ATTACHMENT 14

Noise Analysis

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MEMORANDUM

To:	Catherine Wade, Dudek
From:	Nick Segovia, Dudek
Subject:	Noise Technical Memorandum – 2021 Chanticleer Avenue Affordable Housing Project
Date:	12/13/2024
cc:	Jim Cowan, Dudek
Attachment(s):	Figure 1, Project Location Figure 2, Noise Model Receiver Locations Attachment A, Traffic Noise Model Input/Output Data

This technical noise memo summarizes the results of the noise analysis conducted for on-site uses of the 2021 Chanticleer Avenue Affordable Housing Project (Project) in Santa Cruz, California (see Figure 1).

1 Background

1.1 Project Description

The proposed Project consists of acquisition of the parcel (APN 029-071-03) and construction and operation of a 100% affordable multifamily rental housing development. The Project is proposed to include between 30 and 54 rental units including one manager's unit. The unit mix would include studio, one-, two- and three-bedroom units, with 50% comprised of two- and three-bedroom units, and 50% comprised of studios and one-bedroom units. The Project would be restricted to occupancy by low-income households with incomes at or below 80% of the Santa Cruz County area median income (AMI).

The units would be provided in one new, 3-story building over a semi-subterranean parking garage with 46 to 70 parking spaces. Elevator access would be provided to all levels. Associated improvements would consist of all necessary infrastructure including, but not limited to, curb, gutter, sidewalks, lighting, water, sewer, and electrical connections (including undergrounding if applicable), water drains, parking spaces and drive aisle, landscaping, and off-site improvements as required. The building's layout would facilitate standardized structural modules contributing to construction efficiency and reduced implementation costs.

The project would include at least one community room that may include a kitchen, fitness area, and business center, and community laundry rooms would be provided on each level. The project would be designed with a contemporary aesthetic which can be referenced to bay area traditions and "Sea Ranch." Exterior aesthetics would include fiber cement panels, board and batt, plaster, and metal. Each apartment would include an electric range/oven, refrigerator, garbage disposal, and heating. The residential units would be designed for energy efficiency and would include rated appliances consistent with the California Energy Code (Title 24).

1.2 Noise Fundamentals and Terminology

Vibrations, traveling as waves through air from a source, exert a force perceived by the human ear as sound. Sound pressure level (referred to as sound level) is measured on a logarithmic scale in decibels (dB) that represent the fluctuation of air pressure above and below atmospheric pressure. Frequency, or pitch, is a physical characteristic of sound and is expressed in units of cycles per second or hertz (Hz). The normal frequency range of hearing for most people extends from about 20 to 20,000 Hz. The human ear is more sensitive to middle and high frequencies, especially when the noise levels are quieter. As noise levels get louder, the human ear starts to hear the frequency spectrum more evenly. To accommodate for this phenomenon, a weighting system to evaluate how loud a noise level is to a human was developed. The frequency weighting called "A" weighting is typically used for quieter noise levels, which de-emphasizes the low-frequency components of the sound in a manner similar to the response of a human ear. This A-weighted sound level is called the "noise level" and is referenced in units of dBA.

Because sound is measured on a logarithmic scale, a doubling of sound energy results in a 3 dBA increase in the noise level. Changes in a community noise level of less than 3 dB are not typically noticed by the human ear (Caltrans 2013). Changes from 3 to 5 dB may be noticed by some individuals who are extremely sensitive to changes in noise. A 5 dB increase is readily noticeable. The human ear perceives a 10 dB increase in sound level as a doubling of the sound level (i.e., 65 dBA sounds twice as loud as 55 dBA to a human ear).

An individual's noise exposure occurs over a period of time; however, noise level is a measure of noise at a given instant in time. The equivalent continuous sound level (L_{eq}), also referred to as the average sound level, is a single number representing the fluctuating sound level in A-weighted decibels (dBA) over a specified period of time. It is a sound-energy average of the fluctuating level and is equal to a constant unchanging sound of that dB level. Community noise sources vary continuously, being the product of many noise sources at various distances, all of which constitute a relatively stable background or ambient noise environment.

