Midpoint at 237

San Jose, CA

Loading Dock Noise Study

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INTRODUCTION

This report summarizes our environmental noise study for Midpoint at 237, a proposed technology manufacturing facility on North First Street in San Jose, California. The intent is to quantify the noise levels from the proposed loading dock operations, and compare them with applicable City requirements. For readers not familiar with the fundamental concepts of environmental noise, please refer to **Appendix A**.

There is concern from the community that loading dock activities at the new facility could potentially generate noise impacts at nearby residences in the Alviso neighborhood to the north and west, the George Mayne Elementary School to the west, and the Jubilee Church across Disk Drive.

In response to City requirements and to address neighbors' concerns, we have conducted an environmental noise assessment to determine whether estimated loading dock truck activity and car noise from the new facility will meet the relevant City standards, and recommend mitigation measures as needed.

EXECUTIVE SUMMARY

- Cumulative noise associated with on-site truck activity and vehicle operation is expected to meet the DNL[1] 55 dB[2] or lower goal for project-generated noise at residences along Grand Boulevard and North First Street (east of Tony P. Santos Street), at the George Mayne Elementary School, and at the nearby Jubilee Church.
- Noise from the project will increase existing DNL noise levels at noise-sensitive receiver locations by 2 dB or less. This increase is not expected to be noticeable, and is considered insignificant.
- For reference, maximum noise from on-site loading dock activity and employee vehicles may temporarily exceed the ambient noise level at the surrounding properties by up to about 5 dB. This is considered to be "noticeable", but likely insignificant, because of the short-duration nature of the loudest truck operations.

ACOUSTICAL CRITERIA

City of San Jose General Plan

The Noise Element of the San Jose General Plan 2020, in effect during the project's inception, contains land use compatibility guidelines for environmental noise in the community. Table 1, below, summarizes these guidelines for residential and commercial land uses.

[1] Day-Night Average Sound Level (DNL) – A descriptor established by the U.S. Environmental Protection Agency to describe the average day-night level with a penalty applied to noise occurring during the nighttime hours (10 pm - 7 am) to account for the increased sensitivity of people during sleeping hours. Also noted as Ldn.

[2] dB(A) – A-Weighted sound pressure level (or noise level) represents the noisiness or loudness of a sound by weighting the amplitudes of various acoustical frequencies to correspond more closely with human hearing. A 10-dB (decibel) increase in noise level is perceived to be a doubling of loudness. A-Weighting is specified by the U.S. EPA, OSHA, Caltrans, and others for use in noise measurements.

Table 1: Summary of Figure 16 – Land Use Compatibility Guidelines for Community Noise

DNL Value in Decibels Public, Quasi-Public, Residential, Parks & Playgrounds[3]	Compatibility Level
60 dB or less	Satisfactory
60 to 70 dB	When new development requires a full EIR, an acoustical analysis should be made indicating amount of attenuation necessary to maintain an indoor level of DNL <=45. Onsite outdoor activity limited to acoustically protected areas. Existing uses should receive remedial treatment.
Greater than 70 dB	New development permitted only if uses are entirely indoors and building design limits interior levels to <=45 DNL. Onsite activity areas should be permitted if site planning and noise barriers can achieve levels of 60 DNL or less. Existing uses have top priority for remedial treatment.

The Noise Element defines short- and long-range noise quality level goals for outdoor use areas as DNL 60 and 55 dB, respectively. However, the City acknowledges that it may not be possible to attain these levels in "special noise impact areas", such as areas adjacent to major roadways, without eliminating the beneficial attributes of the exterior space.

In addition, Policy 1 of the Noise Element defines DNL 45 dB as the interior noise quality level goal, and DNL 76 dB as the maximum exterior noise levels to "avoid significant adverse health effects." Policy 11 states, "When located adjacent to existing or planned noise sensitive residential and public/quasi-public land uses, non-residential land uses should mitigate noise generation to meet the DNL 55 dB guideline at the property line."

