Appendix H

Noise Analysis Report

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Noise Analysis for the Los Cerritos Wetlands Oil Consolidation and Restoration Project

Report #16-005NZ
June 21, 2017

Prepared For:

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1.0 EXISTING SETTING

1.1 Project Description

The project will be implemented on four sites: the Synergy Oil Field Site, the "Pumpkin Patch" Site, the Los Cerritos Wetlands Authority (LCWA) Site, and the 33-acre City Marketplace Marsh (City Property) Site (Exhibit 1). The Synergy Oil Field Site is located at 6433 East 2nd Street between Pacific Coast Highway to the west, the Los Cerritos Channel to the north, Studebaker Road to the east, and 2nd Street to the south. The "Pumpkin Patch" Site is located at 6701 East Pacific Coast Highway at the northeast corner of the intersection with the San Gabriel Channel. The LCWA Site is located at the northeast corner of the intersection of Studebaker Road and Westminster Boulevard. The City Property Site is located between 2nd Street to the north and the San Gabriel River to the south. (Refer to the Project Description in the EIR for more information on the location of the project, City boundaries, etc.)

Synergy Oil Field Site: On the Synergy Oil Field Site, the Project proposes to establish a wetlands mitigation bank and public access trail on the northerly approximately 77.3 acres of the 150-acre Synergy Oil Field (formerly known as the Bixby Oil Field), to implement a wetlands restoration plan on the southerly approximately 70 acres of the Synergy Oil Field, and to construct public access improvements, including a parking lot on existing disturbed areas and converting an existing building for use as a visitors' center on the remaining approximately 2.9 acres of the Synergy Oil Field. The mitigation bank provides for the phased restoration and permanent preservation of restored wetlands. The Project also proposes the removal of thirty-five (35) oil wells from the southerly 70 acres. The Synergy Oil Field is owned and operated by Beach Oil Minerals Partners (Exhibit 2).

"Pumpkin Patch" Site: In order to facilitate the restoration of the approximately southerly 70 acres on the Synergy Oil Field and construction of the public access improvements, the warehouse structures currently on the Synergy Oil Field will be removed and a portion of the oil production activities currently being conducted at the Synergy Oil Field and the City Property Site will be relocated to the 7 acre property located at 6701 E. Pacific Coast Highway (commonly known as the "Pumpkin Patch"). The office uses currently occupying the Bixby building on the Synergy Oil Field site would be relocated to a new approximately 5,200 square feet (sf), two-story office building constructed on the Pumpkin Patch site. Other proposed site development on the Pumpkin Patch Site includes an approximately 9,750 sf of storage/warehouse, parking for 47 cars, drilling of up to fifty (50) new wells (both oil production and water injection wells) and associated production facilities. The height of the office building is 35 feet and the storage/warehouse is 22 feet (Exhibit 3).

Exhibit 1 - Overall Location Map

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Exhibit 2 - Synergy Oil Field Site

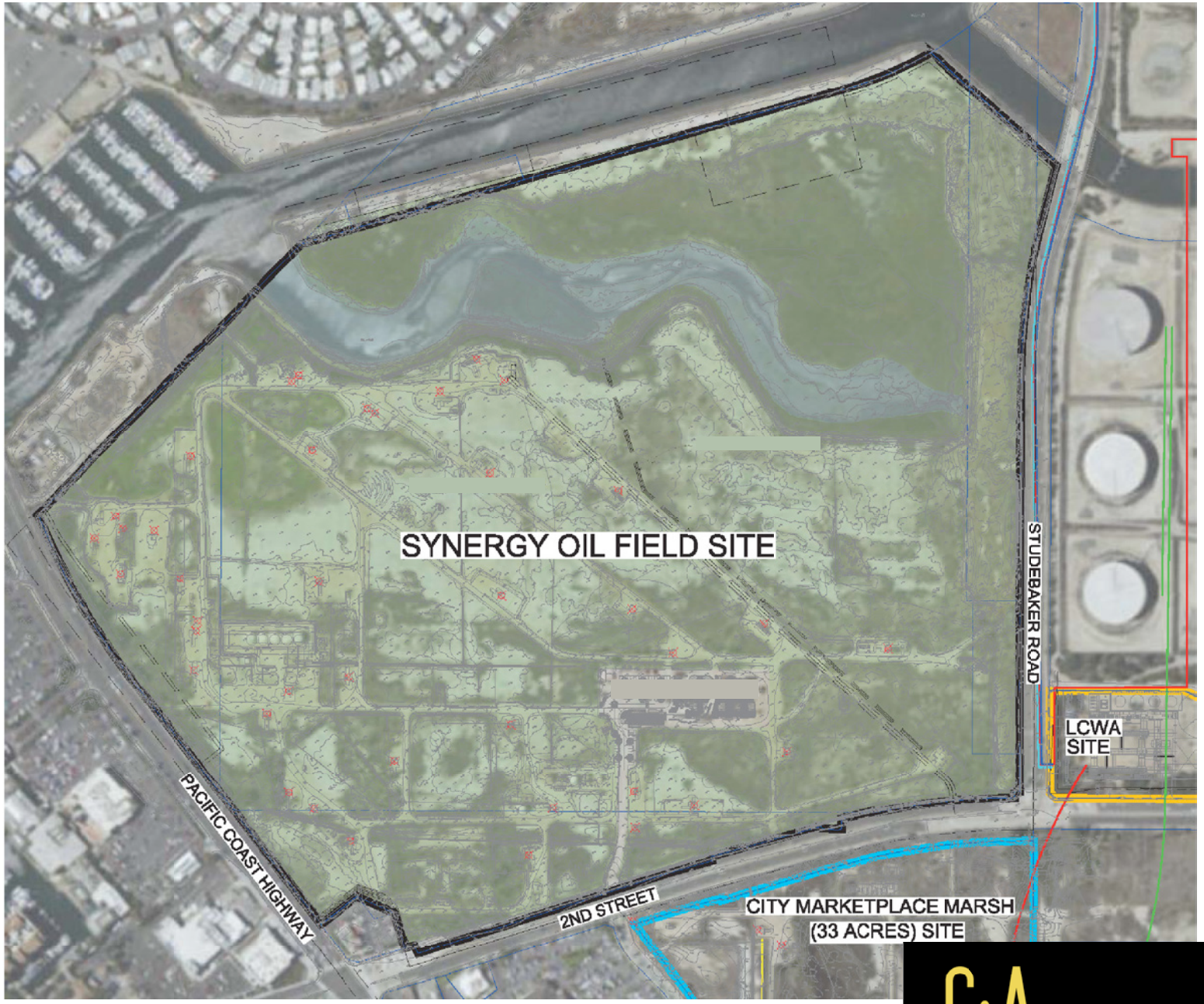

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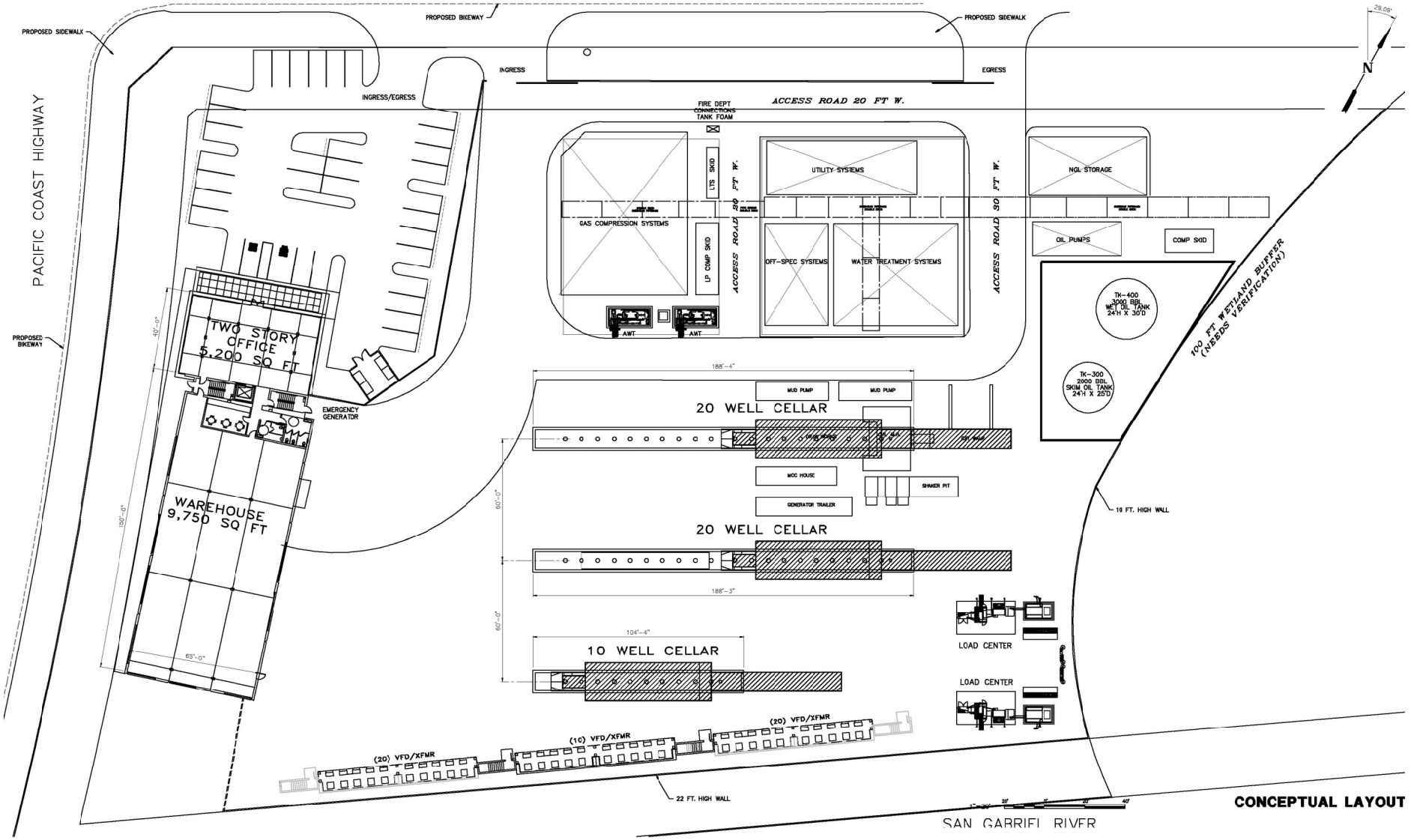
Exhibit 3 - Pumpkin Patch Concept Site Plan



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In addition to the 50 wells, two tanks will be constructed on the site: a 3,000 barrel tank for storing "wet oil" that is 30 feet in diameter and 24 feet high; and a 2,000 barrel "skim oil" tank that is 24 feet in diameter and 24 feet high. There is an existing oil well on the Pumpkin Patch site which will be used on a temporary basis as a test well to confirm the feasibility of oil production operations on Pumpkin Patch.

