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BURLEY LAGOON GEODUCK FARM

NOISE ASSESSMENT

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1. INTRODUCTION

Taylor Shellfish Farms (Taylor Shellfish) of Shelton, Washington, has applied to Pierce County for Shoreline Conditional Use/Shoreline Substantial Development permits to convert 25.5 acres of existing shellfish aquaculture tidelands in Burley Lagoon from Manila clam (*Venerupis philippinarum*) and Pacific oyster (*Crassostrea gigas*) culture to geoduck clam (*Panopea generosa*) culture. All shellfish aquaculture tidelands in Burley Lagoon are owned by Western Oyster Properties, LLC. Taylor Shellfish took over management and operation of shellfish culture in 2011, at which time approximately 60 percent of the lagoon was actively being farmed. Burley Lagoon has been used for shellfish aquaculture since the early 1900s. Historically, over 200 tideland acres have ben used for clam and oyster aquaculture, and wild or scatter-planted geoduck culture.

The purpose and objectives of the Taylor Shellfish Burley Lagoon geoduck farm proposal are to:

- Cultivate geoduck on suitable substrate within Burley Lagoon for harvest, sale, and distribution in local, State, national, and international commercial shellfish markets.
- Sustain an economically viable geoduck farm operation within Burley Lagoon, implementing feasible and sustainable farming practices within the limitations of applicable local, State, and Federal permits.
- Convert a portion of the existing Burley Lagoon Manila clam and Pacific oyster operation to geoduck cultivation for the purpose of diversifying shellfish product availability.

Burley Lagoon is located primarily within Pierce County, Washington, and partially within Kitsap County, at the head of Henderson Bay. Henderson Bay is the northern-most portion of Carr Inlet in south Puget Sound, west of State Route (SR) 16.[1] The 25.5-acre site proposed for conversion to geoduck culture is entirely within Pierce County.

Burley Lagoon is a shallow barrier estuary approximately 2 miles long and 0.7 mile wide at its widest point (south end). The total substrate area of Burley Lagoon is 348 acres (Kitsap County Health District 2001). The Taylor Shellfish proposal to convert 25.5 acres of Manila clam and oyster ground to geoduck aquaculture represents approximately 7% of the total substrate area of Burley Lagoon.

1.1 The Proposed Action and Alternatives

Taylor Shellfish proposes to convert 25.5 acres of shellfish aquaculture tidelands in Burley Lagoon from Manila clam and Pacific oyster culture to geoduck clam culture. The EIS evaluates two action alternatives for achieving the objectives of the proposal. The EIS, and

[1] Pierce County tax lot parcels that comprise the 25.5-acre site include 0122231065, 0122231067, 0122231071, and 0122233078, within Sections 13, 14, 23 and 24 of Township 22 North, Range 1 East.

this technical report, also evaluates the effects of the No Action Alternative, as defined below.

- Alternative 1: Geoduck Aquaculture on 25.5 Acres – convert existing shellfish beds from the cultivation (planting, growing, and harvesting) of Manila clams, Pacific oysters, and scatter-planted geoduck clams to geoduck clams planted in rigid PVC nursery tubes and/or flexible mesh nursery tubes throughout the 25.5-acre project area. In addition, predator exclusion netting may be utilized.
- Alternative 2: Geoduck Aquaculture Rotation in 17 Acres – geoduck farming would be allowed anywhere within the 25.5-acre footprint, but no more than 17 acres would be under geoduck culture at any given time. The other 8.5 acres could be under Manila clam and/or Pacific oyster production. The area used for geoduck culture could shift location, provided other areas within the 25.5-acre footprint would be taken out of geoduck production so that the 17-acre limit under Alternative 2 would not be exceeded at any one time.
- Alternative 3: No Action – continued use of the 25.5-acre site for Manila clam and Pacific oyster culture. Alternative 3 would not meet the objectives of the proposed action, but is required for comparative evaluation in the EIS.

1.1.1 Alternative 1: Geoduck Aquaculture on 25.5 Acres

Alternative 1 is the proposed action described in the Taylor Shellfish application to Pierce County, in which cultivating geoduck throughout the 25.5-acre area is proposed. The 25.5-acre site was selected because it has suitable substrate for geoduck culture. Gear types (e.g., PVC and/or flexible mesh nursery tubes) may vary. A phased planting approach may be used to alter the timing of the main activities that could potentially result in reduced environmental effects (described below).

Geoduck clams would be planted in the intertidal area from appropriate subtidal habitat (down to -10 feet) up to +3 feet MLLW. Planting may occur in a general succession of 1.5- to 2.0-acre plots, depending on site conditions, and may occur over multiple years to allow spatial separation between the various growing areas. Grow-out typically requires a period of 5 to 7 years, but can vary depending on specific site and seasonal growing conditions.

Either gear type used for predator protection (i.e., PVC tubes or flexible mesh tubes) would be positioned 1.0 to 1.5 square feet (ft^2) apart (12 to 18 inches on-center between nursery tubes). Three to four geoduck seed would be planted in each nursery tube. If PVC tubes are used, the entire nursery tube field would be covered with predator exclusion netting. After the nursery tubes are removed, the netting is placed on the sediment surface for a period of time to enable juvenile geoduck clams to adjust to less predator protection and then removed. Predator exclusion gear is present for approximately 3 years. Thereafter, no other predator protection would be used for the remainder of the culture cycle (2.5 to 4.5 years) through harvest.

Flexible mesh nursery tubes, a gear option to PVC nursery tubes with predator exclusion netting, are made from HDPE, which is the same material that has been used for oyster grow-out bags for the last 40-plus years. Compared to PVC nursery tubes with predator exclusion netting, flexible mesh nursery tubes are a relatively new method used for commercial geoduck culture (<10 years). Depending on the presence and type of predators, the top of the flexible mesh tube may be closed. In most cases however, flexible mesh nursery tubes remain open at the top. Predator exclusion netting is not usually used to cover flexible mesh nursery tubes.

Flexible mesh nursery tubes would be in place for the first 2 to 3 years of the grow-out period, after which these nursery tubes would be removed and predator exclusion netting would be placed over the sediment surface. As with the PVC nursery tube option, once the mesh nursery tubes are removed, the netting is placed on the sediment surface for a period of time to enable juvenile geoduck clams to adjust to less predator protection and then removed. Predator exclusion gear is present for approximately 3 years. Thereafter, no other predator protection would be used for the rest of the culture cycle (2 to 4 years) through harvest.

1.1.2 Alternative 2: Geoduck Aquaculture Rotation on 17 Acres

Similar to Alternative 1, the Alternative 2 scenario would use predator protection gear and culture methods responsive to site (e.g., substrate and tidal circulation) and market conditions. The distinguishing characteristic of Alternative 2 would be to limit the area containing geoduck culture at any one time to no more than 17 acres within the proposed 25.5-acre geoduck farm boundary. The remaining 8.5 acres not in geoduck culture would continue to be used for Manila clam and/or Pacific oyster cultivation. Planting would be similar to Alternative 1 in terms of phased planting activities over multiple years. Once a geoduck culture area is harvested, the area may be replanted with geoduck or, alternatively, another area within the 25.5 acres with substrate identified as suitable for geoduck culture could be planted with geoduck, provided that no more than 17 acres would be under geoduck cultivation at one time.

