4.7 NOISE

INTRODUCTION

The Noise chapter of this Draft EIR discusses the existing noise environment in the immediate project vicinity and identifies potential noise-related impacts and mitigation measures associated with the proposed project. Specifically, the Noise chapter analyzes potential noise impacts due to and upon development of the project site relative to applicable noise criteria and to the existing ambient noise environment. Information presented in this chapter is primarily drawn from the *Tuscany Meadows Environmental Noise Assessment*[1] prepared specifically for the proposed project by Illingworth & Rodkin, Inc. (see Appendix I), as well as the *Pittsburg General Plan 2020,*[2] the *Pittsburg General Plan 2020 EIR*,[3] and the *Contra Costa County General Plan 2005-2020.*[4]

EXISTING ENVIRONMENTAL SETTING

The Existing Environmental Setting section provides background information on noise and vibration, a discussion of acoustical terminology, the effects of noise on people, existing sensitive receptors in the project vicinity, existing sources and noise levels in the project vicinity, and groundborne vibration.

Fundamentals of Environmental Noise

Several noise measurement scales exist that are used to describe noise in a particular location. A decibel (dB) is a unit of measurement that indicates the relative amplitude of a sound. The decibel scale is based on the lowest sound level that the healthy, unimpaired human ear can detect. Sound levels in decibels are calculated on a logarithmic basis. An increase of ten decibels represents a ten-fold increase in acoustic energy, while 20 decibels is 100 times more intense, 30 decibels is 1,000 times more intense, etc. Each ten decibel increase in sound level is perceived by humans as approximately a doubling of loudness over a fairly wide range of intensities.

Several methods of characterizing sound exist. The most common in California is the A-weighted sound level (dBA). The A-weighted scale gives greater weight to the frequencies of sound to which the human ear is most sensitive. Representative outdoor and indoor noise levels in units of dBA are shown in Table 4.7-1. Because sound levels can vary markedly over a short period of time, a method for describing either the average character of the sound or the statistical behavior of the variations must be utilized. Most commonly, environmental sounds are described in terms of an average level that has the same acoustical energy as the summation of all the time-varying events. The common energy-equivalent sound/noise descriptor is called L_{eq}. The most common averaging period is hourly, but L_{eq} can describe any series of noise events of arbitrary duration.

Table 4.7-1 Typical Noise Levels		
Common Outdoor Activities	**Noise Level (dBA)**	**Common Indoor Activities**
	--110--	Rock Band
Jet Fly-over at 300 m (1,000 ft)	--100--	
Gas Lawn Mower at 1 m (3 ft)	--90--	
Diesel Truck at 15 m (50 ft), at 80 km/hr (50 mph)	--80--	Food Blender at 1 m (3 ft) Garbage Disposal at 1 m (3 ft)
Noisy Urban Area, Daytime Gas Lawn Mower, 30 m (100 ft)	--70--	Vacuum Cleaner at 3 m (10 ft)
Commercial Area Heavy Traffic at 90 m (300 ft)	--60--	Normal Speech at 1 m (3 ft)
Quiet Urban Daytime	--50--	Large Business Office Dishwasher in Next Room
Quiet Urban Nighttime	--40--	Theater, Large Conference Room (Background)
Quiet Suburban Nighttime	--30--	Library
Quiet Rural Nighttime	--20--	Bedroom at Night, Concert Hall (Background)
	--10--	Broadcast/Recording Studio
Lowest Threshold of Human Hearing	--0--	Lowest Threshold of Human Hearing
Source: Caltrans, Technical Noise Supplement, Traffic Noise Analysis Protocol. November, 2009.		

The scientific instrument used to measure noise is the sound level meter. Sound level meters can accurately measure environmental noise levels to within approximately plus or minus one dBA. Various computer models are used to predict environmental noise levels from sources, such as roadways and airports. The accuracy of the predicted models depends upon the distance the receptor is from the noise source. Close to the noise source, the models are accurate to within approximately plus or minus one to two dBA.

Because sensitivity to noise increases during the evening and at night, due to excessive noise interfering with the ability to sleep, 24-hour descriptors have been developed that incorporate artificial noise penalties added to quiet-time noise events. The Community Noise Equivalent Level (CNEL) is a measure of the cumulative noise exposure in a community, with a five dB penalty added to evening (7:00 PM - 10:00 PM) and a 10 dB addition to nocturnal (10:00 PM - 7:00 AM) noise levels. The Day/Night Average Sound Level (L_{dn}) is essentially the same as CNEL, with the exception that the evening time period is dropped and all occurrences during 7:00 PM and 10:00 PM are grouped into the daytime period.

Existing Sensitive Receptors

Certain land uses are more sensitive to ambient noise levels than others due to the amount of noise exposure (in terms of both exposure time and shielding from noise sources) and the type of activities typically involved. Residences, motels and hotels, schools, libraries, churches, hospitals, nursing homes, auditoriums, parks, and outdoor recreation areas are generally more sensitive to noise than are commercial and industrial land uses. Accordingly, such land uses are referred to as sensitive receptors.

The proposed project site is bounded to the south by the Black Diamond Estates residential development and to the west by the Highlands Ranch residential development. Residential development also exists to the north across Buchanan Road and to the northeast between Buchanan Road and Somersville Road. The nearest existing sensitive land uses to the proposed project site would include the following: residences immediately adjacent to the site to the west associated with the Highlands Ranch residential development along Silver Saddle Drive and Canyon Oaks Circle, residences immediately adjacent to the site to the south associated with the Black Diamond Estates residential development along Heaton Court and Westridge Court, residences to the northeast associated with the residential development contained between Buchanan Road and Somersville Road, and residences to the north along Null Drive and Heatherwood Drive across Buchanan Road. The sensitive receptors may be affected by increased project-related traffic noise and/or project-related noise from on-site activities.

