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NOISE ASSESSMENT STUDY FOR THE PLANNED

JINGYING INTERNATIONAL SCHOOL

755 SOUTH BERNARDO AVENUE, SUNNYVALE

Prepared for
Jingying International Preschool

Prepared by
Jeffrey K. Pack

November 8, 2018
Project No. 50-027-1

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I. Executive Summary

This report presents the results of a noise assessment study, in compliance with the California Environmental Quality Act, for the proposed Jingying International Preschool at 755 South Bernardo Avenue in Sunnyvale. This study includes an analysis of traffic noise impacts to the school site and project-generated noise impacts from playground activity to the residences adjacent to the west and north of the site. Project-generated noise impacts to the residences across Brookfield Avenue to the south of the site are not an issue due to the large separation distance from the playground to these residences. Parking lot activity, which includes school drop offs and pick-ups are not included in this analysis as these activities are a current use on the site.

The plans for the school include remodeling of the existing building on the site, the construction of the playground and preparation of the parking lot. The playground area will consist of turf areas along the westerly and northerly property lines and a rubberized surface play area. The following report includes background information on acoustics, noise standards applicable to the project, project-generated noise impacts, project construction noise impacts and noise reduction measures for noise impacted residential receptor locations. Noise impacts to the project site are evaluated against the City of Sunnyvale noise limits established in the City of Sunnyvale General Plan Noise Element. The project-generated noise impacts were evaluated against the standards contained in the Noise Element and in the City of Sunnyvale Noise Ordinance. The Noise Element also contains the quantitative criteria to define significant noise impacts for environmental review under the California Environmental Quality Act (CEQA).

The results of this study reveal that the noise exposures at the site exceed the Normally Acceptable standard for school land use. However, there are no noise sensitive exterior areas of the project that are exposed to excessive noise and the site is within the Conditionally Acceptable range of the Noise Element.

Project-generated noise will occur from playground activity. The project-generated noise levels and noise exposures will be in compliance with the standards of the first floor elevations of the adjacent and nearby residential uses. Exterior noise excesses in terms of the Noise Ordinance will occur at the upper floor balconies of the apartment complex directly adjacent to the site to the west. The project will also cause increases in the ambient noise environment at these balconies resulting in potentially significant noise impacts.

In terms of the CEQA compliance checklist, the project results in the following:

a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	Potentially Significant
b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	No impact
c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	Potentially Significant
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	Less Than Significant
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	No impact

f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels? No impact

II. Background Information on Acoustics

Noise is defined as unwanted 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.

Most of the sounds which we hear in our normal environment do not consist of a single frequency, but rather a broad range of frequencies. As humans do not have perfect hearing, environmental sound measuring instruments have an electrical filter built in so that the instrument's detector replicates human hearing. This filter is called the "A-weighting" network and filters out low and very high frequencies. All environmental noise is reported in terms of A-weighted decibels, notated as “dBA”. All sound levels used in this report are A-weighted unless otherwise noted. Table I, below, shows the typical human response and noise sources for A-weighted noise levels.

Although the A-weighted noise level may adequately indicate the level of noise at any instant in time, community noise levels vary continuously. Most environmental noise includes a mixture of noise from distant sources that create a relatively steady background noise from which no particular source is identifiable. To describe the time-varying character of environmental noise, the statistical noise descriptors, L_1, L_{10}, L_{50} and L_{90} are often used. They are the A-weighted noise levels exceeded for 1%, 10%, 50% and 90% of a stated time period. The continuous equivalent-energy level (L_{eq}) is that level of a steady state noise which has the same sound energy as a time-varying noise. It is often considered the average noise level and is used to calculate the Day-Night Levels (DNL) and the Community Noise Equivalent Level (CNEL) described below.

TABLE I

The A-Weighted Decibel Scale, Human Response, and Common Noise Sources

Noise Level, dBA	Human Response	Noise Source
120-150+	Painfully Loud	Sonic Boom (140 dBA)
100-120	Physical Discomfort	Motorcycle at 20 ft. (110 dBA) Nightclub Music (105 dBA)
70-100	Annoying	Diesel Pump at 100 ft. (95 dBA) Freight Train at 50 ft. (90 dBA) Food Blender (90 dBA) Jet Plane at 1000 ft. (85 dBA) Freeway at 50 ft. (80 dBA) Alarm Clock (80 dBA)
50-70	Intrusive	Average Traffic at 100 ft. (70 dBA) Pass. Car, 30 mph @ 25 ft. (65 dBA) Vacuum Cleaner (60 dBA) Suburban Background (55 dBA)
0-50	Quiet	Normal Conversation (50 dBA) Light Traffic at 100 ft. (45 dBA) Refrigerator (45 dBA) Desktop Computer (40 dBA) Whispering (35 dBA) Leaves Rustling (20 dBA) Threshold of Hearing (0 dBA)

In determining the daily level of environmental noise, it is important to account for the difference in response of people to daytime and nighttime noises. During the nighttime, exterior background noises are generally lower than the daytime levels. However, most household noise also decreases at night and exterior noise becomes very noticeable. Further, most people sleep at night and are very sensitive to noise intrusion. To account for human sensitivity to nighttime noise levels, the Day-Night Level (DNL) noise descriptor was developed. The DNL is also called the L_{dn}. Either is acceptable, however, DNL is more popular worldwide. The DNL divides the 24-hour day into the daytime period of 7:00 a.m. to 10:00 p.m. and the nighttime period of 10:00 p.m. to 7:00 a.m. The nighttime noise levels are penalized by 10 dB to account for the greater sensitivity to noise at night. The Community Noise Equivalent Level (CNEL) is another 24-hour average which includes a 5 dB evening (7:00 p.m. - 10:00 p.m.) penalty and a 10 dB nighttime penalty. Both the DNL and the CNEL average the daytime, evening and nighttime noise levels over a 24-hour period to attain a single digit *noise exposure*. The proper notations for the Day-Night Level and the Community Noise Equivalent Level are dB DNL and dB CNEL, respectively, as they can only be calculated using A-weighted decibels. It is, therefore, considered redundant to notate dB(A) DNL or dB(A) CNEL.

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

- subjective effects of annoyance, nuisance, dissatisfaction;
- interference with activities such as speech, sleep, learning, relaxing;
- physiological effects such as startling, hearing loss.