1.1.3 Alternative 3: No Action

The No Action Alternative for the Burley Lagoon geoduck farm proposal (i.e., no change from existing conditions on the 25.5-acre site) would result in continuation of existing shellfish aquaculture practices for Manila clams and Pacific oysters. Areas actively farmed for clams and oysters may be covered with predator exclusion netting or other types of gear (e.g., mesh oyster bags). For the purpose of the EIS impact analysis and comparison of alternatives, it is assumed under Alternative 3 that areas planted with Manila clams would be continuously covered with smaller mesh-sized netting than used for geoduck aquaculture, except during active harvest and seeding when the Manila clam netting would be temporarily removed. Alternative 3 also assumes that areas of Pacific oyster culture would not use netting. Oysters would continue to be cultured in bags and/or spread on the tidelands without predator protection

2. NOISE LEVEL TERMINOLOGY AND HUMAN HEARING

Noise is sometimes defined as unwanted sound; this analysis uses the terms noise and sound more or less synonymously. The human ear responds to a very wide range of sound intensities. Noise levels are measured in units called decibels (dB). The dB scale used to describe sound is a logarithmic rating system that accounts for the large differences in audible sound intensities. This scale accounts for the human perception of a doubling of loudness as an increase of 10 dB – a 70-dB sound level would sound about twice as loud as a 60-dB sound level. People generally cannot detect differences of 1 dB. People can detect differences of 2 or 3 dB in ideal laboratory situations, but would probably not notice such a change in a typical outdoor environment. Most people probably would perceive a 5-dB change under normal listening conditions.

As mentioned above, the dB used to describe noise is logarithmic. On this scale, a doubling of sound-generating activity causes a 3-dB increase in the average sound produced by that source, but 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 a nearby location, a doubling of the number of vehicles on this same road would cause the sound level at this same location to increase to 63 dB. However, such an increase might not be discernible in a complex acoustical environment such as a typical outdoor environment.

When addressing the effects of noise on people, the frequency response of the human ear, or those frequencies that people hear best, must be considered. Sound measuring instruments are therefore often designed to weight sounds based on the way people hear. The frequency weighting most often used to evaluate environmental noise is “A” weighting because it best reflects how humans perceive sound. Measurements from instruments using this system are reported in dBA. Unless specified otherwise, noise levels in this report are given in dBA.

Relatively long, multi-source line sources – like the road with steady traffic in the example above – emit cylindrical sound waves. Because these sound waves spread cylindrically, sound levels from such sources decrease at a rate of 3 dBA with each doubling of distance from the source. Sound waves from discrete events or stationary point sources (such as a conveyor motor in a stationary location) spread as a sphere, and sound levels from such sources decrease 6 dBA per doubling of the distance from the source. Conversely, moving half the distance closer to a source increases sound levels by 3 and 6 dBA for line and point sources, respectively.

For any noise source, several factors affect the efficiency of sound transmission traveling from it, which in turn affects the potential noise impact at off-site locations. Important factors include the distance from the source, the frequency of the sound, the absorbency and roughness of the intervening ground (or water) surface, the presence or absence of obstructions and their absorbency or reflectivity, and the duration of the sound.

Noise impacts tend to be cumulative with prolonged or repeated exposure, and the effects can include hearing loss, speech and sleep interference, and annoyance with the noise. There is some evidence that noise as an annoyance can affect health and well-being adversely in the same manner as chronic stress (e.g., hypertension and cardiovascular effects) (Suter 1991). The impact on humans of a new noise source also depends on existing sound levels and who is listening.

Table 1 presents typical sound levels of some familiar noise sources and activities.

Table 1. Common Sound Levels/Sources and Subjective Human Responses

Noise Source at a Given Distance	Sound Level (dBA)	Typical Noise Environments	Subjective Impression
Civil defense siren (100 feet)	130		Pain threshold
Jet takeoff (200 feet)	120	Rock music concert	
Loud rock music	110		
Pile driver (50 feet)	100		Very loud
Ambulance siren (100 feet)		Boiler room	
Freight cars (50 feet)	90	Printing press plant	
Freeway (100 feet)	80	Noisy restaurant	
Busy traffic, hair dryer	70		Moderately loud
Vacuum cleaner (10 feet)	60	Data processing center	
Light traffic (100 feet)	50	Private business office	
Large transformer (200 feet)	40		Quiet
Soft whisper (5 feet)	30	Quiet bedroom	
Very quiet background conditions	20	Sound-buffered room	
Normal breathing	10		
Complete silence	0		Hearing threshold

Beranek, 1988.

Environmental noise is usually described in terms of certain metrics that allow comparison of sound levels at different locations or in different time periods. Federal regulatory agencies often use the equivalent sound level (L_{eq}) or the day-night sound level (L_{dn}) to characterize sound levels and evaluate noise impacts. The L_{eq} is the level that, if held constant over the same period, would have the same sound energy as the actual, fluctuating sound. As such, the L_{eq} can be considered an energy-average sound level. Because the L_{eq} considers sound levels over time, this metric accounts for the number and levels of noise events during an interval (e.g., 1 hour), as well as the cumulative duration of these events. The L_{dn} is like a 24-hour L_{eq}, except that the calculation of the L_{dn} adds 10 dBA to the sound levels between 10:00 PM and 7:00 AM to account for possible sleep disturbance. The L_{dn} is used to describe the noise environment in areas where there are both nighttime and daytime uses, such as residences.

3. NOISE REGULATIONS AND IMPACT CRITERIA

3.1 Pierce County Noise Regulations

The project site and surrounding properties are located in unincorporated Pierce County. Chapter 8.76 of the Pierce County Code (PCC 8.76) establishes limits on the levels and durations of noise crossing property boundaries. Allowable sound levels depend on the

Environmental Designation for Noise Abatement (EDNA) of the source of the noise, and the EDNA of the receiving property. The Pierce County Code specifies that EDNA land classification shall conform to County zoning codes. Generally, lands zoned for residential uses are considered Class A EDNAs, lands zoned for commercial or public uses are considered Class B EDNAs, and agricultural and industrial lands are Class C EDNAs.

The applicable noise limits for each district source and receiver combination are listed in Table 2.

Table 2. Pierce County Maximum Permissible Sound Levels (dBA)

EDNA of Sound Source	EDNA of Receiving Property		
	Class A Day / Night	Class B	Class C
Class A	55 / 45	57	60
Class B	57 / 47	60	65
Class C	60 / 50	65	70

The limitations for noise received in a Class A EDNA are reduced by 10 dBA during nighttime hours, defined as between 10 PM and 7 AM.
Source: PCC 8.76.060

The "maximum permissible" environmental noise levels in Table 2 may be exceeded for short periods as defined in PCC 8.76.060. The allowed short-term increases are as follows: 5 dBA for no more than 15 minutes in any hour, or 10 dBA for no more than 5 minutes of any hour, or 15 dBA for no more than 1.5 minutes of any hour. These allowed short-term increases can be described in terms of noise "metrics" that represent the percentage of time certain levels are exceeded. For example, the hourly L_{25} metric represents the sound level that is exceeded 25 percent of the time, or 15 minutes in an hour. Similarly, the $L_{8.3}$ and $L_{2.5}$ are the sound levels exceeded 5 and 1.5 minutes in an hour, respectively. The maximum permissible levels are not to be exceeded by more than 15 dBA at any time. This limit is represented by the L_{max} noise metric.

Pierce County's noise code (PCC 8.76.070) identifies a number of noise sources or activities that are exempt from the maximum permissible sound levels described in PCC 8.76.060. The following sources are among those exempt:

- Sounds created by warning devices (such as back-up alarms on vehicles) when not operated continuously for more than 5 minutes per incident;
- Sounds caused by natural phenomena and unamplified human voices;
- Sounds created by watercraft when regulated by Chapter 8.88 of this Code.

