4.7 NOISE

This section discusses potential General Aviation Improvement Program ("GAIP")-related impacts to the human noise environment in the vicinity of John Wayne Airport ("JWA" or "the Airport"). The noise analysis in this section is based on the *John Wayne Airport General Aviation Improvement Program Noise Analysis Technical Report* prepared by Landrum & Brown and included in this Program EIR as Appendix H (Landrum & Brown 2018). The Technical Report includes definitions, acronyms, and large data tables that are not repeated in this section.

As discussed in Section 2.3.2, the thresholds pertaining to vibration and projects in proximity to an airstrip were focused out of this Program EIR at the time the Notice of Preparation was issued (refer to the Notice of Preparation ["NOP"]/Initial Study in Appendix A).

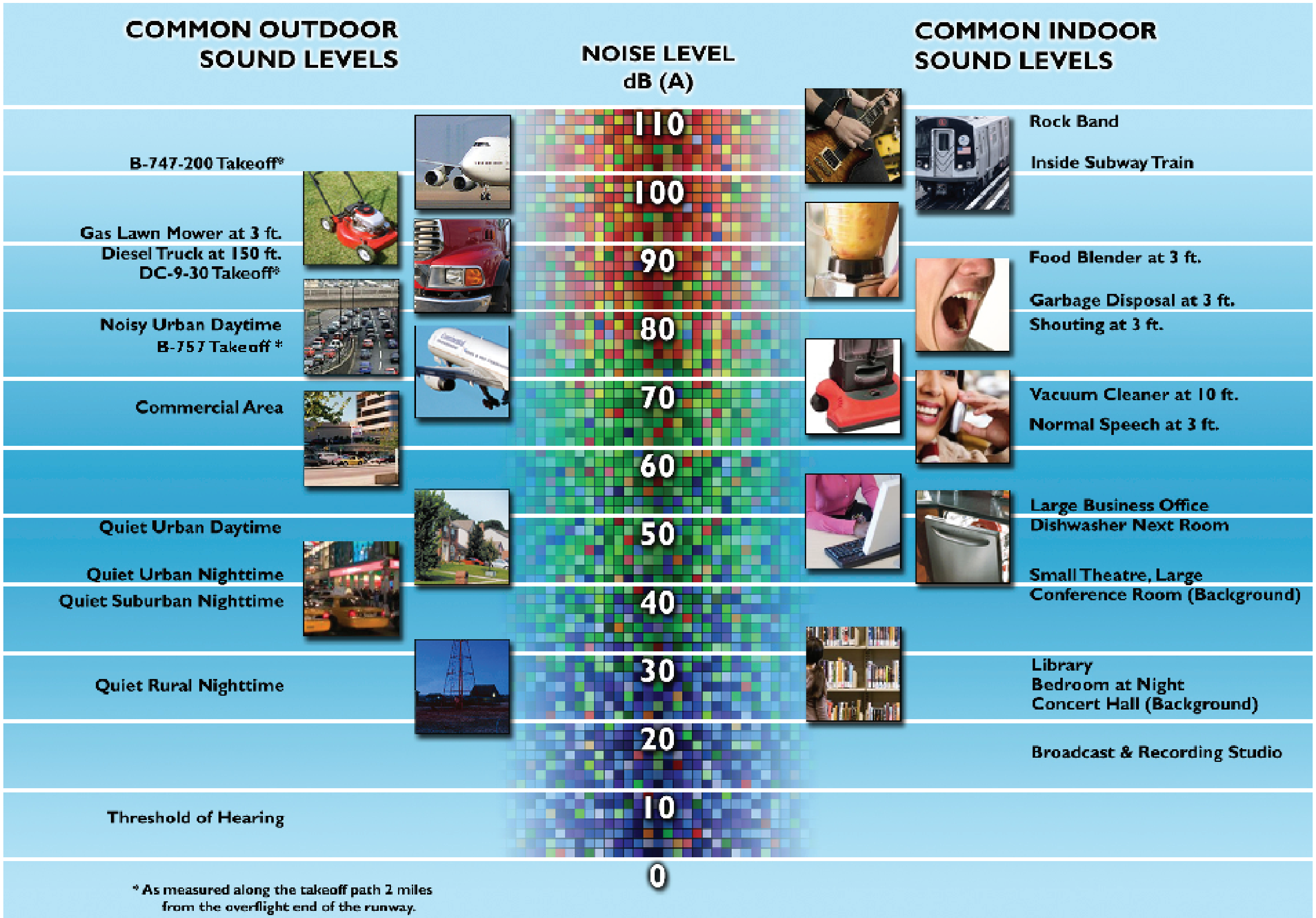
4.7.1 BACKGROUND

Sound can be described in terms of the sound pressure (amplitude) and frequency (similar to pitch). Sound pressure is a direct measure of the magnitude of a sound without consideration for other factors that may influence its perception. The range of sound pressures that occur in the environment is so large that it is convenient to express these pressures on a logarithmic scale that compresses the wide range of sound pressures to a more usable range of numbers. The standard unit of measurement of sound is the decibel ("dB"), which describes the pressure of a sound relative to a reference pressure.

The frequency (pitch) of a sound is expressed as Hertz ("Hz") or cycles per second. The normal audible frequency for young adults is 20 Hz to 20,000 Hz. Community noise, including aircraft and motor vehicles, typically ranges between 50 Hz and 5,000 Hz. The human ear is not equally sensitive to all frequencies, with some frequencies judged to be louder for a given signal than others. As a result of this, the A-weighted decibel scale ("dBA") was developed to approximate the sensitivity of the human ear. In the A-weighted decibel, everyday sounds normally range from 30 dBA (very quiet) to 100 dBA (very loud). Examples of various sound environments, expressed in dBA, are presented in Exhibit 4.7-1.

Outdoor sound levels decrease as the distance from the source to the receiver increases. This decrease in sound level is a result of wave divergence, atmospheric absorption, and ground attenuation. Sound radiating from a source in an undisturbed manner travels in spherical waves. As the sound wave travels away from the source, the sound energy is dispersed over a greater area, decreasing the sound power of the wave. Spherical spreading of the sound wave reduces the noise level at a rate of 6 dB per doubling of the distance.

Atmospheric absorption also influences the sound levels received by the observer. The greater the distance traveled, the greater the influence of the atmosphere and the resultant fluctuations. Atmospheric absorption becomes important at distances of greater than 1,000 feet. The degree of absorption varies depending on the frequency of the sound as well as the humidity and temperature of the air. In addition to atmospheric absorption, aircraft noise can also be affected by the physical properties of the surrounding terrain.



Source: Landrum & Brown, 1974

Typical A-Weighted Noise Levels

Exhibit 4.7-1

John Wayne Airport General Aviation Improvement Program

Duration of Sound. Annoyance from a noise event increases with its duration. The "effective duration" of a sound is the time between when a sound rises above the background sound level until it drops back below the background level.

The relationship between duration and noise level is the basis of the equivalent energy principle of sound exposure. Reducing the acoustic energy of a sound by one half results in a 3-dB reduction in total energy. Doubling the duration of the sound increases the total energy of the event by 3 dB. This equivalent energy principle is based upon the premise that the potential for a noise to impact a person is dependent on the total acoustical energy content of the noise.

Change in Noise. The human ear is a far better detector of relative differences in sound levels than absolute values of levels. Under controlled laboratory conditions, when listening to a steady, unwavering pure tone sound that can be changed to slightly different sound levels, a person can just barely detect a sound level change of approximately 1 decibel for sounds in the mid-frequency region. When ordinary noises are heard, a young, healthy ear can detect changes of 2 to 3 decibels. A 5-dB change is readily noticeable, while a 10-dB change is judged by most people as a doubling or a halving of the loudness of the sound. It is typical in environmental documents to consider a 3-dB change as potentially discernible.

Masking Effect. The ability of one sound to limit a listener from hearing another sound is known as the masking effect. The presence of one sound effectively raises the threshold of audibility for the hearing of a second sound. For a signal to be heard, it must exceed the threshold of hearing for that particular individual and exceed the masking threshold for the background noise.

The masking characteristics of sound depend on many factors, including the frequency characteristics of the two sounds, the sound pressure levels, and the relative start time of the sounds. Masking effect is greatest when the frequencies of the two sounds are similar or when low frequency sounds mask higher frequency sounds. High frequency sounds do not easily mask low frequency sounds.

Human Response to Noise. Many factors influence sound perception and annoyance. This includes not only physical characteristics of the sound but also secondary influences such as sociological and external factors. These factors are summarized in Table 4.7-1.

TABLE 4.7-1
FACTORS THAT AFFECT INDIVIDUAL ANNOYANCE TO NOISE

Primary Acoustic Factors
Sound Level
Frequency
Duration
Secondary Acoustic Factors
Spectral Complexity
Fluctuations in Sound Level
Fluctuations in Frequency
Rise-time of the Noise
Localization of Noise Source
Non-acoustic Factors
Physiology
Adaptation and Past Experience
How the Listener's Activity Affects Annoyance
Predictability of When a Noise will Occur
Is the Noise Necessary?
Individual Differences and Personality
Source: Landrum & Brown 2018 (taken from C. Harris 1979)

Sound Rating Scales

Various rating scales approximate the human subjective assessment of the "loudness" or "noisiness" of a sound. Noise metrics have been developed to account for additional parameters such as duration and the cumulative effect of multiple events. Single event metrics describe the noise from individual events, such as one aircraft flyover. Cumulative metrics describe the noise in terms of the total noise exposure throughout a defined period. The metrics used in this section are all based upon the dBA scale, which has shown good correlation with community response and is easily measured. Noise metrics used in this study are summarized below.

Single Event Metrics

Frequency Weighted Metrics. In order to simplify the measurement and computation of sound loudness levels, frequency-weighting networks have obtained wide acceptance. The A-weighting scale (also identified as dBA) has become the most prominent of these scales and is widely used in community noise analysis. Its advantages are that it has shown good correlation with community response and is easily measured. The metrics used in this study are all based upon the dBA scale.

Maximum Noise Level. The highest noise level reached during a noise event is called the Maximum Noise Level ("L_{max}"). For example, as an aircraft approaches, the sound of the aircraft begins to rise above ambient noise levels. The closer the aircraft gets, the louder it is until the aircraft is at its closest point directly overhead. Then, as the aircraft passes, the noise level decreases to ambient levels. Such a history of a flyover is plotted at the top of Exhibit 4.7-2. It is this metric to which people generally instantaneously respond when an aircraft flyover occurs.

Single Event Noise Exposure Level and Sound Exposure Level. Another metric that is reported for aircraft flyovers is the Single Event Noise Exposure Level ("SENEL"). This metric is essentially equivalent to the Sound Exposure Level ("SEL") metric. It is computed from dBA sound levels. Referring again to the top of Exhibit 4.7-2, the shaded area, or the area within 10 dB of the maximum noise level, is the area from which the SENEL is computed. The SENEL value is the integration of all the acoustic energy contained within the event.[1] Speech and sleep interference research can be assessed relative to SENEL.

The SENEL metric takes into account the maximum noise level of the event and the duration of the event. For aircraft flyovers, the SENEL value is typically about 10 dBA higher than the maximum noise level. This metric is useful in that airport noise models contain aircraft noise curve data based upon the SENEL metric.

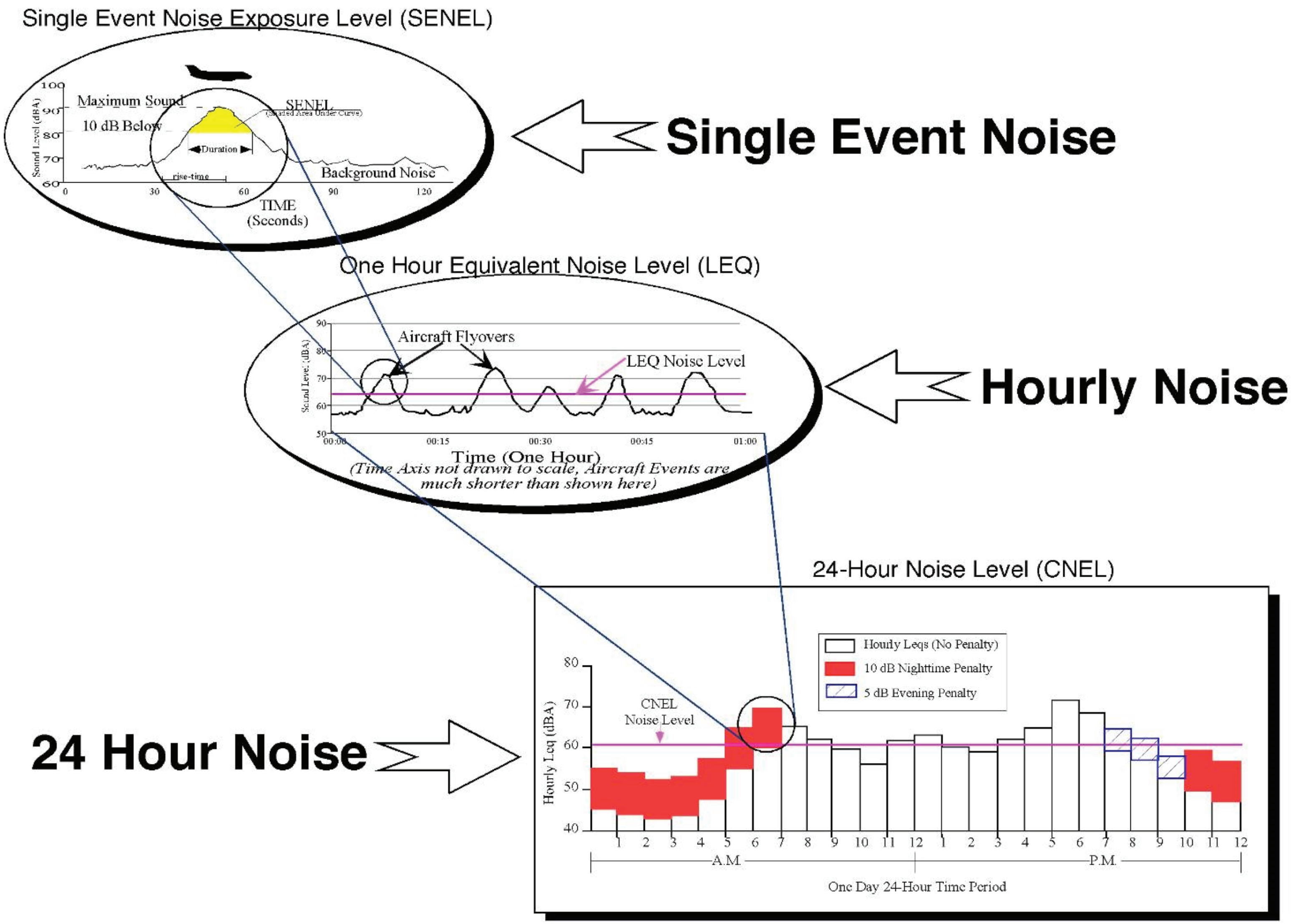
Cumulative Noise Metrics

Cumulative noise metrics assess community response to noise by including the loudness of the noise, the duration of the noise, the total number of noise events and the time of day these events occur in one single number rating scale.

Equivalent Noise Level. The Equivalent Noise Level ("L_{eq}") is the sound level corresponding to a steady-state, A-weighted sound level containing the same total energy as several SENEL events during a given sample period. L_{eq} is the "energy" average noise level during the time period of the sample. It is based on the observation that the potential for noise annoyance is dependent on the total acoustical energy content of the noise. This is graphically illustrated in the middle graph of Exhibit 4.7-2. L_{eq} can be measured for any time period but is typically measured for 15 minutes, 1 hour, or 24 hours. L_{eq} for one hour is used to develop Community Noise Equivalent Level ("CNEL") values.

Community Noise Equivalent Level. CNEL is a 24-hour, time-weighted energy average noise level based on the A-weighted decibel. It is a measure of the overall noise experienced during an entire day. The term "time-weighted" refers to the penalties attached to noise events occurring during certain sensitive time periods. On the CNEL scale, noise occurring between the hours of 7:00 PM and 10:00 PM is penalized by approximately 5 dB. This penalty accounts for the greater potential for noise to cause communication interference during these hours; it also accounts for the typically lower ambient noise levels during these hours. Noise that takes place during the night (10:00 PM to 7:00 AM) is penalized by 10 dB. This penalty was selected to attempt to account for the higher sensitivity to noise in the nighttime and the expected further decrease in background noise levels that typically occur in the nighttime. CNEL is graphically illustrated in the bottom of Exhibit 4.7-2. Examples of various noise environments in terms of CNEL are presented in Exhibit 4.7-3. CNEL is specified for use in the California Airport Noise Regulations and is used by local planning agencies in their General Plan Noise Element for land use compatibility planning.

1 The SENEL value is not shown in Exhibit 4.7-2. The energy represented by the shaded area is "squeezed" into a one-second interval to determine the SENEL value.