Typically, in high noise environments in San Jose, if the DNL due to the project would increase by more than 3 dB at *noise-sensitive receptors*, the impact is considered significant. Where the existing noise level is lower, a somewhat higher increase (i.e. 5 dB) can be tolerated before the impact is considered significant.

City of San Jose Municipal Code

Starting in 2001, the Zoning Ordinance of the San Jose Municipal Code has included the following performance standards for the generation of noise at adjacent properties: Noise from mechanical equipment is limited to a maximum of 55 dB at residential property lines, and 60 dB at commercial property lines. However, because Planned Development Zoning for the Midpoint project was approved in the year 2000 under the Cisco Site 6 EIR (see below), these maximum instantaneous noise level performance standards (which require a permit to authorize excessive noise levels adjacent to residential uses) are *not* applicable to this project. Nevertheless, these standards can be used as a point of reference for comparative and qualitative purposes.

2000 Cisco Site 6 Environmental Impact Report (EIR)

For reference, the Midpoint project site is part of Cisco Site 6. The 2000 Cisco Site 6 EIR concluded that the development of the site with 2.35 million sq.ft. of office/R&D/industrial uses would cause significant traffic noise impacts. The project was therefore subject to implement mitigation measures to reduce impacts to acceptable levels (per **Condition 12. Traffic Noise Mitigation** of PD00-03-027, MM NOI-1), as summarized below:

1. Add noise insulation treatments to impacted residential buildings (including 5004 and 5010 North

[3] Quasi-public land uses are assumed to include churches and schools.

First Street and the residences along Grand Boulevard, east of the Disk Drive extension) and the George Mayne Elementary School along North First Street, as needed to reduce interior noise levels to the City's acceptable noise level objective of 45 dB Ldn for interior spaces.

2. Replace all western-facing windows at the residences and Classroom A of the George Mayne Elementary School with windows having either a Sound Transmission Class[4] (STC) rating of 33 or greater, or with dual pane assemblies having one or both panes of ¼-inch laminated glass and a minimum airspace between panes of 3/8 inch, with a properly sealed fixed sash or an efficiently weather stripped operable sash.
3. Include forced air mechanical ventilation for all noise-sensitive land uses where significant noise increases are identified and interior future noise levels would be 45 dB Ldn or greater with the windows partially open.

EXISTING NOISE ENVIRONMENT

To quantify the existing site noise environment, two monitors continuously measured noise levels between 13 and 19 November 2013. In addition, three short-term simultaneous "spot" measurements were conducted and compared with corresponding time periods of the long-term monitors to determine how noise levels vary at different locations and elevations. Table 2 shows a summary of the measured data. **Figure 1**, attached, shows the approximate measurement locations.

Table 2: Existing Environmental Noise Levels

Site	Location	Date/Time	DNL (dB)
L1	Grand Boulevard Monitor Approximately 20' southeast of Grand Blvd centerline	13 to 19 Nov 2013	62 dB
L2	North First Street Monitor Approximately 40' northeast of N 1st St center of median	13 to 19 Nov 2013	68 dB
S1	Grand Boulevard Spot Approximately 20' northwest of Grand Blvd centerline	14 Nov 2013 13:40 – 13:55	60 dB*
S2	Loading Dock Spot At approximate location of westernmost loading dock	14 Nov 2013 12:35 – 12:50	53 dB*
S3	Wilson Way Spot Approximately 20' southwest of Wilson Way roadway center	14 Nov 2013 13:10 – 13:25	52 dB**

** DNL calculated from simultaneous offset from long-term monitor L1*
*** DNL calculated from simultaneous offset from long-term monitor L2*

FUTURE LOADING DOCK NOISE

Methodology

Operational noise from the proposed facility is expected to consist primarily of semi-trucks (tractor-trailers) accessing loading dock areas, as well as vehicles associated with future supporting office space tenants. To estimate truck noise at the proposed facility, we referenced measured noise levels from a previous project at a local distribution facility that involved semi-trucks similar in size to those that are expected to access the proposed Midpoint at 237 facility. Typical car noise levels were also derived from a previous project.

