

Appendix G. Noise Technical Memorandum

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TECHNICAL MEMORANDUM

To: Angel Hernandez, Senior Project Manager, City of El Centro
From: Sharon Toland, Senior Technical Specialist, and Kelsey Hawkins, Environmental Analyst/Noise Analyst, Harris & Associates
Subject: Analysis of Permanent Vehicle Noise Impacts for the El Centro General Plan Update
Date: March 4, 2021
CC: Kristin Blackson, Senior Project Manager, Harris & Associates
Att: 1, FHWA Noise Prediction Model Results

Dear Mr. Hernandez,

The following presents the results of Harris & Associates' analysis of the potential vehicle noise impacts from implementation of the proposed El Centro General Plan Update (project or General Plan Update). The City of El Centro (City) is updating the Land Use Element and Mobility Element of the El Centro General Plan and creating a new Environmental Justice Element. The El Centro General Plan was last updated in 2004, with the exception of the Housing Element, which was updated in 2013.

Background

The California Department of Transportation defines "noise" as sound that is loud, unpleasant, unexpected, or undesired. Sound pressure levels are quantified using a logarithmic ratio of actual sound pressures to a reference pressure squared called "bels." A bel is typically divided into tenths, or decibels (dB). Sound pressure alone is not a reliable indicator of loudness because frequency (or pitch) also affects how receptors respond to sound. To account for the pitch of sounds and the corresponding sensitivity of human hearing to sounds, the raw sound pressure level is adjusted with a frequency-dependent A-weighting scale that is stated in units of decibels (dBA) (Caltrans 2013).

A receptor's response to a given noise may vary depending on the sound level, duration of exposure, character of the noise sources, time of day during which the noise is experienced, and the activity affected by the noise. Activities most affected by noise include rest, relaxation, recreation, study, and communications. In consideration of these factors, different measures of noise exposure have been developed to quantify the extent of the effects from a variety of noise levels. The Leq, or equivalent energy level, provides an average acoustical or sound energy content of noise measured during a prescribed period, such as 1 minute, 15 minutes, 1 hour, or 8 hours. The sound level may not be constant over the measured time period, but the average dB sound level, given as dBA Leq, contains an equal amount of energy as the fluctuating sound level (Caltrans 2013). Community noise equivalent level (CNEL) is an average sound level during a 24-hour day that considers the 24-hour day divided into three periods. CNEL is obtained by adding an additional 5 dBA to sound levels in the evening between 7:00 p.m. and 10:00 p.m. and an additional 10 dBA to noise levels in the nighttime hours between 10:00 p.m. and 7:00 a.m. (City of El Centro 2004).

The dB level of a sound decreases (or attenuates) as the distance from the source of that sound increases. For a single point source, such as a piece of mechanical equipment, the sound level normally decreases by approximately 6 dBA for each doubling of distance from the source. Sound that originates from a linear, or "line" source, such as vehicular traffic, attenuates by approximately 3 dBA per doubling of distance. Other contributing factors that affect

sound reception include ground absorption; natural topography that provides a natural barrier; meteorological conditions; or the presence of human-made obstacles, such as buildings and sound barriers (Caltrans 2013).

Noise in the City is primarily characterized by traffic noise, particularly near Interstate (I-) 8, State Route 86, and major arterials and collector roads such as La Brucherie Avenue, Imperial Avenue, 8th Street, and Dogwood Avenue. Other transportation noise sources include the Union Pacific Railroad and San Diego and Arizona Railway and aircraft flight patterns. According to the Imperial County General Plan Noise Element (Imperial County 2015), existing railroad noise levels in Imperial County (County) average approximately 74 dBA CNEL at 100 feet. This estimate is a culmination of several railway lines in the County and would be a conservative estimate for existing railway noise in the City. A small portion of northern El Centro falls within the 55 CNEL noise contour of the Imperial County Airport Noise Impact Area.