Source: Landrum & Brown, 2014

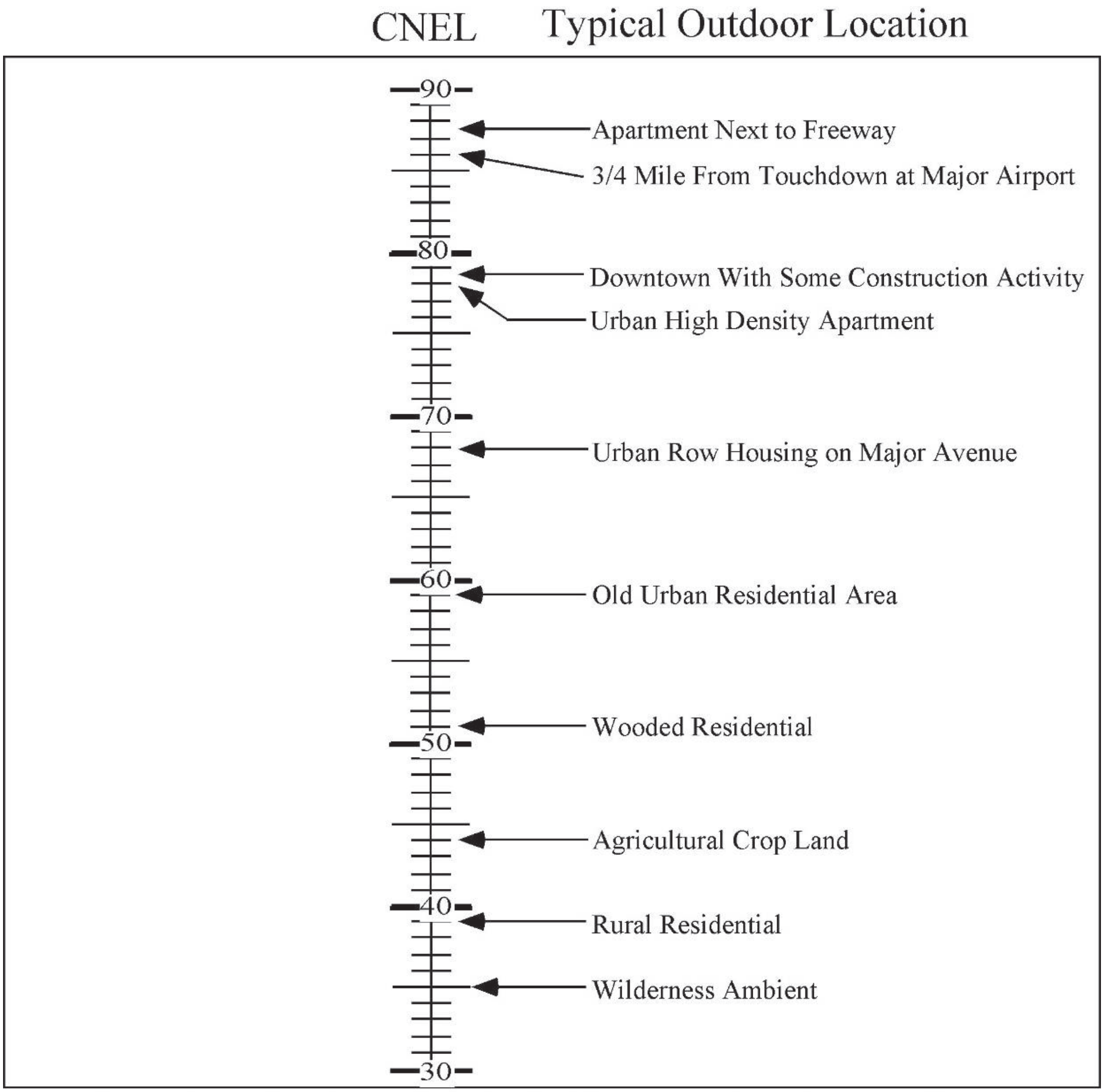
D:\Projects\LAN0102\GRAPHICS\EIR\ex_Single_Cumulative_NoiseMetricDefinitions_20180226.ai

Single and Cumulative Noise Metric Definitions

Exhibit 4.7-2

John Wayne Airport General Aviation Improvement Program

JOHN WAYNE AIRPORT ORANGE COUNTY



Source: Adapted from "Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare With an Adequate Margin of Safety", EPA, 1974

D:\Projects\LAN0102\GRAPHICS\EIR\ex_Typical_Outdoor_NoiseLevels_20180226.ai

Source: EPA, 1974

Typical Outdoor Noise Levels

Exhibit 4.7-3

John Wayne Airport General Aviation Improvement Program

Day Night Noise Level. The Day Night Noise Level ("DNL") is very similar to CNEL, but it does not include the evening (7:00 PM to 10:00 PM) penalty; however, it does include the nighttime (10:00 PM to 7:00 AM) penalty. Typically, DNL is about 1 dB lower than CNEL, although the difference may be greater if there is an abnormal concentration of noise events in the 7:00 PM to 10:00 PM time period. DNL is specified by the Federal Aviation Administration ("FAA") for airport noise assessments and by the U.S. Environmental Protection Agency ("USEPA") for community noise and airport noise assessment. The FAA guidelines allow for the use of CNEL as a substitute to DNL.

Effects of Noise on Humans

Noise, often described as unwanted sound, is known to have several adverse effects on humans. From these known adverse effects of noise, criteria have been established to help protect the public health and safety and to prevent disruption of certain human activities. These criteria are based on effects of noise on people, such as hearing loss, communication interference, sleep interference, physiological responses, and annoyance.

Hearing Loss is generally not a concern, even very near a major airport or a major freeway. The potential for noise-induced hearing loss is more commonly associated with occupational noise exposures in heavy industry, very noisy work environments with long-term exposure, or certain very loud recreational activities (e.g., target shooting, motorcycle or car racing). The Occupational Safety and Health Administration ("OSHA") identifies a noise exposure limit of 90 dBA for 8 hours per day to protect from hearing loss; higher limits are allowed for shorter duration exposures. Noise levels in neighborhoods, even in very noisy neighborhoods, are not sufficiently loud to cause hearing loss.

Communication Interference is one of the primary concerns. Communication interference includes speech interference and interference with activities, such as watching television. Normal conversational speech is in the range of 60 to 65 dBA, and any noise in this range or louder may interfere with speech.

Sleep Interference is a major noise concern and, of course, is most critical during nighttime hours. Noise can make it difficult to fall asleep; creates momentary disturbances of natural sleep patterns by causing shifts from deep to lighter stages; and causes awakening. Noise may even cause awakening which a person may, or may not, be able to recall.

Extensive research has been conducted on the effect of noise on sleep disturbance. Recommended values for desired sound levels in residential bedroom spaces range from 25 to 45 dBA, with 35 to 40 dBA being the norm. The *Noise Analysis Technical Report* (Appendix C Section 2.3, Factors Influencing Human Response to Sound), describes data and studies developed since the 1970s.

In 2008, the American National Standards Institute ("ANSI") published a standard method of estimating sleep disturbance, and this method was adopted by the Federal Interagency Committee on Aviation Noise ("FICAN"). The ANSI standard divided the population into two groups, based on their habituation to the noise source. For a population that has not been habituated to nighttime noise, the FICAN curve shown in Exhibit 4.7-4 is recommended for estimating awakenings due to noise. For communities habituated to nighttime noise, the rate of awakening is considerably lower, as shown in Exhibit 4.7-4. The exhibit shows that, for a habituated population, the rate of awakening for a given indoor noise level is substantially lower than for a population newly exposed to nighttime noise.

Physiological Responses are those measurable effects of noise on people that are realized as changes in pulse rate, blood pressure, or other physical responses. While such effects can be induced and observed, the extent to which these physiological responses cause harm or are a sign of harm is not known. Generally, physiological responses are a reaction to a loud short-term noise, such as a rifle shot or a very loud jet overflight.

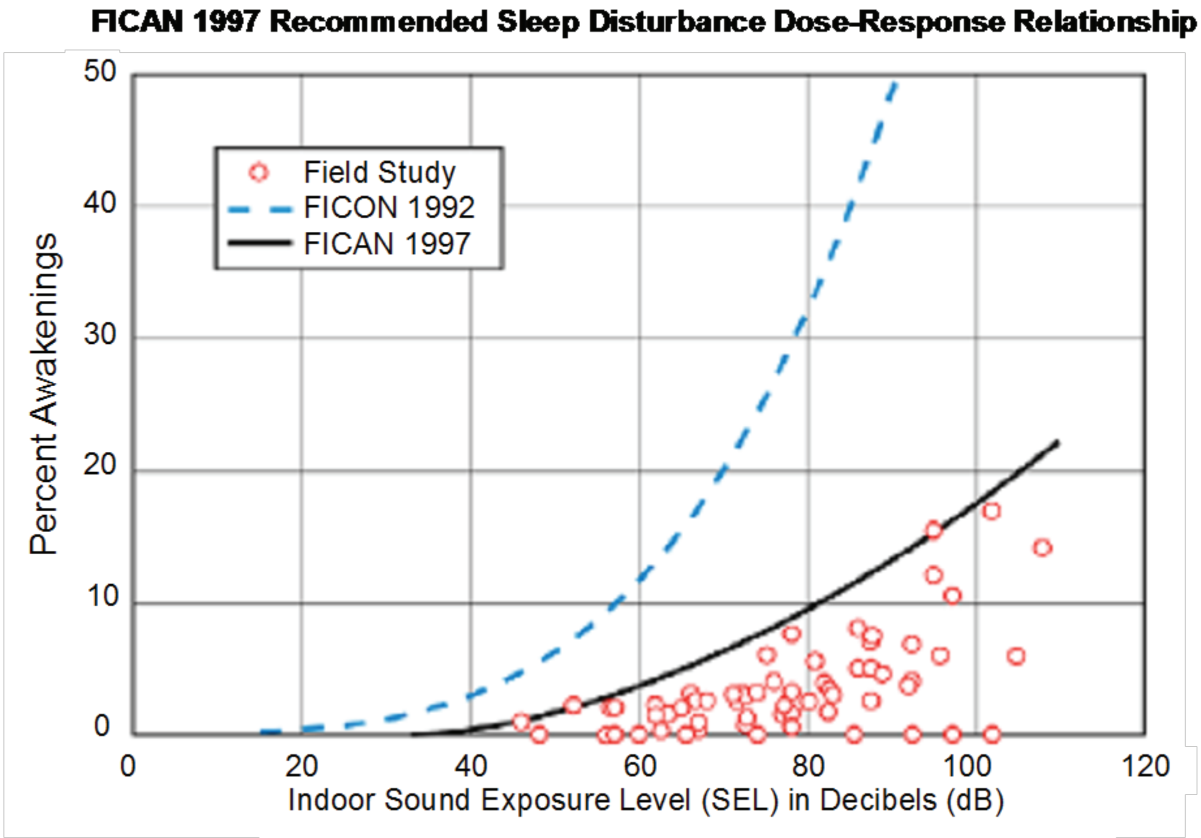
Health effects from noise have been studied around the world for nearly 30 years. Apart from auditory damage—which is amply understood—scientists have attempted to determine whether high noise levels can adversely affect other aspects of human health. These research efforts have covered a broad range of potential impacts from cardiovascular response to fetal weight and mortality. Yet, while a relationship between noise and health effects seems plausible, it has remained a difficult effect to quantify (that is, shown in a manner that can be repeated by other researchers while yielding similar results).

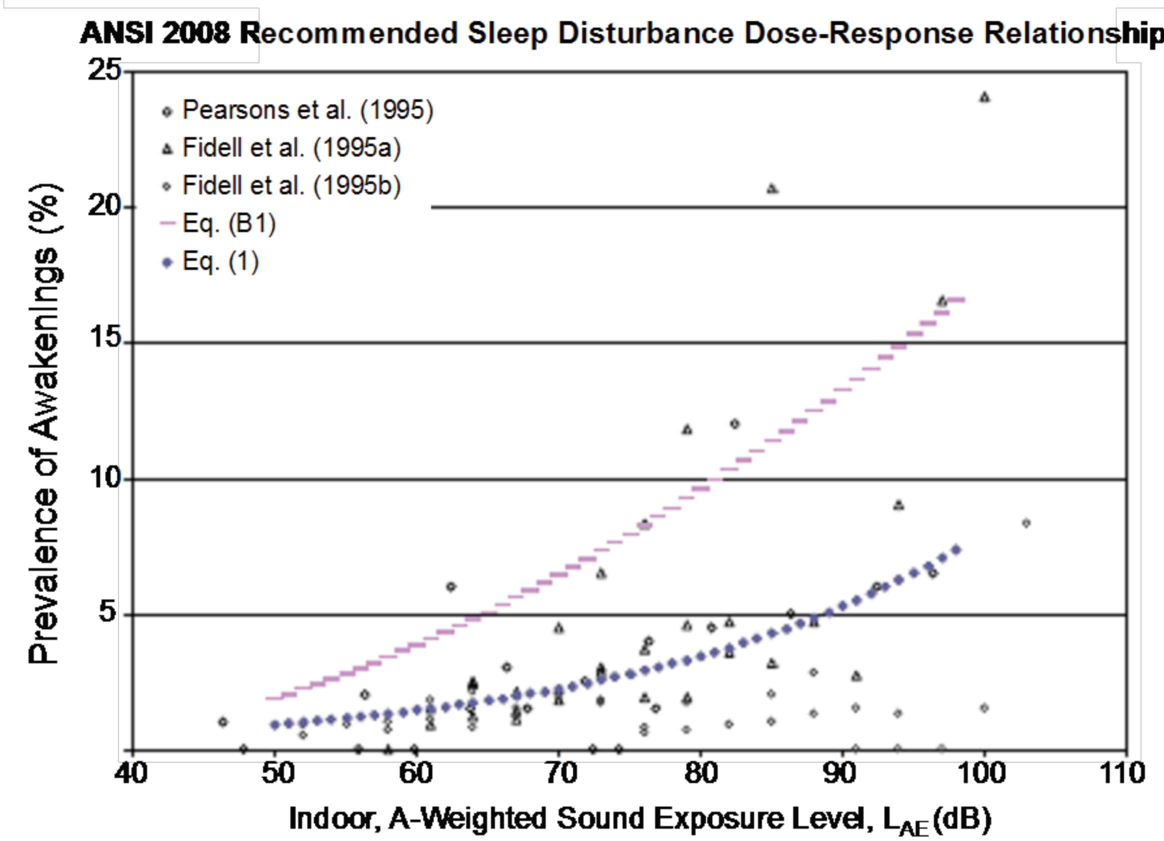
In addition to noise, health effects are also associated with a wide variety of other environmental stressors, including air pollution. Isolating the effects of aircraft noise as a source of long-term physiological change has proven to be almost impossible, as many of the effects that may be associated with noise are also the same as well-known effects of air pollution. As discussed in the *Noise Analysis Technical Report* (Appendix C Section 2.4.3, Effects of Noise on Humans), in 2008, the Airport Cooperative Research Board ("ACRP"), a part of the National Academies, published a synthesis on the effects of aircraft noise and concluded, "Despite decades of research, including review of old data and new research efforts, health effects of aviation noise continues to be an enigma. Most, if not all, current research concludes that it is yet impossible to determine causal relations between health disorders and noise exposure, despite well-founded hypotheses."

In October 2013, two studies on cardiovascular disease associated with aircraft noise were published in the British Medical Journal. The first was done in the United Kingdom ("UK") around Heathrow Airport in London, and the second was done in the United States as part of a multi-airport retrospective study led by researchers from Boston University and the Harvard School of Public Health as part of the Partnership for Air Transportation Noise and Emissions Reduction ("PARTNER") program sponsored by the FAA. The U.S. study focused on Medicare patients, and the British study was based on the total population living around Heathrow.

The British study concluded, in part:

> Our results suggest that high levels of aircraft noise are associated with an increased risk of stroke, coronary heart disease, and cardiovascular disease. As well as the possibility of causal associations, alternative explanations should be considered. These include the potential for incompletely controlled confounding and ecological bias, as we did not have access to individual level confounder data such as ethnicity and smoking. Further work to understand better the possible health effects of aircraft noise is needed, including studies clarifying the relative importance of nighttime compared with daytime noise, as this may affect policy response. (See the *Noise Analysis Technical Report*, Appendix H, Page 17)





Source: Federal Interagency Committee on Aviation Noise (FICAN), 1997; American National Standards Institute, 2008

Sleep Disturbance vs. Noise Level FICAN vs. ANSI — Exhibit 4.7-4

John Wayne Airport General Aviation Improvement Program

D:\Projects\LAN0102\GRAPHICS\EIR\ex_Sleep_Disturbance_Noise_ANSI_20180226.ai

The U.S. study concluded:

> **Results** Averaged across all airports and using the 90th centile noise exposure metric, a zip code with 10 dB higher noise exposure had a 3.5% higher (95% confidence interval 0.2% to 7.0%) cardiovascular hospital admission rate, after controlling for covariates.
>
> **Conclusions** Despite limitations related to potential misclassification of exposure, we found a statistically significant association between exposure to aircraft noise and risk of hospitalization for cardiovascular diseases among older people living near airports." (Abstract, Page 1)
>
> **Limitations of this study**. Our analysis has limitations. Although Medicare data covers nearly the entire US older population, this database was developed for administrative purposes and has been shown to be subject to misclassification and geographic variability in evaluation and management. We only used primary diagnosis, which should reduce misclassification of outcomes, and our analyses of combined cardiovascular disease outcomes are unlikely to have significant misclassification. Other limitations of the Medicare data include limited individual data on risk factors. For example, we were not able to control for smoking and diet, strong risk factors for cardiovascular disease. These variables would only confound the association between aircraft noise and hospitalization for cardiovascular disease if there were significant correlations between aircraft noise exposures and these risk factors. Noise contours display fairly sharp gradients and skew as a function of prevailing wind directions, given runway orientation, and arrival and departure patterns, which may limit spatial confounding. (See the *Noise Analysis Technical Report*, Appendix H, Pages 17 through 19.)

These very recent British and U.S. studies provide more correlation linking noise to cardiovascular disease but still fall short of providing the definitive noise dose and the response relationship that defines at what noise level these effects start and what is the rate of increase in response as noise level increases. As such, no applicable regulatory agency has established standards specific to physiological response for the purpose of the California Environmental Quality Act ("CEQA"), the National Environmental Policy Act ("NEPA"), or any other environmental compliance/assessment law. The absence of such regulations can be attributed, at least in part, to the uncertainty of the science.

Further, the current noise standards used in California ("65 CNEL") and by the FAA ("65 DNL") were adopted with full knowledge that noise effects include physiological responses that include cardiovascular effects. However, as of yet, there is insufficient data on the dose/response relationship to determine whether any revision to the adopted noise standards is warranted. Further, it is not yet clear that the effects being attributed to noise are not, in fact, the effects of air pollution. A great deal more research is necessary to fully understand the relationship between noise and cardiovascular health.

Section 15145 of the State CEQA Guidelines directs Lead Agencies who find a particular impact too speculative after a thorough investigation to note this conclusion and terminate discussion of the impact. The discussion above shows that, at this time, the effects of noise on cardiovascular health at noise levels below 65 CNEL are too speculative for further evaluation in this CEQA document.

However, one of the authors of the U.S. study, Jonathan Levy, suggested what could be done in the interim to protect human health.

> "Our study emphasizes that interventions that reduce noise exposures could reduce cardiovascular risks among people living near airports. This can be done through improved aircraft technology and optimized flight paths, by using runways strategically to avoid when possible residential areas when people are sleeping, and by soundproofing of homes and other buildings."