Calculations for resulting noise levels due to on-site truck and car activities were primarily based on updated information contained within the overall site plan (Sheet 3-A1.01) dated 14 February 2014. A revised grading plan and site section (dated 31 October 2013 and received on 6 February 2014) were also referenced.

[4] Sound Transmission Class (STC) – A single-number rating derived from the sound insulation properties of a partition. Numerically, STC represents the number of decibels of speech sound reduction from one side of the partition to the other.

Based on the assumptions described below, estimated noise levels were then compared to applicable criteria to determine if noise from the proposed facility would exceed the City's noise goals (described above) at neighboring noise-sensitive land uses (including residences, schools, and churches).

Noise Source Assumptions

Our analysis estimated future noise from the facility based on the following assumptions (as discussed with the client via phone and email, and per the revised overall site plan Sheet 3-A1.01 dated 14 February 2014):

Trucks

1. We understand that trucks will not be allowed to venture into the parking lots on the north, east, and west sides of Parcels 3 and 5, as well as the east, west, and south sides of Parcel 4. Therefore, it is assumed that each truck will enter through either the northernmost or southernmost entrance along Disk Drive (whichever is closest to their destined loading dock). Trucks will drive down that aisle directly to their respective loading dock, and then exit along the same path by which they arrived.
2. Any non-truck noise associated with loading/unloading activities (i.e., forklifts, rolling doors, carts, items dropping) is assumed to be completely contained with the warehouse facility, and is therefore not included in our analysis.
3. An average truck trip (not including unloading/loading) is estimated to last for a cumulative period of about 2 minutes, and be at least 470 feet from residential property lines and 350 feet from the school property line.
4. Calculations assume that trucks occupy the loading dock in their loading area that is nearest to noise-sensitive receivers
5. Total number of loading docks across entire site: 78
6. 2 "loading areas" per building
7. 21 loading docks on the south side of Building 1, 10 to 11 loading docks per loading area
8. 21 loading docks on the north side of Building 2, 10 to 11 loading docks per loading area
9. 36 loading docks on the south side of Building 3, 18 loading docks per loading area
10. Total number of trips per truck: 2
11. Total number of truck trips across entire site per day: 156
12. 18 total hours of facility operation (6:00 AM to Midnight), Monday through Friday
13. Total number of truck trips per hour across entire site: 9
14. Total number of truck trips per hour per loading area: 1 to 2
15. An estimated typical truck "trip" consists of the following events (and assumed sound levels):
    - Truck passby (arrival, departure): 68 dB at 30 feet
    - Truck airbrakes: 72 dB at 25 feet
    - Truck backup alarm: 79 dB at 30 feet
    - Brief idle before engine shutoff: 70 dB at 25 feet
    - Truck engine ignition + airbrakes: 71 dB at 25 feet
    - Truck accelerating from stop: 74 dB at 25 feet
16. Truck trip reference heights[5] (above grade)
    - Passby, brief idle, acceleration, and ignition - 8 feet (DNL), 11.5 feet (L_{max}[6])
    - Back-up beeper and airbrake – 2.5 feet

[5] Truck source heights excerpted from Caltrans Technical Noise Supplement document (TeNS) document dated October 1998.
[6] Max Noise Level (L_{max}) – The maximum sound level over the entire measurement (or event) duration.

Employee Vehicles

1. Total facility building area: approx. 547,000 sq.ft.
2. 15% assumed occupancy (since facility is mostly warehouse space)
3. Occupancy density: assumed 300 sq.ft. per person
4. 274 total employee vehicle trips (enter/exit) per day
5. 274 employee vehicles will enter the site within the 6:00 AM hour
   - 91 per building
6. 274 employee vehicles will leave the site within the 11:00 PM hour
   - 91 per building
7. Calculations assume that employee vehicles occupy parking spots around their building that are nearest to noise sensitive receivers

Estimated Noise Levels

We have estimated noise levels at local receptors from the sources described in the previous section. Addressed receptors are indicated in Figure 1, attached. Project-generated DNL's, and maximum noise levels (L_{max}) for reference, include shielding from barriers where indicated in the revised design. Table 2, below, summarizes the estimated levels.

