

3.11 Noise

3.11.1 Introduction

This section evaluates the potential for noise and groundborne vibration impacts to result from implementation of the proposed project. This analysis includes the exposure of people in the vicinity of the project site to excessive noise and groundborne vibration levels, and whether this exposure is in excess of standards established in the local general plan or noise ordinance; and whether project construction and operation would, respectively, result in a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project site. Mitigation measures to reduce noise and vibration impacts are proposed, where appropriate, to avoid or reduce the potential for significant noise impacts of the proposed project.

This noise section has been prepared utilizing the *Noise Analysis for the Los Cerritos Wetlands Restoration and Oil Consolidation Project*, prepared by Greve & Associates, April 27, 2017 (Greve & Associates 2017 [Appendix H]); and traffic information and analysis contained in the four technical memoranda prepared by Pirzadeh Associates, Inc.: *Lyon Communities, Wetlands Restoration Project Synergy Oil Field/Pumpkin Patch* (April 2015 [Appendix I1]), *Pumpkin Patch, Construction Phase Traffic Generation* (June 2016 [Appendix I2]), *Pumpkin Patch Trash Removal/Export Trip Generation* (March 2017 [Appendix I3]), and *Pumpkin Patch, Construction Trip Generation Summary* (June 2017 [Appendix I4]).

3.11.1.1 Noise Fundamentals

Noise is generally defined as unwanted sound. Sound, traveling in the form of waves from a source, exerts a sound pressure level (referred to as sound level) that is measured in decibels (dB), which is the standard unit of sound amplitude measurement. The dB scale is a logarithmic scale that describes the physical intensity of the pressure vibrations that constitute any sound, with 0 dB corresponding roughly to the threshold of human hearing and 120 to 140 dB corresponding to the threshold of pain. Pressure waves traveling through air exert a force registered by the human ear as sound.

The typical human ear is not equally sensitive to all frequencies of the audible sound spectrum. As a consequence, when assessing potential noise impacts, sound is measured using an electronic filter that deemphasizes the frequencies below 1,000 hertz (Hz) and above 5,000 Hz in a manner corresponding to the human ear's decreased sensitivity to extremely low and extremely high frequencies. This method of frequency weighting is referred to as A-weighting and is expressed in units of A-weighted decibels (dBA). A-weighting follows an international standard methodology of frequency de-emphasis and is typically applied to community noise measurements. Some representative noise sources and their corresponding A-weighted noise levels are shown in **Table 3.11-1, Typical Noise Levels**.

Table 3.11-1 Typical Noise Levels

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	110	Rock Band
Jet Flyover at 1,000 feet		
	100	
Gas Lawn Mower at 3 feet		
	90	
Diesel Truck at 50 feet, at 50 mph		Food Blender at 3 feet
	80	Garbage Disposal at 3 feet
Noisy Urban Area, Daytime		
	70	Vacuum Cleaner at 10 feet
Commercial Area		Normal speech at 3 feet
Heavy Traffic at 300 feet	60	
		Large Business Office
Quiet Urban Daytime	50	Dishwasher Next Room
Quiet Urban Nighttime	40	Theater, Large Conference Room (background)
Quiet Suburban Nighttime		
	30	Library
Quiet Rural Nighttime		Bedroom at Night, Concert Hall (background)
	20	
		Broadcast/Recording Studio
	10	
Lowest Threshold of Human Hearing	0	Lowest Threshold of Human Hearing

SOURCE: Caltrans, 2013a.

3.11.1.2 Noise Exposure and Community Noise

An individual’s noise exposure is a measure of noise over a period of time. A noise level is a measure of noise at a given instant in time. The noise levels presented in Table 3.11-1 are representative of measured noise at a given instant in time; however, they rarely persist consistently over a long period of time. Rather, community noise varies continuously over a period of time with respect to the contributing sound sources of the community noise environment. Community noise is primarily the product of many distant noise sources, which constitute a relatively stable background noise exposure, with the individual contributors unidentifiable. Background noise levels change throughout a typical day, but do so gradually, corresponding with the addition and subtraction of distant noise sources such as traffic. What makes community noise variable throughout a day, besides the slowly changing background noise, is the addition of short-duration, single-event noise sources (e.g., aircraft flyovers, motor vehicles, sirens), which are readily identifiable to the individual.

These successive additions of sound to the community noise environment change the community noise level from instant to instant, requiring the measurement of noise exposure over a period of time to legitimately characterize a community noise environment and evaluate cumulative noise impacts. This time-varying

characteristic of environmental noise is described using statistical noise descriptors. The most frequently used noise descriptors are summarized below:

- L_{eq} : L_{eq} , or equivalent sound level, is used to describe noise over a specified period of time in terms of a single numerical value. L_{eq} may also be referred to as the average sound level.
- L_{max} : L_{max} is the maximum, instantaneous noise level experienced during a given period of time.
- L_{min} : L_{min} is the minimum, instantaneous noise level experienced during a given period of time.
- L_x : L_x is the noise level exceeded a percentage of a specified time period. The “x” represents the percentage of time a noise level is exceeded. For instance, L_{50} and L_{90} represents the noise levels that are exceeded 50 percent and 90 percent of the time, respectively.
- L_{dn} : L_{dn} is the average A-weighted noise level during a 24-hour day, obtained after an addition of 10 dBA to measured noise levels between the hours of 10:00 p.m. to 7:00 a.m. to account nighttime noise sensitivity. L_{dn} is also termed the day-night average noise level or DNL.
- CNEL: CNEL, or Community Noise Equivalent Level, is the average A-weighted noise level during a 24-hour day that is obtained after an addition of 5 dBA to measured noise levels between the hours of 7:00 p.m. to 10:00 p.m. and after an addition of 10 dBA to noise levels between the hours of 10:00 p.m. to 7:00 a.m. to account for noise sensitivity in the evening and nighttime, respectively.

3.11.1.3 Effects of Noise on People

Noise is generally loud, unpleasant, unexpected, or undesired sound that is typically associated with human activity that is a nuisance or disruptive. The effects of noise on people can be placed into four general categories:

- Subjective effects (e.g., dissatisfaction, annoyance);
- Interference effects (e.g., communication, sleep, and learning interference);
- Physiological effects (e.g., startle response); or
- Physical effects (e.g., hearing loss).

Although exposure to high noise levels has been demonstrated to cause physical and physiological effects, the principal human responses to typical environmental noise exposure are related to subjective effects and interference with activities. Interference effects of environmental noise refer to those effects that interrupt daily activities and include interference with human communication activities, such as normal conversations, watching television, telephone conversations, and interference with sleep. Sleep interference effects can include both awakening and arousal to a lesser state of sleep. With regard to the subjective effects, the responses of individuals to similar noise events are diverse and are influenced by many factors, including the type of noise, the perceived importance of the noise, the appropriateness of the noise to the setting, the duration of the noise, the time of day and the type of activity during which the noise occurs, and individual noise sensitivity.

Overall, there is no completely satisfactory way to measure the subjective effects of noise, or the corresponding reactions of annoyance and dissatisfaction on people. A wide variation in individual thresholds of annoyance exists, and different tolerances to noise tend to develop based on an individual’s past experiences with noise. Thus, an important way of predicting a human reaction to a new noise environment is the way it compares to the existing environment to which one has adapted (i.e., comparison to the ambient noise environment). In general, the more a new noise level exceeds the previously existing ambient noise level, the

less acceptable the new noise level will be judged by those hearing it. With regard to changes in A-weighted noise level, the following relationships generally occur:

- A 1 dBA change cannot be perceived;
- A 3 dBA change is considered to be a barely perceivable difference;
- A 5 dBA change is considered to be a readily perceivable difference; or
- A 10 dBA change is subjectively heard as doubling of the perceived loudness.

These relationships occur in part because of the logarithmic nature of sound and the decibel system. The human ear perceives sound in a non-linear fashion, hence the decibel scale was developed. Because the decibel scale is based on logarithms, two noise sources do not combine in a simple additive fashion, but rather logarithmically. For example, if two identical noise sources produce noise levels of 50 dBA, the combined sound level would be 53 dBA, not 100 dBA. Therefore, doubling a noise source (e.g., doubling traffic volumes) results in a 3 dBA increase.