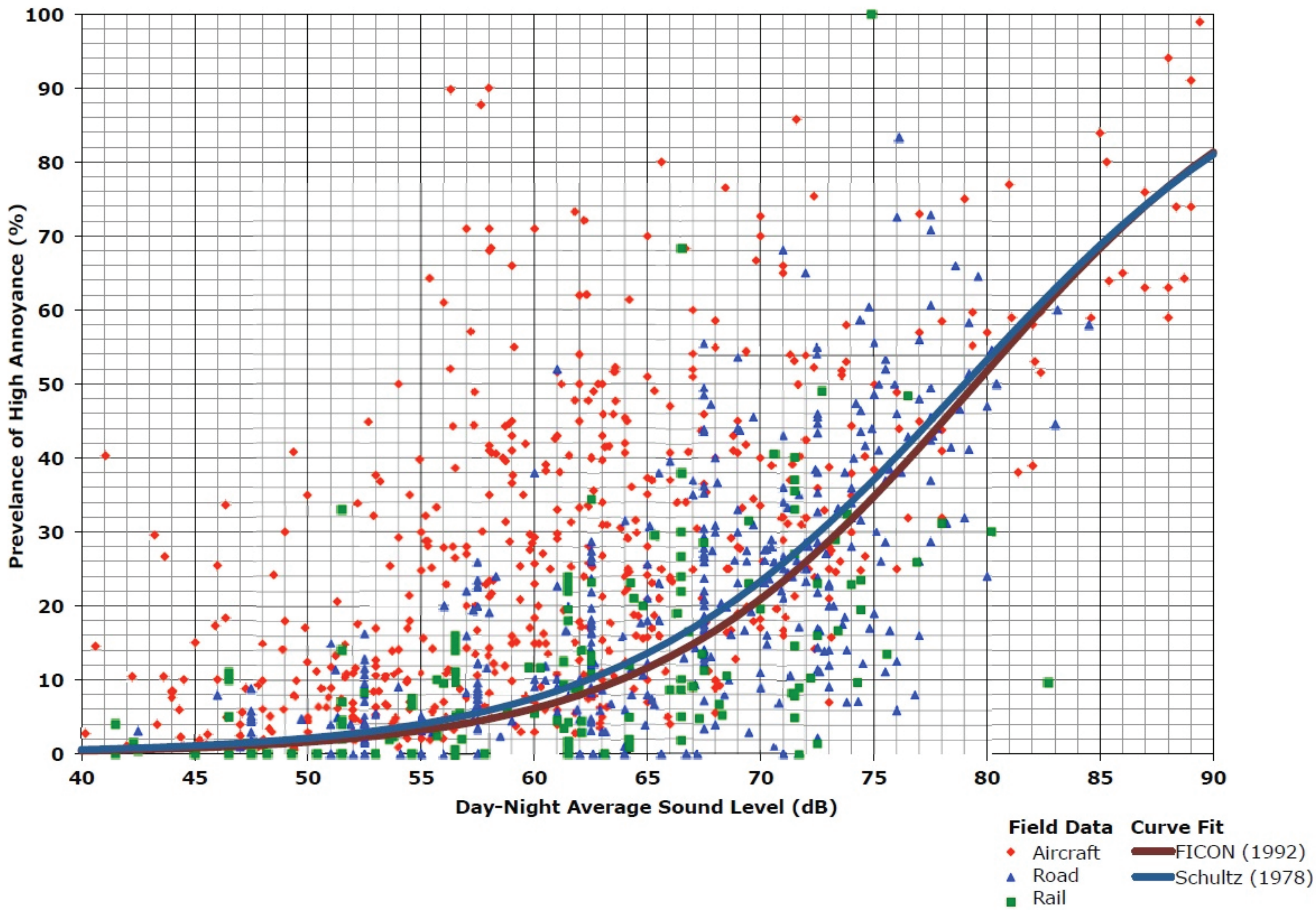
All of the interventions specifically mentioned by the study author are already underway at JWA. Despite the lack of standards or thresholds, the County has taken action to minimize and/or reduce the physiological effects of noise on the surrounding population.

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. The level of annoyance, of course, depends on the characteristics of the noise (i.e., loudness, frequency, time, and duration), and how much activity interference (e.g., speech interference and sleep interference) results from the noise. However, the level of annoyance is also a function of the attitude of the receiver. Personal sensitivity to noise varies widely. It has been estimated that 2 to 10 percent of the population is highly susceptible to annoyance from any noise not of their own making, while approximately 20 percent are unaffected by noise. Attitudes are affected by the relationship between the person and the noise source. Whether we believe that someone is trying to abate the noise would also affect the level of annoyance.

Annoyance levels have been correlated to CNEL levels. Exhibit 4.7-5 relates DNL noise levels to community response from two of these surveys. The curves display the percent of a population that can be expected to be annoyed by various DNL (CNEL in California) values for residential land use with outdoor activity areas. One of the survey curves presented in Exhibit 4.7-5 is the well-known Schultz curve that was developed from a survey of several types of transportation noises such as road traffic, railroad, and aircraft noises. At 65 dB DNL, the Schultz curve predicts that approximately 14 percent of the exposed population will be "highly annoyed." At 60 dB DNL, this decreases to approximately 8 percent of the population.

The curves in Exhibit 4.7-5 include data having a very wide range of scatter, with communities near some airports reporting much higher percentages of annoyance than others. While the precise reasons for this increased noise sensitivity were not identified, it is possible that non-acoustic factors may have played a role in increasing the sensitivity of this community during the period of the survey.

In recent years, researchers have suggested that the noise dose and response curve for annoyance from aircraft noise is different than it is for road and rail noise. In these studies, it has been suggested that the percentage of the population highly annoyed at 65 DNL is closer to 30 percent of the population and not the 14 percent suggested by the Schultz curve. Some studies go on further to describe that communities form unique attitudes about noise and that differing



Source: Schultz (1978) & Ficon (1992)

D:\Projects\LAN0102\GRAPHICS\EIR\ex_Percent_Population_HighlyAnnoyed_DNL_20180226.ai

Percent of Population Highly Annoyed as a Function of DNL

Exhibit 4.7-5

John Wayne Airport General Aviation Improvement Program

communities show a wide range of annoyance response for the same noise exposure that can be attributed to non-acoustic factors.

School Room Effects. Interference with classroom activities and learning from aircraft noise is an important consideration and the subject of much recent research. Studies from around the world indicate that vehicle traffic, railroad, and aircraft noise can have adverse effects on reading ability, concentration, motivation, and long-term learning retention. A complicating factor in this research is the extent of background noise from within the classroom itself. The studies finding the most adverse effects examine cumulative noise levels equivalent to 65 CNEL or higher and single event maximum noise levels ranging from 85 to 95 dBA. In other studies, the level of noise is unstated or ambiguous. According to these studies, a variety of adverse schoolroom effects can be expected from interior noise levels equal to or exceeding 65 CNEL and/or 85 dBA SENEL.

Some interference with classroom activities can be expected with noise events that interfere with speech. High level single events are of concern because speech interference can disrupt a presentation and other classroom activities and learning. As previously discussed, speech interference typically begins at 65 dBA, which is the level of normal conversation. Typical construction attenuates outdoor noise by 20 dBA with windows closed and 12 dBA with windows open. Thus, some interference of classroom activities can be expected at outdoor levels of 77 to 85 dBA.

Noise Attenuation Programs

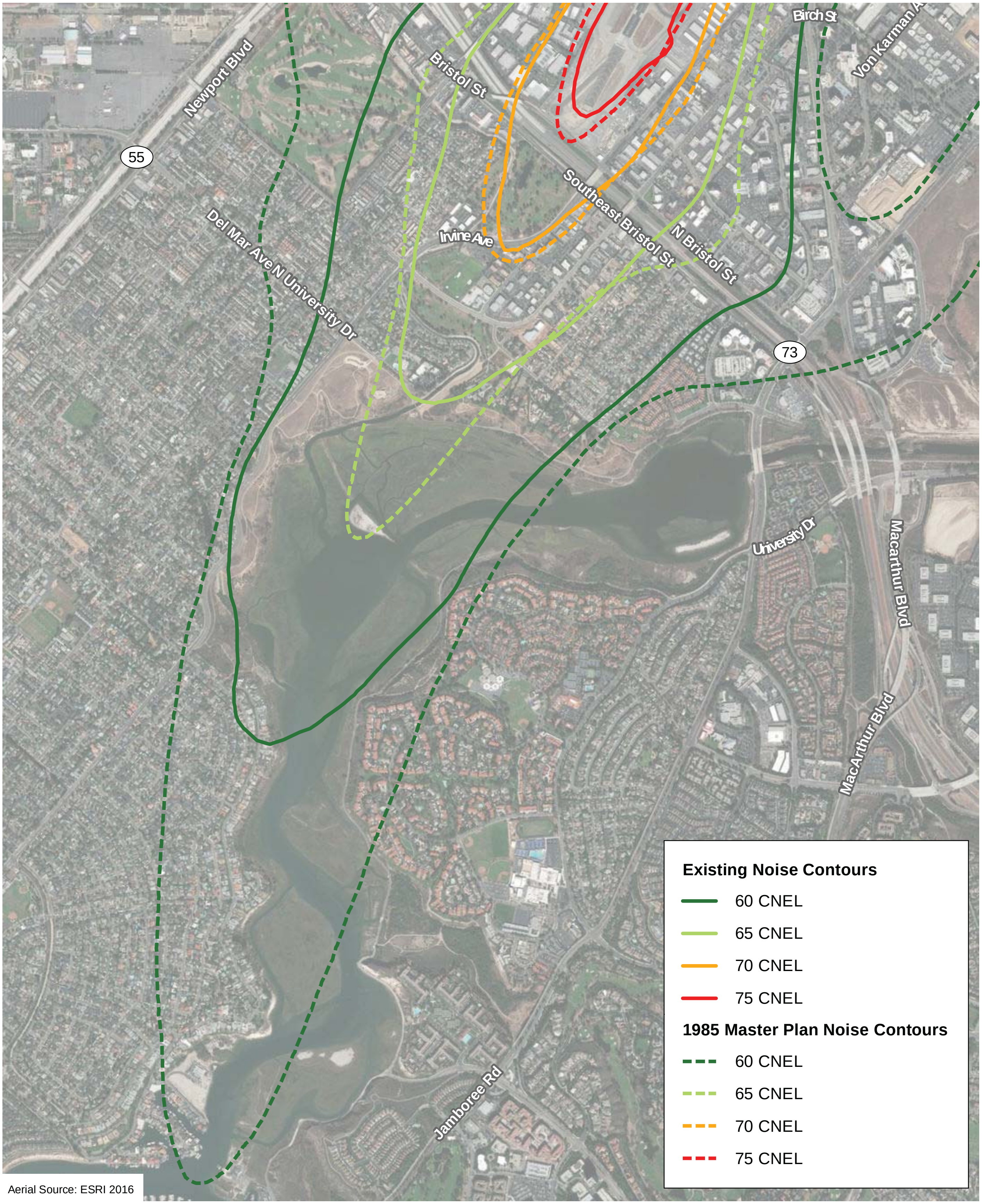
Santa Ana Heights Acoustical Insulation Program

The Airport has adopted two noise attenuation programs. The Santa Ana Heights Acoustical Insulation Program ("AIP") was extensively implemented at JWA as a mitigation measure for the 1985 Master Plan EIR. AIP eligibility was based on the future 65-CNEL contour predicted in the 1985 Master Plan. Exhibit 4.7-6 depicts the 1985 Master Plan departure noise contours, which was the basis for the AIP, along with the existing noise contours. As shown, the existing 65-CNEL contour is much smaller than anticipated in the 1985 Master Plan. Sound insulation was provided for 71 percent of the eligible residences (427 residences) in the AIP area. Of those not insulated, five residences were found to already have sufficient insulation to reduce interior noise levels to less than 45 CNEL. Avigation easements were acquired from the property owners for 16 residences.[2] Seventy six (76) dwelling units were found to be non-conforming uses located in an area zoned for business park uses; prescriptive avigation easements were acquired for these residences. Of the 78 remaining residences that were not insulated, 19 homeowners declined the offer, and 59 homeowners did not respond despite a good faith effort to contact them.

2014 Sound Insulation Program

A second Sound Insulation Program ("SIP") was adopted in conjunction with the 2014 Settlement Agreement Amendment. The program, adopted with the certification of Final EIR 617, provides a monitoring program to compare future noise levels to those of the 2013 Annual Noise Report. The program recognizes the difference between the County of Orange noise impact

2 An avigation easement is a recorded document which grants a perpetual non-exclusive easement for aircraft operations, sound and noise, avigation and flight, hazard and airspace in, to, over, and through the owner's property.



D:\Projects\LAN\0102\MXDs\EIR\Noise_Contours\ex_Comparison_1985_and_Existing_Noise_20180815.mxd

Comparison of 1985 Master Plan and Existing Departure Noise Contours

Exhibit 4.7-6

John Wayne Airport General Aviation Improvement Program

N W E S

2,000 1,000 0 2,000 Feet

JOHN WAYNE AIRPORT ORANGE COUNTY

standards and those adopted by the City of Newport Beach. For properties in the County jurisdiction, if the noise levels have increased by 1.5 dB or more, over the 2013 levels at noise monitoring stations ("NMS") 1S, 2S, and 3S, all noise-sensitive uses represented by that NMS not previously insulated under the 1985 AIP, will be eligible for evaluation for participation in the SIP.[3] The noise level impacting these uses and the measured noise reduction will be used to estimate the interior noise level. If the estimated interior noise level exceeds an average of 45 CNEL, then the use will be eligible for re-evaluation in the form of new interior noise level measurements. If the interior noise level in any habitable room exceeds an average of 45 CNEL, then the use will be eligible for the SIP. For properties in the City of Newport Beach, an increase of 1.0 dB has been established for evaluating eligibility.

When it is determined that a noise-sensitive use is significantly impacted based on measured noise levels and the relevant significance thresholds, that use will be evaluated by the County of Orange for eligibility for sound insulation. The evaluation will be performed by measuring the indoor noise levels for each habitable room or educational space. If the average noise level in all habitable rooms or education spaces of a use is greater than an average of 45 CNEL, then the use will be eligible for sound insulation. Additionally, if the average noise level is less than 45 CNEL, any use with a noise level greater than an average of 45 CNEL in any habitable room or educational space also will be eligible for sound insulation if the FAA waives its requirement that noise levels be averaged across all habitable rooms or education spaces. The implementation of sound insulation will depend on satisfying the FAA criteria described in Chapter 812 of Order 5100.38C Airport Improvement Program Handbook.

To date an increase in noise levels sufficient to require implementation of the SIP has not occurred. Final EIR 617 did not identify a potential impact until Phase 3 (2026 to 2030) under the scenario that was adopted as part of the Settlement Agreement Amendment. It should also be noted that the analysis in Final EIR 617 assumed a continuation of the 2013 fleet mix. Improvements in aircraft may reduce the projected noise levels.

4.7.2 REGULATORY SETTING

Federal Aviation Administration

Federal Aviation Regulations, Part 36

Federal Aviation Regulations ("FAR"), Part 36, "Noise Standards: Aircraft Type and Airworthiness Certification" prescribes noise standards for issuance of new aircraft type certificates. Part 36 prescribes limiting noise levels for certification of new types of propeller-driven, small airplanes as well as for transport category, large airplanes. Subsequent amendments extended the standards to certain newly produced aircraft of older type designs. Other amendments have at various times extended the required compliance dates. Aircraft may be certificated as Stage 1, Stage 2, Stage 3, or Stage 4 aircraft based on their noise level, weight, number of engines and, in some cases, number of passengers. Stage 1 and Stage 2 aircraft are no longer permitted to operate in the United States. As of December 31, 2015, all civil jet aircraft, regardless of weight were required to meet Stage 3 or Stage 4 certification to fly within the contiguous United States. Although aircraft meeting Part 36 standards are noticeably quieter

[3] The Noise Monitoring System is discussed later in Section 4.7.4.

than many of the older aircraft, the regulations make no determination that such aircraft are acceptably quiet for operation at any given airport.

Federal Aviation Noise Abatement Policy

This policy, adopted in 1976 by the U.S. Department of Transportation and FAA, sets forth the noise abatement authorities and responsibilities of the federal government, airport proprietors, State and local governments, air carriers, air travelers and shippers, and airport area residents and prospective residents. The basic thrust of the policy is that the FAA's role is primarily one of regulating noise at its source (the aircraft), plus supporting local efforts to develop airport noise abatement plans. The FAA gives high priority in the allocation of Airport Development Aid Program ("ADAP") funds to projects designed to ensure compatible use of land near airports, but it is the role of State and local governments and airport proprietors to undertake the land use and operational actions necessary to promote compatibility.

Aviation Safety and Noise Abatement Act of 1979

Further weight was given to the FAA's supporting role in noise compatibility planning by congressional adoption of this legislation. Among the stated purposes of this act is "To provide assistance to airport operators to prepare and carry out noise compatibility programs". The law establishes funding for noise compatibility planning and sets the requirements by which airport operators can apply for funding. This is also the law by which Congress mandated that the FAA develop an airport community noise metric to be used by all federal agencies assessing or regulating aircraft noise. The result was DNL. Because California already had a well-established airport community noise metric in CNEL, and because CNEL and DNL are so similar, FAA expressly allows CNEL to be used in lieu of DNL in noise assessments performed for California airports. The law does not require any airport to develop a noise compatibility program.

Federal Aviation Regulations, Part 150

As a means of implementing the Aviation Safety and Noise Abatement Act, the FAA adopted Regulations on Airport Noise Compatibility Planning Programs. These regulations are spelled out in FAR Part 150. FAR Part 150 includes noise and land use compatibility charts to be used for land use planning with respect to aircraft noise. Table 4.7-2 includes relevant data from the FAR Part 150, Appendix A guidelines.

TABLE 4.7-2
FEDERAL AVIATION REGULATION PART 150 LAND USE GUIDELINES

Land Use	Yearly Day-Night Average Sound Level (L_{dn} dBA)					
	<65	65–70	70–75	75–80	80–85	>85
Residential						
Residential, other than mobile homes and transient lodgings	Y	N[1]	N[1]	N	N	N
Mobile home parks	Y	N	N	N	N	N
Transient lodgings	Y	N[1]	N[1]	N[1]	N	N
Public Use						
Schools	Y	N[1]	N[1]	N	N	N
Hospitals and nursing homes	Y	25	30	N	N	N
Churches, auditoriums, and concert halls	Y	25	30	N	N	N
Governmental services	Y	Y	25	30	N	N
Transportation	Y	Y	Y[2]	Y[3]	Y[4]	Y[4]
Parking	Y	Y	Y[2]	Y[3]	Y[4]	N
Commercial Use						
Offices, business and professional	Y	Y	25	30	N	N
Wholesale and retail—building materials, hardware, and farm equipment	Y	Y	Y[2]	Y[3]	Y[4]	N
Retail trade—general	Y	Y	25	30	N	N
Utilities	Y	Y	Y[2]	Y[3]	Y[4]	N
Communication	Y	Y	25	30	N	N
Manufacturing and Production						
Manufacturing, general	Y	Y	Y[2]	Y[3]	Y[4]	N
Photographic and optical	Y	Y	25	30	N	N
Agriculture (except livestock) and forestry	Y	Y[6]	Y[7]	Y[8]	Y[8]	Y[8]
Livestock farming and breeding	Y	Y[6]	Y[7]	N	N	N
Mining and fishing, resource production and extraction	Y	Y	Y	Y	Y	Y
Recreational						
Outdoor sports arenas and spectator sports	Y	Y[5]	Y[5]	N	N	N
Outdoor music shells, amphitheaters	Y	N	N	N	N	N
Nature exhibits and zoos	Y	Y	N	N	N	N
Amusements, parks, resorts, and camps	Y	Y	Y	N	N	N
Golf courses, riding stables, and water recreation	Y	Y	25	30	N	N
Ldn: day night average sound level; dBA: A-weighted noise level						

TABLE 4.7-2
FEDERAL AVIATION REGULATION PART 150 LAND USE GUIDELINES

Land Use	Yearly Day-Night Average Sound Level (L_{dn} dBA)					
	<65	65–70	70–75	75–80	80–85	>85
Table Key						
Y (Yes) =Land Use and related structures compatible without restrictions.						
N (No) =Land Use and related structures are not compatible and should be prohibited.						
NLR =Noise Level Reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.						
25, 30, or 35 = Land use and related structures generally compatible; measures to achieve NLR of 25, 30, or 35 dB must be incorporated into design and construction of structure.						