The levels associated with environmental noise, in almost every case, produce effects only in the first two categories. Workers in industrial plants, airports, etc., can experience noise in the last category. Unfortunately, there is, as yet, no completely satisfactory way to measure the subjective effects of noise, or of the corresponding reactions of annoyance and dissatisfaction. This is primarily due to the wide variation in individual thresholds of annoyance and differing individual past experiences with noise.

An important way to determine a person's subjective reaction to a new noise is to compare it to the existing environment to which one has adapted, i.e., the "ambient". In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will be judged by the receivers.

With regard to increases in A-weighted noise levels, the Environmental Protection Agency has determined the following relationships that will be helpful in understanding this report.

- Except in carefully controlled laboratory experiments, a change of 1 dB cannot be perceived.
- Outside of the laboratory, a 3 dB change is considered a just-perceptible difference.
- A change in level of at least 5 dB is required before any noticeable change in community response would be expected.
- A 10 dB change is subjectively heard as approximately a doubling in loudness, and would almost certainly cause an adverse change in community response.

The adding or subtracting of sound levels is not simply arithmetic. The sound levels, in decibels, must be converted to Bels, the anti-log's of which are then calculated. The manipulation is then performed (arithmetic addition or subtraction), the logarithm of the sum or difference is calculated. The final number is then multiplied by 10 to convert Bels to decibels. The formula for adding decibels is as follows:

$$Sum = 10\log(10^{SL/10} + 10^{SL/10})$$ where, SL is the Sound Level in decibels.

For example, 60 dB + 60 dB = 63 dB, and 60 dB + 50 dB = 60 dB. Two sound sources of the same level are barely noisier than just one of the sources by itself. When one source is 10 dB higher than the other, the less noisy source does not add to the noisier source.

III. Noise Standards, Goals & Policies

A. City of Sunnyvale General Plan

The noise assessment results presented in the findings were evaluated against the City of Sunnyvale General Plan Noise Element, Ref. (a), which utilize the Day-Night Level (DNL) 24-hour noise descriptor. The Noise Element contains land use compatibility standards for various land uses throughout the City. For school land use, the Normally Acceptable limit is 60 dB DNL. Exterior noise exposures up to 75 dB DNL are considered "Conditionally Acceptable", i.e., the land use is compatible provided that noise control measures are included in the design.

The Noise Element also specifies a Normally Acceptable land use compatibility standard of 60 dB DNL for residential land use. The, the project-generated noise exposures at the adjacent residences are limited to 60 dB DNL.

B. California Environmental Quality Act (CEQA)

The project-generated noise exposures were evaluated against the guidelines of the California Environmental Quality Act (CEQA). CEQA does not limit noise levels or noise exposures nor does it quantify noise exposure or noise level increases over the ambient to define noise impacts. CEQA evaluates a project as a significant noise impact if it "...causes a substantial increases in the ambient noise levels...".

The quantification of the threshold of significance is left up to the local jurisdiction. The City of Sunnyvale Noise Element provides thresholds of significance. The thresholds of significance shall be applied at the existing residential area to the south, north and west of the site.

The City of Sunnyvale policy for noise increases is shown below.

In addition to reviewing proposed development for compliance with noise standards, all proposed development must be reviewed to see if it results in a "significant noise impact" on existing development. To determine if a proposed noise increase is considered "significant" under CEQA, the following standards should be used.

Figure 6-6: Significant Noise Impacts from New Development on Existing Land Use

Ldn Category of Existing Development Per figure 6-4	Noise Increase Considered "Significant over Existing Noise Levels
Normally Acceptable	An increase of more than 3 dBA and the total Ldn exceeds the "normally acceptable" category
Normally Acceptable	An increase of more than 5 dBA
Conditionally Acceptable	An increase of more than 3 dBA
Unacceptable	An increase of more than 3 dBA

If the project causes either of the above criteria to occur, the project will be considered a significant noise impact to the areas where it occurs and noise reduction measures will be required. Table II summarizes the quantitative noise limits applied on the residential side of the property lines at the first floor elevations. Note that the values shown in Table II are the noise limits (the limit of acceptability) applicable to the project. Noise exposures or increases greater than what are shown in the Table result in noise impacts.

TABLE II	
Project-Generated Noise Limits	
Noise Element Land Use Compatibility	60 dB DNL
Allowable Noise Increase (CEQA) (based on ambient +4)	55 dB DNL at North Property Line (Playground Noise)
Allowable Noise Increase (CEQA) (based on ambient +4)	54 dB DNL at West Property Line (Playground Noise)
Allowable Noise Increase (CEQA) (based on ambient +4)	58 dB DNL at Residences to South (Playground Noise)
Noise Ordinance	60 dBA (daytime)

B. City of Sunnyvale Noise Ordinance

The project-generated noise levels were also evaluated against the standards of Section 19.42.030 of the City of Sunnyvale Municipal Code (Noise Ordinance), Ref. (b), which limits project-generated short-term noise levels to 60 dBA at residential property lines during daytime hours and to 50 dBA during nighttime hours.

IV. Acoustical Setting

A. Site and Noise Source Descriptions

The planned project site is located at 755 South Bernardo Avenue in Sunnyvale. The site is relatively flat and at-grade with the surrounding roadways and land uses. The site currently contains a vacant commercial building that will be remodeled for the use of the preschool. Surrounding land-uses include the 3-story Citra Apartments adjacent to the west and north, single-family and multi-family residential across Brookfield Avenue to the south and commercial uses across South Bernardo Avenue to the east. The Citra Apartments have first floor patios and second and third floor balconies that have open rail fences and railings that are immediately adjacent to the project site.

The primary source of noise at the site is traffic on South Bernardo Avenue with a minor influence from Brookfield Avenue traffic. Other sources of noise in the project vicinity, such as the Valero Service Station across South Bernardo Avenue and the Safeway shopping center do not add significantly to the noise environment at the project site.

B. Project Description

The planned project, as shown on the Site Plan, Ref. (c), includes minor site preparation, the remodeling of the existing building, the construction of the playground and parking lot surface work. The play area will be located at the northwesterly corner of the site. Parking will be located between the school buildings and Brookfield Avenue, with thirteen parking spaces and the trash enclosure along the west property line. The total number of parking spaces is 31. Noise control barriers ranging from 6 ft. to 8 ft. high will be located along the west and north property lines. The noise reduction provided by these barriers is included in this analysis.

As the parking lot is an existing use of the site, Ref. (d), parking lot operations associated with the proposed project are not included in this analysis

The current Site Plan is shown as Figure 1 on page 11.

