APPENDIX D

Noise Study

FOURTH CORNER APARTMENTS PROJECT

NOISE STUDY

Prepared for:

Wakeland Housing and Development Corporation, Inc.

Prepared by:

BPG
BIRDSEYE
PLANNING GROUP

August 2020

FOURTH CORNER APARTMENTS
SAN DIEGO, CALIFORNIA
Noise Study

Table of Contents

Page

List of Figures

List of Tables

Appendices

FOURTH CORNER APARTMENTS
SAN DIEGO, CALIFORNIA
NOISE STUDY

This report is an analysis of the potential noise impacts associated with the proposed Fourth Corner Apartment Project (proposed project) in the City of San Diego. This report has been prepared by Birdseye Planning Group (BPG) under contract to Wakeland Housing and Development Corporation, Inc., to support preparation of the environmental documentation pursuant to the California Environmental Quality Act (CEQA). This study analyzes the potential for permanent impacts associated with operation of the proposed project and temporary impacts associated with construction activity within proximity to the construction area.

PROJECT DESCRIPTION

The proposed project scope of work includes a 75-unit apartment building, new construction, located at 4021, 4035, 4037 and 4061 Fairmount Avenue in the City Heights Community of San Diego, California (see Figure 1: Regional Location Map and Figure 2: Vicinity Map). The project site includes an existing designated historic resource, American Legion Hall, HRB #525. The project proposes to demolish the historic resource through a Site Development Permit (SDP) per San Diego Municipal Code (SDMC) Section 126.0504 (i) - Proposed Demolition of Historic Structure. The proposed residential project will provide 74 affordable dwelling units for Low Income residents and 1 Manager's Unit for a total of 75 dwelling units. The proposed Site Plan is provided as Figure 3.

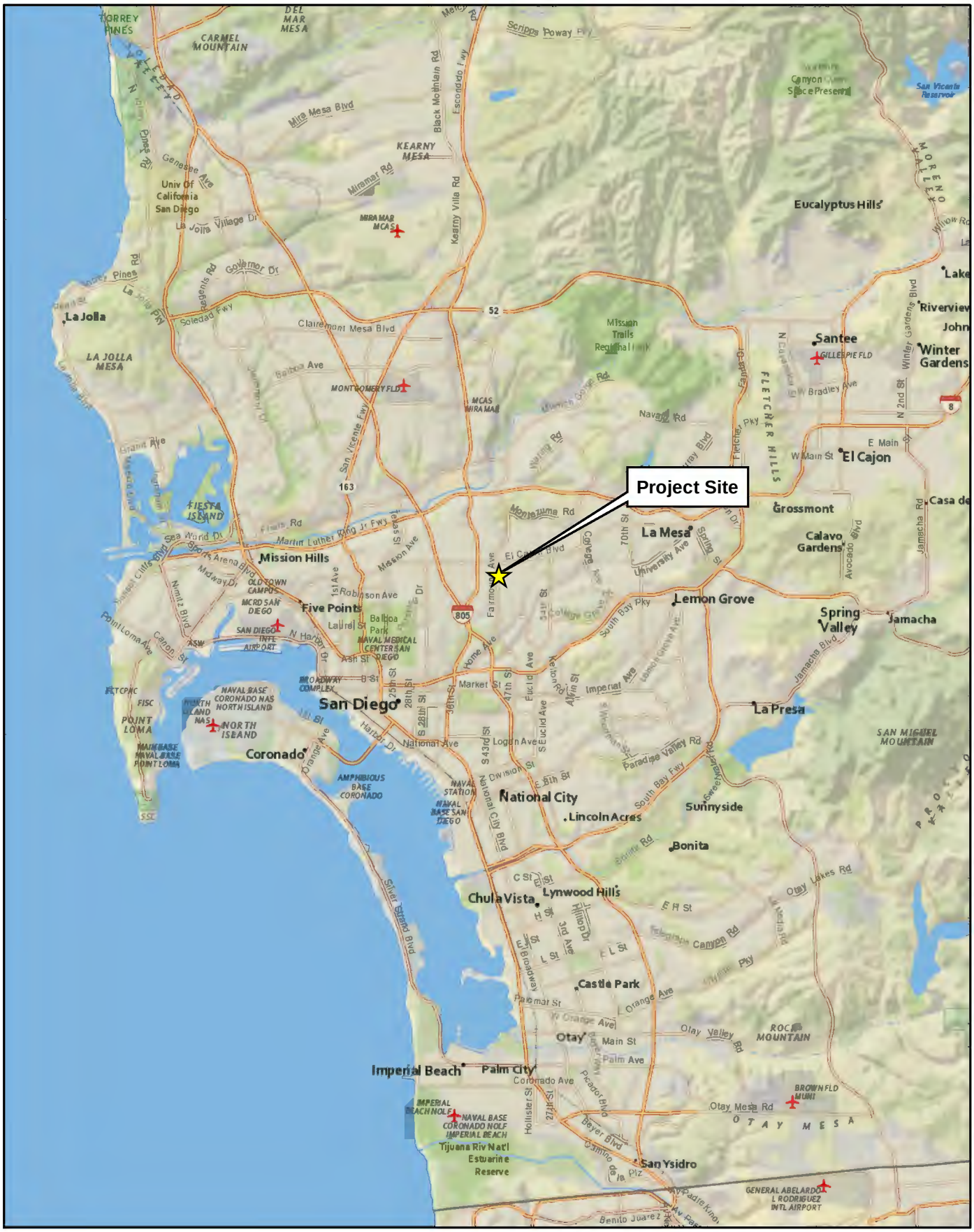
The proposed residential project will include approximately 131,998 gross square feet of new construction with residential amenities, including approximately 5,000 sf of outdoor community recreation open space on the podium deck, approximately 1,818 sf community room for use by the public, a residents' kitchen, laundry room and lounge. Vehicular parking, storage and bicycle parking will be provided in a secured garage on the street level. The building will be four stories of residential - wood construction, over a parking structure at-grade. The elevator lobby, entrance and manager's office/ lounge will be located off Fairmount Avenue.

The proposed project would begin construction in early 2021 and require approximately 16 months to complete.

SETTING

Overview of Sound Measurement

Noise level (or volume) is generally measured in decibels (dB) using the A-weighted sound pressure level (dBA). The A-weighting scale is an adjustment to the actual sound pressure levels to be consistent with that of human hearing response, which is most sensitive to frequencies



SOURCE: Basemap- Esri, 2017.