Existing Noise Environment

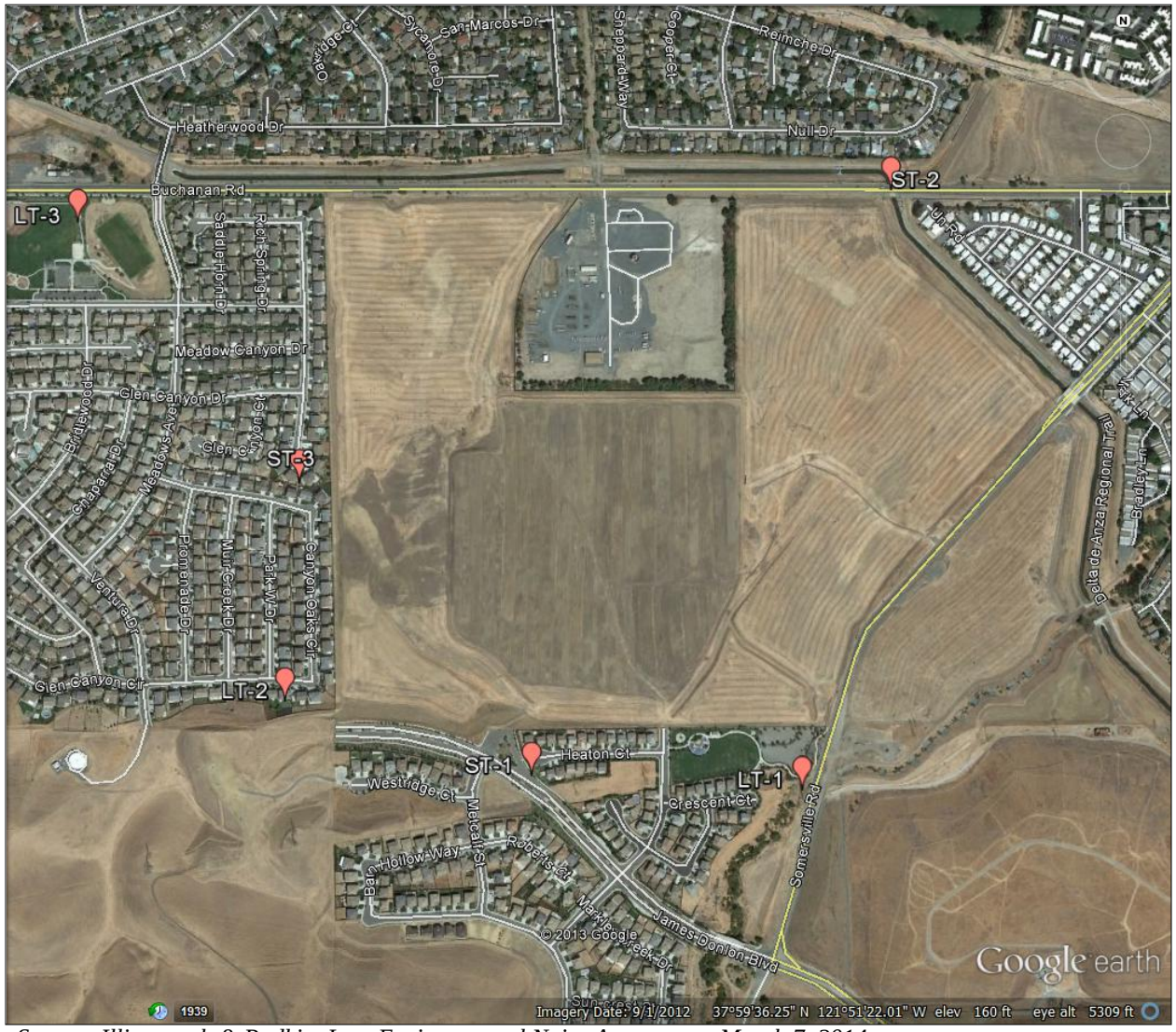
To quantify the existing ambient noise environment in the project vicinity, short-term ambient noise level measurements and continuous (24-hour) noise level measurements were conducted at three overall locations on the project site and vicinity on April 17, 2013 and April 22, 2013 (see Figure 4.7-1, Noise Measurement Locations). The ambient noise levels measured are presented in Table 4.7-2. The noise monitoring survey included three long-term noise measurements (LT-1 through LT-3) and three short-term measurements (ST-1 through ST-3). The maximum value (L_{max}) represents the highest noise level measured during an interval. The average value (L_{eq}) represents the energy average of all of the noise measured during an interval. The median value (L_{50}) represents the sound level exceeded 50 percent of the time during an interval. The existing noise environment at the site and in the vicinity results primarily from traffic on Buchanan Road and Somersville Road.

Long-term noise measurement LT-1 was made within Markley Creek Park, near the southeast corner of the project site. The measurement site was 60 feet from the centerline of Somersville Road, and noise levels measured at this site were primarily the result of traffic along the roadway. CNEL noise levels were 70 to 71 dBA during weekdays and 67 dBA over the weekend.

Long-term noise measurement LT-2 was made near the southwest corner of the project site within the Highlands Ranch subdivision that forms the westernmost project boundary. Noise sources affecting measurements at this location were primarily local traffic along Canyon Oaks Circle and other neighborhood activities (e.g., landscaping, children playing, barking dogs). CNEL noise levels were 53 dBA during weekdays and ranged from 54 to 57 dBA over the weekend.

Long-term noise measurement LT-3 was made within Highland Ranch Park, west of the project site. The measurement site was 75 feet from the centerline of Buchanan Road, and noise levels measured at this site were primarily the result of traffic along the roadway. CNEL noise levels were 70 dBA during weekdays and ranged from 68 to 69 dBA over the weekend.

Figure 4.7-1
Noise Measurement Locations



Source: Illingworth & Rodkin, Inc., Environmental Noise Assessment, March 7, 2014.

Short-term noise measurements ST-1 through ST-3 were made at various locations surrounding the project site and were representative of existing noise-sensitive residential land uses. Observations were also made near the perimeter of the existing Chevron facility. Activities at the Chevron facility appeared to be minimal during the site visits and any activities occurring at the facility are shielded by an approximate ten-foot-high pre-cast concrete noise barrier. Noise sources associated with the Chevron facility were not notable or identifiable and were not in excess of existing ambient noise levels resulting from Buchanan Road traffic.

Table 4.7-2
Summary of Existing Background Noise Measurement Data

Site	Noise Measurement Location	Date, Time	L_{max}	$L_{(1)}$	$L_{(10)}$	$L_{(50)}$	$L_{(90)}$	L_{eq}	CNEL
Long-term Noise Level Measurements									
LT-1	Markley Creek Park, southeast corner of site	Weekdays	NA						70-71
		Weekends							67
LT-2	Highland Ranch subdivision, southwest corner of site	Weekdays	NA						53
		Weekends							54-57
LT-3	Highland Ranch Park, west of the site	Weekdays	NA						70
		Weekends							68-69
Short-term Noise Level Measurements									
ST-1	West end of Heaton Court	4/22/2013, 1:30-1:40 PM	59	50	42	36	34	40	<55
ST-2	60 feet north of the Buchanan Road centerline	4/22/2013, 2:20-2:30 PM	73	69	67	63	51	64	71
ST-3	Front of 37 Silver Saddle Court	4/22/2013, 2:40-2:50 PM	56	52	47	42	39	44	<55

Source: Illingworth & Rodkin, Inc., Environmental Noise Assessment, March 7, 2014.

