Appendix J

Noise Technical Report

Intended for
WSP

Date
April 5, 2024

Pittsburg Technology Park Specific Plan

Noise & Vibration Technical Report

RAMBOLL Bright ideas. Sustainable change.

Pittsburg Technology Park Specific Plan

Noise & Vibration Technical Report

Project name	**Pittsburg Technology Plan Specific Plan**
Project no.	**1940104949**
Recipient	**Stephanie Whitmore**
Document type	**Noise & Vibration Technical Report**
Version	**1**
Date	**2024-04-05**
Prepared by	**Steve Leiby**
Checked by	**Brent Ferren**
Approved by	**Brent Ferren**
Description	This technical report provides a summary of noise regulations relevant to the project, an analysis of existing conditions, and an assessment of potential operational noise impacts on noise-sensitive receptors.

Contents

Table of Figures

Table of Tables

Acronyms and Abbreviations

ANSI	American National Standards Institute
ASTM	ASTM International
Cadna/A	Computer Aided Noise Abatement software from DataKustik GmbH
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
dB	Decibel
DEIR	Draft Environmental Impact Report
DNL	Day-night average sound level
FHWA	Federal Highway Administration
ft	feet
FTA	Federal Transit Authority
GBV	Ground-borne vibration
GP	General Plan
Hz	hertz (1/seconds)
in/sec	inches per second
ISO	International Organization for Standardization
L_{AEQ}	A-weighted time-average sound level
m	meter
mph	miles per hour
MVA	Megavolt-amperes
MV	Megawatt
PMC	City of Pittsburg Municipal Code
PPV	peak particle velocity
Ramboll	Ramboll Americas Engineering Solutions
SLM	sound level meter
TNM	Traffic Noise Model
VdB	Decibels of vibration velocity

1. Introduction

The Pittsburg Technology Park Specific Plan involves an update to the land use of the Pittsburg Technology Park site. The current land use is classified as Open Space (OS) which will be updated to Employment Center Industrial (ECI) as part of the Specific Plan update.

The land comprising the Specific Plan has been split into three phases. Phase 1 is planned as a data center building as part of the Pittsburg Data Hub project. Plans for Phases 2 and 3 have not yet been developed.

This technical report provides a summary of noise regulations relevant to the Specific Plan update including proposed policies of the Pittsburg 2040 General Plan, an analysis of existing conditions, and an assessment of potential noise and vibration impacts on sensitive receptors based on the proposed land use.

2. Regulatory Setting

2.1 State Laws, Regulations, and Policies

2.1.1 California State Code

California Government Code section 65302 encourages each local government entity to implement a noise element as part of its general plan. In addition, the California Governor's Office of Planning and Research has developed guidelines for preparing noise elements, which include recommendations for evaluating the compatibility of various land uses as a function of community noise exposure. The City of Pittsburg and Contra Costa County have developed guidelines that are summarized below.

2.1.2 California Department of Transportation

The California Department of Transportation (Caltrans) provides guidelines for construction vibration in its Transportation and Construction Vibration Guidance Manual. Included in the manual are recommended thresholds for both building damage potential and human annoyance from construction-related vibration, though the thresholds can also be applied to operational activities. The recommended damage thresholds are summarized in Table 2-1. The annoyance thresholds are summarized in Table 2-2. These criteria are frequently used in the absence of any quantitative limits for vibration from local agencies.

Table 2-1. Caltrans Guideline Vibration Damage Potential Threshold Criteria

Structure and Condition	Maximum PPV (in/sec)	
	Transient Sources	Continuous/Frequent Intermittent Sources
Extremely fragile historic buildings, ruins, ancient monuments	0.12	0.08
Fragile buildings	0.2	0.1
Historic and some old buildings	0.5	0.25
Older residential structures	0.5	0.3
New residential structures	1.0	0.5
Modern industrial/commercial buildings	2.0	0.5

Note: Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

Table 2-2. Caltrans Guideline Vibration Annoyance Potential Criteria

Human Response	Maximum PPV (in/sec)	
	Transient Sources	Continuous/Frequent Intermittent Sources
Barely perceptible	0.04	0.01
Distinctly perceptible	0.25	0.04
Strongly perceptible	0.9	0.10
Severe	2.0	0.04

Note: Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

2.2 Regional Laws, Regulations, and Policies

2.2.1 City of Pittsburg Municipal Code (PMC)

Title 9 Public Pace, Safety, and Morals, Chapter 9.44 Noise. Section 9.44.010 of the does not contain any quantitative sound level limits. Rather, it includes a list of prohibitions, including the following:

- The discharge of exhaust of stationary internal combustion engines (e.g., generators) except through a muffler or other noise control device
- The operation of pile drivers, steam shovels, pneumatic hammers, derricks, and steam or electric hoists between the hours of 10:00 p.m. and 7:00 a.m. except in the case of emergency
- The operation of any noise-producing blower, power fan, or engine unless noise from the source is sufficiently controlled.

Title 18 Zoning, Chapter 18.82 Performance Standards. Section 18.82.040 of the PMC requires compliance with Chapter 9.44 and prohibits construction noise on sites adjoining residential properties that exceed 65 dBA measured at the property line, except between the hours of 8:00 a.m. and 5:00 p.m. The PMC does not have any other quantitative sound level limits.

2.2.2 Pittsburg 2040 General Plan

The Pittsburg 2040 General Plan (2040 GP) contains the following policies relevant to Project noise and vibration.

