CHRISTOPHER JEAN & ASSOCIATES, INC.
ACOUSTICAL CONSULTING SERVICES

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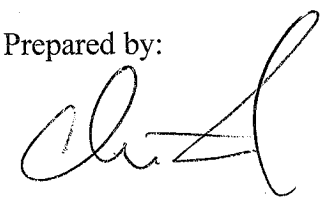
ACOUSTICAL ANALYSIS

LANCASTER CLEAN ENERGY CENTER AND

GREEN HYDROGEN ELECTROLYSIS PLANT

CITY OF LANCASTER

Prepared by:



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SUMMARY

This analysis has been completed to determine the exterior and interior noise exposure and the necessary mitigation measures for the proposed Lancaster Clean Energy Center and Green Hydrogen Electrolysis Plant project located in the City of Lancaster. A list of requirements and recommendations is given in the following summary. Details are discussed in the body of the report.

A. EXTERIOR NOISE CONTROL

Exterior noise control measures are neither required nor proposed.

B. INTERIOR NOISE CONTROL

The buildings shall be constructed, as a minimum, in accordance with the outline of Table 3 found in the body of the report. This will be adequate for all office areas of the project when located more than 150 feet from a major roadway.

C. VENTILATION

This analysis assumed that all office windows and doors are kept closed. If the allowable interior noise levels are met by requiring that windows and doors be kept closed, then the design of the structures must also specify a ventilation or air conditioning system to provide a habitable interior environment. The ventilation system must not compromise the office area noise reduction.

D. UNIT-TO-UNIT NOISE CONTROL

Common wall assemblies between office areas and manufacturing/warehousing areas are subject to the CalGreen Sound Transmission Class (STC) requirements. The plans provided for this analysis did not include common wall assembly details. It is highly recommended that one of the following widely used common wall assemblies, either of which rate at least STC 40, be incorporated into the building plans:

(1) One layer 1/2" direct nailed drywall, 2" by 4" wood studs, R-13 fiberglass insulation, one layer 1/2" direct nailed drywall (Owens/Corning Fiberglas, OCF W-24-69, 1969, 16f, Owens/Corning Fiberglas, STC 40)

(2) One layer 1/2" drywall screwed to 3 5/8" metal studs, R-11 fiberglass insulation, one layer 1/2" drywall screwed to studs (Owens/Corning Fiberglas, OCF 426, 1967, 16f, Owens/Corning Fiberglas, STC 44).

E. PROJECT DISCLOSURE

The acoustical code requirements are minimal acceptable standards. Compliance with Building Department acoustical criteria does not require, guarantee or even imply that local sound sources will be mitigated to inaudibility. Compliance with an interior noise limit of 50 dBA Leq(1 hour) means that exterior noise sources will remain audible on the interior of a structure.

Due to quality control and other field related problems, the code minimum laboratory rating of STC 40 for common wall assemblies does not guarantee that all common wall assemblies will pass a field test. In fact, there is a 50% chance that half of all laboratory rated STC 40 common wall assemblies could fail field tests. An STC 40 rated assembly will produce around 35 dBA of voice reduction in the field. This means that normal conversation in adjoining units will be audible a certain percentage of the time.

Do not misrepresent the degree of exterior to interior or unit to unit acoustical isolation as anything more than meeting code during any phase of this project. Never, ever, use any form of the term "Soundproof" to describe any portion of this project.

F. PROJECT NOISE

Project noise levels could potentially impact the nearest residential uses around the perimeter of the project site. However, the majority of the project site will create only low levels of noise and should not impact any residential uses. The only area of the site that could potentially create high noise levels would be the Green Hydrogen Electrolysis Plant. An analysis of the proposed project equipment could not be performed as the equipment specifications were

not yet available. Thus, it is highly recommended that an acoustical review of the proposed equipment be performed once this equipment is specified.

G. CONSTRUCTION NOISE

Short term construction noise impacts at the nearest residential uses is likely to be unavoidable. Thus, noisy construction phase operations shall be scheduled to minimize the durations of such operations in proximity to the nearest residential uses.

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1.0 INTRODUCTION

This report presents the results of a noise impact and design study of the proposed Lancaster Clean Energy Center and Green Hydrogen Electrolysis Plant project to be located in the City of Lancaster. This report includes a discussion of the expected exterior community noise environment and the recommendations for control of exterior noise in the interior office spaces and project noise at the nearest residential uses.

A vicinity map showing the general location of the project site is presented in Exhibit 1 – Site Location Map. An aerial photograph of the existing project area is shown on Exhibit 2. The project boundaries and the nearest noise sensitive uses are shown on Exhibit 3. The project consists of mainly industrial equipment to be used to produce liquid hydrogen.