3.11.1.4 Noise Attenuation

Stationary point sources of noise, including stationary mobile sources such as idling vehicles, attenuate (lessen) at a rate between 6 dBA for hard sites and 7.5 dBA for soft sites for each doubling of distance from the reference measurement. Hard sites are those with a reflective surface between the source and the receiver, such as asphalt or concrete surfaces or smooth bodies of water. No excess ground attenuation is assumed for hard sites, and the changes in noise levels with distance is simply the geometric spreading of the noise from the source. Soft sites have an absorptive ground surface such as soft dirt, grass, or scattered bushes and trees. In addition to geometric spreading, an excess ground attenuation value of 1.5 dBA (per doubling distance) is normally assumed for soft sites. Line sources (such as traffic noise from vehicles) attenuate at a rate between 3 dBA for hard sites and 4.5 dBA for soft sites for each doubling of distance from the reference measurement (Caltrans 2013a).

3.11.1.5 Vibration Fundamentals

As described in the Federal Transit Administration's (FTA) *Transit Noise and Vibration Impact Assessment* (FTA 2006), ground-borne vibration can be a serious concern for nearby neighbors of a transit system route or maintenance facility, causing buildings to shake and rumbling sounds to be heard. In contrast to airborne noise, ground-borne vibration is not a common environmental problem. It is unusual for vibration from sources such as buses and trucks to be perceptible, even in locations close to major roads. Some common sources of ground-borne vibration are trains, buses on rough roads, and construction activities such as blasting, pile-driving, and operation of heavy earth-moving equipment. Typically, groundborne vibration generated by man-made activities attenuates rapidly with distance from the source of the vibration.

There are two different methods and units of measure that are used to quantify vibration levels for potential structural damage to buildings and human perception/annoyance, respectively. The peak particle velocity (PPV), measured in inches per second (in/sec), is most frequently used to describe potential vibration impacts to buildings, and is defined as the maximum instantaneous peak of the vibration signal. The root mean square (RMS) amplitude is most frequently used to describe the effect of vibration on the human body (i.e., perception and annoyance), which is defined as the average of the squared amplitude of the signal, and commonly measured in velocity decibels (VdB). The difference in PPV and RMS velocity is expressed in terms of the "crest factor," defined as the ratio of the PPV amplitude to the RMS amplitude. The PPV is

typically a factor of 1.7 to 6 times greater than RMS velocity (FTA 2006). The decibel notation of VdB acts to compress the range of numbers required to describe vibration.

Sensitive receptors for vibration include structures (especially older masonry structures), people (especially residents, the elderly, and sick), and vibration sensitive equipment, typically, within buildings. The effects of ground-borne vibration include movement of the building floors, rattling of windows, shaking of items on shelves or hanging on walls, and rumbling sounds. In extreme cases, the vibration can cause structural damage to buildings, depending upon its structural integrity. The potential for structural damage to buildings is not a factor for most projects, except when rock blasting or pile-driving during construction in proximity to buildings (i.e., typically, within approximately 100 feet). Human annoyance from vibration often occurs when the vibration levels exceed the threshold of human perception by only a small margin; however, a vibration level that is at the threshold of human annoyance would be well below the threshold of structural damage for buildings of conventional construction of 0.2 in/sec PPV (FTA 2006).

In residential areas, the typical background vibration level is approximately 50 VdB (or in PPV, approximately 0.0013 in/sec), which is well below the threshold of perception for humans of approximately 65 VdB. A vibration level of 75 VdB is considered to be the approximate differentiation between barely perceptible and distinctly perceptible levels for many people (FTA 2006).

3.11.2 Environmental Setting

3.11.2.1 Noise Setting

The proposed project site is located within an urbanized and industrialized area of the City of Long Beach (City), along the San Gabriel River, Los Cerritos Channel, Studebaker Road, 2nd Street/Westminster Avenue, and Pacific Coast Highway (PCH). The project site is previously disturbed and contains vacant land, oil wells and associated oil infrastructure, and wetlands. The project site is bounded by major roadways and waterways, is adjacent to vacant disturbed land, industrial areas, shopping center, and commercial office parks, and is in proximity to boat marinas and residential areas.

The project site consists of four individual sites, which are described for existing land uses on, adjacent to, and in proximity to each site: (1) the Synergy Oil Field site, (2) the City Property site, (3) the Pumpkin Patch site, and (4) the Los Cerritos Wetlands Authority (LCWA) site:

- **Synergy Oil Field Site:** The Synergy Oil Field site is the approximately 150-acre Synergy Oil Field (formerly known as the Bixby Oil Field), which is bounded by East 2nd Street, PCH, Studebaker Road, and the Los Cerritos Channel. The site is adjacent to the City Property and LCWA sites, as well as industrial areas across Studebaker Road, with boat marinas approximately 200 feet north of the site, and residential developments located approximately 330 feet north, 600 feet northwest, and 700 feet west of the project site. The site is owned and operated by Beach Oil Minerals Partners (BOMP) and currently includes 39 oil wells on the 70 southerly acres of the site, pipelines and tank facilities, other disturbed but vacant areas, and an existing building.
- **City Property Site:** The City Property site is the 33-acre Marketplace Marsh site, which is bounded by East 2nd Street and San Gabriel River, and is adjacent to the Synergy Oil Field, Pumpkin Patch, and LCWA sites, as well as vacant, disturbed land and commercial office park development. The site currently contains approximately 13 operating oil wells, an existing tank farm and oil pipelines.

- **Pumpkin Patch Site:** The approximately 7-acre Pumpkin Patch site is located at the northeast corner of the intersection of PCH with the San Gabriel River, adjacent to the City Property site, commercial office park development, and vacant disturbed land. Pumpkin Patch site, owned by BOMP, is a previously disturbed site and currently vacant, except for one operating oil well. The site is used for the seasonal sale of pumpkins in the fall and Christmas trees in December.
- **LCWA Site:** The approximately 5-acre LCWA site is bounded Studebaker Road and 2nd Street, and adjacent to the Synergy Oil Field and City Property sites. The site is currently disturbed but undeveloped, and is used for equipment storage and staging on a temporary lease basis.

3.11.2.2 Noise-Sensitive Receptors

Certain land uses can be more sensitive to noise than other land uses based on the types of activities typically conducted at the land use (i.e., land uses for sleeping, concentration, and convalescence are considered noise-sensitive). Therefore, people at residences, motels and hotels, schools, libraries, churches, hospitals, nursing homes, natural areas, parks, and other passive outdoor recreation areas are generally more sensitive to noise than people at commercial and industrial land uses. Consequently, noise standards for noise-sensitive land uses are more stringent than for those less sensitive uses.

As described above, the land uses of the project area include primarily industrial and commercial, with single- and multi-family residential located in proximity of the project site. There are no noise-sensitive receptors located on the project site. The areas surrounding the project site include waterways, a commercial office park, a shopping center, a marina with boats, the Los Cerritos Wetlands and residential areas. The boat marina is located approximately 200 feet north of the project site, single-family residential areas approximately 330 feet north of the Synergy Oil Field site, 830 feet southwest of the Pumpkin Patch site, and 850 feet northwest of the project site, and a multi-family residential area located approximately 700 feet west of the project site. The proposed project itself would not introduce any new noise-sensitive receptors. The nearest school is the Rosie the Riveter Charter High School, located approximately 1,475 feet north of the Synergy Oil Field site at 690 North Studebaker Road.

3.11.2.3 Existing Ambient Noise Levels

The existing noise sources of the project site and surrounding areas include primarily the operating oil wells and vehicle traffic on adjacent roadways. To characterize the existing ambient noise environment and establish current baseline noise levels, field noise measurements were conducted at the nearest noise-sensitive receptors in the vicinity of the project site. There are no residential or other noise-sensitive land uses on the project site, adjacent to, or immediately surrounding the project site; however, there are residences as close as approximately 330 feet to the north of the project site. Six site locations were selected for noise measurements, which are displayed in **Figure 3.11-1, Noise Measurements Locations**. Two noise measurements were performed for each site (e.g., for Site 1, Measurements 1A and 1B). Measurements for Sites 1 through 3 were performed on March 8, 2016, between 12:00 p.m. and 3:00 p.m., and Sites 4 through 6 were performed on May 9, 2016, from 9:00 a.m. to 12:00 p.m. The results of the noise measurements are summarized in **Table 3.11-2, Ambient Noise Level Measurements (dBA)**, and details are provided in the project noise report (Greve & Associates 2017), included in Appendix H of this EIR.



