Noise Assessment
For The
WILSON RESERVOIR
City of San Gabriel

Prepared For:

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1.0 EXISTING SETTING

1.1 Project Description

The proposed Wilson Reservoir project would replace the existing water storage facility with a new and improved facility. The new facility would provide approximately 30% more capacity, and would consist of a new 1,200 square foot booster pump station including chlorination facility, an operation building, metering facility, and clearwell.

The proposed project includes demolition of the existing pump station and concrete foundation and construction of a new pump station and related operation building. The bulk of construction time would involve demolition and excavation of the existing facility, some 24-hour concrete pour of the new foundation, and construction of the new pump station and operation building.

The Wilson Reservoir is located at 545 Adelyn Street in City of San Gabriel. The existing reservoir is owned and operated by the City of South Pasadena. The City of South Pasadena is the lead agency for the project. The vicinity map is presented in Exhibit 1 and the site plan is illustrated in Exhibit 2.

1.2 Background Information on Noise

1.2.1 Noise Criteria Background

Sound is technically described in terms of the loudness (amplitude) of the sound and frequency (pitch) of the sound. The standard unit of measurement of the loudness of sound is the decibel (dB). Decibels are based on the logarithmic scale. The logarithmic scale compresses the wide range in sound pressure levels to a more usable range of numbers in a manner similar to the Richter scale used to measure earthquakes. In terms of human response to noise, a sound 10 dB higher than another is judged to be twice as loud; and 20 dB higher four times as loud; and so forth. Everyday sounds normally range from 30 dB (very quiet) to 100 dB (very loud).

Since the human ear is not equally sensitive to sound at all frequencies, a special frequency-dependent rating scale has been devised to relate noise to human sensitivity. The A-weighted decibel scale (dBA) performs this compensation by discriminating against frequencies in a manner approximating the sensitivity of the human ear. Community noise levels are measured in terms of the "A-weighted decibel," abbreviated dBA. Exhibit 3 provides examples of various noises and their typical A-weighted noise level.