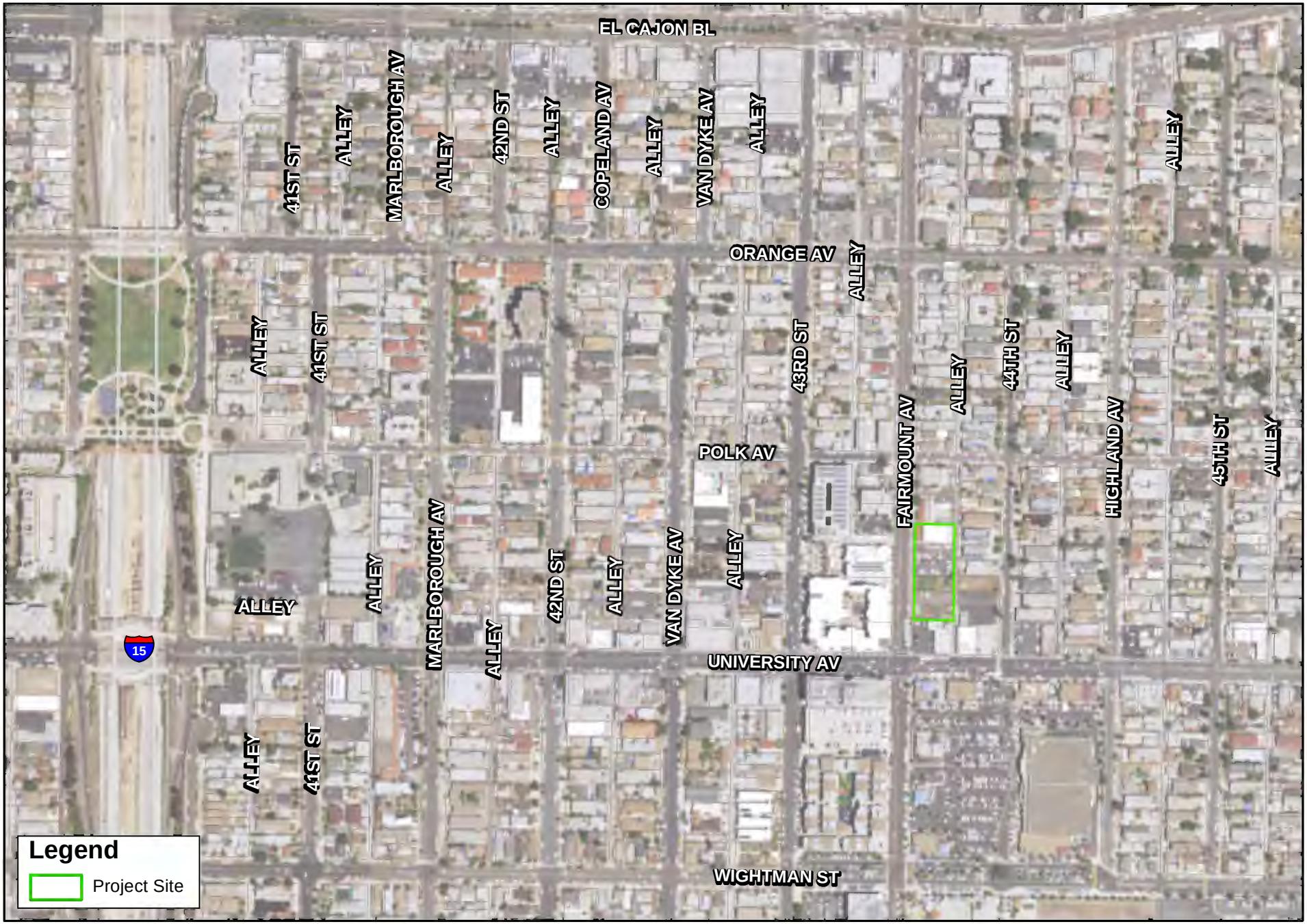
N

0 2.5 5 Miles

Regional Location Map

Fourth Corner Apartments Project

Figure 1



SOURCE: Basemap- Esri, 2017. SanGIS, 2017.

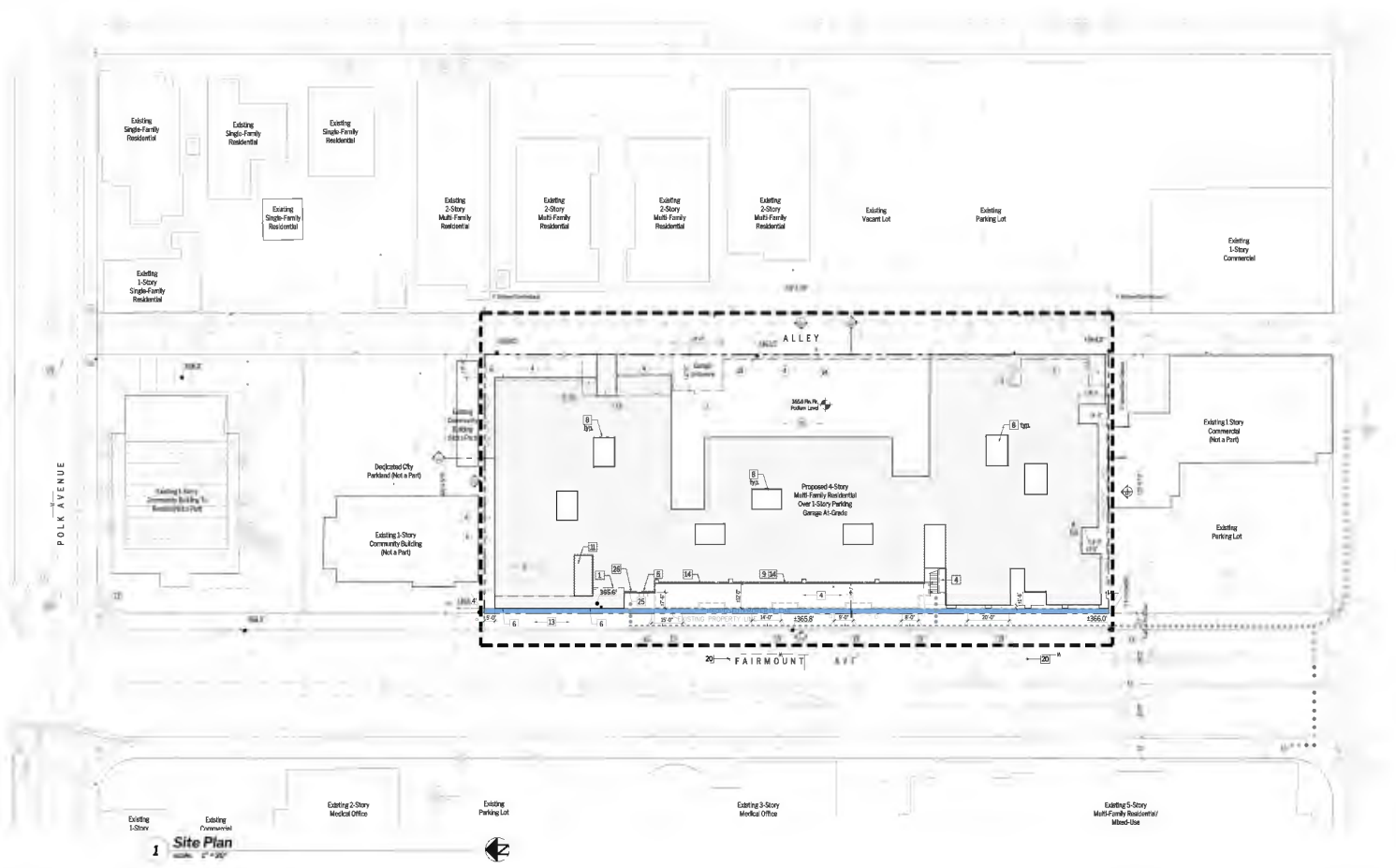
N

0 400 800 Feet

Project Location and Vicinity

Fourth Corner Apartments Project

Figure 2



Site Plan Notes

1. Building Entrance
2. Garage Entrance Gate
3. Emergency Egress
4. Landscaped Planter, See Landscape Plans
5. Bicycle Racks
6. Architectural Projection Balcony, Roof Overhang, Shade Structure, etc.
7. Electrical Transformer Above Grade
8. Light Well
9. Limit of Garage Wall
10. Community Courtyard at Podium Level
11. Elevator Penthouse
12. Stair Bulkhead
13. Enhanced Paving, See Landscape Plans
14. Architectural Screening at Street and Alley Frontages
15. Street Curb Bike
16. Transit Stop
17. Fire Hydrant
18. Edge of Podium Deck
19. Existing Driveway Curb Cut to be Removed/ Closed
20. Existing Streetlight to Remain
21. Existing Landscape to Remain
22. Existing Curb Ramp to Remain
23. Existing Driveway to Remain
24. Existing Parking to Remain
25. Building Address Numbers to be located on Brick Veneer Wall adjacent to street entrance. See elevations
26. Knox Box wall mounted per SDMC

