Appendix B

Noise Memo

Kimley»Horn

MEMORANDUM

To: Paul Junker, Contract Planner, City of Rio Vista

From: Noemi Wyss AICP, Air Quality and Noise Manager, Kimley-Horn

Kimley-Horn and Associates, Inc.

Date: January 3, 2022

Subject: City of Rio Vista Oasis Farms Project – Acoustical Analysis

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1.0 PURPOSE

The purpose of this memorandum is to identify the air quality and greenhouse gas (GHG) emissions associated with construction and operations of the proposed City of Rio Vista Oasis Farms project (project), located in the City of Rio Vista, California. This comparative analysis has been undertaken to analyze whether the proposed project would result in any new or substantially more severe significant environmental impacts as compared to the conclusions discussed in the certified Final Program Environmental Impact Report (FEIR) for the General Plan (Approved Project).

2.0 PROPOSED PROJECT DESCRIPTION

The proposed project is in the City of Rio Vista (City) in the County of Solano. The project site is located on Harvey Felt Court in the City of Rio Vista Business Park. The project site is in the former City of Rio Vista Municipal Airport. The surrounding land uses are consistent with the site's former use as an airport and ongoing efforts to repurpose the area for industrial business uses. Land uses immediately adjacent to the south is Harvey Felt Way and abutting the roadway further south is an agricultural processing and packaging plant. To the north and northeast is an existing cannabis facility that abuts Norman Richardson Way. Further north are vacant lots with remanent runways and further north is a residential development. To the west is a vacant and undeveloped parcel and an area used for drainage and flood control. The proposed project site is approximately 3.9 acres and is located on Assessor Parcel Number (APN) # 178-20-19.

The project site is currently an undeveloped vacant lot. The overall project site is flat and level. The other land uses within the airport reuse area consist of vacant but disturbed land, and areas that have been redeveloped with industrial uses. Throughout the project area there also are remnant sections of the runways, taxiways, other hardscape, and structures.

The project proposes to develop two, two story prefabricated structures used for indoor cannabis cultivation. Both two-story structures would have a total building footprint of 138,904 square foot (sf). The site will also include a natural gas backup generator The structures would be used for indoor commercial cannabis cultivation operations and would be separately fenced. Parking would be

provided for each structure within the fenced area and would consist of 74 spaces for one building and 90 spaces for the second building. The proposed project would be consistent with the design and schemes of other buildings within the area. All proposed services and project elements would be provided for within existing lot and building and would not require any additional construction or expansion of other facilities and would tie into existing utilities.

Construction of the proposed project is anticipated to take approximately five months. No demolition is required as the site is currently vacant. Grading operations would take approximately eight days.

3.0 THRESHOLDS AND SIGNIFICANCE CRITERIA

Based upon the criteria derived from Appendix G of the CEQA Guidelines, a project normally would have a significant effect on the environment if it would:

1. Generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
2. Generate excessive groundborne vibration or groundborne noise levels; and
3. For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, expose people residing or working in the project area to excessive noise levels.

4.0 IMPACT ANALYSIS

Fundamentals of Sound and Environmental Noise

Sound is technically described in terms of amplitude (loudness) and frequency (pitch). The standard unit of sound amplitude measurement is the decibel (dB). The decibel scale is a logarithmic scale that describes the physical intensity of the pressure vibrations which make up any sound. The pitch of the sound is related to the frequency of the pressure vibration. Because the human ear is not equally sensitive to a given sound level at all frequencies, a special frequency-dependent rating scale has been devised to relate noise to human sensitivity. The A-weighted decibel scale (dBA) provides this compensation by discriminating against frequencies in a manner approximating the sensitivity of the human ear.

Noise, on the other hand, is typically defined as unwanted sound because of its potential to disrupt sleep, to interfere with speech communication, and to damage hearing. A typical noise environment consists of a base of steady “background” noise that is the sum of many distant and indistinguishable noise sources. Superimposed on this background noise is the sound from individual local sources. These can vary from an occasional aircraft or train passing by to virtually continuous noise from, for example, traffic on a major highway.