Fundamentals of Groundborne Vibration

Several different methods are typically used to quantify vibration amplitude. One method is the Peak Particle Velocity (PPV). The PPV is defined as the maximum instantaneous positive or negative peak of the vibration wave. A PPV descriptor with units of millimeters per second (mm/sec) or inches per second (in/sec) is used to evaluate construction generated vibration for building damage and human complaints. Table 4.7-3 displays the reactions of people and the effects on buildings that continuous vibration levels produce.

The annoyance levels shown in Table 4.7-3 should be interpreted with care, because vibration may be found to be annoying at much lower levels than those shown, depending on the level of activity or the sensitivity of the individual. To sensitive individuals, vibrations approaching the

threshold of perception can be annoying. Low-level vibrations frequently cause irritating secondary vibration, such as a slight rattling of windows, doors, or stacked dishes. The rattling sound can give rise to exaggerated vibration complaints, even though very little risk of actual structural damage exists.

Table 4.7-3
Effects of Vibration on People and Buildings

Velocity Level, PPV (in/sec)	Human Reaction	Effect on Buildings
0.01	Barely perceptible	No effect
0.04	Distinctly perceptible	Vibration unlikely to cause damage of any type to any structure
0.08	Distinctly perceptible to strongly perceptible	Recommended upper level of the vibration to which ruins and ancient monuments should be subjected
0.1	Strongly perceptible	Virtually no risk of damage to normal buildings
0.3	Strongly perceptible to severe	Threshold at which there is a risk of damage to older residential dwellings such as plastered walls or ceilings
0.5	Severe - Vibrations considered unpleasant	Threshold at which there is a risk of damage to newer residential structures

Source: Caltrans. Transportation and Construction Vibration Guidance Manual. September 2013

Construction activities could cause vibration that varies in intensity depending on several factors. The use of pile driving and vibratory compaction equipment typically generates the highest construction related groundborne vibration levels. Because of the impulsive nature of such activities, the use of the PPV descriptor has been routinely used to measure and assess groundborne vibration and almost exclusively to assess the potential of vibration to induce structural damage and the degree of annoyance for humans.

The two primary concerns with construction-induced vibration, the potential to damage a structure and the potential to interfere with the enjoyment of life, are evaluated against different vibration limits. Studies have shown that the threshold of perception for average persons is in the range of 0.008 to 0.012 inches per second PPV. Human perception to vibration varies with the individual and is a function of physical setting and the type of vibration. Persons exposed to elevated ambient vibration levels, such as people in an urban environment, may tolerate a higher vibration level.

Structural damage could be classified as cosmetic only, such as minor cracking of building elements, or may threaten the integrity of the building. Construction-induced vibration that could be detrimental to the building is very rare and has only been observed in instances where the structure is at a high state of disrepair and the construction activity occurs immediately adjacent to the structure.

Table 4.7-3 indicates that the threshold for damage to structures is 0.3 in/sec PPV. Approximately 0.08 in/sec PPV is considered a safe criterion that would protect against architectural or structural damage. The general threshold at which human annoyance could occur is noted as 0.1 in/sec PPV.

REGULATORY CONTEXT

In order to limit exposure to physically and/or psychologically damaging noise and vibration levels, the State of California, various county governments, and most municipalities in the State have established standards and ordinances to control noise and vibration. The following provides a general overview of the existing regulations established regarding noise and vibration that are relevant to the proposed project.

Federal Regulations

The following are the federal environmental laws and policies relevant to noise.

Federal Interagency Committee on Noise (FICON)

The Federal Interagency Committee on Noise (FICON) provides guidance in the assessment of changes in ambient noise levels resulting from aircraft operations. The recommendations are based upon studies that relate aircraft noise levels to the percentage of persons highly annoyed by the noise. Although the FICON recommendations were specifically developed to assess aircraft noise impacts, it has been widely accepted that they are applicable to all sources of noise described in terms of cumulative noise exposure metrics such as the L_{dn} (see Table 4.7-4).

Table 4.7-4
Significance of Changes in Noise Exposure

Ambient Noise Level Without Project, L_{dn}	Increase Required for Significant Impact
<60 dB	+5.0 dB or more
60-65 dB	+3.0 dB or more
>65 dB	+1.5 dB or more

Source: Federal Interagency Committee on Noise (FICON).

State Regulations

California State Building Codes

The State Building Code, Title 24, Part 2 of the State of California Code of Regulations establishes uniform minimum noise insulation performance standards to protect persons within new buildings which house people, including hotels, motels, dormitories, apartment houses, and dwellings other than single-family dwellings. Title 24 mandates that interior noise levels attributable to exterior sources shall not exceed 45 dB L_{dn} or CNEL in any habitable room. Title 24 also mandates that for structures containing noise-sensitive uses to be located where the L_{dn} or CNEL exceeds 60 dB, an acoustical analysis must be prepared to identify mechanisms for limiting exterior noise to the prescribed allowable interior levels. If the interior allowable noise levels are met by requiring that windows be kept closed, the design for the structure must also specify a ventilation or air conditioning system to provide a habitable interior environment.

Local Regulations

City of Pittsburg General Plan

The Pittsburg General Plan Noise Element contains goals, policies, and implementation measures for assessing exterior and interior noise impacts within the City. The following noise goals and policies are applicable to the proposed project.

Goal 12-G-1 Protect public health and welfare by eliminating or minimizing the effects of existing noise problems, and by preventing increased noise levels in the future.

Goal 12-G-2 Encourage criteria such as building design and orientation, wider setbacks, and intense landscaping in lieu of sound walls to mitigate traffic noise along all major corridors, except along State Route 4.

Goal 12-G-3 Continue efforts to incorporate noise considerations into land use planning decisions, and guide the location and design of transportation facilities to minimize the effects on adjacent land uses.

Policy 12-P-1 As part of development review, use Figure 12-3 of the Pittsburg General Plan – summarized in Table 4.7-5) to determine acceptable uses and installation requirements in noise impacted areas.

Exterior use areas associated with new single-family residences are considered *normally acceptable* up to a noise level of 60 dBA CNEL, *conditionally acceptable* where noise levels range from 55 to 70 dBA CNEL, *normally unacceptable* where noise levels range from 70 to 75 dBA CNEL, and *clearly unacceptable* where noise levels exceed 75 dBA CNEL.