3.2 Federal Transit Administration Noise Impact Criteria

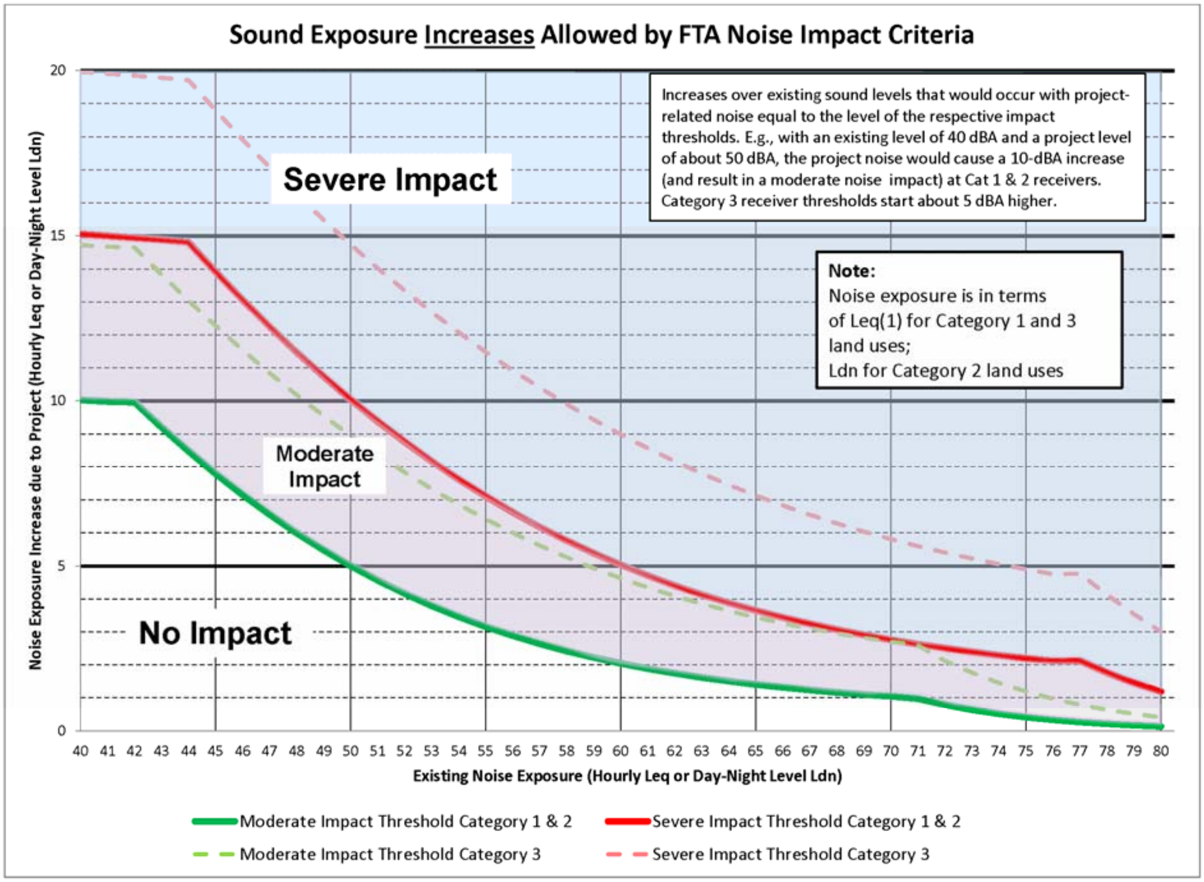
The Federal Transit Administration (FTA) characterizes noise impacts due to transit-project-related increases using noise impact criteria defined in its guidance manual *Transit Noise* *and Vibration Impact Assessment* (Federal Transit Administration 2006). Although FTA noise impact criteria ***do not apply*** to any activities related to the proposed project, the criteria provide a useful and objective method for assessing potential impacts from increases in noise that are directly attributable to the proposed project. Because neither the local jurisdiction nor the State identifies impacts attributable to increases in noise, this noise analysis used FTA noise impact criteria to assess the potential effects of any increases in ambient sound levels that may be caused by the proposed action or alternatives.

FTA noise impact criteria characterize levels of noise impact from a project by comparing the existing sound levels in the project vicinity to sound levels with the project. The characterization of impact is based on the expected increases in sound levels compared to levels without the project (see Figure 1). As shown, the FTA criteria categorize project-related noise changes as no impact, moderate impact, and severe impact. The criteria are based on the following land use categories of the receiving properties:

- Category 1 – Areas where serenity and quiet are an essential element of their intended purpose (e.g., outdoor amphitheaters, recording studios, concert halls)
- Category 2 – Residences and buildings where people normally sleep, and
- Category 3 – Institutional land uses with primarily daytime and evening use (e.g., schools, libraries, theaters, churches).

For the proposed project, the receiving properties of concern are nearby residences, which are identified as Category 2 receiving properties in Figure 1. For Category 2 receiving properties, the FTA criteria use the L_{dn} noise descriptor.

Based on the FTA impact criteria, receiving locations with low existing levels of sound can be exposed to greater increases in overall noise, after the addition of project noise, before an impact occurs. Conversely, locations with higher existing sound levels can be exposed to smaller increases in overall noise before an impact occurs.



Source: Transit Noise and Vibration Impact Assessment
FTA, 2006, page 3-6 and Appendix A page A-5

Figure 1. FTA Noise Impact Criteria Based on Increase over Ambient Sound Levels

3.3 Environmental Impact Thresholds

The analysis based its determinations regarding the potential for significant adverse environmental noise impacts on the following review processes:

- An assessment of the compliance of the proposed project or alternatives with applicable Pierce County noise limits

The identification of noise increases over existing ambient sound levels that would result in a “Severe Impact” under FTA noise impact criteria as a result of the proposed project or alternatives (see Figure 1).

3.4 Land Uses and Zoning

The proposed geoduck culture activities would take place in the aquatic environment of Burley Lagoon. The properties abutting the lagoon north of SR 302 are primarily residential properties zoned R-10 (Rural–10 Acres), and are considered Class A EDNA receiving properties under Pierce County noise regulations. Three parcels on the west waterfront of the lagoon are zoned RSR (Rural Sensitive Resource), contain residences, and are also considered Class A EDNAs. Properties on the east side of the lagoon south of 144th Street NW are zoned either CC (Community Centers) or AC (Activity Centers), and are Class B EDNA receiving properties under Pierce County noise regulations. The estuary itself does not have a zoning designation, but the State of Washington classifies aquaculture as a branch of the agricultural industry (RCW 15.85.010), so current and future shellfish farming activities are considered Class C EDNA noise sources under Pierce County noise regulations.

Applicable Pierce County noise limits for a Class C EDNA noise source affecting a Class A receivers are 60 dBA during daytime hours (7 AM to 10 PM), and 50 dBA during nighttime hours (10 PM to 7 AM), with allowable short-term increases as previously described, resulting in an overall L_{max} limit of 75 dBA during the day and 65 dBA at night. Although nighttime geoduck harvesting is not expected to occur frequently, harvesting activities could occur anytime, and the applicable nighttime noise limit of 50 dBA (with allowed short-term increases) at the nearest residences would be the most stringent.

3.5 Existing Sound Levels

Ramboll measured sound levels in the vicinity of the proposed geoduck farming activities from August 17 - 22, 2017. Measurements were taken at four locations representing residences on the western and eastern shores of Burley Lagoon that may be affected by the proposed geoduck farming activities. Measurements were taken using Larson Davis Class 1 sound level meters (Model LxT). The meters had been factory-certified within the previous 12 months, and were field-calibrated immediately prior to the measurements. The microphones of the meters were fitted with wind screens and set approximately 5 feet above the ground (at a typical listening height).

