Appendix H

Noise and Vibration Assessment

HELIX Environmental Planning, Inc.
11 Natoma Street, Suite 155
Folsom, CA 95630
916.365.8700 tel
619.462.0552 fax
www.**helixepi**.com

May 5, 2022 Project 02576.00050.001

Mr. Steve Banks
Principal Planner
City of Folsom, Community Development Department
50 Natoma Street
Folsom, CA 95630

Subject: Natoma Senior Housing Project Noise and Vibration Assessment

Dear Mr. Banks:

HELIX Environmental Planning, Inc. (HELIX) has assessed the analyzed potential noise and vibration impacts associated with the construction and operation of the proposed Natoma Senior Housing Project (project). Analysis within this report was prepared to support impact analysis pursuant to the California Environmental Quality Act (CEQA; Public Resources Code Sections 21000 et seq.), CEQA Guidelines (Title 14, Section 15000 et seq. of the California Code of Regulations).

PROJECT LOCATION

The project site is located at 103 East Natoma Street, approximately 350 feet northeast of the intersection of Fargo Way and Natoma Street, in the City of Folsom (City) in Sacramento County, California. The approximately 4.86-acre project site is comprised of Assessor's Parcel Number (APN) 071-0320-042. The project site fronts East Natoma Street on the northwest side. The triangle shaped project site is currently vacant and undeveloped. See Figure 1, *Vicinity Map*, and Figure 2, *Measurement and NSLU Locations*, included as attachments to this letter.

PROJECT DESCRIPTION

The proposed project includes the construction of a 136-unit, affordable senior (i.e., age-restricted) rental housing development consisting of one- and two-bedroom units in an estimated 109,608-square-foot, three-story building. Residential units would range from approximately 552 to 748 square feet each. Each unit would be designed with a full kitchen, living space, dining space, bathroom, laundry, and a balcony. Apartment units are planned on each of the three levels of the building and would be accessible from hallway corridors. Entrances to the building would be located on each side of the irregularly shaped building.

The project would include community amenities such as a community center on the first floor, outdoor seating and dining areas, perimeter walkways, a dog park, a bocce ball court, bike racks, picnic tables,

outdoor barbeques/kitchens, and benches. Landscaped areas with various trees and shrubs would surround the parking area and the proposed building. A leasing office would be adjacent to the south building entry. The project site would include surfaced driveways, approximately 144 off-street parking spaces, and 28 bicycle parking spaces. Access to the project site would be provided via two driveways on East Natoma Street with one driveway aligned with the East Natoma Street/Folsom Prison Road signalized intersection. See Figure 3, Site Plan.

NOISE METRICS

All noise-level and sound-level values presented herein are expressed in terms of decibels (dB), with A weighting, abbreviated "dBA," to approximate the hearing sensitivity of humans. Time averaged noise levels of one hour are expressed by the symbol "L_{EQ}" unless a different time period is specified. Maximum noise levels are expressed by the symbol "L_{MAX}." Some of the data also may be presented as octave-band-filtered and/or A-octave band-filtered data, which are a series of sound spectra centered on each stated frequency, with half of the bandwidth above and half of the bandwidth below, the stated frequency. These data are typically used for machinery noise analysis and barrier-effectiveness calculations. The Community Noise Equivalent Level (CNEL) is a 24-hour average, where noise levels during the evening hours of 7:00 p.m. to 10:00 p.m. have an added 5 dBA weighting, and sound levels during the nighttime hours of 10:00 p.m. to 7:00 a.m. have an added 10 dBA weighting. This is similar to the Day Night sound level (L_{DN}), which is a 24-hour average with an added 10 dBA weighting on the same nighttime hours but no added weighting on the evening hours.

Because decibels are logarithmic units, S_{PL} cannot be added or subtracted through standard arithmetic. Under the decibel scale, a doubling of sound energy corresponds to a 3 dBA increase. In other words, when two identical sources are each producing sound of the same loudness, the resulting sound level at a given distance would be 3 dBA higher than from one source under the same conditions. For example, if one automobile produces an S_{PL} of 70 dBA when it passes an observer, two cars passing simultaneously would not produce 140 dBA—rather, they would combine to produce 73 dBA. Under the decibel scale, three sources of equal loudness together produce a sound level 5 dBA louder than one source.

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

VIBRATION METRICS

Groundborne vibration consists of rapidly fluctuating motions or waves transmitted through the ground with an average motion of zero. Sources of groundborne vibrations include natural phenomena and anthropogenic causes (e.g., explosions, machinery, traffic, trains, construction equipment). Vibration sources may be continuous (e.g., factory machinery) or transient (e.g., explosions). Peak particle velocity (PPV) is commonly used to quantify vibration amplitude. The PPV, with units of inches per second (in/sec), is defined as the maximum instantaneous positive or negative peak of the vibration wave.

Decibels are also used compress the range of numbers required to describe vibration. Vibration velocity level (LV) with units of VdB are commonly used in evaluating human reactions to vibrations.

ENVIRONMENTAL SETTING

Existing Noise Environment

The project site is currently vacant and undeveloped. Surrounding land uses include Folsom State Prison to the north; single-family residences to the northeast; Pacific Gas & Electric (PG&E) powerlines and a bicycle trail to the south; single- and multi-family residences to the south; and office space and the City of Folsom Police Department to the west. Noise sources in the project vicinity are dominated by traffic noise from East Natoma Street. Additional noise sources in the area include typical suburban residential noise (e.g., landscape maintenance equipment; building heating, ventilation, and air conditioning (HVAC) systems; dogs) and occasional noise from operation of the Folsom State prison, approximately 2,500 feet (0.5 mile) to the north.

Noise Sensitive Land Uses

Noise-sensitive land uses (NSLUs) are land uses that may be subject to stress and/or interference from excessive noise, including residences, hospitals, schools, hotels, resorts, libraries, sensitive wildlife habitat, or similar facilities where quiet is an important attribute of the environment. Noise receptors (receivers) are individual locations that may be affected by noise. The closest existing NSLUs to the project site are five single-family residences adjacent to the project's northeast property line. Additional single-family and multi-family residence are located approximately 120 feet south of the project site. The closest school to the project site is the Saint John's Notre Dame School approximately 320 feet to the southeast. The closest hospital to the project site is the Vibra Hospital of Sacramento, approximately 350 feet to the south. See Figure 2.

Noise Survey

A site visit/noise survey was on conducted on March 29, 2022, which included two short-term (10 minute) ambient noise measurements. Measurement M1 was conducted on the northeast side of the project site approximately 150 feet from the residences along Cimmaron Drive and approximately 300 feet from East Natoma Street. Measurement M2 was conducted the northwest side of the project site approximately 40 feet from East Natoma Street and approximately 300 feet northeast of the Folsom Prison Road intersection. Traffic counts were conducted during measurement M2. The noise measurement survey notes are included as Attachment A to this report. The noise measurement locations are shown on Figure 2. The measured noise levels are shown on Table 1, *Noise Measurement Results*.

