Waters Technology Park

San Mateo, CA

Construction Noise Analysis

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INTRODUCTION

This report provides a site-specific noise reduction plan for the Waters Technology Park. Construction is scheduled to occur between 31 December 2019 and 31 December 2020.

We have reviewed the City of San Mateo's noise ordinance criteria and have performed an assessment of estimated construction noise levels. This report includes recommendations for construction noise mitigation based on our findings and includes the following sections:

- 1.0 Executive Summary
- 2.0 Applicable Criteria
- 3.0 Site Description
- 4.0 Construction Noise Analysis
- 5.0 Mitigation

1.0 EXECUTIVE SUMMARY

1. Construction equipment anticipated to be used for this project is expected to meet the City's 90 dBA[1] at 25 feet criterion – with the exception of graders, pneumatic nailers, and jackhammers.

2. Construction noise at the east and south residential property planes is expected to exceed the City's 90 dBA criterion. Sound barriers could be implemented to reduce construction noise to meet the 90 dBA limit.

2.0 APPLICABLE CRITERIA

San Mateo Noise Element

Policy N 2.1 of the noise element requires construction noise to meet the criteria contained in the City's Noise Ordinance (included below).

San Mateo Noise Ordinance

The following construction noise criteria are contained in the City's noise ordinance:

> **Section 7.30.060.e Construction.** Construction, alteration, repair or land development activities which are authorized by a valid city permit shall be allowed on weekdays between the hours of seven a.m. and seven p.m., on Saturdays between the hours of eight a.m. and five p.m., and on Sundays and holidays between the hours of noon and four p.m., or at such other hours as may be authorized or restricted by the permit, if they meet at least one of the following noise limitations:
>
> (1) No individual piece of equipment shall produce a noise level exceeding 90 dB at a distance of 25 feet. If the device is housed within a structure or trailer on the property, the measurement shall be made outside the structure at a distance as close to 25 feet from the equipment as possible.
>
> (2) The noise level at any point outside of the property plane of the project shall not exceed 90 dB.

[1] A-Weighted Sound Level – The A-weighted sound pressure level, expressed in decibels (dB). Sometimes the unit of sound level is written as dB(A). A weighting is a standard weighting that accounts for the sensitivity of human hearing to the range of audible frequencies. People perceive a 10 dB increase in sound level to be twice as loud.

3.0 SITE DESCRIPTION

The project is located approximately 100 feet east of Highway 101 (U.S. 101). There is a drainage channel located directly to the north with an electrical sub station beyond that. The only noise-sensitive receivers within 25 feet of the site are the single-family homes along the east and south property lines of the site. Therefore, from a practical point of view, we have only provided construction noise mitigation recommendations for the residences.

Noise levels will likely exceed the City's goal at the east and south property lines during specific construction activities (such as during activities that use graders, jackhammers, and pneumatic nailers). Therefore, the proposed mitigation is likely not needed during the entire duration of construction. This could be determined by construction noise monitoring (to quantify the actual noise levels) and/or complaints from neighbors.

4.0 CONSTRUCTION NOISE ANALYSIS

Expected Construction Equipment

Based on our experience with similar projects, we expect that construction will be completed in several main phases with multiple activities occurring in each phase. Table 1 shows a breakdown of the anticipated equipment to be used in each activity.

Table 1: Expected Construction Equipment per Phase

	Demolition	Excavation & Grading	Building Core and Shell	Interior Work	Landscaping
Dump Trucks	X	X			
Front End Loader	X	X	X		
Excavator	X	X			X
Grader		X			
Bulldozer		X			X
Compactor		X			X
Stucco Drum Mixer			X	X	
Pneumatic Nailers			X	X	
Asphalt Paver					X
Back-up Beeper	X	X	X	X	X
Jackhammer	X				X

We have used the following construction equipment noise levels for our analysis. As can be seen (in bold), the grader, pneumatic nailers, and jackhammers will exceed the 90 dBA at 25 feet criterion. For the nailers, work is typically largely interior, so the building shell will reduce the noise heard at the property line. For graders and jackhammers, the equipment should be mitigated as much as feasible (see Section 5.0).