The measured sound levels are summarized in Table 3, and the sound level measurement locations are depicted on Figure 2. Details of hourly sound level measurements are provided in Appendix A.

Table 3. Measured Existing Sound Levels (dBA) Around Burley Lagoon (August 17-22, 2017)

Location	Time of Day [(a)]	Range of Hourly Sound Levels (dBA) [(b)]					L_{dn}
		L_{eq}	L_{25}	$L_{8.3}$	$L_{2.5}$	L_{max}	
SLM1	Day	41-54	41-55	43-57	46-59	53-80	53
	Night	38-55	38-55	40-56	41-57	47-79	
SLM2	Day	40-57	37-52	40-56	44-60	53-85	49
	Night	36-50	36-51	38-52	38-53	41-80	
SLM3	Day	51-65	50-58	52-66	54-75	63-85	58
	Night	45-52	46-53	48-54	50-55	58-65	
SLM4	Day	52-56	53-57	54-58	55-61	60-78	57
	Night	44-55	45-56	48-57	49-58	54-79	

(a) "Day" refers to the hours between 7 AM and 10 PM, and "Night" to the hours between 10 PM and 7 AM.

(b) The L_{eq} is the "energy-averaged" sound level. The L_{max} is the-highest measured sound level. The $L_{2.5}$, $L_{8.3}$, and L_{25} levels are defined previously in this report in the discussion of the regulatory noise limits (Section 3).

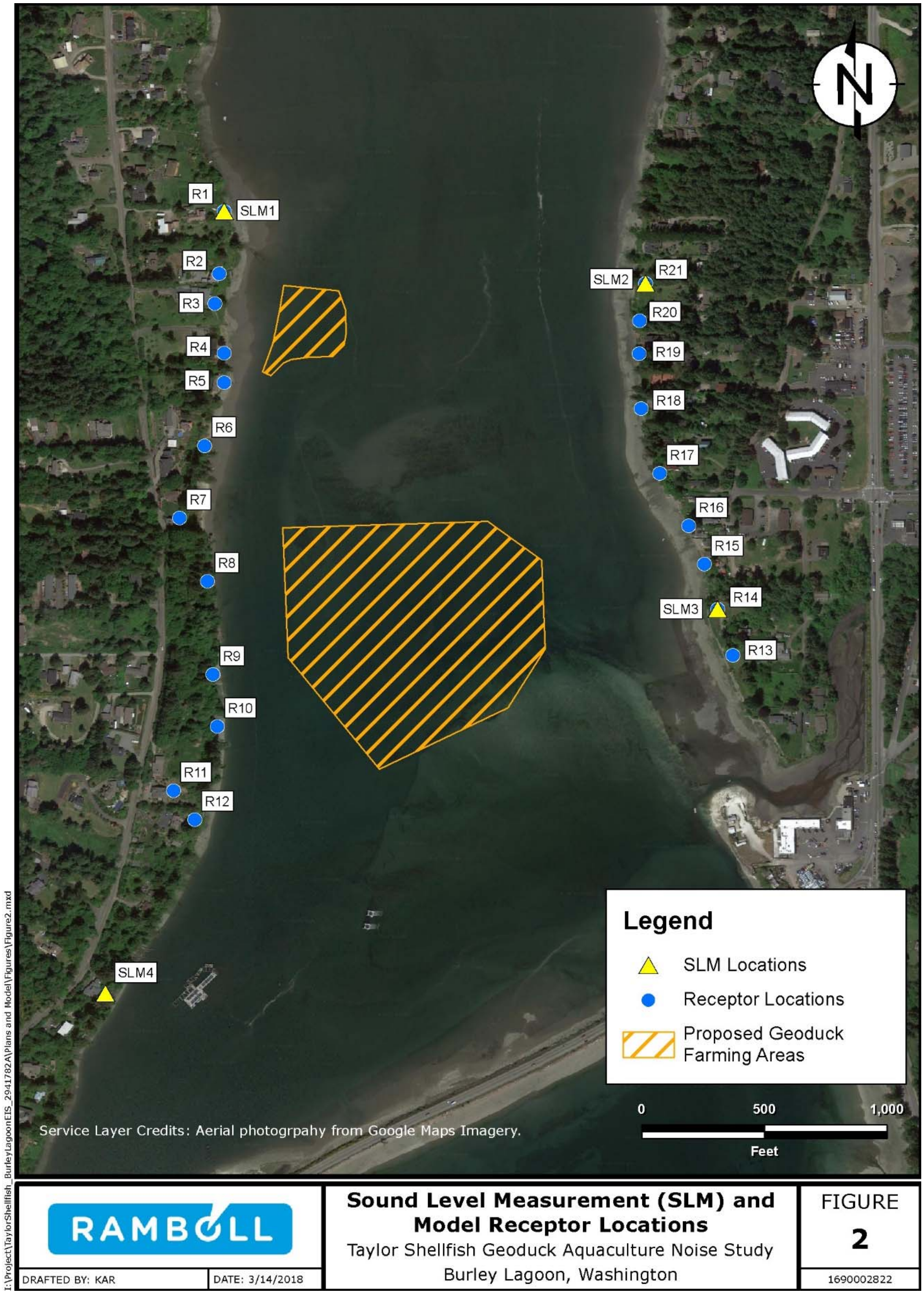


Figure 2. SLM and Noise Model Receptor Locations

4. METHODOLOGY AND ASSUMPTIONS

4.1 Description of Operations and Noise Sources

Geoduck aquaculture is a cyclical activity, rather than an ongoing daily operation. The noise-generating activities occur at discrete points in time during the 5- to 7-year grow out cycle and are typically dependent on low tides. The four major activities associated with the geoduck culture cycle that would generate noise include: (1) planting, (2) maintenance, (3) gear removal, and (4) harvest. Each of the cultivation activities is described below.

Planting is the initial activity. This involves installing PVC or flexible mesh nursery tubes in intertidal and subtidal areas and planting geoduck seed into each tube. PVC nursery tubes are installed manually by pushing them into the substrate. Flexible mesh nursery tubes may be installed hydraulically, using low-pressure water pumped through a hose. Pumps for the hoses are operated by small engines located on a barge offshore near the harvest site. Based on the location of the planting areas, the pump barge would be anchored offshore a minimum of 375 feet from the nearest residential properties. The primary and most consistent noise source associated with planting activities would be the pump barge. Most other planting activities are relatively quiet. Other noise-generating activities associated with planting include boats or barges to transport the crew and gear and potential movement of bags of PVC tubes (if used in lieu of mesh tubes) on the barge deck. These bag movements could result in occasional maximum sound levels, but not continuous noise. Planting and seeding can occur in 4- to 8-hour shifts, depending on tidal cycles and whether the planting would be done by beach or dive crews.

Maintenance of the proposed geoduck aquaculture area would occur throughout the lifecycle when gear is present, to ensure that gear remains on-site. Maintenance would occur a minimum of once per month and following storm events. As with planting, maintenance activities are relatively quiet, with boats and barges used for transportation of crew and gear being the primary source of noise. Site visits for maintenance would be relatively short, usually not more than 2 hours.