General Notes

See Civil Sheet C3.0 for Additional Information

Building Address:
4035, 4041, 4035-B & 4031 Fairmount Avenue San Diego, CA 92105

Off Street Parking:
See A2.0 Garage Plan and A0.0 Project Data for Parking configuration and calculations

Drainage:
See Civil Plans for additional information

Refuse & Recycling:
See A2.0 Garage Plan and A0.0 Project Data for additional information

Fire Hydrants:
See Site Plan Notes and Civil Plans for additional information

Transit:
15 ft. / 45 Bus Service on Fairmount and University

Easements:
No Existing Easements on Site

1. Address identification shall be provided for all new & (E) buildings in a location that is plainly visible and legible from the street or road fronting the property. Where access is by way of a private road and building cannot be viewed from the public way, an approved sign or means shall be used to identify the structure. premises identification shall conform to Section 96.2.0105 of the San Diego Municipal Code and CBC 505.1.

Legend

- Key Note
- Property Line
- Project Boundary/ Limit of Work
- Path to Transit Stop

DESS ARCHITECTURE
4510 I/S 30th Street
San Diego, CA 92116

ARCHITECT:
LICENSED ARCHITECT
DEBORAH SMITHTON, AIA
(619) 573-5522

4th Corner Apartmetns
4021, 4035, 4037, and 4061
Fairmount Ave
San Diego, CA 92105

DEVELOPER:
Wakeland Housing & Development
1230 Columbia Street
San Diego CA 92101
phone: (619) 677-3400
contact: Peter Armstrong

Completeness check 3.17.20
First Submittal 4.16.20
Second Submittal 6.22.20

SHEET SIZE: 24" x 36"
DO NOT SCALE DRAWINGS

SHEET TITLE: Site Plan

DATE:

SCALE: AS NOTED

SHEET: **A1.0**

SOURCE: Dess Partners Architecture, June 2020.

Site Plan/Fire Access Plan
Fourth Corner Apartments Project
Figure 3

around 4,000 Hertz (about the highest note on a piano) and less sensitive to low frequencies (below 100 Hertz). Sound pressure level is measured on a logarithmic scale with the 0 dB level based on the lowest detectable sound pressure level that people can perceive (an audible sound that is not zero sound pressure level). Based on the logarithmic scale, a doubling of sound energy is equivalent to an increase of 3 dBA, and a sound that is 10 dBA less than the ambient sound level has no effect on ambient noise. Because of the nature of the human ear, a sound must be about 10 dBA greater than the reference sound to be judged as twice as loud. In general, a 3 dBA change in community noise levels is noticeable, while 1-2 dB changes generally are not perceived. Quiet suburban areas typically have noise levels in the range of 40-50 dBA, while arterial streets are in the 50-60+ dBA range. Normal conversational levels are in the 60-65 dBA range, and ambient noise levels greater than 65 dBA can interrupt conversations. Noise levels typically attenuate (or drop off) at a rate of 6 dBA per doubling of distance from point sources (i.e., industrial machinery). Noise from lightly traveled roads typically attenuates at a rate of about 4.5 dBA per doubling of distance. Noise from heavily traveled roads typically attenuates at about 3 dBA per doubling of distance. Noise levels may also be reduced by intervening structures; generally, a single row of buildings between the receptor and the noise source reduces the noise level by about 5 dBA, while a solid wall or berm reduces noise levels by 5 to 10 dBA. The manner in which older homes in California were constructed (approximately 30 years old or older) generally provides a reduction of exterior-to-interior noise levels of about 20 to 25 dBA with closed windows. The exterior-to-interior reduction of newer residential units and office buildings construction to California Energy Code standards is generally 30 dBA or more (Harris, Miller, Miller and Hanson, 2006).

In addition to the actual instantaneous measurement of sound levels, the duration of sound is important since sounds that occur over a long period of time are more likely to be an annoyance or cause direct physical damage or environmental stress. One of the most frequently used noise metrics that considers both duration and sound power level is the equivalent noise level (Leq). The Leq is defined as the single steady A-weighted level that is equivalent to the same amount of energy as that contained in the actual fluctuating levels over a period of time (essentially, the average noise level). Typically, Leq is summed over a one-hour period. Lmax is the highest RMS (root mean squared) sound pressure level within the measuring period, and Lmin is the lowest RMS sound pressure level within the measuring period.

The time period in which noise occurs is also important since noise that occurs at night tends to be more disturbing than that which occurs during the day. Community noise is usually measured using Day-Night Average Level (Ldn), which is the 24-hour average noise level with a 10-dBA penalty for noise occurring during nighttime (10 p.m. to 7 a.m.) hours, or Community Noise Equivalent Level (CNEL), which is the 24-hour average noise level with a 5 dBA penalty for noise occurring from 7 p.m. to 10 p.m. and a 10 dBA penalty for noise occurring from 10 p.m. to 7 a.m. Noise levels described by Ldn and CNEL usually do not differ by more than 1 dB. Daytime Leq levels are louder than Ldn or CNEL levels; thus, if the Leq meets noise standards, the Ldn and CNEL are also met. Table 1 shows sounds levels of typical noise sources in Leq.

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

Noise Source (at Given Distance)	Noise Environment	A-Weighted Sound Level (Decibels)	Human Judgment of Noise Loudness (Relative to Reference Loudness of 70 Decibels*)
Military Jet Takeoff with Afterburner (50 ft)	Carrier Flight Deck	140	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., 2016

Sensitive Receptors

Noise exposure goals for various types of land uses reflect the varying noise sensitivities associated with each of these uses. Urban areas contain a variety of land use and development types that are noise sensitive. As referenced in the City of San Diego General Plan Noise Element, noise-sensitive land uses include, but are not necessarily limited to residential uses, hospitals, nursing facilities, intermediate care facilities, child educational facilities, libraries, museums, places of worship, child care facilities, and certain types of passive recreational parks and open space. Nearby sensitive receptors are multifamily residences located along Fairmount Avenue west of the site and on the east side of the alley that forms the property boundary on the east side of the site. The Fourth Corner Apartments will also be a sensitive receptor at completion.

Project Site Setting

The project area is located in the urbanized Mid-City: City Heights community within the City of San Diego. Thus, the most common and primary sources of noise in the project site vicinity are motor vehicles (e.g., automobiles and trucks) on Fairmount Avenue, Polk Avenue to the north and University Avenue to the south. The project site is mid-block between Polk and University Avenues; thus, the majority of existing noise will remain traffic noise. Other noise sources in the area are primarily associated with pedestrian activity; however, these sources do not noticeably contribute to the ambient noise environment.