Addition of Decibels

Because decibels are logarithmic units, sound levels cannot be added or subtracted through ordinary arithmetic. Under the decibel scale, a doubling of sound energy corresponds to a 3 dB increase. In other words, when two identical sources are each producing sound of the same loudness, the resulting sound level at a given distance would be 3 dB higher than one source under the same conditions. Under the decibel scale, three sources of equal loudness together would produce an increase of 5 dB.

Sound Propagation and Attenuation

Sound spreads (propagates) uniformly outward in a spherical pattern, and the sound level decreases (attenuates) at a rate of approximately 6 dB for each doubling of distance from stationary or point source. Sound from a line source, such as a highway, propagates outward in a cylindrical pattern, often referred to as cylindrical spreading. Sound levels attenuate at a rate of approximately 3 dB for each doubling of distance from a line source, such as roadway noise, depending on ground surface characteristics. No excess attenuation is assumed for hard surfaces like a parking lot or body of water. Soft surfaces, such soft dirt or grass, can absorb sound, so an excess ground-attenuation value of 1.5 dB per doubling of distance is normally assumed. For line sources, an overall attenuation rate of 3 dB per doubling of distance is assumed.

Noise levels may also be reduced by intervening structures; generally, a single row of buildings between the receptor and the noise source reduces the noise level by about 5 dBA, while a solid wall or berm reduces noise levels by 5 to 10 dBA. The manner in which older homes in California were constructed generally provides a reduction of exterior-to-interior noise levels of about 20 to 25 dBA with closed windows. The exterior-to-interior reduction of newer residential units is generally 30 dBA or more.

Noise Descriptors

The decibel scale alone does not adequately characterize how humans perceive noise. The dominant frequencies of a sound have a substantial effect on the human response to that sound. Several rating scales have been developed to analyze the adverse effect of community noise on people. Because environmental noise fluctuates over time, these scales consider that the effect of noise upon people is largely dependent upon the total acoustical energy content of the noise, as well as the time of day when the noise occurs. The L_{eq} is a measure of ambient noise, while the L_{dn} and CNEL are measures of community noise. Each is applicable to this analysis and defined below.

- L_{eq}, the equivalent energy noise level, is the average acoustic energy content of noise for a stated period of time. Thus, the L_{eq} of a time-varying noise and that of a steady noise are the same if they deliver the same acoustic energy to the ear during exposure. For evaluating community impacts, this rating scale does not vary, regardless of whether the noise occurs during the day or the night.
- L_{dn}, the Day-Night Average Level, is a 24-hour average L_{eq} with a 10 dBA "weighting" added to noise during the hours of 10:00 PM to 7:00 AM to account for noise sensitivity in the nighttime.

The logarithmic effect of these additions is that a 60 dBA 24-hour L_{eq} would result in a measurement of 66.4 dBA L_{dn}.

- CNEL, the Community Noise Equivalent Level, is a 24-hour average L_{eq} with a 5 dBA "weighting" during the hours of 7:00 PM to 10:00 PM and a 10 dBA "weighting" added to noise during the hours of 10:00 PM to 7:00 AM to account for noise sensitivity in the evening and nighttime, respectively. The logarithmic effect of these additions is that a 60 dBA 24-hour L_{eq} would result in a measurement of 66.7 dBA CNEL.
- L_{min} is the minimum instantaneous noise level experienced during a given period of time.
- L_{max} is the maximum instantaneous noise level experienced during a given period of time.
- Percentile Noise Level (Ln) is the noise level exceeded for a given percentage of the measurement time. For example, L_{10} is the noise level exceeded for 10 percent of the measurement duration, and L_{50} is the noise level exceeded for 50 percent of the measurement duration.

Sensitive Receptors

Table 1: Nearby Sensitive Receptors

Sensitive Receptors (Residences)	Distance from Project Site
Residences to the Northwest	635 feet
Residences to the South	980 feet
Church (Calvary Chapel Rio Vista) to the Southeast	980 feet

There are no existing noise sensitive land uses in the immediate project vicinity. The nearest sensitive receptors are residential uses located approximately 635 feet to the northwest of the project site.