Other noise sources in the City include commercial operations, industrial centers, agricultural activities, restaurants/bars, and other typical urban activity noise. Average noise levels range from 45 to 70 dBA Leq depending on proximity to major freeways and arterials (City of El Centro 2004).

The El Centro General Plan Noise Element defines “noise sensitive land uses” as those that include noise receptors (receivers) in which normal activities associated with the use may be interrupted by noise, including but not limited to residences, schools, hospitals, religious meetings, and recreational areas (City of El Centro 2004). Sensitive residential receptors are primarily in the north-central portion of the City, generally north of I-8 and following the State Route 86 corridor. El Centro Regional Medical Center is the primary hospital serving the region and is in the south-center of the City, immediately north of I-8 off Imperial Avenue. Schools are located throughout the City, primarily near residential neighborhoods.

Regulatory Setting

The El Centro General Plan Noise Element contains policies and programs to achieve and maintain noise levels compatible with various land uses. Table 1 summarizes the City noise standards for various types of land uses that were used to develop the Noise Land Use Compatibility Matrix for ambient noise levels. The Noise Plan of the Noise Element includes the Noise Land Use Compatibility Matrix (Table 2) that presents the Noise Element guidelines for determining acceptable and unacceptable community noise exposure limits for various land use categories. Because traffic noise contributes to the overall ambient noise environment in the City, rather than short-term noise exposure, the El Centro General Plan Noise Element Noise Compatibility Standards are the applicable standards for determining potential noise impacts related to vehicle noise.

Table 1. City of El Centro Noise Standards

Zones (Land Use Types)	1-Hour Average Sound Level (dBA)	
	Outdoor	Indoor ¹
Rural and Single-Family Residential	60	45
Multi-Family Residential	65	45
Schools, libraries, places of worship, hospitals, nursing homes, and parks and recreation areas	70	45

Source: City of El Centro 2004.

Notes: dBA = A-weighted decibel

¹ In the event that outdoor acceptable noise exposure levels cannot be mitigated by various attenuation mitigation measures, indoor noise levels shall not exceed 45 dBA CNEL.

Table 2. El Centro General Plan Noise Element Noise Land Use Compatibility Matrix (dBA Ldn or dBA CNEL)

Land Use Category	Zone A: Normally Acceptable	Zone B: Conditionall y Acceptable	Zone C: Normally Unacceptable	Zone D: Clearly Unacceptable
Residential	50–60	60–70	70–75	75–85
Transient lodging – motels, hotels	50–60	60–75	75–80	80–85
Schools, libraries, places of worship, hospitals, nursing homes	50–60	60–70	70–80	80–85
Auditoriums, concert halls, amphitheaters	NA	50–70	NA	70–85
Sports arenas, outdoor spectator sports	NA	50–75	NA	75–85
Playgrounds, parks	50–70	NA	70–75	75–85
Golf courses, riding stables, water recreation, Cemeteries	50–70	NA	70–80	80–85
Office buildings, business commercial and professional	50–65	60–75	75–85	NA
Industrial, manufacturing, utilities, agriculture	50–70	70–75	80–85	NA

Source: City of El Centro 2004.

Notes: CNEL = community noise equivalent level; dBA = A-weighted decibel; Ldn = day-night noise level; NA = not applicable

If the noise level of a project falls within Zone A (Normally Acceptable) or Zone B (Conditionally Acceptable), the project is considered compatible with the noise environment. Zone A (Normally Acceptable) implies that no mitigation would be needed. Zone B (Conditionally Acceptable) implies that minor mitigation may be required to meet the City’s and Title 24 of the California Code of Regulations noise standards. If the noise level falls within Zone C (Normally Unacceptable), substantial mitigation is likely needed to meet City noise standards. Substantial mitigation may involve construction of noise barriers and substantial building sound insulation. Projects within Zone C (Normally Unacceptable) can be successfully mitigated; however, project proponents with a project within Zone C (Normally Unacceptable) must demonstrate that the noise standards can be met before issuance of a building permit. If noise levels fall within Zone D (Clearly Unacceptable), projects are considered clearly incompatible with the noise environment and should not be approved.