Exterior use areas associated with new multi-family residences are considered *normally acceptable* up to a noise level of 65 dBA CNEL, *conditionally acceptable* where noise levels range from 60 to 70 dBA CNEL, *normally unacceptable* where noise levels range from 70 to 75 dBA CNEL, and *clearly unacceptable* where noise levels exceed 75 dBA CNEL.

Table 4.7-5
City of Pittsburg Noise and Land Use Compatibility

Land Use Category	Exterior Day/Night Noise Levels DNL or Ldn, dB			
	Normally Acceptable[1]	**Conditionally Acceptable[2]**	**Normally Unacceptable[3]**	**Clearly Unacceptable[4]**
Residential – Single-Family	50 – 60	55 – 70	70 – 75	75 – 85
Residential – Multi-Family	50 – 65	60 – 70	70 – 75	75 – 85
Transient Lodging – Motels, Hotels	50 – 65	60 – 70	70 – 80	80 – 85
Schools, Libraries, Churches, Hospitals,* Nursing Homes	50 – 70	60 – 70	70 – 80	80 – 85
Auditoriums, Concert Halls, Amphitheaters	N/A	50 – 70	65 – 85	N/A
Sports Arena, Outdoor Spectator Sports	N/A	50 – 75	70 – 85	N/A
Playgrounds, Neighborhood Parks	50 – 70	N/A	67.5 – 75	72.5 – 85
Golf Courses, Riding Stables, Water Recreation, Cemeteries	50 – 75	N/A	70 – 80	80 – 85
Office Buildings, Business Commercial and Professional	50 – 70	67.5 – 77.5	75 – 85	N/A
Industrial Manufacturing	50 – 75	70 – 80	75 – 85	N/A

Notes:
1. Normally Acceptable: Specified land use is satisfactory, based upon the assumption that any buildings involved are of normally conventional construction, without any special noise insulation requirements.
2. Conditionally Acceptable: New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design.
3. Normally Unacceptable: New construction or development should generally be discouraged. If new construction or development does not proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.
4. Clearly Unacceptable: New construction or development clearly should not be undertaken.

* Because hospitals are often designed and constructed with high noise insulation properties, it is possible for them to be satisfactorily located in noisier areas.

Source: City of Pittsburg. Pittsburg General Plan 2020 Policy Document. January, 2001.

Policy 12-P-4 Require noise attenuation programs for new development exposed to noise above normally acceptable levels. Encourage noise attenuation programs that avoid visible sound walls.

Policy 12-P-5 Require that applicants for new noise-sensitive development, such as schools, residences, and hospitals, in areas subject to noise generators producing noise levels greater than 65 dB CNEL obtain the services of a professional acoustical engineer to provide a technical analysis and design of mitigation measures.

Policy 12-P-6 Ensure that new noise-sensitive uses, including schools, hospitals, churches, and homes, in areas near roadways

identified as impacting sensitive receptors by producing noise levels greater than 65 dB CNEL (Figure 12-1 of the Pittsburg General Plan), incorporate mitigation measures to ensure that interior noise levels do not exceed 45 dB CNEL.

Policy 12-P-8 Develop noise attenuation programs for mitigation of noise adjacent to existing residential areas, including such measures as wider setbacks, intense landscaping, double-pane windows, and building orientation muffling the noise source.

Policy 12-P-9 Limit generation of loud noises on construction sites adjacent to existing development to normal business hours between 8 AM and 5 PM.

Policy 12-P-10 Reduce the impact of truck traffic noise on residential areas by limiting such traffic to appropriate truck routes. Consider methods to restrict truck travel times in sensitive areas.

City of Pittsburg Municipal Code

The City of Pittsburg regulates noise within the community in Chapter 9.44, Noise, of the Municipal Code. The following general rule is outlined in the ordinance:

9.44.010 Prohibitions

It is unlawful for any person to make, continue or cause to be made or continued any noise which either unreasonably annoys, disturbs, injures or endangers the comfort, repose, health, peace or safety of others, within the limits of the city. The following acts, among others, are declared to be unreasonably loud, disturbing and endangering noises in violation of this chapter, but the enumeration shall not be deemed to be exclusive, namely:

H. Exhausts. The discharge into the open air of the exhaust of any steam engine, motorboat, stationary internal combustion engine or motor vehicle, except through a muffler or other device which will effectively prevent loud or explosive noises therefrom; and

J. Pile Drivers, Hammers and Similar Equipment. The operation between the hours of 10:00 PM and 7:00 AM of any pile driver, steam shovel, pneumatic hammer, derrick, steam or electric hoist or other appliance, the use of which is attended by loud or unusual noise, except in case of emergency.

IMPACTS AND MITIGATION MEASURES

The section below describes the standards of significance and methodology utilized to analyze and determine the proposed project's potential impacts related to noise and vibration. Mitigation measures, when appropriate, are also detailed in the following section.

Standards of Significance

In accordance with Appendix G of the CEQA Guidelines, the City of Pittsburg has determined that implementation of the project would result in significant noise and vibration impacts if the project would result in any of the following:

- Exposure of persons to or generation of noise levels in excess of applicable noise standards established in the local General Plan (65 dBA CNEL for exterior noise with multi-family, 60 dBA CNEL for exterior noise with single-family, and 45 dBA for interior noise with any new residential development) or Noise Ordinance, or applicable standards of other agencies.
- Exposure of persons to or generation of excessive groundborne vibration (greater than 0.3 in/sec PPV) or airborne noise levels.
- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

Based on the analysis in the Initial Study prepared for the project (see Appendix C), two potential impacts were determined to have no impact. The two impacts pertain to projects within the vicinity of a public airport or private airstrip causing people residing or working in the project area to be exposed to excessive noise and vibration levels. The proposed project is not located within two miles of an airport or within the vicinity of a private airport. Therefore, aircraft noise or vibration would not impact the proposed project and such impacts are not examined further in this EIR.

Method of Analysis

Below are descriptions of the methodologies utilized to determine traffic noise, as well as construction noise and vibration impacts. Further modeling details and calculations are provided in the Environmental Noise Assessment (see Appendix I). The results of the Environmental Noise Assessment were compared to the standards of significance discussed above in order to determine the associated level of impact.