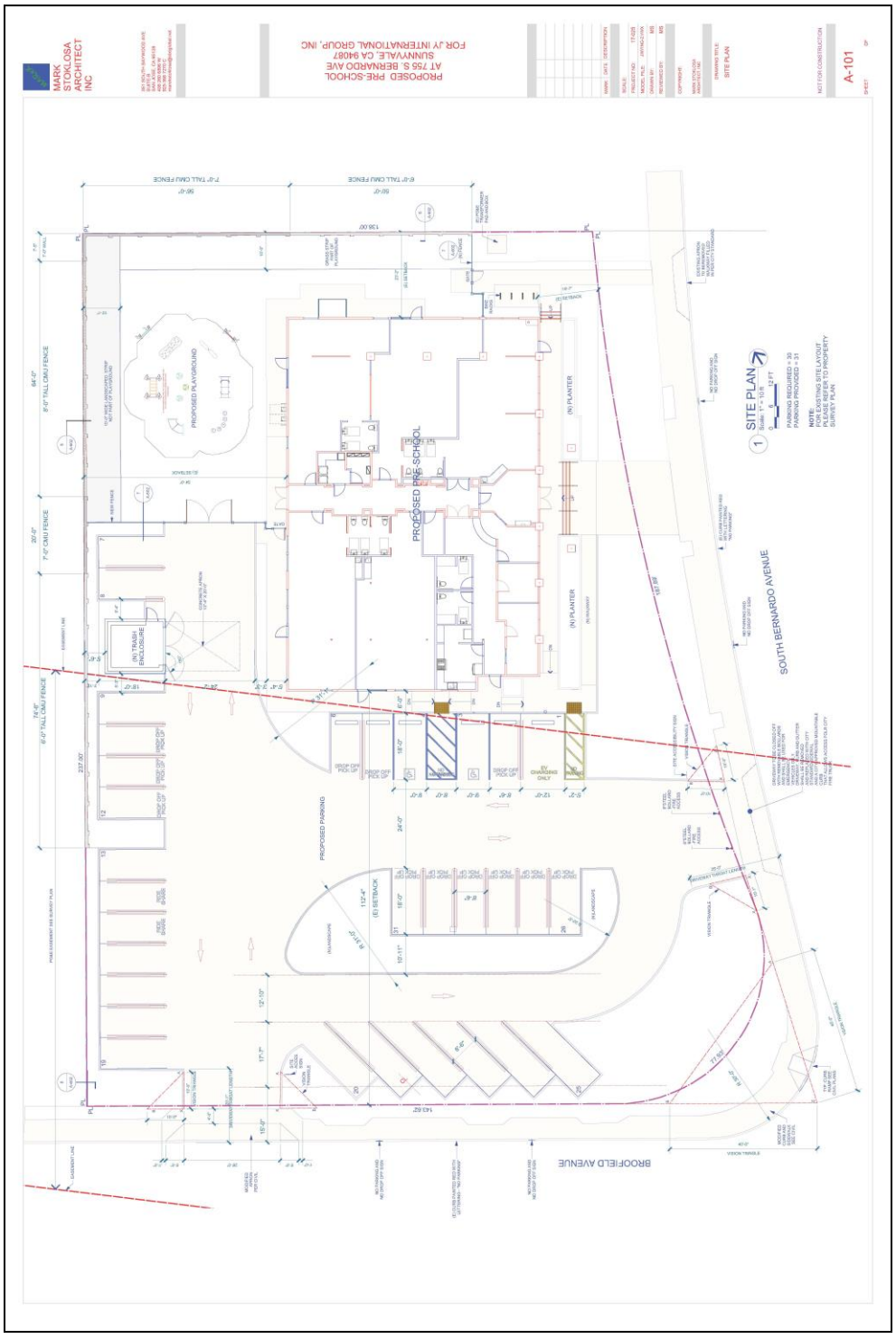

FIGURE 1 – Site Plan

The pre-school is reported to have 120 children ranging in age from 2 to 5 years old. Operational hours of the school will be 6:00 AM to 6:00 PM. Precise operational information is not currently available. However, the project operational information that was available was provided by the project architect, Ref. (e).

From information and experience with other preschool projects, we are making the following estimates:

A group of 30 2-3 year old children will play outdoors for 30 minutes. Then, a second group of 30 2-3 year old children will play outdoors. In the 10:00 AM hour, two groups of 30 4-5 year old children will play outside for 30 minutes each. In the afternoon, the number of children remaining is expected to be 70 and will typically play outdoors between 3:00 and 5:00 PM. .

V. Existing Noise Environment (Without the Project)

A. Existing Noise Levels

To determine the existing noise environment at the site, continuous recordings of the sound levels were made on-site at three locations. Location 1 was along the north property line near the existing transformer, 87 ft. from the centerline of South Bernardo Avenue. The transformer was quiet. Location 2 was along the west property line, 24 ft. from the north property line at the planned playground location. Location 3 was at the sidewalk in front of the residences across Brookfield Avenue, 220 ft. from the centerline of South Bernardo Avenue and 27 ft. from the centerline of Brookfield Avenue. The measurement locations are shown on Figure 2 on page 14. The measurements were made on July 30-31, 2018 for a continuous period of 24 hours at each location and included measurements during the daytime and nighttime periods of the DNL index.

The sound levels were recorded and processed using Larson-Davis Model 812 Precision Integrating Sound Level Meters. The meters yield, by direct readout, a series of descriptors of the sound levels versus time, which include the L_1, L_{10}, L_{50}, and L_{90}, i.e., those levels that are exceeded 1%, 10%, 50%, and 90% of the time. The meters also yield the maximum and minimum levels, and the continuous equivalent-energy levels (L_{eq}), which are used to calculate the DNL's. The measured L_{eq}'s are shown in the data tables in Appendix C.

The L_{eq}'s at measurement Location 1 along the north property line ranged from 51.0 to 63.8 dBA during the daytime and from 41.8 to 56.9 dBA at night. During the operational hours of 6:00 AM to 6:00 PM, the L_{eq}'s ranged from 53.7 to 58.4 dBA.

The L_{eq}'s at measurement Location 2 along the west property line ranged from 44.7 to 56.7 dBA during the daytime and from 39.3 to 46.9 dBA at night. During the operational hours of 6:00 AM to 6:00 PM, the L_{eq}'s ranged from 45.1 to 56.7 dBA.

