3.12 NOISE

NOISE – Would the Project:	**Potentially Significant Impact**	**Less Than Significant with Mitigation**	**Less Than Significant Impact**	**No Impact**
a) Result in exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☐	☒	☐
b) Result in exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels?	☐	☐	☒	☐
c) Result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☒	☐
d) Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☒	☐
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☒	☐
f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒

3.12.1 Environmental Setting

Sound is created when vibrating objects produce pressure variations that move rapidly outward into the surrounding air. The more powerful the pressure variations, the louder the sound perceived by a listener. The decibel (dB) is the standard measure of loudness relative to the human threshold of perception. Noise is a sound or series of sounds that are intrusive, objectionable or disruptive to daily life. Many factors influence how a sound is perceived and whether it is considered disturbing to a listener; these include the physical characteristics of sound (e.g., loudness, pitch, duration, etc.) and other factors relating to the situation of the listener (e.g., the time of day when it occurs, the acuity of a listener's hearing, the activity of the listener during exposure). Environmental noise has many documented undesirable effects on human health and welfare both psychological (e.g., annoyance and speech interference) and physiological (e.g., hearing impairment and sleep disturbance).

The City of Antioch General Plan (2003) identifies two categories of noise sources that substantially impact the people of Antioch: "mobile," including major roadways

(especially State Routes 4 and 160) and rail lines; and "stationary," including industrial sources (especially in northern Antioch where heavy industry is concentrated, including the GP Plant), commercial sources (particularly in the zones of contact/overlap between commercial and residential areas), and construction activities. The residential areas in Antioch closest to the Project site were surveyed (see Appendix F) to identify noise-sensitive uses that could be adversely impacted by Project construction. During this survey, short-term noise measurements were taken during the weekday, daytime off-commute-peak, as shown in Table 3.12-1 and Appendix F, to establish baseline noise levels that affect existing noise-sensitive uses and that could be increased by Project construction, particularly during the pile-driving phase. This time-of-day was selected because it represents the time that Project construction activities would be at their maximum.

Table 3.12-1. Project Site Vicinity Noise Measurements

Location	Time Period	Noise Levels (dBA)*	Observations of Contributing Noise Sources
Measurement #1 Residential area in Antioch (near 904 Minaker Drive), about 1,800 feet southwest of the project site, and about 80 feet south of Wilbur Avenue	Mid-Day Off-Commute-Peak Tues. 11/25/14 1 PM – 3 PM	Leq: 64.9 CNEL: 63** Max: 81.9 Min: 49.7	Dominant source: traffic on Wilbur Avenue and Minaker Drive. Highest noise peaks (> 70 dBA) are from motor vehicles traveling at or above the speed limit or accelerating from stop light on Wilbur Avenue.
Measurement #2 Residential area in Antioch (near 1417 Jacobsen Street) about 1900 feet south of the project site	Mid-Day Off-Commute-Peak Tues. 11/25/14 1 PM – 3 PM	Leq: 56.0 CNEL: 54** Max: 74.3 Min: 44.1	Dominant source: traffic on Jacobsen Street. Highest noise peaks (> 60 dBA) are from motor vehicles traveling on Jacobsen Street. GP Plant visible from measurement location and faint noise (45 – 50 dBA) noticeable probably from mechanical equipment operating there.

* Decibels are said to be A–weighted (dBA), when corrections are made to the measurement values to reflect the known, varying sensitivity of the human ear to sounds of different frequencies. The Equivalent Sound Level (L_{eq}) is a constant sound level that carries the same sound energy as the actual time–varying sound over the duration of the measurement period (the project Leq values tabulated above apply to 1-hour-average intervals within the indicated time period). The Day–Night Average Sound Level ($L_{dn)}$, is a 24–hour average, A–weighted Leq with a 10–decibel penalty added to sound levels occurring at night between 10:00 p.m. and 7:00 a.m. The Community Noise Equivalent Level (CNEL) is similar to L_{dn} with an additional 5-decibel penalty added to sound levels occurring in the evening between 7:00 p.m. and 10:00 p.m.