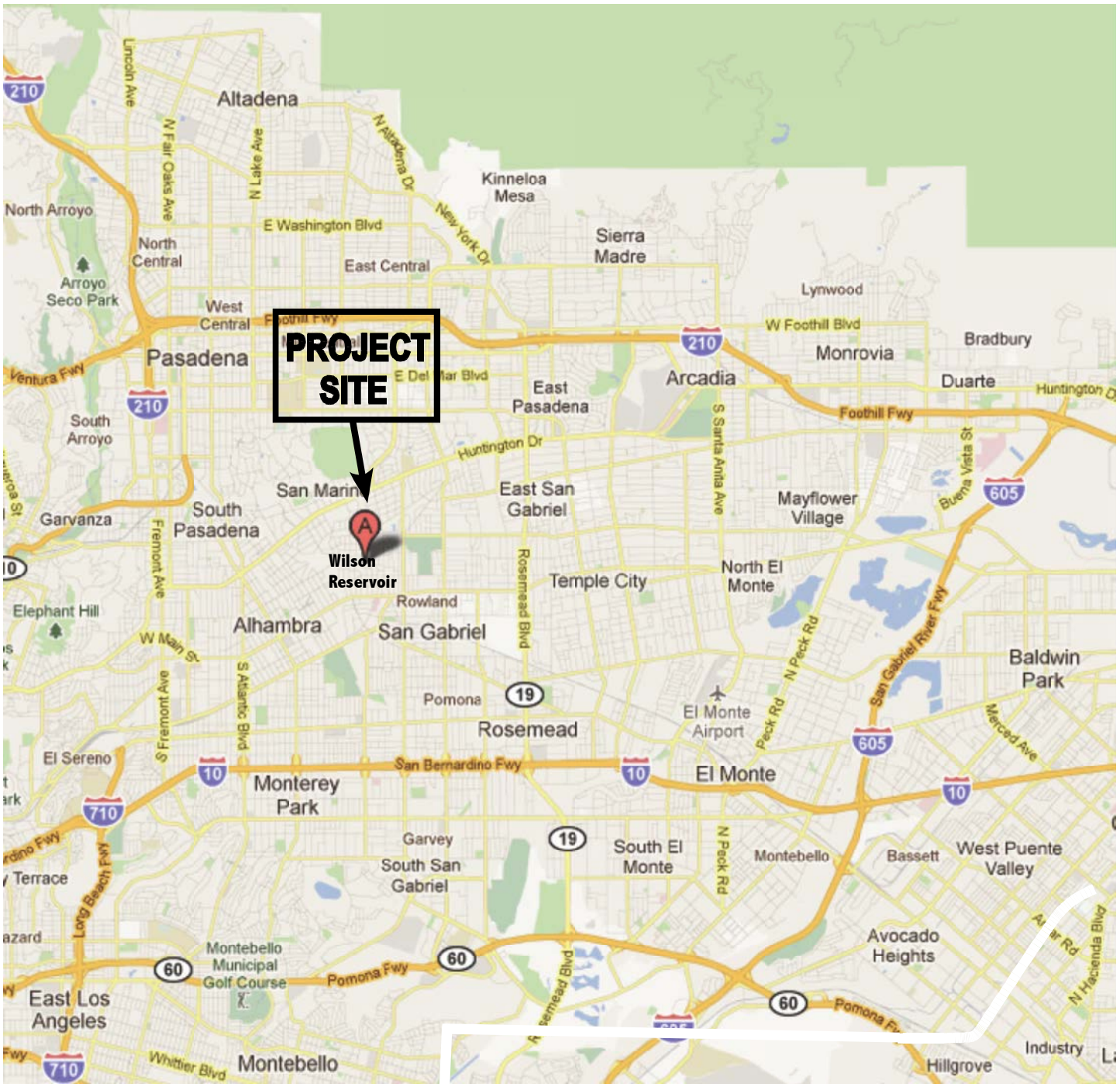

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Exhibit 1
Vicinity Map

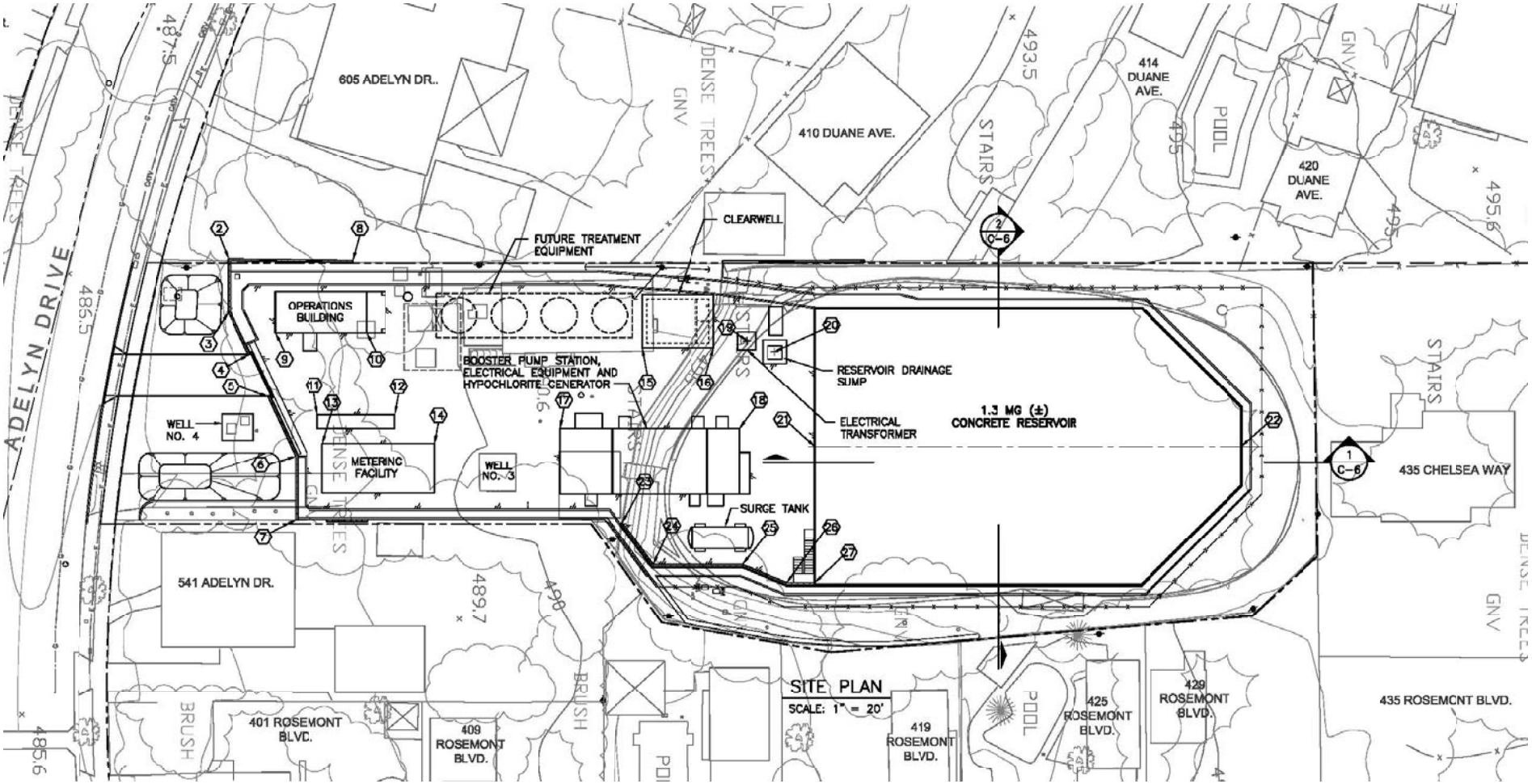

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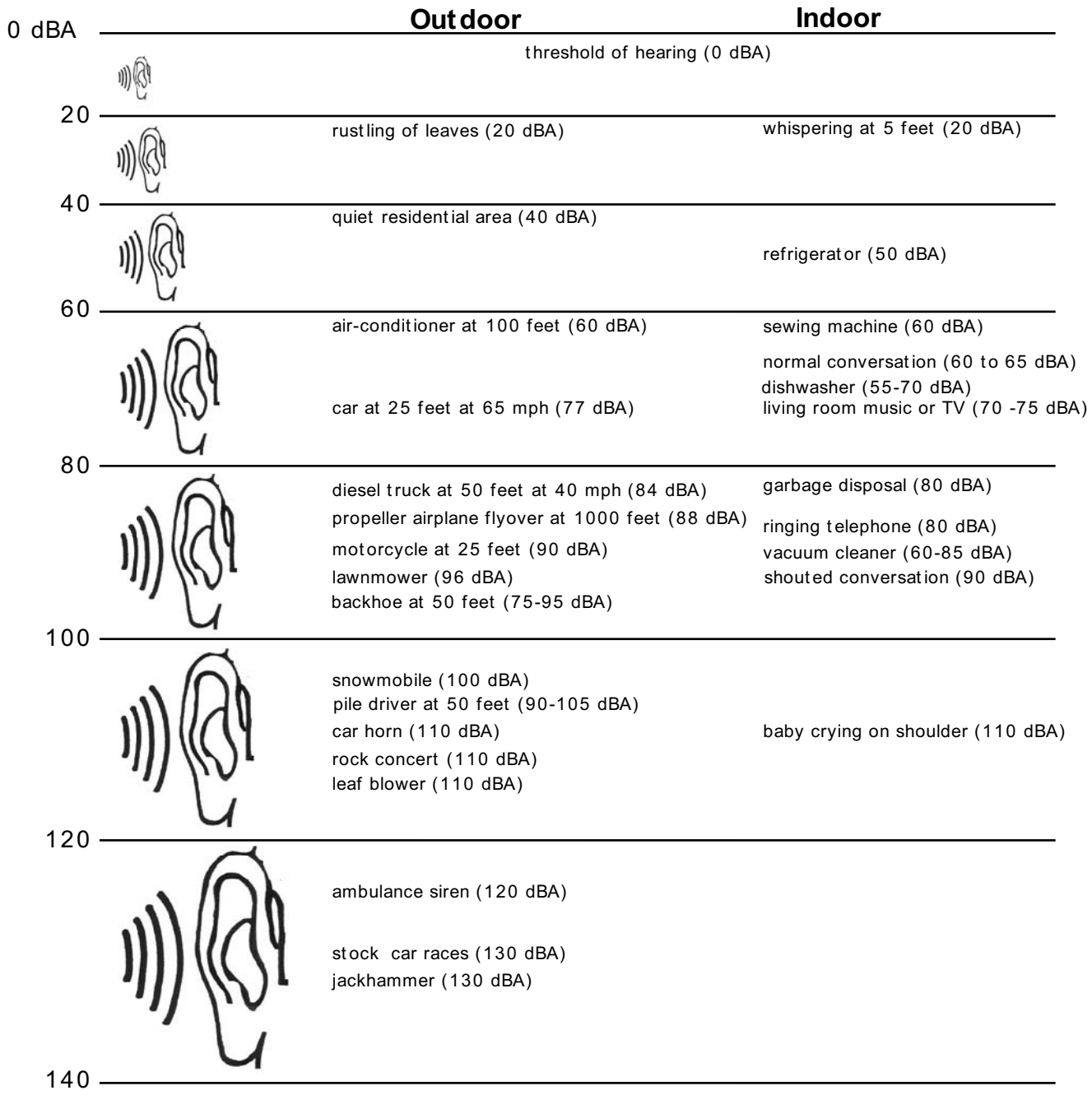
Exhibit 2
Site Plan



Sources: League For The Hard Of Hearing, www.lhh.org
Handbook of Noise Control, McGraw Hill, Edited byCyril Harris, 1979
Measurements by Mestre Greve Associates

Exhibit 3

Typical Sounds in A-weighted Decibels (dBA)

Sound levels decrease as a function of distance from the source as a result of wave divergence, atmospheric absorption and ground attenuation. As the sound wave form travels away from the source, the sound energy is dispersed over a greater area, thereby dispersing the sound power of the wave. Atmospheric absorption also influences the levels that are received by the observer. The greater the distance traveled, the greater the influence and the resultant fluctuations. The degree of absorption is a function of the frequency of the sound as well as the humidity and temperature of the air. Turbulence and gradients of wind, temperature and humidity also play a significant role in determining the degree of attenuation. Intervening topography can also have a substantial effect on the effective perceived noise levels.

Noise has been defined as unwanted sound and it is known to have several adverse effects on people. From these known effects of noise, criteria have been established to help protect the public health and safety and prevent disruption of certain human activities. This criteria is based on such known impacts of noise on people as hearing loss, speech interference, sleep interference, physiological responses and annoyance. Each of these potential noise impacts on people are briefly discussed in the following narratives:

HEARING LOSS is not a concern in community noise situations of this type. The potential for noise induced hearing loss is more commonly associated with occupational noise exposures in heavy industry or very noisy work environments. Noise levels in neighborhoods, even in very noisy airport environs, are not sufficiently loud to cause hearing loss.

SPEECH INTERFERENCE is one of the primary concerns in environmental noise problems. Normal conversational speech is in the range of 60 to 65 dBA and any noise in this range or louder may interfere with speech. There are specific methods of describing speech interference as a function of distance between speaker and listener and voice level.

SLEEP INTERFERENCE is a major noise concern for traffic noise. Sleep disturbance studies have identified interior noise levels that have the potential to cause sleep disturbance. Note that sleep disturbance does not necessarily mean awakening from sleep, but can refer to altering the pattern and stages of sleep.

PHYSIOLOGICAL RESPONSES are those measurable effects of noise on people that are realized as changes in pulse rate, blood pressure, etc. While such effects can be induced and observed, the extent is not known to which these physiological responses cause harm or are sign of harm.

ANNOYANCE is the most difficult of all noise responses to describe. Annoyance is a very individual characteristic and can vary widely from person to person. What one person considers tolerable can be quite unbearable to another of equal hearing capability.

1.2.2 Noise Assessment Metrics

The description, analysis and reporting of community noise levels around communities is made difficult by the complexity of human response to noise and the myriad of noise metrics that have

been developed for describing noise impacts. Each of these metrics attempts to quantify noise levels with respect to community response. Most of the metrics use the A-Weighted noise level to quantify noise impacts on humans. A-Weighting is a frequency weighting that accounts for human sensitivity to different frequencies.

Noise metrics can be divided into two categories: single event and cumulative. Single-event metrics describe the noise levels from an individual event such as an aircraft fly over or perhaps a heavy equipment pass-by. Cumulative metrics average the total noise over a specific time period, which is typically 1 or 24-hours for community noise problems. For this type of analysis, cumulative noise metrics will be used.

Several rating scales have been developed for measurement of community noise. These account for: (1) the parameters of noise that have been shown to contribute to the effects of noise on man, (2) the variety of noises found in the environment, (3) the variations in noise levels that occur as a person moves through the environment, and (4) the variations associated with the time of day. They are designed to account for the known health effects of noise on people described previously. Based on these effects, the observation has been made that the potential for a noise to impact people is dependent on the total acoustical energy content of the noise. A number of noise scales have been developed to account for this observation. Two of the predominate noise scales are the: Equivalent Noise Level (LEQ) and the Community Noise Equivalent Level (CNEL). These scales are described in the following paragraphs.

LEQ is the sound level corresponding to a steady-state sound level containing the same total energy as a time-varying signal over a given sample period. LEQ is the "energy" average noise level during the time period of the sample. LEQ can be measured for any time period, but is typically measured for 1 hour. This 1-hour noise level can also be referred to as the Hourly Noise Level (HNL). It is the energy sum of all the events and background noise levels that occur during that time period.