The City of Rio Vista General Plan identifies an exterior noise standard of 65 dBA L_{dn} for residential land uses. Noise mitigation measures are required for projects that would result in a substantial increase (i.e., 3 dBA, or greater) in ambient noise levels that would exceed the City's exterior noise level of 65 dBA L_{dn} for residential land uses. The City also limits typical construction activities to between the hours of 7:00 AM and 7:00 PM Monday through Friday. Construction is not allowed on weekends. Project construction would be required to comply with these hours.

The City's Noise Ordinance (Title 17, Noise Control, Chapter 17.52) identifies prohibitions and noise standards intended to protect citizens from unnecessary and unusually loud noises that could adversely affect the peace, health, and safety of community residents. For noise sources affecting residential districts, noise levels may not exceed 50 dBA L_{eq}.

4.1 Acoustical Analysis

Threshold (a) Generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.

Construction

Construction noise typically occurs intermittently and varies depending on the nature or phase of construction (e.g. land clearing, grading, excavation, paving). Noise generated by construction equipment, including earth movers, material handlers, and portable generators, can reach high levels. During construction, exterior noise levels could affect the residential neighborhoods surrounding the construction site. Project construction would occur approximately 635 feet from existing single-family residences to the southwest. Noise levels typically attenuate (or drop off) at a rate of 6 dB per doubling of distance from point sources, such as industrial machinery.

Construction activities associated with development of the proposed project would include site preparation, minor grading, paving, building construction, and architectural coating. Such activities would require graders, scrapers, and tractors during site preparation; graders, dozers, and tractors during grading; cranes, forklifts, generators, tractors, and welders during building construction; pavers, rollers, mixers, tractors, and paving equipment during paving; and air compressors during architectural coating. Grading and excavation phases of project construction tend to be the shortest in duration and create the highest construction noise levels due to the operation of heavy equipment required to complete these activities. It should be noted that only a limited amount of equipment can operate near a given location at a particular time. Equipment typically used during this stage includes heavy-duty trucks, backhoes, bulldozers, excavators, front-end loaders, and scrapers. Operating cycles for these types of construction equipment may involve one or two minutes of full-power operation followed by three to four minutes at lower power settings. Other primary sources of noise would be shorter-duration incidents, such as dropping large pieces of equipment or the hydraulic movement of machinery lifts, which would last less than one minute. According to the applicant, no pile-driving would be required during construction and as such a project condition of approval will be included in the project permit to reflect the project's proposed construction.

Noise generated by construction equipment, including earth movers, material handlers, and portable generators, can reach high levels. Typical noise levels associated with individual construction equipment are listed in *Table 2: Typical Construction Noise Levels*.

The City of Rio Vista does not have construction noise standards. As shown in *Table 2* noise levels at the sensitive receptor are below 67 dBA at 635 feet. The nearest sensitive receptor to the project site is located approximately 635 feet northwest of the site. The highest anticipated construction noise level of 67 dBA at 635 feet is expected to occur (paver and scraper). Additionally, the majority of construction would occur throughout the project site and would not be concentrated at a single point near sensitive receptors. Construction would comply with Section 17.25.030 of the municipal code,

limiting construction hours within 500 feet of a residential unit to the hours of 7:00 a.m. to 7:00 p.m. on Monday through Friday.

Table 2: Typical Construction Noise Levels

Equipment	Typical Noise Level (dBA) at 50 feet from Source[1]	Typical Noise Level (dBA) at 635 feet from Source[1]
Air Compressor	81	59
Backhoe	80	58
Compactor	82	60
Concrete Mixer	85	63
Concrete Pump	82	60
Concrete Vibrator	76	54
Dozer	85	63
Generator	81	59
Grader	85	63
Impact Wrench	85	63
Jack Hammer	88	66
Loader	85	63
Paver	89	67
Pneumatic Tool	85	63
Pump	76	54
Roller	74	52
Saw	76	54
Scraper	89	67
Shovel	82	60
Truck	88	66

Note:
[1] Calculated using the inverse square law formula for sound attenuation: $dBA_2 = dBA_1+20Log(d_1/d_2)$
Where: dBA_2 = estimated noise level at receptor; dBA_1 = reference noise level; d_1 = reference distance; d_2 = receptor location distance
Source: Federal Transit Administration, *Transit Noise and Vibration Impact Assessment Manual*, September 2018.