Notes

(1) Where the community determines that residential or school uses must be allowed, measures to achieve outdoor to indoor Noise Level Reduction (NLR) of at least 25 dB and 30 dB should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide a NLR of 20 dB; thus, the reduction requirements are often stated as 5, 10 or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year round. However, the use of NLR criteria will not eliminate outdoor noise problems.

(2) Measures to achieve NLR 25 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.

(3) Measures to achieve NLR of 30 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.

(4) Measures to achieve NLR 35 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal level is low.

(5) Land use compatible provided special sound reinforcement systems are installed.

(6) Residential buildings require an NLR of 25.

(7) Residential buildings require an NLR of 30.

(8) Residential buildings not permitted.

Disclaimer: The designations contained in this table do not constitute a federal determination that any use of land covered by the program is acceptable or unacceptable under federal, State, or local law. The responsibility for determining the acceptable and permissible land uses and the relationship between specific properties and specific noise contours rests with the local authorities. FAA determinations under Part 150 are not intended to substitute federally determined land uses for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving noise compatible land uses.

Source: Landrum & Brown 2018.

These guidelines represent recommendations to local authorities for determining acceptability and permissibility of land uses and recommend a maximum amount of noise exposure in terms of the DNL that might be considered acceptable or compatible to people in living and working areas. These noise levels are derived from case histories involving aircraft noise problems at civilian and military airports and the resultant community response. Note that residential land use is deemed acceptable for noise exposures up to 65 dB DNL. Recreational areas are also considered acceptable for noise levels above 65 dB DNL (with certain exceptions for amphitheaters). However, the FAA guidelines indicate that ultimately “the responsibility for determining the acceptability and permissible land uses remains with the local authorities.”

Federal Aviation Orders 5050.4 and 1050.1F for Environmental Analysis of Aircraft Noise around Airports

The FAA has developed guidelines (Order 5050.4B) for the environmental analysis of airports. Specific policies and procedures for evaluating environmental impacts are described in Order 1050.1F CHG 1 Effective Date March 20, 2006. The noise analysis-related policies and procedures are presented in Section 14 of the Appendix A of the Order. The Significant Impact thresholds are presented in Section 14.3, which reads:

> A significant noise impact would occur if analysis shows that the proposed action will cause noise sensitive areas to experience an increase in noise of DNL 1.5 dB or more at or above DNL 65 dB noise exposure when compared to the no action alternative for the same timeframe. For example, an increase from 63.5 dB to 65 dB is considered a significant impact.

Section 14.4c specifies that impacts to receptors with noise exposures between 60 and 65 DNL should be examined in accordance with the 1992 FICON Recommendations.

> In accordance with the 1992 FICON (Federal Interagency Committee on Noise) recommendations, examination of noise levels between DNL 65 and 60 dB should be done if determined to be appropriate after application of the FICON screening procedure. If screening shows that noise sensitive areas at or above DNL 65 dB will have an increase of DNL 1.5 dB or more, further analysis should be conducted to identify noise-sensitive areas between DNL 60-65 dB having an increase of DNL 3 dB or more due to the proposed action. The potential for mitigating noise in those areas should be considered, including consideration of the same range of mitigation options available at DNL 65 dB and higher and eligibility for federal funding. This is not to be interpreted as a commitment to fund or otherwise implement mitigation measures in any particular area.

Section 14.5e specifies the supplemental analysis that should be performed for projects with study areas that are larger than the immediate vicinity of the airport.

> For air traffic airspace actions where the study area is larger than the immediate vicinity of an airport, incorporates more than one airport, or includes actions above 3,000 feet AGL, noise modeling will be conducted using Noise Integrated Routing System ("NIRS"). For those types of studies, NIRS will be used to determine noise impacts from the ground to 10,000 feet AGL. This noise analysis will focus on the change in noise levels as compared to populations and demographic information at population points throughout the study area. Noise contours will not be prepared for the NIRS analysis. However, NIRS will be used to produce change-of-exposure tables and maps at population centroids using the following criteria:
>
> DNL 60-65 dB ± 3 dB
>
> DNL 45-60 dB ± 5 dB"

Airport Noise and Capacity Act of 1990

Subsequent to the JWA 1985 Settlement Agreement, the U.S. Congress enacted the Airport Noise and Capacity Act of 1990 ("ANCA" or "the Noise Act") (49 United States Code U.S.C.] 47521 et seq.). As a general matter, ANCA precludes the local imposition of noise and access restrictions that are not otherwise in accordance with the national noise policy unless the restrictions are "grandfathered" under ANCA, in which case the restrictions are free from the restrictions that ANCA otherwise would impose. Specifically, ANCA established two broad directives to the FAA: (1) establish a method to review aircraft noise, airport use, or airport access restrictions proposed by airport proprietors; and (2) institute a program to phase-out Stage 2 aircraft over 75,000 pounds by December 31, 1999. Stage 2 aircraft are older, noisier aircraft (B-737-200, B-727, and DC-9); Stage 3 aircraft are newer, quieter aircraft (B-737-300, B-757, MD80/90). To implement ANCA, the FAA amended Part 91 and issued a new Part 161 of the FAR. Part 91 addresses the phase-out of large Stage 2 aircraft and the phase-in of Stage 3 aircraft. Part 161 establishes a stringent review and approval process for implementing use or access restrictions by airport proprietors.

The amended Part 91 required that all Stage 2 commercial aircraft over 75,000 pounds be out of the domestic fleet by December 31, 1999. The State of Hawaii and Alaska are not affected by this regulation. Since 2000, the domestic commercial airline fleet has consisted of all Stage 3 or Stage 4 aircraft. As of December 31, 2015, all civil jet aircraft, regardless of weight were required to meet Stage 3 or Stage 4 certification to fly within the contiguous United States.

In July 2005, the FAA adopted more stringent Stage 4 standards for certification of aircraft, effective January 1, 2006. Any aircraft that meets Stage 4 standards will meet Stage 3 standards. Accordingly, policies for review of noise restrictions affecting Stage 3 aircraft may be applied to Stage 4 aircraft as well.

Part 161 sets out the requirements and procedures for implementing new airport use and access restrictions by airport proprietors. Proprietors must use the DNL metric to measure noise effects and the Part 150 land use guideline table, including 65-dB DNL as the threshold contour to determine compatibility, unless a locally adopted standard is more stringent. CNEL would be an acceptable surrogate for DNL.

The regulation identifies three types of use restrictions and treats each one differently: (1) negotiated restrictions, (2) Stage 2 aircraft restrictions, and (3) Stage 3 aircraft restrictions. Generally speaking, any use restriction affecting the number or times of aircraft operations will be considered an access restriction. Even though the Part 91 phase-out does not apply to aircraft under 75,000 pounds, the FAA has determined that Part 161 limitations on proprietors' authority applies as well to the smaller aircraft.

Negotiated restrictions are more favorable from the FAA's standpoint, but still require unwieldy procedures for approval and implementation. In order to be effective, the agreements normally must be agreed to by all airlines using the airport.

Stage 3 restrictions are even more difficult to implement. A Stage 3 restriction involves considerable additional analysis, justification, evaluation, and financial discussion. In addition, a Stage 3 restriction must result in a decrease in noise exposure of the 65-dB DNL to noise-sensitive land uses (residences, schools, places of worship, parks). The regulation requires both public notice and FAA approval.

ANCA applies to all new local noise restrictions and amendments to existing restrictions proposed after October 1990. Here, ANCA's limitations do not apply to the existing noise regulations and access restrictions established and approved by the County of Orange at JWA because the 1985 Settlement Agreement is "an intergovernmental agreement including an airport noise or access restriction in effect on November 5, 1990." (49 U.S.C. 47524(d)(3)). The amendments made to the 1985 Settlement Agreement to allow for the revised JWA noise abatement departure procedures, and other amendments including, but not limited to, updating the noise monitoring system and corresponding noise limits at the Airport, have been approved by the settlement parties and the County. The FAA provided a "legal opinion letter" for each of these amendments prior to approval indicating that the amendments would not jeopardize the FAA grandfathered status of the Settlement Agreement and the noise regulations and access restrictions at the Airport.

U.S. Environmental Protection Agency Noise Assessment Guidelines

Federal Interagency Committee on Noise (FICON) Report of 1992

The use of the CNEL or DNL metric and the 65-dB CNEL criteria have been reviewed by various interest groups in order to assess its usefulness in assessing aircraft noise impacts. At the direction of the USEPA and the FAA, the FICON was formed to review specific elements of the assessment of airport noise impacts and to make recommendations regarding potential improvements. FICON includes representatives from the Departments of Transportation, Defense, Justice, Veterans Affairs, Housing and Urban Development, the Environmental Protection Agency, and the Council on Environmental Quality.

FICON was formed to review federal policies used to assess airport noise impacts and the manner in which noise impacts are determined. This included whether aircraft noise impacts are fundamentally different from other transportation noise impacts; the manner in which noise impacts are described; and the extent to which impacts outside of 65-dB DNL should be reviewed in federal environmental impact statements.

The committee determined that no new descriptors or metrics of sufficient scientific standing exist to substitute for DNL. The DNL noise exposure metric and the dose-response relationships used to determine noise impact were determined to be proper for assessing noise from civil and military aviation in the general vicinity of airports. The report supported agency discretion in the use of supplemental noise analysis. The report recommended improvement in public understanding of the DNL, supplemental methodologies, and aircraft noise impacts.

The report endorsed and expanded traditional FAA environmental screening criteria for potential airport noise impacts. FICON recommended that if screening analysis determines noise-sensitive areas at or above 65-dB DNL show an increase of DNL 1.5 dB or more, then further analysis should be conducted of noise-sensitive areas between DNL 60 and 65 dB having an increase of DNL 3 dB or more, consistent with the most recent FAA guidelines 1050.1F.

STATE/REGIONAL

California Airport Noise Regulations

California Airport Noise Regulations promulgated in accordance with the State Aeronautics Act and set forth in Section 5000 et seq. of the California Code of Regulations (Title 21, Division 2.5, Chapter 6) are enforced by the Aeronautics Division of the California State Department of Transportation ("Caltrans"). These regulations establish 65 dB CNEL as a noise impact boundary within which there shall be no incompatible land uses. This requirement is based, in part, upon the determination in the Caltrans regulations that 65 dB CNEL is the level of noise which should be acceptable to "...a reasonable man residing in the vicinity of an airport." Airports are responsible for achieving compliance with these regulations. Compliance can be achieved through noise-abatement measures, land acquisition, land use conversion, land use restrictions, or sound insulation of structures. Airports not in compliance can operate under variance procedures established within the regulations.

California Noise Insulation Standards

California Code of Regulations, Title 24 — known as the California Building Code — contains standards for allowable interior noise levels associated with exterior noise sources. These Regulations include the California Noise Insulation Standards which apply to all multi-family dwellings built in the state. Single-family residences are exempt from these regulations. With respect to community noise sources, the regulations require that all multi-family dwellings with exterior noise exposures greater than 60 dB CNEL must be sound insulated such that the interior noise level will not exceed 45 dB CNEL. These requirements apply to all roadway, rail, and airport noise sources.

General Plan Noise Elements

The State of California requires that all municipal General Plans contain a Noise Element. The requirements for the Noise Element of the General Plan include describing the noise environment quantitatively using a cumulative noise metric such as CNEL or DNL, establishing noise/land use compatibility criteria, and establishing programs for achieving and/or maintaining compatibility. Noise elements shall address all major noise sources in the community, including mobile and stationary sources.

Airport Land Use Commissions

Airport Land Use Commissions were created by State Law for the purpose of establishing a regional level of land use compatibility between airports and their surrounding environs. The Airport Land Use Commission for Orange County has adopted Airport Environs Land Use Plans ("AELUPs") for Orange County airports, including JWA, Los Alamitos Joint Forces Training Base, and Fullerton Municipal Airport. The AELUPs establish noise/land use acceptability criteria for residential and other sensitive land uses at 65 dB CNEL for outdoor areas and 45 dB CNEL for indoor areas of residential land uses. These criteria are compatible with the criteria used by the County of Orange.

County of Orange

General Plan

The General Plan Noise Element of the County of Orange establishes noise/land use planning criteria for the unincorporated areas of the County. These noise guidelines and standards cover roadway noise, rail noise, and airport noise, including military and civilian airports. The County has adopted noise standards for various land uses in terms of CNEL and L_{eq}. These standards, Tables VIII-2 and VIII-3 of the Noise Element, are combined and reproduced here as Table 4.7-3. For residential land uses, the County has established a maximum exterior noise level standard of 65 dB CNEL for private outdoor living areas and an interior standard of 45 dB CNEL.

TABLE 4.7-3
COUNTY OF ORANGE COMPATIBILITY MATRIX FOR LAND USE AND COMMUNITY NOISE EQUIVALENT LEVELS

Type of Use	65+ decibels CNEL	60 to 65 decibels CNEL
Residential	3a, b, e	2a, e
Commercial	2c	2c
Employment	2c	2c
Open Space		
Local	2c	2c
Community	2c	2c
Regional	2c	2c
Educational Facilities		
Schools (K through 12)	2c, d, e	2c, d, e
Preschool, college, other	2c, d, e	2c, d, e
Places of Worship	2c, d, e	2c, d, e
Hospitals		
General	2a, c, d, e	2a, c, d, e
Convalescent	2a, c, d, e	2a, c, d, e
Group Quarters	1a, b, c, e	1a, b, e
Hotel/Motels	2a, c	2a, c
Accessory Uses		
Executive Apartments	1a, b, e	2a, e
Caretakers	1a, b, c, e	2a, c, e

dB: decibels; CNEL: Community Noise Equivalent Level; L_{eq}: average noise level.

EXPLANATION AND DEFINITIONS

Action Required to Ensure Compatibility Between Land Use and Noise From External Sources:

1: Allowed if interior and exterior community noise levels can be mitigated.
2: Allowed if interior levels can be mitigated.
3: New residential uses are prohibited in areas within the 65 dB CNEL contour from any airport or air station and are allowed in other areas if interior and exterior community noise levels can be mitigated. The prohibition against new residential development excludes limited "infill" development within an established neighborhood.

Standards Required for Compatibility of Land Use and Noise:

TABLE 4.7-3
COUNTY OF ORANGE COMPATIBILITY MATRIX FOR LAND USE AND COMMUNITY NOISE EQUIVALENT LEVELS

Type of Use	65+ decibels CNEL	60 to 65 decibels CNEL

[a] **Interior Standard:** CNEL of less than 45 decibels (habitable rooms only).
[b] **Exterior Standard:** CNEL of less than 65 decibels in outdoor living areas.
[c] **Interior Standard:** $L_{eq(h)}$ = 45 to 65 decibels interior noise level, depending on interior use.
[d] **Exterior Standard:** $L_{eq(h)}$ of less than 65 decibels in outdoor living areas.
[e] **Interior Standard:** As approved by the Board of Supervisors for sound events of short duration such as aircraft flyovers or individual passing railroad trains.

Key Definitions:

Habitable Room: Any room meeting the requirements of the Uniform Building Code or other applicable regulations which is intended to be used for sleeping, living, cooking, or dining purposes, excluding such enclosed spaces as closets, pantries, bath or toilet rooms, service rooms, connecting corridors, laundries, unfinished attics, foyers, storage spaces, cellars, utility rooms, and similar spaces.

Interior: Spaces that are covered and largely enclosed by walls.

$L_{eq(h)}$: The A-weighted equivalent sound level averaged over a period of "h" hours. An example would be $L_{eq(12)}$ where the equivalent sound level is the average over a specified 12-hour period (such as 7:00 AM to 7:00 PM). Typically, time period "h" is defined to match the hours of operation of a given type of use.

Outdoor Living Area: Outdoor living area is a term used by the County of Orange to define spaces that are associated with residential land uses typically used for passive private recreational activities or other noise-sensitive uses. Such spaces include patio areas, barbecue areas, Jacuzzi areas, and other outdoor areas associated with residential uses; outdoor patient recovery or resting areas associated with hospitals, convalescent hospitals, or rest homes; outdoor areas associated with places of worship which have a significant role in services or other noise-sensitive activities; and outdoor school facilities routinely used for educational purposes which may be adversely impacted by noise. Outdoor areas usually not included in this definition are front yard areas, driveways, greenbelts, maintenance areas, and storage areas associated with residential land uses; exterior areas at hospitals that are not used for patient activities; outdoor areas associated with places of worship and principally used for short-term social gatherings; and outdoor areas associated with school facilities that are not typically associated with educational uses prone to adverse noise impacts (for example, school play yard areas).

Source: Landrum & Brown 2018.

Additionally, the County of Orange requires that the 45-dB CNEL interior noise limit for habitable rooms of residences be met with windows open or windows closed (not necessarily both). Residences with windows closed will provide at least a 20-dB outdoor to indoor noise reduction (based on typical pre-1981 construction practice and Uniform Building Code requirements; newer residences provide additional noise reduction). Residences with windows open will provide a 12-dB outdoor to indoor noise reduction (largely independent of date of construction). The County, therefore, requires that new residences with exterior noise exposure greater than 57 dB CNEL (45 dB plus 12 dB) provide some means of mechanical ventilation in order to ensure that residents are able to close windows and obtain fresh air at a rate specified in the Uniform Building Code. New residences subject to this requirement are typically air-conditioned or supplied with a fresh air switch as part of the forced air heating unit.

The County of Orange has historically restricted nighttime operations at the Airport. Air carriers are not permitted to depart JWA before 7:00 AM on Monday through Saturday, 8:00 AM on Sundays, or after 10:00 PM on any day. Air carriers are not permitted to arrive at JWA before 7:00 AM on Monday through Saturday, 8:00 AM on Sundays, or after 11:00 PM on any day. General aviation aircraft are permitted to operate at night provided that they meet strict nighttime noise limits. These nighttime restrictions predate the 1985 Settlement Agreement and the Phase 2 Commercial Airline Access Plan and Regulation and are exempt under ANCA.

The Phase 2 Commercial Airline Access Plan and Regulation

The Phase 2 Commercial Airline Access Plan and Regulation at JWA was adopted by the County of Orange, in its capacity as the proprietor and certificated operator of JWA, and under the authority of federal law, and the laws of the State of California, which designate the County as the proper local entity to balance the needs of the Orange County community for adequate commercial air transportation facilities, and the desire of the local community for environmentally responsible air transportation operations at JWA. The Access Plan contains the rules and regulations for commercial, cargo, and commuter carrier operations at the Airport.

The General Aviation Noise Ordinance

The General Aviation Noise Ordinance ("GANO") adopted by the County of Orange establishes noise limits and other restrictions for aircraft operating at JWA. Generally, general aviation operations are permitted 24 hours a day, subject to daytime and nighttime noise limits.