2.0 APPLICABLE NOISE CRITERIA

The City of Lancaster and the California Green Building Standards (CalGreen) require all non-residential projects to conform to the requirements of Table 1.

TABLE 1

APPLICABLE NOISE CRITERIA (1)

Exterior	None
Interior	50 dBA Leq(1 hour)
Unit-to-Unit	STC 40

(1) Please see Noise Rating Methods (Appendix 1) for an explanation of the commonly applicable acoustical terminology. The interior noise limit applies only to office areas.

3.0 AMBIENT NOISE LEVELS

The proposed project site is quite large and various residential uses exist along the site perimeter. As the project is dependent on sunlight for power, the majority of the project facilities will operate only during daylight hours. Since these operations could impact the nearby residential uses, the existing daytime ambient conditions at the Receptor locations shown on Exhibit 3 were calculated from the existing traffic counts published in the Lancaster General Plan. The calculations are contained in Appendix 2. The calculation results are given in Table 2.

TABLE 2

EXISTING DAYTIME AMBIENT NOISE LEVELS(1)
AT NEAREST RESIDENTIAL USES

LOCATION	DESCRIPTION	LEVEL
1	West side of 40th Street East from East Avenues K8 to K12	48 dBA Leq
2	West side of 40th Street East north of East Avenue K	53 dBA Leq
3	End of 46th Street East south of East Avenue J	47 dBA Leq
4	South of East Avenue K east of 65th Street East	52 dBA Leq
5	East side of 50th Street East from East Avenues K4 to K8	58 dBA Leq
6	Southeast corner of 50th St East and East Avenue L	59 dBA Leq
7	North side of East Avenue L from 40th St to 45th St East	57 dBA Leq

(1) As aircraft operations can be sporadic, the contribution of aircraft noise was not included in the ambient noise levels.

4.0 DESIGN NOISE LEVELS

4.1 ROADWAYS

The expected future roadway noise impacts upon the project site were projected using the Federal Highway Administration's Highway Noise Prediction Model (FHWA RD-77-108) together with several roadway and site parameters that determine the projected impact of vehicular traffic noise. These include the roadway cross-section (e.g. number of lanes), the roadway active width, the average daily traffic (ADT), the vehicle travel speed, the percentage of auto and truck traffic, the roadway grade, the angle of view, the site conditions ("hard" or "soft" site), and the percentage of average daily traffic that flows each hour throughout a 24 hour period.

The forecast traffic volumes were obtained from the City of Lancaster General Plan. The percentage of truck traffic was taken from a standard arterial mix. The same source was used to project the distribution by time of day. The input data is listed in Table 3.

TABLE 3

TRAFFIC INPUT DATA

	% DAY	% EVENING	% NIGHT	% VOLUME
Autos	75.51	12.57	9.34	100.0
Medium Trucks	1.56	0.09	0.19	100.0
Heavy Trucks	0.64	0.02	0.08	100.0

Volume = 16,000 ADT on East Avenues J, J8, K and L
= 16,000 ADT on 40th Street East and 50th Street East

Speed = 50 MPH (posted) on 40th Street East, East Avenues J8 and K
= 55 MPH (posted) on 50th Street East, East Avenues J and L

The calculations are contained in Appendix 3. The calculations yield 100 foot design noise levels of 66 dBA Leq(1 hour) for 40th Street East, 67 dBA Leq(1 hour) for 50th Street East, 67 dBA Leq(1 hour) for East Avenue J, 65 dBA Leq(1 hour) for East Avenue J8, 66 dBA Leq(1 hour) for East Avenue K, and 67 dBA Leq(1 hour) for East Avenue L.

4.2 RAILROAD

There are no railroad operations in the vicinity of the project site. Railroad noise will not impact the site.

4.3 AIRCRAFT

The Palmdale Airport/Plant 42 General Plan Airport Noise Contours are shown on Exhibit 4. Exhibit 4 shows the site to lie along the 65 dBA CNEL noise contour with levels ranging from about 62 dBA CNEL at the east end of the project site to 66 dBA CNEL at the west end of the project site.

4.4 COMBINED NOISE SOURCES

The roadway and aircraft noise sources will combine on the project site. Thus, future exterior noise levels will range from a low of 68 dBA Leq(1 hour) at the east end of the project site up to a high of 70 dBA Leq(1 hour) at the west end of the site.

5.0 MITIGATION MEASURES

5.1 EXTERIOR

Neither the City of Lancaster nor CalGreen require exterior noise mitigation for non-residential projects. No exterior noise mitigation is proposed.