Noise levels are generally higher during the daytime and early evening when traffic (including airplanes), commercial, and industrial activity is the greatest. However, noise sources experienced during nighttime hours when background levels are generally lower can be potentially more conspicuous and irritating to the receiver. In order to evaluate noise in a way that considers periodic fluctuations experienced throughout the day and night, a concept termed "community noise equivalent level" (CNEL) was developed, The CNEL scale represents a time-weighted 24-hour average noise level based on the A-weighted sound level. CNEL accounts for the increased noise sensitivity during the evening hours (7 p.m. to 10 p.m.) and nighttime hours (10 p.m. to 7 a.m.) by adding 5 dB to the average sound levels occurring during the evening hours and 10 dB to the sound levels occurring during nighttime hours. Additional noise definitions are provided below.

Ambient Noise Level. The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.

A-Weighted Sound Level (dBA). The sound pressure level in decibels as measured on a sound level meter using the A-weighted filter network. The A-weighting filter deemphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with community responses to noise.

Community Noise Equivalent Level (CNEL). CNEL is the A-weighted equivalent continuous sound exposure level for a 24-hour period with a 10 dB adjustment added to sound levels occurring during the nighttime hours (10 p.m.–7 a.m.) and 5 dB added to the sound during the evening hours (7 p.m.–10 p.m.).

Day Night Average Sound Level (DNL or L_{dn}). Similar to the CNEL noise metric, except that no penalty is added during the evening hours (7 p.m.–10 p.m.). Typically, the CNEL and L_{dn} noise metrics vary by approximately 1 decibel or less and are often considered to be functionally equivalent.

Decibel (dB). The decibel is a unit for measuring sound pressure level and is equal to 10 times the logarithm to the base 10 of the ratio of the measured sound pressure squared to a reference pressure, which is 20 micropascals.

2 Noise Analysis Methodology

2.1 Applicable Noise Standards

Because the proposed Project may receive funding from the U.S. Department of Housing and Urban Development (HUD), the noise standards specified by HUD were used for this analysis. HUD's noise standards may be found in 24 CFR Part 51, Subpart B (CFR 2013). Exterior uses with a day night average sound level (DNL) of 65 dBA or less are considered acceptable. Sites at which the environmental or community noise exposure exceeds 65 decibels DNL are considered noise-impacted areas. For new construction proposed in high noise areas, grantees shall incorporate noise attenuation features to the extent required by HUD environmental criteria and standards contained in Subpart B (Noise Abatement and Control) of 24 CFR Part 51.

The "Normally Unacceptable" noise zone includes community noise levels from above 65 decibels to 75 decibels DNL. Approvals in this noise zone require a minimum of 5 dB additional sound attenuation for buildings having noise-sensitive uses if the day-night average sound level is greater than 65 dBA but does not exceed 70 dBA, or a minimum of 10 decibels of additional sound attenuation if the day-night average sound level is greater than 70 dBA but does not exceed 75 dBA.

The interior noise standard is 45 dBA DNL.

2.2 Traffic Noise Modeling

The primary noise source in the Project vicinity is motor vehicle traffic. The western and eastern façades of the proposed residential units would face 17th Avenue to the west and Chanticleer Avenue to the east. Additionally, the Highway 1 freeway is approximately 2,000 feet away and is therefore not considered in the traffic noise analysis. The nearest airport, Watsonville Municipal Airport, is located approximately 10 miles away. Based upon the Aircraft Noise Monitoring Report for Watsonville Municipal Airport (WJV Acoustics, Inc. 2018), the Project site is located approximately 10.75 miles northwest of the airport's 60 dB CNEL noise contour. Thus, noise from the airport would have a negligible contribution to the on-site noise environment.

Based upon Average Daily Traffic (ADT) volumes retrieved from the Santa Cruz County Regional Transportation Commission (SCCRTC 2015), a noise analysis of traffic noise from 17th Avenue and Chanticleer Avenue carried out using HUD's DNL Calculator[1] indicated that worst-case exterior building façade noise levels would not exceed the "acceptable" HUD standard of 65 dBA DNL.

3 Noise Analysis Results

The results of the traffic noise analysis for the modeled on-site receivers (shown in Figure 2) are summarized in Table 1. The modeled input and output data are provided in Attachment A. As shown in Table 1, the highest noise levels would occur at Receiver M3, which is representative of the exterior façade of the habitable rooms and amenity room facing east and closest to Chanticleer Avenue. Exterior traffic noise levels at Receivers M1 (facing west and closest to 17th Avenue) and M2 (facing both 17th Avenue to the west and Chanticleer Avenue to the east) would be lower and below 60 dBA DNL. Thus, the exposure from traffic noise along the exterior building façades would not exceed the HUD exterior noise standard of 65 dBA DNL, putting these receivers in the "acceptable" noise range.