Existing Noise Environment

To gather data on the general noise environment at the project site, weekday morning 15-minute noise measurements were taken on June 20, 2017. Site 1 is located along Fairmount Avenue adjacent to and north of the project site. Site 2 is located in proximity to the alley that forms the eastern property boundary. Fairmount Avenue traffic was visible from Site 2; thus, traffic counts were made from that location during monitoring. Site 3 is located along Fairmount Avenue adjacent to and south of the project site. Traffic volumes have not changed to the extent that baseline noise levels are noticeably different under current conditions. Existing noise at this site was measured for model calibration purposes. Monitoring locations and the approximate location of the existing 65 and 60 dBA noise contours are shown in Figure 4 and represent the project site, noise sensitive multifamily residences located west and just south of the site, as well as the single- and multifamily residences located adjacent east of the project site. The 15-minute measurements were taken using an ANSI Type II integrating sound level meter. The predominant noise source was traffic. The temperature during monitoring was 80 degrees Fahrenheit with no cloud cover or perceptible wind.

During monitoring, 131 cars/light trucks, 6 medium (two-axles and six wheels) and zero heavy (18-wheel) trucks passed Site 1. A total of 181 cars/light truck, five medium trucks and zero

Source: Birdseye Planning Group 2020; Aerial Photo: Nearmap 2020

Figure 4

Noise Monitoring/Receiver Locations and Contours

4TH CORNER APARTMENTS PROJECT

heavy trucks passed Site 2. A total of 143 cars/light truck, five medium trucks and one heavy truck passed Site 3. Background noise at each site included pedestrian activity related activities associated with operation of the medical facilities and community centers (i.e., people being dropped off/picked up, voices, etc.). Noise from University Street was audible at Site 3 which likely contributed to the higher Leq relative to Site 1. Thus, measured noise is representative of noise levels occurring at the project site during a typical daytime scenario with neighboring facilities open. Table 2 identifies the noise measurement locations and measured noise levels. As shown, the Leq was 59.0 dBA at Site 1, 53.3 dBA at Site 2 and 63.6 dBA at Site 3. The monitoring data sheet is provided as Appendix A.

Table 2
Noise Monitoring Results

Measurement Location	Primary Noise Source	Sample Time	Leq (dBA)
1. Adjacent to Fairmount Avenue at the north end of the project site (4089 Fairmount Avenue parking lot).	Traffic and pedestrian activity	Weekday morning	59.0
2. Alley located adjacent to 4067 Fairmount Avenue parking lot.	Traffic	Weekday afternoon	55.0
3. Adjacent to Fairmount Avenue at 4067 Fairmount Avenue parking lot.	Traffic and pedestrian activity	Weekday afternoon	63.6

Source: Field visit using ANSI Type II Integrating sound level meter.

Regulatory Setting

Federal. The Federal Noise Control Act (1972) addressed the issue of noise as a threat to human health and welfare. To implement the Federal Noise Control Act, the U.S. Environmental Protection Agency (EPA) undertook a number of studies related to community noise in the 1970s. The EPA found that 24-hour averaged noise levels less than 70 dBA would avoid measurable hearing loss, levels of less than 55 dBA outdoors and 45 dBA indoors would prevent activity interference and annoyance (EPA 1972).

The U.S. Department of Housing and Urban Development (HUD) published a Noise Guidebook for use in implementing the Department's noise policy. In general, HUD's goal is exterior noise levels that are less than or equal to 55 dBA Ldn. The goal for interior noise levels is 45 dBA Ldn. HUD suggests that attenuation be employed to achieve this level, where feasible, with a special focus on sensitive areas of homes, such as bedrooms (HUD 2009).

State. Title 24 of the California Code of Regulations (CCR) establishes standards governing interior noise levels that apply to all new single-family and multi-family residential units in California. These standards require that acoustical studies be performed before construction at building locations where the existing Ldn exceeds 60 dBA. Such acoustical studies are required to establish mitigation measures that will limit maximum Ldn levels to 45 dBA in any habitable room. Although there are no generally applicable interior noise standards pertinent to all uses,

many communities in California have adopted an Ldn of 45 as an upper limit on interior noise in all residential units.

City of San Diego General Plan Noise Element

The City of San Diego requires projects to meet exterior noise level standards as established in the Noise Element of the General Plan [City of San Diego 2008, Amended 2015: Policy NE-A.4]. Sound levels up to 60 dBA CNEL are considered compatible with outdoor areas of frequent use (patios, balconies, parks, swimming pools, etc.). The building structure must attenuate exterior noise in occupied areas to 45 dBA CNEL or below. General Plan Noise Element Table NE-3: Land Use – Noise Compatibility Guidelines is presented as Table 3. As shown in Table 3, exterior noise levels of 65 dBA are conditionally compatible provide construction techniques and building materials attenuate interior noise levels of 45 dBA or less.

Table 3
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 and Farming; Community Garden, -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 12 Educational Facilities; Libraries; Museums; Child Care Facilities		45		
Other Educational Facilities Including Vocational/Trade Schools; 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				

Land Use Category	Exterior Noise Exposure (dBA CNEL)			
	60	65	70	75
Building Services; Business Support; Eating & Drinking; Financial Institutions; Maintenance & Repair; Personal Services			50	50
Assembly & Entertainment (includes public and religious assembly); Radio & Television Studios; Golf Course Support				
Visitor Accommodations		45	45	45
Offices				
Business & Professional; Government; Medical, Dental & Health Practitioner; Regional & Corporate Headquarters				
Vehicle and Vehicular Equipment Sales and Service 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 constructions 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 to make the outdoor activities acceptable. Refer to Section I.
	Incompatible	**Indoor Uses**	New construction should not be undertaken.
		Outdoor Uses	Sever noise interference makes outdoor activities unacceptable.

Source: General Plan Noise Element Table NE-3: Land Use – Noise Compatibility Guidelines as amended 2015

CEQA Significance Thresholds

The California Environmental Quality Act (CEQA) Significance Determination Thresholds (City of San Diego 2016) addresses traffic noise, as specified in Table K-2: Traffic Noise Significance Thresholds (dB(A) CNEL). Relevant portions are reproduced in Table 4.

Table 4
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[1]
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

Source: City of San Diego Traffic Noise Significance Thresholds, 2016

[1] 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.

Noise Ordinance

Construction. City of San Diego Municipal Code Section 59.5.0404: Construction Noise (b) states:

> … it shall be unlawful for any person… 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. (City of San Diego 2010).

Construction is prohibited on legal holidays and Sundays as specified in Section 21.04 of the San Diego Municipal Code.

Operation. City of San Diego Municipal Code Section 59.5.0401: Sound Level Limits states:

(a) 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 [reproduced as Table 5], 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.

(b) 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.