5.2 INTERIOR

The City's and CalGreen exposure criteria for new non-residential construction require that the interior noise environment, attributable to outside noise sources, be limited to 50 dBA Leq(1 hour) in all office spaces. Manufacturing and warehousing areas are not subject to the interior noise limit. Analysis and recommendations for control of outdoor-to-indoor noise intrusion are presented in this section.

The exterior-to-interior noise reduction expected for the planned construction was based on a detailed analysis of sample rooms and units planned for the development. Calculations of the expected typical noise reduction performance were performed for sample rooms. The analysis was based on the typical spectra expected for the primary sources of community noise impact, the typical octave-band transmission loss for each

element in the planned building shell, the relative square footage of each element of the planned building shell, the expected typical interior surface treatment, and the acoustical absorption coefficient for each interior surface treatment. Corrections for the "A" Weighted room absorption factors are also included.

Each component of the building shell (e.g. exterior wall, windows, doors, etc.) provides a different amount of transmission loss for each "A" Weighted octave- band of community noise. With the knowledge of the building shell components and their individual octave band transmission loss values for the noise sources, calculations of the composite building shell transmission loss can be made for each room.

The characteristics of the basic building shell are listed in Table 4.

TABLE 4

BASIC BUILDING SHELL CHARACTERISTICS

PANEL	CONSTRUCTION
Exterior Wall	Tilt-up concrete -- OR -- Steel siding over metal studs, fiberglass insulation, 5/8" drywall
Windows/Doors	1/4" fixed in storefront frame
Roof	Built-up or steel roof sheathing over 1/2" plywood, fiberglass insulation 5/8" drywall
Floor	Carpeted

Table 4 construction minimums will provide at least 20 dBA of exterior-to-interior noise reduction. Thus, Table 4 construction will provide compliance with the 50 dBA Leq(1 hour) interior noise limit for all buildings exposed to exterior noise levels as high as 70 dBA Leq(1hour). Since the highest exterior noise levels on the project site are not expected to exceed 66 dBA Leq(1 hour), Table 4 construction should be adequate for all office areas on the project. No additional interior noise reduction measures are necessary.

5.3 VENTILATION

If interior allowable noise levels are met by requiring that office area windows be unopenable or remain closed, then the design of the structure must also specify a

ventilation or air conditioning system to provide a habitable interior environment. The ventilation system must not compromise the office area noise reduction.

5.4 UNIT-TO-UNIT NOISE CONTROL

Common wall assemblies between office areas and manufacturing/warehousing areas are subject to the CalGreen Sound Transmission Class (STC) requirements. The plans provided for this analysis did not include common wall assembly details. It is highly recommended that one of the following widely used common wall assemblies, either of which rate at least STC 40, be incorporated into the building plans:

(1) One layer 1/2" direct nailed drywall, 2" by 4" wood studs, R-13 fiberglass insulation, one layer 1/2" direct nailed drywall (Owens/Corning Fiberglas, OCF W-24-69, 1969, 16f, Owens/Corning Fiberglas, STC 40)

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5.5 PROJECT DISCLOSURE

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6.0 PROJECT NOISE SOURCES

The project will introduce mechanical noise sources that could potentially impact the residential uses near the boundaries of the project site. Automobiles, medium and heavy trucks will travel onto and off the site as well as maneuver around the site. As the vehicle speeds will be significantly slower than traffic on area roadways, on site vehicle traffic will be significantly less noisy and indistinguishable from traffic on area roadways.

The project mechanical equipment could potentially impact the nearest residential uses. Most of the project will be large fields of solar panels. The primary noise source at the solar panels fields will be the "Inverter" units that take the direct current (DC) electrical power produced by the photovoltaic panels and convert it to alternating current (AC) electrical power for transfer to the local electrical grid. A similar project installed Sungrow SG 125HV 125 kW inverters in a 16 unit array on a concrete pad. The manufacturer data for these inverters is contained in Appendix 4. The manufacturer reports a single unit noise output level of 53.7 dBA at a distance of 1 meter (3 feet). An array of 16 inverters could produce a combined noise level of 65.7 dBA at a distance of 1 meter (3 feet). Using a point source propagation rate of 6 dB per doubling of distance, the combined noise level at a distance of 50 feet would be 41.3 dBA. This is below the lowest daytime ambient noise level of 47 dBA Leq calculated for Receptor 3. Such inverter arrays should not impact any of the nearest residential uses as long as the arrays are installed at least 50 feet from any project boundary.