CNEL, Community Noise Equivalent Level, is the predominant rating scale now in use in California for land use compatibility assessment. The CNEL scale represents a time weighted 24-hour average noise level based on the A-weighted decibel. Time weighted refers to the fact that noise that occurs during certain sensitive time periods is penalized for occurring at these times. The evening time period (7 p.m. to 10 p.m.) penalizes noises by 5 dBA, while nighttime (10 p.m. to 7 a.m.) noises are penalized by 10 dBA. These time periods and penalties were selected to reflect people's increased sensitivity to noise during these time periods. A CNEL noise level may be reported as a "CNEL of 60 dBA," "60 dBA CNEL," or simply "60 CNEL." Typical noise levels in terms of the CNEL scale for different types of communities are presented in Exhibit 4.

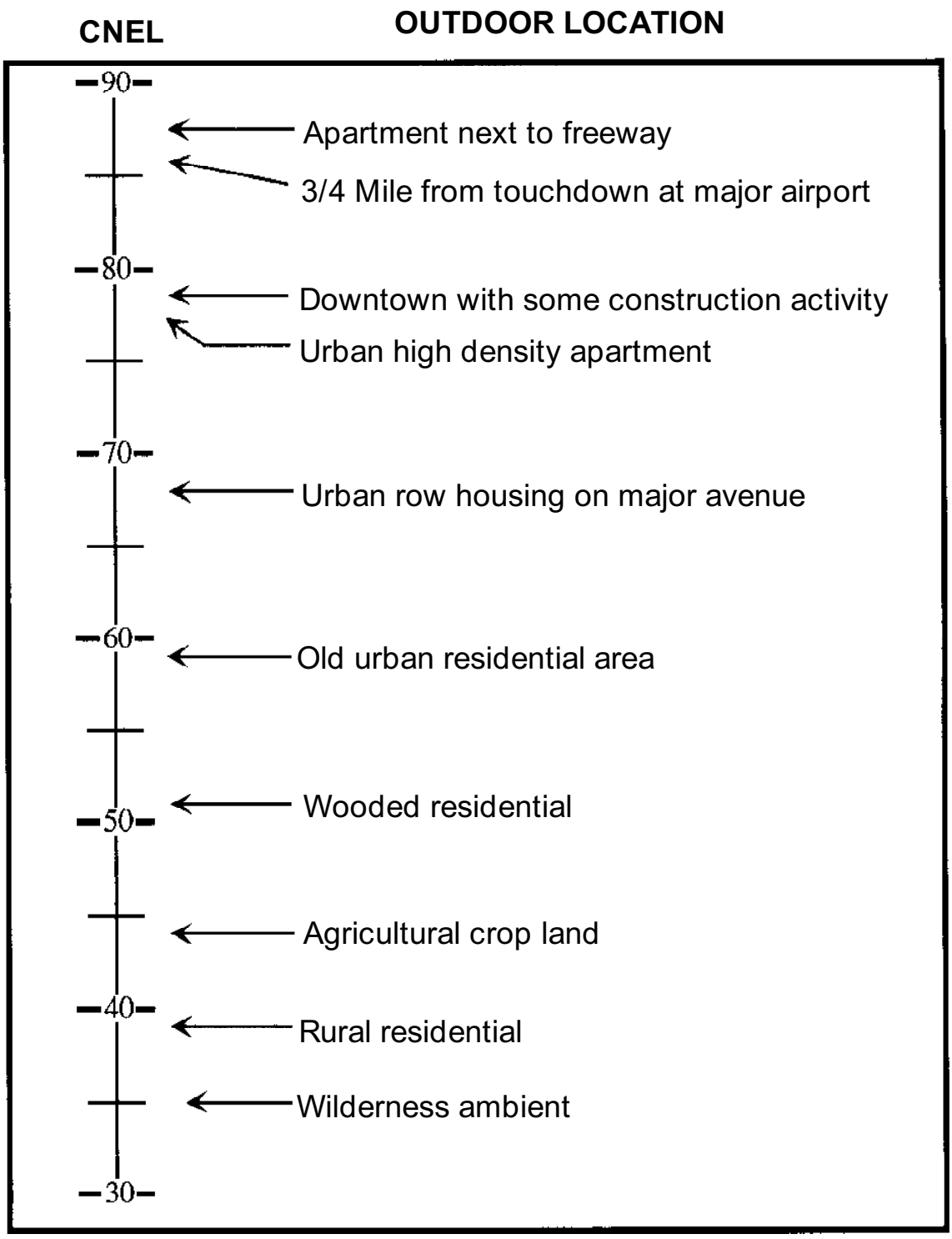


Exhibit 4
Typical CNEL Noise Levels

Ldn, the day-night scale is similar to the CNEL scale except that evening noises are not penalized. It is a measure of the overall noise experienced during an entire day. The time-weighted refers to the fact that noise that occurs during certain sensitive time periods is penalized for occurring at these times. In the Ldn scale, those noise levels that occur during the night (10 pm to 7 am) are penalized by 10 dB. This penalty was selected to attempt to account for increased human sensitivity to noise during the quieter period of a day, where home and sleep is the most probable activity.

L(%) is a statistical method of describing noise which accounts for variance in noise levels throughout a given measurement period. L(%) is a way of expressing the noise level exceeded for a percentage of time in a given measurement period. For example since 5 minutes is 25% of 20 minutes, L(25) is the noise level that is equal to or exceeded for five minutes in a 20 measurement period. It is L(%) that is used for most Noise Ordinance standards. For example most daytime County and City Noise Ordinances use an ordinance standard of 55 dBA for 30 minutes per hour or an L(50) level of 55 dBA. In other words, the Noise Ordinance states that no noise level should exceed 55 dBA for more than fifty percent of a given period.

1.3 Noise Criteria

The General Plan Noise Element and Noise Ordinance contain the City's policies on noise. The noise ordinance applies to noise on one property impacting a neighboring property. Typically, it sets limits on noise levels that can be experienced at the neighboring property. The Noise Ordinance is part of the City's Municipal Code and is enforceable throughout the City. The Noise Element of the General Plan presents limits on noise levels from transportation noise sources, vehicles on public roadways, railroads and aircraft. These limits are imposed on new developments. The new developments must incorporate the measures to ensure that the limits are not exceeded. The City Noise Ordinance and Noise Element policies are presented below.

1.3.1 City of San Gabriel Noise Element

The criteria used to assess the acceptability of community noise levels vary with the municipality. The City of San Gabriel Noise Element (Chapter 9) does not include any noise standards. As a result, the County of Los Angeles will be utilized. The County of Los Angeles indicates 65 CNEL as the critical noise criterion for assessing the compatibility of residential land uses with noise sources. The County of Los Angeles recommends that the exterior living areas (yards and patios) for new residential land uses do not exceed 65 CNEL. In addition, for multi-family residential projects, the California Noise Insulation Standard (California Administrative Code, Title 25, Chapter 1, Subchapter 1, Article 4) requires that the indoor noise levels in multi-family residential development do not exceed a CNEL of 45 dB.

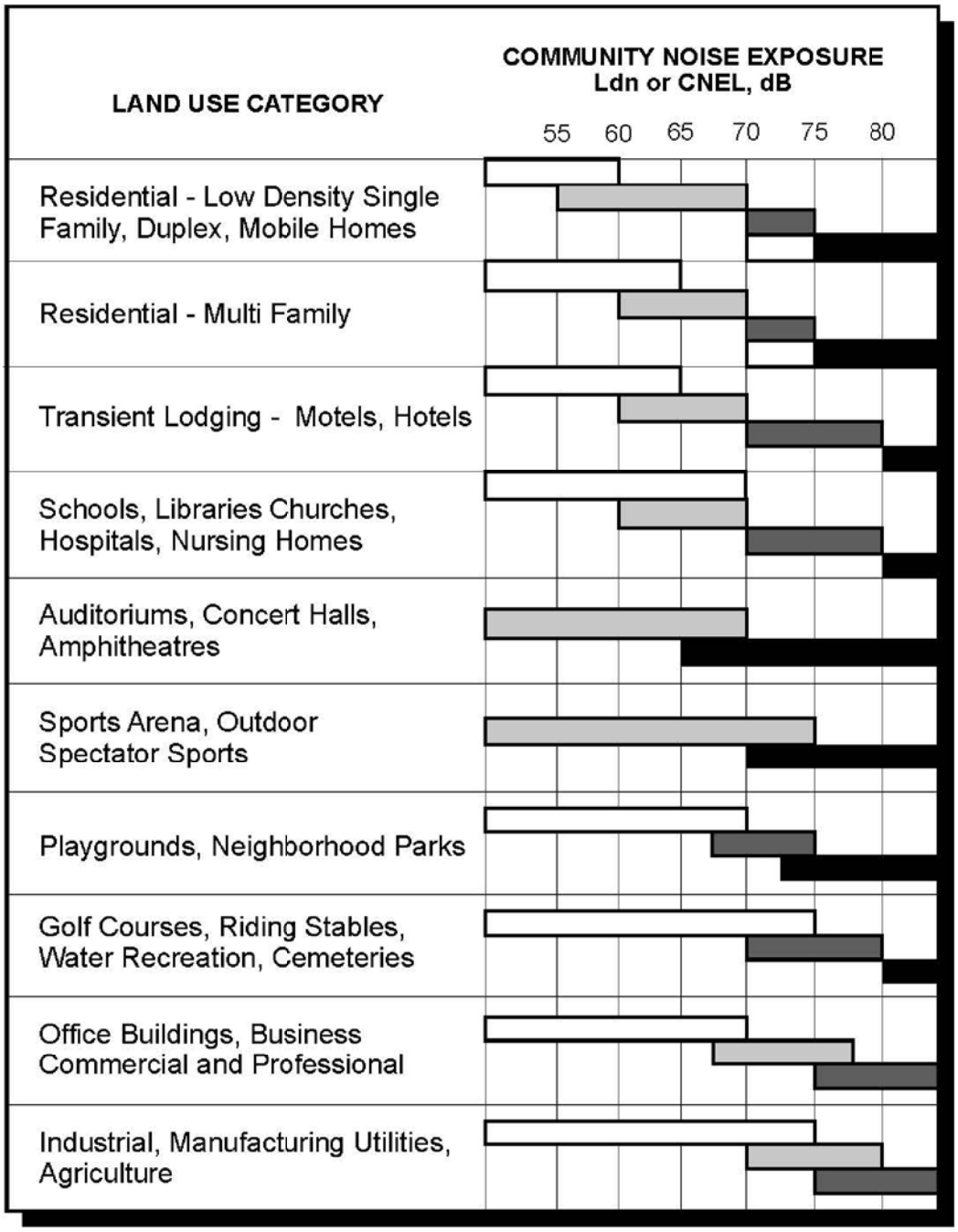
The City San Gabriel Noise Element does not contain a compatibility matrix for determining the compatibility of various land uses with noise levels. The California Department of Health Services has published guidelines for determining the compatibility of varies land uses with noise levels. The guidelines are summarized in Exhibit 5. The guidelines rate compatibility in terms of "normally acceptable, conditionally acceptable, normally unacceptable, and clearly unacceptable."