Table 1
NOISE MEASUREMENT RESULTS

M1	
Date	March 29, 2022
Time	1:57 p.m. – 2:07 p.m.
Location	Northeast side of the project site, approximately 150 feet from residences on Cimmaron Drive
Noise Level	56.7 dBA L_{EQ}
Notes	Noise primarily from vehicular traffic on East Natoma Street and residential landscape maintenance equipment.
M2	
Date	March 29, 2022
Time	2:10 p.m. – 2:20 p.m.
Location	Northwest side of the project site, approximate 40 feet from East Natoma Street.
Noise Level	65.5 dBA L_{EQ}
Notes	Noise primarily from traffic on East Natoma Street. Traffic count: 170 cars, 1 medium truck.

REGULATORY FRAMEWORK

City of Folsom General Plan Noise Element

The Safety and Noise Element of the City of Folsom General Plan regulates noise emissions from public roadway traffic on new development of residential or other noise sensitive land uses. Policy SN 6.1.2 and Table SN-1 from the General Plan provide noise compatibility standards for land uses. For multi-family housing, noise due to traffic on public roadways, railroad line operations, and aircraft shall be reduced to or below 65 CNEL for outdoor activity areas and reduced to or below 45 CNEL for interior use areas. For other land uses that may be affected by project-generated traffic noise, the exterior noise compatibility limit is: 60 CNEL for single-family residential uses and 70 CNEL for commercial uses (City 2021).

Policy SN 6.1.8 requires construction projects and new development anticipated to generate a significant amount of vibration to ensure acceptable interior vibration levels at nearby vibration-sensitive uses based on Federal Transit Administration criteria. Table SN-3 from the General Plan provides vibration impact criteria. For construction with infrequent vibration events (defined as fewer than 30 vibration events of the same source per day), impacts would be significant if nearby residences are subject to ground borne vibrations in excess of 80 VdB (City 2021).

City of Folsom Municipal Code

For stationary noise sources, the City has adopted a Noise Ordinance as Section 8.42 of the City Municipal Code (City 1993). The Noise Ordinance establishes hourly noise level performance standards that are most commonly quantified in terms of the one-hour average noise level (L_{EQ}). Using the limits specified in Section 8.42.040 of the Noise Ordinance, noise levels generated on the project site (other than noise from HVAC systems) for 30 or more minutes in any hour would be significant if they exceed 50 dBA L_{EQ} from 7:00 a.m. to 10:00 p.m. and 45 dBA L_{EQ} from 10:00 p.m. to 7:00 a.m., measured at

off-site residential property boundaries. Section 8.42.060 exempts construction noise from these standards provided that construction does not occur before 7:00 a.m. or after 6:00 p.m. on weekdays, or before 8:00 a.m. or after 5:00 p.m. on Saturday or Sunday. Noise from the project's HVAC would be significant if exterior noise levels exceed 50 dBA, per Section 8.42.070 of the City Municipal Code measured at off-site residential property boundaries.

METHODOLOGY AND ASSUMPTIONS

Noise Modeling Software

Project construction noise was analyzed using the U.S. Department of Transportation (USDOT) Roadway Construction Noise Model ([RCNM]; USDOT 2008), which utilizes estimates of sound levels from standard construction equipment.

Modeling of the exterior noise environment for this report was accomplished using the Computer Aided Noise Abatement (CadnaA) model version 2021. Traffic noise was evaluated within CadnaA using the U.S. Department of Transportation Federal Highway Administration (FHWA) Traffic Noise Model (TNM) version 2.5 (USDOT 2004). The noise models used in this analysis were developed from the site plan provided by the project architect. Input variables included building mechanical equipment reference noise levels, road alignment, lane configuration, projected traffic volumes, estimated truck composition percentages, and vehicle speeds

Off-Site Traffic Noise

The one-hour L_{EQ} traffic noise level is calculated utilizing peak-hour traffic. The model-calculated one-hour L_{EQ} noise output is the equivalent to the CNEL (Caltrans 2009). The off-site traffic noise modeling includes does not account buildings, structures or terrain. The project Transportation Impact Study (TIS) included an intersection analysis with data for calculation of peak hour traffic volumes on streets in the project vicinity (T. Kear 2022). Existing traffic for East Natoma Street was estimated from intersection turning counts included in the TIS. The PM peak hour traffic volumes used in the analysis is shown in Table 2, *PM Peak Hour Traffic Volumes*. The noise modeling input and output is included as Attachment B to this report. Traffic was assumed to be comprised of a typical mix of vehicles for suburban streets in California: 96 percent cars and light trucks; 3 percent medium trucks and buses; and 1 percent heavy trucks.

Table 2
PM PEAK HOUR TRAFFIC VOLUMES

Roadway Segment	Existing (2022)	Existing (2022) + Project
East Natoma Street – Fargo Street to Folsom Prison Road	1,060	1,089
East Natoma Street – Folsom Prison Road to Cimmaron Circle	943	969

Source: T. Kear 2022

Heating, Ventilation, and Air Conditioning

The project would use one residential-sized HVAC units for each apartment, with the air conditioning condenser located on the rooftop of the building. The condensers would be located behind a parapet wall of equal or greater height to the HVAC unit, which would provide substantial noise attenuation.

Specific details on planned HVAC units were not available at the time of this analysis. A typical system for apartments in multi-story buildings would be a Carrier model 38BRC-024-34 2-ton split system for, which has a sound rating of 76 dBA S_{WL} (Carrier 2005). The manufacturer's noise data for the HVAC units is provided below in Table 3, *HVAC Condenser Noise Data*.

Table 3
HVAC CONDENSER NOISE DATA (S_{WL} dBA)

	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	Overall Noise Level
	55.5	62.5	68.0	70.0	67.0	61.5	58.5	76.0

Source: Carrier 2005
S_{WL} = sound power level; Hz = Hertz; kHz = kilohertz

STANDARDS OF SIGNIFICANCE

Based on Appendix G of the CEQA Guidelines, implementation of the project would result in a significant adverse impact if it would:

1. Generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the City of Folsom General Plan or noise ordinance;

2. Generate excessive ground-borne vibration or ground borne noise levels; or

3. For a project located within the vicinity of a private airstrip or an airport land use plan, or where such a plan has not been adopted, within two miles of a public use airport or private airstrip, expose people residing or working in the project area to excessive noise.

Per the City General Plan, impacts related to the generation of noise on the project site would be significant if noise levels generated by the project site HVAC systems would be significant if it would exceed 50 dBA L_{EQ} residential property boundaries. For traffic-related noise, impacts would be considered significant if the project would cause ambient noise levels at nearby NSLUs to exceed the noise compatibility limits defined in the City General Plan or would increase noise levels by 1.5 CNEL or more in areas with exiting ambient noise levels exceeding the noise compatibility limits.

In accordance with the City Municipal Code, any noise from project construction activity would be considered significant for construction occurring before 7:00 a.m. or after 6:00 p.m. on weekdays, or before 8:00 a.m. or after 5:00 p.m. on Saturday or Sunday.

In accordance with the City General Plan, excessive ground-borne vibration would occur if construction-related ground-borne vibration exceeds 80 VdB at nearby residential properties.

IMPACT ANALYSIS

1) Generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the Folsom General Plan or noise ordinance?

Less than Significant Impact.