Standards of Significance

The City does not have established criteria for assessing traffic noise increases. Therefore, the guidelines outlined in the Imperial County General Plan Noise Element have been determined to be the applicable standards for the project (Imperial County 2015). Based on Imperial County guidelines for the evaluation of significant noise impacts, the project would results in a significant impact if:

1. The future noise level after the project is completed would be within the “normally acceptable” noise levels shown in the City’s land use compatibility matrix, but the project would result in an increase of 5 dBA CNEL or greater compared to noise levels without project implementation.
2. The future noise level after the project is complete would be greater than the “normally acceptable” noise levels shown in the City’s land use compatibility matrix, and the project would result in a noise increase of 3 dBA CNEL or greater compared to noise levels without project implementation.

Noise level compatibility varies by land use as demonstrated in Table 2. According to the El Centro General Plan, 60 dBA CNEL or greater is the threshold for “normally acceptable” levels at sensitive receptors and is the most conservative noise compatibility threshold. Sensitive receptors are throughout the project study area; therefore, for the purposes of this analysis, 60 dBA CNEL conservatively serves as the standard for potential vehicle noise impacts on all project study area segments.

Impact Analysis

The following analysis includes an analysis of increases in vehicle noise that may result from project implementation and the potential for new sensitive receptors to be exposed to incompatible noise levels.

Permanent Increase in Vehicle Noise

The potential for implementation of the proposed project to permanently increase ambient noise levels as a result of increased traffic was assessed using standard noise modeling equations adapted from the Federal Highway Administration noise prediction model (Attachment 1, FHWA Noise Prediction Model Results). The modeling calculations take into account the posted vehicle speed, median width, average daily trip (ADT) volume, and estimated vehicle mix. Existing and future traffic volumes and roadway characteristics with the buildout of the General Plan Update were obtained from Chen Ryan Associates (2020a, 2020b). Noise levels were calculated at 50 feet from the centerline of each roadway segment. Generally, noise from heavily traveled roadways would experience a decrease of approximately 3 dBA for every doubling of distance. The actual sound level at any receptor location depends on such factors as the source-to-receptor distance and the presence of intervening structures, barriers, vegetation, and topography; therefore, the result of the calculations is the worst-case scenario.

Of the 210 segments included in the project study area, 10 segments were chosen as representative of the potential changes in traffic noise conditions in the City and Sphere of Influence (SOI). A range of segments was selected to demonstrate a low change in ADT as a result of project implementation, greatest change in ADT as a result of project implementation, and the highest total ADT (I-8) as a result of project implementation. Segments demonstrating a range of post-project ADT for which the project would include a major change, such as an increase in the number of lanes with implementation of the project, were also selected. Table 3 includes existing and existing plus project ADTs for the 10 representative segments. Table 4 provides existing noise levels and future increases in traffic with implementation of the proposed project from the 10 representative street segments.

Table 3. Existing Plus Project Average Daily Trip Counts

Roadway	Segment	Existing ADT	Existing Plus Project ADT
La Brucherie Avenue	Ocotillo Drive to Wake Avenue	6,041	16,900
	Wake Avenue to Danenberg Drive	4,823	10,200
Imperial Avenue	Ocotillo Drive to I-8 WB Ramps	8,464 ¹	35,000
Dogwood Avenue	Danenberg Drive to West McCabe Road	12,883	28,700
Orange Avenue	Glenwood Road to La Brucherie Avenue	2,412	5,000
Wake Avenue	Imperial Avenue to 8th Street	1,472	8,400
Danenberg Drive	4th Street to Dogwood Avenue	6,765	28,900
	Dogwood Avenue to Industry Way	5,426	12,300
McCabe Road	Dogwood Avenue to Pitzer Road	1,689	7,100
I-8	Dogwood Avenue to SR-111	32,500	44,300

Source: Chen Ryan Associates 2020a, 2020b.

Notes: ADT = average daily trips; I- = Interstate; SR- = State Route; WB = westbound

¹ All ADTs were gathered by Chen Ryan Associates in 2019 except this segment, which was gathered in 2014.