13-P-1.1: Areas within Pittsburg exposed to existing or projected exterior noise levels from mobile noise sources exceeding the performance standards in Table 13-1 shall be designated as noise-impacted areas. Figure 13-1 identifies noise contours anticipated at General Plan buildout. [Note: Figure 13-1]

Table 13-1: Maximum Allowable Noise Exposure from Mobile Noise Sources

Land Use or Project Type[1]	Outdoor Activity Areas[2,3]	Interior Spaces	
		Ldn/CNEL, dBA	Leq, dBA4
Residential	60	45	-
Motels/Hotels	65	45	-
Mixed-Use	65	45	
Hospitals, Nursing Homes	60	45	-
Theaters, Auditoriums	-	-	35
Churches	60	-	40
Office Buildings	65	-	45
Schools, Libraries, Museums	70	-	45
Playgrounds, Neighborhood Parks	70	-	-
Industrial	75	-	45
Golf Courses, Water Recreation	70	-	-

[1]Where a proposed use is not specifically listed, the use shall comply with the standards for the most similar use as determined by the City.

[2]Outdoor activity areas for residential development are considered to be the back yard patios or decks of single family units and the common areas where people generally congregate for multi-family developments. Where common outdoor activity areas for multi-family developments comply with the outdoor noise level standard, the standard will not be applied at patios or decks of individual units provided noise-reducing measures are incorporated (e.g., orientation of patio/deck, screening of patio with masonry or other noise-attenuating material). Outdoor activity areas for non-residential developments are the common areas where people generally congregate, including pedestrian plazas, seating areas, and outside lunch facilities; not all residential developments include outdoor activity areas.
[3]In areas where it is not possible to reduce exterior noise levels to achieve the outdoor activity area standard using a practical application of the best noise-reduction technology, an increase of up to 10 Ldn over the standard will be allowed provided that available exterior noise reduction measures have been implemented and interior noise levels are in compliance with this table.
[4]Determined for a typical worst-case hour during periods of use.

13-P-1.2: Require development projects, including new uses, to meet the noise standards established in Table 13-1.

13-P-1.7: Limit generation of loud noises on construction sites adjacent to existing development to normal business hours between 8:00 AM and 5:00 PM.

13-P-1.9: Evaluate projects for stationary noise source impacts based on the standards in Table 13-2:

TABLE 13-2: Performance Standards For Stationary Noise Sources, Including Affected Projects[1,2,3,4]		
Noise Level Descriptor	Daytime (7 AM to 10 PM)	Nighttime (10 PM to 7 AM)
Hourly Leq, dBA	55	45

Notes:

[1] Each of the noise levels specified above should be lowered by 5 dB for simple noise tones, noises consisting primarily of speech or music, or recurring impulsive noises. Such noises are generally considered to be particularly annoying and are a primary source of noise complaints.

[2] No standards have been included for interior noise levels. Standard construction practices should, with the exterior noise levels identified, result in acceptable interior noise levels.

[3] Stationary noise sources which are typically of concern include, but are not limited to, the following:

HVAC Systems	Cooling Towers/Evaporative Condensers
Pump Stations	Lift Stations
Emergency Generators	Boilers
Steam Valves	Steam Turbines
Generators	Fans
Air Compressors	Heavy Equipment
Conveyor Systems	Transformers
Pile Drivers	Grinders
Drill Rigs	Gas or Diesel Motors
Welders	Cutting Equipment
Outdoor Speakers	Blowers

[4] The types of uses which may typically produce the noise sources described above include but are not limited to: industrial facilities, pump stations, trucking operations, tire shops, auto maintenance shops, metal fabricating shops, shopping centers, drive-up windows, car washes, loading docks, public works projects, batch plants, bottling and canning plants, recycling centers, electric generating stations, race tracks, landfills, sand and gravel operations, and athletic fields.

13-P-1.11: Require the preparation of ground-borne vibration studies by qualified professionals when construction activities include vibration-sensitive uses and significant site grading, foundation work, or underground work would occur within less than 100 feet of existing structures.

13-P-1.12: Require development projects to reduce adverse construction vibration impacts to sensitive receptors, as feasible, when vibration-related construction activities are to occur within 100 feet from existing sensitive receptors. Measures to reduce noise and vibration effect may include, but are not limited to:

- Phase demolition, earth-moving and ground-impacting operations so as not to occur in the same time period.
- The pre-existing condition of all buildings within a 100-foot radius will be recorded in order to evaluate damage from construction activities. Fixtures and finishes within a 100-foot radius of construction activities susceptible to damage will be documented (photographically and in writing) prior to construction. All damage will be repaired back to its pre-existing condition.
- Substituting vibration-generating equipment with equipment or procedures that would generate lower levels of vibration. For instance, in comparison to impact piles, drilled piles or the use of a sonic or vibratory pile driver are preferred alternatives where geological conditions would permit their use.
- Other specific measures as they are deemed appropriate by the implementing agency to maintain consistency with adopted policies and regulations regarding vibration.

The 2040 GP also includes the following relevant actions:

13-A-1.a: As part of development review, require projects to submit to meet the City's noise standards identified in Policies 13-P-1.1 through 13-P-4 and 13-P-9. Where projects would cause and/or be subject to noise levels in excess of the City's standards, require an acoustical analysis prepared by a qualified acoustical engineer that includes measures to reduce exposure to noise levels in excess of City standards and encourage use of noise-attenuating measures that avoid sound walls, except where uses are affected by State Route 4.