Construction Noise

The nearest NSLUs to the project site area are single-family residences approximately adjacent to the project's northeast property line. Heavy earthmoving equipment would have the potential to be as close as 15 feet from the residential property line, including rubber-tired dozers and graders. Over the course of one hour, it is anticipated that the average distance of heavy earthmoving equipment from residential property lines would be approximately 50 feet. Modeling shows that the combined one-hour noise from a dozer and grader would result in 82.7 dBA L_{EQ} at the closest residential property. Because construction equipment would be mobile as it moves across the project site, the noise level experienced by the neighboring uses would vary throughout the day. The modeling output for the anticipated construction equipment is included in Attachment B to this report.

According to the City Code Section 8.42.060, noise sources associated with construction of the project which are conducted between the hours of 7:00 a.m. and 6:00 p.m., on Monday, Tuesday, Wednesday, Thursday, Friday, and Saturday, and between 9:00 a.m. and 6:00 p.m. on Sunday, are exempt from the City noise standard (City 1993). Nighttime construction noise is not anticipated for the project. However, nighttime construction is not exempt from the City Noise Ordinance and would exceed the nighttime standard of 45 dBA if it were to occur, resulting in a potentially significant noise impact. Mitigation measure NOI-01 would prohibit construction activities outside the above daytime hours.

Operational Noise

Off-Site Traffic Noise

As described above, modeling of the exterior noise environment for this report was accomplished using CadnaA and the TNM. According to the TIS, the project is expected to generate approximately 504 daily trips and 41 trips during the PM peak hour (T. Kear 2022). Future traffic noise levels presented in this analysis are based on traffic volumes (as described above) for the existing (2022) and existing plus project scenarios. The modeling does not account for intervening terrain or structures (e.g., sound walls, buildings).

The calculated off-site traffic noise levels are shown in Table 4, *Off-Site Traffic Noise Levels*. In typical outdoor environments, a 3 dBA increase in ambient noise level is considered just perceptible and a 5 dBA increase is considered distinctly perceptible. In areas where existing or future ambient noise exceeds the land use compatibility standards, an individual project's contribution to increases in ambient noise level could be considered significant if it exceeds 1.5 dBA. Because areas along the analyzed road segments already exceed the residential land use noise compatibility standard listed in the City General Plan (60 CNEL for low density residential; 65 CNEL for multi-family residential), this analysis uses a threshold of a 1.5 CNEL increase to determine significance of the impact.

As shown in Table 4, the maximum change in CNEL as a result of project-generated traffic would be 0.1 CNEL, a change in ambient noise level that is lower than the threshold and is not discernable. Therefore, impacts related to the project generating a substantial permanent increase in ambient noise levels in the vicinity of the project in excess of General Plan standards from project-generated traffic would be less than significant.

Table 4
OFF-SITE TRAFFIC NOISE LEVELS

Roadway Segment	Existing 2021 (CNEL)	Existing + Project (CNEL)	Change in CNEL
East Natoma Street – Fargo Street to Folsom Prison Road (Commercial)	63.4	63.5	0.1
East Natoma Street – Folsom Prison Road to Cimmaron Circle (Residential)	67.5	67.6	0.1

Source: TNM version 2.5

Heating, Ventilation, and Air Conditioning Noise

The primary potential noise sources on the project site would be roof-top mounted HVAC systems, as described in the Methodology and Assumptions section, above. HVAC systems were analyzed using the CadnaA software, assuming 140 condenser units (one per apartment plus additional for common areas) as shown on the project roof plan. Modeling assumed one hour of continuous operation of all equipment. Modeled noise levels were analyzed at receivers placed at the property line of nearby NSLUs (see Figure 2 for NSLU areas) at a height of five feet above the ground. The modeled 1-hour (L_{EQ}) noise level at the adjacent property lines is compared with the City standard in Table 5, *Operational HVAC Noise*. As shown in Table 5, noise from the project's HVAC systems would not exceed the City's noise ordinance standard of 50 dBA L_{EQ}, and impacts from project HVAC noise would be less than significant.

Table 5
OPERATIONAL HVAC NOISE

Receptor	Description	Modeled Noise (dBA L_{EQ})	HVAC Standard (dBA L_{EQ})	Exceed Standards?
R1	Single-family residence	28.5	50	No
R2	Single-family residence	29.7	50	No
R3	Single-family residence	29.7	50	No
R4	Single-family residence	28.6	50	No
R5	Single-family residence	26.2	50	No
R6	Multi-family residence	28.8	50	No
R7	Single-family residence	28.6	50	No
S1	School	20.3	50	No
H1	Hospital	24.5	50	No

Source: CadnaA; City Noise Ordinance Sections 8.42.050

On-site Traffic Noise

Modeling of the exterior noise environment on the project site was accomplished using the CadnaA model and the road segment traffic volumes, as described above.

Exterior Noise

As discussed above, the City General Plan Safety and Noise Element has established an exterior noise standard of 65 CNEL for multi-family residential outdoor activity areas, defined as "[…] the patios or

common areas where people generally congregate for multifamily development" (City 2021). The patio/outdoor kitchen/bocce ball and seating areas on the west side of the project building would be the outdoor activity areas for the project. The modeling shows ground level noise for the outdoor common areas would range from approximately 55.5 CNEL to 58.6 CNEL. This noise level would not exceed the City exterior noise standard of 65 CNEL and the impact would be less than significant.

Interior Noise

Standard building design and construction using current building codes provides approximately 20 dBA of exterior to interior noise reduction with the windows and doors closed. The noise at the exterior facades for the project end units facing East Natoma Street was modeled for apartments on the first through third floors, and is shown in Table 6, *Building Exterior Noise Levels*.

Table 6
BUILDING EXTERIOR NOISE LEVELS

Floor	North Arm (CNEL)	West Arm (CNEL)
First	66.3	62.7
Second	66.0	62.5
Third	65.7	62.0

Source: CadnaA version 2021

Buildings with exterior noise levels exceeding 65 dBA could result in interior noise levels in excess of the City General Plan Safety and Noise Element standard of 45 CNEL. As shown in Table 6, noise levels for the end unit apartments on the project building north arm would exceed 65 CNEL. Therefore, interior noise levels were calculated based on the architectural plans for the project. The calculation sheets are included in Attachment B. The calculations show, with construction meeting minimum code requirements, interior noise levels would not exceed the City standard of 45 CNEL, and the impact would be less than significant.

Impact Conclusion

If project construction activities were to occur outside the hours of 7:00 a.m. and 7:00 p.m. Monday through Friday and 9:00 a.m. to 5:00 p.m. on Saturday, construction noise generated by the project would not be exempt for the City's noise ordinance nighttime exterior standard of 45 dBA, and the impact would be potentially significant. Implementation of mitigation measure NOI-1 would restrict construction hours.

The addition of permanent project-generated traffic vicinity on roadways would not result in a discernable increase in ambient noise levels. The project would not expose future project residents to noise levels that exceed compatibility guidelines in the General Plan.

Long-term operation of project would not result in noise levels from on-site sources, including HVAC systems, exceeding the City noise ordinance standards, measured at the property line of the closest NSLUs to the project site.

Therefore, with implementation of mitigation measure NOI-01, the project would not generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the Folsom General Plan or noise ordinance and the impact would be less than significant.