The L_{eq}'s at measurement Location 3 along the residential property line to the south ranged from 50.7 to 61.5 dBA during the daytime and from 39.2 to 50.3 dBA at night. During the operational hours of 6:00 AM to 6:00 PM, the L_{eq}'s ranged from 50.3 to 61.5 dBA.

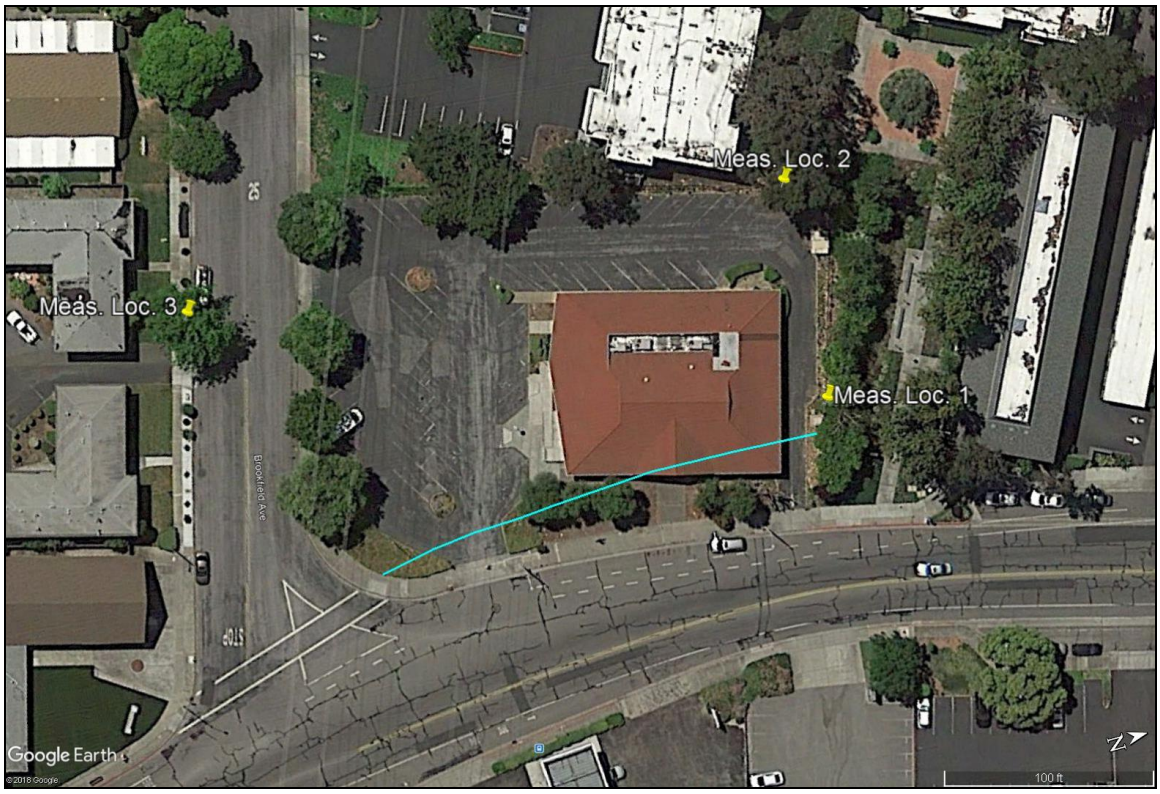

FIGURE 2 – Noise Measurement Locations

B. Existing Noise Exposures

To determine the acceptability of the site for the intended use and the existing ambient noise environments at the adjacent residential receptors, the DNL's for the survey locations were calculated by decibel averaging of the L_{eq}'s as they apply to the daily time periods of the DNL index. A 10 decibel nighttime weighting factor was applied and the DNL was calculated using the formula shown in Appendix B. The measured L_{eq}'s and DNL calculations are shown in the data tables in Appendix C.

Table III on the following page provides the results of the DNL calculations.

TABLE III	
Existing Ambient Noise Exposures	
North Property Line (1)	59 dB DNL
West Property Line (2)	52 dB DNL
Residences to the South (3)	56 dB DNL

The existing 60 dB DNL noise contour from South Bernardo Avenue traffic is shown as the light blue line on Figure 2.

VI. Noise Impacts

A. Impacts to the Project

The City of Sunnyvale Noise Element specifies land use compatibility guidelines for institutional uses. The "Normally Acceptable" noise exposure limit is 60 dB DNL and the "Conditionally Acceptable noise exposure limit is 75 dB DNL.

The exterior noise exposure at the project site is up to 61 dB DNL. Thus, the noise exposures are up to 1 dB in excess of the 60 dB DNL "Normally Acceptable" limit of the City of Sunnyvale Noise Element standards, but are within the Conditionally Acceptable limit. This noise exposure occurs at the small corner of the building and planter area at the front of the building closest to South Bernardo Avenue. However, there are no exterior noise sensitive spaces on the site exposed to noise greater than 60 dB DNL. The site should be considered acceptable as noise reduction measures to resolve the 1 decibel excess are not practical.

CEQA has no requirement for addressing noise impacts to a project from off-site sources.

B. Project-Generated Noise Impacts

Potential noise impacts from the project to the area surrounding the proposed school will include playground activity. Mechanical equipment noise associated with the building and noise increases from project traffic on local streets are expected to be negligible.

Project Mechanical Equipment

There is no information on mechanical equipment for the buildings. Thus, an analysis of the project mechanical equipment could not be performed. However, the mechanical equipment will be located in the existing roof-top well.

Project Traffic Noise

Noise from project traffic on the local road network is expected to be negligible as the project would need to add at least 15% of the existing daily traffic volume on any given roadway. Due to the small size of the project and low expected traffic volumes, project traffic is expected not to add to the existing noise exposures.

Impact: Less Than Significant

Playground Noise Impacts

Noise from playground activity was determined from past noise studies of similar facilities in the area, Ref's (f, g, h). The reference facilities contained similar play environments for the age groups corresponding to the proposed project. Noise control barriers along the west and north property lines are part of the project and are included in this analysis.

Table IV provides the reference sound levels for each age group, the number of children at play, the distance to the center of the play area and the name of the facility. Note that the noise levels used for this analysis are the energy-averages for each playground scenario over the course of the play time. Since decibels are a logarithmic function (high levels carry more weight), the sound levels shown below and utilized in this study represent the total amount of noise created during the play time integrated over the play time duration.