As noted earlier, there are residential uses located approximately 635 feet northwest of the project site. Residential uses are also approximately 980 feet south of the site. Commercial and industrial facilities are located adjacent to the east and southeast of the project site. There are no noise sensitive uses immediately adjacent to the site. Based on the noise levels discussed above and the distance to nearest receptors, construction noise would result in a less than significant impact.

Operational

Project operations, including cannabis product manufacturing, would occur indoors within structures. No significant noise sources are predicted or planned for this use. Other noise sources would include increased vehicle traffic to the site. However, with approximately 64 total employees divided into 32 employees per shift on site at one time and associated traffic, this represents a minimal increase in an environment that has existing indoor cannabis cultivation noise from adjacent uses. As a result, this impact would be less than significant.

Construction Traffic Noise

Construction noise may be generated by large trucks moving materials to and from the project site. Large trucks would be necessary to deliver building materials as well as remove dump materials. Excavation and cut and fill would be required. Based on the California Emissions Estimator Model (CalEEMod) default assumptions for this project, as analyzed in Oasis Farms Project Air Quality and Greenhouse Gas Emissions Analysis, the project would generate the highest number of daily trips during the building construction phase. The model estimates that the project would generate up to 90 worker trips and 35 vendor trips per day for building construction. Because of the logarithmic nature of noise levels, a doubling of the traffic volume (assuming that the speed and vehicle mix do not also change) would result in a noise level increase of 3 dBA. The surrounding streets have an average daily traffic (ADT) volume of approximately 14,000 TO 20,000 vehicles[1]. A typical fleet mix assumes approximately 2 percent (i.e., 500 per day) of these vehicles would be trucks. Therefore, 125 project construction trips (90 worker trips plus 35 vendor trips) would not double the existing traffic volume per day. Construction related traffic noise would not be noticeable and would not create a significant noise impact.

California establishes noise limits for vehicles licensed to operate on public roads using a pass-by test procedure. Pass-by noise refers to the noise level produced by an individual vehicle as it travels past a fixed location. The pass-by procedure measures the total noise emissions of a moving vehicle with a microphone. When the vehicle reaches the microphone, the vehicle is at full throttle acceleration at an engine speed calculated for its displacement.

For heavy trucks, the State pass-by standard is consistent with the federal limit of 80 dB. The State pass-by standard for light trucks and passenger cars (less than 4.5 tons gross vehicle rating) is also 80 dB at 15 meters from the centerline. According to the FHWA, dump trucks typically generate noise levels of 77 dBA and flatbed trucks typically generate noise levels of 74 dBA, at a distance of 50 feet from the truck (FHWA, Roadway Construction Noise Model, 2006).

Traffic Noise

Implementation of the project would generate increased traffic volumes along study roadway segments. The project is expected to generate 146 average daily trips, which would result in noise increases on project area roadways. In general, a traffic noise increase of less than 3 dBA is barely perceptible to people, while a 5-dBA increase is readily noticeable (Caltrans, *Technical Supplement to the Traffic Noise Analysis Protocol*, 2013). Generally, traffic volumes on project area roadways would have to approximately double for the resulting traffic noise levels to increase by 3 dBA. Therefore, permanent increases in ambient noise levels of less than 3 dBA are considered to be less than significant.

[1] The 14,000 to 20,000 ADT is for the City of Rio Vista. No ADT volumes adjacent to the Project site are provided

The project would result in 146 average daily trips which would not generate a noticeable difference in traffic noise levels. Project traffic would traverse and disperse over project area roadways, where existing ambient noise levels already exist. Future development associated with the project would result in additional traffic on adjacent roadways, thereby increasing vehicular noise near existing and proposed land uses. This level is below the perceptible noise level change of 3.0 dBA. Therefore, impacts would be less than significant.