4.7.3 METHODOLOGY

Aircraft Noise Modeling

The FAA's Aviation Environmental Design Tool ("AEDT") Version 2d was used to model aircraft operations at JWA. AEDT is a software system that models aircraft performance that estimates fuel consumption, emissions, noise, and air quality emissions data. AEDT has an extensive database of civilian and military aircraft noise characteristics and incorporates advanced plotting features. Noise contour files from AEDT were loaded into the ArcView™ Geographic Information System ("GIS") software for plotting airport noise contours and land use analysis.[4]

AEDT requires the input of the physical and operational characteristics of the airport. Physical characteristics include runway coordinates, airport altitude, and temperature, and optionally, topographical data. Operational characteristics include various types of aircraft data. This includes not only the aircraft types and flight tracks, but also departure procedures, arrival procedures and stage lengths (flight distance) that are specific to the operations at the airport.

Key assumptions for the noise modeling include:

- The percentage of day, evening, and night distribution of future aircraft operations would be consistent with the percentage of existing operations.
- The total yearly aircraft operations by aircraft type (fleet mix) for the Baseline (2016) plus No Project, the Baseline (2016) plus Proposed Project, and Baseline (2016) plus Alternative 1 scenarios are the same for commercial operations. The operations and fleet mix for the general aviation operations was developed based on the *Orange County/John Wayne Airport (JWA) General Aviation Improvement Program (GAIP) Based Aircraft*

[4] A noise contour is a line on a map that represents equal levels of noise exposure.

Parking—Capacity Analysis and General Aviation Constrained Forecasts (April 3, 2018), provided as Appendix D to this Program EIR.

- The flight tracks and runway use developed for the Baseline (2016) has been used for all scenarios. Runway use at JWA is based on aircraft size with commercial aircraft and large jets using Runway 20R and smaller general aviation aircraft using Runway 20L.

The significance of noise impacts attributable to the GAIP is evaluated based on the County of Orange significance threshold criteria, which is summarized in Table 4.7-4. It should be noted that the adjacent Cities of Costa Mesa, Irvine, and Tustin have also adopted the County of Orange's significance thresholds.

TABLE 4.7-4
COUNTY OF ORANGE CNEL INCREASE
SIGNIFICANCE THRESHOLD

Noise Exposure With Project	CNEL Increase Over Existing Conditions
>65 CNEL	1.5 dB or greater
60-65 CNEL	3.0 dB or greater
45-60 CNEL	5.0 dB or greater
Source: Landrum & Brown 2018	

Traffic Noise Modeling

The significance of traffic noise impacts attributable to the GAIP is evaluated based on two criteria:

1. The change in traffic noise (increase or decrease) attributable to traffic generated by the GAIP (Proposed Project or an alternative)
2. The absolute traffic noise level that results with inclusion of traffic from the Proposed Project or the alternative being evaluated in combination with other vehicle traffic

Both criteria must be exceeded for a significant impact to occur.

With respect to the first criterion, changes in traffic noise levels resulting from traffic volume increases can be calculated based on the changes in traffic volumes. The increase in traffic noise over existing conditions is calculated by taking ten times the base 10 logarithm of the ratio of the future traffic volume to the existing traffic volume. Similarly, the increase due to the Proposed Project or an alternative can be calculated by taking ten times the base 10 logarithm of the ratio of the future traffic volume with the Proposed Project/Alternative to the future traffic volume without the Project/Alternative. Traffic volumes used to calculate traffic noise level changes were provided by Austin Transportation Consulting (the *Traffic Impact Analysis* is provided as Appendix I to this Program EIR).

With respect to the second criterion, absolute noise levels can be difficult to predict accurately over a wide area because it is not only dependent on the roadway characteristics (width, posted speed limit, traffic volume) but it is also dependent on intervening structures and topography between the road and the receptor. Nonetheless, noise modeling software is available to allow for accurate predictions in this regard. To determine traffic noise impacts as a result of the project, the FHWA (Federal Highway Administration) noise model was used. The FHWA noise model utilizes various traffic-flow parameters (e.g., traffic volume, speed, mix, etc.) to predict noise levels that result from the operation of motor vehicles on the roadways.

Traffic noise impact significance is determined using the same increase thresholds for aircraft presented above.

4.7.4 EXISTING CONDITIONS

The Airport serves both general aviation and scheduled commercial passenger airline and cargo operations. The use of the Airport is heavily regulated as a result of its limited area and facilities and the environmental sensitivity of the local area and because of a long history of Airport-related litigation extending back at least to 1969.

Noise Monitoring System at the Airport

JWA has a long history of noise analysis. Extensive data from its noise monitoring system and from a myriad of other studies relating to aircraft operations and noise levels enables precise modeling and prediction of noise levels. Radar tracks and sophisticated use of noise monitoring stations has produced very accurate depictions of flight tracks and aircraft noise. The noise levels of all commercial aircraft operations and general aviation operations are recorded at ten permanent NMSs around the Airport. Both CNEL and SENEL are monitored and calculated for each day and each aircraft. In accordance with State of California airport noise standards, a detailed report is compiled every three months summarizing this information; and each year an annual CNEL contour is computer modeled and included in the quarterly report. Noise complaint data is also recorded and analyzed. All of the data for the past three decades is contained in the Noise Abatement Quarterly Reports, which are obtainable from the JWA Access and Noise Office.

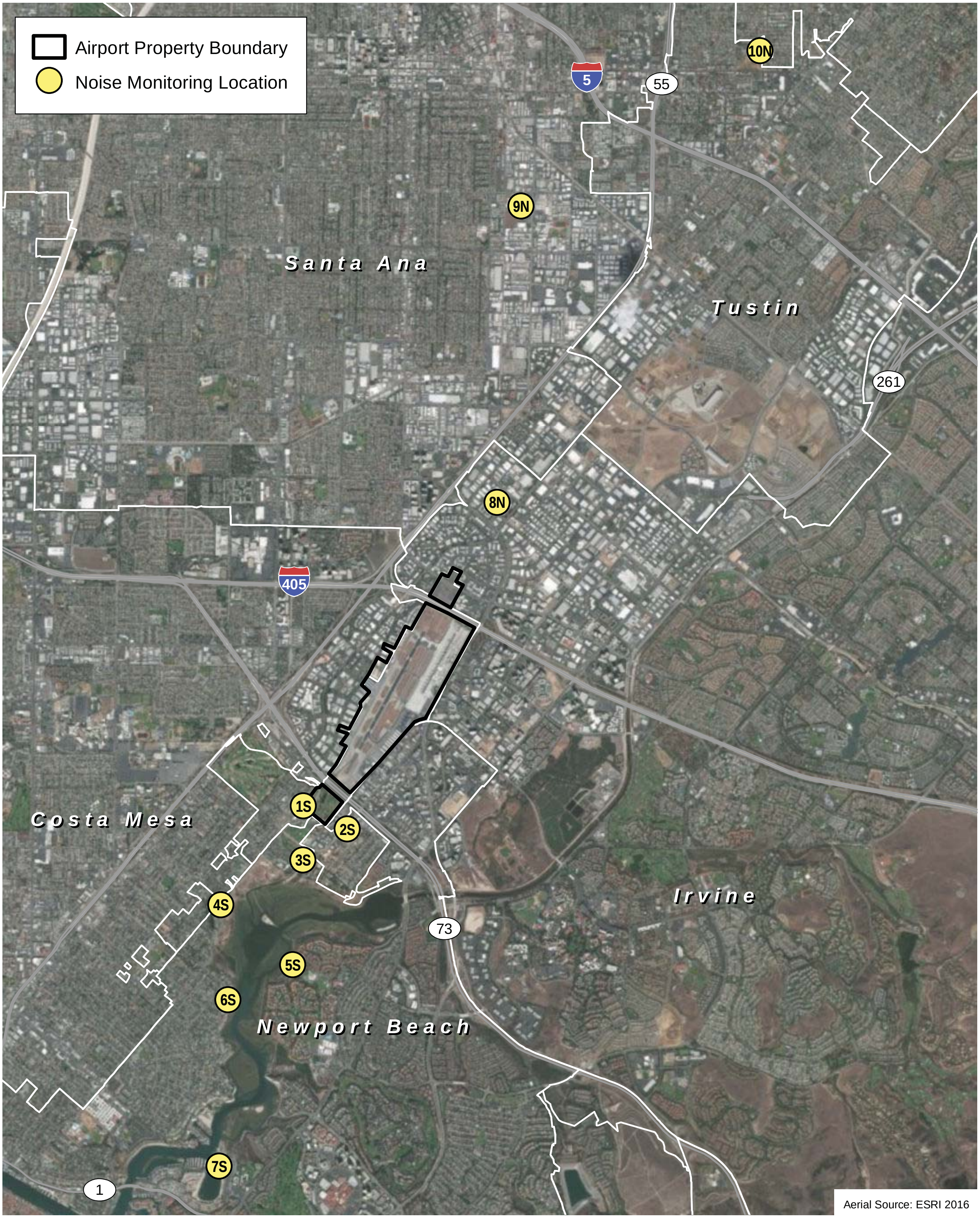
The locations of the ten permanent NMS are shown in Exhibit 4.7-7. This exhibit also shows the boundaries of the local jurisdictions. Seven are located in the City of Newport Beach (Terminals 1S through 7S)[5]; one is in Irvine (8N); one is in Santa Ana (9N); and one is in Tustin (10N).

2015 Changes to the Noise Monitoring System

In 2015 a new JWA noise monitoring system that is more sensitive was installed. A side-by-side comparison of noise levels as recorded by the new system and the old system was conducted from March 1 through May 31, 2015. Based upon the results of the comparison, the Board of Supervisors approved technical adjustments to the permitted noise levels surrounding the Airport in order to maintain parity with the existing noise levels at JWA and to maintain the grandfathered status of the County's noise and access restrictions under ANCA. The Board approved similar parity adjustments for the same reasons in 1999 when the prior noise monitoring equipment was installed.

Based upon an analysis of the side-by-side noise data, the Board approved noise level adjustments for Class A and Class E commercial aircraft operations, as referenced in the Phase 2

[5] Three of the NMT (1S, 2S, and 3S) are located in the area previously identified Santa Ana Heights, which has been annexed by the City of Newport Beach.



Noise Monitoring Station Locations

Exhibit 4.7-7

John Wayne Airport General Aviation Improvement Program

Access Plan, at NMS 1S, 2S, 3S, 4S, 5S, 6S, and 7S. Additionally, the Board approved adjustments to permitted noise levels for general aviation aircraft operations at NMS 1S, 2S, 3S (daytime and nighttime hours), and NMS 4S, 5S, 6S, 7S, 8N, 9N, and 10N (nighttime hours) by revising applicable sections of the GANO, which regulates noise levels for general aviation aircraft. The approved adjustments in the permitted noise levels are shown in Table 4.7-5.

TABLE 4.7-5
PARITY ADJUSTMENTS AT THE
NOISE MONITORING STATIONS

Site	Prior SENEL	Adjusted SENEL	Change
Class A Aircraft			
NMS 1S	101.8 dB	102.5 dB	0.7 dB
NMS 2S	101.1 dB	101.8 dB	0.7 dB
NMS 3S	100.7 dB	101.1 dB	0.4 dB
NMS 4S	94.1 dB	94.8 dB	0.7 dB
NMS 5S	94.6 dB	95.3 dB	0.7 dB
NMS 6S	96.1 dB	96.8 dB	0.7 dB
NMS 7S	93.0 dB	93.7 dB	0.7 dB
Class E Aircraft			
NMS 1S	93.5 dB	94.1 dB	0.6 dB
NMS 2S	93.0 dB	93.5 dB	0.5 dB
NMS 3S	89.7 dB	90.3 dB	0.6 dB
NMS 4S	86.0 dB	86.6 dB	0.6 dB
NMS 5S	86.6 dB	87.2 dB	0.6 dB
NMS 6S	86.6 dB	87.2 dB	0.6 dB
NMS 7S	86.0 dB	86.6 dB	0.6 dB
General Aviation Noise Ordinance			
Daytime			
NMS 1S	101.8 dB	102.5 dB	0.7 dB
NMS 2S	101.1 dB	101.8 dB	0.7 dB
NMS 3S	100.7 dB	101.1 dB	0.4 dB
Curfew			
NMS 1S	86.8 dB	87.5 dB	0.7 dB
NMS 2S	86.9 dB	87.6 dB	0.7 dB
NMS 3S	86.0 dB	86.7 dB	0.7 dB
NMS 4S	86.0 dB	86.7 dB	0.7 dB
NMS 5S	86.0 dB	86.7 dB	0.7 dB
NMS 6S	86.0 dB	86.7 dB	0.7 dB
NMS 7S	86.0 dB	86.7 dB	0.7 dB
NMS 8N	86.0 dB	86.9 dB	0.9 dB
NMS 9N	86.0 dB	86.9 dB	0.9 dB
NMS 10N	86.0 dB	86.9 dB	0.9 dB
Source: Landrum & Brown 2018			

Flight Path Changes

As discussed in Section 1.9, the FAA has implemented flight path changes around the Airport's airspace beginning in 2016. These changes concentrate aircraft flight paths, specifically departures to the southwest, on a more narrowly defined flight corridor when compared with a more dispersed flight corridor prior to 2016. As a result, the measured NMS noise levels for the baseline (2016) conditions are not directly comparable to measured NMS noise levels shown in previous years and studies.

Baseline (2016) Airport Operations

In 2016, there were 284,246 aircraft operations at JWA. Of these operations, approximately 192,800 were general aviation operations. A detailed a summary of the annual operations and fleet mix at JWA, organized by AEDT aircraft type, operation type, and during the daytime (7:00 AM to 6:59 PM), evening (7:00 PM to 9:59 PM) nighttime (10:00 PM to 6:59 AM) periods is provided in the *Noise Analysis Technical Report* (provided as Appendix H to this Program EIR).

The flight paths at JWA are well established to take advantage of the runway configuration and prevailing wind conditions. Runway 20R/02L is approximately 5,700 feet long and is the only runway suitable for larger commercial aircraft. With winds predominantly coming from the ocean, aircraft typically depart to the southwest and arrive from the northeast about 95 percent of the time with slight variations from year to year. The reverse (depart to northeast and arrive from southwest) occurs primarily when Santa Ana wind conditions occur, but there are times where winds aloft, or other weather conditions may cause operations to go into reverse. Additional information on aircraft flight paths are provided in the *Noise Analysis Technical Report*.

Baseline (2016) Airport CNEL Contours and Land Use Impacts

The CNEL contours, used to depict "existing" or Baseline (2016) noise exposure from the Airport as derived from the 2016 conditions, are depicted on Exhibit 4.7-8**.** The contours were developed by calibrating the results of AEDT modeling to the measurements from the ten permanent NMS. A description of the size and identification of noise-sensitive uses in each of the contours is provided below. In addition, Table 4.7-6 provides the CNEL values at each of the NMS from the noise modeling of Baseline 2016 conditions.

- 70 CNEL contour: 582.4 acres/0.91 square miles, including one (1) place of worship but no other noise sensitive land uses. This place of worship is considered compatible as it has been sound attenuated.
- 65 to 70 CNEL contour: 953.6 acres/1.49 square miles, including 247 residential dwellings with approximately 401 residents and 3 places of worship but no other noise sensitive land uses. These three places of worship and 247 dwelling units have been sound attenuated, the Airport has made a genuine effort to sound attenuate, or the structures did not qualify for sound attenuation.
- 60 to 65 CNEL contour: 2,150.4 acres/3.36 square miles, including 1,365 residences with approximately 2,772 residents, 5 places of worship, and 6 schools.

D:\Projects\LAN\0102\MXDs\EIR\Noise_Contours\ex_Baseline_Noise_Contours_20180228.mxd

Baseline (2016) CNEL Noise Contours

Exhibit 4.7-8

John Wayne Airport General Aviation Improvement Program

N W E S

4,000 2,000 0 4,000 Feet

JOHN WAYNE AIRPORT ORANGE COUNTY

TABLE 4.7-6
BASELINE (2016) CNEL AT NOISE MONITORING STATIONS (NMS)

NMS	1S	2S	3S	4S	5S	6S	7S	8N	9N	10N
Measured CNEL	**67.8**	**66.7**	**66.4**	59.6	58.9	59.9	56	**67.7**	43.9	56.4
Modeled CNEL	**67.8**	**66.7**	**66.5**	59.6	59.0	60.0	56.0	**68.3**	45.6	55.3
Difference	0.0	0.0	0.1	0.0	0.1	0.1	0.0	0.6	1.7	-1.1

Note: Noise monitors within the 65 CNEL are shown in **bold**. The 65 and 70 CNEL contours shall be validated by measurements made by noise monitors and be within a tolerance of plus or minus 1.5 dB CNEL.
Source: Landrum & Brown, 2018 (obtained from John Wayne Airport Access/GANO Software System Database Data, January 2016-December 2016)

4.7.5 THRESHOLDS OF SIGNIFICANCE

In accordance with the County's Environmental Analysis Checklist and Appendix G of the CEQA Guidelines, the Project would result in a significant noise impact if it would:

Threshold 4.7-1 Expose persons to or generate noise levels in excess of standards established in a local general plan or noise ordinance or applicable standards of other agencies.

Threshold 4.7-2 Cause substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.

Threshold 4.7-3 Cause a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

Threshold 4.7-4 Expose people residing or working within an airport land use plan area to excessive noise levels.

For the GAIP, the County's applicable noise standards for determining a potential significant impact for these thresholds are as follows:

- A noise increase of 1.5 CNEL or more at a sensitive receptor where the existing exposure is 65 CNEL or above.
- A noise increase of 3.0 CNEL or more at a sensitive receptor where the existing exposure is between 60 and 65 CNEL.
- A noise increase of 5.0 CNEL or more at a sensitive receptor where the existing exposure is between 45 and 60 CNEL.

4.7.6 REGULATORY REQUIREMENTS AND STANDARD CONDITIONS OF APPROVAL

Regulatory Requirement

RR NOI-1 The Orange County Municipal Code Article 3 Section 2-1-30, General Aviation Noise Ordinance, prohibits nighttime general aviation operations for operations that exceed the specified SENEL noise limit at each of the noise monitoring locations.

Standard Conditions of Approval

The following standard conditions of approval would apply to the GAIP:

SC NOI-1 Except when the interior noise level exceeds the exterior noise level, the applicant shall sound attenuate all nonresidential structures against the combined impact of all present and projected noise from exterior noise sources to meet the interior noise criteria as specified in the Noise Element and Land Use/Noise Compatibility Manual.