SOURCE: ESA, 2017

Long Beach Cerritos Wetland . 150712

Figure 3.11-1
Noise Measurements Locations

Table 3.11-2 Ambient Noise Level Measurements (dBA)

Site	Measurement	Date	Start Time	L _{eq}	L _{max}	L _{1,7}	L ₈	L ₂₅	L ₅₀	L _{min}
1	1A	3/8/16	12:15 p.m.	54.2	65.6	61.4	57.0	54.6	52.9	47.4
	1B		12:31 p.m.	55.2	67.6	61.3	57.8	55.7	54.0	47.7
2	2A	3/8/16	12:55 p.m.	57.4	67.2	62.6	60.2	58.5	56.6	47.8
	2B		1:12 p.m.	57.3	68.5	62.0	59.9	58.3	56.8	49.7
3	3A	3/8/16	2:25 p.m.	67.5	79.6	73.9	71.3	68.9	66.0	52.3
	3B		2:41 p.m.	68.9	83.3	74.3	72.3	70.2	67.7	54.2
4	4A	5/9/16	9:52 a.m.	65.4	79.9	72.4	69.3	66.7	62.5	45.3
	4B		10:09 a.m.	66.1	83.8	71.6	69.1	66.7	62.5	45.0
5	5A	5/9/16	10:44 a.m.	70.0	81.0	77.6	75.2	71.4	65.1	53.1
	5B		11:00 a.m.	71.1	88.3	79.4	76.4	71.4	64.8	54.0
6	6A	5/9/16	11:25 a.m.	50.1	58.4	55.0	53.0	50.9	49.3	42.6
	6B		11:42 a.m.	51.1	67.8	57.1	53.1	50.9	49.1	41.6

SOURCE: Greve & Associates, 2017.

As shown in Table 3.11-2, overall, the average noise level measurements ranged from 54.2 to 71.1 dBA L_{eq}, based on proximity of the sites to the various noise sources, as summarized below:

- Site 1 represents the office building parking lot. Noise sources included distant vehicle traffic along PCH, and parking lot activity.
- Site 2 was located at the same office complex as Site 1. Noise sources included vehicle traffic on PCH.
- Site 3 represents the restaurant parking lot. Noise sources included vehicle traffic on PCH, parking lot activity, and landscaping.
- Site 4 represents the apartment development. Noise sources were trucks and motorcycles on PCH, at noise levels very similar to Site 3.
- Site 5 represents the housing development southeast of the LCWA site, the loudest of the six sites measured. Noise sources were vehicle traffic on 2nd Street including trucks and motorcycles, and the operating power plant across the street from the housing development producing a continuous noise level of 55 to 60 dBA.
- Site 6 represents the mobile home park, the quietest of the six sites measured. Noise sources were distant vehicle traffic from PCH, nearby chirping birds, and occasional aircraft flyovers.

3.11.2.4 Existing Roadway Noise Levels

Existing vehicle traffic on roadways adjacent to the project site is the primary noise source contributing to existing ambient noise levels. Vehicle traffic noise levels on project roadway segments were estimated based on their respective vehicle traffic volumes in the project noise report (Greve & Associates 2017) using the Federal Highway Administration (FHWA) Highway Traffic Noise Prediction Model (FHWA-RD-77-108) (FHWA 1978). The FHWA Model uses vehicle traffic volume, vehicle mix, vehicle speed, and roadway geometry to compute the "equivalent noise level" in terms of CNEL at 100 feet from the centerline of the roadway, from which distances to their respective 60, 65, 70, and 75 CNEL contours are determined. Peak hour traffic volume counts, from May 2015, were provided by the traffic engineer for the project (Pirzadeh Associates 2015, 2016), and average daily traffic (ADT) volumes were calculated from the peak hour data. Traffic noise modeling details are provided in the project noise report (Greve & Associates 2017). Estimated

existing vehicle traffic noise levels for the roadways in the vicinity of the project site, and the distance to their respective 60, 65, and 70 CNEL contours are shown in **Table 3.11-3, Existing Traffic Noise Levels**.

Table 3.11-3 Existing Traffic Noise Levels

Roadway Segment	Extent of Segment	dBA CNEL @ 100 feet*	Distance to CNEL Contours from Centerline of Roadway (feet)		
			70 CNEL	65 CNEL	60 CNEL
PCH	North of 2nd Street	68.3	76	165	355
PCH	South of 2nd Street	68.0	73	157	339
2nd Street	West of PCH	67.7	70	151	326
2nd Street	East of PCH	66.5	58	126	272
PCH	North of Studebaker Road	68.1	74	159	344
PCH	South of Studebaker Road	68.1	75	161	348
Studebaker Road	West of PCH	59.4	19	42	90
Studebaker Road	East of PCH	48.4	RW	RW	16
Shopkeeper Road	North of 2nd Street	44.5	RW	RW	RW
Shopkeeper Road	South of 2nd Street	53.0	RW	15	34
2nd Street	West of Shopkeeper Road	67.3	66	143	308
2nd Street	East of Shopkeeper Road	66.6	59	127	274
PCH	North of Loynes Drive	67.8	71	154	332
PCH	South of Loynes Drive	67.1	64	138	297
Loynes Drive	West of PCH	60.4	22	49	106
Loynes Drive	East of Loynes Drive	58.6	17	37	80
PCH	North of 1st Street	68.3	77	166	359
PCH	South of 1st Street	68.0	73	157	339
1st Street	West of PCH	56.8	13	28	61
1st Street	East of PCH	42.5	RW	RW	RW
Seal Beach Boulevard	North of Westminster Avenue	68.5	79	170	366
Seal Beach Boulevard	South of Westminster Avenue	67.2	65	140	303
Westminster Avenue	West of Seal Beach Boulevard	68.2	75	162	349
Westminster Avenue	East of Seal Beach Boulevard	67.4	67	145	313
Studebaker Road	North of 7th Street	66.7	60	130	280
Studebaker Road	South of 7th Street	66.3	56	121	261
7th St NB Off Ramp	East of Studebaker Road	63.1	34	75	161
Studebaker Road	North of Westminster Avenue	67.9	72	155	335
Westminster Avenue	West of Studebaker Road	70.1	100	217	468
Westminster Avenue	East of Studebaker Road	67.1	64	138	298

SOURCE: Greve & Associates, 2017.

NOTES:

The values provided in Table 3.11-4 are based on noise attenuation over distance alone, and do not account for any intervening structures or topography that may exist, which could act as noise barriers and further reduce the noise levels and distances provided.

RW = the noise contour falls within roadway right-of-way.

* From roadway centerline.

As shown in Table 3.11-3, the loudest roadway segments are portions of Westminster Avenue and PCH. Overall, the project roadway segments have traffic noise levels typical of a suburban area.

3.11.3 Regulatory Framework

Detailed below is a discussion of the relevant noise regulatory setting, and the noise regulations, plans, and policies applicable to the project.

3.11.3.1 Federal

There are no federal noise standards that directly regulate environmental noise related to the construction or operation of the proposed project. Though not a standard that is applicable to the proposed project, the FTA has adopted vibration criteria that are used to evaluate potential human annoyance and building damage impacts.

3.11.3.2 State

There are no State noise standards that directly regulate environmental noise related to the construction or operation of the proposed project, and there are no state vibration standards applicable to the proposed project, including no official California Department of Transportation's (Caltrans) standards for vibration; however, the Caltrans *Transportation and Construction Vibration Guidance Manual* (Caltrans 2013b) provides guidelines for assessing vibration damage potential to various types of buildings, ranging from 0.12 in/sec PPV for extremely fragile historic buildings to 0.50 in/sec PPV for modern residential and commercial buildings. The Caltrans manual also discusses the potential for humans to perceive vibration generated by pile driving, which is a short-term impact and considered by the acoustic engineering industry to be more of an annoyance issue rather than an impact. The manual provides four categories for vibration annoyance potential criteria, ranging from "barely perceptible" at 0.01 in/sec PPV to "severe" at 0.4 in/sec PPV.

3.11.3.3 Local

Local noise regulation involves implementation of the noise goals and policies of the noise element of the General Plan, and the noise standards of the noise ordinance. The project site is located in the City of Long Beach; therefore, the City of Long Beach General Plan Noise Element and Noise Ordinance are applicable to the project; however, some of the areas affected by the project lie within the adjacent City of Seal Beach; therefore, the City of Seal Beach Noise Ordinance is also applicable in those locations. Generally, the City of Long Beach Noise Ordinance is more restrictive than the City of Seal Beach Noise Ordinance.