Table 1 – Traffic Noise Level Results Summary

Receiver #	Noise Level (DNL (dBA))
M1 – western exposure	59
M2 – western and eastern exposure	57
M3 - eastern exposure	65

Source: Attachment A.

4 References

Caltrans (California Department of Transportation). 2013. Technical Noise Supplement to the Caltrans Traffic Noise Analysis Protocol. Division of Environmental Analysis, Environmental Engineering, Hazardous Waste, Air, Noise, Paleontology Office. September 2013.

CFR (United States Code of Federal Regulations). 2013. Title 24, Volume 1, Title 51 Subpart B. Accessed November 5, 2024, at https://www.govinfo.gov/content/pkg/CFR-2013-title24-vol1/pdf/CFR-2013-title24-vol1-part51-subpartB.pdf.

SCCRTC (Santa Cruz County Regional Transportation Commission). 2015. Santa Cruz and Live Oak Average Daily Traffic Map. Accessed December 4, 2024, at https://www.sccrtc.org/funding-planning/statistics/.

[1] https://www.hudexchange.info/programs/environmental-review/dnl-calculator/.

WJV Acoustics, Inc. 2018. Aircraft Noise Monitoring Report Watsonville Municipal Airport. Prepared for the City of Watsonville. August 29, 2018. Accessed December 4, 2024, at https://www.watsonville.gov/DocumentCenter/View/12654/Watsonville-Airport-Noise-Report-8-29-18.

SOURCE: Esri World Imagery

FIGURE 1

Project Location

2021 Chanticleer Avenue Affordable Housing Project

DUDEK

0 500 1,000 Feet

SOURCE: Esri World Imagery

DUDEK

0 42 84 Feet

FIGURE 2

Noise Model Receiver Locations

2021 Chanticleer Avenue Affordable Housing Project

Attachment A

Traffic Noise Model Input/Output Data

Day/Night Noise Level (DNL) Calculator

The Day/Night Noise Level Calculator is an electronic assessment tool that calculates the Day/Night Noise Level (DNL) from roadway and railway traffic. For more information on using the DNL calculator, view the **Day/Night Noise Level Calculator Electronic Assessment Tool Overview (/programs/environmental-review/daynight-noise-level-electronic-assessment-tool/)**.

Guidelines

- To display the Road and/or Rail DNL calculator(s), click on the "Add Road Source" and/or "Add Rail Source" button(s) below.
- All Road and Rail input values must be positive non-decimal numbers.
- All Road and/or Rail DNL value(s) must be calculated separately before calculating the Site DNL.
- All checkboxes that apply must be checked for vehicles and trains in the tables' headers.
- **Note #1:** Tooltips, containing field specific information, have been added in this tool and may be accessed by hovering over all the respective data fields (site identification, roadway and railway assessment, DNL calculation results, roadway and railway input variables) with the mouse.
- **Note #2:** DNL Calculator assumes roadway data is always entered.

DNL Calculator

Site ID	2021 Chanticleer Ave HUD
Record Date	12/04/2024
User's Name	Nick Segovia

Road # 1 Name:	**17th Ave (M1)**

Road #1

Vehicle Type	**Cars** ☑	**Medium Trucks** ☑	**Heavy Trucks** ☑
Effective Distance	185	185	185
Distance to Stop Sign			
Average Speed	30	30	25
Average Daily Trips (ADT)	12292	253	127
Night Fraction of ADT	15	15	15
Road Gradient (%)			0
Vehicle DNL	55	48	55
Calculate Road #1 DNL	59	Reset	

Road # 2 Name:	**Chanticleer Ave (M1)**

Road #2

Vehicle Type	**Cars** ☑	**Medium Trucks** ☑	**Heavy Trucks** ☑

Effective Distance	460	460	460
Distance to Stop Sign			
Average Speed	25	25	20
Average Daily Trips (ADT)	5770	119	59
Night Fraction of ADT	15	15	15
Road Gradient (%)			0
Vehicle DNL	44	37	46