Stationary Noise Sources

Implementation of the project would create new sources of noise in the project vicinity from mechanical equipment, parking lot noise, and landscape maintenance.

Mechanical Equipment

Regarding mechanical equipment, the project would generate stationary-source noise associated with heating, ventilation, and air conditioning (HVAC) units. HVAC units typically generate noise levels of approximately 52 dBA at 50 feet.[2] The nearest existing sensitive receptor's property lines are located approximately 635 feet from the project site. At 635 feet, mechanical equipment noise levels would be 30 dBA. This noise level is below the City's 65 dBA exterior standard. The project would not place mechanical equipment near residential uses, and noise from this equipment would not be perceptible at the closest sensitive receptor (existing single-family residences to the northwest of the project site). Impacts from mechanical equipment would be less than significant.

Parking Areas

Traffic associated with parking areas is typically not of sufficient volume to exceed community noise standards, which are based on a time-averaged scale such as the CNEL scale. However, the instantaneous maximum sound levels generated by a car door slamming, engine starting up and car pass-bys range from 53 to 61 dBA[3] at 50 feet. This may be an annoyance to noise-sensitive receptors. Parking lot noise can also be considered a "stationary" noise source.

Conversations in parking areas may also be an annoyance to sensitive receptors. Sound levels of speech typically range from 33 dBA at 48 feet for normal speech to 50 dBA at 50 feet for very loud speech.[4] It should be noted that parking lot noise are instantaneous noise levels compared to noise standards in the CNEL scale, which are averaged over time. As a result, actual noise levels over time resulting from parking lot activities would be far lower.

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2 Elliott H. Berger, Rick Neitzel, and Cynthia A. Kladden. (2010). *Noise Navigator Sound Level Database with Over 1700 Measurement Values*.

3 Kariel, H. G., *Noise in Rural Recreational Environments*, Canadian Acoustics 19(5), 3-10, 1991.

4 Elliott H. Berger, Rick Neitzel, and Cynthia A. Kladden. (2010). *Noise Navigator Sound Level Database with Over 1700 Measurement Values*.

The proposed project includes a surface parking area. Noise impacts associated with parking would be a maximum of 39 dBA. In addition, parking lot noise would also be partially masked by the background noise from traffic along Poppy House Road and St. Francis Way. Noise associated with parking lot activities is not anticipated to exceed the City's Noise Standards or the California Land use Compatibility Standards during operation. Therefore, noise impacts from parking lots would be less than significant.

Landscape Maintenance Activities

Development and operation of the project includes new landscaping that would require periodic maintenance. Noise generated by a gasoline-powered lawnmower is estimated to be approximately 70 dBA at a distance of 5 feet. Landscape Maintenance activities would be 28 dBA at the closest sensitive receptor approximately 635 feet away. Noise from landscaping equipment is generated at the surrounding uses under existing conditions. Maintenance activities would operate during daytime hours for brief periods of time as allowed by the City Municipal Code and would not permanently increase ambient noise levels in the project vicinity and would be consistent with activities that currently occur at the surrounding uses. Therefore, with adherence to the City's Municipal Code, impacts associated with landscape maintenance would be less than significant.

Mitigation Measure: Compliance with General Plan Policies and applicable state and local law would reduce impacts to a less than significant level. No additional site-specific mitigation measures are required.

Level of Significance: Less than significant impact.

Threshold (b) Generate excessive groundborne vibration or groundborne noise levels.

There are no federal, state, or local regulatory standards for ground-borne vibration. However, various criteria have been established to assist in the evaluation of vibration impacts. For instance, the California Department of Transportation (Caltrans) has developed vibration criteria based on human perception and structural damage risks. For most structures, Caltrans considers a peak particle velocity (ppv) threshold of 0.2 inches per second (in/sec) to be the level at which architectural damage (i.e., minor cracking of plaster walls and ceilings) to normal structures may occur. Below 0.10 in/sec ppv there is virtually no risk of 'architectural' damage to normal buildings. Levels above 0.4 in/sec ppv may possibly cause structural damage (Caltrans 2002).