Table 5
City of San Diego Applicable Limits

Land Use	Time of Day	One-Hour Average Sound Level (decibels)
1. Single Family Residential	7:00 a.m. to 7:00 p.m 7:00 p.m. to 10:00 p.m 10:00 p.m. to 7:00 a.m.	50 45 40
2. Multi-Family Residential (Up to a maximum density of 1/2000)	7:00 a.m. to 7:00 p.m 7:00 p.m. to 10:00 p.m 10:00 p.m. to 7:00 a.m.	55 50 45
3. All other Residential	7:00 a.m. to 7:00 p.m 7:00 p.m. to 10:00 p.m 10:00 p.m. to 7:00 a.m.	60 55 50
4. Commercial	7:00 a.m. to 7:00 p.m 7:00 p.m. to 10:00 p.m 10:00 p.m. to 7:00 a.m.	65 60 60
5. Industrial or Agricultural	any time	75

Source: City of San Diego Municipal Code Section 59.5.0401, 2010

Vibration Standards

Vibration is a unique form of noise as the energy is transmitted through buildings, structures and the ground whereas audible noise energy is transmitted through the air. Thus, vibration is generally felt rather than heard. The ground motion caused by vibration is measured as particle velocity in inches per second and is referenced as vibration decibels (VdB). The vibration velocity level threshold of perception for humans is approximately 65 VdB. A vibration velocity of 75 VdB is the approximate dividing line between barely perceptible and distinctly perceptible levels.

The City's General Plan Noise Element, Municipal Code and the CEQA Significance Determination Thresholds do not provide vibration standards. The Federal Transit Administration's (FTA) *Transit Noise and Vibration Impact Assessment* (September 2018) uses a threshold of 65 VdB for buildings where low ambient vibration is essential for interior operations. These buildings include hospitals and recording studios. A threshold of 72 VdB is used for residences and buildings where people normally sleep (i.e., hotels and rest homes). A threshold of 75 VdB is used for institutional land uses where activities occur primarily during the daytime (i.e., churches and schools). The threshold used for the proposed project is 72 VdB.

Construction activities such as blasting, pile driving, demolition, excavation or drilling have the potential to generate ground vibrations near structures. With respect to ground-borne vibration impacts on structures, the FTA states that ground-borne vibration levels in excess of 100 VdB would damage fragile buildings and levels in excess of 95 VdB would damage extremely fragile historic buildings. The building at 4061 Fairmount Avenue is considered historic; however, it

would be demolished as part of the project. Thus, 100 VdB is used to quantify potential vibration impacts to neighboring structures. Construction activities referenced above that would generate significant vibration levels are not proposed. However, to provide information for use in completing the CEQA evaluation, construction-related vibration impacts are evaluated using the above referenced criteria.

IMPACT ANALYSIS

Project Noise Sources

Project construction would occur in phases. The initial phase would require demolition of existing structures, hardscape and related improvements located within the construction site. The second phase would focus on site preparation, grading and installation of underground improvements including utility infrastructure. The next phase would construct and building foundation, floor slab and all concrete improvements required for the ground floor parking structure include setting concrete forms and pouring the concrete. From that point, the work would be focused on vertical wood-frame construction of the residential floors (Floors 2-5).

The initial phases of the construction process would take between 4-6 months to complete and generate the highest noise levels as heavy equipment would be required to perform this work. The type of equipment used and duration of use would vary depending upon the construction activities planned throughout the course of a work day.

At completion, the proposed improvements would consist of 75 new apartment units over an at-grade parking structure and incorporate various amenities. These improvements would generate approximately 502 Average Daily Trips, 39 AM peak hour trips and 43 PM peak hour trips (LOS Engineering, June 2020). Traffic volumes would be concentrated on Fairmount Avenue and disperse primarily to Polk Street to the north. Transit is available along Fairmount Avenue and University Avenue. Traffic related impacts are addressed herein based on the difference in volumes between existing conditions and the proposed use referenced above. A doubling of traffic volumes would be required to cause a noticeable increase (3 dBA) in the Leq associated with traffic noise.

Significance Thresholds

As stated in the City of San Diego CEQA Significant Determination Thresholds (July 2016), the following criteria are used to determine with noise-related impacts would occur as a result of project construction and operation:

Would the project:

- Result or create a significant increase in the existing ambient noise levels?
- Result in the exposure of people to noise levels which exceed the City's adopted noise ordinance or are incompatible with Table K-4?

- Result in the exposure of people to current or future transportation noise levels which exceed standards established in the Transportation Element of the General Plan or an adopted airport Comprehensive Land Use Plan?
- Result in land uses which are not compatible with aircraft noise levels as defined by an adopted airport Comprehensive Land Use Plan (CLUP)?

Temporary Construction Noise

Construction noise estimates are based upon noise levels reported by the FTA, Office of Planning and Environment, and the distance to nearby sensitive receptors. Reference noise levels from that document were used to estimate noise levels at nearby sensitive receptors based on a standard noise attenuation rate of 3 dB per doubling of distance (line-of-sight method of sound attenuation) for hardscape conditions.

The main sources of noise during construction activities would include heavy machinery used during demolition of existing buildings, pavement, sidewalks and general clearing of the site, as well as equipment used for construction. Table 6 shows the typical noise levels associated with heavy construction equipment. As shown, average noise levels associated with the use of heavy equipment at construction sites can range from about 81 to 95 dBA at 25 feet from the source, depending upon the types of equipment in operation at any given time and phase of construction.

As referenced above, the City of San Diego limits the average sound level from construction noise to 75 decibels at any property zoned residential during the 12-hour period from 7:00 a.m. to 7:00 p.m. Noise-sensitive uses near the project site are existing multifamily residences across Fairmount Avenue to the west and adjacent to the site across the adjacent alley to the east. The average distance from the center of the site to the nearest receiver (i.e., multifamily residences along the alley adjacent to the east property line) is approximately 50 feet.

As referenced, it is assumed demolition, grading and site preparation work would require the simultaneous use of several pieces of heavy equipment. Building construction and finishing would utilize hand tools; however, equipment would also be required to deliver materials to the project site and work areas.

Based on EPA noise emissions, empirical data from existing noise studies as well as the amount and type of equipment needed for construction of the proposed project, worst-case noise levels from the construction equipment would occur during demolition and grading activities. The anticipated equipment used on-site would include a jackhammer, bobcat/dozer, backhoe/tractor, grader and dump truck. Due to size of the site (i.e., 0.87 acres) and related physical constraints and normal site preparation operations, the equipment will be spread out over the site and likely only used for specific operations. Based upon the site plan, construction operations would occur near the eastern property line (the location closest to sensitive receptors) while other operations could occur as far as 100 feet from the same property line along the west side of the site. This would result in an average distance of 50 feet from the

Table 6
Typical Construction Equipment Noise Levels

Equipment Onsite	Typical Level (dBA) 25 Feet from the Source	Typical Level (dBA) 50 Feet from the Source	Typical Level (dBA) 100 Feet from the Source
Air Compressor	84	78	64
Backhoe	84	78	64
Bobcat Tractor	84	78	64
Concrete Mixer	85	79	73
Bulldozer	88	82	76
Jack Hammer	95	89	83
Pavement Roller	86	80	74
Street Sweeper	88	82	76
Man Lift	81	75	69
Dump Truck	82	76	70

Source: Hanson, Towers and Meister, May 2006
Noise levels based on FHWA Roadway Construction Noise Model (2006) Users Guide Table 1.
Noise levels based on actual maximum measured noise levels at 50 feet (Lmax).
Noise levels assume a noise attenuation rate of 6 dBA per doubling of distance.

center of the construction operations to the property lines. The closest distance to proposed construction activities would be approximately 25 feet from the eastern property line where sensitive receivers are located along the east side of the adjacent alley.