City of Long Beach

General Plan, Noise Element

The Noise Element of the City of Long Beach General Plan was adopted on March 25, 1975 (City of Long Beach 1975). The Noise Element identifies an interior noise goal of 45 L_{dn} for residential uses, but does not identify standards for other land uses. In addition, the Noise Element recommends that drilling rig engines be equipped with an "effective exhaust muffler" (Recommendation 7.1), and diesel powered oil pumps be replaced "with quieter electric ones as the former becomes worn out" (Recommendation 7.11).

Noise Ordinance

Long Beach Municipal Code (LBMC) Chapter 8.80 represents the City’s Noise Ordinance, which governs operational noise generated on one property, potentially impacting an adjacent property. The City’s Noise Ordinance establishes operational noise criteria of allowable noise levels for percentages of an hour over a given time of day period within a land use district as shown on the Noise District Map provided in the City’s Noise Ordinance. Greater noise level limits are allowed during the day (7:00 a.m. to 10:00 p.m.) as compared to the more noise-sensitive nighttime period (10:00 p.m. to 7:00 a.m.). If a location is on a boundary between two different districts, the applicable noise level limit is the arithmetic mean of the two districts. The noise levels allowed by the City’s Noise Ordinance for the districts applicable to the project are listed in **Table 3.11-4, City of Long Beach Noise Ordinance Criteria**. District 1 includes the Synergy Oil Field, Pumpkin Patch, and City Property sites (which is generally defined predominantly residential with other land use types also present), and District 4 includes the LCWA site (which is generally defined as predominantly industrial with other land types use also present).

Table 3.11-4 City of Long Beach Noise Ordinance Criteria

Time Period	L _{max}	L _{1.7}	L _{8.3}	L ₂₅	L ₅₀
District 1					
Daytime (7:00 a.m. to 10:00 p.m.)	70	65	60	55	50
Nighttime (10:00 p.m. to 7:00 a.m.)	65	60	55	50	45
District 4					
Anytime	90	85	80	75	70

SOURCE: City of Long Beach, 2016.

As shown in Table 3.11-4, the noise level limits are provided by district for the day- and nighttime periods as L_{max} (the maximum noise level over the time period) and over percentages of an hour (L_x). For example, L_{1.7} is the 1-minute standard, which is that noise level limit no to be exceeded for more than 1 minute in any hour-long period (i.e., 1.7 percent of an hour is 1 minute). Accordingly, L_{8.3} is the 5-minute standard, L₂₅ is the 15-minute standard, and L₅₀ is the 30-minute standard.

City Noise Ordinance Section 8.80.150C allows for adjustments to the noise criteria if the existing ambient noise level is higher than criteria levels. As such, the limits should be increased in 5 dB increments as necessary to encompass the ambient noise level.

Section 8.80.202, Construction Activity, regulates construction noise and exempts noise generated by construction activities during daytime hours depending on the day of the week. Construction is not allowed between 7:00 p.m. and 7:00 a.m. on weekdays and federal holidays. On Saturdays, construction is prohibited between 7:00 p.m. on Friday and 9:00 a.m. on Saturday, and after 6:00 p.m. on Saturday. On Sundays construction is prohibited all day.

Section 8.80.250, Exemption—Emergencies, exempts noise restrictions during emergencies including the performance of emergency work.

Section 8.80.260, Exemption—Oil and Gas Wells, exempts the following activities from the noise restrictions:

- Normal well servicing, remedial or maintenance work performed within an existing well which does not involve drilling or re-drilling and which is restricted to the hours between 7:00 a.m. and 7:00 p.m., exclusive of weekends and holidays, in residential areas.
- Any drilling or re-drilling work which is done in full compliance with Subsection 8.80.040.E and Sections 8.80.060 through 8.80.120, and with the soundproofing and all other requirements of Section 12.32.030.

Section 12.32.030 requires that derricks and drilling machines be covered with soundproofing material.

Local Coastal Program

The City of Long Beach Local Coastal Program (LCP) includes specific mitigation measures and restrictions related to noise and vibration regarding oil drilling operations in the City's coastal zone. To promote the policies of CEQA, the Coastal Act, the City, and the intent of the Oil Code in residential areas in the coastal zone where oil extraction is a permitted use, the following mitigating measures shall be used to mitigate the adverse effects of noise:

Regarding any work related to drill site preparation, abandonment and major maintenance, work shall be limited to the hours from 8:00 a.m. until 6:00 p.m. Monday through Friday, except in emergencies. No initial drilling operations shall be permitted within 300 feet of any residence, and all derricks and motors within 1,500 feet of any residence shall be soundproofed with acoustical padding.

Regarding work related to drilling or re-drilling operations, no drilling or re-drilling operations shall be permitted during the hours of 7:00 p.m. to 7:00 a.m. within 1,500 feet of any single or multiple-family dwelling. The only power source permitted in residential drilling operation areas shall be electric or equivalent power sources which meet the noise standards level. The noise levels allowed by the City's LCP are the same as those listed in the City of Long Beach Noise Ordinance, listed in Table 3.11-4.

Additionally, the LCP states that the best available technology shall be required to reduce or eliminate vibration impacts to any sensitive receptor during drilling or other groundborne vibration-inducing processes.

City of Seal Beach

Noise Ordinance

City of Seal Beach Municipal Code Chapter 7.15 represents the City's Noise Ordinance, which establishes noise criteria for noise that impacts adjacent properties. Similar to the City of Long Beach Noise Ordinance, the City of Seal Beach Noise Ordinance provides noise level limits for a percentage of an hour over a given period of time within a land use zone. Greater noise levels are allowed during the daytime period (7:00 a.m. to 10:00 p.m.) as compared to the nighttime period (10:00 p.m. to 7:00 a.m.). The noise levels allowed by the City's Noise Ordinance are listed below by land use zone in **Table 3.11-5, City of Seal Beach Noise Ordinance Criteria**.

City Noise Ordinance Section 7.15.015C allows for adjustments to the noise criteria, if the ambient noise level is higher than the criteria levels shown in Table 3.11-5. Therefore, the noise level limits should be increased to the ambient noise level.

Table 3.11-5 City of Seal Beach Noise Ordinance Criteria

Time Period	L _{max}	L _{1,7}	L _{5,3}	L ₂₅	L ₅₀
Zone 1 (Residential)					
Daytime (7:00 a.m. to 10:00 p.m.)	75	70	65	60	55
Nighttime (10:00 p.m. to 7:00 a.m.)	70	65	60	55	50
Zone 2 (Commercial)					
Anytime	85	80	75	70	65
Zone 3 (Industrial)					
Anytime	90	85	80	75	70

SOURCE: City of Seal Beach, 2016.

City Noise Ordinance Section 7.15.025E exempts noise generated by construction activities during certain hours depending on the day of the week. Construction is allowed between 7:00 a.m. and 8:00 p.m. on weekdays, and on Saturdays between 8:00 a.m. and 8:00 p.m.

As shown in Table 3.11-5, the City of Seal Beach’s Noise Ordinance criteria, are 5 dB less stringent for residential districts/zones (i.e., District/Zone 1) than the City of Long Beach Noise Ordinance criteria, shown in Table 3.11-4.

3.11.4 Analysis of Impacts

This section describes the impact analysis relating to noise and ground-borne vibration for the proposed project. It describes the methods and applicable thresholds used to determine the impacts of the proposed project.

3.11.4.1 Significance Criteria

CEQA Guidelines Appendix G provides that a project would have a significant noise and/or ground-borne vibration impact if it would:

- Result in exposure of persons to, or generation of, noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
- Result in exposure of persons to, or generation of, excessive groundborne vibration or groundborne noise levels;
- Results in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;
- Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project;
- For a project located within an airport land use plan area or, where such a plan has not been adopted, in an area within 2 miles of a public airport or public use airport, expose people residing or working in the area to excessive noise levels; or
- For a project located in the vicinity of a private airstrip, expose people residing or working in the project area to excessive noise levels.