Prior to the issuance of any building permits, the applicant shall submit to the Manager, Building and Safety, an acoustical analysis report prepared under the supervision of a County-certified acoustical consultant which describes in detail the exterior noise environment and the acoustical design features required to achieve the interior noise standard and which indicates that the sound attenuation measures specified have been incorporated into the design of the project. (County Standard Condition N02)

4.7.7 IMPACT ANALYSIS

Thresholds 4.7-1, 4.7-2, and 4.7-4

- ***Would the project expose persons to or generate noise levels in excess of standards established in a local general plan or noise ordinance or applicable standards of other agencies?***
- ***Would the project cause substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?***
- ***Would the project expose people residing or working within an airport land use plan area to excessive noise levels?***

Proposed Project

Aviation Noise Impacts

The analysis of the Proposed Project compared to the Baseline (2016) condition took the baseline noise contours and applied the Proposed Project 2026 general aviation fleet mix and operations. The specific CNEL values at each NMS for the Baseline (2016) and the Baseline (2016) Plus Proposed Project scenarios are provided in Table 4.7-7. This provides an assessment of the change in noise values compared to baseline conditions that would be attributable to the Proposed Project. To facilitate comparison and minimize duplication, the CNEL values for the Baseline Plus Alternative 1 and the Baseline Plus No Project scenarios is also provided in Table 4.7-7. NMS with noise levels equal to or above 65 CNEL are shown in bold type. Only the close-in NMS 1S, 2S, 3S located in the Santa Ana Heights community in the City of Newport Beach and NMS 8N located in the City of Irvine show noise levels above 65 CNEL for any case. However, it should be noted that NMS 8N is located in a commercial area with no nearby sensitive uses.

TABLE 4.7-7
BASELINE (2016) PLUS GAIP SCENARIOS
CNEL AT NOISE MONITORING STATIONS

NMS[a]	Baseline (2016)	Baseline Plus No Project	Baseline Plus Proposed Project	Baseline Plus Alternative 1
1S	**67.77**	**67.85**	**67.86**	**67.87**
2S	**66.66**	**66.74**	**66.73**	**66.74**
3S	**66.46**	**66.60**	**66.61**	**66.63**
4S	59.62	59.72	59.73	59.74
5S	58.95	59.05	59.06	59.07
6S	59.95	60.10	60.11	60.13
7S	56.00	56.04	56.04	56.04
8N	**68.31**	**68.36**	**68.37**	**68.37**
9N	45.59	45.65	45.64	45.63
10N	55.27	55.32	55.32	55.31

CNEL: Community Noise Equivalent Level; NMS: Noise Monitoring Terminal

a NMS 1S, 2S, and 3S are located in the Santa Ana Heights Community of the City of Newport Beach; NMS 4S, 5S, 6S and 7S are located in the City of Newport Beach, NMS 8N is located in the City of Irvine, NMS 9N is located in the City of Santa Ana; and NMS 10N is located in the City of Tustin.

Source: Landrum & Brown 2018

Table 4.7-8 presents the change in noise level in terms of CNEL relative to Baseline (2016) conditions. NMS that are located in areas with noise levels above 65 CNEL are bolded.[6] The noise contours for the Baseline Plus Proposed Project are shown in Exhibit 4.7-9. A comparison of the Baseline (2016) 60, 65, 70, and 75 CNEL contours and the projected contours for the Baseline with the Proposed Project are shown. As shown, the CNEL noise contours in the Baseline (2016) Plus Proposed Project remain approximately the same size and shape as the Baseline (2016) noise contours. The change in general aviation operations from the Proposed Project has a

6 The AEDT computes the noise level to hundredths of a decibel, but that the overall absolute accuracy of the model is more in the range of plus or minus 1.5 to 2 dB.

negligible impact on the CNEL noise contours. In this scenario, the total contour areas between 60 and 65 CNEL would increase by 0.03 square mile (0.9 percent), and the area between 65 and 70 CNEL would increase by 0.01 square mile (0.6 percent) when compared to the Baseline (2016) noise contours. The area exceeding 70 CNEL would increase by 0.01 square mile (0.7 percent) over Baseline (2016) conditions. The total number of residences exposed to noise levels between 65 and 70 CNEL would increase by 10 residences (4.0 percent). No additional dwelling units would be exposed to 70+ CNEL. However, based on the thresholds identified above, the change in aviation noise level would not increase at a level greater than the significance threshold at any NMS. Although additional residences would be in the 65 to 70 CNEL contour compared to the Baseline (2016) condition, these residences are included in the area covered by the AIP approved in conjunction with the 1985 Master Plan (see discussion under Background). Exhibit 4.7-10 depicts the 1985 Master Plan contour, which was the basis for the AIP, and the Baseline (2016) with the Proposed Project 65 CNEL contour.[7] Of these units, four multi-family units are non-conforming uses (residential use in a business park zone) and a prescriptive avigation easement has been acquired; two units have received acoustical insulation and an avigation easement has been acquired; one unit refused the offer of acoustical insulation; a genuine effort to offer insulation to two units was made but no response was received; and one unit has participated in the purchase assurance program, received insulation, and an avigation easement was acquired.

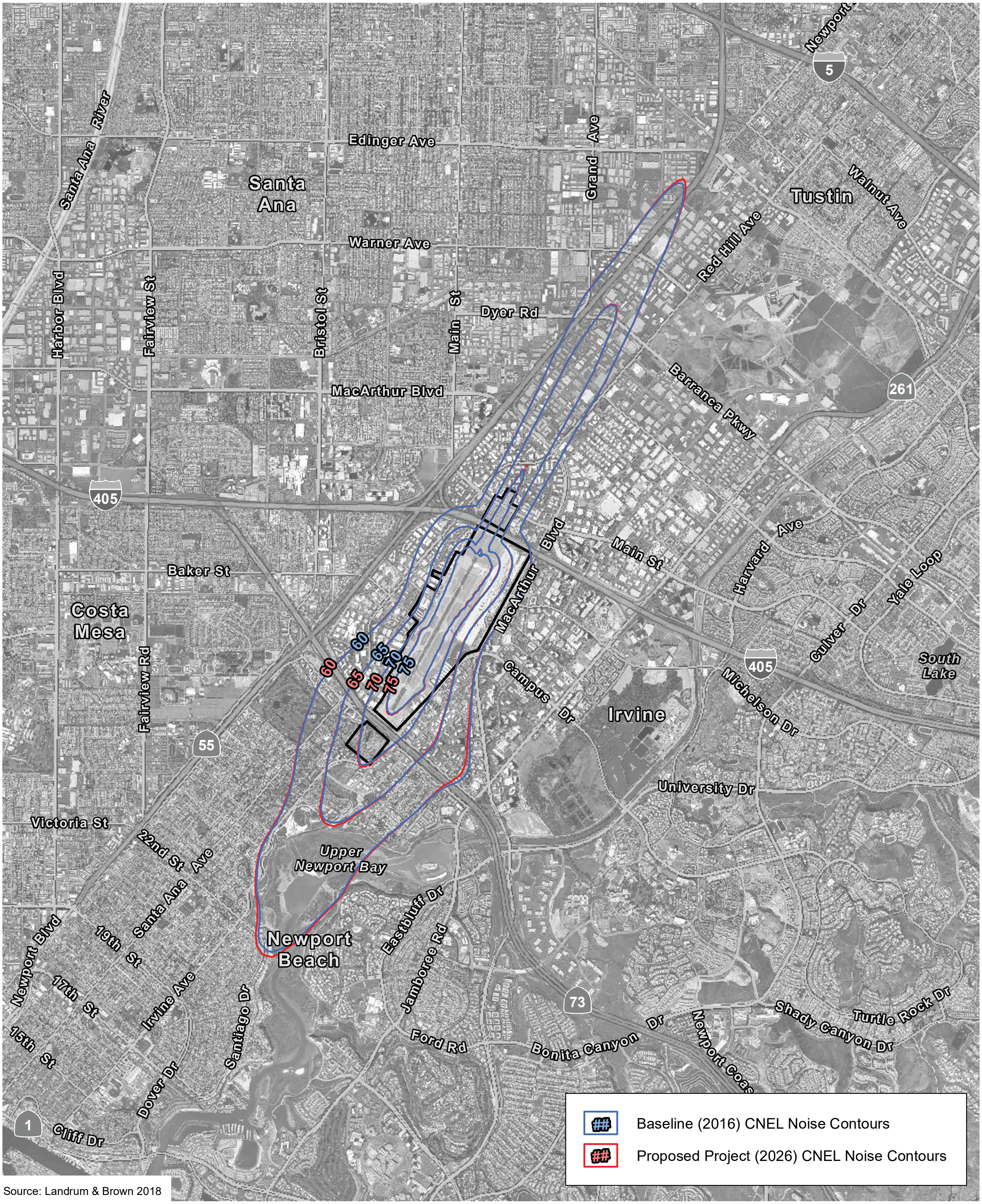
TABLE 4.7-8
CHANGES IN CNEL VALUES COMPARED TO BASELINE (2016)
AT NOISE MONITORING STATIONS

NMS[a] Baseline (2016)	Baseline Plus No Project	Baseline Plus Proposed Project	Baseline Plus Alternative 1
1S	**0.08**	**0.09**	**0.10**
2S	**0.08**	**0.07**	**0.08**
3S	**0.14**	**0.15**	**0.17**
4S	0.10	0.11	0.12
5S	0.10	0.11	0.12
6S	0.15	0.16	0.18
7S	0.04	0.04	0.04
8N	**0.05**	**0.06**	**0.06**
9N	0.06	0.05	0.04
10N	0.05	0.05	0.04

CNEL: Community Noise Equivalent Level; NMS: Noise Monitoring Terminal
a Noise monitors within the 65 CNEL are shown in **bold**.
Source: Landrum & Brown 2018

Since none of the increases at any of the NMS would be greater than the significance threshold, impacts for the Proposed Project would be less than significant for the Baseline (2016) Plus Proposed Project scenario.

7 As shown in Exhibit 4.7-10 the 65 CNEL contour is generally larger with the 1985 Master Plan than with the Proposed Project 2026 noise contours. There is one location east of Britch Street where the Proposed Project contour is slightly larger; however, this area consists of non-noise sensitive land uses (i.e., office buildings).



D:\Projects\LAN0102\MXDs\EIR\Noise_Contours\ex_Baseline_PP_Noise_Contours_A_Overview_20180416.mxd

Baseline (2016) and Baseline Plus Proposed Project CNEL Noise Contours

Exhibit 4.7-9

John Wayne Airport General Aviation Improvement Program

N W E S

1 0.5 0 1 Miles

JOHN WAYNE AIRPORT ORANGE COUNTY

D:\Projects\LAN\0102\MXDs\EIR\Noise_Contours\ex_65_CNEL_1985_and_PP_Noise_Contour_20180307.mxd

1985 Master Plan Departure and Baseline (2016) Plus Proposed Project 65 CNEL Noise Contour

Exhibit 4.7-10

John Wayne Airport General Aviation Improvement Program

N W E S

1,500 750 0 1,500 Feet

JOHN WAYNE AIRPORT ORANGE COUNTY

The Proposed Project does provide for construction of new office space and a flight school, which would be required to meet the interior noise criteria as specified in the Noise Element and Land Use/Noise Compatibility Manual. This requirement is contained in SC NOI-1.

Traffic Noise Impacts

Changes in traffic patterns caused by the Proposed Project would result in a slight increase in traffic noise levels along the roadways on the west side of the Airport and a slight decrease in traffic noise levels on the east side of the Airport. Changes in CNEL traffic noise levels along roadways in the vicinity of JWA were calculated using the traffic volumes provided in the *Traffic Impact Analysis* (Appendix I to this Program EIR).[8]

Table 4.7-9 shows the traffic noise level increases in dB CNEL on each of the roadway segments affected by the Proposed Project. The first column lists the roadway and segment analyzed. The second column of the table lists the Baseline (2016) average daily traffic ("ADT") volume for the roadway segment. The third column lists the additional ADT attributable to the Proposed Project. The fourth column lists the Baseline (2016) Plus Proposed Project ADT volume. The fifth column lists the increase in noise level due to the Proposed Project. The values listed in this column are due to the difference between the Baseline (2016) traffic volumes and the Baseline Plus Proposed Project traffic volumes. The noise increase is due solely to the Proposed Project and represents the greatest increase that can be attributable to the Proposed Project.

[8] The traffic analysis is presented in Section 4.8 of this Program EIR.

TABLE 4.7-9
TRAFFIC NOISE LEVEL INCREASES
PROPOSED PROJECT COMPARED TO BASELINE (2016)

Roadway and Segment	Baseline (2016) ADT	Proposed Project ADT	Baseline Plus Proposed Project ADT	Increase in Noise Level (dB)
Paularino Avenue				
West of SR-55	16,000	80	16,080	0.0
SR-55 to Red Hill Avenue	12,000	480	12,480	0.2
Red Hill Avenue to Airway Avenue	4,000	520	4,520	0.5
Baker Street				
West of SR-55	27,000	40	27,040	0.0
SR-55 to Red Hill Avenue	20,000	140	20,140	0.0
Red Hill Avenue to Airway Avenue	6,000	220	6,220	0.2
Bristol Street				
Paularino Avenue to I-405	36,000	80	36,080	0.0
Red Hill Avenue				
North of SR-73	19,000	80	19,080	0.0
South of Baker Street	15,000	80	15,080	0.0
Baker Avenue to Paularino Avenue	18,000	60	18,060	0.0
Paularino Avenue to Airport Loop Drive	19,000	40	19,040	0.0
Airport Loop Drive to Main Street	20,000	40	20,040	0.0
Campus Drive				
SR-73 to Quail Street	34,000	-440	33,560	-0.1
n/o Dove Street	32,000	-450	31,550	-0.1
s/o MacArthur Blvd	32,000	-300	31,700	0.0
MacArthur Blvd to Von Karman Avenue	13,000	-40	12,960	0.0
MacArthur Blvd				
Campus Drive to Michelson Drive	35,000	-260	34,740	0.0
Michelson Drive to I-405	53,000	-250	52,750	0.0

ADT: Average Daily Traffic; dB: decibels; Blvd: Boulevard; I: Interstate; SR: State Route ; n/o: north of; s/o: south of
Source: Landrum & Brown 2018

As shown in Table 4.7-9, no roadways with existing adjacent noise-sensitive uses are projected to experience a traffic noise level increase greater than 0.5 dB. Therefore, the Proposed Project would not result in a significant traffic noise impact.

Impact Conclusion: *The Proposed Project would result in minor increases in aviation noise levels compared to the Baseline (2016) condition. The increases would occur at four NMS that are within the 65 CNEL contour (NMS 1S, 2S, 3S, and 8N). The largest increase (NMS 3S) is 0.15 CNEL, which is 0.01 CNEL higher than the Baseline Plus No Project Alternative. The increase in aviation noise would* *result in ten residences currently outside the 65 CNEL contour being included in the 65 CNEL contour. However, these units are already included in the AIP program adopted as part of the 1985 Master Plan, which was adopted to mitigate noise impacts to sensitive land uses south of the Airport. Interior noise levels for the new facilities at the Airport would be consistent with the Orange County requirements through the implementation of SC NOI-1.*

In addition to aviation noise, the redistribution in traffic would result in increased traffic on the west side of the Airport, which would result in an incremental increase in traffic noise levels. The greatest increase is projected to be 0.5 dB. Additionally, no noise-sensitive uses adjacent to the roadways would be exposed to the increased noise level.

None of the increases in noise level exceed the performance standard established for determining a significant impact under Thresholds 4.7-1, 4.7-2, and 4.7-4.

Alternative 1

Aviation Noise Impacts

As with the Proposed Project, the analysis of Alternative 1 compared to the Baseline (2016) condition took the baseline noise contours and applied the 2026 general aviation fleet mix and operations proposed for Alternative 1. The specific CNEL values at each NMS for the Baseline (2016) and the Baseline (2016) Plus Alternative 1 are provided in Table 4.7-7, above. This provides an assessment of the change in noise values compared to baseline conditions that would be attributable to Alternative 1. Only the close-in NMS 1S, 2S, 3S located in the Santa Ana Heights community in the City of Newport Beach and NMS 8N located in the City of Irvine show noise levels above 65 CNEL, which is the case for the Baseline (2016) scenario as well.

Table 4.7-8, also presented above, shows that the largest increase with Alternative 1 compared to the Baseline (2016) condition is an increase of 0.18 CNEL. The noise contours for the Baseline Plus Alternative 1 are shown in Exhibit 4.7-11. The CNEL noise contours in the Baseline (2016) Plus Alternative 1 remain approximately the same size and shape as the Baseline (2016) noise contours. The change in general aviation operations from Alternative 1 has a negligible impact on the CNEL noise contours. In this scenario, the total contour areas between 60 and 65 CNEL will increase by 0.03 square mile (0.9 percent), and the area between 65 and 70 CNEL will increase by 0.01 square mile (0.6 percent) when compared to the Baseline (2016) noise contours. The area exceeding 70 CNEL will increase by 0.01 square mile (0.7 percent) over Baseline (2016) conditions. The number of residences between 65 and 70 CNEL would increase by 12 residences (4.9 percent), and no additional dwelling units would be exposed to 70+ CNEL. Of these units, six multi-family units are non-conforming uses (residential use in a business park zone) and a prescriptive avigation easement has been acquired; two units have received acoustical insulation and an avigation easement has been acquired; one unit declined the offer of acoustical insulation; a genuine effort to offer insulation to two units was made but no response was received; and one unit has participated in the purchase assurance program, received insulation, and an avigation easement was acquired.

As with the Proposed Project, the change in noise level associated with Alternative 1 would not increase at a level greater than the significance threshold at any NMS. Although additional residences would be in the 65 to 70 CNEL contour compared to the Baseline (2016) condition, these residences are included in the area covered by the AIP approved in conjunction with the 1985 Master Plan (see discussion under Background). Exhibit 4.7-12 depicts the 1985 Master Plan contour, which was the basis for the AIP, and the Baseline (2016) with the Alternative 1 65 CNEL contour.