Table 2: Future Midpoint at 237 Facility Noise at Noise-Sensitive Land Uses: DNL and L_{max}, dB

Receiving Property Line Location	**DNL (dB) (General Plan Policies Apply)**					**Project L_{max} (dB) at Receiver (For Reference Only)**
	Existing at Receiver	**Trucks at Receiver**	**Employee Vehicles Parking at Receiver**	**Combined (Existing plus Project)**	**Increase**	
Grand Boulevard Residences	60	34	37	60	<1	42
North First Street Residences East of Tony P. Santos Street	57	52	35	58	1	62
George Mayne Elementary School	52	50	43	54	2	59
Jubilee Church	*Not Measured*	52	32	58	N/A	60

Analysis & Recommendations

1. General Plan Policies *(Required)*

   - *Residential Receivers* – As designed, estimated operational noise from on-site trucks and vehicles are approximately DNL 52 dB or lower along receiving residential property lines to the north and west of the site (including the nearby SJFD Fire House, Grand Boulevard residences, and residences near the corner of North First Street and Tony P. Santos Street), which complies with the General Plan goal of DNL 55 dB or lower.

   - *Elementary School Receiver* – The estimated noise level at the George Mayne Elementary School property line, due to facility operations, is DNL 50 dB (with acoustical shielding from the proposed 9½-foot tall solid noise barrier shown along the west side of the western loading areas of Buildings 1 and 2). This meets the City's goal of DNL 55 dB or lower from project-generated noise. The increase of 2 dB to a combined noise environment of DNL 54 dB is not expected to be noticeable or significant.

The proposed noise barrier should be solid from bottom to top with no cracks or gaps, and should have a minimum surface density of three pounds per square foot (e.g., earth, plywood, cement board, CMU, etc). They may be comprised of a variety or combination of materials including metal or concrete panels, berms, plaster assemblies, etc.

- *Jubilee Church Receiver* – Estimated day/night average operational noise levels from on-site trucks and vehicles are estimated to be DNL 52 dB at the Jubilee Church (without any noise barriers), which is consistent with the City's DNL 55 dB limit.

2. San Jose Municipal Code Limits *(For Reference Only)*

- *North First Street Residential Receivers (Near Tony P. Santos Street)* – For reference, maximum noise levels due to on-site trucks and vehicles are expected to be in the range of 60 to 65 dB for people standing at-grade on the north-eastern property line of North First Street residences near Tony P. Santos Street. By comparison, typical maximum traffic noise levels on North First Street and Grand Boulevard (e.g., loud cars, trucks, motorcycles, etc.) were between 80 and 85 dB, which is generally louder than the calculated maximum levels from the proposed facility.
- *Elementary School Receiver* – The proposed noise barrier between the loading docks of Buildings 1 and 2 and the receiving elementary school will reduce maximum noise levels due to the operation of on-site trucks and vehicles to approximately 59 dB at the school property line. For reference, this complies with the City's *current* maximum noise level goal of 60 dB or lower at non-residential properties.
- *Jubilee Church Receiver* – The maximum noise level due to the operation of on-site trucks and vehicles is estimated to be approximately 60 dB at the Jubilee Church property line (without any noise barriers). Such a level is consistent with our expectation of typical traffic noise levels along Disk Drive near the Church, as well as with the City's *current* noise goal.