TABLE IV
Children Playing Reference Sound Levels

Sport	# of Children	Age	Dist.	Sound Level	Location
Playground	23	2-3	42	64	A Creative Playschool
Playground	23	4-5	42	66	St. Martin of Tours
Playground	14	3-5	45	53	Most Holy Trinity

None of the past studies had children playing outside that were younger than 2 years old. For the purposes of this study, we have grouped the 2 and 3 year olds together and the 4 and 5 year olds together. We are also assuming that there are an equal number of children in each age group as there are no data indicating otherwise.

The change in overall sound level from a change in the number of children playing is calculated by the formula:

$\Delta dB = 10 \log_{10}(V_1/V_2)$ where, V = the number of children.

The attenuation of sound from children playing is calculated by the formula:

$\Delta dB = 20 \log_{10}(r_1/r_2)$ where, r = the distance from the (acoustic) center of the play area to the measurement or receptor location.

The data acquired at the reference noise study locations reveal that older children make more noise than younger children. Over the course of a play period, a group of 4-5 year old children will produce of a noise level 2 dB higher than a group of 2-3 year olds given all other parameters the same. The primary sources of noise from children playing are voices.

Table V on page 19 provides the analysis for the outdoor playground activity derived from the information provided in Table IV. The playground noise source consist of children at general play, including running around, playing tag, kicking and throwing balls and climbing on short apparatus. The distances shown are for the receptors that have both shielded (by a barrier) and unshielded views (over the barriers) to the playground. A 2 dB upward adjustment was included in the west property line sound data to account for sound reflections off of the side of the preschool building. Also included in the Table are the noise reduction factors provided by the property line noise control barriers.

As shown in Table V, the playground noise levels will range from 57 to 60 dBA on the Citra Apartments property at the first floor elevation (west property line), 64 to 67 dBA at the Citra Apartments balconies, 58 to 60 dBA on the Citra Apartments property at the first floor elevation (north property line) and 47 to 49 dBA at the residences to south of the site across Brookfield Avenue. Thus, the short-term playground noise levels will be within the 60 dBA daytime standard of the City of Sunnyvale Noise Ordinance at the first floor elevations to the west, all floor elevations to the north and all floor elevations to the south. The playground noise levels will be up to 7 dB in excess of the 60 dBA daytime standard at the Citra Apartments balconies closest to the playground.

Due to limitations of the project site and infeasibility of noise barriers to shield the upper floor balconies, there are no noise mitigation measures available to reduce the noise excesses at the balconies.

TABLE V

PLAYGROUND SOUND LEVELS, dBA

120 student					WEST RECEPTOR 1			
		# of			Dist., ft.	Sound Reflection	Barrier	Leq Sound Level
Time Period	Sport	Children	Ages	Activity	Source to PL	Factor	Reduction	@ Prop. Line
9:00	Playground	30	2-3	Playground	28	2	11	60
9:30	Playground	30	2-3	Playground	28	2	11	60
10:00	Playground	30	4-5	Playground	28	2	11	60
10:30	Playground	30	4-5	Playground	28	2	11	60
3:00	Playground	17	2-3	Playground	28	2	11	57
3:30	Playground	18	2-3	Playground	28	2	11	57
4:00	Playground	17	4-5	Playground	28	2	11	57
4:30	Playground	18	4-5	Playground	28	2	11	57
120 student					WEST RECEPTOR 2			
		# of			Dist., ft.	Sound Reflection	Barrier	Leq Sound Level
Time Period	Sport	Children	Ages	Activity	Source to Balcony	Factor	Reduction	@ Prop. Line
9:00	Playground	30	2-3	Playground	45	2	0	67
9:30	Playground	30	2-3	Playground	45	2	0	67
10:00	Playground	30	4-5	Playground	45	2	0	67
10:30	Playground	30	4-5	Playground	45	2	0	67
3:00	Playground	17	2-3	Playground	45	2	0	64
3:30	Playground	18	2-3	Playground	45	2	0	64
4:00	Playground	17	4-5	Playground	45	2	0	64
4:30	Playground	18	4-5	Playground	45	2	0	64
120 student					NORTH RECEPTOR			
		# of			Dist., ft.	Sound Reflection	Barrier	Leq Sound Level
Time Period	Sport	Children	Ages	Activity	Source to PL	Factor	Reduction	@ Prop. Line
9:00	Playground	30	2-3	Playground	27	0	9	60
9:30	Playground	30	2-3	Playground	27	0	9	60
10:00	Playground	30	4-5	Playground	27	0	9	60
10:30	Playground	30	4-5	Playground	27	0	9	60
3:00	Playground	17	2-3	Playground	27	0	9	58
3:30	Playground	18	2-3	Playground	27	0	9	58
4:00	Playground	17	4-5	Playground	27	0	9	58
4:30	Playground	18	4-5	Playground	27	0	9	58
120 student					SOUTH RECEPTOR			
		# of			Dist., ft.	Sound Reflection	Barrier	Leq Sound Level
Time Period	Sport	Children	Ages	Activity	Source to PL	Factor	Reduction	@ Prop. Line
9:00	Playground	30	2-3	Playground	270	0	0	49
9:30	Playground	30	2-3	Playground	270	0	0	49
10:00	Playground	30	4-5	Playground	270	0	0	49
10:30	Playground	30	4-5	Playground	270	0	0	49
3:00	Playground	17	2-3	Playground	270	0	0	47
3:30	Playground	18	2-3	Playground	270	0	0	47
4:00	Playground	17	4-5	Playground	270	0	0	47
4:30	Playground	18	4-5	Playground	270	0	0	47

To calculate the play area noise exposures in terms of the DNL, the L_{eq}'s shown in Table V were combined to obtain the hourly L_{eq}'s.

For instance, 30 minutes of 60 dBA plus 30 minutes of 60 dBA equals 60 minutes of 60 dBA also written as 60 dBA $L_{eq(h)}$. The noise exposure calculation tables are provided in Appendix C.

Table VI, below, provides the results of the project-generated DNL calculations, the existing ambient noise exposures, the combined noise exposures (ambient + project), the increase over the existing ambient and the CEQA evaluation.