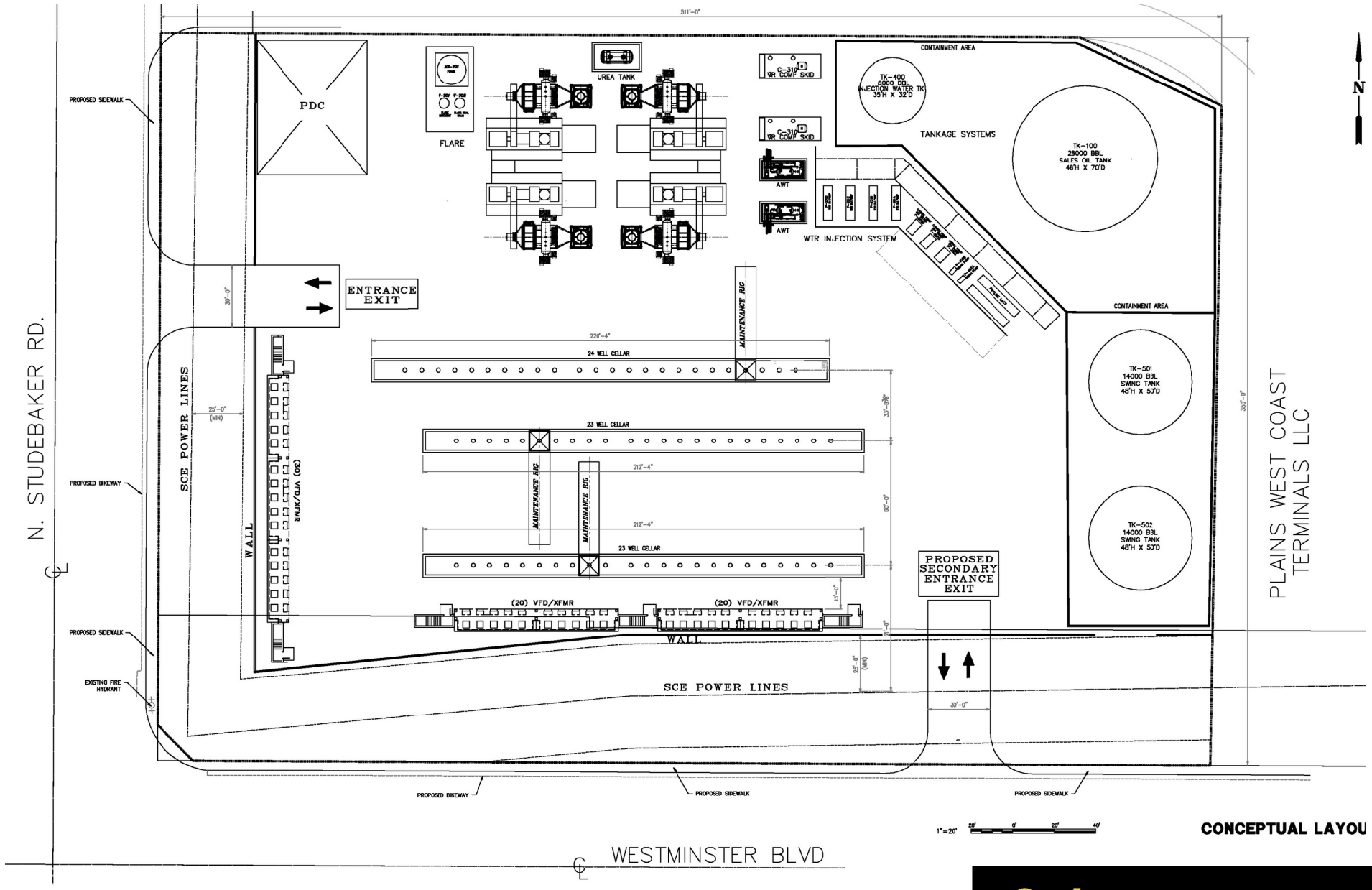
A 22-foot high screen wall will be built on the perimeter of the Pumpkin Patch site. Vehicular access to the site will be from Studebaker Road. The structures will be set back 30 feet from Pacific Coast Highway and perimeter landscaping will be provided along Studebaker, Pacific Coast Highway and the San Gabriel River Channel.

The Pumpkin Patch Site is owned by Beach Oil Minerals Partners. The Pumpkin Patch site is currently vacant, except for one operating oil well. It is currently used for seasonal sales of pumpkins and Christmas trees.

Although the Pumpkin Patch site is approximately 7 acres in size, the oil production operations will be located on 5 acres of the site closest to Pacific Coast Highway. The northeasterly 2-acre portion of the site will be retained as open space and used to provide a 100-foot buffer from the coastal wetland habitat area at the eastern edge of the site. The project also proposes the removal of an oil well that is located on the northeasterly portion of the Pumpkin Patch site.

LCWA Site: The Project proposes the drilling and operation of up to seventy (70) wells on an approximately 4-acre parcel (excluding public rights-of-way) owned by LCWA located at Studebaker and Westminster ("LCWA Site") to replace and expand the oil production facilities currently on the Synergy Oil Field and the City Property Site (Exhibit 4). The LCWA Site is currently undeveloped and is used on a temporary lease basis for equipment storage and staging. Due to the geologic conditions at the Synergy Oil Field (i.e., the Newport-Inglewood Fault traverses the site), the oil field is divided between two operating areas; one on each side of the fault. The oil field operations north of the fault extract oil from a subterranean oil horizon that cannot be accessed from Pumpkin Patch, but can be accessed from the LCWA Site.

Exhibit 4 - LCWA Concept Site Plan



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The wells will be a combination of oil production well and water injection wells. In addition to the oil production area, the project proposes to construct an elevated piperack, a 28,000 barrel sales oil tank (48 feet in height and 75 feet in diameter), and a 5,000 barrel injection water tank (35 feet in height and 32 feet in diameter). The site will also include a 15-20 feet high ground flare to be used for emergencies only. The site will incorporate a hybrid power-generating system comprised of a combination of electrical lines extending from an existing SCE facility to a new SCE substation, and four natural gas-powered turbines to generate electricity to be used onsite, solar panels, and heat recovery systems. A 22-foot high screen wall will be built on the perimeter of the LCWA site. The project proposes to improve the existing driveway off of Studebaker Road to a 30-foot entrance/exit, and to construct a secondary 30-foot access from Westminster Boulevard. Perimeter landscaping will be provided along the Studebaker Road and Westminster Boulevard frontage.

City Property Site (34.6-acre Marketplace Marsh): The Project proposes the removal of approximately twelve (12) oil wells that are currently being operated on the 34.6-acre City Property Site located at Westminster and Shopkeeper Road. The wells are being operated pursuant to a Surface Use Release Agreement and Grant of Easements ("Surface Use Agreement") between the City and LCW Oil Operations, LLC, and the wells would be removed and abandoned in accordance with the terms of the Surface Use Agreement which requires abandonment to a standard acceptable to the State of California Division of Oil, Gas and Geothermal Resources at the time of abandonment and suitable for the City's intended use for public open space. The project will also remove an oil well that is located immediately adjacent to the City Property Site on the edge of the business park located at Pacific Coast Highway and Studebaker.

This report assesses the potential noise impacts of the project on the surrounding land uses. Construction noise, oil production noise, and other on-site activity noise are considered for their potential impact.

1.2 Background Information on Noise

1.2.1 Noise Criteria Background

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

Since the human ear is not equally sensitive to sound at all frequencies, a special frequency-dependent rating scale has been devised to relate noise to human sensitivity. The A-

weighted decibel scale (dBA) performs this compensation by discriminating against frequencies in a manner approximating the sensitivity of the human ear. Community noise levels are measured in terms of the "A-weighted decibel," abbreviated dBA. Exhibit 5 provides examples of various noises and their typical A-weighted noise level.