CONCLUSIONS

1. Project-generated noise (due to on-site trucks and vehicles) is expected to comply with the City's goal of DNL 55 dB or lower from non-residential sources.
2. Noise from the project will increase overall 24-hour DNL noise levels at noise-sensitive receiver locations by 2 dB or less, assuming that a solid noise barrier and loading docks nearest to receivers are used and per the assumptions described above. This increase is not expected to be noticeable, and is not considered to be significant according to the City's noise criteria.
3. Estimated maximum noise levels range from 60 to 65 dB at the North First Street residences east of Tony P. Santos Street. On-site truck and vehicles operation noise is expected to be intermittently audible at the above receiving locations, but, comparable to existing ambient levels and typical events such as loud cars and trucks, emergency vehicle passbys, motorcycles, aircraft, etc.).

* * *

This concludes our current comments on Midpoint at 237. Please call with any questions.

APPENDIX A

FUNDAMENTAL CONCEPTS OF ENVIRONMENTAL NOISE

This section provides background information to aid in understanding the technical aspects of this report.

Three dimensions of environmental noise are important in determining subjective response. These are:

1. The intensity or level of the sound;
2. The frequency spectrum of the sound; and
3. The time-varying character of the sound.

Airborne sound is a rapid fluctuation of air pressure above and below atmospheric pressure. Sound levels are usually measured and expressed in decibels (dB), with 0 dB corresponding roughly to the threshold of hearing.

The "frequency" of a sound refers to the number of complete pressure fluctuations per second in the sound. The unit of measurement is the cycle per second (cps) or hertz (Hz). Most of the sounds which we hear in the environment do not consist of a single frequency, but of a broad band of frequencies, differing in level. The name of the frequency and level content of a sound is its sound spectrum. A sound spectrum for engineering purposes is typically described in terms of octave bands, which separate the audible frequency range (for human beings, from about 20 to 20,000 Hz) into ten segments.

Many rating methods have been devised to permit comparisons of sounds having quite different spectra. Surprisingly, the simplest method correlates with human response practically as well as the more complex methods. This method consists of evaluating all of the frequencies of a sound in accordance with a weighting that progressively de-emphasizes the importance of frequency components below 1000 Hz and above 5000 Hz. This frequency weighting reflects the fact that human hearing is less sensitive at low frequencies and at extreme high frequencies relative to the mid-range.

The weighting system described above is called "A"-weighting, and the level so measured is called the "A-weighted sound level" or "A-weighted noise level." The unit of A-weighted sound level is sometimes abbreviated "dBA." In practice, the sound level is conveniently measured using a sound level meter that includes an electrical filter corresponding to the A-weighting characteristic. All U.S. and international standard sound level meters include such a filter.

Although a single sound level value may adequately describe environmental noise at any instant in time, community noise levels vary continuously. Most environmental noise is a conglomeration of distant noise sources, which results in a relatively steady background noise having no identifiable source. These distant sources may include traffic, wind in trees, industrial activities, etc. and are relatively constant from moment to moment. As natural forces change or as human activity follows its daily cycle, the sound level may vary slowly from hour to hour. Superimposed on this slowly varying background is a succession of identifiable noisy events of brief duration. These may include nearby activities such as single vehicle passbys, aircraft flyovers, etc. which cause the environmental noise level to vary from instant to instant.

To describe the time-varying character of environmental noise, statistical noise descriptors were developed. "L10" is the A-weighted sound level equaled or exceeded during 10 percent of a stated time period. The L10 is considered a good measure of the maximum sound levels caused by discrete noise events. "L50" is the A-weighted sound level that is equaled or exceeded 50 percent of a stated time period; it represents the median sound level. The "L90" is the A-weighted sound level equaled or exceeded during 90 percent of a stated time period and is used to describe the background noise.

As it is often cumbersome to quantify the noise environment with a set of statistical descriptors, a single number called the average sound level or "Leq" is now widely used. The term "Leq" originated from the concept of a so-called equivalent sound level which contains the same acoustical energy as a varying sound level during the same time period. In simple but accurate technical language, the Leq is the average A-weighted sound level in a stated time period. The Leq is particularly useful in describing the subjective change in an environment where the source of noise remains the same but there is change in the level of activity. Widening roads and/or increasing traffic are examples of this kind of situation.

