Blvd	20,383	45	72.3	154
College Blvd to Vandegrift Blvd	31,503	45	74.2	206
College Boulevard				
N. River Rd to Buchanon Park	35,485	40	73.6	187
Buchanon Park to Adams St	34,426	45	74.6	218
Adams St to Via Cupeno	34,479	45	74.6	219
Via Cupeno to SR-76	41,981	50	76.5	293
SR-76				
Foussat Rd to Douglas Dr	41,500	65	79.2	444
Douglas Dr to Rancho Del Oro	46,500	65	79.7	479
Frazee Rd to College Blvd	41,000	65	79.2	440
College Blvd to N. Santa Fe	46,000	65	79.7	475

[1] Source: Project Traffic study prepared by LOS Engineering, Inc., 2020

Table 4-4: Existing + Project Noise Levels

Roadway Segment	ADT[1]	Vehicle Speeds (MPH)[1]	Noise Level @ 50-Feet (dBA CNEL)	65 dBA CNEL Contour Distance (Feet)
Douglas Drive				
N. River Rd to Rainier Way	37,483	50	76.0	272
Rainier Way to Pala Rd	38,147	50	76.1	275
Pala Rd to El Camino Real	38,648	50	76.2	277
El Camino Real to Mission Ave	24,233	40	72.0	145
Mission Ave to SR-76	20,686	40	71.3	131
North River Road				
Douglas Dr to Avenida Descanso	21,823	45	72.6	161
Avenida Descanso to Riverview Way	19,795	45	72.2	151
Riverview Way to Calle Montecito	21,189	45	72.5	158
Calle Montecito to Redondo Dr	22,085	45	72.7	163
Redondo Dr to College Blvd	21,823	45	72.6	161
College Blvd to Vandegrift Blvd	31,823	45	74.3	207
College Boulevard				
N. River Rd to Buchanon Park	36,605	40	73.7	191
Buchanon Park to Adams St	35,546	45	74.7	223
Adams St to Via Cupeno	35,567	45	74.7	223
Via Cupeno to SR-76	42,973	50	76.6	298
SR-76				
Foussat Rd to Douglas Dr	42,012	65	79.3	447
Douglas Dr to Rancho Del Oro	46,532	65	79.7	479
Frazee Rd to College Blvd	41,032	65	79.2	440
College Blvd to N. Santa Fe	46,288	65	79.7	477

[1] Source: Project Traffic study prepared by LOS Engineering, Inc., 2020

Table 4-5 presents the comparison of the Existing Year with and without Project related noise levels. The overall roadway segment noise levels will increase from 0.0 dBA CNEL to 0.4 dBA CNEL with the development of the project. Note that the values given do not take into account the effect of any noise barriers, structures, or topography that may affect roadway noise levels. The Project does not create a direct noise increase of more than 3 dBA CNEL on any roadway segment. Therefore, the project's direct contributions to off-site roadway noise increases will not cause any significant impacts to any existing or future noise sensitive land uses.

Table 4-5: Existing vs. Existing + Project Noise Levels

Roadway Segment	Existing Noise Level @ 50-feet (dBA CNEL)	Existing + Project Noise Level @ 50-feet (dBA CNEL)	Difference (dBA CNEL)
Douglas Drive			
N. River Rd to Rainier Way	75.8	76.0	0.2
Rainier Way to Pala Rd	75.9	76.1	0.2
Pala Rd to El Camino Real	76.0	76.2	0.2
El Camino Real to Mission Ave	71.8	72.0	0.2
Mission Ave to SR-76	71.1	71.3	0.1
North River Road			
Douglas Dr to Avenida Descanso	72.3	72.6	0.3
Avenida Descanso to Riverview Way	71.8	72.2	0.4
Riverview Way to Calle Montecito	72.2	72.5	0.3
Calle Montecito to Redondo Dr	72.4	72.7	0.3
Redondo Dr to College Blvd	72.3	72.6	0.3
College Blvd to Vandegrift Blvd	74.2	74.3	0.0
College Boulevard			
N. River Rd to Buchanon Park	73.6	73.7	0.1
Buchanon Park to Adams St	74.6	74.7	0.1
Adams St to Via Cupeno	74.6	74.7	0.1
Via Cupeno to SR-76	76.5	76.6	0.1
SR-76			
Foussat Rd to Douglas Dr	79.2	79.3	0.1
Douglas Dr to Rancho Del Oro	79.7	79.7	0.0
Frazee Rd to College Blvd	79.2	79.2	0.0
College Blvd to N. Santa Fe	79.7	79.7	0.0
[1] Source: Project Traffic study prepared by LOS Engineering, Inc., 2020			

Cumulative Traffic Noise Levels

To determine if cumulative off-site noise level increases associated with the development of the Project and other planned or permitted projects in the vicinity will create noise impacts. The noise levels for the near-term Project Buildout and other planned and permitted projects were compared with the existing conditions. Utilizing the Project's traffic assessment (Source: LOS Engineering, Inc., 2020) noise contours were developed for the following traffic scenarios:

Existing: Current day noise conditions without construction of the project.