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

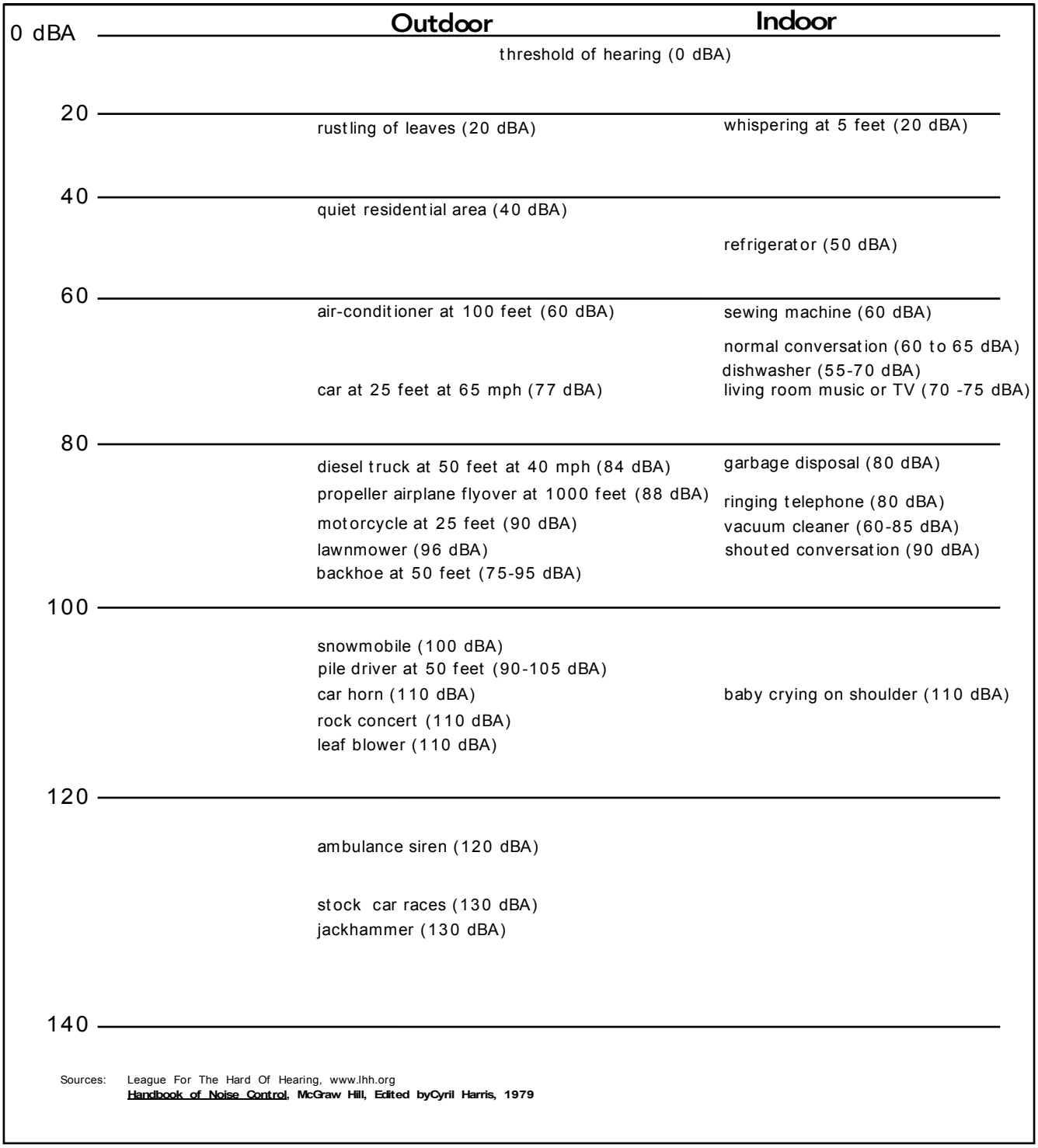
Noise has been defined as unwanted sound and it is known to have several adverse effects on people. From these known effects of noise, criteria have been established to help protect the public health and safety and prevent disruption of certain human activities. This criteria is based on such known impacts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

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

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

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

Exhibit 5 - Typical Noise Levels



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

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

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

1.2.2 Noise Assessment Metrics

The description, analysis and reporting of community noise levels around communities is made difficult by the complexity of human response to noise and the myriad of noise metrics that have been developed for describing noise impacts. Each of these metrics attempts to quantify noise levels with respect to community response. Most of the metrics use the A-Weighted noise level to quantify noise impacts on humans. A-weighting is a frequency weighting that accounts for human sensitivity to different frequencies.

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

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

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

CNEL, Community Noise Equivalent Level, is the predominant rating scale now in use in California for land use compatibility assessment. The CNEL scale represents a time weighted 24-hour average noise level based on the A-weighted decibel. Time weighted refers to the fact that noise that occurs during certain sensitive time periods is penalized for occurring at these times. The evening time period (7 p.m. to 10 p.m.) penalizes noises by 5 dBA, while nighttime (10 p.m. to 7 a.m.) noises are penalized by 10 dBA. These time periods and penalties were selected to reflect people's increased sensitivity to noise during these time periods. A CNEL noise level may be reported as a "CNEL of 60 dBA," "60 dBA CNEL," or simply "60 CNEL." Typical noise levels in terms of the CNEL scale for different types of communities are presented in Exhibit 6.

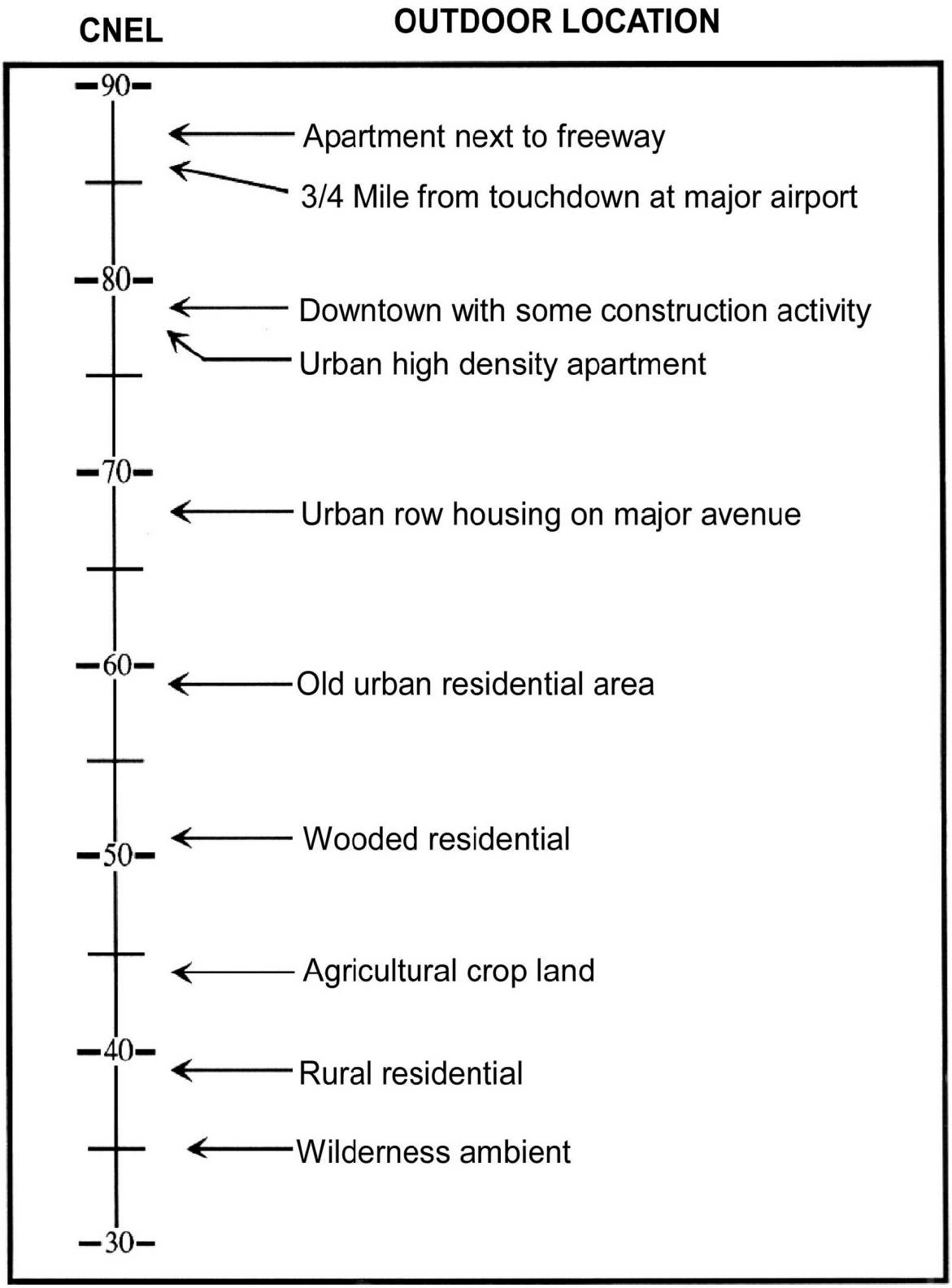
L(%) (also sometimes represented as L(n) is a statistical method of describing noise which accounts for variance in noise levels throughout a given measurement period. L(%) is a way of expressing the noise level exceeded for a percentage of time in a given measurement period. For example, since 15 minutes is 25% of one hour, L(25) is the noise level that is equal to or exceeded for 15 minutes in a one-hour period. It is L(%) that is commonly used in Noise Ordinance standards. For example, many daytime County and City Noise Ordinances use an ordinance standard of 55 dBA for 30 minutes per hour or an L(50) level of 55 dBA. In other words, the Noise Ordinance states that no noise level should exceed 55 dBA for more than fifty percent of a given period. Lmax, which is L(0), is the maximum sound level during a measurement period.

1.3 Noise Criteria

The Noise Element of the General Plan (City of Long Beach Planning Department, March 25, 1975) and the Noise Ordinance (Long Beach Municipal Code, Chapter 8.80, 1977) contain the City of Long Beach policies and regulations on noise. The Noise Element of the General Plan presents limits on noise levels from transportation noise sources, vehicles on public roadways, railroads and aircraft. Additionally, the General Plan provides guidance to ensure that noise and land use compatibility are integrated into the development process.