Mitigation Measure NOI-01: Construction Hours/Scheduling

> The City shall specify on all grading, and construction permits that construction activities for all phases of construction, including servicing of construction equipment shall only be permitted during the hours of 7:00 a.m. and 7:00 p.m. Monday through Friday and between 9:00 a.m. to 5:00 p.m. on Saturdays. Construction shall be prohibited on Sundays and on all holidays. Delivery of materials or equipment to the site and truck traffic coming to and from the site shall be restricted to the same construction hours specified above.

2) Generate excessive ground-borne vibration or ground borne noise levels?

An on-site source of vibration during project construction would be a vibratory roller. A vibratory roller would primarily be used to achieve soil compaction as part of the foundation and paving construction, and for aggregate and asphalt compaction as part of project driveway and parking lot construction). Vibratory rollers could be used within approximately 65 feet of the single-family residences to the northwest. A large vibratory roller creates approximately 0.21 in/sec PPV at a distance of 25 feet, or 94 VdB (Caltrans 2020). At a distance of 65 feet, a vibratory roller would create a PPV of 0.073 in/sec, or 85 VdB.[1] This would exceed the City General Plan residential standard of 80 VdB, and the impact would be potentially significant. Once operational, the project would not be a source of groundborne vibrations. A large vibratory roller would result in approximately 80 VdB or greater at distances less than 120 feet. Mitigation measure NOI-02 would require the contactor demonstrate that the rollers to be used on the project site would produce less than 80 VdB at nearby occupied residences, or use vibratory rollers in static mode only (no vibrations) when operated within 120 feet of occupied residences. Therefore, with implementation of mitigation measure NOI-02, the project would not generate excessive ground-borne vibration levels and the impact would be less than significant.

Mitigation Measure NOI-02: Vibratory Roller

> The applicant or designated contractor shall provide evidence to the City (via testing data or calculations from a qualified expert), demonstrating that vibratory rollers to be used on the project site would produce less than 80 VdB at nearby occupied residences, or all vibratory rollers shall be used in static mode only (no vibrations) when operating within 120 feet of an occupied residence. The City shall specify vibratory roller model, size, or operating mode restrictions on all demolition, grading, and construction permits.

3) For a project located within the vicinity of a private airstrip or an airport land use plan, or where such a plan has not been adopted, within two miles of a public use airport or private airstrip, expose people residing or working in the project area to excessive noise.

[1] Equipment PPV = Reference PPV * $(25/D)^n$(in/sec), where Reference PPV is PPV at 25 feet, D is distance from equipment to the receptor in feet, and n= 1.1 (the value related to the attenuation rate through the ground); formula from Caltrans 2020. VdB = 20 * Log(PPV/4/10^{-6}).

The closest airports to the project site are the Cameron Park Airport, approximately 9 miles to the east, and Mather Airport, approximately 10.7 miles to the southwest. The project site is not located within the influence area or noise contours for the Cameron Park Airport (El Dorado County 2012). The project site is located within the influence area and is identified as a review area in the Mather Airport Land Use Compatibility Plan (ALUCP). The project site is beneath the approach paths for runways 22 Left and 22 Right, however, the project site is not with the 60 dBA noise contour for the airport (Sacramento County Association of Governments 2020). Therefore, although the project site is subject to overflight by aircraft approaching and departing Mather Airport, residents of the proposed project or people working in the project area would not be exposed to excessive levels of noise due to aircraft or airport operations, and the impact would be less than significant.

SUMMARY

As described above, with implementation of mitigation measure NOI-01 to restrict the hours of construction, the project would not result in a temporary or permanent increase in ambient noise levels in excess of City Standards. With implementation of mitigation measure NOI-02 to restrict the use of vibratory rollers within 120 feet of residence during construction, the project would not result in the generation of excessive groundborne vibrations. The project would not expose persons to excessive noise from aircraft or airport operations.

Sincerely,

Martin Rolph
Noise Specialist

Jason Runyan
Noise Specialist, QA/QC

Attachments:

Figure 1: Vicinity Map
Figure 2: Measurement and NSLU Locations
Figure 3: Site Plan
Attachment A: Noise Measurement Survey Notes
Attachment B: Noise Modeling Input and Output

REFERENCES

California Department of Transportation (Caltrans). 2020. Transportation and Construction Vibration Guidance Manual. April. Available at: https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/env/tcvgm-apr2020-a11y.pdf.

2009. Technical Noise Supplement (TeNS). November.

Carrier. 2005. Product Data 38BRC (60 Hz) 12 SEER Air Conditioner. Available at: https://www.shareddocs.com/hvac/docs/1009/Public/02/38BRC-14PD.pdf.

City of Folsom. 2021. 2035 General Plan Safety and Noise Element. Available at: https://www.folsom.ca.us/home/showpublisheddocument/7565/637667924531470000. Amended August 24.

1993. Folsom Municipal Code Chapter 8.42, Noise Control. Available at: http://www.codepublishing.com/CA/Folsom/.

El Dorado, County of. 2012. El Dorado County Airport Land Use Compatibility Plan: Cameron Airpark Airport; Georgetown Airport; Placerville Airport. Available at: https://www.edctc.org/airport-land-use-compatability-plans-and-fee-schedule.

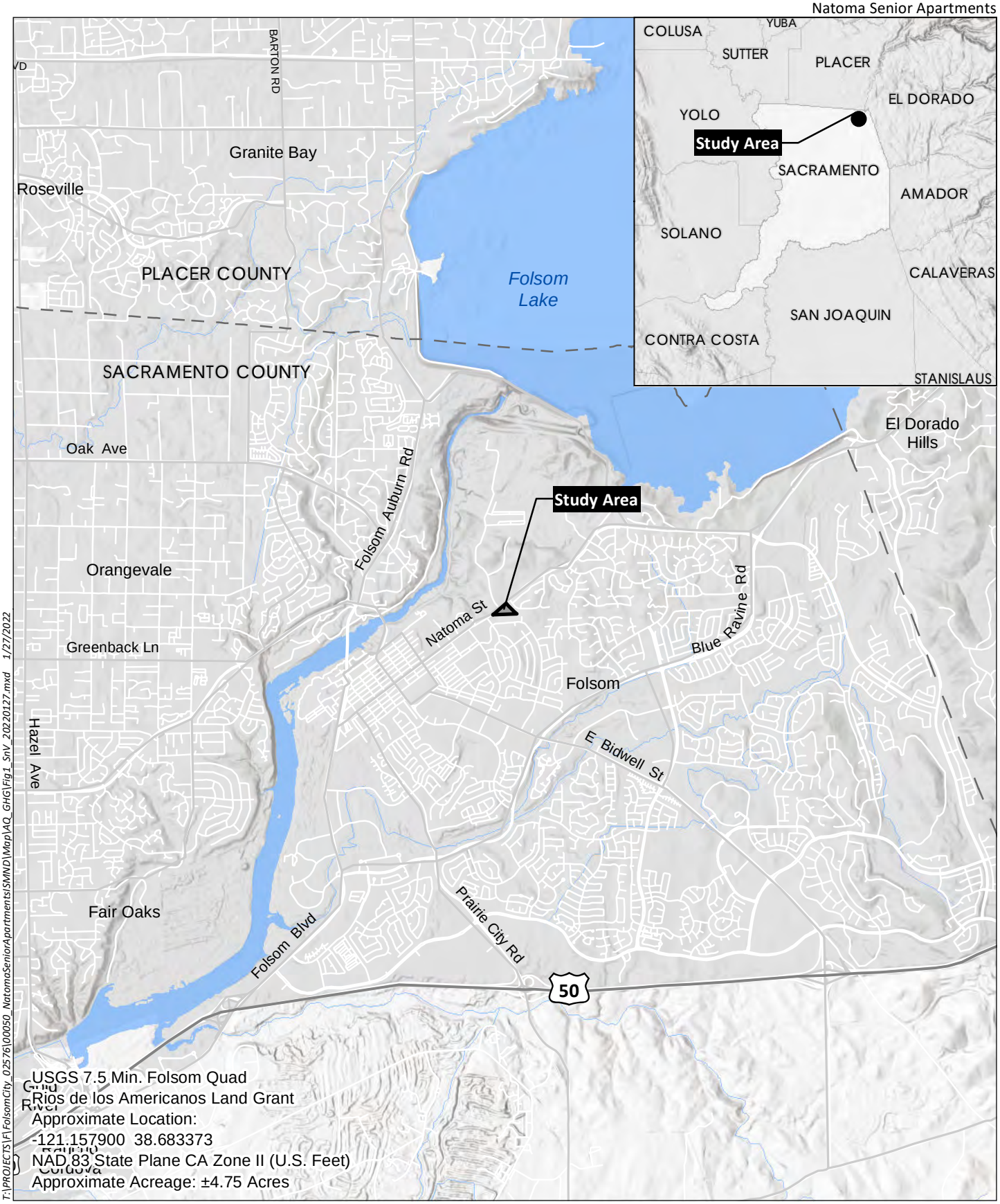
Sacramento County Association of Governments. 2020. Mather Airport – Airport Land Use Compatibility Plan. September. Available at: https://www.sacog.org/sites/main/files/file-attachments/mather_draft_alucp.pdf?1601659275.