For the issues related to airports and airstrips, the nearest airports or airfields to the project site are the Los Alamitos Army Airfield, approximately 2.7 miles northeast of the LCWA site, and the Long Beach Airport, approximately 3.2 miles northwest of the project site. The Seal Beach Naval Weapons Station is located 1.5 miles south of the City Property site. Therefore, the project is not located within 2 miles of a public or public use airport, or in the vicinity of a private airstrip. Thus, the implementation of the proposed project would have no impact with regard to exposing people residing or working in the area to excessive aircraft noise levels. Therefore, airport/airstrip-related noise impacts will not be discussed further in the EIR.

3.11.4.2 Methodology

The evaluation of noise impacts is based on the development assumptions for the proposed project, as described in Chapter 2, *Project Description*, and the noise impact analysis in the project's noise technical report (Greve & Associates 2017).

Implementation of the proposed project would generate noise from project construction and operation of constructed facilities on the project site, with minimal construction and operational related traffic generated on local roadways. The primary sources of construction noise associated with the proposed project would be construction activities within the project site and construction-related traffic volumes generated by daily worker trips, and equipment and materials truck transport. The primary sources of operational noise would include new stationary sources associated with the project site development including operating oil wells. Noise levels generated by project construction activities and operational sources have been quantitatively estimated, and compared to the applicable noise standards and thresholds of significance of the applicable city noise ordinances in Section 3.11.3, Regulatory Framework. For construction noise, the City noise ordinances set allowable hours of construction (i.e., daytime) in which construction activities are exempt from noise regulations; however, the city ordinances do not establish construction noise level limits. For operational noise, established criteria noise levels for noise-sensitive uses must not be exceeded by the project traffic noise and oil production noise. The criteria noise level for residential schools, and other sensitive land uses is 65 dBA CNEL.

In addition to noise levels, groundborne vibration would also be generated on site during project construction by various construction-related activities and equipment. The groundborne vibration levels generated by these sources have also been quantitatively estimated and compared to applicable vibration thresholds of significance.

The noise levels generated by project construction activities and operational sources have been quantitatively estimated, and compared to the existing ambient noise levels to determine whether the temporary or permanent increase from project construction and operation respectively would result in a substantial increase. The cities of Long Beach and Seal Beach do not identify an increase that would be considered substantial. As discussed in Section 3.11.1, Introduction, a change in noise levels of 3 dBA is considered to be a perceivable difference; therefore, an increase of 3 dBA would be considered a substantial increase.

As stated in Chapter 1, *Introduction*, on April 21, 2016, the City sent an NOP to responsible, trustee, and federal agencies, as well as to organizations, and individuals potentially interested in the proposed project to identify the relevant environmental issues that should be addressed in the EIR. Comments received that are relevant to noise impacts include analysis showing the wildlife living on site will not be disturbed because of implementation of the proposed project. As applicable to noise impacts, this issue is addressed in this section.

3.11.4.3 Impact Evaluation

Impact NOI-1: The project would not result in exposure of persons to, or generation of, noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies. (Less than Significant with Mitigation)

Construction

Project construction would generate noise on site from construction activities and the operation of construction equipment, including drilling rigs, trucks, graders, bulldozers, and concrete mixers. The project site is located within the City. As discussed in Section 3.11.3, City of Long Beach Noise Ordinance Section 8.80.202, Construction Activity, exempts noise generated by construction activities during daytime hours depending on the day of the week. Construction is prohibited between 7:00 p.m. and 7:00 a.m. on weekdays and federal holidays. On Saturdays, construction is prohibited between 7:00 p.m. on Friday and 9:00 a.m. on Saturday and after 6:00 p.m. on Saturday. On Sundays, construction is prohibited all day.

Per the Noise Ordinance, project construction would be required to occur within these defined hours. The City's Noise Ordinance does not establish construction noise level limits. Therefore, project construction would not expose people to or generate noise levels in excess of the applicable noise standards.

Operation

Project operation would generate off-site vehicle traffic noise from project vehicle traffic on area roadways in support of site operations, and would generate on-site noise from operating oil wells, as discussed separately below.

As discussed in Section 3.11.3, the City's Noise Ordinance establishes operational noise criteria of allowable noise levels for percentages of an hour over a given time of day period within a land use district. Greater noise level limits are allowed during the day (7:00 a.m. to 10:00 p.m.) as compared to the more noise-sensitive nighttime period (10:00 p.m. to 7:00 a.m.). The Synergy Oil Field, Pumpkin Patch, and City Property sites are located in land use District 1 (which is generally defined predominantly residential with other land use types also present); the LCWA site is located in District 4 (which is generally defined as predominantly industrial with other land types use also present).

Additionally, the City exempts oil and gas wells from normal well servicing, remedial, or maintenance work performed within an existing well, which does not involve drilling or re-drilling and which is restricted to the hours between 7:00 a.m. and 7:00 p.m., exclusive of weekends and holidays, in residential areas.

Off-Site Traffic Noise

As discussed in Section 3.15, *Transportation and Traffic*, the project is not likely to generate a substantial number of vehicle trips; therefore, a detailed traffic study has not been prepared for the project. Though vehicle estimates were calculated for trips associated with operation of the oil production facilities and for drilling and workover operations, given the uniqueness of this project, and to maintain a worst-case conservative estimate, it was assumed that 200 trips per day are associated with oil production and drilling activities. Most of these trips would be in and out of the Pumpkin Patch site as this is the location of the office building and warehouse. The 200 vehicle trips would add to PCH daily traffic volumes, which in the vicinity of the site are approximately 40,000 vehicles per day. Therefore, traffic noise would increase by approximately

0.02 dBA, which would be imperceptible. Off-site traffic noise would not expose people to or generate noise levels in excess of the applicable noise standards, and the impact would be less than significant.

The visitors center on the Synergy Oil Field site would attract some visitors, but a formal estimate of visitors has not been made. The visitors would access the site via 2nd Street, which in the vicinity of the site has daily traffic volumes of approximately 38,000 vehicles per day. Assuming a worst-case estimate of approximately 500 vehicle trips per day to the Synergy site, would result in a less than a 0.1 dB increase in traffic noise levels along 2nd Street, which would be imperceptible. Off-site traffic noise would not expose people to or generate noise levels in excess of the applicable noise standards; therefore, the impact would be less than significant.

On-Site Oil Production Operations

The Pumpkin Patch and LCWA sites would be developed with oil production facilities, which would generate noise from operational oil wells. The design for the oil production facilities is in its initial phases; therefore, the specific equipment has not yet been selected. Therefore, this noise analysis uses a combination of specifications for some of the equipment that would likely be used and measurement data for typical or worst-case equipment from other facilities. The analysis presented here does not represent a final noise analysis of the proposed oil production facilities, which would be required prior to construction permits. Rather, this analysis determines whether the project would feasibly comply with the City's Noise Ordinance, as required by CEQA. When specific information is not available, worst-case assumptions have been made when determining potential noise levels from proposed project equipment at the Pumpkin Patch and LCWA sites. Prior to the issuance of any grading permits, the City would work with the developer to ensure the proper selection during the final design of equipment and control devices (e.g., mufflers, enclosures, etc.) that meet City requirements would ensure project compliance with City noise regulations.

Pumpkin Patch Site

The Pumpkin Patch site would be developed with 50 operational oil wells, which would include the following components:

- Electric submersible pumps would be incorporated down in the wells, according to the project oil engineer (SPEC Services), which are substantially quieter than above-grade diesel pumps of common wells. Noise levels of submersible pumps in wells were measured in the City of Brea area at 60 dBA when measured at 15 feet from the wells, and this number was used for this analysis (Greve & Associates 2017).
- Three injection pumps plus a backup would likely be used on site. Approximately one-third of the 50 wells would inject water underground to drive oil to the other wells. According to SPEC Services, these injection pumps have a noise level of 85 dBA when measured 3 feet from the pump.
- One electric drilling rig would also be located on site, which would utilize a façade as a noise barrier around the drilling rig to reduce drilling noise levels and improve visual impacts. SPEC Services estimates that the drilling rig would have a noise level of 80 dBA at the property line, which is consistent with the FHWA rating of 79 dBA at 50 feet.
- A flare and blowdown would be located on site for emergency situations only; therefore, as emergency equipment, it is exempt from the City's Noise Ordinance (Section 8.80.250).
- An 18-foot-high masonry wall would surround the Pumpkin Patch site on three sides, and a 10-foot-high wall along the back of the site would serve as a noise barrier.