The Noise Ordinance regulates noise on one property impacting a neighboring property. Typically, it sets limits on noise levels that can be experienced at the neighboring property. The Noise Ordinance is part of the City of Long Beach Code (Chapter 8.80 - Noise) and is enforceable throughout the City. The City's Noise Ordinance and Noise Element policies are summarized below.

Exhibit 6 - Examples of CNEL Noise Levels



Source: "Protective Noise Levels, Condensed Version of EPA Levels Document," U.S. Environmental Protection Agency, November 1978

1.3.1 City of Long Beach Noise Ordinance

Within the City of Long Beach, the Noise Ordinance governs operational noise generated on one property impacting a nearby property. Chapter 8.80 of the City Code represents the Noise Ordinance. This portion of the code was updated in 1977. To control noise generated on private property, most communities have developed noise ordinances. The City of Long Beach has adopted a Noise Ordinance that uses L(%) noise levels to regulate sound generated on private property. The ordinance is designed to protect adjacent sensitive land uses from non-transportation related noise sources such as car wash noise, music, mechanical equipment, and other activities on private property.

The City of Long Beach Noise Ordinance establishes noise criteria for noise that impacts adjacent properties. These criteria are given in terms of allowable noise levels for a given period of time within a land use district. The City is divided into five land use districts. If a location is on a boundary between two different districts, the applicable noise level limit shall be the arithmetic mean of the two districts. Greater noise levels are permitted during the day (7 a.m. to 10 p.m.) as compared to the nighttime period (10 p.m. to 7 a.m.). The noise levels allowed by the City of Long Beach Noise Ordinance are listed below in Table 1 . The Synergy Oil Field, Pumpkin Patch, and City Site are all located in District 1. The LCWA site is located in District 4. Therefore, only the noise limits for Districts 1 and 4 are presented in the table below.

Table 1 City of Long Beach Noise Ordinance Criteria

Time Period	Lmax	L1.7	L8.3	L25	L50
District 1					
Daytime (7 a.m. to 10 p.m.)	70	65	60	55	50
Nighttime (10 p.m. to 7 a.m.)	65	60	55	50	45
District 4					
Anytime	90	85	80	75	70

The 30-minute standard is the median sound level interpreted as that noise level that cannot be exceeded for more than 30 minutes in any one-hour period (abbreviated L50 for 50th percentile). The 15-minute standard is that noise level that cannot be exceeded more than 15 minutes in any hour-long period (i.e., 25 percent of the time, abbreviated L25), and so forth. Another level that is valuable in assessing intermittent noise is the Lmax level, which is the loudest level recorded during the measurement period. The limits in Table 1 are reduced by 5 dB if the offensive noise contains a steady audible tone such as a whine, screech, or hum, or is a repetitive noise such as hammering or riveting or contains music or speech conveying informational content.

The Noise Ordinance allows for adjustments to the noise criteria if the ambient is higher than the criteria levels (Section 8.80.150 C). The ordinance states that if the ambient exceeds the permissible limit then the limits should be increased in 5 dB increments as necessary to encompass the ambient conditions.

Long Beach Noise Ordinance Section 8.80.202 – Construction Activity, regulates construction noise. The Noise Ordinance exempts noise generated by construction activities during certain 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. Construction is also prohibited between "7 p.m. on Friday and 9 a.m. on Saturday and after 6 p.m. on Saturday." On Sundays construction is prohibited all day.

Section 8.80.250 – Exemption – Emergencies exempt 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:

A. Normal well servicing, remedial or maintenance work performed within an existing well which does not involve drilling or redrilling and which is restricted to the hours between 7 a.m. and 7 p.m., exclusive of weekends and holidays, in residential areas.
B. Any drilling or redrilling 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.

1.3.2 City of Long Beach Noise Element

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

1.3.3 City of Seal Beach Noise Ordinance

A summary of the Seal Beach Noise Ordinance is presented here for reference. Some of the affected areas lie within the City of Seal Beach. However, the Long Beach Noise Ordinance is the governing document since all of the project is within the City of Long Beach. It should

also be noted that generally, the Long Beach Noise Ordinance is more restrictive than the Seal Beach regulations.

Chapter 7.15 of the Seal Beach Municipal Code represents the Noise Ordinance (no date is provided in the ordinance for the last update). The City of Seal Beach Noise Ordinance establishes noise criteria for noise that impacts adjacent properties. These criteria are given in terms of allowable noise levels for a given period of time within a land use district. The City is divided into three noise zones. Zone 1 is residential, Zone 2 is commercial, and Zone 3 is industrial, manufacturing, and oil properties. Greater noise levels are permitted during the day (7 a.m. to 10 p.m.) as compared to the nighttime period (10 p.m. to 7 a.m.). The noise levels allowed by the City of Seal Beach Noise Ordinance are listed below in Table 2 .

Table 2 City of Seal Beach Noise Ordinance Criteria

Time Period	Lmax	L1.7	L8.3	L25	L50
Zone 1					
Daytime (7 a.m. to 10 p.m.)	75	70	65	60	55
Nighttime (10 p.m. to 7 a.m.)	70	65	60	55	50
Zone 2					
Anytime	85	80	75	70	65
Zone 3					
Anytime	90	85	80	75	70

The Seal Beach Noise Ordinance is 5 dB less stringent for residential zones than the Long Beach Noise Ordinance.

The Noise Ordinance allows for adjustments to the noise criteria if the ambient is higher than the criteria levels (Section 7.15.015C). The ordinance states that if the ambient exceeds the permissible limit then the limits should be increased to the ambient conditions.

Seal Beach 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 a.m. and 8 p.m.

1.4 Existing Noise Measurements

The existing noise levels in the vicinity of the proposed project are needed to establish the current baseline noise levels. A visual survey of the project site and the surrounding area was conducted to determine the location of a set of noise measurement sites that would provide

a noise profile of the area in the vicinity of the project site. The primary criteria used for the site selection process was the proximity of a measurement site to other active land uses. There are no residential or other noise-sensitive land uses in the immediate area, however, there are residences at more distant locations. Six sites were selected for noise measurements. The measurement sites are displayed in Exhibit 7. The measurements of Sites 1 through 3 were taken on March 8, 2016 between the hours of noon and 3:00 p.m., and the measurements at Sites 4 through 6 where taken during the morning of May 9, 2016.

All noise measurements were performed using a Rion NL-52 Type 1 Sound Level Meter. During the measurements a large windscreen (i.e., Rion WL-10) covered the sound meter's microphone to dampen-out unwanted wind-generated noise. Both before and after the set of measurements were taken, a Rion NC-74 Class 1 Sound Calibrator was used to check the calibration of the sound meter to ensure that the measured sound levels readings were accurate. Both pieces of equipment have current certification that is traceable to the National Institute of Standards and Technology (NIST). The monitoring system is Type 1, which is the highest rating available for environmental noise measurements. For each measurement site, two sets of 15 minutes of data were collected. Two sets of measurements are often taken to ensure that one set of measurement did not result in atypical noise levels. At the conclusion of each set of measurements, the Leq, Lmin, Lmax, L1.7, L8, L25, and L50 values for the full-time period were written down on a data sheet. Prevailing weather conditions were noted along with any other factors that might affect the noise measurements. Table 3 shows the results of the measurements.

Exhibit 7 - Measurement Sites

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Table 3 Existing Noise Measurements (dBA)

Site	Start Time	Leq	Lmax	L1.7	L8	L25	L50	Lmin
1A	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
2A	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
3A	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
4A	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
5A	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
6A	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

Site 1 is away from major roadways and near an office building (i.e., Keller Williams Realty). The maximum sound level was due to a car traveling in the parking lot. Other noise sources included distant traffic along Pacific Coast Highway, and vehicles in the parking lot.

Site 2 was in the same office complex as Site 1. There was very little noise from parking lot activities, and the majority of noise monitored was from Pacific Coast Highway.

Site 3 is on the south side of Pacific Coast Highway in the parking lot near Mimi's Restaurant. The noise levels were dominated from noise associated with Pacific Coast Highway. The parking lot was a secondary contributor and during the second measurement, landscape maintenance equipment contributed to the noise levels. Site 3 was the loudest site.

Site 4 is near the "Eaves by Avalon" apartments and inline with the row of apartments closest to Pacific Coast Highway. Pacific Coast Highway was the dominant noise source with First Street contributing very little to the total noise levels. The loudest sources of noise were trucks and motorcycles on Pacific Coast Highway. The noise levels are very similar to Site 3 which is also along Pacific Coast Highway.

Site 5 is representative of the housing development southeast of the LCWA site. Traffic on 2nd Street is the dominant noise source in this area. However, across the street from the housing development is powerplant that produces a continuous noise in the 55 to 60 dBA range. Trucks and motorcycles produce the loudest noise events in this area.

Site 6 represents the noise levels for the mobile home park. This was the quietest of the six sites measured. Traffic noise from the distant Pacific Coast Highway was the dominant noise, however, birds chirping also added significantly to the overall noise levels. General aviation aircraft occasional flew nearby and was responsible for the loudest noise levels.

1.5 Existing Roadway Noise Levels

The highway noise levels projected in this report were computed using the Highway Noise Model published by the Federal Highway Administration ("FHWA Highway Traffic Noise Prediction Model," FHWA-RD-77-108, December, 1978). The FHWA Model uses traffic volume, vehicle mix, vehicle speed, and roadway geometry to compute the "equivalent noise level." A computer code has been written which computes equivalent noise levels for each of the time periods used in the calculation of CNEL. Weighting these noise levels and summing them results in the CNEL for the traffic projections used. CNEL contours are found by iterating over many distances until the distances to the 60, 65, 70, and 75 CNEL contours are found.