Traffic Noise

Traffic volume information at the study area intersections was reviewed as part of the traffic noise analysis. Traffic data provided by Abrams & Associates estimates 9,940 net new daily trips as a result of the project with a total of 797 trips occurring in the AM Peak Hour and 947 trips occurring in the PM Peak Hour. Traffic volumes under the "Existing", "Near-Term Project", and

"Cumulative Plus Project (with James Donlon extension)" traffic scenarios were compared to calculate the relative increase in traffic noise attributable to the proposed project.

Construction Noise and Vibration

Construction noise and vibration was analyzed using data compiled for various pieces of construction equipment at a representative distance of 50 feet. Construction activities are discussed relative to the applicable City of Pittsburg noise policies and the above mentioned thresholds of significance.

Project-Specific Impacts and Mitigation Measures

The following discussion of impacts is based on the implementation of the proposed project in comparison with the standards of significance identified above.

4.7-1 Construction noise impacts to existing sensitive receptors in the project vicinity. Based on the analysis below, even with implementation of mitigation, the impact is *significant and unavoidable*.

During the construction of the proposed project, including roads, water and sewer lines, and related infrastructure, noise from construction activities would add to the noise environment in the project vicinity. Construction of the project would involve site improvements, such as the establishment of utilities, site grading and excavation, the construction of foundations, building framing, paving, and landscaping. The project would also generate truck trips along roadways serving the site.

Noise impacts from construction activities depend on the various pieces of construction equipment, the timing and length of noise generating activities, and the distance between the construction noise sources and noise sensitive areas. Construction noise impacts primarily result when construction activities occur during noise-sensitive times of the day (e.g., early morning, evening, or nighttime hours), when the construction occurs in areas adjoining noise sensitive land uses, or when construction lasts over extended periods of time.

During each stage of construction, a different mix of equipment would be operating. Construction noise levels would vary by stage and vary within stages based on the amount of equipment in operation and location where the equipment is operating. Typical construction noise levels at a distance of 50 feet are shown in Table 4.7-6. According to the Noise Assessment prepared for the proposed project, construction noise for domestic housing is in the range of 81 to 88 dBA L_{eq} at a distance of 50 feet from the source. For reference, typical daytime ambient noise levels at receptors away from major roadways in the project vicinity are less than 50 dBA L_{eq}.

Table 4.7-6
Construction Equipment 50-foot Noise Emission Limits

Equipment Category	L_{max} Level (dBA)[1,2]	Impact/Continuous
Arc Welder	73	Continuous
Auger Drill Rig	85	Continuous
Backhoe	80	Continuous
Bar Bender	80	Continuous
Boring Jack Power Unit	80	Continuous
Chain Saw	85	Continuous
Compressor[3]	70	Continuous
Compressor (other)	80	Continuous
Concrete Mixer	85	Continuous
Concrete Pump	82	Continuous
Concrete Saw	90	Continuous
Concrete Vibrator	80	Continuous
Crane	85	Continuous
Dozer	85	Continuous
Excavator	85	Continuous
Front End Loader	80	Continuous
Generator	82	Continuous
Generator (25 KVA or less)	70	Continuous
Gradall	85	Continuous
Grader	85	Continuous
Grinder Saw	85	Continuous
Horizontal Boring Hydro Jack	80	Continuous
Hydra Break Ram	90	Impact
Impact Pile Driver	105	Impact
Insitu Soil Sampling Rig	84	Continuous
Jackhammer	85	Impact
Mounted Impact Hammer (hoe ram)	90	Impact
Paver	85	Continuous
Pneumatic Tools	85	Continuous
Pumps	77	Continuous
Rock Drill	85	Continuous
Scraper	85	Continuous
Slurry Trenching Machine	82	Continuous
Soil Mix Drill Rig	80	Continuous
Street Sweeper	80	Continuous
Tractor	84	Continuous
Truck (dump, delivery)	84	Continuous
Vacuum Excavator Truck (vac-truck)	85	Continuous
Vibratory Compactor	80	Continuous
Vibratory Pile Driver	95	Continuous
All other equipment with engines larger than 5 HP	85	Continuous

Notes:
1. Measured at 50 feet from the construction equipment, with a "slow" (1 sec.) time constant.
2. Noise limits apply to total noise emitted from equipment and associated components operating at full power while engaged in its intended operation.
3. Portable Air Compressor rated at 75 cfm or greater and that operates at greater than 50 psi.

Source: Illingworth & Rodkin, Inc., Environmental Noise Assessment, March 7, 2014.

The highest noise levels would be generated during excavation and foundation construction. Jackhammers typically generate maximum noise levels of 85 dBA L_{max} at a distance of 50 feet. Large pieces of earth-moving equipment, such as graders, excavators, and bulldozers, generate maximum noise levels of 85 to 90 dBA L_{max} at a distance of 50 feet. As shown in Table 4.7-6, activities involved in construction would generate maximum noise levels ranging from 70 to 105 dB at a distance of 50 feet. Construction activities would be temporary in nature and are anticipated to occur during normal daytime working hours, as regulated by the City of Pittsburg.

Construction noise levels drop off at a rate of approximately six dBA per doubling of distance between the noise source and receptor. Thus, the average noise levels at 100 feet from the more typical construction activity at the site would range from 75 to 82 dBA L_{eq} during busy construction periods. Noise levels at 200 feet would be expected to range from 69 to 76 dBA L_{eq}, and noise levels at 400 feet would be expected to range from 63 to 70 dBA L_{eq}, and so on. Therefore, construction activities occurring on the vast majority of the site, in the vicinity of existing noise-sensitive residential land uses, would have the potential to substantially increase ambient noise levels on a temporary basis.

The proposed project would comply with the City's General Plan Policy 12-P-9 which restricts construction to normal business hours between 8:00 AM and 5:00 PM. Because the project buildout will be long-term, construction noise is not considered "temporary."

Based on the analysis above, project development would expose existing area residences to construction-generated noise over multiple building seasons. Given the potential for substantial increases in noise at adjacent residences as a result of project construction and the likelihood that substantial noise increases would likely occur for more than one year, construction activities would result in periods of elevated noise levels that could result in a ***significant*** impact.

Mitigation Measure(s)

Implementation of the following mitigation measures would reduce the effects of construction noise upon existing residences in the area. However, even after implementation of the measures, noise levels at adjacent residences would continue to substantially exceed existing ambient noise levels. In addition, because construction is expected to last over several years, project construction noise would remain a *significant and unavoidable* impact until full buildout of the project.