13-A-1.b: As Develop noise attenuation programs for mitigation of noise adjacent to existing residential areas, including such measures as wider setbacks, intense landscaping, double-paned windows, and building orientation muffling the noise source, and avoid sound walls where feasible

13-A-1.e: As In making a determination of impact significance under the California Environmental Quality Act (CEQA), a substantial increase will occur if ambient noise levels experience a substantial permanent increase. Generally, a 3 dB increase in noise levels is barely perceptible, and a 5 dB increase in noise levels is clearly perceptible. Therefore, increases in noise levels shall be considered to be substantial when the following occurs:

- When existing noise levels are less than 60 dB, a 5 dB increase in noise will be considered substantial;
- When existing noise levels are between 60 dB and 65 dB, a 3 dB increase in noise will be considered substantial;
- When existing noise levels exceed 65 dB, a 1.5 dB increase in noise will be considered substantial.

3. Thresholds of Significance

3.1 Significance Criteria

Based on the environmental checklist in Appendix G of the State CEQA Guidelines, the proposed Project would result in a significant noise or vibration impact if it would result in:

a) Generation of 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, or generate a substantial incremental increase in noise levels;
b) Generation of excessive ground-borne vibration or ground-borne noise levels;
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, exposure of people residing or working in the project area to excessive noise levels.

Note that the Project site is not located within an airport land use plan and there are no public airports or public use airports within two miles of the Project. Also, there are no private airstrips within the Project vicinity. The nearest public or public use airport is the Buchanan Field Airport, approximately 7.5 miles southwest of the Project area. Therefore, there would be no impact from Significance Criteria c), which is not considered further in this analysis.

3.2 Project Thresholds of Significance

3.2.1 Noise

3.2.1.1 Construction

The PMC prohibits construction noise in excess of 65 dBA at residential properties outside of the hours of 8:00 a.m. and 5:00 p.m. The 2040 GP also includes a policy to limit loud construction noise to the hours of 8:00 a.m. and 5:00 p.m. This analysis adopts these thresholds, consistent with the Draft Environmental Impact Report for the Pittsburg 2040 General Plan Update (2040 GP DEIR).

Neither the PMC nor the 2040 GP include any quantitative sound level limits for construction noise between the hours of 8:00 a.m. and 5:00 p.m. FTA guidelines recommend a daytime criterion of an 8-hour L_{AEQ} of 80 dBA, which this analysis adopts as a threshold for daytime construction noise.

3.2.1.2 Operations

The 2040 GP includes thresholds for increases in noise from additional traffic and thresholds for stationary noise source sound levels, as detailed in Section 2.2.2 above. The 2040 GP DEIR also introduces an additional threshold of a 3-dB increase in sound levels from stationary noise sources. This analysis adopts the 2040 GP and 2040 GP DEIR thresholds for operational noise.

3.2.2 Vibration

Neither the City of Pittsburg nor Contra Costa County have limits related to vibration in either their codes or general plans. To assess the impacts of Project vibration to sensitive receptors, this analysis uses the Caltrans guidelines discussed in Section 2.1.2 for both building damage potential and human annoyance.

3.3 Summary

Table 3-1 provides a summary of the significance thresholds for the project.

Table 3-1. Thresholds of Significance

<table>
<tr><th>Significance Criteria</th><th>Significance Threshold</th><th>Source / Agency</th></tr>
<tr><td rowspan="4">a)</td><td>Construction sound level limits:
Maximum sound level of 65 dBA at residential receptors 5:00 p.m. to 8:00 a.m.

Prohibited activity:
Operation of pile drivers, steam shovels, pneumatic hammers, derricks, and hoists between 10:00 p.m. and 7:00 a.m. except in the case of emergency</td><td>PMC</td></tr>
<tr><td>Maximum 8-hr L_{AEQ} of 80 dBA or less 8:00 a.m. to 5:00 p.m.</td><td>2040 GP/FTA</td></tr>
<tr><td>For transportation noise:
<table><tr><th>Ambient Sound Level without Project (DNL)</th><th>Increase Required for Significant Impact</th></tr><tr><td><60 dBA</td><td>+5.0 dB or more</td></tr><tr><td>60-65 dBA</td><td>+3.0 dB or more</td></tr><tr><td>>60 dBA</td><td>+1.5 dB or more</td></tr></table>
For stationary noise sources:
Hourly L_{AEQ} 50 dBA or more (7 AM to 10 PM), Hourly L_{AEQ} 45 dBA or more (10 PM to 7 AM), with 5 dB penalty for tonal noise</td><td>2040 GP</td></tr>
<tr><td>Increase of 3 dB or more from stationary noise sources</td><td>2040 GP DEIR</td></tr>
<tr><td rowspan="2">b)</td><td>Damage to structures: 0.12 in/sec PPV</td><td>Caltrans</td></tr>
<tr><td>Annoyance: 0.04 in/sec PPV</td><td>Caltrans</td></tr>
</table>

4. Environmental Setting

4.1 Noise- and Vibration-Sensitive Receptors

The locations of the noise- and vibration-sensitive receptors in close proximity to the project site are shown in Figure 4-1 below. The noise- and vibration-sensitive receptors within 1000 feet the site include the following:

- Residences
  - Adjacent to the site along Golf Club Road
  - Approximately 85 feet northwest of the site across West Leland Road
  - Approximately 800 feet to the east along Orinda Circle, Brookshire Court, Fairway Court, La Miranda Place, and Alta Vista Circle
- School: Ranch Medanos Junior High School approximately 640 feet north of the site on Range Road

- Parks:
  - John Henry Johnson Park approximately 250 feet to the west across West Leland Road
  - Park proposed by the Pittsburg 2040 GP on part of former Delta View Golf Course, approximately 80 feet from the westernmost corner of Phase 2
- The Church of Jesus Christ of Latter-day Saints approximately 200 feet north of the site on Golf Club Road

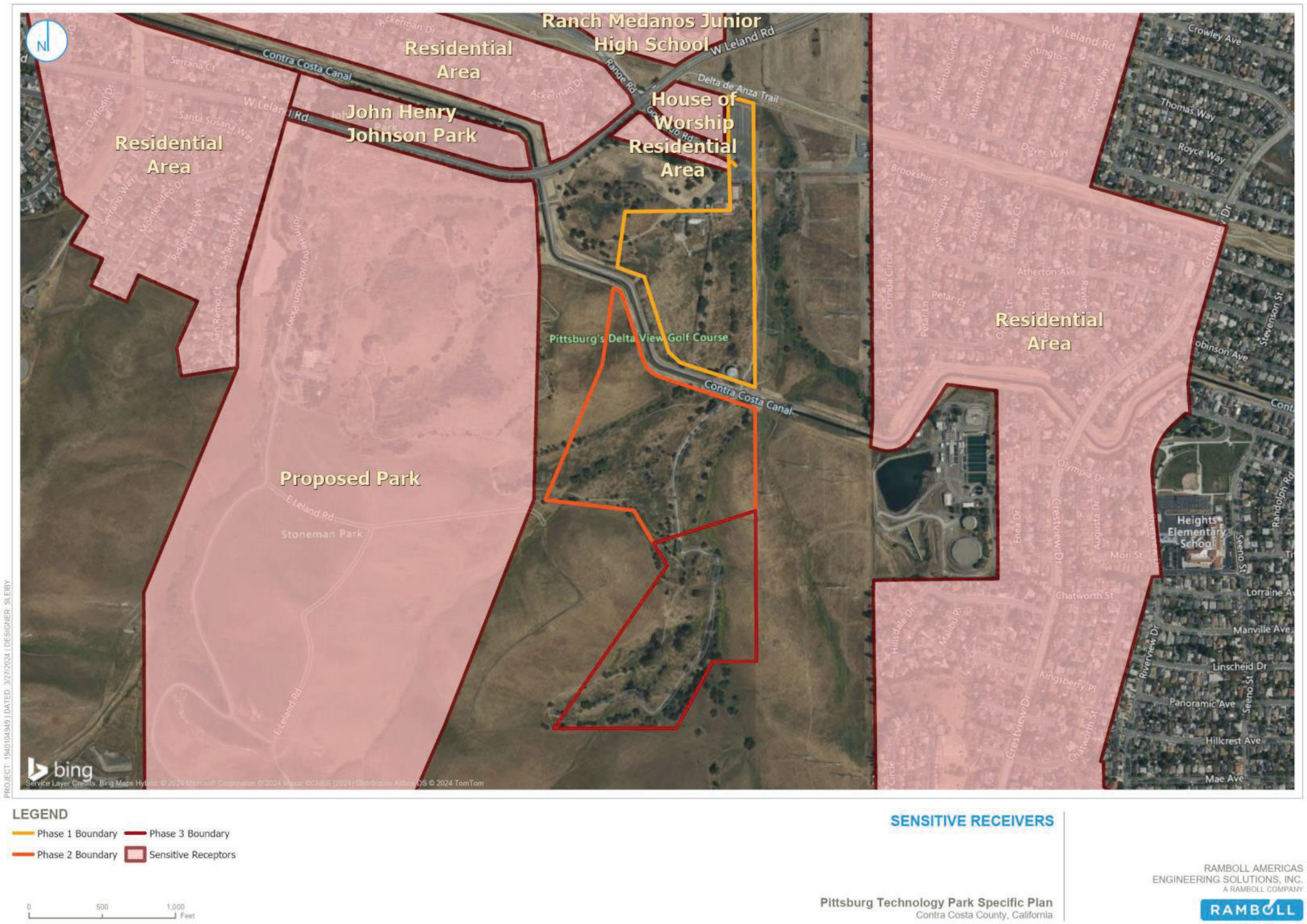

Figure 4-1. Noise- and Vibration-Sensitive Receptors Around the Project Site

4.2 Existing Sources of Noise and Vibration

The existing sources of noise include the following:

- CA-4 approximately 1/3-mile to the north.
- Local roads around the Project site, including West Leland Road and residential neighborhood roads.
- Rail lines approximately 4/5-mile to the north.

There are no significant sources of vibration near the Project site.

4.3 Existing Ambient Sound Environment

To quantify the existing ambient sound environment for the purpose of assessing potential impacts of noise from the site, Ramboll conducted an ambient sound level survey at the Project site from 1 to 3 November 2023.

4.3.1 Measurement Procedures

The survey consisted of continuous 48-hour measurements at two locations using two Larson Davis LxT sound level meters, which meet ANSI S1.4 requirements for a Type 1 sound level meter. The monitoring locations were chosen based on the locations of future construction and operational activity, the locations of noise-sensitive receptors, and the locations of existing sources of sound. The measurements were made in general conformance to ANSI S12.9-1992/Part 2. The measurement locations are shown in Figure 4-2 and described in Table 4-1.