The Green Hydrogen Electrolysis Plant could install equipment that could create more noise than the solar panel inverters. Such equipment could impact the residential uses across 50th Street East. Due to their proximity to 50th Street East, these residential uses are already exposed to daytime exterior noise levels around 58 dBA Leq. This means that project mechanical equipment could produce noise levels as high as 74 dBA Leq at a distance of 50 feet and not exceed the existing ambient. As the project is designed to use electrolysis to produce the liquid hydrogen, it is unlikely that any of the proposed equipment will produce noise levels this high. However, as an equipment list was not yet available for this analysis, it is highly recommended that an acoustical review be performed once the proposed equipment is specified.

7.0 CONSTRUCTION NOISE

The construction phase of the project will produce noise levels that could potentially impact the nearest residential uses around the perimeter of the project site. The residential uses are exposed to daytime exterior noise levels as low as 47 dBA Leq (Receptor 3). Worst-case construction activities (likely grading operations in this instance) could produce noise levels as high as 84 dBA Leq at a distance of 50 feet. It would take a distance of 3,000 feet for such construction noise to approach the existing ambient at Receptor 3. Thus, some construction noise impacts will be unavoidable. The only way to mitigate construction noise with the distances involved will be to schedule the loudest construction activities to be completed within the shortest time possible to minimize such impacts.