4.7-1 *Prior to issuance of Building Permits, the contractor shall prepare a detailed construction plan identifying the schedule for major noise-generating construction activities. The construction plan shall identify a procedure for coordination with adjacent residential land uses so that construction activities can be scheduled to minimize noise disturbance. The plan shall implement, but not be limited to, the following available control measures to reduce construction noise levels as low as practical:*

- *Construction activities shall be limited to the hours between 8:00 AM and 5:00 PM, Monday through Saturday. No construction activities should occur on Sundays or federal holidays (Consistent with General Plan Policy 12-P-9 and as approved by the City Engineer and Chief Building Official);*
- *Equip all internal combustion engine-driven equipment with mufflers, which are in good condition and appropriate for the equipment;*
- *Prohibit all unnecessary idling of internal combustion engines;*
- *Route construction related traffic to and from the site via designated truck routes and avoid residential streets where possible;*
- *Utilize "quiet" models of air compressors and other stationary noise sources where technology exists;*
- *Locate all stationary noise-generating equipment, such as air compressors and portable power generators, as far away as possible from adjacent land uses;*
- *Shield adjacent sensitive uses from stationary equipment with individual noise barriers or partial acoustical enclosures;*
- *Locate staging areas and construction material storage areas as far away as possible from adjacent land uses;*
- *Designate a "disturbance coordinator" who would be responsible for responding to any local complaints about construction noise. The disturbance coordinator will determine the cause of the noise complaint (e.g., starting too early, bad muffler, etc.) and will require that reasonable measures warranted to correct the problem be implemented. Conspicuously post a telephone number for the disturbance coordinator at the construction site and include the telephone number in the notice sent to neighbors regarding the construction schedule; and*
- *Hold a preconstruction meeting with the job inspectors and the general contractor/on-site project manager to confirm that noise mitigation and practices (including construction hours, construction schedule, and noise coordinator) are completed.*

The construction plan shall be submitted to the City Building Official for review and approval.

4.7-2 Construction vibration impacts to existing sensitive receptors in the project vicinity. Based on the analysis below and with implementation of mitigation, the impact is *less than significant*.

The construction of the proposed project may generate perceptible vibration when heavy equipment or impact tools (e.g., jackhammers, hoe rams, etc.) are used. Construction activities would include excavation, grading, site preparation work, foundation work, and

new building framing and finishing. Construction vibration impacts include human annoyance and building structural damage. Human annoyance occurs when construction vibration rises significantly above the threshold of perception. Building damage could take the form of cosmetic or structural. Table 4.7-7 shows the typical vibration levels produced by construction equipment at a distance of 25 feet.

The California Department of Transportation recommends a vibration limit of 0.5 in/sec PPV for buildings structurally sound and designed to modern engineering standards, 0.3 in/sec PPV for buildings that are found to be structurally sound but where structural damage is a major concern, and a conservative limit of 0.08 in/sec PPV for ancient buildings or buildings that are documented to be structurally weakened. Ancient buildings or buildings that are documented to be structurally weakened do not exist in the vicinity of the project site. Therefore, groundborne vibration levels exceeding 0.3 in/sec PPV would have the potential to result in a significant vibration impact.

Table 4.7-7
Vibration Levels for Varying Construction Equipment

Equipment		PPV @ 25 feet (in/sec)	Approximate L_v @ 25 feet (VdB)
Pile Driver (Impact)	upper range	1.158	112
	typical	0.644	104
Pile Driver (Sonic)	upper range	0.734	105
	typical	0.170	93
Clam shovel drop		0.202	94
Hydromill (slurry wall)	in soil	0.008	66
	in rock	0.017	75
Vibratory Roller		0.210	94
Hoe Ram		0.089	87
Large bulldozer		0.089	87
Caisson drilling		0.089	87
Loaded trucks		0.076	86
Jackhammer		0.035	79
Small bulldozer		0.003	58

Source: Transit Noise and Vibration Impact Assessment, United States Department of Transportation, Office of Planning and Environment, Federal Transit Administration, May 2006.

Jackhammers typically generate vibration levels of 0.035 in/sec PPV and drilling typically generates vibration levels of 0.09 in/sec PPV at a distance of 25 feet. Vibration levels from vibratory rollers can reach 0.210 in/sec PPV at a distance of 25 feet. It should be noted that pile driving is not anticipated for the proposed project. Vibration levels would vary depending on soil conditions, construction methods, equipment used, and with distances from the source of the vibration.

Existing residences bordering the site are typically located about 20 to 25 feet from the common property line, but one residence along the west boundary of the site (Canyon

Oaks Circle) is located as near as about 10 feet from the property line. At a distance of 10 feet, vibration levels from most construction equipment would be less than the 0.3 in/sec PPV threshold; however, the use of a vibratory roller at a distance of 10 feet would result in vibration levels of about 0.6 in/sec PPV. At more typical distances of 20 feet or greater, vibration levels from all construction equipment would be at or below the 0.3 in/sec PPV vibration threshold. Vibration generated by construction activities occurring near the common property line would at times be perceptible, but would only be expected to exceed the 0.3 in/sec PPV vibration threshold when activities occur closer than 20 feet of existing residences.

Construction activities associated with the proposed project would not be expected to result in cosmetic damage to the nearest sensitive receptors' buildings. In addition, construction activities would be temporary in nature and would occur during normal daytime working hours, as regulated by the City of Pittsburg. However, because the use of vibratory rollers may cause annoyance to the residence to the west along Canyon Oaks Circle, construction of the proposed project may expose persons to or generate excessive ground borne vibration or ground borne noise levels. Therefore, impacts related to ground borne vibration would be considered ***potentially significant***.

Mitigation Measure(s)
Implementation of the following mitigation measure would reduce the above impact to a *less-than-significant* level.

4.7-2 *In conjunction with submittal of Grading Plans for the Tuscany Meadows subdivision, the applicant shall show on the Grading Plans to the satisfaction of the City Engineer that, if necessary, alternate vibratory compaction equipment, such as a plate compactor or smaller, rubber-tire equipment, shall be used when grading is required within 20 feet of existing residential land uses adjoining the project site.*

4.7-3 Transportation noise impacts to proposed sensitive receptors in the project vicinity. Based on the analysis below and with the implementation of mitigation, the impact is *less than significant.*

The proposed project includes both low and high density residential development, with a total of up to roughly 917 single-family lots and up to 365-multi-family units. Vehicle trips associated with operation of the project would result in changes to traffic on the existing roadway network within the project vicinity. As a result, project buildout would cause an increase in traffic noise levels on the local roadway network.