Table 4-1. Descriptions of sound monitoring locations

Tag	Location	Measurement Period	Nearest Noise-Sensitive Receptor(s)
L-1	South of residences on Golf Club Road	9:30 AM 11/1/23 - 9:45 AM 11/3/23	Residences along Golf Club Road
L-2	West of residences along Orinda Circle	9:45 AM 11/1/23 – 10:00 AM 11/3/23	Residences along Orinda Circle
S-1	Just west of residences along Alta Vista Circle	11:06 AM – 11:21 AM & 4:00 PM – 4:15 PM 11/1/23	Residences along Alta Vista Circle

The sound level meters were placed in weather-resistant cases, while the microphones were placed on tripods approximately 5 feet above grade. Figure 4-3 shows an example installation.

Figure 4-2. Sound monitoring locations.

Figure 4-3. Example Sound Level Meter Deployment (L-1)

4.3.2 Measurement Results

The measured sound levels are summarized in Table 3-2. The primary source of sound was local road traffic, with birds, distant trains, and general neighborhood activity also contributing to the sound environment. The most active local road was West Leland Road.

Table 4-2. Sound monitoring results

Tag	Measured Sound level (DNL)
L-1	56
L-2	54
S-1	57*

* Estimate based on 1-dB offset between L-1 and S-1 during the short-term measurements.

5. Analysis of Potential Impacts

5.1 Phase 1

Noise analysis for Phase 1 of the site was completed in February 2024. Details of the analysis can be found in the noise chapter of the draft EIR and the supporting noise technical report (Ramboll, Pittsburg Data Hub Noise & Vibration Technical Report, February 2024). The results of the analysis found that none of the project thresholds of significance for noise or vibration would be exceeded.

5.2 Phases 2 and 3

As part of this Specific Plan update, in addition to Phase 1, the land comprising Phases 2 and 3 will be reclassified from OS to ECI. ECI includes any of the following uses:

- Research and development
- Custom and light manufacturing
- Limited assembly
- Warehouse and distribution
- Data center
- Technology and innovation
- Energy
- Light and heavy automobile services
- Administrative, financial, business, professional, medical, and public offices
- Business incubators

Potential sound levels from these uses can vary significantly. The following sections provide a general overview of potential noise emissions.

5.2.1 Construction Noise

Construction typically involves the use of heavy machinery that can be a significant source of noise and, while often temporary, can result in significant impacts. A general assessment of potential construction noise should be undertaken for proposed projects. The following performance standards should be used for the general assessment:

PS1. Construction sound levels are expected to be below all of the thresholds provided in the table below:

Distance to Nearest Sensitive Receptor (ft)	80	100	150	200	400	800
Sound Level Threshold (dBA) at 50 ft	81	83	86	89	95	101

PS2. Nighttime construction activity is not anticipated

PS3. Weekend construction activity is not anticipated

If there is a potential for a proposed project to not comply with any of the performance standards above, then detailed construction noise analysis is required. For construction noise to result in a less-than-significant impact, mitigation techniques should be incorporated to reduce construction noise emissions to comply with the thresholds in Table 3-1 above. Examples of construction noise mitigation include limiting hours of construction, locating stationary noise sources (e.g., generators, compressors) away from sensitive receptors, using shrouds or temporary barriers for louder equipment (e.g., pile drivers), and using newer machinery. If construction noise mitigation is not feasible or if construction noise after mitigation exceeds the thresholds in Table 3-1, then the impact of the construction noise would be significant and unavoidable.

The table below provides examples of sound levels for various pieces of equipment at reference distances of 50 feet and 800 feet.

Table 5-1. Common Construction Equipment Sound Pressure Levels

Equipment	L_{ASmax} @ 50 ft	L_{ASmax} @ 800 ft
Air Compressor	80	56
Backhoe	80	56
Compactor	82	58
Concrete Mixer	85	61
Concrete Pump	82	58
Crane, Derrick	88	64
Crane, Mobile	83	59
Dozer	85	61
Generator	82	58
Grader	85	61
Jack Hammer	88	64
Loader	80	56
Paver	85	61
Pile-driver (Impact)	101	77
Pile-driver (Sonic)	95	71
Rock Drill	95	71
Roller	85	61
Saw	76	53
Scarifier	83	59
Scraper	85	61
Shovel	82	58
Spike Driver	77	53
Truck	84	60

Source: Federal Transit Administration, *Transit Noise and Vibration Impact Assessment,* September 2018
Note the sound levels in the table above are provided as examples only for the general assessment; detailed construction noise analysis should account for reflections, shielding, and topography of the site.

While the proposed park land use is approximately 80 feet from the westernmost corner of Phase 2, the distance between construction noise sources and sensitive receptors (e.g., park paths, picnic areas) is not known at this time. The table for PS1 should be used to assess potential construction sound levels depending on the distance to the nearest receptor. As a note, given the distance to the nearest residences, construction activity is not likely to exceed the thresholds in PS1. Regardless, a general assessment should be undertaken for any proposed projects to determine if detailed analysis of construction noise is required.

5.2.2 On-Site Operational Noise

On-site operational noise can be emitted by any number of sources, including mechanical equipment, power plants, loading docks, and parking lots. Operational noise can vary greatly depending on the land use of a property, and in some instances operational noise can result in a significant impact. Off-site operational noise consists of traffic, which is discussed in Section 5.2.3.