A land use exposed to noise levels that are considered Normally Acceptable indicates that the land use is compatible with the noise environment and no special noise insulation is required. If new construction is exposed to a Conditionally Acceptable noise level a noise analysis is typically required to determine noise mitigation required to reduce noise levels to a compatible level. Conventional construction will normally suffice with a fresh air supply system or air conditioning to allow windows to remain closed. A noise analysis is also required for new construction exposed to a Normally Unacceptable noise level. The analysis is required to determine mitigation measures, which may be significant, to reduce noise levels to a compatible level. In general development is discouraged for land uses in areas this designation. Proposed development exposed to Clearly Unacceptable noise levels should generally not be undertaken.

1.3.2 City of San Gabriel Noise Ordinance

The San Gabriel Noise Element of the General Plan (Chapter 9, page N-8) establishes exterior and interior Noise Criteria that protect residential areas. The Noise Criteria are designed to control unnecessary, excessive and annoying sounds from noise sources on private property such as parking lots, mechanical equipment, and stationary sources from impacting adjacent residential areas. The Noise Criteria cannot be applied to vehicles when traveling on public roadways. Federal and State laws preempt control of the mobile noise sources on public roads. Exhibit 5 presents the City of San Gabriel's Noise criteria.

The Noise Ordinance standards are in terms of the "A-weighted decibel," abbreviated dBA. The ordinance defines levels that cannot be exceeded for a certain period of time. In terms of a noise metric this represents the L(%) metric. The L(%) metric describes the noise level that is exceeded during a certain percentage of the measurement period. The lowest outdoor noise levels defined in the Noise Ordinance are the levels that cannot be exceeded for more than 30 minutes in an hour. This is equivalent to the L50 metric. Similarly the Noise Ordinance defines a noise level that cannot be exceeded for more than 5 minutes per hour. This is the noise level exceeded 8.3% of the time and the L8.3 metric.



NORMALLY ACCEPTABLE
Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

CONDITIONALLY ACCEPTABLE
New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.

NORMALLY UNACCEPTABLE
New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise reduction features included in the design.

CLEARLY UNACCEPTABLE
New construction or development should generally not be undertaken.

Source: California Governor's Office of Planning and Research, State of California General Plan Guidelines, Appendix C.

Exhibit 5
Noise/Land Use Compatibility Guidelines

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Table 1 City of San Gabriel Noise Criteria at Adjacent Residential Properties

Maximum Time of Exposure	Noise Metric	Noise Level Not To Be Exceeded 7 a.m. to 11 p.m. (Daytime)	11 p.m. to 7 a.m. (Nighttime)
EXTERIOR NOISE STANDARDS			
30 Minutes/Hour	L50	50 dBA	45 dBA
15 Minutes/Hour	L25	55 dBA	50 dBA
5 Minutes/Hour	L8.3	60 dBA	55 dBA
1 Minute/Hour	L1.7	65 dBA	60 dBA
Any period of time	Lmax	70 dBA	65 dBA
INTERIOR NOISE STANDARDS			
5 Minutes/Hour	L8.3	45 dBA	40 dBA
1 Minute/Hour	L1.7	50 dBA	45 dBA
Any period of time	Lmax	55 dBA	50 dBA

The City of San Gabriel Municipal Code Chapter 100.058 (Noise, Vibration, Dust and Debris), allows construction activity for certain time periods. Construction activities are not permitted to take place between the hours of 6 p.m. and 7 a.m., on Sundays and holidays, except with the express written permission of the Administrative Authority, or in case of emergency.

1.4 Existing Noise Measurements

To document the existing noise levels in the project area short-term noise measurements were made at four locations in the vicinity of the project and one long-term (i.e., 24-hour) noise measurement was made at the project site. The locations of the measurements are presented in Exhibit 6. The short-term measurements were performed on Wednesday, August 31, 2011. The long-term measurements were performed on Wednesday, October 19, 2011 to Thursday, October 20, 2011.

Short-term measurement Site 1 was located at the end of Chelsea Way at the northern boundary of the reservoir site. Site 2 was located in the southeast corner of the rear yard of 410 Duane Avenue along the western boundary of the reservoir near the pump house. Site 3 was located in the front yard of 120 Bradbury Drive, along the proposed construction haul route. Site 4 was located at the southwest corner of Madelyn Drive and Bradbury Drive, also along the proposed haul route. The long-term measurement site, "LT," was located along the southern edge of the reservoir site.

The measurement survey utilized Brüel & Kjær 2238 automated digital noise data acquisition systems. These instruments automatically calculate both the Equivalent Noise Level (Leq) and Percent Noise Level (L%) for any specific time period. The noise monitors were equipped with Brüel & Kjær 1/2-inch electret microphone and calibrated with a Brüel & Kjær calibrator with calibrations traceable to the National Bureau of Standards. Calibration for the instruments is performed annually and is certified through the duration of the measurements. The measurement systems satisfy the ANSI (American National Standards Institute) Standards 1.4 for Type 1 precision noise measurement instrumentation.