Demolition Noise Levels

Construction equipment will not operate continuously during a 12-hour workday which for the purposes of avoiding temporary construction noise impacts, is allowed between 7:00 a.m. and 7:00 p.m. per San Diego Municipal Code Section 59.5.0404. Equipment would be used as needed depending on the activity. For example, jackhammers and loaders may be used to break up asphalt areas and load material into trucks for transport off-site. Noise levels from the demolition activities can reach short-term peak levels exceeding 90 dBA but will be periodic rather than constant. For reference purposes, empirical data obtained from the *Point Loma High School Whole Site Modernization and Athletic Facilities Upgrade Project Noise Study* (Ldn Consulting 2016) states that worst-case hourly construction noise levels can be approximately 80.8 dBA Leq at an average distance of 25 feet. This data is relevant to the proposed project as the equipment types and numbers used for assessing noise impacts for the school project was similar to what is anticipated for the project. Additionally, the site is located within a densely populated urban area analogous to the project site. The daily 12-hour average noise level at the Point Loma High School site was measured to be 76 dBA at a distance of 25 feet. This variability results from periodic rather than constant use of equipment and the fact that equipment moves around the site throughout the workday. Assuming a reference level of 76 dBA at 25 feet and a 3 dBA decrease per doubling of distance, the average noise level over a 12-hour period would be approximately 73 dBA. Construction noise levels during demolition for the project are expected

to be similar to what occurs at other urban fill sites throughout the City; and thus would be within the acceptable limits required by the City of San Diego.

Construction Noise Levels

The project site is 0.87 acres in size which limits the amount and type of equipment that can operate on the site at any one time. If during site preparation and grading, a bobcat tractor (78 dBA), a backhoe (78 dBA) and a dump truck (82 dBA) were working simultaneously generally in the center of the site over a 12-hour workday, the Leq would be approximately 85 dBA at 50 feet and 82 dBA at 25 feet. This would exceed the 75-dBA average at the sensitive properties located east of the site. For reference purposes, noise levels associated with the above construction scenario are shown at varying distances in Table 7. As shown, noise levels at 100 feet or more from the active construction site would attenuate to below the 75-dBA threshold.

Table 7
Typical Maximum Construction Noise Levels at Various Distances from Project Construction

Distance from Construction	Maximum Noise Level at Receptor (dBA)
25 feet	88
50 feet	85
100 feet	72
250 feet	66
500 feet	60
1,000 feet	54

As referenced, construction noise would not be continuous in one location over a 12-hour workday; however, it is possible that during project construction, noise levels would have the potential to exceed the 75-dBA standard at adjacent receivers. Thus, without mitigation, temporary construction noise impacts could be significant. Mitigation Measure NOI-1 below would be implemented during project construction to avoid or reduce potential impacts to less than significant.

Mitigation Measure NOI-1: Noise Control Plan. Construction contractors shall develop and implement a noise control plan that includes a noise control monitoring program to ensure sustained construction noise levels do not exceed 75 decibels over a 12-hour period at the nearest sensitive receivers. The plan shall include the following requirements:

> **Construction Equipment**. Construction equipment noise shall be controlled using a combination of the following methods:

- Electrical power shall be used to run air compressors and similar power tools where feasible;

- Internal combustion engines shall be equipped with a muffler of a type recommended by the manufacturer and in good repair;

- All diesel equipment shall be operated with closed engine doors and be equipped with factory recommended mufflers;

- Any construction equipment that continues to generate substantial noise at the eastern project boundary shall be shielded with temporary noise barriers, such as barriers that meet a sound transmission class (STC) rating of 25, sound absorptive panels, or sound blankets on individual pieces of construction equipment;

- Stationary noise-generating equipment, such as generators and compressors, shall be located as far as practically possible from the nearest residential property lines;

- Contractor shall turn off idling equipment while not being used for operations after idling for five minutes; and

- Contractor shall perform noisier operation during the times least sensitive to nearby residential receptors.

Neighbor Notification. Designate a noise control monitor to oversee construction operations in proximity to sensitive receivers. Provide notification to residential occupants adjacent to the project site at least 24 hours prior to initiation of construction activities that could result in substantial noise levels at outdoor or indoor living areas. This notification should include the anticipated hours and duration of construction and a description of noise reduction measures being implemented at the project site. The notification should include the telephone number and/or contact information for the on-site noise control monitor that residents can use for inquiries and/or to submit complaints associated with construction noise.

Temporary Construction-Related Vibration

Activities associated with residential facilities do not generate vibration. Thus, this discussion focuses on temporary vibration caused by construction. As referenced, the closest multifamily residences to the site are located along the east side of the alley approximately 30 feet from the eastern project property line. Based on the information presented in Table 8, vibration levels from operation of a loaded truck or bulldozer bobcat/backhoe would attenuate to 87 VdB or less at 25 feet. As discussed below, 100 VdB is the threshold where minor damage can occur in fragile buildings. Vibration levels are projected to be under this threshold; thus, structural

damage is not expected to occur as a result of construction activities associated with the proposed project.

As referenced, 72 VdB is the vibration threshold for residences and/or buildings where people sleep. Table 8 shows construction equipment, with the exception of a small bulldozer could exceed 72 VdB at varying distances across the site. Construction activities would occur during daytime hours which would minimize nighttime sleep disturbance; however, to minimize vibration impacts, it is recommended that small dozers and similar equipment be used in proximity to the receivers east of the site. Construction activities that cause vibration would be temporary; however, they may be perceptible at adjacent receivers. Implementation of the above-referenced BMPs would minimize short-term vibration impacts at receivers located in proximity to the site.

Table 8
Vibration Source Levels for Construction Equipment

Equipment	Approximate VdB				
	25 Feet	50 Feet	60 Feet	75 Feet	100 Feet
Large Bulldozer	87	81	79	77	75
Loaded Trucks	86	80	78	76	74
Jackhammer	79	73	71	69	67
Small Bulldozer	58	52	50	48	46

Source: Federal Railroad Administration, 1998

Long-Term Operational Noise Exposure

Long-term operation of the proposed project was evaluated for potential exterior traffic related impacts caused by increased traffic volumes associated with the project. In addition, a discussion regarding potential noise levels associated with roof top Heating, Ventilation and Air Conditioning (HVAC) an operation of the parking garage is provided.

Exterior Traffic Noise. Traffic is the primary noise source that would be generated by the proposed project. Existing measured noise levels are lower than the residential standard (65 dBA) at the multifamily residences located along Fairmount Avenue and along the alley east of the site. As referenced, the highest measured noise level is 63.6 dBA (see Table 2). Noise levels attenuate with distance from Fairmount Avenue, the primary noise source in the study area. Whether a traffic-related noise impact would occur is based on whether project traffic, when added to the existing traffic, would cause the Leq to noticeably increase (+3 dBA) or exceed the 65-dBA exterior standard referenced in Table 4 above.

The roadway network adjacent to the project site (Fairmount Avenue, eastbound Polk Avenue and the alley to the east of the site) was modeled using the Federal Highway Administration Traffic Noise Model (TNM) version 2.5 software (see Appendix A). The model calculates traffic

noise at receiver locations based on traffic volumes, travel speed, mix of vehicle types operating on the roadways (i.e., cars/trucks, medium trucks and heavy trucks) and related factors. Traffic volumes and vehicle mix used to calibrate TNM were based on vehicle counts obtained during the monitoring period. The 15-minute counts were multiplied by four to obtain hourly traffic counts. The model was calibrated to calculate noise levels that are +/- 2 dBA those measured on-site and reported in Table 2.