Peak hour traffic counts were provided by the traffic engineer for the project. The counts were made in May 2015. Average daily traffic volumes (ADT) were calculated from the peak hour data assuming that p.m. peak hour was 8% of the daily volume. Posted speed limits and the ADTs were used with the FHWA Model to estimate the noise levels in terms of CNEL. The distances to the CNEL contours for the roadways in the vicinity of the project site are given in Table 4 . These numbers represent the distance from the centerline of the road to the contour value shown. Note that the values given in Table 4 do not take into account the effect of any noise barriers or topography that may affect ambient noise levels.

Table 4 Existing Traffic Noise Levels

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

* From roadway centerline
RW – Noise contour falls within roadway right-of-way.

Table 4 shows that the loudest roadways in the area are portions of Westminster Boulevard and Pacific Coast Highway. The roadways in the area have noise levels typical for a suburban area.

2.0 POTENTIAL NOISE IMPACTS

Potential noise impacts are commonly divided into two groups; temporary and long term. Temporary impacts are usually associated with noise generated by construction activities. Long-term impacts are caused by the operation of the project.

2.1 Thresholds of Significance

Off-site impacts from on-site activities, short-term and long-term, are measured against the Noise Ordinance criteria discussed in Section 1.3. Construction activities for the proposed project will be required to meet the noise ordinance standards along with any noise generating activities associated with the operation of the project. Similarly, the operations at the Pumpkin Patch, LCWA, and Synergy Oil Field must be able to comply with the Noise Ordinance or a significant impact will occur.

Long-term off-site impacts from traffic noise are measured against two criteria. Both criteria must be met for a significant impact to be identified. First, project traffic must cause a substantial noise level increase (greater than 3 dB) on a roadway segment adjacent to a noise sensitive land use. Second, the future noise level that will exist if the project is completed must exceed the criteria level for the noise sensitive land use. In this case, the criteria level is 65 CNEL for residential land uses, schools, and other sensitive land uses. The project will have a significant impact if it causes a 3 dB increase and the resulting noise level is 65 CNEL or higher for sensitive land uses. In community noise assessment, changes in noise levels greater than 3 dB are often identified as significant, while changes less than 1 dB will not be discernible to local residents. In the range of 1 to 3 dB, residents who are very sensitive to noise may perceive a slight change. Note that there is no scientific evidence available to support the use of 3 dB as the significance threshold. In laboratory testing situations, humans are able to detect noise level changes of slightly less than 1 dB. In a community noise situation, however, noise exposures are over a long time period, and changes in noise levels occur over years, rather than the immediate comparison made in a laboratory situation. Therefore, the level at which changes in community noise levels become discernible is likely to be some value greater than 1 dB, and 3 dB appears to be appropriate for most people.

2.2 Temporary Impacts

2.2.1 Landfill Excavation and Fill

In addition to pipeline removal, it may be necessary to remove the buried landfill under the western two-thirds of the Pumpkin Patch site. If needed, this work would consist of the following phases: (1) remove the dry trash from the site and haul to a transfer station for disposal; and (2) using excavation equipment with a dredging bucket, remove wet trash so the water would be allowed to drain within the confines of the excavation. Any residual water brought to the surface would be contained for transfer to an on-site liquid retention Baker-type tank; the collected water would be sampled and subsequently disposed at an approved offsite facility.

Based upon a visual determination to identify the appropriate disposal method, inert waste would be hauled to a transfer facility within 5 to 10 miles, potentially hazardous waste would be hauled to a Class I or Class II facility, likely the Kettleman Hills Landfill. It is assumed that approximately 63,000 cubic yards of waste would be exported, and approximately 45,000 cubic yards of clean dirt would be imported. This fill material would likely be obtained from a site within a 10 to 50 mile radius.

A soil auger will be used to drill holes for dewatering. Recent monitoring by Greve & Associates indicates that a soil auger can reach 75 dBA at 35 feet. These measurements were made on Central Mine Equipment Company (CME) 75 truck mounted 8-inch soil auger, which will be similar to that used for the project. The nearest sensitive use is the residential apartments to the southwest. It is 1,150 feet from the center of the landfill to the closest residential building, and this would result in noise level of 45 dBA. Noise measurements at this residential area showed average (Leq) noise levels around 65 dBA (see Site 4 in Table 3), and therefore, the noise levels generated by the drilling will be well below ambient conditions and will not be an impact.

During the excavation phase a small dozer, excavator, and dump trucks will be used. At 50 feet these equipment have the following expected noise level; excavator 80 dBA, small dozer 85 dBA, and dump trucks 88 dBA. The total noise level from these equipment could be as high as 63 dBA (Leq) at the nearest residence. Again, the average noise level at the closest residential area is 65 dBA, and this noise level will be below ambient conditions, and therefore, will not be an impact.

During the import of fill a grader (85 dBA at 50 feet), a watering truck (88 dBA at 50 feet), and dump trucks (88 dBA at 50 feet) could be in operation. Total noise levels could reach 65 dBA at the nearest residence 1,150 feet from the center of the landfill site. This level is about the same as the average noise level at the residential site due to traffic on Pacific Coast Highway, and therefore, will not be an impact.

The maximum daily haul truck traffic would occur during import and would be 375 truck trips (one-way). All trucks would be heavy duty trucks and travel would occur during daytime hours. The haul truck traffic by itself would generate a noise level of 60.9 dBA CNEL at 50 feet from the centerline of the roadway. Truck routes are not known at this time, but most roadways in the area are major streets, and it is unlikely that the trucks would increase the noise levels significantly.

2.2.2 Construction and Demolition Noise

Construction noise represents a short-term impact on ambient noise levels. Noise generated by construction equipment, including drilling rigs, trucks, graders, bulldozers, and concrete mixers can reach high levels. Construction noise at each of the four sites is discussed below. It should be noted that the City of Long Beach exempts construction noise as long as it occurs

between 7 a.m. and 7 p.m. on weekdays, and 9 a.m. and 6 p.m. on Saturday (refer to Section 1.3.1).

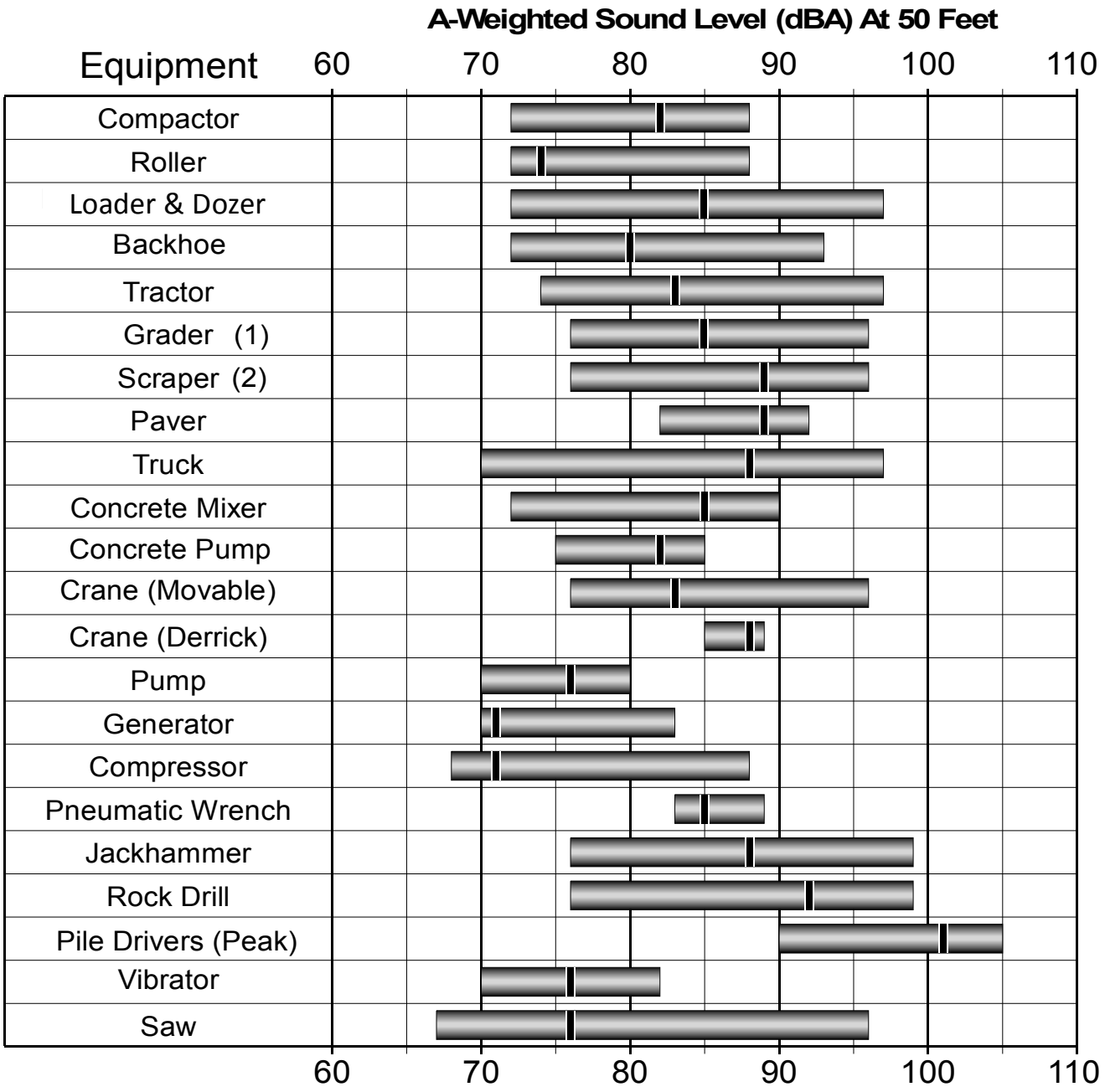
In general, the type of equipment that will be used for construction and demolition will the type of equipment used for most construction projects. Drilling will occur at the Pumpkin Patch and the LCWA sites. Drilling of new wells could be considered in the construction category, but since drilling operations will occur throughout the life of the project (initially for the drilling of new wells and eventually the reworking of wells), drilling operations are considered under operational impacts (refer to Section 2.3.2).