Existing Plus Cumulative Projects Plus Project: Current day noise conditions plus the completion of the project and the completion of other permitted, planned projects or approved ambient growth factors.

Existing vs. Existing Plus Cumulative Plus Project: Comparison of the existing noise levels and the related noise level increases from the combination of the project and all other planned or permitted projects in the vicinity of the site.

The existing noise levels and reference distances to the 65 dBA CNEL contours for the roadways in the vicinity of the Project site are given in Table 4-3 above for the Existing Scenario. The near-term cumulative noise conditions are provided in Table 4-6. No noise barriers or topography that may affect noise levels were incorporated in the calculations. Note that the values given do not take into account the effect of any noise barriers, structures, or topography that may affect roadway noise levels.

Table 4-6: Existing + Near Term + Project Noise Levels

Roadway Segment	ADT[1]	Vehicle Speeds (MPH)[1]	Noise Level @ 50-Feet (dBA CNEL)	65 dBA CNEL Contour Distance (Feet)
Douglas Drive				
N. River Rd to Rainier Way	37,140	50	76.0	270
Rainier Way to Pala Rd	37,862	50	76.1	273
Pala Rd to El Camino Real	38,491	50	76.1	276
El Camino Real to Mission Ave	24,556	40	72.0	147
Mission Ave to SR-76	21,083	40	71.3	132
North River Road				
Douglas Dr to Avenida Descanso	21,399	45	72.5	159
Avenida Descanso to Riverview Way	19,361	45	72.1	149
Riverview Way to Calle Montecito	20,755	45	72.4	156
Calle Montecito to Redondo Dr	21,651	45	72.6	160
Redondo Dr to College Blvd	21,549	45	72.6	160
College Blvd to Vandegrift Blvd	36,554	45	74.9	227
College Boulevard				
N. River Rd to Buchanon Park	39,503	40	74.1	201
Buchanon Park to Adams St	38,458	45	75.1	235
Adams St to Via Cupeno	38,611	45	75.1	236
Via Cupeno to SR-76	46,099	50	76.9	312
SR-76				
Foussat Rd to Douglas Dr	45,100	65	79.6	469
Douglas Dr to Rancho Del Oro	49,347	65	80.0	498
Frazee Rd to College Blvd	43,864	65	79.5	460
College Blvd to N. Santa Fe	49,247	65	80.0	497

[1] Source: Project Traffic study prepared by LOS Engineering, Inc., 2020

The overall cumulative roadway segment noise levels will increase from 0.1 dBA CNEL to 0.5 dBA CNEL with the development of the Project and all the cumulative projects as shown in Table 4-7 below. Therefore, the Project's contributions to off-site roadway noise increase would not be considered cumulatively considerable and would not cause any significant impacts.

Table 4-7: Existing vs. Near Term + Project Noise Levels

Roadway Segment	Existing Noise Level @ 50-feet (dBA CNEL)	Near Term + Project Noise Level @ 50-feet (dBA CNEL)	Difference (dBA CNEL)
Douglas Drive			
N. River Rd to Rainier Way	75.8	76.0	0.1
Rainier Way to Pala Rd	75.9	76.1	0.1
Pala Rd to El Camino Real	76.0	76.1	0.2
El Camino Real to Mission Ave	71.8	72.0	0.2
Mission Ave to SR-76	71.1	71.3	0.2
North River Road			
Douglas Dr to Avenida Descanso	72.3	72.5	0.2
Avenida Descanso to Riverview Way	71.8	72.1	0.3
Riverview Way to Calle Montecito	72.2	72.4	0.3
Calle Montecito to Redondo Dr	72.4	72.6	0.2
Redondo Dr to College Blvd	72.3	72.6	0.2
College Blvd to Vandegrift Blvd	74.2	74.9	0.6
College Boulevard			
N. River Rd to Buchanon Park	73.6	74.1	0.5
Buchanon Park to Adams St	74.6	75.1	0.5
Adams St to Via Cupeno	74.6	75.1	0.5
Via Cupeno to SR-76	76.5	76.9	0.4
SR-76			
Foussat Rd to Douglas Dr	79.2	79.6	0.4
Douglas Dr to Rancho Del Oro	79.7	80.0	0.3
Frazee Rd to College Blvd	79.2	79.5	0.3
College Blvd to N. Santa Fe	79.7	80.0	0.3
[1] Source: Project Traffic study prepared by LOS Engineering, Inc., 2020			

5.0 CONSTRUCTION NOISE LEVELS

Construction noise represents a short-term impact on the ambient noise levels. Noise generated by construction equipment includes haul trucks, water trucks, graders, dozers, loaders, and scrapers and can reach relatively high levels. Grading activities typically represent one of the highest potential sources for noise impacts. The most effective method of controlling construction noise is through local control of construction hours and by limiting the hours of construction to normal weekday working hours.