Traffic volumes for peak hour existing and project operation were obtained from the Trip Generation Memorandum (LOS Engineering, June 2020). Evening (PM) peak hour project trips for existing conditions were modeled to determine baseline noise conditions. Project trips were then added to the baseline trips to determine whether the Leq at neighboring receivers would noticeably change or exceed 65 dBA as a result of project-related traffic. As referenced, the project would generate 502 ADT. Peak hour volumes are estimated to be 39 AM peak hour trips (9 inbound and 30 outbound), and 43 PM peak hour trips (30 inbound and 13 outbound). The PM peak hour trips were used in the analysis. Noise levels were calculated at the following receivers and are intended to represent conditions at multiple receivers within proximity to these locations:

1. Single-family residence at 4086 44th Street;
2. City Heights Square Apartments at 4029 43rd Street (east side fronts Fairmount Avenue);
3. Multifamily apartments at 4046 44th Street; and
4. Multifamily apartments at 4068 44th Street.

Note the residences on 44th Street backup to the alley that runs north/south along the east property boundary. The receiver locations are shown in Figure 4. As shown in Table 9, the daytime hourly average (Leq) does not exceed the 65-dBA standard at the receivers modeled under baseline conditions.

Table 9
Modeled Noise Levels

Receptor	Existing Leq	Exceed Standard?	With Project Leq	dBA Change	Significant Impact
Site 1	58.7	No	58.5	-0.2	No
Site 2	67.2	Yes	67.2	0.0	No
Site 3	60.9	No	58.6	-2.3	No
Site 4	57.6	No	55.4	-2.2	No

As shown, the units within Receiver Site 2 that front Fairmount Avenue are the only modeled location where existing traffic noise exceeds the 65-dBA standard. This receiver is located adjacent to and west of Fairmount Avenue southwest of the project site. It is assumed that the Leq at the project site is similar given the proximity to Receiver Site 2. The existing buildings located on the east side of Fairmount Avenue provide some shielding for the receivers east of the alley. Receivers Site 1 benefits the most from existing shielding. Receiver Sites 3 and 4 benefit from both shielding and distance attenuation.

To cause a significant noise impact, project-related traffic would have to cause the existing Leq at one or more receivers to exceed the 65-dBA standard or increase by 3 or more dBA. A change

of 3 dBA requires a doubling or halving of sound energy. Thus, for the project to noticeably change existing traffic related noise, it would have to generate enough traffic to double volumes on the adjacent roadways. Further, existing vehicle speeds would have to be maintained. As shown in Table 9, traffic associated with the project would have no effect on Receiver Site 2 as the trips would be focused in the alley east of the site. The proposed residential building would provide greater shielding than the existing building as it extends further south and would be taller. This would result in an approximately 2 dBA reduction in noise levels at Receiver Sites 3 and 4. Receiver Sites 1 would not have a noticeable benefit. Properties closer to Polk Avenue are expected to have higher noise levels because of traffic noise from Polk Avenue. The project units that front Fairmount Avenue are expected to have exterior noise levels similar to that modeled for Receiver Site 2 at units that also front Fairmount Avenue. Operation traffic from the proposed project would have no adverse impact on sound levels at receivers in proximity to the site.

With respect to future (i.e., cumulative) traffic noise, as referenced, traffic volumes on Fairmount Avenue, University Avenue, Polk Avenue and the alley located adjacent to and east of the project site would have to double while maintaining existing speeds to create a noticeable increase in noise levels. The project site is located in a densely populated urban area. Future development in the project area would be limited to urban infill projects similar in size and scope to the proposed project. Because land use constraints prohibit the expansion of the existing street network and transit access is available throughout the area, the traffic volumes and vehicle speeds required to noticeably increase noise are not projected to occur nor could these conditions be accommodated on the local street network. Thus, cumulative traffic noise is not expected to noticeably change from existing conditions.

Exterior Use Noise (HVAC). The HVAC system proposed for use on the site has not been specified and noise levels vary depending on the system size. However, it is assumed that one or more HVAC compressor units will be installed on the roof-top of the proposed apartment building. HVAC noise levels can be expected to range from 60 to 70 dBA at 5 feet from the roof top equipment and ventilation openings (Illingsworth & Rodkin, 2011). Assuming HVAC units are installed at the center of the roof top, or approximately 50 feet from the closest receivers (Receivers 1, 3 and 4) and 150 feet from Receiver 2, a 70-dBA reference noise level would attenuate to 52 dBA at 40 feet from the source. HVAC noise would be less than the 65 dBA criteria at the project property line.

Outdoor Open Space Noise Compatibility. The project proposes and outdoor recreation courtyard on the east side of the building. This area would face the adjacent alley and the single- and multifamily residences located along the east side of the alley. As referenced herein, construction of the 4-story building between the outdoor recreation area and the primary noise source in the area (i.e., Fairmount Avenue), would provide some shielding from surround roadways; however, Fairmount Avenue and University Avenue would be audible. The surrounding building would provide screening for the outdoor recreation courtyard; thus, exterior noise levels at this usable open space area would be approximately 59.6 dBA.

Table NE-3 in the Noise Element of the General Plan (Table 3 above) shows that sound levels up to 60 dBA CNEL are considered compatible with outdoor areas of frequent use (patios, balconies, pools, etc.) in the Multifamily Residential land use category. Sound levels up to 70 dBA CNEL are considered Conditionally Compatible with the use. Based on noise predictive modelling of the existing and future traffic conditions, noise levels within the outdoor recreation courtyard would be compatible with noise levels allowed in Table NE-3 of the General Plan Noise Element.

Parking Garage Noise. Vehicles operating in the parking garage may generate temporary noise. This would include engine operation, period car alarm activation and other noises commonly associated with vehicles operating in a parking lot or structure. These noises would be short-term, periodic and consistent with what occurs within densely developed urban areas. Because of the duration, these sources typically do not impact the overall Leq at sensitive properties located in proximity. While these noises would be audible, they would be part of the ambient condition occurring in the neighborhood and not have or cause a significant or adverse impact to sensitive properties located in proximity to the site

Interior Noise. California Energy Code Title 24 standards specify construction methods and materials that result in energy efficient structures and up to a 30-dBA reduction in exterior noise levels (assuming windows are closed). This includes operation of mechanical ventilation (e.g. heating and air conditioning), in combination with standard building construction that includes dual-glazed windows with a minimum Sound Transmission Class (STC) rating of 26 or higher. When windows are open, the insertion loss drops to about 10 dBA. Assuming windows are closed, interior noise levels at project residences that front Fairmount Avenue would be approximately 37 dBA and less at residences located along the east side of the proposed building provided the building is designed to achieve an STC of 26 or higher. This would be below the 45-dBA interior standard. To ensure this requirement is met, an exterior to interior noise study would be prepared during the building permit process, prior to occupancy, to confirm attenuation associated with wall, window and door assemblies would achieve the required 45-dBA standard.