Worst-case examples of construction noise at 50 feet are presented in Exhibit 8. Typical equipment that might be employed for this type of project includes graders, scrapers, front loaders, trucks, backhoes, concrete mixers and concrete pumps. The maximum (Lmax) noise level for most of the equipment that will be used during the construction is 70 to 95 dBA at a distance of 50 feet. Noise levels at further distances would be less than this, and intervening terrain such as ridgelines would reduce noise levels even further. The noise levels shown in Exhibit 8 are based upon worst-case (i.e. loudest noise) conditions at the construction site, so these noise levels will be used as the basis for predicting the worst-case construction noise estimate.

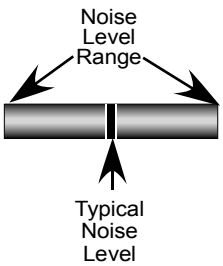
Pumpkin Patch

At the Pumpkin Patch site, an office building and warehouse will be constructed along with oil production facilities. Some demolition of oil facilities may occur on-site too. Commercial office buildings lie less than 100 feet north of the Pumpkin Patch site. Office buildings are usually not considered noise-sensitive. Additionally, these office buildings are exposed to significant noise levels generated by traffic on Pacific Coast Highway (refer to Section 1.4). The nearest noise-sensitive area would be the residential area southwest of the project, and approximately 830 feet from the site. This area is also exposed to significant levels of noise from Pacific Coast Highway, with noise levels that are probably very similar to those measured at Site 3 (refer to Section 1.4). Based on a distance of 830 feet, the worst-case unmitigated maximum (Lmax) construction noise levels could be 46 to 71 dBA at the residences. The average noise levels (L50) are typically 15 dB lower than the maximum (Lmax) noise levels. The 15 dB value is based on our general observations during construction noise measurements over the past 20 years. The use of a 15 dB difference is also consistent with most of the values presented in Exhibit 8 that show typical, which can be assumed to be average, and maximum noise levels. Average noise levels (L50) at the nearest existing residential buildings to the east (830 feet) could be in the range of 31 to 56 dBA (L50). Ambient noise levels were measured in the area along Pacific Coast Highway that would be representative of this area (i.e., Site 3). The Lmax noise level measured at this site was 83.3 dBA with an average noise level (L50) of 67.7 dBA. The Lmax and L50 noise levels during construction would be substantially less than ambient conditions, and no impacts would occur. Without mitigation, construction noise impacts will be less than a significant.

Exhibit 8 - Construction Noise Levels



LEGEND



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

G&A

LCWA Site

At the LCWA site oil production facilities will be constructed including up to 70 wells on the approximately 4-acre site. Additionally, a 22-foot high screen wall will be constructed, and in place before full operation of the site. The 22-foot high screen wall was not assumed to be in place during construction.

Commercial office buildings lie approximately 1,650 feet southwest of the LCWA site. Office buildings are usually not considered noise-sensitive. Additionally, these office buildings are exposed to significant noise levels generated by traffic on Pacific Coast Highway (refer to Section 1.4). The nearest noise-sensitive area would be the residential area southeast of the project, and approximately 1,825 feet from the site. This area is also exposed to significant levels of traffic noise from 2nd Street (refer to Section 1.4), and is surrounded by a soundwall. Based on a distance of 1,650 feet, the worst-case unmitigated maximum (Lmax) construction noise levels could be 40 to 65 dBA at the office buildings, and average construction noise could be in the range of 25 to 50 dBA (L50). Ambient noise levels were measured in the area that would be representative of this area (i.e., Site 1). The Lmax noise level measured at this site was 67.6 dBA with an average noise level (L50) of 54.0 dBA. The Lmax and L50 noise levels during construction would be substantially less than ambient conditions, and no impacts would occur. Without mitigation, construction noise impacts will be less than significant at the office buildings to the southwest.

Based on a distance of 1,825 feet and including the effect of the soundwall that surrounds the residences, the worst-case unmitigated maximum (Lmax) construction noise levels could be 34 to 59 dBA at the residences southeast of the project site. The average construction noise could be in the range of 19 to 44 dBA (L50). Ambient noise levels were measured in the area that would be representative of this area (i.e., Site 5). The Lmax noise level measured at this site was 88.3 dBA with an average noise level (L50) of 65.1 dBA. The Lmax and L50 noise levels during construction would be substantially less than ambient conditions, and no impacts would occur. Without mitigation, construction noise impacts will be less than significant at the residences to the southeast.

Since the resultant construction noise will be below ambient conditions, impacts from the construction of the LCWA site will be less than significant, and no mitigation measures are required.

Synergy Oil Field Site

The Synergy Oil Field site will see a low level of construction and demolition. The oil wells and associated piping, tanks, and accessory equipment will be removed. Excavators, loaders, trucks, ram hoes, and backhoes may be needed for demolition. Public trails will be established sometimes requiring some minor grading. Additionally, the existing office building will be converted to a Visitors' Center along with a parking lot and paved access road. In the northern 77 acres of the site restoration activities will occur. This will involve grading to clear some berms and establish other berms, and the construction of a sheet pile

wall that will be approximately 4,730 feet long. Grading and sheet pile driving will last 4 to 6 months and will occur outside of the nesting period for bird species utilizing the site. Restoration activities will use graders, trucks, and a sheet pile driver.

The restoration activities will have the greatest potential for generating a noise impact. With respect to the impact to sensitive receptors, there is a mobile home park north of the Synergy Oil Field Site. The closest mobile home is about 330 feet from the nearest grading activity. Restoration activities in this area nearest to the mobile home park could last up to 6 months. Based on a distance of 330 feet, the worst-case unmitigated maximum (Lmax) construction noise levels, mainly due to grading activities, could be 54 to 79 dBA at the residences. The average noise levels (L50) are typically 15 dB lower than the maximum (Lmax) noise levels. The 15 dB value is based on our general observations during construction noise measurements over the past 20 years. The use of a 15 dB difference is also consistent with most of the values presented in Exhibit 8 that show typical, which can be assumed to be average, and maximum noise levels. Average noise levels (L50) at the nearest existing mobile homes to the north (330 feet) could be in the range of 39 to 64 dBA (L50). Ambient noise levels were measured in the area that would be representative (i.e., Site 6). The Lmax noise level measured at this site was 51.1 dBA with an average noise level (L50) of 49.3 dBA. The Lmax and L50 noise levels during construction would be higher than ambient conditions, and impacts would occur. Without mitigation, construction noise impacts on the nearest sensitive receptors will be a significant impact, and mitigation measures are proposed in Section 3.1.

In addition to the mobile home park, the noise analysis also considered the potential impact of noise on sensitive species, specifically sensitive bird species. The species activity that would be most impacted by potential noise is nesting and breeding activity. In order to avoid impacts to bird species that utilize the site, all grading and sheet pile driving activity will be conducted outside of the nesting period and a mitigation measure has been recommended to ensure that this is implemented. (The nesting season lasts from March 1 to August 15.) 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 will still be able to continue to forage on site and this impact is not considered significant. (Refer to Section 6.1.3 of the "Biological Technical Report for the Los Cerritos Wetlands Oil Consolidation and Restoration Project" for a complete assessment.)

Sheet pile driving will occur as close as 621 feet from the mobile home park. It will require roughly 2 to 6 months of sheet pile driving 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.

The Federal Transit Authority ("Transit Noise and Vibration Impact Assessment," April 1995) reports that vibratory driving results in noise levels of 96 dBA at 50 feet when the pile is actually being driven. Approximately 1/3 of the time the pile is being driven with the other

2/3 of the time the pile is being positioned or checked. This results in an average noise level (Leq) of 91 dBA at 50 feet. At the mobile home park for a distance of 621 feet, the resultant noise levels will be a maximum noise level (Lmax) of 74 dBA and an average noise level (Leq) of 69 dBA. These levels do not pose any harm to the residents, but are well above ambient conditions and would result in speech interference when the residents are outside. Without mitigation, sheet pile driving noise impacts will be a significant impact, and mitigation measures are proposed in Section 3.1.

The Federal Transit Authority report states that impact driving results in typical noise levels of 101 dBA at 50 feet with peak noise levels as high as 105 dBA. At the mobile home park for a distance of 621 feet, the resultant noise levels will be a maximum noise level (Lmax) of 83 dBA and an average noise level (Leq) of 79 dBA. These levels do not pose any harm to the residents, but are well above ambient conditions and would result in speech interference when the residents are outside. Without mitigation, sheet pile driving noise impacts will be a significant impact, and mitigation measures are proposed in Section 3.1. Since vibratory pile driving is commonly used now, and since the impact pile driving is significantly louder, it is being recommended that vibratory pile driving be used.

The southern portion of the Synergy Oil Field site will see a low level of construction and demolition. Over time, the oil wells and associated piping, tanks, and accessory equipment will be removed. Usually only a few pieces of equipment will be needed for the demolition (e.g., trucks, excavators, ram hoe, and backhoe). Public trails will be established sometimes requiring some minor grading. Additionally, the existing office building will be converted to a Visitors' Center along with a parking lot and paved access road. The mobile home park would be about 2,000 feet from the field office that would be converted to a Visitor Center. All construction associated with the project is anticipated to occur during the daytime hours. Due to the large distance to the nearest sensitive receptors and the low level of construction anticipated for the southern portion of the site, construction noise will be less than significant for this portion of the Synergy Oil Field Site.