Using this data, noise levels of operating oil wells were projected for the three noise measurement locations of the site, and the nearest residential area. The loudness of the equipment, the distance from the site to the receptors, and the noise barrier effect of the perimeter wall were accounted for in the calculations. The results of the calculations are provided below in **Table 3.11-6, Pumpkin Patch Site Oil Production Noise Levels**, with details provided in the appendix of the project noise report, provided for reference in Appendix H.

Table 3.11-6 Pumpkin Patch Site Oil Production Noise Levels

Measurement Location	Operational Noise Level (dBA L ₅₀)	Ambient Noise Level (dBA L ₅₀)	Daytime Ordinance Limit (dBA L ₅₀)	Nighttime Ordinance Limit (dBA L ₅₀)
1	52.3	52.9	55	N/A
2	53.4	56.6	60	N/A
3	50.8	66.0	70	N/A
4 (nearest residential)	45.8	62.5	65	60

SOURCE: Greve & Associates, 2017; City of Long Beach, 2016.

Table 3.11-6 identifies the projected noise levels generated by the oil production operations and the ambient noise level measured for the measurement locations on site and the nearest residential area, located approximately 1,000 feet southwest of the center of the site. Provided for comparison are the respective City of Long Beach Noise Ordinance limits, in which the daytime limit was increased in 5 dB increments to accommodate the ambient noise level. The nighttime noise limit is 5 dB less than the daytime limit. No nighttime limit is given for Locations 1 through 3 as these are commercial or office uses that would not be operating during the nighttime period. As shown in Table 3.11-6, the noise levels projected for oil production would be less than the ambient noise levels and would not exceed the Noise Ordinance criteria. Therefore, the noise impact from oil production operations at the Pumpkin Patch site would result in a less-than-significant impact, based on proper facility design. A mitigation measure is proposed to ensure that the facility is properly designed.

LCWA Site

The LCWA site is proposed to be developed with 70 operating oil wells, including injection pumps, gas turbines, compressor, and a drilling rig, similar to the Pumpkin Patch site. The LCWA site would be surrounded by a 10-foot-high masonry wall, which would serve as a noise barrier.

The site is relatively isolated from residential and commercial development. The office complex is approximately 1,875 feet from the center of the site to the southwest. The nearest residential area is approximately 2,195 feet to the southwest from the middle of the LCWA site. The LCWA site is located in District 4, which has higher noise limits than District 1, where the residential and commercial is located. Therefore, the noise limit is the average of the two districts. No sensitive species have been identified on the LCWA site; therefore, no impact to sensitive species from operational noise is anticipated. Noise levels were calculated for the two locations, including equipment noise, distance to the receptors, and the noise barrier effect of the wall. The results of the calculations are provided below in **Table 3.11-7, Los Cerritos Wetlands Authority (LCWA) Site Oil Production Noise Levels**, and details are provided in the appendix of the noise report, provided in Appendix H.

Table 3.11-7 Los Cerritos Wetlands Authority (LCWA) Site Oil Production Noise Levels

Measurement Location	Operational Noise Level (dBA L ₅₀)	Ambient Noise Level (dBA L ₅₀)	Daytime Ordinance Limit (dBA L ₅₀)	Nighttime Ordinance Limit (dBA L ₅₀)
1	46.6	52.9	60	N/A
5 (nearest residential)	45.3	65.1	70	65

SOURCE: Greve & Associates, 2017; City of Long Beach, 2016.

As shown in Table 3.11-7, the projected operational noise levels for the LCWA site’s oil production are very low for the two locations, which are much lower than the measured ambient noise levels and noise limits of the City of Long Beach Noise Ordinance. Therefore, the noise impact from oil production operations at LCWA would result in a less-than-significant impact, based on the facility being properly designed, for which a mitigation measure is prescribed to ensure that the facility is properly designed.

Mitigation Measures

Mitigation Measure NOI-1: Prior to issuance of the permits for the drilling and drilling equipment at the Pumpkin Patch and LCWA sites, a detailed noise assessment shall be prepared to demonstrate that the resultant noise levels from oil production activities will meet the City of Long Beach Noise Ordinance limits. The operational noise assessment shall be prepared by a qualified acoustical consultant who is a Registered Engineer in the State of California. The report shall document the specific sources of noise and detail any measures, if any are required, to ensure that operational noise is maintained within the City’s standards. These measures will be incorporated into the project plans. The report shall be completed and approved by the City prior to issuance of building permits. Additionally, once the sites are in operation, noise measurements should be conducted within 60 days that demonstrate both oil production sites are in compliance with the City’s Noise Ordinance. If any exceedances are detected, the City shall require that noise attenuation measures, such as equipment enclosures, mufflers, etc. are implemented, and require additional noise measurements be taken to demonstrate compliance with the City’s Noise Ordinance.

Significance Determination: Less than Significant with Mitigation.

Impact NOI-2: The project would not result in exposure of persons to, or generation of, excessive groundborne vibration or groundborne noise levels. (Less than Significant)

Construction

The 2004 Caltrans *Transportation- and Construction-Induced Vibration Guidance Manual* was used to evaluate construction vibration impacts from the construction of the proposed project (Greve & Associates 2017). According to the manual, the most critical construction vibration concern is whether impact pile driving is used, as vibration levels can be higher than typical heavy construction equipment. The project would likely use vibratory pile driving for sheet piles, which has much less potential for generating vibration impacts than impact pile driving, and no vibration impacts would occur with vibratory sheet pile driving; however, impact pile driving may also be considered for this project.

In describing vibration in the ground and in structures, the motion of a particle (i.e., a point in or on the ground or structure) is used. Accordingly, vibratory motion is commonly described by identifying the PPV in inches per second (in/sec), which is generally accepted as the most appropriate descriptor for evaluating the potential for building damage.

The most critical concern of pile driving is the vibration generated cause damage to surrounding buildings. The Caltrans manual identifies threshold criteria for vibration damage potential for various building types ranging from extremely fragile historic buildings to modern industrial buildings. The buildings surrounding the project site fall into one of two categories; new residential structures or modern commercial buildings, both of which have a threshold of potential structural damage of 0.5 in/sec PPV.

The Caltrans manual also discusses the potential for humans feeling the vibration generated by pile driving, which is a short-term impact and considered to be more of an annoyance issue rather than an impact. The manual provides four categories for vibration annoyance potential criteria, ranging from “barely perceptible” at 0.01 in/sec PPV to “severe” at 0.4 in/sec PPV.

The equipment to be used has not been determined; however, if impact pile driving was selected, as a worst case, a Delmag diesel hammer Model D30-32 was used for this analysis. The number of piles, length of construction, and size of piles is not yet known, and would be engineered as part of the design. The hours of the pile driving would be limited by the allowable construction hours of the City of Long Beach Noise Ordinance (Section 8.80.202). The Caltrans manual provides a methodology for estimating the PPV value at a nearby receptor, which includes the distance from the pile driver to the receptor, the rated energy of the pile driver, and a value for the intervening ground. The closest distance to receptors (i.e., the mobile home park) from potential pile driving activities would be approximately 621 feet. Caltrans equations were used to project the vibration level at the nearest receptor of 0.01 in/sec PPV, which is well below the 0.5 in/sec threshold of structural damage; therefore, no structural damage would occur, and the impact would be less than significant.

The potential for human annoyance from project construction vibration was also considered. At the mobile home park, the vibration levels of 0.01 in/sec PPV would be considered “barely perceptible.” Since the pile driving activities are short term in nature, annoyance is usually not used as the determinant for impacts. In addition, as no pile driving or grading would take place during the nesting season for sensitive bird species, pile driving vibration would not have an impact on any sensitive species on site. Therefore, the impact would be less than significant.

Operation

The proposed project would develop oil wells, which when in operation, would generate vibration; however, the oil wells would be centrally located within the project site boundary, and not in proximity to humans or structures where they would exceed vibration thresholds for annoyance or structural damage. Therefore, the impact would be less than significant.

Mitigation Measures: None required.

Significance Determination: Less than Significant.

Impact NOI-3: The project would not result in substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project. (Less than Significant with Mitigation)

Operation

As discussed under Impact NOI-1, project operation would generate off-site vehicle traffic noise from project vehicle traffic on area roadways in support of site operations, and would generate on-site noise from operating oil wells and production facilities, as discussed separately below.