Sound levels (exposures) are combined using the formula:

$$\text{Sum} = 10\log_{10}(10^{(SL1/10)} + 10^{(SL2/10)})$$

TABLE VI

Project-Generated Noise Exposure Evaluation

Location	Project-generated DNL	Existing Ambient DNL	Combined DNL	Excess Over Ambient, dB	Impact?
West PL	51	52	55	3	No
West Balconies	58	52	59	7	Yes
North PL	51	59	60	1	No
South Residences	40	56	56	0	No

As shown in Table VI, the increases in the ambient noise environment at the first floor elevations of the adjacent Citra Apartments and at the residences to the south of the site across Brookfield Avenue will be within the ambient + 4 dB limit of the City of Sunnyvale Noise Element/CEQA standard. The combined noise exposures will also be with the 60 dB DNL Normally Acceptable limit of the Noise Element. However, balconies of the Citra Apartment building adjacent to the west that are within 73 ft. of the property line will receive noise exposure increases in excess of the ambient + 4 dB limit by up to 3 decibels. This is considered a Potentially Significant Impact.

VII. Conclusions

In conclusion, noise impacts to the project will be within the "Conditionally Acceptable" standard of the City of Sunnyvale. Reducing the noise exposures to the Normally Acceptable level will not be practical.

Play area noise will exceed the limits of the City of Sunnyvale Noise Ordinance and Noise Element standards. Therefore, this is a potentially significant impact under CEQA.

The City of Sunnyvale may, at its discretion, determine acceptability of the project by applying variances and considering the likelihood of conflicting use of balconies during playground activity.

This report presents the results of a noise assessment study for the planned "Jingying International Preschool at 755 South Bernardo Avenue in Sunnyvale. The study findings for existing conditions are based on field measurements and other data and are correct to the best of our knowledge. Future noise projections are based on information provided by the project sponsor. Significant deviations in the predicted school enrollment, site planning, future changes in school activity levels, noise regulations or other future changes beyond our control may produce long-range noise results different from our estimates.

Report Prepared By:

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Jeffrey K. Pack
President

APPENDIX A

References

(a) City of Sunnyvale General Plan, Consolidated in 2011, Chapter 6, Safety and Noise - Noise

(b) City of Sunnyvale Municipal Code, Section 19.42.030 – Noise or Sound Level

(c) Site Plan, Proposed Preschool at 755 S. Bernardo Ave, by Mark Stoklosa Architect, Inc., November 6, 2018

(d) Parking Lot Activity Noise Exemption Information Provided by Ms. Cindy Hom, City of Sunnyvale Planning Department to Edward L. Pack Associates, Inc., by email, October 24, 2018

(e) Information on the Proposed Jingying International Preschool Provided by Marek Stoklosa, Mark Stoklosa Architects, Inc. by email to Edward L. Pack Associates, Inc., June 23, 2018

(f) "Noise Assessment Study of the A Creative Playschool Playground Activity, Amador Valley Boulevard, Dublin", by Edward L. Pack Associates, Inc., Project No. 30-011, February 18, 1998

(g) "Noise Assessment Study for the Planned 'Most Holy Trinity Preschool', 2033 Nassau Drive, Sunnyvale", by Edward L. Pack Associates, Inc., Project No. 45-021, June 12, 2013

(h) "Noise Assessment Study for the Planned 'St. Martin of Tours Day-Care Center', 2570 Bailey Avenue, Sunnyvale", by Edward L. Pack Associates, Inc., Project No. 45-041, August 30, 2013

APPENDIX B

Noise Standards, Terminology, Instrumentation,

1. Noise Standards

A. City of Sunnyvale Noise Element Standards

The noise criteria for residential uses in the City of Sunnyvale are specified in the Noise Element of the General Plan, Chapter 6, "Safety and Noise", as approved by the City Council, July, 2011. These standards include the following:

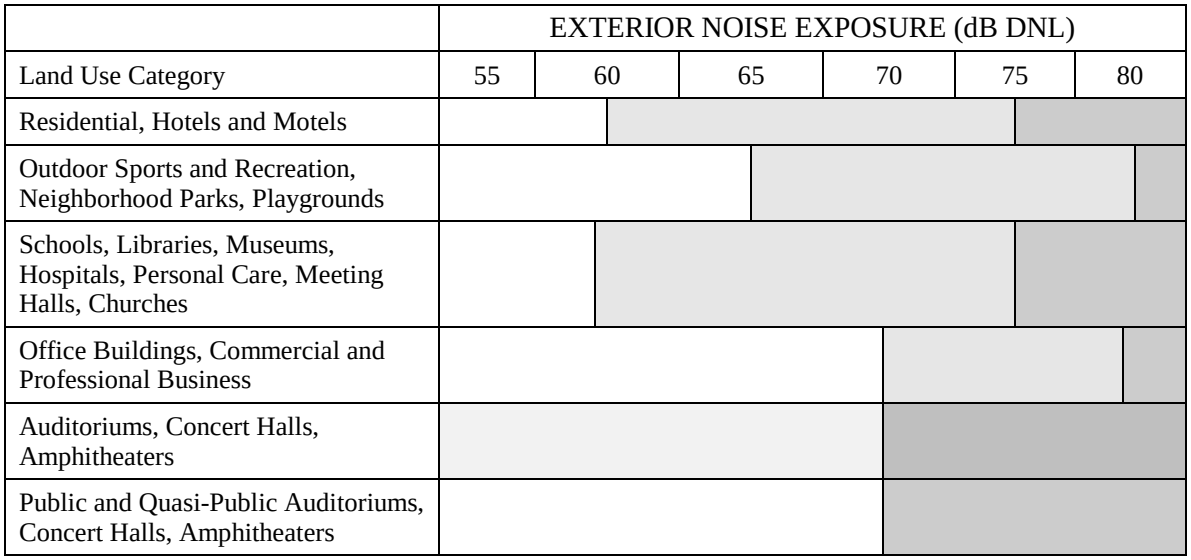
- Attempt to achieve an outdoor limit of 60 dB DNL for common recreation areas, backyards, patios, and useable balconies. This standard does not apply where the noise source is a railroad or airport.

- Enforce the California Code of Regulations, Title 24 noise standard of 45 dB DNL multi-family for interiors. This standard shall also be applied to single-family interiors.

- When the noise source is a railroad, 70 dB DNL is acceptable for exteriors. Attempt to achieve maximum instantaneous noise levels (L_{max}) of 50 dBA for bedrooms and 55 dBA for other living spaces when the noise source is a railroad or aircraft and the exterior DNL exceeds 55 dB.