Because the City of Oceanside does not have property line standards for construction, the City of San Diego 75 dBA Leq standard is utilized in the analysis. Division 4 of Article 9.5 of the City of San Diego Municipal Code addresses the limits of disturbing or offensive construction noise. The Municipal Code states that with the exception of an emergency, it should be unlawful 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 U.S. Environmental Protection Agency (U.S. EPA) has compiled data regarding the noise generating characteristics of specific types of construction equipment. Noise levels generated by heavy construction equipment can range from 60 dBA to in excess of 100 dBA when measured at 50 feet. However, these noise levels diminish rapidly with distance from the construction site at a rate of approximately 6 dBA per doubling of distance. For example, a noise level of 75 dBA measured at 50 feet from the noise source to the receptor would be reduced to 69 dBA at 100 feet from the source to the receptor, and reduced to 63 dBA at 200 feet from the source.

Using a point-source noise prediction model, calculations of the expected construction noise levels were completed. The essential model input data for these performance equations include the source levels of the equipment, source to receiver horizontal and vertical separations, the amount of time the equipment is operating in a given day (also referred to as the duty-cycle), and any transmission loss from topography or barriers.

5.1 Potential Construction Noise Impact

Based on the EPA noise emissions, empirical data and the amount of equipment needed, worst-case noise levels from the construction equipment operations would occur during the base operations (grading/site preparation). The Planned Development and Mixed Use Plan identifies that grading will be balanced within each Planning Area in order to allow phased development while minimizing impacts across the Plan area. Due to physical constraints and normal site preparation operations, most of the equipment will be spread out over the site. Based upon the proposed site plan, the majority of the grading operations will occur more than 200 feet from

the nearest property lines.

Therefore, the worst-case noise condition would occur when the construction equipment is working in close proximity to each other at an average distance of approximately 200 feet from the property lines. The noise levels utilized in this analysis are shown in Table 5-1. The amount of time the equipment will be utilized over an 8-hour period at this distance from the property line is also given and factored into the average noise level calculations. This is referred to as the duty-cycle.

Table 5-1: Construction Noise Levels

Equipment Type	Quantity Used	Source @ 50 Feet (dBA)	Cumulative Noise Level @ 50 Feet (dBA)
Tractor/Backhoe/Loader	1	72	72.0
Dozer Cat	1	74	74.0
Grader	2	73	76.0
Water Trucks	2	70	73.0
Scraper	2	75	78.0
		Cumulative Level	**82.2**
		Distance to Sensitive Use	**115**
		Noise Reduction due to Distance	**-7.2**
		Property Line Noise Level	**74.9**

5.2 Construction Noise Conclusions

As can be seen in Table 5-1, none of the proposed equipment will exceed the City of Oceanside 85 dBA standard at 100 feet from the source. The project will meet the City of Oceanside's 85 dBA standard at 100 feet from the source for all proposed equipment and no impacts are anticipated. Accordingly, impacts will be less than significant and no mitigation measures are required.

5.3 Construction Vibration Findings

The nearest vibration-sensitive uses are the residences located 50 feet or more from the proposed construction. The anticipated construction equipment will be spread out over the site working in different portion of the site as needed. For example: a single dozer may be utilized near the project boundary while the other equipment is working on the opposite side of the site. Table 5-2 lists the average vibration levels that would be experienced at the nearest vibration sensitive land uses from the temporary construction activities. Vibration levels were assessed at a distance of 50 feet to be conservative.

Table 5-2: Vibration Levels from Construction Activities (Residential Receptors)

Equipment	Approximate Velocity Level at 25 Feet (VdB)	Approximate RMS Velocity at 25 Feet (in/sec)	Approximate Velocity Level at 50 Feet (VdB)	Approximate RMS Velocity at 50 Feet (in/sec)
Small bulldozer	58	0.003	49.0	0.0011
Jackhammer	79	0.035	70.0	0.0124
Loaded trucks	86	0.076	77.0	0.0269
Large bulldozer	87	0.089	78.0	0.0315
		FTA Criteria	80	0.2
		Significant Impact?	**No**	**No**

[1] PPV at Distance D = PPVref x $(25/D)^{1.5}$

The FTA has determined vibration levels that would cause annoyance to a substantial number of people and potential damage to building structures. The FTA criterion for vibration induced structural damage is 0.20 in/sec for the peak particle velocity (PPV). Project construction activities would result in PPV levels below the FTA's criteria for vibration induced structural damage. Therefore, project construction activities would not result in vibration induced structural damage to residential buildings near the demolition and construction areas. The FTA criterion for infrequent vibration induced annoyance is 80 Vibration Velocity (VdB) for residential uses. Construction activities would generate levels of vibration that would not exceed the FTA criteria for nuisance for nearby residential uses. Therefore, vibration impacts would be less than significant.