In terms of human annoyance, continuous vibrations in excess of 0.1 in/sec ppv are identified by Caltrans as the minimum level perceptible level for ground vibration. Short periods of ground vibration in excess of 0.2 in/sec ppv can be expected to result in increased levels of annoyance to people within buildings (Caltrans 2002).

Increases in groundborne vibration levels from the proposed project would be primarily associated with short-term construction-related activities. Project construction would require the use of off-road

equipment, such as tractors, concrete mixers, and haul trucks. The proposed project is not expected to use major groundborne vibration–generating construction equipment, such as pile drivers.

Construction equipment groundborne vibration levels are summarized in *Table 3: Typical Construction Equipment Vibration Levels*. Based on the vibration levels, ground vibration generated by construction equipment would not be anticipated to exceed approximately 0.089 inches per second peak particle velocity (ppv) at 25 feet. Predicted vibration levels at the nearest on- and off-site structures (65 feet for non-residential structures and 635 feet for residential structures) would not exceed the minimum recommended criteria for structural damage and human annoyance (0.02 and 0.001 in/sec ppv, respectively). As a result, this impact would be less than significant.

Table 3: Typical Construction Equipment Vibration Levels

Equipment	Peak Particle Velocity at 25 Feet (in/sec)	Peak Particle Velocity at 65 feet (in/sec) [1]	Peak Particle Velocity at 635 Feet (in/sec) [1]
Large Bulldozer	0.089	0.0212	0.0007
Loaded Trucks	0.076	0.0181	0.0006
Rock Breaker	0.059	0.0141	0.0005
Jackhammer	0.035	0.0083	0.0003
Small Bulldozer/Tractors	0.003	0.0007	0.0000

1. Calculated using the following formula: PPVequip = PPVref x (25/D)1.5, where: PPVequip = the peak particle velocity in in/sec of the equipment adjusted for the distance; PPVref = the reference vibration level in in/sec from Table 7-4 of the Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual, 2018; D = the distance from the equipment to the receiver.

Source: Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual, September 2018.

Mitigation Measure: Compliance with General Plan Policies and applicable state and local law would reduce impacts to a less than significant level. No additional site-specific mitigation measures are required.

Level of Significance: Less than significant impact.

Threshold (c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, expose people residing or working in the project area to excessive noise levels?

The proposed project is within two miles of the Rio Vista Municipal Airport. However, the proposed use, indoor manufacturing, is not sensitive to aircraft noise and the proposed project would not be within the direct flight path of aircraft. Therefore, the proposed project would have a less than significant impact.

Cumulative Impacts

As discussed above, the proposed project would not cause a new noise impact to occur, nor an increase in the severity of a noise impact. Therefore, the proposed project would not cause either a new cumulative impact to occur, nor an increase in the severity of a cumulative impact previously disclosed.

Mitigation Measure: Compliance with General Plan Policies and applicable state and local law would reduce impacts to a less than significant level. No additional site-specific mitigation measures are required.

Level of Significance: Less than significant impact.

References

1. California Department of Transportation, *California Vehicle Noise Emission Levels*, 1987.
2. California Department of Transportation, *Traffic Noise Analysis Protocol*, 2011.
3. California Department of Transportation, *Technical Noise Supplement to the Traffic Noise Analysis Protocol*, 2013.
4. California Department of Transportation, *Transportation Related Earthborne Vibrations*, 2002.
5. California Department of Transportation, *Transportation and Construction-Induced Vibration Guidance Manual*, 2004.
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8. County of Solano, Solano County Climate Action Plan, 2010
9. City of Rio Vista Municipal Airport, Master Plan Update, 2007.
10. Cyril M. Harris, *Handbook of Noise Control*, Second Edition, 1979.
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14. Federal Highway Administration, *Roadway Construction Noise Model*, 2006.
15. Federal Highway Administration, Roadway *Construction Noise Model User's Guide Final Report*, 2006.
16. Federal Interagency Committee on Noise, *Federal Agency Review of Selected Airport Noise Analysis Issues*, 1992.
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