A general assessment of potential operational noise should be undertaken for proposed projects. The following performance standards should be used for the general assessment:

PS4. Operational sound levels are expected to be below all of the thresholds provided in the table below:

Distance to Nearest Sensitive Receptor (ft)	80	100	150	200	400	800
Sound Level Threshold (dBA) at 100 ft, Daytime	38	40	43	46	52	58
Sound Level Threshold (dBA) at 100 ft, Daytime	43	45	48	51	57	63

PS5. The following uses are not anticipated: Energy, warehouse and distribution, data center

PS6. The following noise sources are not anticipated: Steam turbines, generators (unless only intended for back-up power in the event of a power outage), pile drivers, drill rigs, car wash air dryer fans, outdoor sound reinforcement systems

If there is a potential for a proposed project to not comply with any of the performance standards above, then detailed operational noise analysis is required. For operational noise to result in a less-than-significant impact, mitigation techniques should be incorporated to reduce noise emissions to comply with the thresholds in Table 3-1 above. Examples of operational noise mitigation include changes to a site layout to place noise sources further from sensitive receptors, using manufacturer-supplied or third-party noise mitigation (e.g., low-sound fan options, silencers, acoustical louvers), and installing sound barriers. If operational noise mitigation is not feasible or if operational noise after mitigation exceeds the performance standards in Table 3-1, then the impact of the construction noise would be significant and unavoidable.

Table 5-2 includes typical sound levels for various stationary noise sources, taken from Table 3.12-5 of the 2040 GP DEIR:

Table 5-2. Typical Stationary Source Noise Levels

Use	Noise Level at 100 Feet, L_{EQ}[1]	Distance to Noise Contours, Feet			
		50 dB L_{EQ} (No Shielding)	45 dB L_{EQ} (No Shielding)	50 dB L_{EQ} (With 5 dB Shielding)	45 dB L_{EQ} (With 5 dB Shielding)
Auto Body Shop	56 dBA	200	355	112	200
Auto Repair (Light)	53 dBA	141	251	79	141
Busy Parking Lot	54 dBA	158	281	89	158
Cabinet Shop	62 dBA	398	708	224	398
Car Wash	63 dBA	446	792	251	446
Cooling Tower	69 dBA	889	1581	500	889
Loading Dock	66 dBA	596	1059	335	596
Lumber Yard	68 dBA	794	1413	447	794
Maintenance Yard	68 dBA	794	1413	447	794
Outdoor Music Venue	90 dBA	10,000	17783	5623	10,000
Paint Booth Exhaust	61 dBA	355	631	200	355
Skate Park	60 dBA	316	562	178	316
School Playground/ Neighborhood Park	54 dBA	158	281	89	158
Truck Circulation	48 dBA	84	149	47	84
Vendor Deliveries	58 dBA	251	446	141	251

1. Analysis assumes a source-receiver distance of approximately 100 feet, no shielding, and flat topography. Actual noise levels will vary depending on site conditions and intensity of the use. This information is intended as a general rule only and is not suitable for final site specific noise studies.

Source: Draft Environmental Impact Report for the Pittsburg 2040 General Plan Update, Dec. 2023.

Sound levels from the various potential uses can vary significantly. On-site noise sources for uses such as office spaces and business incubators would likely be limited to parking lot noise, loading dock noise, rooftop air handling units, and small backup generators. Energy, manufacturing, and data centers could have significant noise sources such as cooling towers, chillers, turbines, and large generators. Sound levels would also depend on the quantity and sizes of the various sources of noise, which in turn depend on a variety of factors.

Based on the distance to the nearest residential noise-sensitive receptors, most of the uses listed above should be able to limit sound emissions from the site(s) to not exceed the thresholds of significance at the residences, either by means of careful site arrangement or with "off-the-shelf" noise control techniques, such as low-sound fans, acoustical louvers, and sound barriers, or a combination thereof. Sound levels at sensitive receptors of the proposed park will depend on the layout of the park.

For most land uses, proper site layout and incorporation of noise control techniques to the design should result in a less-than-significant impact at the nearby sensitive receptors. Regardless, a general assessment should be undertaken for any proposed projects to determine if detailed analysis of construction noise is required.

5.2.3 Traffic Noise

Given the various potential uses for the sites, the analysis below assumes a split of 80% manufacturing / 20% commercial for traffic, based on information provided by Fehr & Peers. The table below provides a summary of predicted traffic volumes for Phases 1, 2, and 3.

Table 5-3. Predicted Traffic Volumes

Phases	Trips/Day
Phase 1	344
Phase 2	1568
Phase 3	1670
All Phases Combined	3582

As a conservative estimate, the analysis assumes that 5 trips per day for Phase 1 and 10 trips per day for Phases 2 and 3 would be vendor delivery trucks. The sound level of traffic along W Leland Road from Phases 1 through 3 was predicted using CadnaA's FHWA TNM module. The results of the model and comparison to the 2040 GP DEIR existing sound levels are provided in the table below.

Table 5-4. Predicted Traffic Sound Levels along W Leland Rd

Source	Sound Level at Nearest Sensitive Receptor (approx. 65 ft), DNL	Increase From Existing (2022) Sound Level	Threshold	Threshold Exceedance?
Phases 1 through 3	56.5 dBA	-	-	-
Existing (2022)	65.7 dBA	-	-	-
Proposed GP	66.6 dBA	0.9 dB	+1.5 dB	No
Proposed GP + Phases 1 through 3	67.0 dBA	1.3 dB	+1.5 dB	No

As shown in the table above, even assuming the 2040 GP DEIR did not account for trips generated by Phases 1 through 3, the significance threshold was not exceeded, which would result in a less-than-significant impact.