Table 4. Existing Plus Project Traffic Noise Levels

Roadway	Segment	Applicable Threshold (dBA Ldn)	Existing (dBA Ldn)	Exceeds Threshold Without Project?	Existing + Project (dBA Ldn)	Increase in Noise Level From Existing	Significant Impact?
La Brucherie Avenue	Ocotillo Drive to Wake Avenue	60	63	Yes	67	+4	Yes
	Wake Avenue to Danenberg Drive	60	62	Yes	67	+5	Yes
Imperial Avenue	Ocotillo Drive to I-8 WB Ramps	60	65	Yes	75	+10	Yes
Dogwood Avenue	Danenberg Drive to West McCabe Road	60	68	Yes	73	+5	Yes
Orange Avenue	Glenwood Road to La Brucherie Avenue	60	55	No	58	+3	No
Wake Avenue	Imperial Avenue to 8th Street	60	53	No	66	+16	Yes
Danenberg Drive	4th Street to Dogwood Avenue	60	64	Yes	72	+8	Yes
	Dogwood Avenue to Industry Way	60	61	Yes	69	+8	Yes
McCabe Road	Dogwood Avenue to Pitzer Road	60	60	No	65	+5	Yes
I-8	Dogwood Avenue to SR-111	60	81	Yes	83	+2	No

Notes: dBA = A-weighted decibel; I- = Interstate; Ldn = day-night noise level; SR- = State Route

As shown in Table 4, implementation of the General Plan Update would have the potential to result in potentially significant noise impacts due to increased traffic volume at 8 of the 10 representative segments throughout the City. Of those eight segments, seven segments currently generate noise levels that exceed the applicable 60 dBA CNEL threshold without implementation of the proposed project. However, all eight segment would result in a noise increase of 3 dBA CNEL or greater as a result of the proposed project.

As shown in Table 4, significant impacts would not occur to two representative segments. These segments represent the highest ADT of any project study area segment (I-8 from Dogwood Avenue to SR-111) and the

greatest percent change in ADT as a result of the project (Orange Avenue from Glenwood Road to La Brucherie Avenue). I-8 traverses the City from east to west and is the major freeway that serves the City. The I-8 segment from Dogwood Avenue to SR-111 would not result in a significant noise impact from vehicle noise as a result of the proposed project, as demonstrated previously. Because this segment of I-8 represents the highest ADT and largest change compared to the other project study area segments of I-8, it can be reasonably assumed that the remaining I-8 segments would not result in significant impacts from vehicle noise as well. Due to the high volume of existing traffic on this roadway, the incremental increase in traffic volume as a result of the proposed project would not result in a significant impact on this roadway. In addition, the Orange Avenue segment from Glenwood Road to La Brucherie Avenue would not result in a significant noise impact from vehicle noise as a result of the proposed project because traffic volumes along this roadway are low and would remain low under the proposed project. The incremental increase in traffic volume as a result of the proposed project would not result in a significant impact on this roadway. Roadway segments with a similarly low ADT (5,000 ADT or below) would also not be expected to generate a noise level that exceeds 60 dBA CNEL.

Vehicle noise increases would generally occur in the areas where the proposed General Plan Update anticipates an intensification of development and, therefore, would require an increase in roadway capacity. This is observed in the five proposed Opportunity Areas (OAs), which are larger, specific areas where targeted change is anticipated as a result of the General Plan Update. These OAs would introduce new mixed-use, commercial, recreation, tourist, and neighborhood commercial land uses and a variety of residential uses to areas throughout the City and SOI. Further, under the proposed project, certain new proposed roadways or roadway extensions would result in an increase in roadway levels above existing conditions. The highest volume roadways are mainly concentrated in the northwestern and central portions of the City and SOI and include La Brucherie Avenue, Imperial Avenue, 8th Street, 4th Street, and Dogwood Avenue. These roadways are classified as two-lane, four-lane, or six-lane arterials and are central roadways that traverse the City from north to south. Based on the predicted traffic noise levels at the representative segments, as listed in Table 4, the highest volume roadways would likely have a potentially significant noise impact from increased vehicle noise as a result of the General Plan Update. These roadways would likely exceed the 60 dBA CNEL threshold at 50 feet from the centerline and cause a noise increase of 3 dBA CNEL or greater. Therefore, implementation of the proposed General Plan Update would result in a potentially significant permanent increase in vehicle noise levels.