The City of Sunnyvale Land Use Compatibility Chart is shown below

Figure 6-5: State of California Noise Guidelines for Land Use Planning Summary of Land Use Compatibility for Community Noise Environment



2. Terminology

A. Statistical Noise Levels

Due to the fluctuating character of urban traffic noise, statistical procedures are needed to provide an adequate description of the environment. A series of statistical descriptors have been developed which represent the noise levels exceeded a given percentage of the time. These descriptors are obtained by direct readout of the Sound Level Meters and Noise Analyzers. Some of the statistical levels used to describe community noise are defined as follows:

L_1 - A noise level exceeded for 1% of the time.

L_{10} - A noise level exceeded for 10% of the time, considered to be an "intrusive" level.

L_{50} - The noise level exceeded 50% of the time representing an "average" sound level.

L_{90} - The noise level exceeded 90 % of the time, designated as a "background" noise level.

L_{eq} - The continuous equivalent-energy level is that level of a steady-state noise having the same sound energy as a given time-varying noise. The L_{eq} represents the decibel level of the time-averaged value of sound energy or sound pressure squared and is used to calculate the DNL and CNEL.

B. Day-Night Level (DNL)

Noise levels utilized in the standards are described in terms of the Day-Night Level (DNL). The DNL rating is determined by the cumulative noise exposures occurring over a 24-hour day in terms of A-Weighted sound energy. The 24-hour day is divided into two subperiods for the DNL index, i.e., the daytime period from 7:00 a.m. to 10:00 p.m., and the nighttime period from 10:00 p.m. to 7:00 a.m. A 10 dB weighting factor is applied (added) to the noise levels occurring during the nighttime period to account for the greater sensitivity of people to noise during these hours. The DNL is calculated from the measured L_{eq} in accordance with the following mathematical formula:

$$DNL = \left[[(10\log_{10}(10^{\Sigma Leq(7\text{-}10)})) \times 15] + [((10\log_{10}(10^{\Sigma Leq(10\text{-}7))})+10) \times 9]\right]/24$$

C. A-Weighted Sound Level

The decibel measure of the sound level utilizing the "A" weighted network of a sound level meter is referred to as "dBA". The "A" weighting is the accepted standard weighting system used when noise is measured and recorded for the purpose of determining total noise levels and conducting statistical analyses of the environment so that the output correlates well with the response of the human ear.

3. Instrumentation

The on-site field measurement data were acquired by the use of one or more of the precision acoustical instruments shown below. The acoustical instrumentation provides a direct readout of the L exceedance statistical levels including the equivalent-energy level (L_{eq}). Input to the meters was provided by a microphone extended to a height of 5 ft. above the ground. The meter conforms to ANSI S1.4 for Type 1 instruments. The "A" weighting network and the "Fast" response setting of the meter were used in conformance with the applicable ISO and IEC standards. All instrumentation was acoustically calibrated before and after field tests to assure accuracy.

Bruel & Kjaer 2231 Precision Integrating Sound Level Meter
Larson Davis LDL 812 Precision Integrating Sound Level Meter
Larson Davis 2900 Real Time Analyzer
Larson Davis 831 Precision Integrating Sound Level Meter

APPENDIX C

Noise Measurement Data and Calculation Tables

DNL CALCULATIONS

CLIENT: JINGYING INTERNATIONAL PRESCHOOL
FILE: 50-027
PROJECT: JINGYING INTERNATIONAL PRESCHOOL
DATE: 7/30-31/2018
SOURCE: EXISTING AMBIENT

LOCATION 1	North Prop. Line			
Dist to Source	87 ft.			
TIME		10^Leq/10		
7:00 AM	57.1	512861.4		
8:00 AM	58.4	691831.0		
9:00 AM	57.6	575439.9		
10:00 AM	55.6	363078.1		
11:00 AM	54.7	295120.9		
12:00 PM	54.7	295120.9		
1:00 PM	53.7	234422.9		
2:00 PM	53.8	239883.3		
3:00 PM	54.4	275422.9		
4:00 PM	55.4	346736.9		
5:00 PM	56.6	457088.2		
6:00 PM	56.2	416869.4		
7:00 PM	54.3	269153.5		
8:00 PM	63.8	2398832.9		
9:00 PM	51.0	125892.5	SUM=	7497755
10:00 PM	49.4	87096.4	Ld=	68.7
11:00 PM	45.7	37153.5		
12:00 AM	46.0	39810.7		
1:00 AM	43.0	19952.6		
2:00 AM	41.8	15135.6		
3:00 AM	46.0	39810.7		
4:00 AM	49.2	83176.4		
5:00 AM	51.7	147910.8		
6:00 AM	56.9	489778.8	SUM=	959826
			Ln=	59.8
	Daytime Level=	68.7		
	Nighttime Level=	69.8		
	DNL=	**59**		
	24-Hour Leq=	55.5		

LOCATION 2	West Prop. Line			
Dist to Source	187 ft.			
TIME	Leq	10^Leq/10		
7:00 AM	45.1	32359.4		
8:00 AM	47.6	57942.9		
9:00 AM	47.9	61659.5		
10:00 AM	48.5	70794.6		
11:00 AM	46.9	48977.9		
12:00 PM	48.1	64565.4		
1:00 PM	49.3	85113.8		
2:00 PM	48.8	75857.8		
3:00 PM	50.5	112201.8		
4:00 PM	49.7	93325.4		
5:00 PM	56.7	467735.1		
6:00 PM	51.6	144544.0		
7:00 PM	47.0	50118.7		
8:00 PM	53.4	218776.2		
9:00 PM	44.7	29512.1	SUM=	1613485
10:00 PM	43.0	19952.6	Ld=	62.1
11:00 PM	41.0	12589.3		
12:00 AM	39.3	8511.4		
1:00 AM	40.7	11749.0		
2:00 AM	43.5	22387.2		
3:00 AM	45.1	32359.4		
4:00 AM	45.3	33884.4		
5:00 AM	40.4	10964.8		
6:00 AM	46.9	48977.9	SUM=	201376
		1.0	Ln=	53.0
	Daytime Level=	62.1		
	Nighttime Level=	63.0		
	DNL=	**52**		
	24-Hour Leq=	48.8		

DNL CALCULATIONS

CLIENT: JINGYING INTERNATIONAL PRESCHOOL
FILE: 50-027
PROJECT: JINGYING INTERNATIONAL PRESCHOOL
DATE: 7/30-31/2018
SOURCE: EXISTING AMBIENT