5.3 Vibration

Vibration attenuates rapidly with distance. At distances of 500 feet or more, even a significant source of vibration (e.g., impact pile driving) would not exceed any of the Caltrans vibration thresholds. Given that Phase 2 and Phase 3 are approximately 800 feet from the nearest residence, it is unlikely that any future activities on the Phase 2 and 3 sites would exceed any vibration thresholds, which would result in a less-than-significant impact.

6. References

Caltrans, 2020. Transportation and Vibration Guidance Manual, 2020 Update. April 2020.

City of Pittsburg

2023. Pittsburg 2040 General Plan. December 2023.

2023. Draft Environmental Impact Report for the Pittsburg 2040 General Plan Update, prepared by De Novo Planning Group. December 2023.

Pittsburg Municipal Code, Chapter 9.44 Noise and Chapter 18.82 Performance Standards. September 2023. Accessed October 13, 2023.

Contra Costa County

Title 7 Building Regulations, Chapter 716-8 Grading. January 11, 2024. Accessed January 31, 2024.

2005-2020 General Plan, Chapter 3 Land Use Element and Chapter 11 Noise Element. January 18, 2005. Accessed December 5, 2023.

Datakustik, 2023. CadnaA version 2023 (Build 197.5343) Noise Prediction Software.

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

Ramboll, 2024. Pittsburg Data Hub Noise & Vibration Technical Report. February 2, 2024.

State of California, 2022. Government Code, title 7, Division 1, Chapter 3 [Section 65302]. January 1, 2022.

Appendix A – Noise & Vibration Principles and Terminology

This report uses several terms common to noise and vibration analysis. The following section provides a summary of acoustic principles and terminology to familiarize the reader.

A.1 Sound

Sound is the transmission of energy in the form of fluctuating pressure waves from a vibrating source through an elastic medium, such as air, that is detectable by the human ear. The pressure fluctuates above and below atmospheric pressure. The amplitude of the pressure fluctuation is typically described in terms of decibels (dB), while the rate of fluctuation per unit time (frequency) is described in hertz (Hz).

The decibel is a logarithmic ratio of a given sound pressure to a reference sound pressure. A logarithmic ratio is used for decibels since human hearing is roughly logarithmic, rather than linear. The reference sound pressure is roughly equal to the threshold of human hearing. Sound pressure levels below the human threshold of hearing are less than 0 dB, while levels above the human threshold of hearing are greater than 0 dB. Differences in sound level are also described in decibels. A 3-dB difference is considered "just noticeable", a 5-dB difference is considered "clearly noticeable", while a 10-dB difference is perceived as a doubling (or halving) in loudness. Table A- 1 provides a list of common noise sources, their sound level, and their subjective loudness.

Because the decibel is logarithmic, a doubling of sound energy from a noise source produces a 3-dB increase in sound level from that source, not a doubling of the loudness of the sound (which requires a 10-dB increase). For example, if traffic along a road is causing a 60 dB sound level at some nearby location, doubling the amount traffic on this same road would cause the sound level at this same location to increase to 63 dB. Such an increase might not be discernible in a complex acoustical environment.

The range of frequencies a healthy human ear can hear is approximately 20 Hz to 20,000 Hz. The human ear is not equally sensitive to all frequencies across the audible frequency spectrum. The human ear is most sensitive to mid frequencies (the frequency range associated with speech) and is less sensitive at low frequencies and very high frequencies. To account for this, frequency weighting networks have been developed to approximate the human ear's frequency response at different sound pressure levels. The A-weighting network is used to approximate the frequency response of the human ear at normal sound levels. Measurements using the A-weighting network are described in terms of A-weighted decibels, often abbreviated colloquially as dBA or dB(A).

Table A- 1. Typical Sound Pressure Levels Associated with Common Noise Sources

Sound Pressure Level (dBA)	Subjective Evaluation	Environment	
		Outdoor	Indoor
140	Deafening	Jet aircraft at 75 ft	-
130	Threshold of pain	Jet aircraft during takeoff at a distance of 300 ft	-
120	Threshold of feeling	-	Hard rock band
110	Extremely Loud	Jet flyover at 1000 ft	-
100	Very Loud	Auto horn at 10 ft	-
90		Jackhammer at 50 ft	Noisy factory
80	Loud	Diesel truck (40 mph) at 50 ft, noisy urban street	Garbage disposal, cafeteria with sound-reflecting surfaces
70	Moderately Loud	Busy highway at 100 ft	Vacuum cleaner
60	Moderate	-	Face-to-face conversation
50	Quiet	Small town	Open office area
40			
30	Very quiet	-	Bedroom, typical residence (without TV or sound system)
20		Rustling leaves	Audiometric testing room, whisper
10	Just audible	-	Human breathing
0	Threshold of hearing	-	-

Adapted from Architectural Acoustics, M. David Egan, 1988; and EPA, 1974.

A.2 Sound Level Metrics

To better characterize changes in sound levels over time, several sound level metrics have been developed. The following is a summary of some of the more common metrics.