City Property Site

Approximately 12 oil wells and associated piping will be removed from the City Property site, and two additional wells will be removed from an area immediately adjacent to the City Property site and the Pumpkin Patch site. The City intends to use this site as open space. No improvements to this site are currently proposed. On the west edge of the City Property Site abuts an office building site. Office buildings are usually not considered noise sensitive. However, some offices are located within 200 feet of the City Property site. Levels of noise for the removal of the wells would usually be low, requiring only two or three pieces of equipment for the well removal. As a worst-case estimate, Lmax levels could reach 83 dBA at the office with average (Leq) noise levels typically in the 43 to 68 dBA range. Noise measurements at Site 1 are representative of the noise levels at the nearest office buildings and showed noise levels of 67 dBA (Lmax) and 55 dBA (Leq). Well removal has the potential to increase peak noise levels on occasion. Since the office buildings are not noise sensitive

and only well removal closest to the offices has the potential to increase noise, the noise impact is considered to be less than significant.

2.2.3 Vibration Impacts

The California Department of Transportation (Caltrans) has published the "Transportation and Construction-Induced Vibration Guidance Manual" (June 2004). This document has become the standard by which construction projects are evaluated for their vibration potential in California.

The most critical concern according to Caltrans is whether impact pile driving will be used. If impact pile driving is to be used then vibration levels can be high. Although no decision has been made on the construction technique to install the sheet piles, for the project will likely use vibratory sheet pile driving which has much less potential for generating vibration impacts, and no vibration impacts would occur with vibratory sheet pile driving.

Impact pile driving may also be considered as part of 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. The concepts of particle displacement, velocity, and acceleration are used to describe how the ground or structure responds to excitation. Although displacement is generally easier to understand than velocity or acceleration, it is rarely used to describe ground and structure borne vibration because most transducers used to measure vibration directly measure velocity or acceleration, not displacement. Accordingly, vibratory motion is commonly described by identifying the peak particle velocity (PPV). PPV is generally accepted as the most appropriate descriptor for evaluating the potential for building damage. The usual units of PPV are inches per second (in/sec).

The California Department of Transportation (Caltrans) has published the "Transportation and Construction-Induced Vibration Guidance Manual" (June 2004). This document has become the standard by which construction projects are evaluated for their vibration potential in California, and is used as a guide for evaluating this project.

The most critical concern is whether the use of pile driving will cause damage to surrounding buildings. The Caltrans manual identifies threshold criteria for vibration damage potential for various building types. Six categories are identified 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 these categories have a PPV threshold of 0.5 in/sec.

The Caltrans manual also discusses the potential for feeling the vibration generated by the pile driving. Since the ability to feel the vibration is a short-term impact, this is considered to be more of an annoyance issue rather than an impact. The manual provides four categories for annoyance potential criteria. The criteria are presented in Table 5 .

Table 5 Vibration Annoyance Potential Criteria

Human Response	Maximum PPV (in/sec)
Barely Perceptible	0.01
Distinctly Perceptible	0.04
Strongly Perceptible	0.10
Severe	0.4

The equipment to be used, if impact pile driving was selected, has not been determined. As a worst case a Delmag diesel hammer Model D30-32 was used for the analysis. The rated energy for this equipment is 69,000 foot-pounds. According to the manufacturer's website the maximum piston weight is 6,615 pounds and delivers between 36 and 52 blows per minute. The number of piles, length of construction, and size of piles is not yet known, and will be engineered as part of the design. The hours of operation will be limited by the Long Beach Noise Ordinance (Section 8.80.202). Construction is not allowed between 7:00 p.m. and 7:00 a.m. on weekdays and federal holidays. Construction is also prohibited between "7 p.m. on Friday and 9 a.m. on Saturday and after 6 p.m. on Saturday." On Sundays construction is prohibited all day.

The Caltrans manual (referenced previously) provides a methodology for estimating the PPV value at a nearby receptor. The methodology uses (1) the distance from the pile driver to the receptor, (2) the rated energy of the pile driver, and (3) an "n" value for the intervening ground. The closest distance to the receptors from potential pile driving activities would be 621 feet. The soil in the area can best be described as "silty fine sands" and "loose (soft) fine sand, sandy silt, and soft clayey silt…" Caltrans provides four categories of soil with suggested "n" values. The soil description most closely matches Caltrans Class II soils, which have an "n" value of 1.3. The Caltrans equations were then used to project the vibration level at the nearest mobile home park area.

The PPV value calculated is 0.01 inches per second. The structural damage threshold is 0.50 in/sec. The forecast vibration level is 0.01 in/sec. This level is well below the 0.50 in/sec threshold, and therefore, no structural damage is anticipated and no significant impacts will occur. Near the area of pile driving the vibration levels will be higher but not a potential impact to off-site humans or structures.

The ability to detect vibration is also considered because of its potential for annoyance. At the mobile home park the vibration levels will be "barely perceptible." Since the pile driving activities are short term in nature, annoyance due to the ability to detect vibration is usually not used as the determinant for impacts. As noted above, as no pile driving or grading will take place during the nesting season for sensitive bird species, this construction activity will

not have an impact on any sensitive species on site. No significant vibration impacts will occur with impact pile driving.

2.3 Long-Term Off-Site Impacts

This section examines noise impacts from the proposed project on the surrounding land uses. Traffic generated by the project will result in increased traffic noise levels along the roadways in the vicinity of the project. The project will generate significant noise levels on-site, and the potential for this noise to impact adjacent uses is considered.

2.3.1 Off-Site Traffic Noise

The project will not generate significant off-site traffic noise. A detailed traffic study has not been prepared for the project since the project does not have the potential to generate significant levels of traffic. At the Pumpkin Patch site an office/warehouse will be located that will have 47 parking spaces. Two hundred (200) trips per day might be an upper end estimate of the trips in and out of the Pumpkin Patch site. This estimate is a high end estimate that would be applicable to both construction and operation. The traffic from Pumpkin Patch would feed onto Pacific Coast Highway that has a current estimate daily traffic volume of over 40,000 vehicles per day. This would result in an increase in noise of 0.02 dB. The increase in traffic noise on Pacific Coast Highway due to the project would be imperceptible and would be less than significant.

The Visitor Center on the Synergy Oil Field Site would attract guests. A formal estimate of visitor trips has not been made. The visitors would access the site via 2nd Street. 2nd Street in the vicinity of the project has an estimated 38,000 vehicles per day on it. An increase of 500 trips per day, for example, would cause less than a 0.1 dB increase in noise levels along 2nd Street. An increase of 500 trips per day to the Synergy site would be a very high (i.e., worst-case) estimate that would be applicable to both construction and operational activities. The impact of the project on traffic noise will be much less than the 3 dB significance threshold and will not be a significant impact.

2.3.2 On-Site Oil Production Operations

The Pumpkin Patch and LCWA sites will be developed with oil production facilities. These facilities have the potential to generate noise, and therefore, need to be assessed for potential impacts. Compliance with the Long Beach Noise Ordinance is the benchmark used to determine whether a noise impact will occur. It should be noted that the design for the oil production facilities is in its initial phases. Equipment has not been selected. Therefore, this analysis uses a combination of specifications for some of the equipment that will 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 study for the oil production facilities. This will be required prior to construction permits. Rather, this analysis as required by CEQA determines whether the project can feasibly comply with the City's Noise Ordinance.

Therefore, worst-case assumptions when specific information is not available have been made in regards to noise levels. Both the Pumpkin Patch and LCWA sites are addressed below. It should be noted that the approach is not considered to be "delayed mitigation" but rather is consistent what is normally done for large engineering projects. It is impossible to completely design a project before obtaining environmental clearance. The following analysis consistently uses worst-case assumptions when determining potential noise levels from project equipment. Proper selection during the final design of equipment and control devices (e.g., mufflers, enclosures, etc.) will result in the project complying with all City noise regulations. This analysis conclusively shows that it is feasible to design and operate the project in a manner that will result in compliance with City noise regulations.

Pumpkin Patch

The Pumpkin Patch site will be developed with 50 wells. According to SPEC Services, (who has provided much of the information in this section and who is doing the oil engineering for the project) the wells will incorporate electric submersible pumps. That is, the pump is down in the well and is driven with an electric motor as opposed to the common wells that are driven with diesel engine and are above grade. This system is substantially quieter than the standard oil well pump that most people commonly see in the field. Several unsuccessful attempts were made to measure submersible oil wells in the Long Beach and Huntington Beach areas. Submersible wells were measured by this firm in the Brea area and a noise value of 60 dBA at 15 feet per well was used for this analysis.

Three injection pumps plus a backup will probably be used on-site. About one-third of the 50 wells will inject water underground to drive oil to the other wells. These injection pumps will be electric driven, unlike many injection pumps that are driven by diesel motors. Electric drives are much quieter than diesel. According to SPEC Services these pumps have a noise level of roughly 85 dBA at 3 feet per pump.

One drilling rig will be located on-site. Whereas the common drilling rig is powered by a diesel engine, this rig will be electric driven which is much quieter. There will be a façade around the drilling rig that will help to reduce noise levels and make the rig more visually appealing. SPEC Services estimates that the drilling rig will have a noise value of 80 dBA at the property line, and this is consistent with our drilling rig data of 79 dBA at 50 feet based on data published by the Federal Highway Administration.

A flare and blowdown will be located on site, but will only be used for emergency situations, and since it is regarded as emergency equipment it is exempt from the Noise Ordinance (Municipal Code Section 8.80.250).