Gear removal would include the removal of nursery tubes and predator-exclusion netting. Protective gear would be present for 2 to 3 years of a 5- to 7-year cycle for geoduck aquaculture. PVC tubes with canopy nets would be removed after approximately 2 years of growth. Predator-exclusion nets would be placed directly on the substrate of the geoduck bed for a period of time following removal of the tubes, then removed for the remainder of the grow-out cycle. Flexible mesh tubes would be removed after approximately 3 years of growth. Canopy netting would not be used while flexible mesh tubes are present; however, similar to geoduck beds planted with PVC nursery tubes, predator exclusion netting would be placed directly on the substrate for a period of time following the removal of flexible mesh tubes, so that juvenile geoducks could adjust to the lack of predator protection. The primary noise-generating source during gear removal would be a crane used to remove the predator-exclusion nets. Other noise-generating activity would include the use of boats or barges to transport the crew and gear.

Harvesting generally occurs after approximately 5 to 7 years of growth. Geoduck clams are harvested using either dry or wet harvest methods. Dry harvesting occurs during a minus tide series (typically lasting 3 to 4 hours), and wet harvesting using divers occurs during a high tide series. Both methods employ low-pressure water pumped through a hose. Pumps for the hoses are operated by small engines located on a barge offshore near the harvest site. Based on location of farming areas, the pump barge would be anchored offshore a minimum of 375 feet from the nearest residential properties. Harvesting would occur in the same basic pattern in which planting occurred, although the length of time allotted for harvesting would exceed that of planting activities. The primary source of noise associated with harvesting would be pump engine noise. Other noise-generating sources would include boats used for transportation of crew and gear, the hoses, and human activity.

Boat/barge transport noise would be short-term, infrequent, and similar to existing levels of boat/barge noise associated with Taylor Shellfish clam and oyster culture activities in Burley Lagoon. This noise analysis focuses on new sources with the most potential for impact. During planting, this primarily entails noise from pump engines, hydraulic insertion of nursery tubes, and PVC tubes or bags hitting the barge deck. During gear removal, the noise source with the most potential for impacts would be a crane used to remove predator netting. During harvesting, the primary sources would be pump engine noise and water/human noise. The primary noise sources and estimated sound levels associated with geoduck aquaculture activities are presented in Table 4.

Table 4. Estimated Sound Levels of Noise Sources Associated with Geoduck Aquaculture (dBA)

Noise Source	Sound Level at 50 feet [a]	Continuous/ Instant	Location	Time of Day
Planting				
Pump Engine	60	Continuous	Far side of Geoduck Planting Area [b]	Day or Night
Water/Human Noise	30	Continuous	Geoduck Area	Day or Night
PVC Tube Bag Drop	71	Instant	Near Edge of Geoduck Planting Area [c]	Day or Night
PVC Tube Drop	77	Instant	Near Edge of Geoduck Planting Area [c]	Day or Night
Gear Removal				
Crane	60	Continuous	Near Edge of Geoduck Area [c]	Daytime
Harvesting				
Water/Human Noise	30	Continuous	Geoduck Area	Day or Night
Pump Engine	60	Continuous	Far side of Geoduck Harvesting Area [b]	Day or Night

[a] Based on sound level measurements of similar activities/sources taken during geoduck harvesting/planting activities at the Taylor Shellfish Stretch Island farm in Mason County, WA. Crane engine noise was measured by Taylor Shellfish personnel during predator net removal.

[b] The far side of the geoduck planting or harvesting area was assumed to be at least 375 feet from the nearest shoreline.

[c] The near edge of the geoduck planting or harvesting area was assumed to be 160 feet or more from the nearest shoreline.

Note: Noise from boat transport is not included in this assessment because this noise source typically only occurs for short periods of time at the beginning and end of each cycle and is exempt from the applicable local noise limits (PCC 8.76.070). Therefore, there is minimal potential for noise impacts to be caused by boat or barge transport.

4.2 Noise Model Used

Modeling of the geoduck planting and harvesting noise sources was completed using the CadnaA noise model. CadnaA is a computer tool that calculates sound levels after considering the noise reductions or enhancements caused by distance, topography, varying ground surfaces, atmospheric absorption, and meteorological conditions. The model uses algorithms that comply with the international standards in ISO-9613-2:1996.[2]

[2] ISO-9613-2:1996, developed and published by the International Organization for Standardization, is a standard that describes a method for calculating the attenuation of sound during propagation outdoors.

The modeling process includes the following steps: (1) characterizing the noise sources; (2) creating 3-dimensional maps of the site vicinity to enable the model to evaluate effects of distance, topography, and ground types on noise attenuation; and (3) assigning equipment and activity sound levels to appropriate locations. CadnaA then constructs topographic cross-sections to calculate sound levels in the vicinity of a project.

4.3 Modeling Assumptions

The following assumptions were used in our Burley Lagoon noise assessment:

- Geoduck planting could occur at anytime, day or night. To be conservative, Ramboll assumed that planting could occur for up to 12 hours a day, split evenly into six daytime hours (i.e., between 7 AM and 10 PM) and six nighttime hours (i.e., between 10 PM and 7 AM). The primary and most continuous noise associated with geoduck planting would come from a pump engine barge anchored off-shore. Sounds from individual planting activities (primarily water noise associated with hydraulic insertion of nursery tubes) would occur beach-side. Although the individual planting sound levels are fairly quiet (30 dBA lower than pump noise at a similar distance), they were included in the noise model to be conservative. In addition to the continuous pump and water noise, bags of PVC tubes and/or individual PVC tubes, if used in lieu of mesh tubing, would drop onto the barge surface, likely less than 10 times in any one hour, and this activity would be subject to the short-term maximum noise limit. Maximum sound levels from individual PVC tubes were considered in the modeling, since this would produce louder sound levels than the bags of PVC tubes.
- Gear removal, specifically removal of predator nets, could occur for up to 8 hours a day, during daytime hours. The primary gear removal noise source would be the crane used to remove the netting.
- Geoduck harvesting could occur at anytime, day or night. To be conservative, Ramboll assumed that harvesting could occur for up to 12 hours a day, split evenly into six daytime hours (i.e., between 7 AM and 10 PM) and six nighttime hours (i.e., between 10 PM and 7 AM). Geoduck harvesting noise sources include pump engine noise from a barge anchored off-shore, and individual harvesting sound levels (primarily water noise) beach-side. Although the individual harvesting sound levels are fairly quiet (30 dBA lower than pump noise at a similar distance), they were included in the noise model to be conservative.
- The model-calculated sound levels of planting/harvesting pump engine and water noise and net removal crane noise represent hourly L_{eq}s. These noise sources emit a fairly constant noise, and the hourly L_{25} and L_{eq} would be essentially the same if the sources were to operate continuously over a full hour, as is assumed. Therefore, the modeled hourly L_{eq}s are used to assess compliance with the Pierce County L_{25} noise limit.
- The model-calculated sound levels of PVC tubes dropping onto the barge surface represent the hourly L_{max} and are compared to Pierce County's L_{max} noise limit to assess compliance.

5. OPERATIONAL NOISE IMPACTS

As part of this noise study, Ramboll considered both the compliance of the facility with the noise limits and the potential impacts from projected increases over baseline sound levels. These are discussed separately below.

5.1 Alternative 1 – Proposed Action

5.1.1 Compliance of On-Site Sources with Noise Limits

Ramboll conducted the noise modeling with the assumptions stated above. Table 5 presents the model-calculated results for longer-term noise sources associated with planting, gear removal, and harvesting. These model-calculated results are compared to Pierce County's applicable L_{25} noise limits to assess the potential for compliance.