T. Kear Transportation Planning and Management, Inc. 2022. Natoma Senior Apartments Transportation Impact Study. February.

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

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

Natoma Senior Apartments



USGS 7.5 Min. Folsom Quad
Rios de los Americanos Land Grant
Approximate Location:
-121.157900 38.683373
NAD 83 State Plane CA Zone II (U.S. Feet)
Approximate Acreage: ±4.75 Acres

0 1 Miles

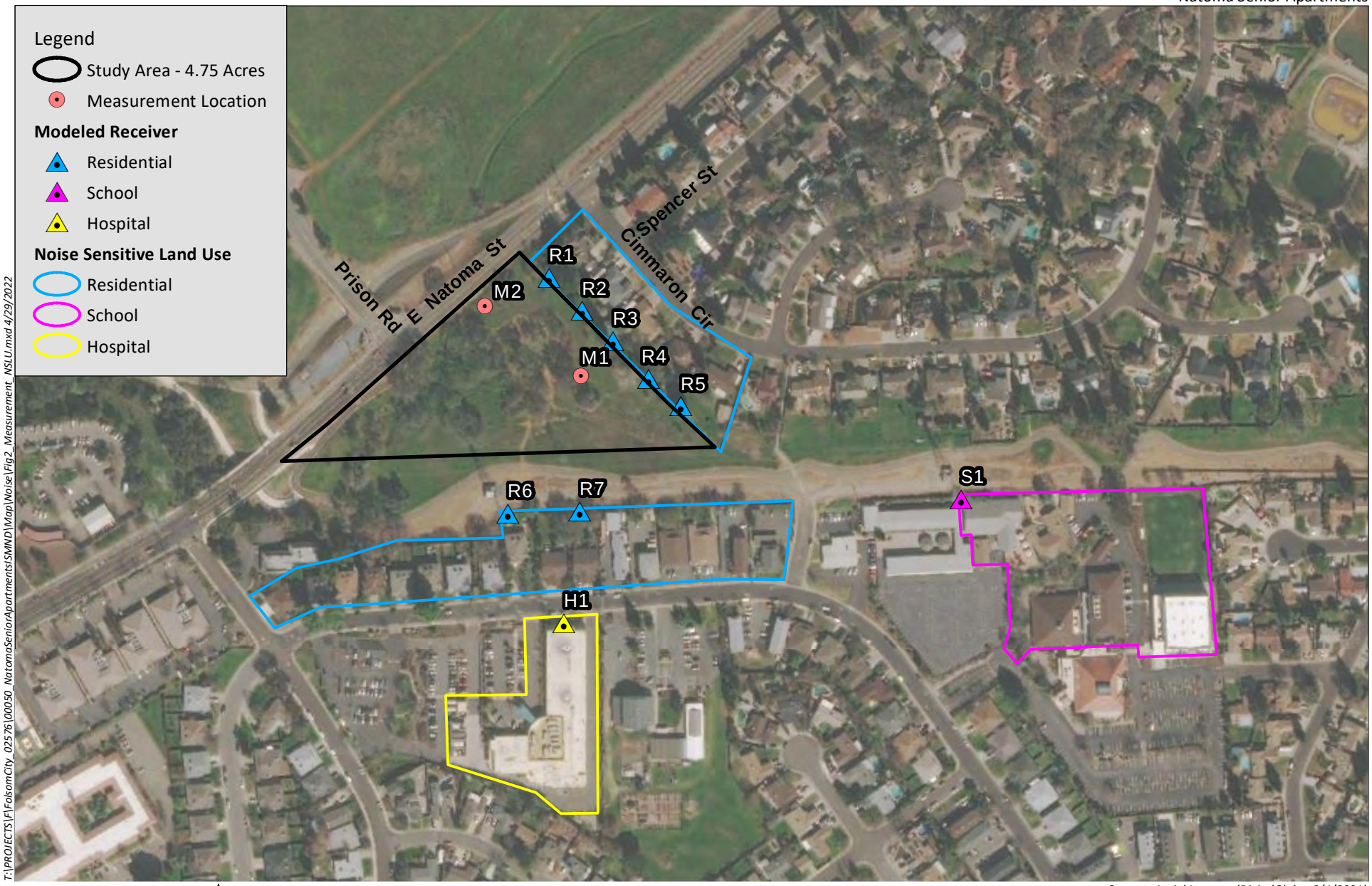
Source: Base Map Layers (Esri, USGS, NGA, NASA)

T:\PROJECTS\F\FolsomCity_02576\00050_NatomaSeniorApartments\SMND\Map\AQ_GHG\Fig1_SnV_20220127.mxd 1/27/2022

HELIX Environmental Planning

Vicinity Map

Figure 1



T:\PROJECTS\F\FolsomCity_025761\00050_NatomaSeniorApartments\SMND\Map\Noise\Fig2_Measurement_NSLU.mxd 4/29/2022

Source: Aerial Imagery (DigitalGlobe, 3/4/2021)

HELIX Environmental Planning

Measurement and NSLU Locations

Figure 2

T:\PROJECTS\F\FolsomCity_02576\00050_NatomaSeniorApartments\SMND\Map\AQ_GHG\Fig3_Siteplan.indd