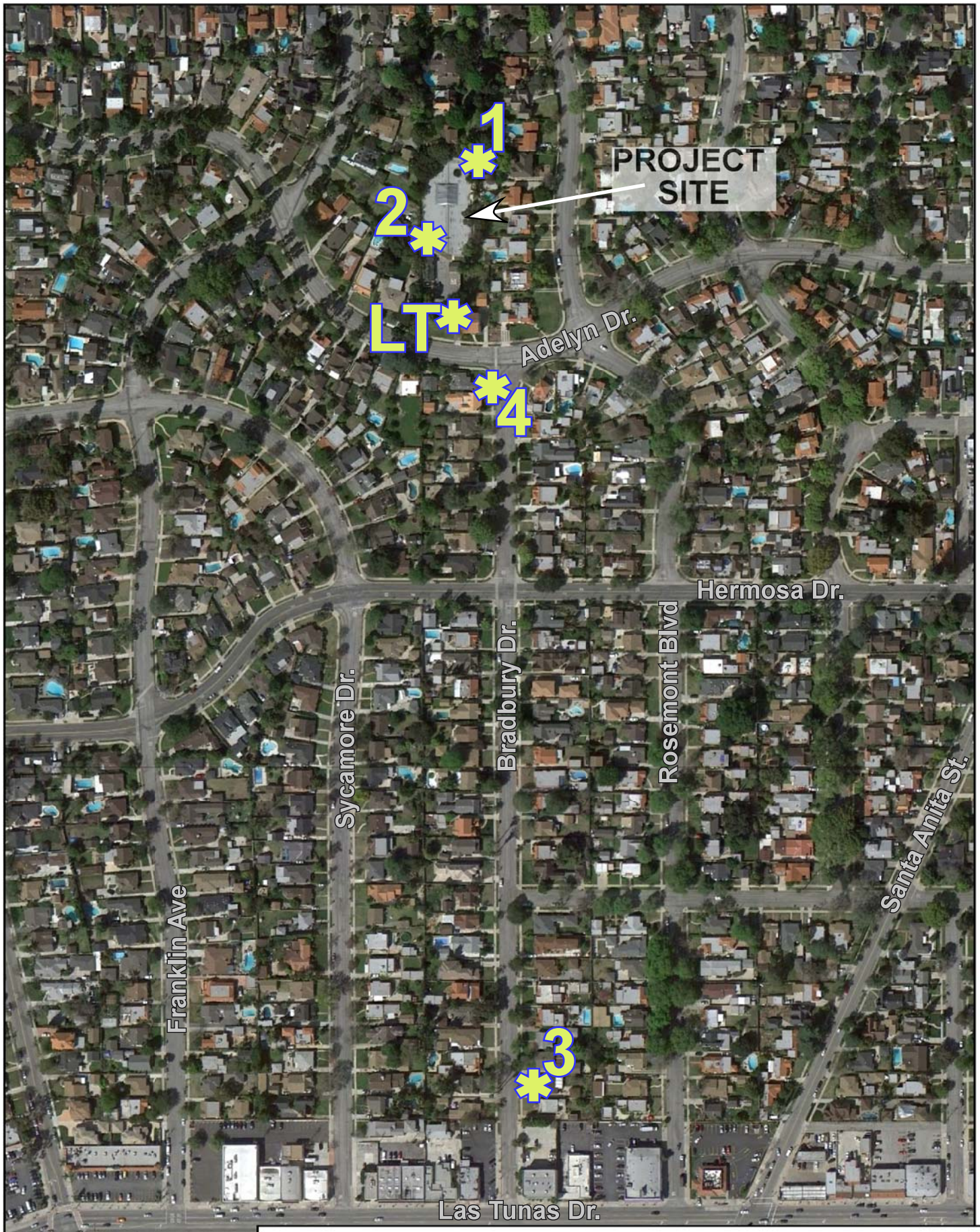

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Exhibit 6
Noise Measurement Locations

The short-term measurements were made with an observer noting noise sources and noise events. The long-term measurements were unattended. A recorder was set up to record the sounds from the sound level meter microphone to assist with identification of noise sources and events during the long-term measurements.

The short-term measurement results are presented in Table 2 in terms of the equivalent noise level (Leq), maximum noise level, minimum noise level and percentile noise levels (L%) from the Noise Ordinance criteria for each measurement period. The L50 percentile level represents the noise level that was exceeded 50 percent of the measurement period and represents the median ambient noise level. The L90 noise levels represent the background noise level which is exceeded 90 percent of the time. The L1.7, L8.3, L25 and L50 correspond with the noise ordnance metrics described in Section 1.3.2.

Table 2 Sound Levels Measured at Short-Term Sites

Site	Start Time	Leq	Lmax	L1.7	L8.3	L25	L50	L90	Lmin
1	1:08 PM	46.7	63.4	55.9	47.5	45.3	44.2	43.7	43.0
2	1:37 PM	47.7	51.2	49.1	48.2	47.7	47.5	47.2	46.9
3	12:26 PM	50.9	61.2	57.5	54.4	51.3	49.3	46.5	42.5
4	12:50 PM	49.5	62.2	56.0	53.2	50.4	47.1	41.7	38.7

Table 2 shows that the average noise levels in the project area are relatively low ranging from about 45 dBA to about 51 dBA. These levels are consistent with what one would expect in a suburban single-family residential area.

Birds and a nearby residential pool pump were the primary sources of noise at measurement Site 1. During the measurement period there were two high en route commercial jets and one distant propeller general aviation overflights during the event. Only one of the en route jets generated a considerable amount of noise, and the maximum noise level experienced during the measurement period. This event also affected the average (Leq) noise level. Without this aircraft overflight, the Leq level would be 2 dB lower at 44.7 dBA. This is a relatively low level of noise.

Noise generated by the equipment inside the pump house was the primary source of noise at Site 2. Birds and rustling foliage also contributed to the noise environment. Table 2 shows that the range in noise levels (i.e., the difference between the maximum and minimum noise levels) was only 4.3 dB at Site 2. For comparison, the range in measured noise levels at the other sites was approximately 20 dB. This is due to the reservoir equipment being the dominant noise source and generating a relatively constant noise level.

The noise environment at Site 3 was dominated by traffic noise. Lower level, but more constant traffic noise from Las Tunas Drive, and occasional traffic passing on Bradbury Drive also contributed to the noise environment. Birds, a distant leaf blower, and occasional activity in the parking lot of the restaurant located at the northwest corner of Las Tunas Drive and Bradbury Drive.

At Site 4, distant gardener activity and traffic were the primary sources of noise with occasional vehicle passes on Adelyn Drive or Bradbury Drive causing momentarily higher levels of noise, and the maximum level of noise. When the distant gardener equipment was not operating the noise level dropped into the 38 to 44 dBA range. Vehicle passes resulted in peak noise levels in the 55 to 60 dBA range with one car pass resulting in the maximum noise level during the measurement.

Long-term measurements were performed from Wednesday, October 19, 2011 to Thursday, October 20, 2011. The sound level meter was located along the wall at the western edge of the secured reservoir area. Table 3 presents the hourly average noise levels (Leq(h)) and the maximum and minimum noise levels recorded during each hour. The data presented for the 11:00 PM, 6:00 AM, 7:00 AM, 8:00 AM, and 9:00 AM hours were edited to remove extraneous events that do not accurately represent the noise environment as described below.

Table 3 Sound Levels Measured at Long-Term Site

Hour	Leq(h)	Lmax	Lmin	Hour	Leq(h)	Lmax	Lmin
1:00 PM	50.9	59.4	48.8	1:00 AM	49.3	59.0	48.4
2:00 PM	51.4	63.1	48.5	2:00 AM	49.0	49.8	48.4
3:00 PM	50.3	62.4	48.3	3:00 AM	49.2	62.9	48.3
4:00 PM	50.7	65.6	48.0	4:00 AM	49.0	51.7	48.3
5:00 PM	49.9	62.5	48.0	5:00 AM	49.3	51.8	48.6
6:00 PM	49.8	61.1	48.1	6:00 AM	50.0*	63.8*	48.2
7:00 PM	49.3	57.0	48.3	7:00 AM	50.3*	62.9	48.6
8:00 PM	50.1	67.5	48.1	8:00 AM	50.8*	61.4*	48.7
9:00 PM	49.4	54.7	48.1	9:00 AM	51.1*	65.0*	48.6
10:00 PM	49.6	58.1	48.7	10:00 AM	50.8	63.3	48.6
11:00 PM	49.3*	54.9*	48.5	11:00 AM	52.8	63.5	48.7
12:00 AM	49.3	51.9	48.7	12:00 PM	51.9	68.0	48.1

* Levels edited to remove non-representative noise events (see text)

Exhibit 7 presents the hourly average (Leq(h)) noise levels graphically. The main columns present the edited Leq(h) for each hour with a bar showing the measured Leq(h) during these hours. The weighted noise levels used to determine the CNEL (See section 1.2.2) are also presented along with the CNEL level. The measured CNEL level at the long term site was 56.3 dBA with the non-representative noise events removed. With these events the CNEL was 2 dB higher.

During the 11:00 PM and 6:00 AM hours there was a one-minute noise event of air being released as the pump for well four starts that generated a maximum noise level of 74.3 dBA at the sound level meter. However, this release occurred approximately 5 feet from the sound level meter location and therefore resulted in a high noise level at the microphone that drops off quite rapidly away from the microphone. At a distance of 10 feet the level would be reduced by at

least 6 dBA and at 40 feet the level would be reduced by at least 18 dBA. Without this noise event being removed, the Leq(h) during the 11:00 P.M. hour was 55.3 dBA.