5.4 Vibration Findings

Given attenuation of vibration velocities with distance, the RMS vibration velocity and peak particle velocity at the nearest existing residence would be about 78 VdB and 0.03 inch per second, respectively. Based on the construction vibration human annoyance criterion of 80 VdB published by the FTA, the vibration levels for the construction activity on nearby residential structures will not be significant.

6.0 OPERATIONAL NOISE LEVELS

This section examines the potential stationary noise source levels associated with the development and operation of the proposed project. Noise from a fixed or point source drops off at a rate of 6 dBA for each doubling of distance. Which means a noise level of 70 dBA at 5-feet would be 64 dBA at 10-feet and 58 dBA at 20-feet. A review of the proposed project indicates that noise sources such as residential activities are the primary sources of stationary noise.

6.1 Property Line Noise Levels

The required sound levels at a Project's property boundary depend on the time of day and the land use zone. The Project proposes a zone change to residential. The existing and proposed residential uses allow an equivalent one-hour sound level of 50 dBA Leq-h between 7 A.M. and 9:59 P.M. and 45 dBA from 10 P.M. to 6:59 A.M at the property lines. The section will analyze the noise levels at the property line to determine the worst case noise levels, any impacts and necessary mitigation solutions, if needed.

Residential Activities

Noise generated from residential uses is generally from sources such as amplified music, barking dogs, and landscape maintenance equipment that may be disturbing to other residents. Noise impacts are more likely to occur in the more densely developed areas of the project site where residences would be closer together and neighbors would be more likely to hear a neighbor's dog or music. Section 38.16 of the Oceanside Municipal Code prohibits nuisance noise at any time which causes discomfort or annoyance to reasonable persons of normal sensitivity. Compliance with the noise ordinance would limit exposure to excessive nuisance noise. The Oceanside Police Department enforces the nuisance noise provisions of the noise ordinance. Additionally, nuisance noises would be different from each other in kind, duration, and location, so that the overall effects would be separate and in most cases would not affect the receptors at the same time. Instances of nuisance noise would be addressed on an individual case basis by the Oceanside Police Department. Therefore, nuisance noise from the proposed residences would be less than significant.

The project site would be landscaped; therefore, regular maintenance would be required. Maintenance activities would include the use of mowers, trimmers, and blowers, which would result in intermittent short-term temporary noise increases. Maintenance activities are permitted uses and would be subject to the daytime one-hour Leq noise limits in residential neighborhoods. Maintenance equipment would not be operating at any one location for more than a few minutes and it is not likely that the equipment would be operating all at the same time. Due to the limited amount of time the equipment would be operating in one location.

Therefore, operation of maintenance equipment would generally not exceed the hourly noise level limit at adjacent residential receptors and no impacts are anticipated.

6.2 Conclusions

Based upon the operational noise levels none of the proposed noise sources are anticipated to exceed the property line standards at the surround property lines. Therefore, the proposed development related operational noise levels comply with the City's noise standards. Impacts would be less than significant and no mitigation is required.

7.0 CERTIFICATIONS

The contents of this report represent an accurate depiction of the noise and vibration environment and impacts within and surrounding the proposed North River Road development. The information contained in this report was based on the best available data at the time of preparation.

DRAFT

Jeremy Louden, Principal
Ldn Consulting, Inc.
(760) 473-1253
jlouden@ldnconsulting.net

Date October 2, 2020

ATTACHMENT A

FUTURE EXTERIOR NOISE MODEL INPUT AND
OUTPUT FILES

Attachment: Roadway Noise Levels

Project Name:	North River Road	Date:	24-Aug-20
Project Number:	15-49	Location:	Oceanside

Traffic Volumes, Mix and Speeds

	Autos	Med. Trucks	Heavy Trucks
Mix Ratio by Percent	96.0	2.0	2.0

Propagation Rule Hard

Roadway	ADT	Speed MPH	CNEL @ 50 Feet	60 CNEL (Feet)
North River Road	26,300	45	73.4	1,103

Noise Reduction due to Distance

	Distance	Reduction	Resultant Level
North River Road	80	-2.04	71.4

Cumulative Noise Level **71.4** **dBA CNEL**