The Pumpkin Patch site will be surrounded by a 22-foot high masonry wall that will act as a noise barrier. The data above was used to calculate the noise levels at key areas around the site. Specifically, noise levels were projected for the three noise measurement sites plus the nearest residential area. The loudness of the equipment, the distance from the site to the

receptors, and the barrier effect of the wall were all accounted for in the calculations. A spreadsheet is provided in the Appendix. The results of the calculations are provided below in Table 6 .

Table 6 Noise Levels Generated by Pumpkin Patch Oil Production

Location	Operational Noise Level (dBA L50)	Ambient Noise (dBA L50)	Daytime Ordinance Limit (dBA L50)	Nighttime Ordinance Limit (dBA L50)
1	52.3	52.9	55	N/A
2	53.4	56.6	60	N/A
3	50.8	66.0	70	N/A
Nearest Residential (i.e., Site 4)	45.8	62.5	70	65

The first column of Table 6 simply identifies the receptor location. Receptor sites 1, 2, and 3 are the measurement sites presented previously, and the nearest residential area lies more than 1,000 feet southwest of the middle of the Pumpkin Patch site. The second column presents the projected noise level generated by the oil production operations. The third column represents the noise level measured. For the residential site, the noise levels measured at Site 3 were used since they would be the most similar. The Noise Ordinance limits are presented in the fourth and fifth columns. (Note that the Long Beach Noise Ordinance is used since it is the ordinance that regulates the noise of the facility. Additionally, the Long Beach ordinance is more stringent than the Seal Beach ordinance.) The daytime limit was increased in 5 dB increments per the direction given in the Noise Ordinance to accommodate the ambient noise level. The nighttime noise limit is 5 dB less than the daytime limit. No nighttime limit is given for Sites 1 through 3 because these are either commercial or office and would not be operating during the nighttime hours. In all cases, the noise level projected for oil production is below the Noise Ordinance criteria. No sensitive species have been identified on the Pumpkin Patch and therefore no impact to sensitive species from operational noise is anticipated. Therefore, the noise impact from oil production operations at Pumpkin Patch will result in a less than significant impact if properly designed. Mitigation is proposed in Section 3.2.2 to ensure that the facility is properly designed.

LCWA Site

The LCWA Site will have similar noise generating equipment as the Pumpkin Patch site. The LCWA is proposing 70 wells, and will have injection pumps, gas turbines, compressor, and two drilling rigs similar to Pumpkin Patch. Additionally, the LCWA Site is proposed to have a storage tank and piperack, but these features will add little to the noise levels generated. A flare and blowdown will be located on site, but will only be used for emergency situations,

and since it is regarded as emergency equipment it is exempt from the Noise Ordinance (Municipal Code Section 8.80.250).

The site is relatively isolated from noise-sensitive receptors. The nearest noise-sensitive receptor is at the office complex to the southwest represented by noise measurement Site 1 and is approximately 1,875 feet from the center of the site. The nearest residence is the residential area located 2,195 feet to the southwest from the middle of the LCWA site.

The LCWA Site is located in Noise District 4 which has higher noise limits than District 1 (See Section 1.3.1). The noise limit is the average of the two districts since the LCWA site is in District 4 and the receptors are located in District 1.

The LCWA site will be surrounded by a 10-foot high masonry wall, which will act as a noise barrier. The data above was used to calculate the noise levels at key areas around the site. Specifically, noise levels were projected for the two critical sites. The loudness of the equipment, the distance from the site to the receptors, and the barrier effect of the wall were all accounted for in the calculations. A spreadsheet is provided in the Appendix. The results of the calculations are provided below in Table 7 .

Table 7 Noise Levels Generated by LCWA Oil Production

Location	Operational Noise Level (dBA L50)	Ambient Noise (dBA L50)	Daytime Ordinance Limit (dBA L50)	Nighttime Ordinance Limit (dBA L50)
1	46.6	52.9	60	N/A
Residential to SE (i.e., Site 5)	45.3	65.1	70	65

The noise levels projected for the LCWA oil production are all very low for the two sites. The noise levels are projected to be in the mid 40 dBA range, which is much lower than typical suburban noise levels and the noise levels monitored. The projected noise levels are also well below those required by the City of Long Beach Noise Ordinance. No sensitive species have been identified on the LCWA site and therefore no impact to sensitive species from operational noise is anticipated. Therefore, the noise impact from oil production operations at LCWA will result in a less than significant impact if properly designed. Mitigation is proposed in Section 3.2.2 to ensure that the facility is properly designed.

2.3.3 Aircraft Noise

There are two airports in the vicinity of the project, but aircraft overflight noise is not significant at the project site. Aircraft overflights were not a significant cause of noise during the ambient noise measurements at the site. The Los Alamitos Army Airfield is located roughly 3 miles northeast of the LCWA site. The nearest commercial airport is the Long

Beach Airport, which lies to the northwest approximately 3.5 miles. There are no aircraft noise impacts at the project site.

3.0 MITIGATION MEASURES

3.1 Temporary Impacts

The analysis presented in Section 2.2.2 shows that the project will result in significant construction noise impacts due to grading and sheet pile driving on the Synergy Oil Field site. Mitigation measures are presented below.

Mitigation Measure N-1: Control of Construction Hours. The hours of operation will be limited in a manner consistent with the Long Beach Noise Ordinance (Section 8.80.202). Construction is not allowed between 7:00 p.m. and 7:00 a.m. on weekdays and federal holidays. Construction is also prohibited between 7 p.m. on Friday and 9 a.m. on Saturday and after 6 p.m. on Saturday. On Sundays construction is prohibited all day.

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

Mitigation Measure N-3: Limit Grading and Pile Driving. All grading and sheet pile driving activities will 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 N-4: Prohibit Impact Sheet Pile Driving. Impact sheet pile driving should be prohibited on the Synergy Oil Field Site. Only vibratory sheet pile driving should be employed.

3.2 Long Term Off-Site Impacts

3.2.1 Traffic Noise

The analysis presented in Section 2.3.1 shows that the project will not result in any significant long-term off-site traffic noise impacts. No mitigation is required.

3.2.2 On-Site Compatibility

The analysis concluded that the oil production facilities at both the Pumpkin Patch and LCWA sites, if properly designed, would be able to meet the City of Long Beach Noise Ordinance criteria. Mitigation Measure N-5 will ensure that the oil production facilities will be designed properly and will meet the City's Noise Ordinance limits.

Mitigation Measure N-6: Require Acoustical Study and Testing. Prior to issuance of construction permits for 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 and will fall within the range of operational noise level provided in this report. 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.

4.0 UNAVOIDABLE SIGNIFICANT IMPACTS

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

APPENDIX

Pumpkin Patch Operational Noise
April 15, 2016

Unit	No.*	Nz Level (dBA)	Total Nz.	Distance	Nz Level at 50 ft.	
Wells	50	60.0	77.0	15	49.5	Tonner Submersible Well
Drill Rig	1	79.0	79.0	50	79.0	FHWA/DOT Data
Gas Turbine	2	80.0	83.0	3	55.6	Spec Services
Injection Pumps	3	85.0	89.8	3	60.6	Spec Services
Compressor	1	73.3	73.3	114	80.5	Tonner Compressor K300
Total	--	--	--	--	82.8	

* Number of units likely to be operating at any one time. May be additional units that are used primarily for backup.

Critical Freq. (Hz)	***500***

Dist.	dBA
50	82.8
100	76.8
200	70.8
300	67.3
400	64.8
500	62.8
600	61.3
700	59.9
800	58.8
900	57.7
1000	56.8

dBA	Dist.
80	69
75	123
70	219
65	390
60	693
55	1,233
50	2,192
45	3,898
40	6,931
35	12,325

Lot	Ground Elevation	Source Ht	Source Elevation	Distance To Wall	Base Of Wall	Dist. To Observer	Receptor Elevation	Observer Height	Wall Height	Barrier Reduction	Noise Level (dBA)
Site 1	0.0	3	3.0	241	0.0	411	0.0	5	**22.0**	11.6	52.9
Site 2	0.0	3	3.0	214	0.0	318	0.0	5	**22.0**	12.8	54.0
Site 3	0.0	3	3.0	264	0.0	560	0.0	5	**22.0**	10.4	51.4
Nearest Resy	0.0	3	3.0	307	0.0	1156	0.0	5	**22.0**	9.2	46.4

LCWA Operational Noise

Unit	No.*	Nz Level (dBA)	Total Nz.	Distance	Nz Level at 50 ft.	
Wells	70	60.0	78.5	15	68.0	Tonner Submersible Well
Drill Rig	2	79.0	82.0	50	82.0	FHWA/DOT Data
Gas Turbine	2	80.0	83.0	3	58.6	Spec Services
Injection Pumps	3	85.0	89.8	3	65.3	Spec Services
Compressor	1	73.3	73.3	114	80.5	Tonner Compressor K300
Total	--	--	--	--	84.5	

* Number of units likely to be operating at any one time. May be additional units that are used primarily for backup.

Critical Freq. (Hz)	***500***

Dist.	dBA
50	84.5
100	78.5
200	72.4
300	68.9
400	66.4
500	64.5
600	62.9
700	61.6
800	60.4
900	59.4
1000	58.5

dBA	Dist.
80	84
75	149
70	265
65	471
60	837
55	1,489
50	2,648
45	4,709
40	8,373
35	14,890

Lot	Ground Elevation	Source Ht	Source Elevation	Distance To Wall	Base Of Wall	Dist. To Observer	Receptor Elevation	Observer Height	Wall Height	Barrier Reduction	Noise Level (dBA)
Site 1	0.0	3	3.0	150	0.0	1875	0.0	5	**10.0**	6.4	46.6
Resy to SW	0.0	3	3.0	150	0.0	2195	0.0	5	**10.0**	6.4	45.3