HELIX Environmental Planning

Site Plan

Figure 3

Attachment A

Noise Measurement Survey Notes

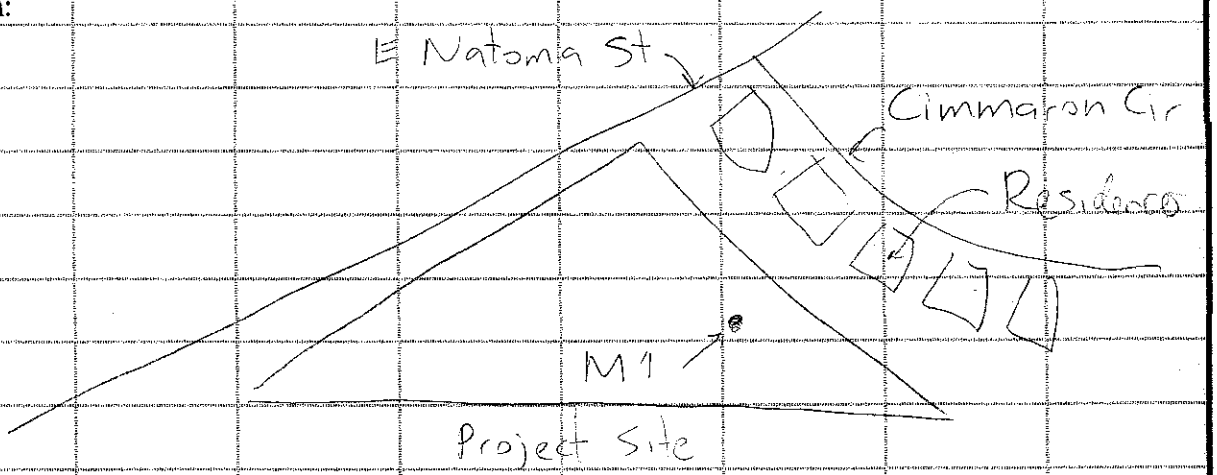
M1

Site Survey

Job #		Project Name: Natoma Senior Housing	
Date: 3/29/22	Site #:	Engineer: M. Rolph J. Pano	
Address:			
Meter: LXT	Serial #: 1013	Calibrator: Cal 150	Serial #: 5529

Notes: Traffic on Natoma; landscape equipment

Sketch:



Temp:	65 F	Wind Spd:	6 mph	Humidity:	57 %
Start of Measurement: 1:57 PM		End of Measurement: 2:07 PM		56.7	dBA L_{EQ}

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

Noise Measurement for Information Only

No Through Roadways

No Calibration Analysis Will Be Provided

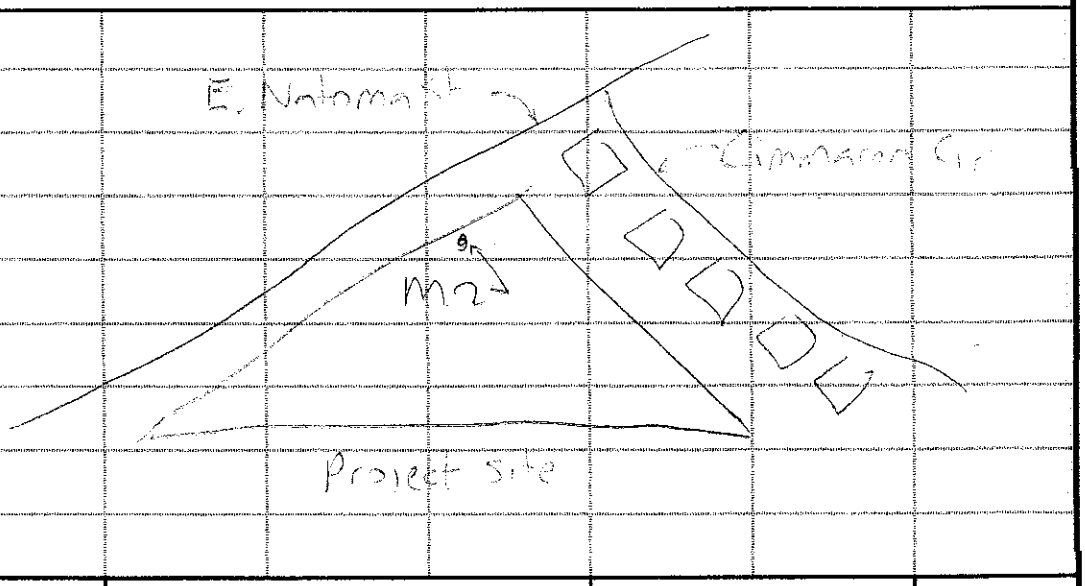
M2

Site Survey

Job #	Project Name: Natoma Senior Housing		
Date: 3/29/22	Site #:	Engineer: M. Ralph J. Pond	
Address:			
Meter: LXT	Serial #: 1013	Calibrator: Cal 150	Serial #: 5529

Notes: Traffic on E. Natoma.

Sketch:



Temp:	65° F	Wind Spd:	6 mph	Humidity:	57 %
Start of Measurement: 2:10 pm		End of Measurement: 2:30 PM		65.5	dBA L_{EQ}

Cars (tally per 5 cars)	Medium Trucks (MT)	Heavy Trucks (HT)
~~IIII IIII IIII IIII~~ IIII IIII IIII (170)	1 (1)	0

Noise Measurement for Information Only

No Through Roadways

No Calibration Analysis Will Be Provided

Attachment B

Noise Modeling Input and Output

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 4/28/2022
Case Description: Natoma Senior Apartments

				---- Receptor #1 ----
		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Multi-Family	Commercial	65	65	65

			Equipment			
			Spec	Actual	Receptor	Estimated
	Impact		Lmax	Lmax	Distance	Shielding
Description	Device	Usage(%)	(dBA)	(dBA)	(feet)	(dBA)
Dozer	No	40		81.7	50	0
Grader	No	40	85		50	0

Results

Calculated (dBA)

Equipment		*Lmax	Leq
Dozer		81.7	77.7
Grader		85	81
	Total	85	82.7

*Calculated Lmax is the Loudest value.

Natoma Senior Housing Project HVAC Noise

CadnaA Noise Library

Name	ID	Type	1/3 Oktave Spectrum (dB)									
			Weight.	125	250	500	1000	2000	4000	8000	A	lin
Carrier 38BRC-024-34	AC	Li		55.5	62.5	68	70	67	61.5	58.5	73.5	74.1

Natoma Senior Housing Project HVAC Noise

CadnaA Receiver Table

Name	M.	ID	Level Lr		Limit. Value		Land Use			Height		Coordinates		
			Day	Night	Day	Night	Type	Auto	Noise Type			X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)				(m)		(m)	(m)	(m)
R1		R1	28.5	28.5	0	0		x	Total	1.52	r	660189.08	4283309.79	108.2
R2		R2	29.7	29.7	0	0		x	Total	1.52	r	660208.19	4283289.45	108.64
R3		R3	29.7	29.7	0	0		x	Total	1.52	r	660229.76	4283265.96	108.72
R4		R4	28.6	28.6	0	0		x	Total	1.52	r	660251.49	4283243.35	108.69
R5		R5	26.2	26.2	0	0		x	Total	1.52	r	660270.43	4283223.89	108.18
R6		R6	28.8	28.8	0	0		x	Total	1.52	r	660158.76	4283151.55	107.4
R7		R7	28.6	28.6	0	0		x	Total	1.52	r	660208.57	4283152.32	108.41
S1		S1	20.3	20.3	0	0		x	Total	1.52	r	660458.37	4283158.94	112.52
H1		H1	24.5	24.5	0	0		x	Total	1.52	r	660195.91	4283076.25	107.52