Off-Site Traffic Noise

As discussed under Impact NOI-1, the oil production facilities and drilling operations would generate a maximum of approximately 200 trips per day, predominantly in and out of the Pumpkin Patch site, which would add to PCH daily traffic volumes in the vicinity of the site of approximately 40,000 vehicles per day. To result in a 3 dBA increase, traffic volumes would have to double. The project traffic volume increase would result in a traffic noise increase of approximately 0.02 dBA along PCH. Therefore, the increase would be imperceptible and less than the significance threshold of a 3 dB increase. The impact would be less than significant.

The visitors center on the Synergy Oil Field site would attract visitors to the site via 2nd Street, which in the vicinity of the site has ADT volumes of approximately 38,000 vehicles per day. Assuming a worst-case estimate of approximately 500 vehicle trips per day to the visitors center, applicable to both construction and operational activities, would result in a less than a 0.1 dB increase in traffic noise levels along 2nd Street. Therefore, the increase in traffic noise on 2nd Street due to the project would be much less than the significance threshold of a 3 dB increase, and the impact would be less than significant.

On-Site Oil Production Operations

As discussed under Impact NOI-1, the Pumpkin Patch and LCWA sites would be developed with oil production facilities, which would generate noise from operational oil wells.

Pumpkin Patch Site

As discussed under Impact NOI-1, the Pumpkin Patch site would be developed with 50 operational oil wells including injection pumps, gas turbines, compressor, a drilling rig and workover rig. The drilling rig would be covered with soundproofing material. The site would be surrounded by an 18-foot-high masonry wall on three sides and a 10-foot wall along the back, which would serve as a noise barrier. Based on preliminary design, noise levels of operating oil wells were projected for the three noise measurement locations of the site, and the nearest residential area. Table 3.11-6 identified the projected operational noise levels and the ambient noise levels measured on site and at the nearest residential area, approximately 1,000 feet southwest of the center of the site, and the City Noise Ordinance limits. As shown in Table 3.11-6, the noise levels projected for oil production would be less than the ambient noise levels. Therefore, there would be no increase in noise level at the nearest receptor, which would be less than the significance threshold of a 3 dB increase. Therefore, the noise impact from oil production operations at the site would result in a less-than-significant impact, if the facility is properly designed; however, a mitigation measure is proposed to ensure that the facility is properly designed.

LCWA Site

As discussed under Impact NOI-1, the LCWA site is proposed to be developed with 70 operating oil wells, including injection pumps, gas turbines, compressor, and a drilling rig and workover rig, similar to the Pumpkin Patch site. The oil drilling equipment would be covered with soundproofing material. The LCWA site would be surrounded by a 10-foot-high masonry wall, which would serve as a noise barrier. Additionally, the gas turbine generators will be encased in an all steel full-length enclosure and the turbines will be self-contained, weatherproof, insulated and sound attenuated. The enclosure panels will be treated with fiberglass material for sound attenuation and thermal insulation. Weather stripping is installed between all panels for sealing and additional sound attenuation.

The site is relatively isolated from residential and commercial development. The nearest residential area is approximately 2,195 feet to the southwest from the middle of the LCWA site. As shown in Table 3.11-7, the projected operational noise levels for the LCWA oil production and power generation would be very low at the nearest residential location, and much lower than the measured ambient noise levels. Therefore, there would be no increase in noise level at the nearest receptor, which would be less than the significance threshold of a 3 dB increase. Therefore, the noise impact from oil production operations at the site would result in a less-than-significant impact, if the facility is properly designed; however, a mitigation measure is proposed to ensure that the facility is properly designed.

Mitigation Measures: Mitigation Measure NOI-1 would apply.

Significance Determination: Less than Significant with Mitigation.

Impact NOI-4: The project would not result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project. (Less than Significant with Mitigation)

Construction

As described under Impact NOI-1, project construction would generate noise on site from construction activities and the operation of construction equipment, including drilling rigs, trucks, graders, bulldozers, and concrete mixers. In general, the type of equipment that would be used for construction and demolition would be similar to the equipment used for most construction projects using heavy equipment. Typical construction equipment that would be employed for this project includes graders, scrapers, front loaders, trucks, backhoes, concrete mixers, and concrete pumps. The maximum noise level (L_{max}) for most of the equipment that would be used during the construction ranges from 80 to 95 dBA at 50 feet, as shown in **Table 3.11-8, Typical Noise Levels from Construction Equipment**.

Table 3.11-8 Typical Noise Levels from Construction Equipment

Construction Equipment	Noise Level (dBA, L_{max} at 50 feet)
Air Compressor	81
Backhoe	80
Compactor	82
Concrete Mixer	85
Concrete Pump	82
Crane (Mobile)	83
Dozer	85
Grader	85
Jack Hammer	88
Loader	85
Paver	89
Pile-Driver (Impact)	101
Pile-Driver (Sonic or Vibratory)	96
Scraper	89
Truck	88

SOURCE: FTA, 2006.

The maximum noise levels shown in Table 3.11-8 are based upon worst-case loudest noise levels produced at the construction activity on site; therefore, these noise levels were used for predicting the worst-case construction noise estimate. At distances beyond 50 feet, these noise levels would be reduced by distance at a rate of 6 dBA per doubling of distance, and any intervening terrain, such as ridgelines, could reduce noise levels somewhat further.

The drilling of wells would occur at the Pumpkin Patch and LCWA sites, which could be considered as construction, but since drilling operations would occur throughout the life of the project (i.e., initially the drilling of new wells and eventually the reworking of existing wells), drilling operations were considered under operational impacts under Impact NOI-1.

Pumpkin Patch Site

At the Pumpkin Patch site, an office building and warehouse would be constructed along with the oil production facilities. An 18-foot-high masonry wall would be constructed along three sides and a 10-foot-high wall along the back, which would serve as a noise barrier for operational noise. The wall would be constructed in Year 2.

The nearest noise-sensitive area to the Pumpkin Patch site would be the residential area approximately 830 feet southwest of the site, which is exposed to vehicle traffic noise from PCH at noise levels likely very similar to those measured at Location 3 along PCH in Table 3.11-2. At 830 feet, the worst-case unmitigated maximum (L_{max}) construction noise levels would attenuate to approximately 46 to 71 dBA at the residences. Maximum (L_{max}) noise levels are typically 15 dB higher than average noise levels (L_{50}), based on general observations during construction noise measurements over the past 20 years (Greve & Associates 2017). Therefore, average noise levels (L_{50}) at the nearest existing residential buildings approximately 830 feet southwest of the site would range from approximately 31 to 56 dBA L_{50} . Ambient noise levels measured along PCH at Location 3 would be representative of this area along PCH. The L_{max} noise level measured at Location 3 was 83.3 dBA with an average noise level (L_{50}) of 67.7 dBA. Therefore, the predicted L_{max} and L_{50} construction noise levels at the nearest residences would be substantially less than ambient noise levels, and impacts would be less than significant.

LCWA Site

At the LCWA site, oil production facilities and the majority of the project's microgrid would be constructed including up to 70 wells on the approximately 5-acre site. A 10-foot-high masonry wall would be constructed around the site, which would serve as a noise barrier for operational noise. The wall would be constructed in Year 2.

The nearest noise-sensitive area is the residential area approximately 1,825 feet southeast of the site, which is exposed to significant levels of traffic noise from 2nd Street and is surrounded by a soundwall. Based on a distance of 1,825 feet and including the effect of the soundwall, the worst-case unmitigated maximum (L_{max}) construction noise levels would be approximately 34 to 59 dBA at the residences southeast of the project site, and the average construction noise level would be in the range of approximately 19 to 44 dBA (L_{50}). Ambient noise levels, measured in at Location 5, would be representative of this area. The L_{max} noise level measured at Location 5 was approximately 88.3 dBA with an average noise level (L_{50}) of approximately 65.1 dBA. Therefore, the L_{max} and L_{50} construction noise levels at the nearest residence would be substantially less than ambient noise levels, and impacts would be less than significant.

Synergy Oil Field Site

At the Synergy Oil Field site, site demolition and restoration, and facilities construction would occur. Site demolition would include the removal of the existing oil wells and associated piping, tanks, and accessory equipment on site. Excavators, loaders, trucks, ram hoes, and backhoes would be used for site demolition. Public trails would be established on site, requiring some minor grading. The existing office building would be converted to a visitors center along with a parking lot and paved access road.