Noise Incompatibilities with New Sensitive Receptors

In addition to the potential to increase vehicle noise as a result of growth under the proposed General Plan Update, implementation of the project would have the potential to result in the placement of new sensitive receptors in areas that would be exposed to vehicle noise levels in excess of the City's noise land use compatibility standards. As part of the General Plan Update, new sensitive receptors would be concentrated in the proposed OAs throughout the City and SOI, including along major roadway corridors, such as Adams Avenue, Downtown El Centro, near Imperial Valley Mall, and along the future extension of Imperial Avenue. OA-1, OA-2, OA-4, and OA-5 would include new residential development in areas where new receptors would have the potential to be exposed to vehicle noise exceeding 60 dBA CNEL. In contrast, impacts are less likely to occur in OA-3 because the OA proposes primarily commercial uses, which are not considered sensitive.

As discussed previously, new sensitive receptor development would be concentrated near major City roadways, which have the potential to generate noise levels in excess of 60 dBA CNEL with and without the proposed project. Therefore, new sensitive receptor development that is planned under the General Plan Update, particularly in the OAs, would have the potential to be exposed to vehicle noise above the normally acceptable limits. New development accommodated by the proposed General Plan Update throughout the City and SOI would have the potential to be exposed to ambient noise levels in excess of the existing El Centro General Plan Noise Element Noise Compatibility Standards. A potentially significant impact would occur.

Mitigation Measures

Permanent Increase in Vehicle Noise

The proposed General Plan Update would result in a potentially significant impact associated with a permanent increase in ambient noise levels. A potentially significant impact would also occur related to new development or redevelopment under the proposed project in areas with the potential to be exposed to traffic noise levels that exceed the applicable noise compatibility standard. Mitigation Measure NOI-1 would reduce impacts related to increases in vehicle noise level by requiring future development or redevelopment to implement noise reduction measures where feasible. This measure would be required for projects with the potential to generate 700 ADT or greater. This screening level was determined to be the maximum project-level ADT that would not trigger a direct project impact on any representative project segment.

NOI-1: Roadway Noise Measures. Before the approval of building permits, project applicants for future development projects proposed as a result of the General Plan Update with the potential to generate 700 average daily trips or greater shall be required to complete a site-specific Noise Technical Study to determine if the project would result in a significant increase in traffic noise. This Noise Technical Study shall be prepared by a qualified acoustical analyst.

If a significant increase in vehicle noise level is identified as a result of project implementation, the project shall incorporate buffers or other noise reduction measures to the extent feasible to reduce noise levels at affected sensitive receptors to a normally acceptable noise level. Reduction measures that shall be considered include but are not limited to alternative road design, reduced speeds, alternative paving, building retrofits to provide additional noise attenuation, and setbacks or buffers before berms and walls. The noise reduction measures shall be designed by a qualified acoustical engineer. Where noise reduction measures in the public right-of-way are infeasible, the project applicant shall conduct outreach to potentially affected sensitive receptors to determine the feasibility of noise reduction measures on private property, including a noise barrier or building retrofits. Based on affected receptor response, a qualified acoustical engineer shall determine the feasibility of a noise barrier on private property and/or the extent of required building retrofits. The project applicant shall submit plans to the City of El Centro Community Development Department for review and approval before the start of any construction. These plans shall demonstrate that the proposed noise reduction measures would reduce traffic noise exposure at sensitive receptors to the extent feasible.