In determining the daily measure of environmental noise, it is important to account for the different response of people to daytime and nighttime noise. During the nighttime, exterior background noise levels are generally lower than in the daytime; however, most household noise also decreases at night, thus exterior noise intrusions again become noticeable. Further, most people trying to sleep at night are more sensitive to noise.

To account for human sensitivity to nighttime noise levels, a special descriptor was developed. The descriptor is called the DNL (Day/Night Average Sound Level), which represents the 24-hour average sound level with a penalty for noise occurring at night.

The DNL computation divides the 24-hour day into two periods: daytime (7:00 am to 10:00 pm); and nighttime (10:00 pm to 7:00 am). The nighttime sound levels are assigned a 10 dB penalty prior to averaging with daytime hourly sound levels. For highway noise environments, the average noise level during the peak hour traffic volume is approximately equal to the DNL.

The effects of noise on people can be listed in three general categories:

a) Subjective effects of annoyance, nuisance, dissatisfaction;
b) Interference with activities such as speech, sleep, and learning; and
c) Physiological effects such as startle, hearing loss.

The sound levels associated with environmental noise usually produce effects only in the first two categories. Unfortunately, there has never been a completely predictable measure for the subjective effects of noise nor of the corresponding reactions of annoyance and dissatisfaction. This is primarily because of the wide variation in individual thresholds of annoyance and habituation to noise over time.

Thus, an important factor in assessing a person's subjective reaction is to compare the new noise environment to the existing noise environment. In general, the more a new noise exceeds the existing, the less acceptable the new noise will be judged.

With regard to increases in noise level, knowledge of the following relationships will be helpful in understanding the quantitative sections of this report:

4.
a) Except in carefully controlled laboratory experiments, a change of only 1 dB in sound level cannot be

perceived.

b) Outside of the laboratory, a 3 dB change is considered a just-noticeable difference.
c) A change in level of at least 5 dB is required before any noticeable change in community response would be expected.
d) A 10 dB change is subjectively heard as approximately a doubling in loudness, and would almost certainly cause an adverse community response.

A-WEIGHTED
SOUND PRESSURE LEVEL,
IN DECIBELS

	140	
	130	THRESHOLD OF PAIN
CIVIL DEFENSE SIREN (100')		
JET TAKEOFF (200')	120	
RIVETING MACHINE	110	
		ROCK MUSIC BAND
DIESEL BUS (15')	100	PILEDRIVER (50')
		AMBULANCE SIREN (100')
BAY AREA RAPID TRANSIT TRAIN PASSBY (10')	90	BOILER ROOM
OFF HIGHWAY VEHICLE (50')		PRINTING PRESS PLANT
PNEUMATIC DRILL (50')	80	GARBAGE DISPOSAL IN THE HOME
SF MUNI LIGHT-RAIL VEHICLE (35')		INSIDE SPORTS CAR, 50 MPH
FREIGHT CARS (100')	70	
VACUUM CLEANER (10')	60	
SPEECH (1')		DATA PROCESSING CENTER
	50	DEPARTMENT STORE
		PRIVATE BUSINESS OFFICE
LARGE TRANSFORMER (200')		LIGHT TRAFFIC (100')
AVERAGE RESIDENCE	40	
	30	TYPICAL MINIMUM NIGHTTIME LEVELS--RESIDENTIAL AREAS
SOFT WHISPER (5')		
	20	
RUSTLING LEAVES		RECORDING STUDIO
	10	
THRESHOLD OF HEARING		MOSQUITO (3')
	0	

(100') = DISTANCE IN FEET BETWEEN SOURCE AND LISTENER

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TYPICAL SOUND LEVELS MEASURED IN THE ENVIRONMENT AND INDUSTRY

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MIDPOINT AT 237 – LOADING DOCK NOISE STUDY
NOISE MEASUREMENT LOCATIONS AND MEASURED DNL

FIGURE 1

CSA # 13–0613

EAF/ECS 03.27.14

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