Table 5. Model-calculated Sound Levels of Geoduck Planting, Gear Removal, and Harvesting Noise Sources (L_{eq}, dBA)

Receptor	Planting / Harvesting [(a)]		Gear Removal	
	Model-Calculated Level	Nighttime L_{25} Limit	Model-Calculated Level	Daytime L_{25} Limit
R1	44	50	41	60
R2	43	50	45	60
R3	43	50	46	60
R4	44	50	48	60
R5	44	50	47	60
R6	45	50	41	60
R7	42	50	41	60
R8	45	50	45	60
R9	44	50	43	60
R10	45	50	42	60
R11	41	50	38	60
R12	43	50	39	60
R13	44	50	38	60
R14	45	50	39	60
R15	44	50	40	60
R16	44	50	40	60
R17	43	50	40	60
R18	42	50	39	60
R19	43	50	37	60
R20	43	50	36	60
R21	42	50	33	60

[(a)] The primary, longer-term noise sources associated with planting and harvesting activities are essentially the same (i.e., pump engine and water noise).

Source: Ramboll

As shown in Table 5, the model-calculated planting, gear removal, and harvesting sound levels are predicted to be well within the Pierce County noise limits applied to longer-term noise sources.

Table 6 presents the model-calculated results for short-term noise events associated with planting, specifically dropping PVC tubes on the barge deck. These model-calculated results are compared to Pierce County's applicable L_{max} noise limits to assess the potential for compliance.

Table 6. Model-calculated Sound Levels of Short-term Geoduck Planting-related Noise (L_{max}, dBA)

Receptor	Planting (Dropped PVC Tube)	
	Model-Calculated Level	Nighttime L_{max} Limit [(a)]
R1	58	65
R2	63	65
R3	64	65
R4	65	65
R5	63	65
R6	60	65
R7	61	65
R8	62	65
R9	64	65
R10	61	65
R11	55	65
R12	56	65
R13	55	65
R14	55	65
R15	57	65
R16	57	65
R17	57	65
R18	56	65
R19	54	65
R20	53	65
R21	48	65
Source: Ramboll		

As shown in Table 6, the short-term planting-related sound levels are predicted to comply with the Pierce County noise limits.

5.1.2 Increases Over Existing Noise Levels From Project Sources

In addition to evaluating the potential compliance of on-site sources, Ramboll considered potential noise impacts that could be caused by project-related increases over existing background sound levels. This assessment focused on long-term noise associated with planting and harvesting activities, since noise from gear removal would occur for a shorter period of time and would generally occur during daytime hours only. The calculated increases in L_{dn}s, identified in Table 7, are compared to the FTA impact criteria previously shown in Figure 1 to assess the potential for moderate or severe noise impacts.

Table 7. Calculated Increases over Existing Sound Levels (L_{dn}, dBA) Attributable to Proposed Geoduck Planting/Harvesting Activities

Receptor	Existing[a]	Project[b]	Cumulative[c]	Increase	Moderate/Severe Impact?
R1	53	48	54	1	N/N
R2	53	47	54	1	N/N
R3	54	47	55	1	N/N
R4	54	49	55	1	N/N
R5	54	49	55	1	N/N
R6	54	49	55	1	N/N
R7	55	47	55	1	N/N
R8	55	49	56	1	N/N
R9	56	49	57	1	N/N
R10	56	49	57	1	N/N
R11	57	46	57	0	N/N
R12	57	48	58	0	N/N
R13	57	48	57	1	N/N
R14	55	49	56	1	N/N
R15	54	48	55	1	N/N
R16	54	48	55	1	N/N
R17	52	48	54	1	N/N
R18	51	46	52	1	N/N
R19	50	47	52	2	N/N
R20	50	48	52	2	N/N
R21	49	46	51	2	N/N

[a] The existing sound levels shown are the L_{dn}s, calculated using the measured existing levels identified in Table 3 and distance attenuation calculations to account for varying distances from the primary noise source(s) (e.g., major roadways). Existing sound levels are also representative of Alternative 3/No Action sound levels.

[b] The levels shown represent planting/harvesting sound levels using the assumption these activities could occur for 6 daytime hours and 6 nighttime hours during any 24-hour period.

[c] Cumulative levels represent the existing measured sound levels + the modeled project-related sound levels, where “the project” is Alternative 1.

Source: Ramboll

Comparison of the calculated increases over background sound levels (Table 7) to the FTA noise impact criteria (Figure 1) indicates that Alternative 1 would not be expected to result in moderate or severe noise impacts by federal standards.

5.2 Alternative 2

Alternative 2 would introduce the same noise-producing activities and equipment to the 25.5-acre site in Burley Lagoon as Alternative 1, but the total area used for geoduck culture at any one time would be limited to 17 acres. The other 8.5 acres of leased area would remain in Manila clam or Pacific oyster production. The 17 acres of geoduck culture would move around within the same parcels as considered under Alternative 1.

Under Alternative 2, the worst-case geoduck farming locations, geoduck farming noise levels, and resulting changes to the existing noise environment would be similar to those identified above with Alternative 1. However, noises associated specifically with geoduck farming, such as pumps and crane noise, would occur less often with Alternative 2 than with Alternative 1. Because no significant noise impacts were identified under worst-case locations with Alternative 1, none would be expected with Alternative 2.

5.3 Alternative 3 - No Action

Under the No Action alternative, Manila clam and Pacific oyster production, and the noises produced by such activities, would continue as they are at present. No substantial changes in the existing noise environment would be expected under Alternative 3.

6. CONSTRUCTION NOISE IMPACTS[3]

6.1 Alternative 1: Proposed Action

Geoduck clam aquaculture generally requires little site preparation prior to planting because sandflat substrate is selected for this species. Sandflats do not have large substrate materials. Any large materials (e.g., woody debris) are typically moved by hand to a new location or left in-place and planted around. Therefore, there would be no notable amount of construction noise associated with the proposed action.

6.2 Alternative 2

Similar to Alternative 1, there would be no notable amount of construction noise associated with geoduck farming on up to 17 acres of the 25.5-acre site under Alternative 2.

6.3 Alternative 3: No Action

With the No Action alternative, the 25.5 acres would continue to be used for Manila clam and Pacific oyster production and wild or scatter-planted geoduck culture. Noise from construction activities associated with the No Action alternative would be similar to noise

[3] In the context of shellfish aquaculture addressed in this noise analysis, “construction impacts” are considered to be activities associated with site or substrate preparation prior to planting a clam, oyster or geoduck bed. Although clam and oyster harvesting would need to be completed prior to geoduck cultivation in locations slated for geoduck clam aquaculture, these activities are not considered “construction.”

from existing construction of clam and oyster beds, and no significant noise impacts are expected.

7. MITIGATION

7.1 Operation

7.1.1 Alternative 1 or 2

No significant noise impacts (as defined by Pierce County noise regulations or federal noise impact criteria) are anticipated from geoduck farming on the 25.5-acre site under Alternative 1 or Alternative 2. Operational noise mitigation will occur primarily through the continuation of existing practices used by Taylor Shellfish in clam and oyster operations within Burley Lagoon, which include:

- Using rubber mats on decks to minimize the sound of planting gear and harvesting equipment (like oyster baskets) dropped on the deck.
- Installing an insulated box or acoustic blankets around pump housing on the barge.
- When feasible, limiting activities to daylight hours.
- When feasible, temporarily adjusting activity schedules in response to specific requests.

Taylor Shellfish is currently having new dive boats built and existing dive boats retrofitted to place pump housings in the wheelhouse instead of on the deck. This will have a noise mitigation effect for Alternative 1, 2 or 3.