LOCATION 3	Brookfield Ave			
Dist to Source	27 ft.			
TIME		10^Leq/10		
7:00 AM	50.7	117489.8		
8:00 AM	55.8	380189.4		
9:00 AM	54.4	275422.9		
10:00 AM	54.7	295120.9		
11:00 AM	53.7	234422.9		
12:00 PM	56.0	398107.2		
1:00 PM	61.5	1412537.5		
2:00 PM	59.2	831763.8		
3:00 PM	56.4	436515.8		
4:00 PM	55.1	323593.7		
5:00 PM	54.5	281838.3		
6:00 PM	54.0	251188.6		
7:00 PM	54.2	263026.8		
8:00 PM	59.4	870963.6		
9:00 PM	50.8	120226.4	SUM=	6492408
10:00 PM	48.1	64565.4	Ld=	68.1
11:00 PM	46.0	39810.7		
12:00 AM	43.9	24547.1		
1:00 AM	40.9	12302.7		
2:00 AM	39.2	8317.6		
3:00 AM	39.9	9772.4		
4:00 AM	49.3	85113.8		
5:00 AM	45.2	33113.1		
6:00 AM	50.3	107151.9	SUM=	384695
		1.0	Ld=	55.9
	Daytime Level=	68.1		
	Nighttime Level=	65.9		
	DNL=	**56**		
	24-Hour Leq=	54.6		

DNL CALCULATIONS

CLIENT: JINGYING INTERNATIONAL PRESCHOOL
FILE: 50-027-1
PROJECT: JINGYING INTERNATIONAL PRESCHOOL
DATE: 11/7/2018
SOURCE: **PROJECT GENERATED**

Location	Citra Apts to West - First Floor			
Distance	28 ft.			
Source	Playground			
TIME		10^Leq/10		
7:00 AM		1.0		
8:00 AM		1.0		
9:00 AM	60.0	1000000.0		
10:00 AM	60.0	1000000.0		
11:00 AM		1.0		
12:00 PM		1.0		
1:00 PM		1.0		
2:00 PM		1.0		
3:00 PM	57.0	501187.2		
4:00 PM	57.0	501187.2		
5:00 PM		1.0		
6:00 PM		1.0		
7:00 PM		1.0		
8:00 PM		1.0		
9:00 PM		1.0	SUM=	3002385
10:00 PM		1.0	Ld=	64.8
11:00 PM		1.0		
12:00 AM		1.0		
1:00 AM		1.0		
2:00 AM		1.0		
3:00 AM		1.0		
4:00 AM		1.0		
5:00 AM		1.0		
6:00 AM		1.0	SUM=	9
			Ld=	9.5
	Daytime Level=	64.8		
	Nighttime Level=	19.5		
	DNL=	**51**		
	24-Hour Leq=	51.0		

Location	Citra Apts to West - Balconies			
Distance	45 ft.			
Source	Playground			
TIME		10^Leq/10		
7:00 AM		1.0		
8:00 AM		1.0		
9:00 AM	67.0	5011872.3		
10:00 AM	67.0	5011872.3		
11:00 AM		1.0		
12:00 PM		1.0		
1:00 PM		1.0		
2:00 PM		1.0		
3:00 PM	64.0	2511886.4		
4:00 PM	64.0	2511886.4		
5:00 PM		1.0		
6:00 PM		1.0		
7:00 PM		1.0		
8:00 PM		1.0		
9:00 PM		1.0	SUM=	15047529
10:00 PM		1.0	Ld=	71.8
11:00 PM		1.0		
12:00 AM		1.0		
1:00 AM		1.0		
2:00 AM		1.0		
3:00 AM		1.0		
4:00 AM		1.0		
5:00 AM		1.0		
6:00 AM		1.0	SUM=	9
			Ld=	9.5
	Daytime Level=	71.8		
	Nighttime Level=	19.5		
	DNL=	**58**		
	24-Hour Leq=	58.0		

DNL CALCULATIONS

CLIENT: JINGYING INTERNATIONAL PRESCHOOL
FILE: 50-027-1
PROJECT: JINGYING INTERNATIONAL PRESCHOOL
DATE: 11/7/2018
SOURCE: **PROJECT GENERATED**

Location	Citra Apts to North - First Floor			
Distance	27 ft.			
Source	Playground			
TIME		10^Leq/10		
7:00 AM		1.0		
8:00 AM		1.0		
9:00 AM	60.0	1000000.0		
10:00 AM	60.0	1000000.0		
11:00 AM		1.0		
12:00 PM		1.0		
1:00 PM		1.0		
2:00 PM		1.0		
3:00 PM	58.0	630957.3		
4:00 PM	58.0	630957.3		
5:00 PM		1.0		
6:00 PM		1.0		
7:00 PM		1.0		
8:00 PM		1.0		
9:00 PM		1.0	SUM=	3261926
10:00 PM		1.0	Ld=	65.1
11:00 PM		1.0		
12:00 AM		1.0		
1:00 AM		1.0		
2:00 AM		1.0		
3:00 AM		1.0		
4:00 AM		1.0		
5:00 AM		1.0		
6:00 AM		1.0	SUM=	9
			Ld=	9.5
	Daytime Level=	65.1		
	Nighttime Level=	19.5		
	DNL=	**51**		
	24-Hour Leq=	51.3		

Location	Residences to South			
Distance	270 ft.			
Source	Playground			
TIME		10^Leq/10		
7:00 AM		1.0		
8:00 AM		1.0		
9:00 AM	49.0	79432.8		
10:00 AM	49.0	79432.8		
11:00 AM		1.0		
12:00 PM		1.0		
1:00 PM		1.0		
2:00 PM		1.0		
3:00 PM	47.0	50118.7		
4:00 PM	47.0	50118.7		
5:00 PM		1.0		
6:00 PM		1.0		
7:00 PM		1.0		
8:00 PM		1.0		
9:00 PM		1.0	SUM=	259114
10:00 PM		1.0	Ld=	54.1
11:00 PM		1.0		
12:00 AM		1.0		
1:00 AM		1.0		
2:00 AM		1.0		
3:00 AM		1.0		
4:00 AM		1.0		
5:00 AM		1.0		
6:00 AM		1.0	SUM=	9
			Ld=	9.5
	Daytime Level=	54.1		
	Nighttime Level=	19.5		
	DNL=	**40**		
	24-Hour Leq=	40.3		