Noise Incompatibilities with New Sensitive Receptors

Mitigation Measure NOI-2 would reduce impacts related to exposure of new sensitive receptors to excessive noise levels by requiring that new development demonstrate consistency with the El Centro General Plan Noise Element Noise Compatibility Standards.

NOI-2: Site-Specific Acoustic Analysis. Before the approval of building permits, for each development, project applicants shall submit an Acoustical Study prepared by a certified acoustical engineer. Should the results of the Acoustical Study indicate that exterior noise levels would exceed the land use compatibility limits in the El Centro General Plan Noise Element of 60 A-weighted decibels community noise equivalent level exterior limit for sensitive receptors, the project applicant shall include design measures that may include acoustical paneling or walls to ensure that interior noise levels do not exceed the City of El Centro's interior noise standard of 45 decibels community noise equivalent level. If it is necessary for windows to be able to remain closed to ensure that interior noise levels meet the interior standard of 45 A-weighted decibels community noise equivalent level, the design for these residences shall include ventilation or an air conditioning system to provide a habitable interior environment with the windows closed. Final project design shall incorporate special design measures in the construction of the residential units.

Level of Significance After Mitigation

Permanent Increase in Vehicle Noise

Implementation of Mitigation Measure NOI-1 would reduce impacts from vehicle noise by implementing noise reduction measures where feasible. However, roadway noise buffers and additional noise reduction measures would not necessarily be feasible in all circumstances throughout the City and SOI. For example, for a permanent noise barrier to be effective, the barriers would need to be continuous across multiple properties. Because multiple City roadways include existing cross streets and driveways, noise walls would not necessarily be effective to reduce traffic noise. Implementation of retrofits of existing residences would require approval from private homeowners. Future projects put forward through implementation of the General Plan Update would continue to be subject to results according to the noise standards under the California Environmental Quality Act and the El Centro General Plan Noise Element but cannot be determined to be less than significant at this time. Therefore, permanent increases in vehicle noise as a result of the General Plan Update would remain significant and unavoidable.

Noise Incompatibilities with New Sensitive Receptors

Implementation of Mitigation Measure NOI-2 would reduce exposure of new sensitive receptors to excessive vehicle noise to a less than significant level because modern construction practices are capable of achieving high levels of interior noise reductions that would reduce exposure of noise levels to be within interior standards, even at the highest exterior levels, as portrayed in Table 3. Therefore, noise impacts on new sensitive receptors from implementation of the General Plan Update would be reduced to less than significant.

Summary

The proposed General Plan Update has the potential to result in a significant impact associated with a permanent increase in ambient noise levels from vehicle traffic noise. A potentially significant impact would also occur related to new development or redevelopment under the proposed project in areas where sensitive receptors would have the potential to be exposed to traffic noise levels that exceed the applicable noise compatibility standard. Mitigation Measure NOI-1 would reduce impacts related to increases in vehicle noise level by requiring future development or redevelopment to implement noise reduction measures where feasible. However, this impact would not be reduced to a less than significant level and would remain significant and unavoidable.

Mitigation Measure NOI-2 would reduce impacts related to exposure of new sensitive receptors to excessive noise by requiring that new development to demonstrate consistency with the El Centro General Plan Noise Element Noise Compatibility Standards. Mitigation Measure NOI-2 would reduce impacts on new sensitive receptors to a less than significant level.

References

- Caltrans (California Department of Transportation). 2013. Technical Noise Supplement to the Traffic Noise Analysis Protocol. September.
- Chen Ryan Associates. 2020a. Traffic Volume Forecast 2040.
- Chen Ryan Associates. 2020b. Roadway Segment Level of Service Results – Future Year 2040 Conditions (Alt 1).
- City of El Centro. 2004. “Noise Element.” In El Centro General Plan. Accessed March 2021. <http://www.cityofelcentro.org/communitydevelopment/plans-documents>.
- Imperial County. 2015. “Noise Element.” In Imperial County General Plan. Approved by Board of Supervisors October 6. Accessed March 2021. <http://www.icpds.com/?pid=835>.

Attachment 1. FHWA Noise Prediction Model Results

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