- Sound environments often vary in level over time. The equivalent-continuous sound level, L_{EQ}, is the steady-state sound level over a given time period that has the same total sound energy as the time-varying sound level measured over that same time period. L_{EQ} is the time-averaged sound energy of a measurement.
- The Day-Night Level, abbreviated as either DNL or L_{DN}, is an equivalent-continuous sound pressure level for a 24-hour period that includes a 10-dB penalty from 10:00 PM to 7:00 AM to reflect people’s increased sensitivity to noise at night.

A.3 Noise and its Effects on People

Noise is sound that is considered undesirable or unpleasant. The effects of noise on people depends on a variety of factors, including the type of noise source, the context of the noise, and the sensitivity of the person.

The following factors affect how a noise source perceived:

- The sound level. Louder noise tends to be more annoying. In addition, noise sources that change in sound level over time are more noticeable than those that do not vary over time.
- The duration. Noise that is fairly steady over time tends to be less noticeable, while short, impulsive noises are more noticeable.
- The frequency spectrum. Broadband noise – noise that contains sound energy at many frequencies – is not as noticeable than noise that contains discrete tones. For example, the tone from a backup beeper is more noticeable than noise from a fan, even if they are producing the same overall sound level.
- Masking effects. Noise from one source can be masked – made less noticeable – by noise from one or more louder sources.

The extent to which a noise affects people can vary from subjective (causing annoyance) to physical (causing hearing loss). Where noise is loud enough to cause hearing loss, regulations such as those developed by OSHA have been adopted to mitigate hearing loss. In most environments, noise is not sufficiently loud to cause hearing loss but may still cause annoyance or impact people's productivity and general well-being. Note that the degree of annoyance caused by a given noise varies from person to person.

A.4 Sound Propagation Outdoors

The attenuation of sound over distance outdoors depends on the type of source and environmental factors. In the free field (i.e., no obstructions for the sound), sound from a source that can be considered a point spreads hemispherically, resulting in a sound attenuation rate of 6 dB per doubling of distance. Point sources include, for example, fans and individual vehicles such as trucks. Sound from a line source spreads in the shape of a half cylinder, with a sound attenuation rate of 3 dB per doubling of distance. One common type of line source is a highway. While highways have many point sources (vehicles), the constant stream of traffic results in the collection of point sources acting as a line source.

The environmental factors that affect the spread of sound outdoors include the following:

- Atmospheric effects. At short distances, atmospheric effects are negligible. However, at large distances, atmospheric effects can significantly impact the propagation of sound.
- Air absorption. Air absorbs a small amount of sound, primarily at high frequencies. The amount of sound air absorbs depends primarily on the relative humidity, but it also depends on temperature and pressure to a lesser extent. Air absorption can typically be ignored at distances of 100 m or less. At greater distances (e.g., 10,000 m), air absorption has a significant effect that must be accounted for. Air can also refract sound (bend the sound waves in a different direction) when there is a vertical temperature gradient in the atmosphere (i.e., the temperature changes with altitude). Sound waves will refract away from cooler temperatures and towards warmer temperatures.
- Wind. Wind can also play a role in sound propagation over large distances. Sound refracts in the direction the wind is traveling. The sound traveling downwind propagates more efficiently, resulting in less attenuation, while sound traveling upwind propagates less efficiently, resulting in more attenuation.

- Ground absorption. The amount of sound the ground absorbs varies based on the surface. For example, asphalt and bodies of water are more reflective, while soft, porous ground absorbs more sound.
- Vegetation. The amount of sound vegetation absorbs is typically low. However, sound traveling through 100 feet of dense woods or forest can be reduced up to 6 dB.
- Obstructions. Obstructions, such as buildings or hills, that break the line-of-sight between a noise source and receptor reduce sound levels by shielding the receptor from the source.
- Reflections. While obstructions between a source and receptor can reduce sound levels at the receptor, reflections from nearby surfaces (such as a wall or the façade of a building) that do not obstruct the line between the source and receptor can actually increase noise levels. For example, in an urban environment, the densely concentrated buildings create a "canyon effect," where sound bouncing between the buildings can increase noise levels.

A.5 Environmental Noise Descriptors

Several descriptors can be used to differentiate types of sound and noise based on the context. Two descriptors relevant to this Project are defined below.

- **Ambient sound**. ANSI S12.9-2013/Part 1 defines ambient sound as
  at a specified time, the all-encompassing sound associated with a given environment, being usually a composite of sound from many sources from many directions, near and far, including the specific sound source(s) of interest.
- **Ambient noise**. ASTM C634-13 (R2021) defines ambient noise as
  the composite of airborne sound from many sources near and far associated with a given environment. No particular sound is singled out for interest.

A.6 Vibration

Vibration is the transmission of energy in the form of waves through the ground, man-made structures, or other solid objects. As with sound, the frequencies of vibration are described in hertz (Hz). The amplitude of vibration is typically described either as peak particle velocity (PPV) in units of inches per second (in/sec) or in decibels of vibration velocity, abbreviated as VdB.

Vibration is perceived tactilely whether through feet or hands or through the whole body while sitting or lying down. Like noise, vibration can be a source of annoyance and can cause sleep disturbance.

Most perceptible indoor vibration is caused by sources within buildings, such as equipment operation, movement of people, or slamming doors. Typical outdoor sources are heavy construction equipment and activities (such as blasting and pile driving), steel-wheeled trains, and heavy trucks on rough roads or offroad. It is unusual for vibration from sources such as buses and trucks on smooth roads to be perceptible, even in nearby locations.