** According to Federal Transit Administration (FTA) methodology, L_{dn} or CNEL can be adequately estimated by subtracting 2 dBA from the measured value of the daytime hourly L_{eq}; see *Transit Noise and Vibration Impact Assessment, Appendix D, Determining Existing Noise* (FTA, May 2006).

3.12.2 Regulatory Setting

Federal and State laws and regulations pertaining to this issue area and relevant to the Project are identified in Table 3.12-2.

Table 3.12-2. Laws, Regulations, and Policies (Noise)

U.S.	• The **Noise Control Act** (42 USC 4910) required the USEPA to establish noise emission criteria, as well as noise testing methods (40 CFR Chapter 1, Subpart Q). These criteria generally apply to interstate rail carriers and to some types of construction and transportation equipment. The USEPA published a guideline (USEPA 1974) containing recommendations for acceptable noise level limits affecting residential land use of 55 dBA L_{dn} for outdoors and 45 dBA L_{dn} for indoors. • The **Department of Housing and Urban Development Environmental Standards** (24 CFR Part 51) set forth the following exterior noise standards for new home construction (for interior noise levels, a goal of 45 dBA is set forth and attenuation requirements are geared to achieve that goal): o 65 L_{dn} or less – Acceptable o 65 L_{dn} and < 75 L_{dn} – Normally unacceptable, appropriate sound attenuation measures must be provided o > 75 L_{dn} – Unacceptable • **Federal Highway Administration Noise Abatement Procedures** (23 CFR Part 772) are procedures for noise studies and noise abatement measures to help protect the public health and welfare, to supply noise abatement criteria, and to establish requirements for information to be given to local officials for use in the planning and design of highways. It establishes five categories of noise sensitive receptors and prescribes the use of the Hourly L_{eq} as the criterion metric for evaluating traffic noise impacts. • **Federal Energy Regulatory Commission (FERC) Guidelines On Noise Emissions From Compressor Stations, Substations, And Transmission Lines** (18 CFR 157.206(d)(5)) require that "the noise attributable to any new compressor stations, compression added to an existing station, or any modification, upgrade or update of an existing station, must not exceed a L_{dn} of 55 dBA at any pre-existing noise sensitive area (such as schools, hospitals, or residences)." • **NTIS 550\9-74-004, 1974** ("Information on Levels of Environmental Noise Requisite to Protect Health and Welfare with an Adequate Margin of Safety"). In response to a Federal mandate, the USEPA provided guidance in this document, commonly referenced as the, "Levels Document," that establishes an L_{dn} of 55 dBA as the requisite level, with an adequate margin of safety, for areas of outdoor uses including residences and recreation areas. The USEPA recommendations contain a factor of safety and do not consider technical or economic feasibility (i.e., the document identifies safe levels of environmental noise exposure without consideration for achieving these levels or other potentially relevant considerations), and therefore should not be construed as standards or regulations.
CA	State regulations for limiting population exposure to physically and/or psychologically significant noise levels include established guidelines and ordinances for roadway and aviation noise under California Department of Transportation as well as the now defunct California Office of Noise Control. The California Office of Noise Control land use compatibility guidelines provided the following: • An exterior noise level of 60 to 65 dBA CNEL is considered "normally acceptable" for residences. • A noise level of 70 dBA CNEL is considered to be "conditionally acceptable" (i.e., the upper limit of "normally acceptable" noise levels for sensitive uses such as schools, libraries, hospitals, nursing homes, churches, parks, offices, and commercial/professional businesses). • A noise level of greater than 75 dBA CNEL is considered "clearly unacceptable" for residences.

The Project site is within an area of Contra Costa County that was annexed by the city of Antioch in 2013; therefore, the pertinent local goals, policies, and/or regulations applicable to this issue area lie with the City.

The following goals and policies from the City of Antioch General Plan (City of Antioch 2003) and Antioch Municipal Code may be applicable to the proposed Project:

General Plan

Noise Objective (Section 11.6.1)

Achieve and maintain exterior noise levels appropriate to planned land uses throughout Antioch, as described below.