Natoma Senior Housing Project Existing Off-Site Traffic

CadnaA Noise Source Table

Name	M.	ID	Lme			Count Data		exact Count Data						Speed Limit		SCS	Surface		Gradient	Mult. Reflection		
			Day	Evening	Night	DTV	Str.class.	M			p (%)			Auto	Truck	Dist.	Dstro	Type		Drefl	Hbuild	Dist.
			(dBA)	(dBA)	(dBA)			Day	Evening	Night	Day	Evening	Night	(km/h)	(km/h)		(dB)		(%)	(dB)	(m)	(m)
E Natoma East		Road1	63.9	0	0			943	0	0	4	0	0	72		0	0	1	0	0		
E Natoma West		Road1	61.3	0	0			1060	0	0	4	0	0	56		0	0	1	0	0		

Natoma Senior Housing Project Existing Off-Site Traffic

CadnaA Receiver Table

Name	M.	ID	Level Lr		Limit. Value		Land Use			Height		Coordinates		
			Day	Night	Day	Night	Type	Auto	Noise Type			X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)				(m)		(m)	(m)	(m)
TC1		TC1	63.4	-67.4	0	0		x	Total	1.52	r	659980.8	4283144.55	1.52
TR1		TR1	67.5	-65.7	0	0		x	Total	1.52	r	660195.34	4283343.98	1.52

Natoma Senior Housing Project Off-Site Existing Plus Project Traffic

CadnaA Source Table

Name	M.	ID	Lme			Count Data		exact Count Data						Speed Limit		SCS	Surface		Gradient	Mult. Reflection		
			Day	Evening	Night	DTV	Str.class.	M			p (%)			Auto	Truck	Dist.	Dstro	Type		Drefl	Hbuild	Dist.
			(dBA)	(dBA)	(dBA)			Day	Evening	Night	Day	Evening	Night	(km/h)	(km/h)		(dB)		(%)	(dB)	(m)	(m)
E Natoma East		Road1	64	0	0			969	0	0	4	0	0	72		0	0	1	0	0		
E Natoma West		Road1	61.4	0	0			1089	0	0	4	0	0	56		0	0	1	0	0		

Natoma Senior Housing Project Off-Site Existing Plus Project Traffic

CadnaA Receiver Table

Name	M.	ID	Level Lr		Limit. Value		Land Use			Height		Coordinates		
			Day	Night	Day	Night	Type	Auto	Noise Type			X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)				(m)		(m)	(m)	(m)
TC1		TC1	63.5	-67.4	0	0		x	Total	1.52	r	659980.8	4283144.55	1.52
TR1		TR1	67.6	-65.7	0	0		x	Total	1.52	r	660195.34	4283343.98	1.52

Natoma Senior Housing Project On-Site Traffic

CadnaA Receiver Table

Name	M.	ID	Level Lr		Limit. Value		Land Use			Height		Coordinates		
			Day	Night	Day	Night	Type	Auto	Noise Type			X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)				(m)		(m)	(m)	(m)
1 - 1st Floor		1a	63	-70.3	0	0		x	Total	1.52	r	660157.33	4283299.15	107.02
1 - 2nd Floor		1b	62.6	-70.9	0	0		x	Total	4.78	r	660157.72	4283298.74	110.28
2 - 3rd Floor		1c	62.2	-71.1	0	0		x	Total	8.03	r	660158.02	4283298.41	113.53
2 - 1st Floor		2a	66.3	-67.2	0	0		x	Total	1.52	r	660154.13	4283299.46	107.02
2 - 2nd Floor		2b	66	-67.6	0	0		x	Total	4.78	r	660154.02	4283299.34	110.28
2 - 3rd Floor		2c	65.7	-67.8	0	0		x	Total	8.03	r	660153.89	4283299.21	113.53
3 - 1st Floor		3a	66.1	-67.3	0	0		x	Total	1.52	r	660144.99	4283290.31	107.02
3 - 2nd Floor		3b	66.1	-67.7	0	0		x	Total	4.78	r	660144.89	4283290.21	110.28
3 - 3rd Floor		3c	65.6	-67.9	0	0		x	Total	8.03	r	660144.8	4283290.12	113.53
4 - 1st Floor		4a	62.7	-70.4	0	0		x	Total	1.52	r	660144.99	4283287.66	107.02
4 - 2nd Floor		4b	62.5	-70.5	0	0		x	Total	4.78	r	660145.06	4283287.58	110.28
4 - 3rd Floor		4c	62	-70.8	0	0		x	Total	8.03	r	660145.12	4283287.52	113.53
5 - 1st Floor		5a	59.4	-72.1	0	0		x	Total	1.52	r	660114.28	4283223.91	107.02
5 - 2nd Floor		5b	59.5	-72.1	0	0		x	Total	4.78	r	660114.51	4283223.93	110.28
5 - 3rd Floor		5c	59.5	-72.2	0	0		x	Total	8.03	r	660114.76	4283223.96	113.53
6 - 1st Floor		6a	59.3	-71.9	0	0		x	Total	1.52	r	660113.11	4283222.43	107.02
6 - 2nd Floor		6b	58.3	-72.2	0	0		x	Total	4.78	r	660113.13	4283222.25	110.28
6 - 3rd Floor		6c	58.5	-72.3	0	0		x	Total	8.03	r	660113.15	4283222.06	113.53
Outdoor Space 1		OS1	57.7	-73.8	0	0		x	Total	1.52	r	660164.43	4283262.63	107.02
Outdoor Space 2		OS2	55.5	-75.4	0	0		x	Total	1.52	r	660168.6	4283233.41	107.02
Outdoor Space 3		OS3	58.6	-73.2	0	0		x	Total	1.52	r	660139.94	4283230.91	107.02

EXTERIOR TO INTERIOR NOISE REDUCTION ANALYSIS

Project Name: Natoma Senoir Apartments

Wall 1 of 2

Room Name:Plan A1, Living Room

Room Type : **Moderate**

	125 Hz	250 Hz	500 Hz	1KHz	2KHz	4KHz	
Reverberation Time (sec) :	1.2	1.2	1.2	1.2	1.0	1.0	: Moderately Reflective Room
Room Absorption (Sabins) :	81	81	81	81	101	101	

		Noise Level		125 Hz	250 Hz	500 Hz	1KHz	2KHz	4KHz	
Source 1:	**Traffic**	**66.3**	**CNEL**	49.6	55.1	57.6	61.6	61.6	55.6	: Traffic Spectrum
Source 2:	**<N/A>**	**0.0**	**CNEL**	0.0	0.0	0.0	0.0	0.0	0.0	
Source 3:	**<N/A>**	**0.0**	**CNEL**	0.0	0.0	0.0	0.0	0.0	0.0	
Source 4:	**<N/A>**	**0.0**	**CNEL**	0.0	0.0	0.0	0.0	0.0	0.0	
Overall:		**66.3**	**CNEL**	49.6	55.1	57.6	61.6	61.6	55.6	: Effective Noise Spectrum