7.1.2 Alternative 3: No Action

No new noise impacts are anticipated with continued clam and oyster culture under the No Action alternative. A noise mitigation measure proposed by Taylor Shellfish under any alternative is the construction of new dive boats, or retrofitting existing dive boats to place pump housings inside the wheelhouse (described above).

7.2 Construction

7.2.1 Alternative 1 or 2

No site/substrate preparation noise impacts are anticipated with Alternative 1 or Alternative 2 (see Section 6.1); therefore, no noise mitigation measures are proposed for geoduck site preparation activities.

7.2.2 Alternative 3: No Action

No significant site preparation noise impacts are anticipated with the No Action Alternative. Noise mitigation measures will consist of the continuation of existing practices described above.

8. CUMULATIVE IMPACTS

This report analyzes the potential noise impacts of the proposed action in the context of past, present, and reasonably foreseeable aquaculture activities in Burley Lagoon. Oyster processing and canning have occurred in Purdy since around 1900, and oyster and clam cultivation have continued since the early 1900s throughout Burley Lagoon. Past, present and future aquaculture activities include the operation of boats and barges, hand harvesting, laying down shell and gravel for substrate preparation, and transporting harvested products. Boat noise from recreation, as well as vessel noise associated with shellfish aquaculture, has historically been a part of the overall noise environment in Burley Lagoon.

According to Taylor Shellfish, the tideland parcels that comprise the 25.5-acre site proposed for geoduck aquaculture constitute the only area within Burley Lagoon that has suitable substrate for geoduck. Therefore, it is not foreseeable that there would be other applications for geoduck culture within Burley Lagoon in the future.

8.1 Alternative 1 or 2

Under Alternative 1 or 2, geoduck cultivation would replace some or all Manila clam and Pacific oyster cultivation on the 25.5-acre site (see Section 1.1). Given the longer growth cycle of geoduck (5 to 7 years) compared to the existing clam and oyster cycles (2 to 3 years), Alternative 1 or 2 could result in less frequent planting, maintenance, and harvesting activities on the site compared to existing conditions (e.g., compared to the No Action Alternative). Regardless, as part of the noise impact assessment, Ramboll considered the relative increase in noise at sensitive receivers (i.e., residences) in the project vicinity assuming that geoduck cultivation activities would simply be added to the existing environment instead of replacing some existing activities (See Section 5.1.2). Even using this conservative assumption, Ramboll finds that noise associated with the proposed geoduck farming activities in Burley Lagoon would result in minimal increases in the overall sound levels compared to existing sound levels, and would result in minimal to no cumulative noise impacts as these are defined by Pierce County Code and a representative federal regulatory context (described in Section 3).

8.2 Alternative 3: No Action

Under the No Action alternative, noise emissions from existing practices of Manila clam and Pacific oyster culture on the 25.5-acre site would continue as they are at present. However, ambient noise from vehicular traffic on nearby roadways is the most consistent, and often dominant, noise source in the project vicinity. Increased development in the region could potentially lead to increased vehicular and recreational boat traffic, and noise from these sources would continue and potentially increase in the future.

9. SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

9.1 Alternative 1

Noise modeling of the primary noise sources associated with geoduck aquaculture activities indicate that planting and harvesting activities would comply with the applicable daytime (60 dBA) or nighttime (50 dBA) limits applied to longer-term or continuous noise sources under Pierce County Code. Similarly, model-calculated noise levels during crane operations during gear (i.e., predator exclusion netting) removal would comply with the applicable daytime noise limit of 60 dBA. In addition, model-calculated L_{max} levels of PVC tubes dropping on the deck of the planting gear barge during planting activities would comply with the nighttime L_{max} limit of 65 dBA. Activities associated with the proposed conversion of 25.5 tideland acres in Burley Lagoon to geoduck aquaculture are expected to comply with the Pierce County noise limits in PCC Chapter 8.76, with no significant unavoidable adverse impacts.

For additional context, projected increases over existing ambient sound levels due to proposed geoduck aquaculture activities on the 25.5-acre site are estimated to be 2 dBA or less during the worst-case activity levels, which would result in no noise impacts under FTA noise impact criteria. While not applicable to the proposed action, these federal criteria are included in this noise analysis as a useful and objective method for assessing the magnitude of sound level change due to the project (see Section 3.2).

No significant unavoidable adverse noise impacts are expected with Alternative 1.

9.2 Alternative 2

The worst-case noise levels associated with Alternative 2 would be the same as those identified for Alternative 1. However, the worst-case noise levels may occur less often than with Alternative 1, since geoduck aquaculture activities and any associated noise would be limited to 17 acres of the 25.5-acre lease area at any one time under this alternative. Because projected sound levels of geoduck aquaculture activities were shown to comply with the Pierce County noise limits, and increases over existing ambient levels would not be expected to result in noise impacts by representative federal criteria, no significant unavoidable adverse noise impacts would be expected with Alternative 2.

9.3 Alternative 3: No Action

Existing shellfish aquaculture activities on the 25.5-acre site would continue as they are at present under Alternative 3, with no resulting significant unavoidable adverse noise impacts.

10. REFERENCES

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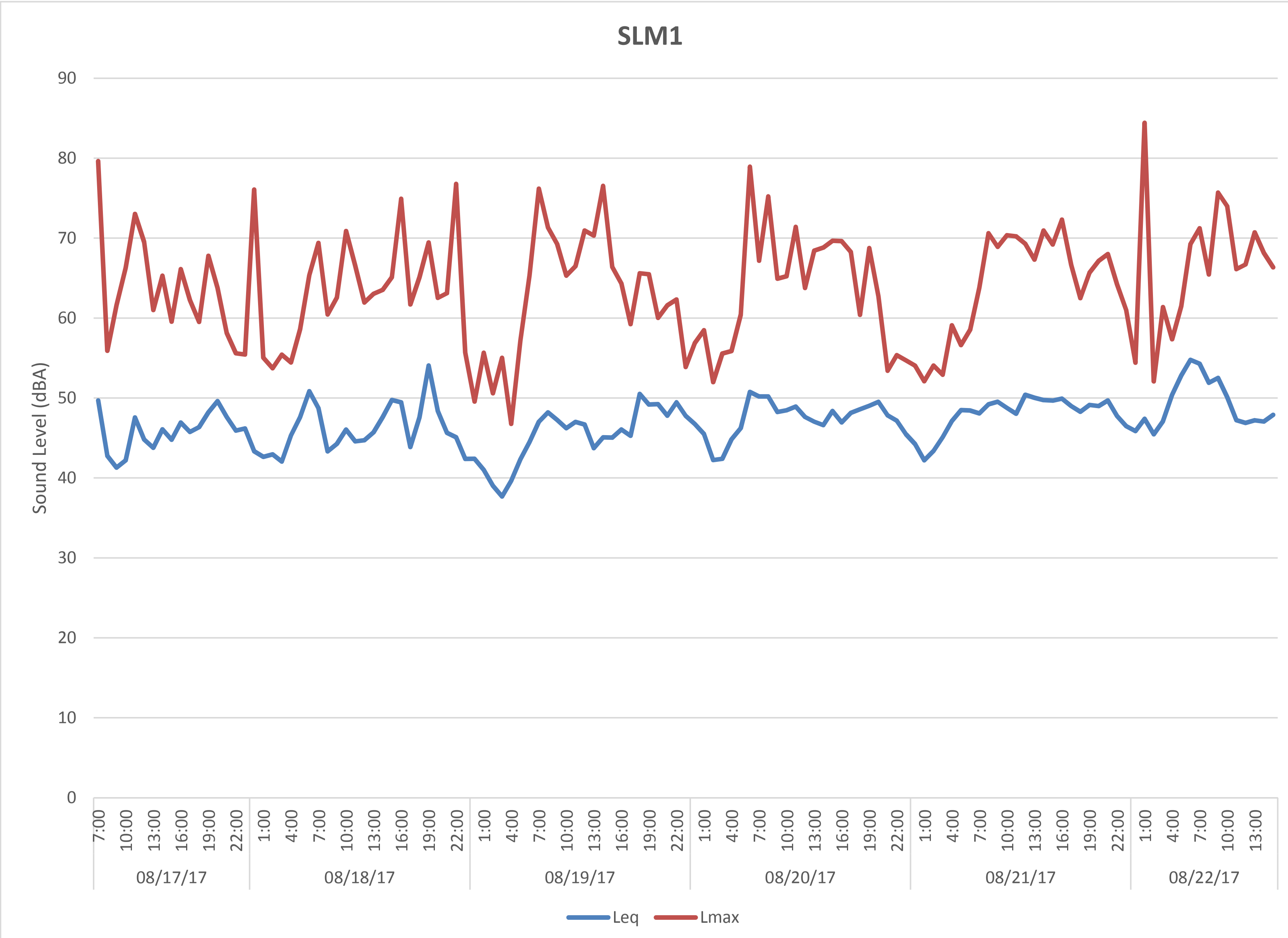
APPENDIX A: SOUND LEVEL MEASUREMENT DATA