It should be noted that the cumulative transportation noise levels were utilized in order to determine the project-level impacts, as the design of the proposed project would be required to be sufficient to mitigate not only the project-level noise levels, but the future cumulative noise levels as well. As discussed in further detail below, the proposed project would require sound walls in order to meet the City's exterior noise level standard for

residential uses. Accordingly, the sound walls would need to be designed sufficient to mitigate the anticipated future cumulative noise levels.

Future Exterior Noise Environment – Single-Family Residential Land Uses

Future cumulative noise conditions at the project site are provided in Table 4.7-8, graphically summarized on Figure 4.7-2, and discussed in detail below.

Table 4.7-8
Traffic Noise Levels at 75 feet from the Centerline (dBA, CNEL)

Roadway	Existing	Near-Term Project	Cumulative
Buchanan Road	70	71	71
Somersville Road	70	71	71
James Donlon Boulevard	N/A	N/A	66

Source: Illingworth & Rodkin, Inc., Environmental Noise Assessment, March 7, 2014

Buchanan Road

The future noise environment along Buchanan Road is anticipated to increase by about one dBA CNEL under cumulative conditions reaching 71 dBA CNEL at a distance of 75 feet (residential lots one to three). Exterior noise levels at single-family residential lots one to three would be approximately 11 dBA CNEL above the 60 dBA CNEL "normally acceptable" noise level standard for single-family residential land uses. Traffic noise levels would attenuate with distance from the roadway and are calculated to reach 60 dBA CNEL at a distance of 440 feet from the roadway centerline. Future exterior noise levels within approximately 440 feet of the roadway centerline would exceed the "normally acceptable" noise level standard of 60 dBA CNEL for single-family residential land uses. Intermittent noise from the existing Chevron facility would also be expected at receptors in the Buchanan Road/Tuscany Drive vicinity.

Somersville Road

The future noise environment along Somersville Road is also anticipated to increase by about one dBA CNEL under cumulative conditions and reach 71 dBA CNEL at a distance of 75 feet from the roadway centerline. Exterior noise levels at single-family residential lots 539-557, 569-576, and 901-915 would be approximately 11 dBA CNEL above the 60 dBA CNEL "normally acceptable" noise level standard for single-family residential land uses.

James Donlon Boulevard

The future noise environment along Somersville Road is anticipated to reach 66 dBA CNEL under cumulative conditions (with Bypass) at a distance of 75 feet from the roadway centerline. Exterior noise levels at single-family residential lots 232-234 would be approximately six dBA CNEL above the 60 dBA CNEL "normally acceptable" noise level standard for single-family residential land uses.

Figure 4.7-2
Future CNEL Noise Contours [1]

1. Contours do not assume attenuation provided by noise barriers or structures.
Source: Illingworth & Rodkin, Inc., Environmental Noise Assessment, March 7, 2014

Future Exterior Noise Environment – Multi-Family Residential Land Uses

The project would construct up to 365 multi-family units on Parcel A. The proposed multi-family housing would only be exposed to traffic noise from Buchanan Road. Future cumulative noise conditions at the project site and impacts on the multi-family residential land uses are discussed in detail below.

Buchanan Road

The future noise environment on Parcel A would continue to result primarily from vehicular traffic along Buchanan Road, with intermittent noise from the existing Chevron facility located to the west. As noted above, future exterior noise levels are calculated to reach 71 dBA CNEL at a distance of 75 feet. Traffic noise levels would attenuate with distance from the roadway to 65 dBA CNEL at a distance of 205 feet from the centerline. Common outdoor use areas located in unshielded areas within 205 feet of the roadway centerline would be exposed to future exterior noise levels exceeding the "normally acceptable" noise level standard of 65 dBA CNEL for multi-family residential land uses. Exterior noise levels would exceed 60 dBA CNEL within approximately 440 feet of the roadway centerline.

Future Interior Noise Environment

The City of Pittsburg requires that interior noise levels within new residential units be maintained at or below 45 dBA CNEL. In buildings of typical construction, with the windows partially open, interior noise levels are generally 15 dBA lower than exterior noise levels. With the windows closed, standard residential construction typically provides about 20 to 25 dBA of noise reduction. For example, a unit exposed to exterior noise levels of 71 dBA CNEL would be 56 dBA CNEL inside with the windows partially open and would range from 46 to 51 dBA CNEL with the windows shut. Interior noise levels would exceed the maximum allowable interior sound level of 45 dBA CNEL inside residential units exposed to exterior noise levels of 60 dBA CNEL when windows are open for ventilation. Attaining the necessary noise reduction from exterior to interior spaces is possible with proper wall construction techniques, the selection of proper windows and doors, and the incorporation of a forced-air mechanical ventilation system to allow the occupant the option of controlling noise by closing the windows. Preliminary calculations indicate that windows and doors with minimum sound transmission class (STC) ratings from STC 26 to STC 32 would be necessary to maintain interior noise levels at or below 45 dBA CNEL.

Because residential land uses proposed at the project site would be exposed to exterior and interior noise levels greater than the "normally acceptable" noise level standards presented in the City of Pittsburg General Plan, noise impacts to proposed sensitive receptors would be considered ***potentially significant***.

Mitigation Measure(s)

Noise barriers on the proposed project site would provide approximately six to eleven dBA of attenuation, reducing the noise exposure to 60 dBA CNEL or less. After implementation of the following mitigation measures, the resulting noise levels would be reduced to approximately 60 dBA along Buchanan Road, Somersville Road, and James Donlon Boulevard. Generally, an effective noise barrier is constructed without cracks or gaps and has a surface weight of at least three pounds per square foot. Implementation of the following mitigation measures would reduce the above impact to a *less-than-significant* level.