Calculate Road #2 DNL | 48 | Reset

Add Road Source | Add Rail Source

Airport Noise Level	
Loud Impulse Sounds?	○Yes ◉No
Combined DNL for all Road and Rail sources	**59**
Combined DNL including Airport	**N/A**
Site DNL with Loud Impulse Sound	

Calculate | Reset

Mitigation Options

If your site DNL is in Excess of 65 decibels, your options are:

- **No Action Alternative**: Cancel the project at this location
- **Other Reasonable Alternatives**: Choose an alternate site
- **Mitigation**
    - **Contact your Field or Regional Environmental Officer (/programs/environmental-review/hud-environmental-staff-contacts/)**
    - Increase mitigation in the building walls (only effective if no outdoor, noise sensitive areas)
    - Reconfigure the site plan to increase the distance between the noise source and noise-sensitive uses
    - Incorporate natural or man-made barriers. See ***The Noise Guidebook (/resource/313/hud-noise-guidebook/)***
    - Construct noise barrier. See the **Barrier Performance Module (/programs/environmental-review/bpm-calculator/)**

Tools and Guidance

Day/Night Noise Level Assessment Tool User Guide (/resource/3822/day-night-noise-level-assessment-tool-user-guide/)

Day/Night Noise Level Assessment Tool Flowcharts (/resource/3823/day-night-noise-level-assessment-tool-flowcharts/)

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DNL Calculator

Site ID	2021 Chanticleer Ave HUD
Record Date	12/04/2024
User's Name	Nick Segovia

Road # 1 Name:	**17th Ave (M2)**

Road #1

Vehicle Type	**Cars** ☑	**Medium Trucks** ☑	**Heavy Trucks** ☑
Effective Distance	463	463	463
Distance to Stop Sign			
Average Speed	30	30	25
Average Daily Trips (ADT)	12292	253	127
Night Fraction of ADT	15	15	15
Road Gradient (%)			0
Vehicle DNL	49	42	49
Calculate Road #1 DNL	53	Reset	

Road # 2 Name:	**Chanticleer Ave (M2)**

Road #2

Vehicle Type	**Cars** ☑	**Medium Trucks** ☑	**Heavy Trucks** ☑

Effective Distance	180	180	180
Distance to Stop Sign			
Average Speed	25	25	20
Average Daily Trips (ADT)	5770	119	59
Night Fraction of ADT	15	15	15
Road Gradient (%)			0
Vehicle DNL	50	43	52

Calculate Road #2 DNL | 55 | Reset

Add Road Source | Add Rail Source

Airport Noise Level	
Loud Impulse Sounds?	○Yes ◉No
Combined DNL for all Road and Rail sources	**57**
Combined DNL including Airport	**N/A**
Site DNL with Loud Impulse Sound	

Calculate | Reset

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DNL Calculator

Site ID	2021 Chanticleer Ave HUD
Record Date	12/04/2024
User's Name	Nick Segovia

Road # 1 Name:	**17th Ave (M3)**

Road #1

Vehicle Type	**Cars** ☑	**Medium Trucks** ☑	**Heavy Trucks** ☑
Effective Distance	610	610	610
Distance to Stop Sign			
Average Speed	30	30	25
Average Daily Trips (ADT)	12292	253	127
Night Fraction of ADT	15	15	15
Road Gradient (%)			0
Vehicle DNL	47	40	48
Calculate Road #1 DNL	51	Reset	

Road # 2 Name:	**Chanticleer Ave (M3)**

Road #2

Vehicle Type	**Cars** ☑	**Medium Trucks** ☑	**Heavy Trucks** ☑

Effective Distance	35	35	35
Distance to Stop Sign			
Average Speed	25	25	20
Average Daily Trips (ADT)	5770	119	59
Night Fraction of ADT	15	15	15
Road Gradient (%)			0
Vehicle DNL	61	54	63

Calculate Road #2 DNL | 65 | Reset

Add Road Source | Add Rail Source

Airport Noise Level	
Loud Impulse Sounds?	○Yes ◉No
Combined DNL for all Road and Rail sources	**65**
Combined DNL including Airport	**N/A**
Site DNL with Loud Impulse Sound	

Calculate | Reset

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