EXHIBIT 1
SITE LOCATION

Google Maps

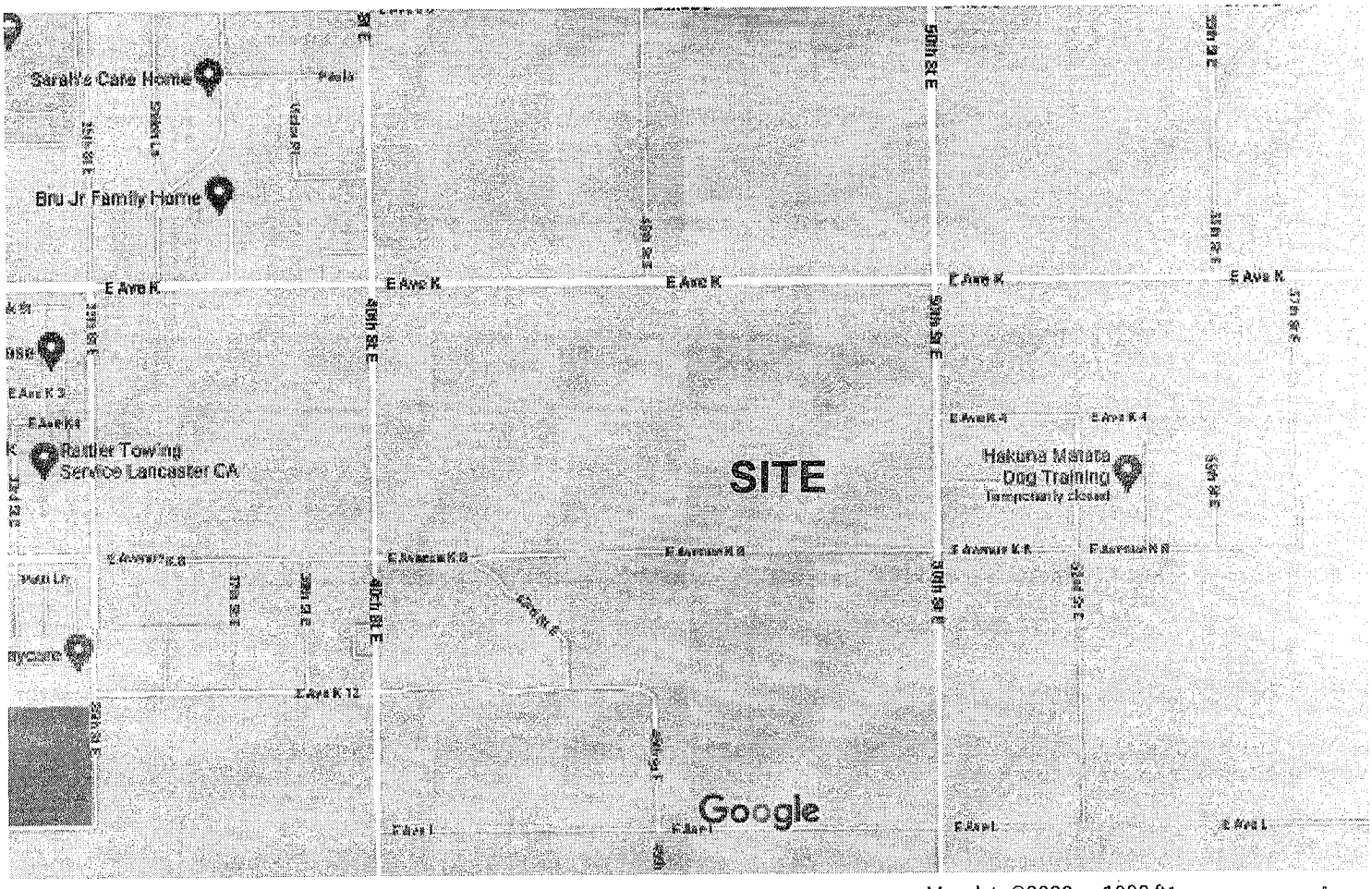
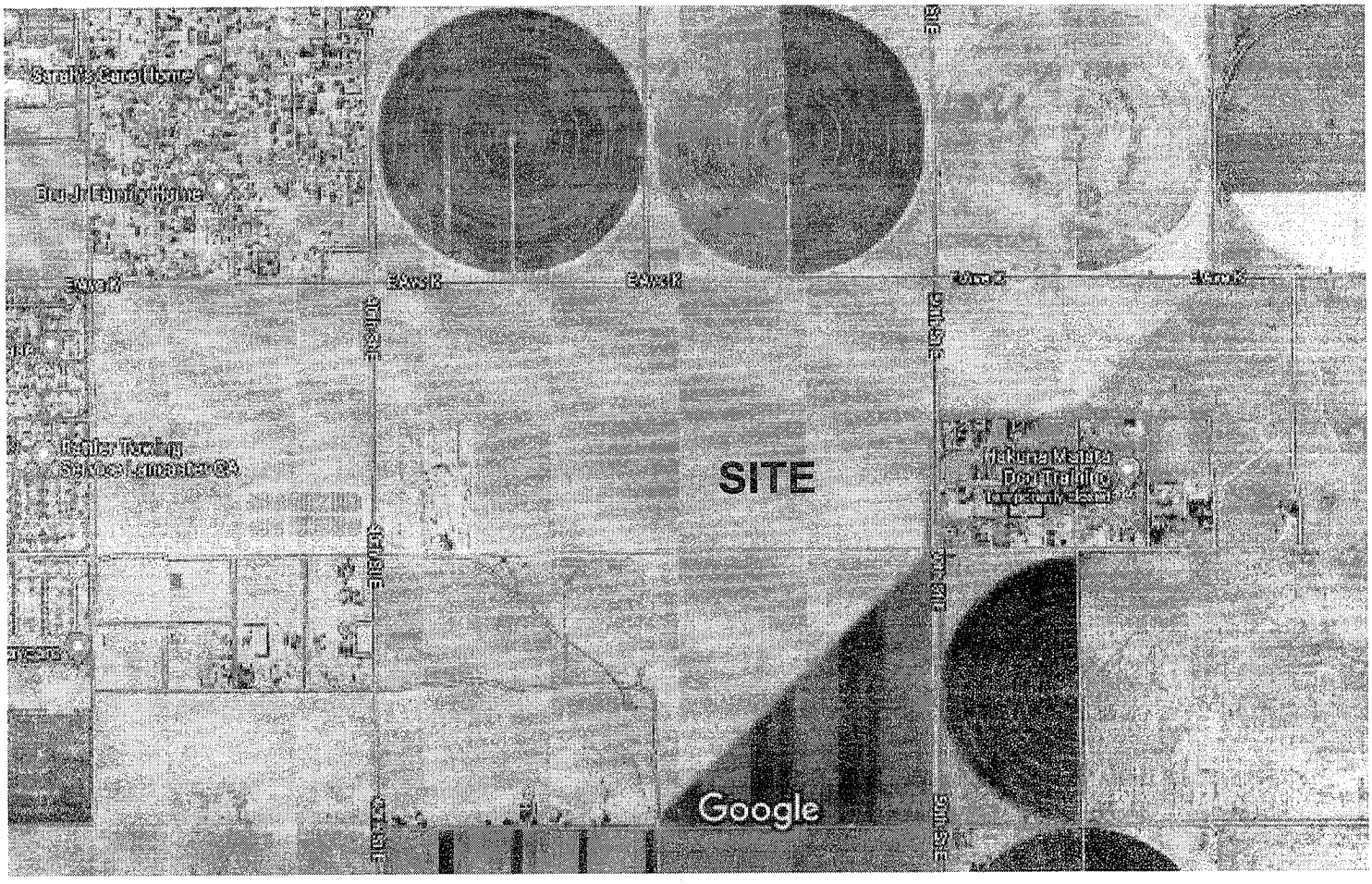


EXHIBIT 2
AERIAL PHOTO

Google Maps



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