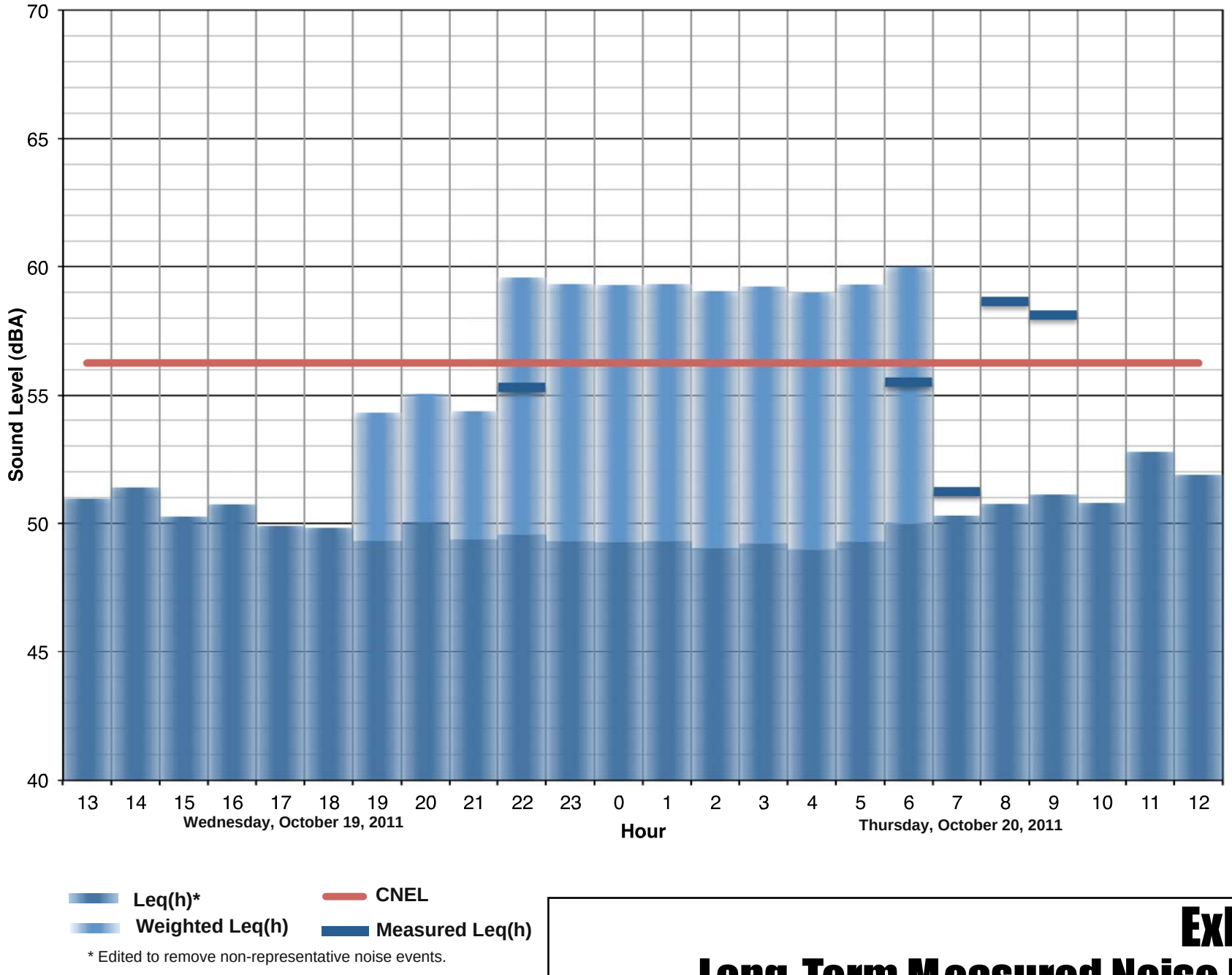
In addition to the drain box noise event during the 6:00 AM hour, the site attendant arrived and parked their vehicle adjacent to the measurement site. Near the end of the hour, the attendant started the service truck that is stationed at the facility, and parked near the measurement site, and let the truck idle to warm up. Because these events occurred so close to the sound level meter microphone they were much louder there than in the general area around the project site and edited from the reported noise level. With these events the measured hourly average (Leq(h)) noise level was 55.5 dBA.

The service truck idling continued for approximately 16 minutes in the 7:00 AM hour, after which the truck departed the site. This noise event was removed from the Leq(h) level presented above. Without this event removed, the Leq(h) level during the 7:00 AM hour was 51.2 dBA.

During the 8:00 AM hour a delivery truck visited the site and a residential trash collection truck passed by the site. The delivery truck during the 8:00 AM hour generated maximum noise levels of 84.1 dBA and the trash truck generated a maximum noise level of 79.6 dBA. Each event lasted about two minutes. The Leq(h) during the 8:00 AM hour was 58.7 dBA without these events being removed.

During the 9:00 AM hour a trash truck visited the site and operated in close proximity to the sound level meter. This event generated a maximum noise level of 88.7 dBA and lasted about one minute. Without this event being removed the measured Leq(h) was 58.1 dBA.

Exhibit 7 shows that, with the non-representative noise events removed, the average noise level was relatively consistent. The reservoir pumps generated a relatively constant noise level of just less that 50 dBA. The table shows the minimum noise levels during each hour ranged from 48.0 to 48.8 dBA. The minimum noise levels are determined by the reservoir pumps as they generate a constant sound level. During the nighttime hours, the hourly average noise levels ranged from 49 dBA to 50 dBA. During these hours the noise environment consisted almost exclusively of noise generated by the reservoir equipment along with crickets. During the daytime the noise levels increased somewhat primarily due to activities outside of the reservoir including tree trimming, general property maintenance activities (e.g., lawn mower, line trimmer, blowers) as well as other activity in the surrounding neighborhood.



* Edited to remove non-representative noise events.

Exhibit 7
Long-Term Measured Noise Levels

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2.0 Potential Noise Impacts

Potential noise impacts are commonly divided into two groups; temporary and long term. Temporary impacts are usually associated with noise generated by construction activities. Long-term impacts from traffic are not anticipated to occur at the proposed project site.

2.1 Noise Impact Criteria

Off-site impacts from on-site activities, short-term and long-term, are measured against the Noise Ordinance criteria discussed in Section 1.3. Construction activities for the proposed project will be required to meet the noise ordinance standards along with any noise generating activities associated with the operation of the project. Inability to comply with the Noise Ordinance criteria would result in a significant impact.

2.2 Traffic Noise

The existing reservoir would be replaced with new and improved booster pumps with operation building. The new facility would provide approximately 30% more capacity. However, the traffic would remain the same as existing traffic. No new traffic associated with the proposed facility is anticipated, and thus, there will be no change in the future traffic and no change in noise levels associated with traffic.

2.3 Temporary Impacts

2.3.1 Construction Noise

Construction noise represents a short-term impact on ambient noise levels. Noise generated by construction equipment, including trucks, graders, bulldozers, concrete mixers and portable generators can reach high levels. Demolition, excavation, grading, and building construction activities will have similar noise levels.

The construction would primarily consist of demolition and excavation of the existing pump station and concrete foundation, 24-hour concrete pour associated with the construction of the new concrete foundation, and construction of a new pump station and operation building.

The construction of the project would entail demolition and excavation of the existing pump station and concrete foundation. Based on the construction trip schedule provided by the City, the demolition and excavation phase is anticipated to take 150 days, and involves approximately 5,302 tons of debris. The preparation/grading phase is next, and would include approximately 3,218 cubic yard of export and 1,917 cubic yards of import. The following phase would consist of some 24-hour concrete pours associated with the construction of the new concrete foundation, and would take approximately 10 days. Subsequently, a new pump station and operation building will be constructed; this phase is projected to take approximately 150 days. It is projected that the construction of the project would start in early 2012 and take about 18 months to complete.

Worst-case examples of construction noise at 50 feet are presented in Exhibit 8. Typical equipment that might be employed for this type of project includes graders, scrapers, front loaders, trucks, concrete mixers and concrete pumps. The peak noise level for most of the equipment that will be used during the construction is 70 to 95 dBA at a distance of 50 feet.

Noise levels at further distances would be less than this. For example, at 200 feet, the peak construction noise levels range from 58 to 83 dBA.

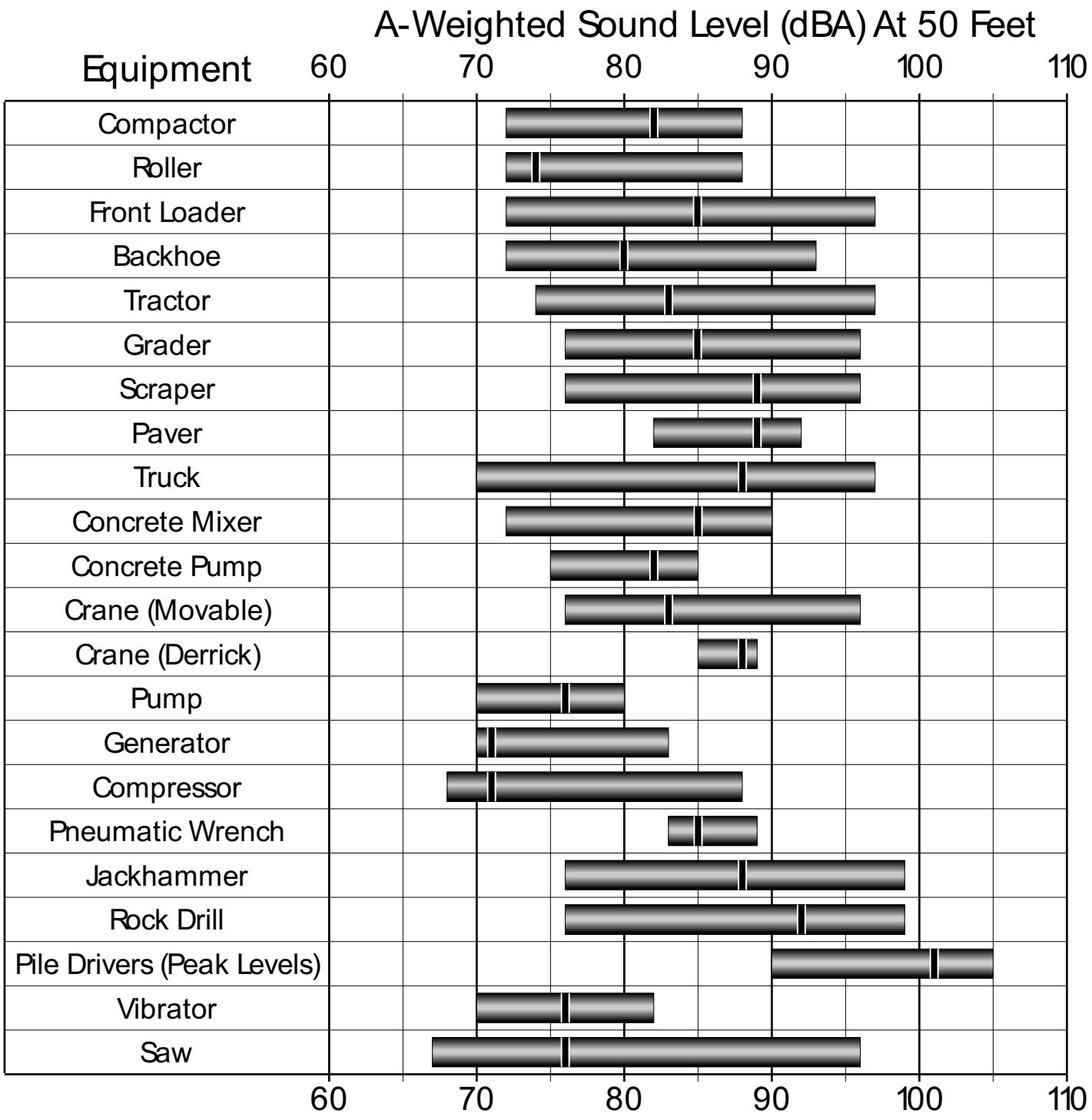
The noise levels shown in Exhibit 8 are based upon worst-case (i.e. loudest noise) conditions at the construction site, so these noise levels will be used as the basis for predicting the worst-case construction noise estimate.