Assembly Type	Open	Width	Height	Qty	Total Area	125 Hz	250 Hz	500 Hz	1KHz	2KHz	4KHz
Wall, Standard: 5/8 Gyp, 2x4, Insul	N	23	8	1	184.0	16	31	36	42	39	43
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0

Room Depth: **11** ft **Overall Area:** **184** ft²

Volume: **2024** ft³

Number of Impacted Walls: **2**

Windows Open
Interior Noise Level: **44.0** **CNEL**

Windows Closed
Interior Noise Level: **39.5** **CNEL**

125 Hz	250 Hz	500 Hz	1KHz	2KHz	4KHz	
49.6	55.1	57.6	61.6	61.6	55.6	: Exterior Wall Noise Exposure
16.0	31.0	36.0	42.0	39.0	43.0	: Transmission Loss
0.0	8.4	13.4	19.4	16.4	20.4	: Noise Reduction
19.1	19.1	19.1	19.1	20.1	20.1	: Absorption
30.5	27.7	25.2	23.2	25.2	15.2	: Noise Level

34.2 **CNEL** WINDOWS OPEN

125 Hz	250 Hz	500 Hz	1KHz	2KHz	4KHz	
49.6	55.1	57.6	61.6	61.6	55.6	: Exterior Wall Noise Exposure
16.0	31.0	36.0	42.0	39.0	43.0	: Transmission Loss
0.0	8.4	13.4	19.4	16.4	20.4	: Noise Reduction
19.1	19.1	19.1	19.1	20.1	20.1	: Absorption
30.5	27.7	25.2	23.2	25.2	15.2	: Noise Level

34.2 **CNEL** WINDOWS CLOSED

EXTERIOR TO INTERIOR NOISE REDUCTION ANALYSIS

Project Name: Natoma Senoir Apartments **Wall 2 of 2**

Room Name:Plan A1, Living Room

		Noise Level		125 Hz	250 Hz	500 Hz	1KHz	2KHz	4KHz	
Source 1:	**Traffic**	**63.0**	**CNEL**	46.3	51.8	54.3	58.3	58.3	52.3	: Traffic Spectrum
Source 2:	**<N/A>**	**0.0**	**CNEL**	0.0	0.0	0.0	0.0	0.0	0.0	
Source 3:	**<N/A>**	**0.0**	**CNEL**	0.0	0.0	0.0	0.0	0.0	0.0	
Source 4:	**<N/A>**	**0.0**	**CNEL**	0.0	0.0	0.0	0.0	0.0	0.0	
Overall:		**63.0**	**CNEL**	46.3	51.8	54.3	58.3	58.3	52.3	: Effective Noise Spectrum

Assembly Type	Open	Width	Height	Qty	Total Area	125 Hz	250 Hz	500 Hz	1KHz	2KHz	4KHz
Wall, Standard: 5/8 Gyp, 2x4, Insul	N	11	8	1	55.5	16	31	36	42	39	43
Window, Single Pane	Y	5	6.5	1	32.5	12	19	21	19	27	26
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0

Overall Area: **88** ft²

125 Hz	250 Hz	500 Hz	1KHz	2KHz	4KHz	
46.3	51.8	54.3	58.3	58.3	52.3	: Exterior Wall Noise Exposure
6.7	7.3	7.3	7.3	7.3	7.3	: Transmission Loss
0.0	0.0	0.0	0.0	0.0	0.0	: Noise Reduction
19.1	19.1	19.1	19.1	20.1	20.1	: Absorption
27.2	32.7	35.2	39.2	38.3	32.3	: Noise Level
43.5	**CNEL**	WINDOWS OPEN				

125 Hz	250 Hz	500 Hz	1KHz	2KHz	4KHz	
46.3	51.8	54.3	58.3	58.3	52.3	: Exterior Wall Noise Exposure
14.1	22.9	25.1	23.3	30.9	30.2	: Transmission Loss
0.0	3.4	5.7	3.8	11.4	10.7	: Noise Reduction
19.1	19.1	19.1	19.1	20.1	20.1	: Absorption
27.2	29.3	29.6	35.4	26.8	21.5	: Noise Level
38.0	**CNEL**	WINDOWS CLOSED				

EXTERIOR TO INTERIOR NOISE REDUCTION ANALYSIS

Project Name: Natoma Senoir Apartments

Wall 1 of 1

Room Name:Plan A1, Bedroom

Room Type : **Moderate**

	125 Hz	250 Hz	500 Hz	1KHz	2KHz	4KHz	
Reverberation Time (sec) :	1.2	1.2	1.2	1.2	1.0	1.0	: Moderately Reflective Room
Room Absorption (Sabins) :	39	39	39	39	48	48	

		Noise Level		125 Hz	250 Hz	500 Hz	1KHz	2KHz	4KHz	
Source 1:	Traffic	63.0	CNEL	46.3	51.8	54.3	58.3	58.3	52.3	: Traffic Spectrum
Source 2:	<N/A>	0.0	CNEL	0.0	0.0	0.0	0.0	0.0	0.0	
Source 3:	<N/A>	0.0	CNEL	0.0	0.0	0.0	0.0	0.0	0.0	
Source 4:	<N/A>	0.0	CNEL	0.0	0.0	0.0	0.0	0.0	0.0	
Overall:		63.0	CNEL	46.3	51.8	54.3	58.3	58.3	52.3	: Effective Noise Spectrum

Assembly Type	Open	Width	Height	Qty	Total Area	125 Hz	250 Hz	500 Hz	1KHz	2KHz	4KHz
Wall, Standard: 5/8 Gyp, 2x4, Insul	N	11	8	1	63.0	16	31	36	42	39	43
Window, Single Pane	Y	5	5	1	25.0	12	19	21	19	27	26
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0

Room Depth: 11 ft **Overall Area:** 88 ft²

Volume: 968 ft³

Number of Impacted Walls: 1

Windows Open Interior Noise Level:	**46.7**	**CNEL**
Windows Closed Interior Noise Level:	**40.3**	**CNEL**

125 Hz	250 Hz	500 Hz	1KHz	2KHz	4KHz	
46.3	51.8	54.3	58.3	58.3	52.3	: Exterior Wall Noise Exposure
7.7	8.4	8.4	8.4	8.5	8.5	: Transmission Loss
0.0	0.0	0.0	0.0	0.0	0.0	: Noise Reduction
15.9	15.9	15.9	15.9	16.8	16.8	: Absorption
30.4	35.9	38.4	42.4	41.5	35.5	: Noise Level

46.7 **CNEL** WINDOWS OPEN

125 Hz	250 Hz	500 Hz	1KHz	2KHz	4KHz	
46.3	51.8	54.3	58.3	58.3	52.3	: Exterior Wall Noise Exposure
14.4	23.8	26.1	24.4	31.8	31.3	: Transmission Loss
0.0	4.4	6.7	5.0	12.4	11.8	: Noise Reduction
15.9	15.9	15.9	15.9	16.8	16.8	: Absorption
30.4	31.5	31.7	37.5	29.1	23.7	: Noise Level

40.3 **CNEL** WINDOWS CLOSED