4.7-3(a) *In conjunction with submittal of Improvement Plans, the applicant shall show on the Improvement Plans noise barriers six feet to twelve feet in height, as measured above the adjacent private outdoor activity areas, to shield private outdoor spaces adjacent to Buchanan Road, Somersville Road, and James Donlon Boulevard. In addition, the Plans shall require with notation that noise barrier walls shall be constructed of concrete panels, concrete masonry units, earthen berms, or any combination of these materials. Wood is not recommended due to eventual warping and degradation of acoustical performance. The specific height and locations of the noise barriers shall be confirmed based upon the final approved site and grading plans. See Figure 4.7-3 for the suggested location and heights of the preliminary noise barrier plan. The site and grading plans shall be subject to review and approval by the City Engineer. Final wall heights shall be determined by an acoustical engineer based on the final grade of the lots in order to bring noise levels to an acceptable level of 60 dB for the single-family development along Somersville Road and 65 dB for the multi-family development along Buchanan Road.*

4.7-3(b) *In conjunction with submittal of the Site Plan for the multi-family site, the applicant shall show on the Site Plan that the common outdoor use areas would be located a minimum distance of 205 feet from the Buchanan Road centerline, or in areas shielded by multi-family residential buildings or noise barriers, in order to reduce the noise exposure to 65 dBA CNEL or less. The location of outdoor use areas, or attenuation provided by buildings or noise barriers, shall be confirmed based upon the final approved site and grading plans. As an alternative, the applicant shall provide a noise report identifying the noise barriers aimed to decrease traffic noise at outdoor activity areas which would result in traffic noise levels that comply with the exterior noise level criterion of 65 dB CNEL. The site and grading plans shall be subject to review and approval by the City Engineer.*

Figure 4.7-3
Preliminary Noise Barrier Plan

4.7-3(c) *Prior to issuance of Building Permits, a qualified acoustical consultant shall review final site plans, building elevations, and floor plans prior to construction to calculate expected interior noise levels as required by the City of Pittsburg to confirm that the design results in interior noise levels reduced to 45 dBA CNEL or lower. The specific determination of what noise insulation treatments are necessary shall be conducted on a unit-by-unit basis. Results of the analysis, including the description of the necessary noise control treatments, shall be submitted to the City along with the building plans and approved prior to issuance of a building permit. Potential measures could include, but would not be limited to, restriction of two-story homes, or incorporation of noise-insulating building materials such as windows with a sound transmission class rating of 35-38 and resilient channels for walls, for homes adjacent to Buchanan Road, Somersville Road, and James Donlon Boulevard.*

4.7-3(d) *Prior to issuance of Building Permits, the applicant shall show on the construction drawings that a suitable form of forced-air mechanical ventilation shall be installed as determined by the City Building Official, for units throughout the site, so that windows can be kept closed at the occupant's discretion to control interior noise and achieve the interior noise standards.*

4.7-4 Transportation noise impacts to existing sensitive receptors in the project vicinity. Based on the analysis below, the impact is *less than significant.*

A noise impact would be identified at noise-sensitive land uses where: (1) the noise level increase is five dBA CNEL or greater, with a future noise level of less than 60 dBA CNEL, or (2) the noise level increase is three dBA CNEL or greater, with a future noise level of 60 dBA CNEL or greater.

Traffic volumes under the "Existing" and "Near-Term Project" traffic scenarios were compared to calculate the relative increase in traffic noise attributable to the proposed project. The comparison showed that traffic noise levels would not be substantially increased with the project as compared to existing conditions at sensitive land uses along roadway segments serving the project site. As shown in Table 4.7-8, the existing traffic noise levels would increase from 70 dBA CNEL to 71 dBA CNEL. Traffic noise levels were calculated to increase by zero to one dBA CNEL as a result of the project. Such a noise increase would not be considered substantial as the increase is below three dBA CNEL. Therefore, project generated traffic would not substantially increase transportation noise levels in the area, and impacts would be considered ***less than significant***.

Mitigation Measure(s)
None required.

Cumulative Impacts and Mitigation Measures

The cumulative context for noise impacts associated with the proposed project would consist of the existing and future noise sources from implementation of the proposed project in combination with other proposed and pending projects in the region that could affect the project or surrounding uses. The Cumulative Plus Project scenario assumes development of reasonably foreseeable land uses in the City and in adjacent jurisdictions, including pending projects, the proposed project, the proposed bypass route at James Donlon Boulevard, and buildout of the Pittsburg General Plan. In addition, the Cumulative Plus Project (with James Donlon extension) condition assumes various planned roadway improvements in the area.

4.7-5 Cumulative traffic noise impacts. Based on the analysis below, the impact is *less than significant.*

Cumulative noise impacts would occur primarily as a result of increased traffic on local roadways due to the proposed project and on-site activities resulting from operation of the proposed project.

The project would result in a significant cumulative traffic noise impact if existing sensitive receptors would be exposed to cumulative traffic noise level increases greater than three dBA Ldn above existing traffic noise levels and if the project would make a "cumulatively considerable" contribution to the overall traffic noise increase. A "cumulatively considerable" contribution would be defined as an increase of one dBA Ldn or more attributable solely to the proposed project. Table 4.7-9 summarizes future traffic noise level increase expected with the proposed project.

Table 4.7-9
Cumulative Traffic Noise Levels at 75 feet from the Centerline (dBA, CNEL)

Roadway	Existing	Near-Term Project	Cumulative	Cumulative Plus Project
Buchanan Road	70	71	71	71
Somersville Road	70	71	71	71
James Donlon Boulevard	N/A	N/A	66	66

Source: Illingworth & Rodkin, Inc., Environmental Noise Assessment, March 7, 2014

Traffic volumes along roadways serving the project site will increase as a result of cumulative growth planned in and around the City of Pittsburg. Traffic volumes under the "Existing" and "Cumulative Plus Project (with James Donlon extension)" traffic scenarios were calculated to determine the cumulative traffic noise increase expected at buildout. Cumulative traffic noise levels, with or without the proposed project, are not anticipated to increase substantially along the majority of roadways serving the project site, and the project's contribution to cumulative traffic noise level increases is calculated to be 0.8 dBA CNEL or less. The one exception would be traffic noise levels along James Donlon Boulevard, which would increase substantially. However, according to the Noise Assessment, residential land uses along the existing segment of James Donlon Boulevard have been designed to account for such future increases in traffic and noise. Cumulative

traffic noise increases would not be considered substantial as the increase is below one dBA Ldn, and the project would not make a cumulatively considerable contribution to increased noise levels along James Donlon Boulevard.

Because the increase in noise levels associated with implementation of the proposed project would be below the applicable threshold of significance, the noise increase associated with the proposed project would be considered incremental increases to the cumulative noise environment. Therefore, the proposed project would not be expected to have a cumulatively considerable incremental contribution to the surrounding noise environment, and the cumulative noise impact would be considered ***less than significant***.

Mitigation Measure(s)
None required.

Endnotes

[1] Illingworth & Rodkin, Inc. *Tuscany Meadows Environmental Noise Assessment*. March 7, 2014.
[2] City of Pittsburg. *Pittsburg General Plan 2020 Policy Document*. January, 2001.
[3] City of Pittsburg. *Pittsburg General Plan 2020 Environmental Impact Report*. January, 2001.
[4] Contra Costa County. *Contra Costa County General Plan 2005-2020*. January 18, 2005.