In the northern 76.52 acres of the site, restoration activities would include grading to clear some berms and establish other berms, and a sheet pile wall approximately 4,730 feet long would be constructed. The grading and sheet pile driving would last approximately 4 to 6 months and occur outside of the nesting season for bird species utilizing the site. Site restoration activities would use graders, trucks, and a sheet pile driver.

The nearest noise-sensitive receptor is a mobile home park approximately 330 feet north of the nearest grading activity of the site. Restoration activities in the area, nearest to the mobile home park, could last up to 6 months. The worst-case unmitigated maximum (L_{max}) construction noise levels, mainly due to grading activities, would attenuate with a distance of 330 feet to approximately 54 to 79 dBA L_{max} at the residences, and the average noise levels (L_{50}) would range from approximately 39 to 64 dBA L_{50} . Ambient noise levels measured at Location 6 was approximately 51.1 dBA L_{max} with an average noise level of 49.3 dBA L_{50} , which would be representative of the nearest residence. Therefore, L_{max} and L_{50} noise levels at the nearest residence would be higher than ambient levels, and potential significant noise impacts would occur. Mitigation measures are proposed.

In addition to site restoration, sheet pile driving would occur as close as approximately 621 feet from the mobile home park over approximately 2 to 6 months to install the 4,730-foot barrier. Sheet pile driving can be either impact or vibratory; the vibratory method is quieter than the impact pile driving. Both methods are explained below.

The FTA (2006) reports that vibratory pile driving results in maximum noise levels of 96 dBA L_{max} at 50 feet, when the pile is actually being driven. More specifically, approximately one-third of the time the pile is being driven, and the other two-thirds of the time the pile is being positioned or checked, which results in an average noise level (L_{eq}) of 91 dBA at 50 feet. At the mobile home park, at a distance of 621 feet, the resultant noise levels would be a maximum noise level (L_{max}) of 74 dBA and an average noise level (L_{eq}) of 69 dBA. These levels are well above ambient conditions and would result in speech interference when the residents are outside. Therefore, vibratory sheet pile driving noise would potentially result in a significant impact. Mitigation measures are prescribed to lessen this impact.

The FTA report states that impact pile driving results in maximum noise levels as high as 105 dBA L_{max} at 50 feet, and average noise levels of 101 dBA L_{eq} at 50 feet. At the mobile home park, at a distance of 621 feet, the resultant noise levels would be a maximum noise level of 83 dBA L_{max} , and an average noise level of 79 dBA L_{eq} . These levels are well above ambient conditions and would result in speech interference when the residents are outside. Therefore, impact sheet pile driving noise would potentially be a significant impact. Mitigation measures are prescribed to lessen this impact. Since vibratory pile driving is now commonly used, and impact pile driving is significantly louder, vibratory pile driving is prescribed to be used.

In addition to mobile home park, the site restoration also considered the potential impact of construction noise on sensitive animal species, specifically special-status bird species during nesting and breeding activity. To

avoid noise impacts to sensitive bird species that utilize the site, all grading and sheet pile driving activity would be conducted outside of the nesting season (March 1 to August 15), and a mitigation measure has been recommended to ensure that this is implemented. Outside of the nesting season, birds use the site for foraging mostly in the area of the Steamshovel Slough. As the Slough will not be affected during restoration activities, the birds would still be able to continue to forage on site, and this impact is not considered significant (see Section 3.3, *Biological Resources*, for more details).

In the southern portion of the site, a low level of construction and demolition would occur. Over time, the oil wells and associated piping, tanks, and accessory equipment would be removed using trucks, excavators, ram hoe, and backhoe. Public trails would be established, requiring some minor grading. Additionally, the existing office building would be relocated and converted to a visitors center along with a parking lot and paved access road. The mobile home park is approximately 2,000 feet from the proposed visitors center. Due to the distance to the nearest sensitive receptors and the low level of construction anticipated and occurring during the daytime hours allowable under the City's Noise Ordinance, the construction noise impact would be less than significant for the southern portion of the site.

City Property Site

The oil wells and associated piping, tank farm, and accessory equipment would be removed. Excavators, loaders, trucks, ram hoes, and backhoes may be needed for demolition. Additionally, an approximately 2,200 feet aboveground pipeline system and utility corridor would be constructed.

The western edge of the City Property site abuts a commercial/retail center. Commercial buildings are usually not considered noise sensitive. For informational purposes, noise measurements were taken because some offices are located within 200 feet of the City Property site. Based on a distance of 200 feet, the worst-case unmitigated maximum (L_{max}) construction noise levels could reach 83 dBA, and the average construction noise level would be in the range of approximately 43 to 68 dBA (L_{50}). Ambient noise levels, measured at Location 1, would be representative of this area. The L_{max} noise level measured at Location 1 was approximately 67 dBA with an average noise level (L_{50}) of approximately 55 dBA. Well removal has the potential to increase peak noise levels on occasion. The noise impact is considered to be less than significant because the office buildings are not noise sensitive and only four wells would be removed in close proximity to the offices.

The potential impact of noise on sensitive species, specifically sensitive bird species would be similar to those described above for the Synergy site, and the same mitigation would apply (see Section 3.3, *Biological Resources*, for more details).

Mitigation Measures

Mitigation Measure NOI-2: Staging Areas and Mufflers. Staging areas for construction shall be located away from existing off-site residences. All construction equipment shall use properly operating mufflers. These requirements shall be included in construction contracts.

Mitigation Measure NOI-3: Limit Grading and Pile Driving. All grading and sheet pile driving activities shall be conducted outside of the nesting season for sensitive bird species. The nesting season has been identified as extending from March 1 to August 15. (Refer to the Biological section of the EIR for more information on potential impacts to bird species and the corresponding mitigation.)

Mitigation Measure NOI-4: Prohibit Impact Sheet Pile Driving. Impact sheet pile driving should be prohibited on the Synergy Oil Field site. Only vibratory sheet pile driving shall be employed.

Significance Determination: Less than Significant with Mitigation.

3.11.4.4 Cumulative Impacts

The geographic scope for the consideration of cumulative project construction noise impacts are primarily the areas immediately surrounding the project site, and to a lesser degree, along designated roadways, where heavy truck traffic would travel during the project construction period. Generally, noise impacts are limited to the area directly surrounding the noise sources, as noise attenuates logarithmically with distance at a higher rate in proximity to the source, and only has the potential to combine with other noise sources occurring simultaneously in the immediate vicinity. The project's potential noise impacts, when viewed together with the environmental impacts from past, present, and probably future projects, could be cumulatively considerable if project impacts exceed impact thresholds, resulting in significant impacts.

Construction

Project construction noise was determined to not expose persons to, or generate, noise levels in excess of standards established in the local General Plan or Noise Ordinance, or applicable standards of other agencies. Therefore, the noise impacts would be less than significant; however, project construction would occur in proximity to noise-sensitive receptors (i.e., residences), resulting in a substantial temporary increase in ambient noise levels at the receptors during construction. Therefore, these impacts would be considered significant; however, implementation of construction mitigation measures would reduce the construction noise impacts to a level of less than significant. Therefore, project construction noise would not be of the magnitude to potentially combine with other cumulative projects potentially located in immediate proximity to the project site, where the noise could combine together to cumulatively substantially temporarily increase the ambient noise environment in the project area. Therefore, project construction would not be a cumulatively considerable noise impact.

As previously discussed for vibration, project construction would occur in proximity to structures and inhabited buildings; however, construction vibration levels would be less than the vibration thresholds at the buildings; therefore, vibration impacts would be less than significant. Therefore, project construction would not be a cumulatively considerable vibration impact.

Operation

Project operation would generate off-site vehicle traffic noise from project vehicle traffic on area roadways in support of site operations, and would generate on-site noise from operating oil wells.

The project does not have the potential to generate a substantial number of construction or operational vehicle trips. Therefore, project traffic noise increase on roadways surrounding the project site would be imperceptible, and the impact would be less than significant. Therefore, future noise levels in these specific locations would not be cumulatively significant.

The Pumpkin Patch and LCWA sites would be developed with oil production facilities, which would generate noise from operational oil wells. The noise levels projected for oil production would be less than the ambient

noise levels and would not exceed the Noise Ordinance criteria. Therefore, the noise impact from oil production operations at the Pumpkin Patch and LCWA sites would result in a less-than-significant impact, based on proper facility design. A mitigation measure has been prescribed to ensure that the facility is properly designed. Therefore, future operational noise levels in these specific locations would not be cumulatively significant.

3.11.5 References

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