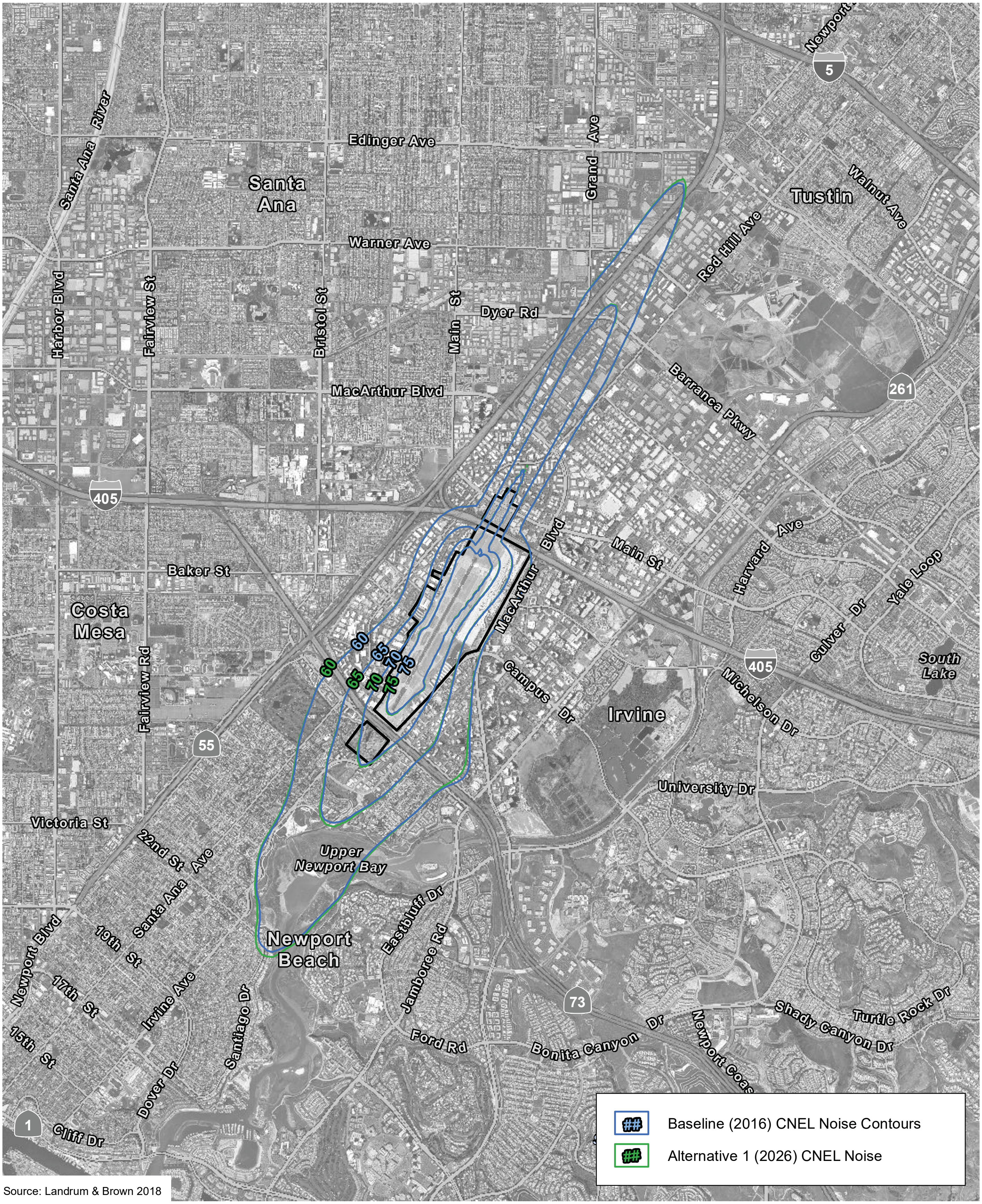
The change in noise level does not increase at a level greater than the significance threshold at any NMS. Therefore, impacts for Alternative 1 would be less than significant for the Baseline (2016) Plus Alternative 1 scenario.

Alternative 1 does provide for construction of new office space and the flight school, which would be required to meet the interior noise criteria as specified in the Noise Element and Land Use/Noise Compatibility Manual. This requirement is contained in SC NOI-1.

Traffic Noise Impacts

As with the Proposed Project, changes in traffic patterns caused by Alternative 1 would result in a slight increase in traffic noise levels along the roadways on the west side of the Airport and a slight decrease in traffic noise levels on the east side of the Airport. Changes in CNEL traffic noise levels along roadways in the vicinity of JWA were calculated using the traffic volumes provided in the *Traffic Impact Analysis*.

Table 4.7-10 shows the traffic noise level increases in dB CNEL on each of the roadway segments affected by Alternative 1. The first column lists the roadway and segment analyzed. The second column of the table lists the Baseline (2016) average daily traffic ("ADT") volume for the roadway segment. The third column lists the additional ADT attributable to Alternative 1. The fourth column lists the Baseline (2016) Plus Alternative 1 ADT volume. The fifth column lists the increase in noise level due to Alternative 1. The values listed in this column are due to the difference between the Baseline (2016) traffic volumes and the Baseline Plus Alternative 1 traffic volumes. The noise increase is due solely to Alternative 1 and represents the greatest increase that can be attributable to Alternative 1.



D:\Projects\LAN0102\MXDs\EIR\Noise_Contours\ex_Baseline_Alt1_Noise_Contours_A_Overview_20180416.mxd

Baseline (2016) and Baseline Plus Alternative 1 CNEL Noise Contours

Exhibit 4.7-11

John Wayne Airport General Aviation Improvement Program

N W E S

1 0.5 0 1 Miles

JOHN WAYNE AIRPORT ORANGE COUNTY

D:\Projects\LAN\0102\MXDs\EIR\Noise_Contours\ex_65_CNEL_1985_and_Alt1_Noise_Contour_20180308.mxd

1985 Master Plan Departure and Baseline (2016) Plus Alternative 1 65 CNEL Noise Contour

Exhibit 4.7-12

John Wayne Airport General Aviation Improvement Program

N W E S

1,500 750 0 1,500 Feet

JOHN WAYNE AIRPORT ORANGE COUNTY

TABLE 4.7-10
TRAFFIC NOISE LEVEL INCREASES
ALTERNATIVE 1 COMPARED TO BASELINE (2016)

Roadway and Segment	Baseline (2016) ADT	Alternative 1 ADT	Baseline Plus Alternative 1 ADT	Increase in Noise Level (dB)
Paularino Avenue				
West of SR-55	16,000	60	16,060	0.0
SR-55 to Red Hill Avenue	12,000	380	12,380	0.1
Red Hill Avenue to Airway Avenue	4,000	410	4,410	0.4
Baker Street				
West of SR-55	27,000	30	27,030	0.0
SR-55 to Red Hill Avenue	20,000	110	20,110	0.0
Red Hill Avenue to Airway Avenue	6,000	170	6,170	0.1
Bristol Street				
Paularino Avenue to I-405	36,000	60	36,060	0.0
Red Hill Avenue				
North of SR-73	19,000	60	19,060	0.0
South of Baker Street	15,000	60	15,060	0.0
Baker Avenue to Paularino Avenue	18,000	45	18,045	0.0
Paularino Avenue to Airport Loop Drive	19,000	30	19,030	0.0
Airport Loop Drive to Main Street	20,000	30	20,030	0.0
Campus Drive				
SR-73 to Quail Street	34,000	-340	33,660	0.0
n/o Dove Street	32,000	-350	31,650	0.0
s/o MacArthur Blvd	32,000	-230	31,770	0.0
MacArthur Blvd to Von Karman Avenue	13,000	-30	12,970	0.0
MacArthur Blvd				
Campus Drive to Michelson Drive	35,000	-200	34,800	0.0
Michelson Drive to I-405	53,000	-190	52,810	0.0
ADT: Average Daily Traffic; Blvd: Boulevard; dB: decibels; I: Interstate; SR: State Route				
Source: Landrum & Brown 2018				

As shown in Table 4.7-9, no roadways with existing adjacent noise-sensitive uses are projected to experience a traffic noise level increase greater than 0.5 dB. Therefore, the Proposed Project would not result in a significant traffic noise impact.

Impact Conclusion: *Alternative 1 would result in minor increases in aviation noise levels compared to the Baseline (2016) condition. The increases would occur at four NMS that are within the 65 CNEL contour (NMS 1S, 2S, 3S, and 8N). The largest increase (NMS 3S) is 0.17 CNEL and is 0.03 CNEL higher than the Baseline Plus No Project Alternative. The increase in aviation noise would* *result in 12 residences currently outside the 65 CNEL contour being included in the 65 CNEL contour. However, these units are already included in the AIP program adopted as part of the 1985 Master Plan, which was adopted to mitigate noise impacts to sensitive land uses south of the Airport. Interior noise levels for the new facilities at the Airport would be consistent with the Orange County requirements through the implementation of SC NOI-1.*

In addition to aviation noise, the redistribution in traffic would result in increased traffic on the west side of the Airport, which would result in an incremental increase in traffic noise levels. The greatest increase is projected to be 0.4 dB. Additionally, no noise-sensitive uses adjacent to the roadways would be exposed to the increased noise level.

None of the increases in noise level exceed the performance standard established for determining a significant impact under Thresholds 4.7-1, 4.7-2, and 4.7-4.

Threshold 4.7-3

- ***Would the project cause a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?***

Proposed Project and Alternative 1

Construction activities would result in a temporary increase in ambient noise. Construction equipment can be considered to operate in two modes: stationary and mobile. Noise impacts from stationary equipment are assessed from the center of the equipment, while noise impacts for mobile construction equipment are assessed as emanating from the center of the equipment activity or construction site. The construction activities for the Proposed Project and Alternative 1 would be similar; therefore, they are addressed together.

Construction noise is related primarily to the use of heavy equipment. Typical maximum noise levels generated by representative pieces of construction equipment are listed in Table 4.7-11; however, not all this equipment would be utilized during construction of the GAIP improvements. Noise levels at any receptor point vary as equipment moves around a site. Noise levels of individual pieces of equipment also vary as equipment use ranges from full power to idle. The typical percentage of time at full power is indicated by the acoustic usage factors in Table 4.7-11. Each phase of construction has a different equipment mix depending on the work to be accomplished during that phase. Each phase also has its own noise characteristics; some will have higher continuous noise levels than others, and some have high-impact noise levels. The loudest phases of the Proposed Project and Alternative 1 are anticipated to be demolition and grading. However, the GAIP would involve limited grading because the site has already been developed. Following grading, construction noise levels are less because fewer pieces of construction equipment are used and the equipment used is generally smaller and quieter than demolition and grading equipment. For point sources, such as construction equipment, the sound level attenuates (or drops off) at a rate of 6 dBA for each doubling of the distance (i.e., if the noise level is 70 dBA at 25 feet, it is 64 dBA at 50 feet).

TABLE 4.7-11
TYPICAL MAXIMUM CONSTRUCTION NOISE LEVELS

Equipment	Noise Level (dBA) at 50 ft	Acoustic Usage Factor
Auger Drill Rig	85	20%
Backhoe	80	40%
Blasting	94	1%
Chain Saw	85	20%
Clam Shovel	93	20%
Compactor (ground)	80–82	20%
Compressor (air)	80	40%
Concrete Mixer Truck	85	40%
Concrete Pump	82	20%
Concrete Saw	90	20%
Crane (mobile or stationary)	85	20%
Dozer	85	40%
Dump Truck	84	40%
Excavator	85	40%
Front End Loader	80	40%
Generator (25 KVA or less)	70	50%
Generator (more than 25 KVA)	82	50%
Grader	85	40%
Hydra Break Ram	90	10%
In situ Soil Sampling Rig	84	20%
Jackhammer	85	20%
Mounted Impact Hammer (hoe ram)	90	20%
Paver	85	50%
Pile Driver, Impact (diesel or pneumatic)	95–101	20%
Pile Driver, Vibratory	95	20%
Pneumatic Tools	85	50%
Pumps	77	50%
Rock Drill	85	20%
Scraper	85	40%
Tractor	84	40%
Vacuum Excavator (vac-truck)	85	40%
Vibratory Concrete Mixer	80	20%

dBA: A-weighted decibels; ft: foot/feet; KVA: kilovolt amps
Source: Thalheimer 2000; FTA 2006

Construction activities are exempt from the quantitative limits of the Orange County Noise Ordinance provided the construction does not take place between the hours of 8:00 PM and 7:00 AM on weekdays, including Saturday, or at any time on Sunday or a federal holiday. However, due to FAA safety restrictions it is anticipated that some night construction would occur.

The nearest sensitive land uses to the GAIP construction is a new multi-story residential building on the south corner of Baker Street and SR-55. These residences are located about 1,760 feet from the nearest section of the construction zone. Existing commercial buildings are located between the Airport and the residential buildings, which provides attenuation to the construction noise. Based on this distance and the height of the intervening buildings, the worst-case mitigated peak (L_{max}) construction noise levels would be in the 44- to 59-dBA range at those residences on the east side of SR-55 for very short periods. The average noise levels are typically 5 to 15 dB lower than the peak noise levels. Average noise levels (L_{eq}) at the nearby residences could be in the range of 34 to 49 dBA. These noise levels are below the nighttime noise ordinance level (50 dBA) for the City of Costa Mesa, and the resultant noise levels are lower than existing ambient conditions in this area, which are about 65 dB CNEL. Therefore, noise from construction activities at the Airport for the Proposed Project would not impact the noise-sensitive land uses nearest to the proposed construction area.

Impact Conclusion: *Construction activities for the Proposed Project and Alternative 1 would generate noise. Although construction activities are exempt from the quantitative limits of the Orange County Noise Ordinance, nighttime construction activities may be required. The closest residences to the construction area are approximately 1,760 feet away. This distance and the intervening commercial buildings would provide enough attenuation that construction noise impacts would be less than significant under Threshold 4.7-3.*

4.7.8 CUMULATIVE IMPACTS

For purposes of CEQA, "cumulative impacts" refer to individual effects which, when considered together, are considerable or which compound or increase other environmental impacts. Because of the way noise levels are combined, in order for two noise sources to result in a cumulative impact, the noise levels generated by the sources need to generate similar noise levels that are just below or exceeding an applicable noise standard, 65 CNEL for residences. Two noise sources generating equal noise levels will result in a cumulative noise level 3 dB greater than the level from only one of the sources. Therefore, the noise levels from two individual sources would need to be within 3 dB of the standard for a cumulative impact to be possible. If the noise levels from two sources differ by 10 dB or more, the cumulative noise level is the same as the louder noise source. The noise levels must be within 4 dB of each other for the cumulative noise level to be 1.5 dB greater than the loudest noise level. These facts considerably limit the situations where cumulative noise impacts could occur.

The cumulative projects that would contribute to a change in the noise environment at the Airport are the FAA's SoCal Metroplex project and the 2014 John Wayne Airport Settlement Agreement Amendment. The final procedures in the Metroplex were implemented in April 2017; however, the departure patterns were modified three times in 2017, with the latest modifications occurring in December 2017. As noted in Section 1.9, the FAA is reviewing the possible implementation of the City-requested procedure that would utilize satellite guidance to more accurately direct aircraft along the middle of the Upper Newport Bay. Due to the uncertainty of the final departure pattern, the cumulative noise analysis does not assume different flight paths than those currently being used because it would be speculative.

As noted in Section 4.0, the 2014 Settlement Agreement Amendment provided for the modification to the terms of an agreement between the Orange County Board of Supervisors, City of Newport Beach, and two community groups pertaining to the commercial carrier operations at JWA. The amendment extends the term of the agreement through 2030 and allows an incremental increase in the number of regulated flights and passengers at the Airport. The amendment will allow an increase from 10.8 million annual passengers ("MAP") up to 12.5 MAP in 2026.[9] The 2014 Final EIR 617, prepared for the Settlement Agreement Amendment, identified significant unavoidable impacts for noise, for which a Statement of Overriding Considerations was adopted. The noise impact and the associated land use impact result from an increase in the number of noise-sensitive uses exposed to noise levels in excess of the 65-dBA CNEL contour for JWA exterior noise standard. Although Final EIR 617 included a Sound Insulation Program as a mitigation measure, this program would reduce impacts associated with excess interior noise levels only to less than significant levels. There are no feasible mitigation measures for exterior noise level (See Section 4.7.1 for a discussion of the adopted sound insulation programs).

The cumulative analysis assumes the Phase 3 (2026 to 2030) operation of the commercial carriers consistent with the 2014 JWA Settlement Agreement Amendment. The assumptions on the total yearly general aviation aircraft operations by aircraft type (fleet mix) for the No Project, the Proposed Project, and Alternative 1 scenarios are provided in the *Noise Analysis Technical Report* (Appendix H of this Program EIR). The cumulative analysis reflects the number of air carrier flights and passenger levels consistent with year 2026 analysis in Final EIR 617, prepared for the 2014 Settlement Agreement Amendment.[10] The proposed GAIP would change only the general aviation operations and fleet mix at JWA. The Proposed Project and Alternative 1 do not change the number of air carrier operations, runway use, or flight tracks. The air carrier operations at JWA are the greatest influence on the size and shape of the noise contours, while the general aviation traffic contributes only a small amount to the contour size and shape. The assumptions for commercial operations are consistent for each of the GAIP scenarios evaluated.

A direct comparison of the analysis in this Program EIR to the data presented in Final EIR 617 cannot be made for several reasons. First, the FAA model used for calculating the noise impacts is different from the model used in Final EIR 617. As discussed in Section 4.7.3, the FAA has

---

9 The Settlement Agreement, at the time amendment was being processed, allowed up to 85 Class A Average Daily Departures ("ADD") 10.8 Million Annual Passengers ("MAP"). The amendment assumes the flight and passenger levels allowed under the Settlement Agreement would remain unchanged until January 1, 2021, at which point it would be allowed to increase to 95 Class A ADDs and 11.8 MAP. On January 1, 2026, the number of passengers would again be able to increase, to up to 12.5 MAP, depending upon the actual service levels in the preceding five years. The analysis in Final EIR 617 and this Program EIR assume the full number of allowed flights and passengers served would occur on January 1, 2026.

10 The noise analysis does take into account the Boeing 737-MAX and Airbus A320-NEO families increasing in operation at JWA. The forecasted increase at JWA is based on the current aircraft orders reported by Boeing and Airbus in the U.S. These aircraft families include substantial noise reduction features and are beginning to operate at JWA now. The AEDT version 2d includes the Boeing 737-MAX aircraft in the model; however, the A320-NEO is not currently included in the model. Therefore, measured data at the NMT for the NEO was used to create a new aircraft type in the AEDT that reflects the operating characteristics of the NEO..

developed AEDT for evaluating aircraft noise impacts in the vicinity of airports. The AEDT replaced the Integrated Noise Model ("INM"), which was used in Final EIR 617, for predicting noise impacts in the vicinity of airports. Per the FAA, many updates and corrections representing the best available science have been incorporated into AEDT, which will result in differences when comparing results from AEDT with the "legacy tools" (FAA 2016).[11]

Additionally, since the preparation of the 2014 JWA Settlement Agreement Amendment Final EIR 617, a new JWA noise monitoring system was installed in 2015 replacing the system that was in place during the preparation of the 2014 Settlement Agreement Amendment. Because of the noise sensitivity of the new noise monitoring equipment, among other reasons, the Airport conducted a side-by-side noise analysis to compare the two noise monitoring systems prior to switching over to the new noise monitoring equipment. Based upon an analysis of the side-by-side noise data, the parties to the 1985 Settlement Agreement, as amended, and the Board approved noise level adjustments for Class A and Class E commercial aircraft operations at JWA noise monitoring stations (NMS) 1S, 2S, 3S, 4S, 5S, 6S, and 7S. Specifically, Class A and Class E aircraft noise levels of the Phase 2 Access Plan, which regulate noise levels for scheduled commercial operations, were revised. Additionally, the settlement parties and the Board approved adjustments to permitted noise levels for general aviation aircraft operations at NMS 1S, 2S, 3S (daytime and nighttime hours), and NMS 4S, 5S, 6S, 7S, 8N, 9N, and 10N (nighttime hours) by revising applicable sections of the GANO, which regulate noise levels for general aviation aircraft. This is further discussed above under Existing Conditions with comparative information shown in Table 4.7-5.