Residential

- Single Family: 60 dBA Community Noise Equivalent Level (CNEL) within rear yards
- Multi-Family: 60 dBA CNEL within interior open space

Noise Policies (Section 11.6.2)

Noise Analysis and Mitigation

- When new development incorporating a potentially significant noise generator is proposed, require noise analyses to be prepared by a qualified acoustical engineer. Require the implementation of appropriate noise mitigation when the proposed Project will cause new exceedances of General Plan noise objectives, or an audible (3 dBA) increase in noise in areas where General Plan noise objectives are already exceeded as the result of existing development.

Temporary Construction

- Ensure that construction activities are regulated as to hours of operation [see Municipal Code restrictions below] in order to avoid or mitigate noise impacts on adjacent noise-sensitive land uses.
- Require proposed development adjacent to occupied noise-sensitive land uses to implement a construction-related noise mitigation plan. This plan would depict the location of construction equipment storage and maintenance areas, and document methods to be employed to minimize noise impacts on adjacent noise sensitive land uses.
- Require that all construction equipment utilize noise reduction features (e.g., mufflers and engine shrouds) that are no less effective than those originally installed by the manufacturer.

- The construction-related noise mitigation plan required shall also specify that haul truck deliveries be subject to the same hours specified for construction equipment. Additionally, the plan shall denote any construction traffic haul routes where heavy trucks would exceed 100 daily trips (counting those both to and from the construction site). To the extent feasible, the plan shall denote haul routes that do not pass sensitive land uses or residential dwellings.

Municipal Code

Specific Prohibitions (Section 5.17.050)

Where construction activities on a construction project which is adjacent to any noise sensitive use(s) are anticipated to last for a year or more, temporary noise barriers shall be constructed that break the line of sight between the noise-sensitive use(s) and the construction project, and that minimize noise impacts.

Prohibited Persistent Noises (Section 5.17.060)

Use of heavy construction equipment when the noise or sound from such equipment can be heard beyond the perimeter of the premises where such heavy construction equipment is being used shall not be permitted during the following times:

- On weekdays prior to seven (7:00) a.m. and after six (6:00) p.m.
- On weekdays within three hundred (300) feet of any occupied dwelling, prior to eight (8:00) a.m. and after five (5:00) p.m.
- On weekends and City holidays, prior to nine (9:00) a.m. and after five (5:00) p.m. regardless of the distance from occupied dwellings. Use of pile drivers, sources of impulsive sound and jackhammers shall be prohibited on Sundays and City holidays, except for emergencies and as approved in advance by the Building Official.

3.12.3 Impact Analysis

The following analysis addresses noise impacts to humans. Noise impacts to wildlife are addressed in Section 3.4 – Biological Resources.

a) Result in exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

Less than Significant Impact. The Project would not increase the cargo ship handling capacity (as measured by annual tonnage of gypsum delivered, or other similar metric), the wharf's gypsum off-loading capacity, or the on-land gypsum storage, material

processing, and/or truck/train loading capacity of the Plant. Thus, after Project construction is complete, the day-to-day Plant operational profile, with consequent operational noise emissions, would continue at pre-Project levels. Any Project-related noise exposure impacts would be due to construction activities. The total Project construction window would be 3 months, with active construction activities lasting approximately 8 weeks.

City of Antioch General Plan (2003) policies require that potential noise impacts to existing noise-sensitive local uses be addressed as they relate to appropriate noise exposure standards with mitigations imposed if necessary to attain the standards or achieve feasible reductions. Within the Project site boundaries there are only the industrial uses of the Plant, which are not noise-sensitive. The closest noise-sensitive receptors are the residential areas of Antioch that begin just south of Wilbur Avenue, 1,800 feet or more from the locus of Project construction activity (i.e., the wharf). Motor vehicle traffic activity on Wilbur Avenue and other local streets is the dominant local noise source in these areas.

Pre-project (background) ambient noise measurements taken during the Project site vicinity survey found an off-commute-peak daytime equivalent sound level (L_{eq}) of about 65 dBA (corresponding to an estimated daily average 63 dBA CNEL) at existing residential uses close to Wilbur Avenue. Daytime instantaneous noise levels there ranged from 50 dBA to 82 dBA during this period. This noise exposure intensity is borderline with respect to the General Plan's Noise Objective of an ideal exterior CNEL of 60 dBA or less for residential uses in Antioch. However, noise measurements taken in the residential neighborhoods further south, where the influence of Wilbur Avenue traffic noise is negligible, found an off-commute-peak daytime L_{eq} of about 56 dBA (corresponding to an estimated 54 dBA CNEL) with instantaneous noise levels ranging from 44 dBA to 74 dBA. This is well within the General Plan's acceptable range for residential noise exposure.