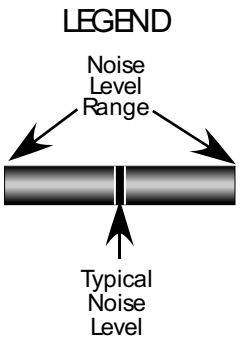
The nearest sensitive land uses are the existing single-family homes immediately east and west of the project site. Potential construction operations could occur as close as 10 feet from the nearest residential homes. Based on this distance, the worst-case unmitigated peak (Lmax) construction noise levels could be 97 dBA for very short periods. However, as the construction is moved towards the center of the project site, the noise levels would be significantly less. The average noise levels are typically 5 to 15 dB lower than the peak noise levels. Average noise levels (L50) at the nearest existing residential buildings could be in the range of 71 to 82 dBA (L50).

Construction of the project would result in noise levels at residential areas in excess of the City of San Gabriel Noise Ordinance. However, the City's Municipal Code Chapter 100.058, allows construction activity for certain time periods. Construction activities are not permitted to take place between the hours of 6 p.m. and 7 a.m., on Sundays and holidays, except with the express written permission of the Administrative Authority, or in case of emergency. The City has no time limits for Mondays through Saturday. However, due to the duration of the construction (up to 18 months) the need for mitigation may be more acute than the average construction project which may last weeks or at most a few months. Therefore, noise mitigation is recommended in Section 3.0.

Haul trucks associated with the demolition/excavation, and 24-hour concrete pour phases will generate noise along public roadways. The trucks are expected to enter and exit the site via Bradbury Drive and West Las Tunas Drive, and other adjacent roadways. It is anticipated that there would be a maximum of 81 haul trucks per day. This would add approximately 162 daily truck trips to the adjacent roadways. Given a maximum of 162 truck trips a day, the CNEL noise levels due to the haul trucks via Bradbury Drive would be approximately 57 dBA at 50 feet from the centerline. This is the closest distance to the nearest typical home. This noise level is below the City's 65 CNEL noise standard and would not be considered to be significant. Once the trucks are on West Las Tunas Drive and other roadways, there is enough existing traffic on these roadways so that construction trucks will contribute little to the total noise level and there will not be any significant impact.

Construction of the project would include a 24-hour concrete pour phase for approximately 10 days. During this phase, the noise levels will be sufficiently high to cause speech interference and sleep disturbance during the nighttime. The construction equipment, such as concrete mixers, should be located towards the center of the project site, and far from the surrounding homes when possible. Additionally, a written construction permit is necessary for this phase to operate between the hours of 6 p.m. and 7 a.m. on Sundays and holidays. Noise mitigation is recommended in Section 3.0.





Sources: "Handbook of Noise Control," by Cyril Harris, 1979
"Transit Noise and Vibration Impact Assessment" by Federal Transit Administration, 1995

Exhibit 8
Construction Equipment Noise Levels

Mestre Greve Associates

2.4 Long-Term Off-Site Impacts

There will not be any increased traffic caused by the project. This section examines noise impacts from the proposed project on the surrounding land uses. Specifically, noise from equipment operation on the project site is examined.

2.4.1 Off-Site Impacts From On-Site Activities

The project would consist of a new 1,200 square foot booster pump station including chlorination facility, an operation building, metering facility, and clearwell. However, only the booster pump station on-site would have the potential to generate significant noise.

Sensitive land uses surrounding the project site includes adjacent residential immediately east and west. These nearest residences would be located a little less than 60 feet from the new pump station.

Booster Pump Station

The new pump station will house three booster pumps. The electrical consumption under the new project conditions is not known. However, future consumption should be less due to the installation of new energy efficient equipment. The three electrical booster pumps will be Teco Westinghouse with 150 HP and 250 HP WP1 motors. The noise rating for a WP1 motor is typically 85 dBA at 3 feet for both 150 HP and 250 HP. Based on this noise level, the combined noise generated from all three booster pumps is projected to be 89.8 dBA at 3 feet.

The pump station housing would be constructed of composite shingle attic spaced roof, fiber-cement shingles walls, metal doors, and 4 by 8 foot acoustical intake louvers. The facility would need to comply with the City's more stringent nighttime noise limit of 45 dBA at the nearest residences. Based on the combined noise level of 89.8 dBA at 3 feet, the pump station building would need to achieve an inside-to-outside noise reduction of at least 44.8 dBA, in order to comply with the 45 dBA noise limit.

To meet the noise limit, the pump station building must provide sufficient inside-to-outside building attenuation to reduce the noise to acceptable levels. The indoor to outdoor noise reduction characteristics of a building are determined by combining the transmission loss of each of the building elements that make up the building. Each unique building element has a characteristic transmission loss. The critical building elements are typically the roof, walls, windows, doors, attic configuration and insulation. The total noise reduction achieved is dependent upon the transmission loss of each element, and the surface area of that element in relation to the total surface area of the room. Room absorption is the final factor used in determining the total noise reduction.

Based upon the construction details and the EWNR values, the inside to outside noise reduction was calculated for the pump station building. The EWNR calculations are provided in the appendix. The construction details were from the architectural drawings provided by URS, October 2011.

Roofs are vented attic space constructions and incorporate asphalt/composite shingle on the exterior and 5/8" gypsum drywall on the interior surface. Attic spaces are insulated with fiberglass insulation, and roofs are sloped. This roof/ceiling assembly was estimated to achieve a noise reduction rating of at least EWNR=34.

Exterior walls are wood stud construction with fiber-cement shingles exteriors and minimum 1/2" gypsum drywall on the interior. All exterior walls include fiberglass insulation in the stud cavities. The walls were estimated to achieve a noise reduction rating of at least EWNR=42.

Acoustic intake louvers (Ruskin Model ACL 845) in the exterior walls achieve a noise reduction rating of EWNR=11.

Doors are hollow metal core with a noise reduction rating of EWNR=18.

Based on EWNR calculations, the pump housing would achieve noise reduction less than the required to comply with the 45 dBA noise limit. As a result, upgrades would be required to meet the 45 dBA. Upgrades are required for all acoustic louvers on the exterior walls. Recommended upgrades are addressed in Section 3.0.

3.0 MITIGATION MEASURES

3.1 Temporary Impacts

3.1.1 Construction Noise

The analysis presented in Section 2.3.1 shows that loud construction activities could generate noise levels in excess of limits defined in the City's Municipal Code Chapter 100.058. The most effective method of controlling construction noise is through limiting construction hours. Therefore, the following mitigation measure is proposed and is consistent with the San Gabriel Noise Ordinance.

> **Mitigation Measure N-1:**
> Control of Construction Hours – Construction activities should not permitted to take place between the hours of 6 p.m. and 7 a.m., on Sundays and holidays, except with the express written permission of the Administrative Authority, or in case of emergency. As long as the project operates within these hours, it will be in compliance with the Noise Ordinance.
>
> The 24-hour concrete pour phase will last for approximately 10 days. The construction equipment, specifically concrete mixers, should be located towards the center of the project site, and far from the surrounding homes when possible. Additionally, an expressed written construction permit is required for this phase to operate between the hours of 6 p.m. and 7 a.m. on Sundays and holidays.