In the context of these approved adjustments, it is important to note, although ideally the new noise monitoring system would measure the exact same level for each noise event as the previous system, this type of accuracy is not technologically feasible because the new equipment is more advanced and more sensitive than the previous equipment. The approved adjustments were required solely to reflect the technical capabilities of the new equipment in comparison to the previous equipment. The comparative values for each NMS are presented in Table 4.5-7. For example, the parity study identified a noise level at NMS 5S of 94.6 dB for a Class A flight with the previous noise monitoring system and a noise level of 95.3 dB with the new noise monitoring system when monitoring the same noise event. The 0.7 dB increase is not a change in the amount of noise actually generated, rather an adjustment to ensure that the change in noise monitoring technology and equipment neither increased nor decreased the noise levels permitted in the County's access and noise regulations. This issue is more fully explained in the discussion of the Noise Monitoring System in Section 4.7.4

Finally, the FAA has studied and implemented flight path changes around the Airport's airspace since 2016. These FAA flight path changes concentrate aircraft flight paths, specifically departures to the southwest, on a more narrowly defined flight corridor when compared with a more dispersed flight corridor prior to 2016. As a result of these FAA initiated flight path changes, the measured NMS noise levels for the Existing (2016) conditions are not directly comparable to the 2013 measured NMS noise levels shown in the 2014 Settlement Agreement Amendment Final EIR 617. Additionally, since the Existing (2016) and Future (2026) noise

[11] The FAA references "legacy tools" as previous FAA tools used for modeling noise, emissions, and fuel consumption. These legacy tools include the INM, Emissions and Dispersion Modeling System ("EDMS"), and Noise Integrated Routing System ("NIRS") (FAA 2016).

contours in this report are based on the 2016 measured NMS noise levels, these contours are also not directly comparable to those in the Final EIR 617 report.

CNEL values have been calculated for each NMS. Table 4.7-12 presents CNEL values at each of the NMS for Existing (2016) conditions, and all of the future (2026) scenarios. NMS with noise levels equal to or above 65 CNEL are shown in bold type. Only the close-in NMS 1S, 2S, 3S located in the Santa Ana Heights community in the City of Newport Beach and NMS 8N located in the City of Irvine show noise levels above 65 CNEL for any case. However, NMS 8N is located in a commercial area with no nearby sensitive uses.

TABLE 4.7-12
CUMULATIVE (2026) MODELED CNEL VALUES COMPARED TO BASELINE (2016) AT NOISE MONITORING STATIONS

NMS[a]	Baseline (2016)	Future (2026) No Project	Future (2026) Proposed Project	Future (2026) Alternative 1
1S	**67.77**	**67.60**	**67.61**	**67.63**
2S	**66.66**	**66.72**	**66.73**	**66.75**
3S	**66.46**	**66.90**	**66.95**	**66.98**
4S	59.62	59.68	59.70	59.72
5S	58.95	59.56	59.59	59.61
6S	59.95	60.81	60.86	60.88
7S	56.00	57.06	57.10	57.12
8N	**68.31**	**69.18**	**69.20**	**69.20**
9N	45.59	48.08	48.08	48.07
10N	55.27	57.54	57.54	57.53

Noise monitors within the 65 CNEL are shown in **bold**.

[a] NMS 1S, 2S, and 3S are located in the Santa Ana Heights Community of the City of Newport Beach; NMS 4S, 5S, 6S, and 7S are located in the City of Newport Beach, NMS 8N is located in the City of Irvine, NMS 9N is located in the City of Santa Ana; and NMS 10N is located in the City of Tustin.

Source: Landrum & Brown 2018

Table 4.7-13 presents the change in noise level in terms of CNEL relative to existing year 2016 conditions. Using the County significance thresholds (see Table 4.7-4), none of the NMSs that exceed 65 CNEL in the baseline would experience an increase equal to or greater than 1.5 dB.[12] Since NMSs 9N and 10N have existing and projected noise levels below 60 CNEL the threshold for the identification of a significant impact is a 5 dB or greater increase. It should also be noted, these two NMS do not have noise sensitive land uses nearby. Additionally, as demonstrated by a comparison of the data for the Proposed Project and Alternative 1 to the Future No Project Alternative, the majority of the change in noise levels in 2026 is associated the approved increase in commercial carrier operations provided for through the 2014 JWA Settlement Agreement

[12] For disclosure purposes, the City of Newport Beach identifies a noise increase of 1.0 CNEL or more at a sensitive receptor where the existing exposure is 65 CNEL or above as a significant impact. Additionally, the City standards indicate when the resulting noise level is between 60 and 65 CNEL, a 2 dB increase results in a significant impact. None of the changes in noise levels between the 2016 Baseline and the 2026 cumulative condition at NMS in the City of Newport Beach would exceed the City's thresholds.

Amendment (i.e., there is nominal change associated with the Proposed Project and Alternative 1 when compared to the No Project).[13]

However, the change in noise level does not increase at a level greater than the significance threshold at any NMS even when comparing the 2026 cumulative noise levels (i.e., increase in commercial carrier operations and the GAIP operations) to the Baseline (2016) condition.

TABLE 4.7-13
CUMULATIVE (2026) CHANGES IN CNEL VALUES COMPARED TO BASELINE (2016) AT NOISE MONITORING STATIONS

NMS[1]	Future (2026) No Project	Future (2026) Proposed Project	Future (2026) Alternative 1
1S[a]	**-0.17**	**-0.16**	**-0.14**
2S	**0.06**	**0.07**	**0.09**
3S	**0.44**	**0.49**	**0.52**
4S	0.06	0.08	0.10
5S	0.61	0.64	0.66
6S	0.86	0.91	0.93
7S	1.06	1.10	1.12
8N	**0.87**	**0.89**	**0.89**
9N	2.49	2.49	2.48
10N	2.27	2.27	2.26

Noise monitors within the 65 CNEL are shown in **bold**.

[a] The reduction at NMS 1S reflects the increased usage of aircraft in the Boeing 737-MAX and Airbus A320-NEO families. These aircraft families include substantial noise reduction features, which are greatest at take-off with the most benefit realized in the closest proximity to the Airport.

Source: Landrum & Brown 2018

As shown in Table 4.17-13, in the cumulative scenarios, neither the Proposed Project nor Alternative 1 are projected to result in a significant noise impact at any NMS (i.e., an increase of 1.5 CNEL or more at a sensitive receptor where the existing exposure is 65 CNEL or above). In addition to CNEL values at the NMS, CNEL contours have been developed for the cumulative scenarios. As noted, the cumulative scenarios include the approved changes to commercial carrier operations (increased number of regulated flights and passengers served) in addition to the changes that would occur as a result of the GAIP. Exhibits 4.7-13 and 4.7-14 depict CNEL contours for the cumulative scenario departure path with the Proposed Project and Alternative 1, respectively. To provide a comparison, the Baseline (2016) and future (2026) No Project Alternative contours have been included on each of these exhibits. The No Project scenario is relevant for comparison because noise contours are dominated by the commercial carrier operations, and these will occur independently of the GAIP. The GAIP would make no changes to the terms of the 2014 Settlement Agreement Amendment, including no changes to the commercial operations levels or noise levels approved as part of the 2014 Settlement Agreement Amendment. The graphic depictions demonstrate that the increase in size of the noise contours

[13] Table 4.7-8, which quantifies the noise increase directly attributable to the GAIP, demonstrates the GAIP's small incremental noise increase for the Baseline (2016) Plus GAIP (the Proposed Project and Alternative 1).

from 2016 to 2026 is mainly due to the increase in commercial carrier aircraft previously addressed in Final EIR 617.

The specific land uses affected by these increases are discussed in Section 4.6.7 of this Program EIR. However, for the cumulative condition, the noise contours are dominated by the commercial carrier operations. A comparison to the noise contours for the cumulative GAIP (Proposed Project and Alternative 1) to the cumulative No Project noise contours shows that even though areas exposed to noise levels in excess of 65 CNEL would increase, the GAIP (Proposed Project and Alternative 1) would not substantially contribute to the cumulative noise increase. The reason for this is the Proposed Project and alternatives do not affect the number of commercial operations, fleet mix, runway use or flight tracks. Therefore, the cumulative impacts for the GAIP would be less than significant. Additionally, two noise mitigation programs have been previously adopted to address cumulative noise impacts. The eligibility for the Santa Ana Heights AIP, which has been extensively implemented as a mitigation measure for the 1985 Master Plan EIR, was based on the future 65 CNEL contour predicted in the 1985 Master Plan. This program was supplemented as part of the 2014 Settlement Agreement Amendment with the SIP. The SIP is designed to provide attenuation to residences significantly impacted by the commercial carrier operations. As previously noted in Section 4.7.1, to date there has not been a sufficient increase in noise levels to require implementation of the SIP. Final EIR 617 did not identify a potential impact until Phase 3 (2026 to 2030), which is reflected in the cumulative analysis used in this Program EIR.

4.7.9 MITIGATION PROGRAM

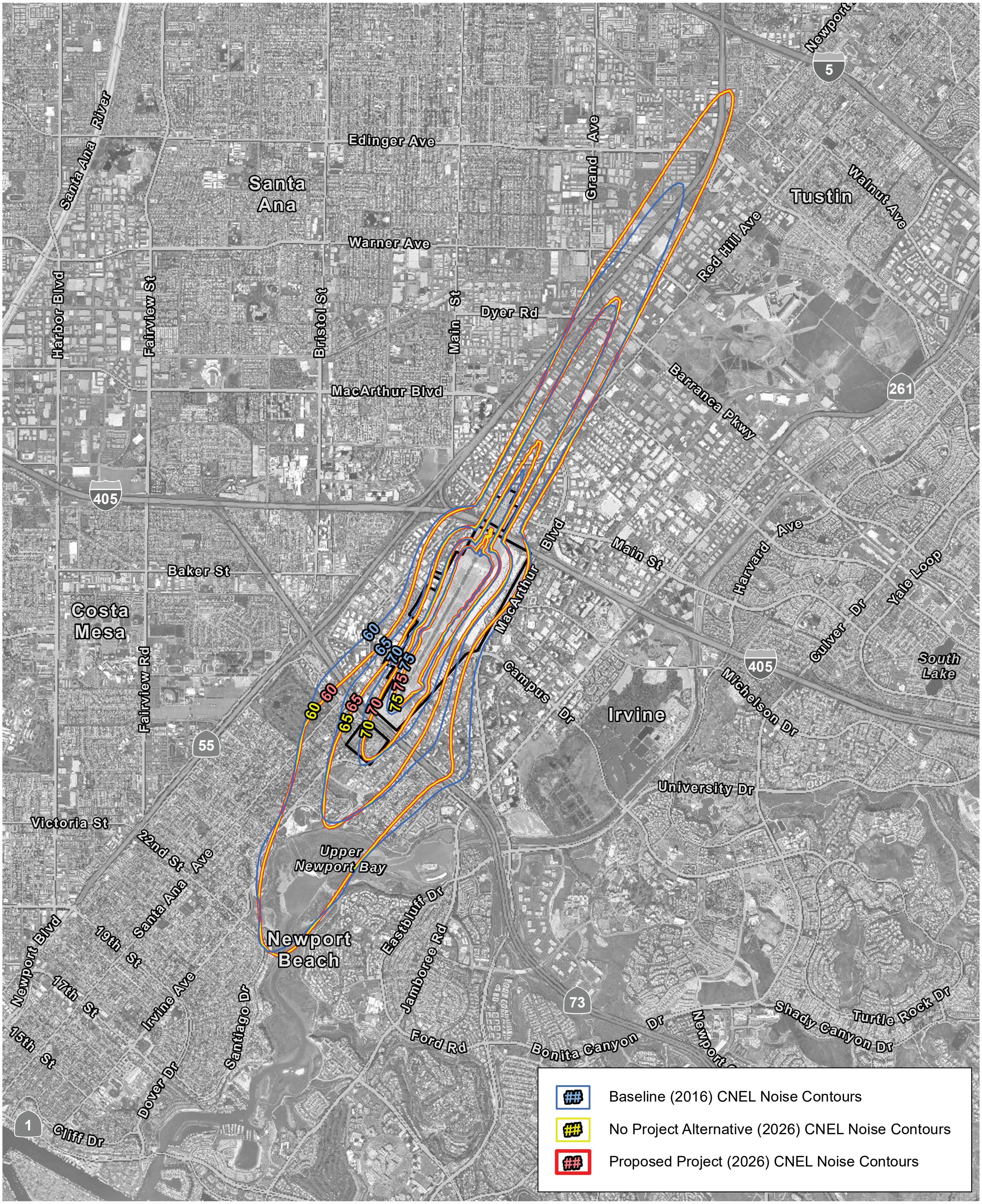
No significant noise impacts were identified; therefore, no additional noise mitigation measures are required. However, it should be noted that RR NOI-1 and SC NOI-1, identified in Section 4.7.6 would apply to the GAIP (Proposed Project and Alternative 1).

RR NOI-1 identifies that the Orange County Municipal Code Article 3 Section 2-1-30, General Aviation Noise Ordinance, would apply to general aviation activities and would serve to avoid potential noise impacts from daytime and nighttime operations.

SC NOI-1 would serve to ensure interior noise standards specified in the Noise Element and Land Use/Noise Compatibility Manual are achieved for noise-sensitive uses at the Airport, such as office space.

4.7.10 LEVEL OF SIGNIFICANCE AFTER MITIGATION

Project and cumulative impacts would be less than significant for the Proposed Project and Alternative 1; however, RR NOI-1 and SC NOI-1 would apply to the GAIP (Proposed Project and Alternative 1).



D:\Projects\LAN0102\MXDs\EIR\Noise_Contours\ex_Baseline_NPA_PP_Noise_Contours_A_Overview_20180830.mxd

Baseline (2016), No Project Alternative (2026) and Cumulative with the Proposed Project (2026) CNEL Noise Contours

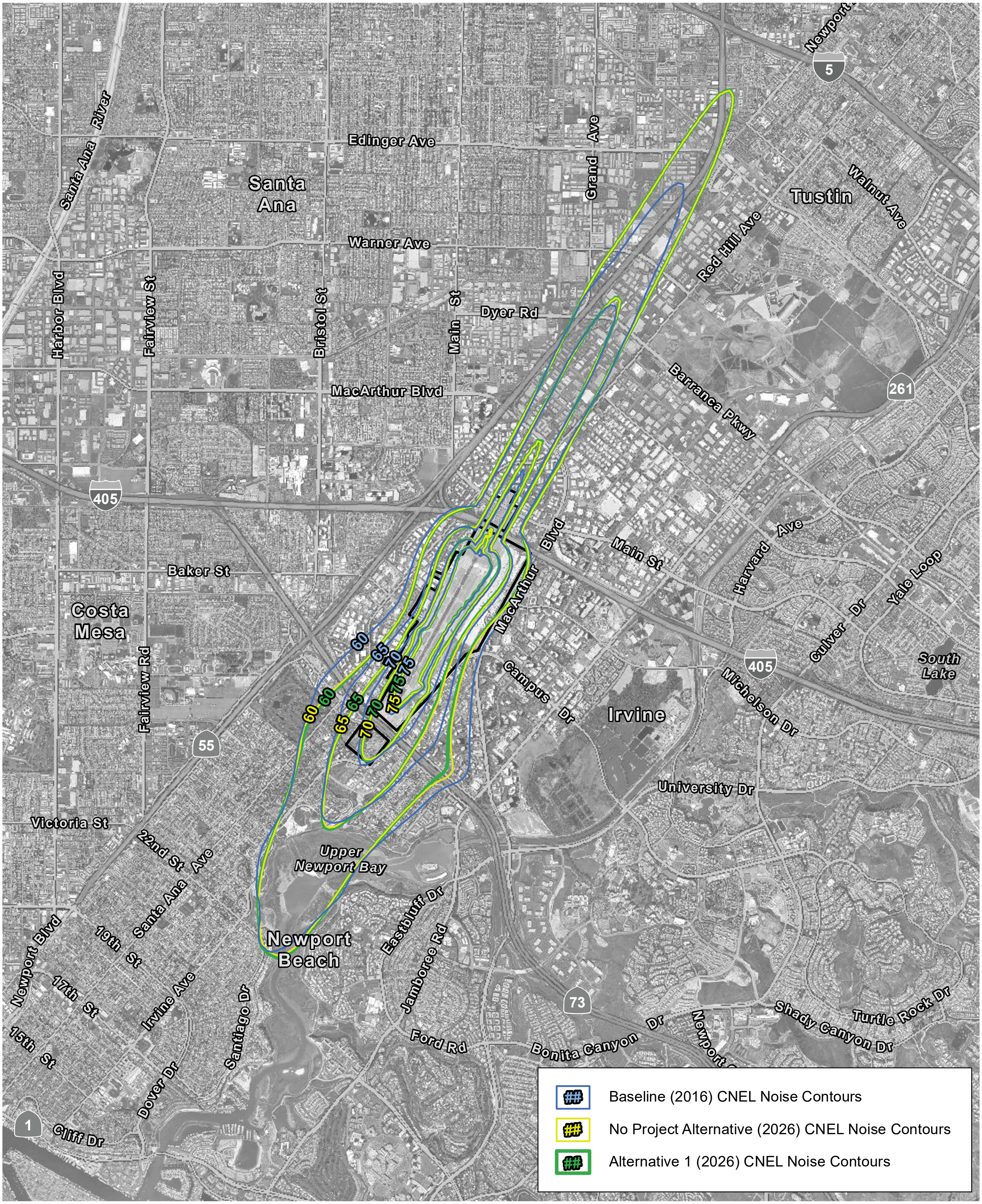
Exhibit 4.7-13

John Wayne Airport General Aviation Improvement Program

N W E S

1 0.5 0 1 Miles

JOHN WAYNE AIRPORT ORANGE COUNTY



D:\Projects\LAN\0102\MXDs\EIR\Noise_Contours\ex_Baseline_NPA_Alt1_Noise_Contours_A_Overview_20180830.mxd

Baseline (2016), No Project Alternative (2026) and Cumulative with Alternative 1 (2026) CNEL Noise Contours

Exhibit 4.7-14

John Wayne Airport General Aviation Improvement Program

JOHN WAYNE AIRPORT ORANGE COUNTY

4.7.11 REFERENCES

AECOM. 2018 (April). Orange County/John Wayne Airport (JWA) General Aviation Improvement Program (GAIP) Based Aircraft Parking—Capacity Analysis and General Aviation Constrained Forecasts. Orange, CA (Appendix D)

Federal Aviation Administration (FAA). 2016 (June). *AEDT & Legacy Tools Comparison*. Washington D.C. https://aedt.faa.gov/Documents/Comparison_AEDT_Legacy_Summary.pdf (accessed August 15, 2018).

Landrum & Brown. 2018 (August). *John Wayne Airport General Aviation Improvement Program Noise Analysis Technical Report.* Irvine, CA: Landrum & Brown.

Thalheimer, E. 2000. Construction Noise Control Program and Mitigation Strategy as the Central Artery/Tunnel Project. Noise Control Engineering Journal 48(5), Sep–Oct. Indianapolis, IN: Institute of Noise Control Engineering.

U.S. Department of Transportation, Federal Transit Administration (FTA). 2006 (May). Transit Noise and Vibration Impact Assessment, FTA-VA-90-1003-06 (prepared by Harris Miller Miller & Hanson, Inc.). Washington, D.C.: FTA. https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/FTA_Noise_and_Vibration_Manual.pdf.