The Federal Highway Administration (FHWA) Roadway Construction Noise Model (RCNM) was used to estimate the maximum and average outdoor noise levels that the closest residences would experience during the Project pile-driving construction phase, with results as presented in Table 3.12-3. Two types of pile drivers, impact-hammer and vibratory-hammer (both of which would be used for the Project, but not simultaneously), were modeled. Since noise levels from impact-hammer pile drivers are always higher than those from vibratory-hammer pile drivers, the Project "worst-case" scenario analyzed below considers only impact-hammer pile drivers.

For residential receptors near Wilbur Avenue, where the existing daytime noise background level is already relatively high (i.e., about 65 dBA daytime average, with frequent peak noise events from passing cars exceeding 65-70 dBA), the average pile-driving noise level (63 dBA) would be less than the existing background level, while the

maximum pile-driving noise level (70 dBA), which is produced momentarily each time the hammer hits the pile, would be comparable to the peak noise levels at the receptor location produced by passing cars on Wilbur Avenue.

Table 3.12-3. Modeled Construction Noise Levels Nearest Residential Uses

Receptor/Construction Noise Source	Distance from Construction Activity (feet)	Maximum Construction Daytime Noise Level (dB)	Average Construction Daytime Noise Level During Equipment Operation (dB)
Residence #904 Minaker Drive/ Vibratory-Hammer Pile Driver	1,800	69.7	62.7
Residence #904 Minaker Drive/ Impact-Hammer Pile Driver	1,800	70.1	63.2
Residence #1417 Jacobsen Street/ Vibratory-Hammer Pile Driver	1,900	69.2	62.2
Residence #1417 Jacobsen Street/ Impact-Hammer Pile Driver	1,900	69.7	62.7
Source: Federal Highway Administration, Roadway Construction Noise Model (RCNM).			

For residential receptors further back from Wilbur Avenue, the existing daytime noise background level is lower (i.e., about 56 dBA daytime average, with occasional peak noise events from passing cars on the local street exceeding 65 dBA), the average pile-driving noise level (63 dBA) would be greater than the existing background level, while the maximum pile-driving noise level (70 dBA), which is produced momentarily each time the hammer hits the pile, would be higher than most of the peak noise levels produced by passing cars on local residential streets.

In addition to the loudness of a noise produced, the noise impact severity of a particular source is also dependent on the temporal pattern of its emission. Project pile driving would occur only during weekday, daytime periods, not during evenings, nights and early mornings, nor anytime at all during weekend days or holidays. Project pile driving would not occur continuously over every workday of the total 3-month Project construction phase, but rather only during two short-duration, sub-periods consisting of five weekdays in the mid-weeks of August and six weekdays in the mid-weeks of September. Pile driving would be required to install 13 piles for the new wharf. Thus, on average, only one to two piles would be driven during each of the 11 workdays scheduled for pile driving. Two types of pile drivers would be used in driving each and every pile: a vibratory-hammer pile driver and an impact-hammer pile driver. The driving of each pile would start (for at least the first 15 minutes) with the vibratory-hammer pile driver, which is the quieter of the two, and then continue with the impact-hammer pile driver until the pile is set in its final position, each taking between 100 to 700 pile strikes by the hammer.

With these temporal considerations taken into account, Project pile-driving noise would have no impact on any residential receptors in Antioch during weekday evenings and nights, nor anytime on weekends and holidays (because pile driving would not occur then). When Project pile driving does occur, potential noise impacts would be limited to the residential areas in Antioch within a few thousand feet of the Project construction site during the weekday, daytime hours on the 11 days over which all of the 13 piles would be driven. During these times, the short-term local average noise levels would be elevated by a few dBAs compared to existing background levels in residential areas not adjacent to Wilbur Avenue, and the peak noise events from pile driver hammer strikes would be audible at about the momentary loudness levels produced by passing cars on local streets. Since pile-driving noise would be limited to short, daytime periods, and would not occur at all during evenings and nights, it would have a negligible effect on the residential areas' daily-average (CNEL) noise levels, which is the General Plan's primary indicator of noise impact.