Due to the high noise levels that will occur during construction and due to the extended length of construction, an two additional mitigation measure are recommended.

> **Mitigation Measure N-2:**
> Additional Limits on Construction Hours – Except when construction can not be avoided (i.e., 24-hour construction pour), construction should be limited to 7 a.m. to 6 p.m. on Mondays through Friday. Construction should be avoided on Saturdays and Sundays whenever possible.

> **Mitigation Measure N-3:**
> Construct a temporary noise barrier along the west, north, and east sides of the project along the property line adjacent to the existing residences. The temporary construction barrier should be 8 feet high. Two construction barriers are commonly utilized and either is acceptable for this project. Plywood barriers can be used, but should incorporate a minimum of 1 inch thickness of wood. Sound curtains are also an acceptable noise barrier, however, any acoustic sound curtain should have a Sound Transmission Class (STC) rating of at least 20. The temporary noise barrier will reduce the noise levels by 6 to 10 dB, depending on the source and its location.

3.2 Long Term Off-Site Impacts

3.2.1 On-Site Activities

The analysis presented in Section 2.4.1 shows that the on-site activities, primarily the pump station, could generate sufficient noise to generate a significant impact, and therefore, noise mitigation is necessary.

Booster Pump Station

The pump station building would not achieve noise attenuation sufficient to meet the 45 dBA noise limit at the nearest residences as currently designed. As a result, upgrades are necessary for the louvers that are located on two sides of the building. The following measure is recommended.

> **Mitigation Measure N-4:**
> The louvers on the building should be upgraded to high performance acoustic louvers that have a minimum EWNR rating of 20 or an STC rating of 23. An acceptable louver would be the Industrial Acoustics Company (IAC) Noishield Louvers Model 2R (www.industrialacoustics.com). Louvers with the same or higher noise performance are also acceptable.

With the recommended upgrade, the outdoor noise levels would be reduced to approximately 43 dBA at the nearest residences. (Note that this noise level is lower than the measured ambient noise of 44 dBA, as shown in Table 2 for Site 1). The mitigated noise level complies with the nighttime noise limit of 45 dBA. The EWNR calculations are included in the appendix.

4.0 UNAVOIDABLE SIGNIFICANT IMPACTS

The mitigation measures described above will mitigate all significant impacts to a level of insignificance. The project will not result in an unavoidable significant impact.

APPENDIX

EWNR (Inside to Outside) Calculation Sheet **Revised 7-31-09 by FG and MH**

Wilson Reservoir 3 electrical pumps worst case (inside bldg) : based on TECO Westinghouse tech. LEQ =85 dBA @3' per pump

NOISE LEVEL: 89.8 3 electrical pumps
CORRESPONDING NOISE STANDARD: 45.0

CASE 1 : Pump Room impacting nearest residence (to the east)

BUILDING ELEMENT	AREA (ft^2)	EWNR	COMMENTS	10^(-EWNR/10)
Roof / Ceiling	647.9	34	composite shingle, attic	0.25794
Wall	882.7	42	fiber-cement shingles	0.05569
Window (acoustic louver)	64.0	11	Ruskin Model ACL 845	5.08370
Entry Door	84.0	18	hollow metal	1.33131
TOTAL AREA (ft^2)	1678.6			6.72864

Distance: 56
Radiating Area (wall): 441.3

Composite EWNR (TL): 24.0
Calculated Noise Level: 46.1 per Secrets of Noise Control, Eq 37 (page 129)

SPECTRAL ADJUSTMENT: 0.0 dB
SAFETY MARGIN: 2.0 dB

NOISE LEVEL: 48.1 45 dBA Noise Limit

NOISE LEVEL: 89.8
CORRESPONDING NOISE STANDARD: 45.0

CASE 2 : Pump room impacting nearest residence2 (to the west)

BUILDING ELEMENT	AREA (ft^2)	EWNR	COMMENTS	10^(-EWNR/10)
Roof / Ceiling	647.9	34	composite shingle, attic	0.25794
Wall	882.7	42	fiber-cement shingles	0.05569
Window (acoustic louver)	64.0	11	Ruskin Model ACL 845	5.08370
Entry Door	84.0	18	hollow metal	1.33131
TOTAL AREA (ft^2)	1678.6			6.72864

Distance: 58
Radiating Area (wall): 441.3

Composite EWNR (TL): 24.0
Calculated Noise Level: 45.8 per Secrets of Noise Control, Eq 37 (page 129)

SPECTRAL ADJUSTMENT: 0.0 dB
SAFETY MARGIN: 2.0 dB

NOISE LEVEL: 47.8 45 dBA Noise Limit

NOISE LEVEL: 89.8
CORRESPONDING NOISE STANDARD: 45.0

CASE 3 : Pump room impacting nearest residence2 (to the southeast)

BUILDING ELEMENT	AREA (ft^2)	EWNR	COMMENTS	10^(-EWNR/10)
Roof / Ceiling	647.9	34	composite shingle, attic	0.25794
Wall	882.7	42	fiber-cement shingles	0.05569
Window (acoustic louver)	64.0	11	Ruskin Model ACL 845	5.08370
Entry Door	84.0	18	hollow metal	1.33131
TOTAL AREA (ft^2)	1678.6			6.72864

Distance: 90
Radiating Area (wall): 441.3

Composite EWNR (TL): 24.0
Calculated Noise Level: 42.0 per Secrets of Noise Control, Eq 37 (page 129)

SPECTRAL ADJUSTMENT: 0.0 dB
SAFETY MARGIN: 2.0 dB

NOISE LEVEL: 44.0 45 dBA Noise Limit

EWNR (Inside to Outside) Calculation Sheet **Revised 7-31-09 by FG and MH**

Wilson Reservoir 3 electrical pumps worst case (inside bldg) : based on TECO Westinghouse tech. LEQ =85 dBA @3' per pump

NOISE LEVEL: 89.8 3 electrical pumps
CORRESPONDING NOISE STANDARD: 45.0

CASE 1 : Pump Room impacting nearest residence 1 (to the east)

BUILDING ELEMENT	AREA (ft^2)	EWNR	COMMENTS	10^(-EWNR/10)
Roof / Ceiling	647.9	34	composite shingle, attic	0.25794
Wall	882.7	42	fiber-cement shingles	0.05569
Window (acoustic louver)	64.0	**20**	**IAC Noishield Model 2R**	0.64000
Entry Door	84.0	18	hollow metal	1.33131
TOTAL AREA (ft^2)	1678.6			2.28494

Distance: 56
Radiating Area (wall): 441.3

Composite EWNR (TL): 28.7
Calculated Noise Level: 41.4 per Secrets of Noise Control, Eq 37 (page 129)

SPECTRAL ADJUSTMENT: 0.0 dB
SAFETY MARGIN: 2.0 dB

NOISE LEVEL: 43.4 **45 dBA Noise Limit**

NOISE LEVEL: 89.8
CORRESPONDING NOISE STANDARD: 45.0

CASE 2 : Pump room impacting nearest residence2 (to the west)

BUILDING ELEMENT	AREA (ft^2)	EWNR	COMMENTS	10^(-EWNR/10)
Roof / Ceiling	647.9	34	composite shingle, attic	0.25794
Wall	882.7	42	fiber-cement shingles	0.05569
Window (acoustic louver)	64.0	**20**	**IAC Noishield Model 2R**	0.64000
Entry Door	84.0	18	hollow metal	1.33131
TOTAL AREA (ft^2)	1678.6			2.28494

Distance: 58
Radiating Area (wall): 441.3

Composite EWNR (TL): 28.7
Calculated Noise Level: 41.1 per Secrets of Noise Control, Eq 37 (page 129)

SPECTRAL ADJUSTMENT: 0.0 dB
SAFETY MARGIN: 2.0 dB

NOISE LEVEL: 43.1 **45 dBA Noise Limit**

NOISE LEVEL: 89.8
CORRESPONDING NOISE STANDARD: 45.0

CASE 3 : Pump room impacting nearest residence3 (to the southeast)

BUILDING ELEMENT	AREA (ft^2)	EWNR	COMMENTS	10^(-EWNR/10)
Roof / Ceiling	647.9	34	composite shingle, attic	0.25794
Wall	882.7	42	fiber-cement shingles	0.05569
Window (acoustic louver)	64.0	**20**	**IAC Noishield Model 2R**	0.64000
Entry Door	84.0	18	hollow metal	1.33131
TOTAL AREA (ft^2)	1678.6			2.28494

Distance: 90
Radiating Area (wall): 441.3

Composite EWNR (TL): 28.7
Calculated Noise Level: 37.3 per Secrets of Noise Control, Eq 37 (page 129)

SPECTRAL ADJUSTMENT: 0.0 dB
SAFETY MARGIN: 2.0 dB

NOISE LEVEL: 39.3 **45 dBA Noise Limit**