Table 2: Maximum Noise Levels of Construction Equipment[2]

Equipment Type	Sound Level at 50 Feet (dBA)	Sound Level at 25 Feet (dBA)
Dump Trucks	76	82
Front End Loader	79	85
Excavator	81	87
Grader	85	**91**
Bulldozer	82	88
Compactor	83	89
Stucco Drum Mixer	80	86
Pneumatic Nailers	85	**91**
Asphalt Paver	77	83
Back-up Beeper	76	82
Jackhammer	89	**95**

The noise levels in Table 2 are "typical". Equipment used in the field may vary slightly depending on the sizes of engines, age of equipment, specific use, etc. Additionally, noise levels at property boundaries will vary depending on which equipment is being used simultaneously.

Predicted Construction Equipment Noise Levels

Based on the equipment noise levels listed in Table 2, we have calculated the expected maximum noise levels for the various phases at the nearest property plane. We have assumed that activity will occur an average of 20 feet from the nearest property line with the receiver standing 10 feet away on the opposite side of the property line[3]. Actual noise levels at the site will typically be lower, since it is unlikely that all equipment will operate simultaneously. The "with mitigation" noise levels listed in Table 3 include an eight-foot tall barrier along the property line.

[2] Based on the Federal Highway Administration document "FHWA Roadway Construction Noise Handbook" Table 9.1, and data from other Salter construction noise monitoring projects.

[3] The surrounding single-family homes are single-story. Therefore, we have assumed the "receiver" is standing on grade.

Table 3: Calculated Maximum Construction Equipment Noise Levels

Activity	Noise Levels (in dBA) at Property Plane	
	Without Mitigation	With Mitigation
Demolition	98	88
Excavation & Grading	97	87
Building Core & Shell	95	85
Interior Work	94	84
Landscaping	99	89

5.0 MITIGATION

To reduce noise levels at the east and south residential property lines, temporary sound barriers should be constructed. To be effective, the barriers need to have a minimum height of eight feet, a minimum surface density of three psf, and be continuous from grade to top. The barriers are not required along the entire length of the east and south property lines for the entire duration of construction. They can be located at times and locations where construction is occurring within 30 feet of these property planes.

Pneumatic nailers should not be used during construction on the roofs of the two story single-family homes within 30 feet of the residential property planes, as the eight-foot barriers would be ineffective with the noise source at this height.

The following general mitigation measures should also be implemented:

- Construction should be limited to the allowable hours specified in the City Noise Ordinance.
- Use scrapers in lieu of loaders and hauling trucks as feasible for earth removal.
- Use a motor grader rather than a bulldozer for final grading.
- Locate noisy stationary equipment (e.g., generators and compressors) and material unloading and staging areas near the center of the project, away from residential property lines
- Locate staging and equipment loading areas away from residences. Where feasible, barriers should be used to break line-of-sight with nearby residences.
- Minimize drop height when loading excavated materials onto trucks.
- Minimize drop height when unloading or moving materials on site.
- Require that all construction equipment be in good working order and that mufflers are inspected to be functioning properly. Avoid unnecessary idling of equipment and engines.
- Use "quiet" gasoline or electric-powered compressors.
- Use electric forklifts when feasible.
- Use electric nailers instead of pneumatic nailers or manual hammers as feasible – especially on the roofs of the two-story single-family homes.
- Power saws should be shielded or enclosed where practical.
- Only use back-up beepers when required by law. Spotters or flaggers should be used in lieu of back-up beepers to direct backing operations when allowable.
- Notify the City and neighbors in advance of the schedule for each major phase of construction and expected loud activities.

- Require posted signs at the construction site that include permitted construction times, a contact for the job site, and a contact number for the City in the event of problems.
- Designate a construction noise coordinator. This coordinator would be available to respond to complaints from neighbors and take appropriate measures to reduce noise.

Construction noise monitoring could be conducted at the beginning of major construction phases (e.g., demolition, excavation) to determine the need for and effectiveness of noise-attenuation measures