Thus, Project construction activities would not expose nearby residential uses south of Wilbur Avenue to excessive noise levels and Project construction noise impacts would be less than significant.

b) Result in exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels?

Less than Significant Impact. Just as vibrating objects radiate sound through the air, if they are in contact with the ground they also radiate acoustical energy through the ground. If such an object is massive enough and/or close enough to an observer, the ground vibrations can be perceptible and, if the vibrations are strong enough (as measured in vibration decibels [VdB]), they can cause annoyance to the observer and/or damage to buildings. Background ground vibration levels in most inhabited areas are usually 50 VdB or lower, well below the threshold of perception (i.e., typically about 65 VdB).

There are no policies or standards in the City of Antioch General Plan for avoiding/reducing structural damage or annoyance from vibration impacts. However, it is most common for many government agencies to rely on assessment methodologies, impact standards and vibration-reduction strategies developed by the Federal Transit Administration (FTA) in *Transit Noise and Vibration Impact Assessment* (2006). According to the FTA, limiting vibration levels to 94 VdB or less would avoid structural damage to wood and masonry buildings (which are typical of most residential structures), while limiting vibration levels to 72 VdB[23] or less at residential locations would avoid significant annoyance to the occupants.

[23] FTA vibration annoyance impact criteria vary with the number of vibration events that a receptor is expected to be exposed to daily. The 72 VdB criterion is appropriate to residential receptors that are

There would be no increase in noise generating activities from wharf operations after Project implementation, so any such impacts would only occur during Project construction. The most vibration-intensive piece of construction equipment is a pile driver; other types of construction equipment are far less vibration-intensive. Using FTA methodology and impact criteria appropriate to Project construction equipment type (i.e., an impact-hammer pile driver), the expected daily number of vibration events (i.e., > 70), and the sensitive receptor type (i.e., residential, housed in single-family, wood-frame structures) the radii of potential significant Project construction impact based on resident annoyance and structural damage criteria were estimated to be 1,000 feet and 60 feet, respectively. Since the nearest residential uses are almost twice this distance from the locus of Project pile driving activity, the Project's construction vibration impact severity would be less than significant.

c) Result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?

Less than Significant Impact. Once Project construction is complete, the day-to-day Plant operational profile, with consequent operational noise emissions, would continue at pre-Project levels. Thus, Project operational noise impacts would be less than significant.

d) Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?

Less than Significant Impact. The incremental noise impacts in the closest residential areas from on-site Project construction activity are discussed above. The only other potential Project source of temporary incremental noise impacts to off-site sensitive receptors would be from haul trucks taking treated timber pile debris (originating from the partial wharf demolition) from the contractor's yards in Richmond to the disposal landfill in Suisun City. After transport by barge from the Project site to the contractor's marine yard, treated timber debris disposal trips would occur periodically during August, September, and October of 2015, but the amount of debris to be disposed of is relatively small. Approximately 21 truck trips would be needed to haul all of the wood material to the landfill. Thus, there would be an average of less than one Project-related haul truck trip per day during the total Project construction phase. All such debris haul truck trips to the Potrero Hills Landfill would be limited to regularly used truck routes from the contractor's marine yard in Richmond, including highways and freeways, and would not travel along local residential streets in Antioch. Therefore, all Project temporary, incremental construction noise impacts would be less than significant.

exposed to 70 or more daily vibration events. This best fits Project circumstances where the pile driver is expected to strike each pile between 100 and 700 times before it is set.

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

Less than Significant Impact. The Project site is about 14.5 miles east of the closest public use airport, Buchanan Field Airport in Concord. The Project site is well outside the airport's aviation noise impact contours (i.e., typically 65 dBA CNEL for residential uses). Additionally, no major influence on noise levels on or near the Project site was noted from aircraft overflights observed during the Project noise survey. Thus, aircraft noise impacts as a result of the Project are less than significant.

f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?

No Impact. The proposed Project site is not located in the vicinity of a private airstrip. There would be no impact.

3.12.4 Mitigation Summary

The Project would not result in significant Noise impacts; therefore, no mitigation is required.