Airport Land Use Compatibility Plan Compatibility. The San Diego International Airport is located approximately 4.5 miles southwest of the project site and Montgomery Field Airport is located approximately 5 miles northwest of the site. Based on the noise contour maps provided in the San Diego International Airport Land Use Compatibility Plan (County of San Diego County 2014) and the Montgomery Field Airport Land Use Compatibility Plan (County of San Diego 2010), the project site is located outside the 60 dBA CNEL contours and is not affected by airport noise. For this reason, the project site is not located in an area that is affected by aircraft noise; and thus, compatibility with an adopted Airport Land Use Compatibility Plan is not required.

CONCLUSION

The proposed project would have the potential to cause temporary adverse noise impacts associated with construction near the project's eastern property line. With implementation of Mitigation Measure NOI-1, noise levels exceeding the 75 dBA 12-hour average standard would be avoided. Thus, a **less than significant** construction noise impact would occur.

Exterior noise levels caused by traffic sources are expected to be acceptable at the project site and for noise-sensitive properties in the project area. The proposed building would provide shielding from Fairmount Avenue and contribute to a 2 dBA decrease in noise levels at Receiver Sites 3 and 4 relative to ambient conditions. Noise levels within the outdoor recreation courtyard located on the east side of the building would be approximately 59.6 dBA; and thus, compatible with Table NE-3 of the General Plan Noise Element. Assuming a 30-dBA reduction in noise levels between exterior and interior levels, the project would be compatible with the future noise environment in the project area and the 45-dBA standard would be met at all residential receivers modeled with operation of the proposed project. As referenced, an exterior to interior noise study would be prepared during the building permit process to confirm projected attenuation associated with wall, window and door assemblies would achieve the required 45-dBA standard. Thus, a **less than significant** operational noise impact would occur.

Regarding the HVAC system, noise would be less than the 65 dBA criteria at the project property line. Noise from the parking garage would be audible but part of the ambient condition occurring in the neighborhood and not have or cause a significant or adverse impact to the on-site residential units or sensitive properties located in proximity to the site. Noise from the HVAC system and parking garage would be **less than significant.**

REFERENCES

California Office of Planning and Research. *OPR General Plan Guidelines*, 2003.

City of San Diego Municipal Code, *Section 59.5.0401*, 2010.

City of San Diego. *Municipal Code Section 59.5.0404: Construction Noise*, 2010

City of San Diego. *General Plan Noise Element Policy NE-A.4*. 2008, amended 2015.

City of San Diego. *California Environmental Quality Act Traffic Noise Significance Thresholds*, July, 2016

City of San Diego. *California Environmental Quality Act (CEQA) Significance Determination Thresholds*, July 2016.

County of San Diego Regional Airport Authority, *San Diego International Airport, Airport Land Use Compatibility Plan*, May 1, 2014.

County of San Diego Regional Airport Authority, *Montgomery Field Airport Land Use Compatibility Plan*, January 25, 2010.

dBF & Associates, Inc., Reference Noise Level Compilation Table, 2016.

Federal Highway Administration. *Roadway Construction Noise Model. 2006.* Users Guide Table 1.

Federal Highway Administration, Transportation Noise Model Version 2.5, 2004.

Federal Transit Administration. *Transit Noise and Vibration Impact Assessment*. September, 2018.

Federal Rail Administration (FRA) *Guidelines (Report Number 293630-1),* December 1998.

Hanson, Carl E., Towers, David A., and Meister, Lance D. (2006, May). *Transit Noise and Vibration Impact Assessment.* Federal Transit Administration, Office of Planning and Environment. http://www.fta.dot.gov/documents/FTA_Noise_and_Vibration_Manual.pdf

Harris Miller Miller & Hanson Inc. T*ransit Noise and Vibration Impact Assessment, Final Report*. May 2006.

Ldn Consulting, Inc. *Point Loma High School Environmental Impact Report Noise Study*, February 2016

.

LOS Engineering, Inc., *Fourth Corner Apartments Traffic Access Analysis*, June 2020.

United States Environmental Protection Agency. *Federal Noise Control Act of 1972, 42 U.S.C. §4901 et seq.*, 1972

United States Department of Housing and Urban Development. *Noise Control Guidebook*, 2009.

Appendix A

Monitoring Data Sheet and Modeling Results

FIELD NOISE MEASUREMENT DATA

Project Name: PECO 4TH STREET Apts Page 1 of

Project #: Day / Date 6-20-17 My Name

Sound Level Meter	Calibrator	Weather Meter
Model # LD 820	Model #	Model # Serial #
Serial #	Serial #	
Weighting: (A) / C / Flat	Pre-Test: ____ dBA SPL	Terrain: Hard / Soft / Mixed
Response: (Slow) / Fast / Impl	Post-Test: ____ dBA SPL	Topo: (Flat) / Hilly (describe)
Windscreen: (Yes) / No		Wind: (Steady) / Gusty

ID	Time Start	Time Stop	Leq	Lmin	Lmax	L10	L50	L90	Wind Spd/ Dir (mph)	Temp (°F)	RH (%)	Bar Psr (in Hg)	Cloud Cover (%)
1	9:50	10:05	59	48.4	75.1	62.1	55.1	50.2		80°			0%
2	10:19	10:34	55	48.3	66.1	57.9	53.3	49.8		80°			0%
3	10:40	10:50	63.6	49.9	78.9	67.2	58.7	52.7					

			Location(s) / GPS Reading(s):
Roadway Name	FAIRMOUNT (408)	KING	
Speed (post/obs)	20-35	20-35	
Number of Lanes	4	4	
Width (pave/row)	48'	48'	
1- or 2- way	2	2	
Grade	0%	0%	
Bus Stops	yes	yes	
Stoplights	yes	yes	
Street Parking	yes	yes	
Automobiles	131	181 143	
Medium Trucks	6	5	
Heavy Trucks	0	0 1	

Other Noise Sources: distant (aircraft) / (roadway traffic) / trains / landscaping / rustling leaves / children playing / dogs barking / birds vocalizing

Notes and Sketches on Reverse

BPG
<Analysis By?>

13 April 2020
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: <Project Name?>
RUN: Fourth Corner Existing
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 Calculated	No Barrier LAeq1h Crit'n	Increase over existing Calculated	Increase over existing Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Noise Reduction Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Receiver1	1	1	0.0	58.7	66	58.7	10	----	58.7	0.0	8	-8.0
Receiver2	2	1	0.0	67.2	66	67.2	10	Snd Lvl	67.2	0.0	8	-8.0
Receiver3	3	1	0.0	60.9	66	60.9	10	----	60.9	0.0	8	-8.0
Receiver4	4	1	0.0	57.6	66	57.6	10	----	57.6	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Noise Reduction Avg	Noise Reduction Max
		dB	dB	dB
All Selected	4	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

BPG
<Analysis By?>

13 April 2020
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: <Project Name?>
RUN: Fourth Corner w-Project
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					With Barrier			
				LAeq1h		Increase over existing		Type Impact	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
Receiver1	1	1	0.0	58.5	66	58.5	10	----	58.5	0.0	8	-8.0
Receiver2	2	1	0.0	67.2	66	67.2	10	Snd Lvl	67.2	0.0	8	-8.0
Receiver3	3	1	0.0	58.6	66	58.6	10	----	58.6	0.0	8	-8.0
Receiver4	4	1	0.0	55.4	66	55.4	10	----	55.4	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction		
		Min	Avg	Max
		dB	dB	dB
All Selected	4	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