Table A- 1. Measured Sound Levels at SLM1 (dBA)

Date	Time	L_{eq}	L_{max}	L_{25}	$L_{8.3}$	$L_{2.5}$	L_{90}
08/17/17	7:00	55.1	60.9	57.7	56.9	55.9	52.9
08/17/17	8:00	54.4	63.9	56.9	56.0	55.1	52.3
08/17/17	9:00	54.8	63.7	57.7	56.6	55.6	52.3
08/17/17	10:00	54.2	60.5	56.9	56.1	55.1	51.6
08/17/17	11:00	54.5	65.4	57.5	56.4	55.4	51.4
08/17/17	12:00	55.0	73.5	57.9	56.7	55.6	51.9
08/17/17	13:00	54.4	64.5	57.2	56.2	55.2	51.3
08/17/17	14:00	54.7	64.1	57.9	56.8	55.5	51.9
08/17/17	15:00	55.2	69.7	58.0	56.9	55.9	53.0
08/17/17	16:00	55.5	67.3	59.3	57.0	55.8	53.0
08/17/17	17:00	55.0	61.1	57.1	56.4	55.6	53.1
08/17/17	18:00	55.3	68.3	58.4	56.8	55.8	52.7
08/17/17	19:00	54.9	63.4	57.8	56.7	55.7	51.6
08/17/17	20:00	54.8	63.1	57.7	56.8	55.6	52.2
08/17/17	21:00	53.3	62.5	56.7	55.6	54.2	50.0
08/17/17	22:00	50.8	64.2	54.6	53.1	51.7	46.0
08/17/17	23:00	48.5	60.0	53.0	51.5	49.5	43.9
08/18/17	0:00	47.5	76.3	52.0	50.3	48.4	42.1
08/18/17	1:00	48.0	75.8	51.7	49.4	47.1	41.0
08/18/17	2:00	46.3	55.9	52.1	50.2	47.4	40.7
08/18/17	3:00	47.2	57.2	52.3	50.5	48.5	41.3
08/18/17	4:00	50.7	56.7	54.2	53.3	51.8	46.6
08/18/17	5:00	52.8	59.1	55.9	55.0	53.8	49.4
08/18/17	6:00	55.5	63.6	58.4	57.2	56.2	53.0
08/18/17	7:00	55.8	66.3	58.3	57.6	56.6	53.1
08/18/17	8:00	55.2	66.9	57.9	57.0	56.0	52.6
08/18/17	9:00	54.9	61.3	57.4	56.6	55.7	52.7
08/18/17	10:00	55.2	63.8	58.4	57.2	55.9	52.5
08/18/17	11:00	55.5	61.8	57.9	57.2	56.3	53.1
08/18/17	12:00	55.9	74.6	58.4	57.2	56.4	53.1
08/18/17	13:00	55.5	67.8	59.0	57.5	56.2	52.4
08/18/17	14:00	55.8	69.4	59.1	57.4	56.2	53.4
08/18/17	15:00	56.1	66.9	60.6	58.1	56.4	53.9
08/18/17	16:00	56.4	78.0	58.8	57.1	56.0	53.5
08/18/17	17:00	55.4	66.3	57.6	56.9	56.0	53.4
08/18/17	18:00	56.2	68.5	59.2	57.8	56.6	54.1
08/18/17	19:00	55.5	66.5	58.1	57.2	56.3	52.9
08/18/17	20:00	53.9	68.8	57.1	55.9	54.7	50.5

Date	Time	L_{eq}	L_{max}	L_{25}	$L_{8.3}$	$L_{2.5}$	L_{90}
08/18/17	21:00	53.1	59.8	56.2	55.3	54.2	50.0
08/18/17	22:00	52.6	78.9	56.4	55.1	53.6	48.4
08/18/17	23:00	49.6	59.1	53.8	52.5	50.8	45.1
08/19/17	0:00	49.4	66.4	54.5	52.3	50.2	44.4
08/19/17	1:00	46.9	59.9	51.7	49.8	47.8	42.6
08/19/17	2:00	44.8	57.4	50.4	48.3	45.9	39.6
08/19/17	3:00	44.1	53.8	49.2	47.8	45.4	39.1
08/19/17	4:00	45.6	54.6	50.6	49.1	46.8	40.0
08/19/17	5:00	47.3	57.3	52.2	50.3	48.3	41.6
08/19/17	6:00	50.8	61.9	54.7	53.5	52.0	46.8
08/19/17	7:00	53.5	69.6	56.7	55.6	54.3	50.5
08/19/17	8:00	54.7	66.0	58.1	56.8	55.4	51.9
08/19/17	9:00	54.8	67.4	57.5	56.5	55.5	52.5
08/19/17	10:00	54.9	66.8	57.7	56.7	55.6	52.8
08/19/17	11:00	54.7	69.9	57.7	56.3	55.3	52.3
08/19/17	12:00	54.2	73.4	57.4	55.7	54.5	50.8
08/19/17	13:00	54.5	72.1	57.1	56.0	54.9	52.2
08/19/17	14:00	54.6	72.5	57.4	56.0	54.9	51.9
08/19/17	15:00	54.6	65.9	57.9	56.3	55.2	52.3
08/19/17	16:00	54.9	67.7	58.3	56.7	55.5	52.3
08/19/17	17:00	55.1	67.6	58.0	56.9	55.9	52.2
08/19/17	18:00	55.1	68.1	58.0	56.9	55.7	52.1
08/19/17	19:00	54.0	70.0	57.0	56.0	54.9	51.3
08/19/17	20:00	53.9	71.5	56.7	55.6	54.5	51.4
08/19/17	21:00	53.7	64.6	57.5	55.8	54.4	50.3
08/19/17	22:00	52.4	66.4	56.7	54.8	53.1	48.3
08/19/17	23:00	49.9	57.5	53.7	52.7	51.0	45.7
08/20/17	0:00	49.0	60.1	53.9	51.8	49.9	44.4
08/20/17	1:00	48.5	59.1	53.1	51.3	49.5	43.9
08/20/17	2:00	46.9	57.0	52.4	50.5	48.0	41.8
08/20/17	3:00	45.5	56.7	51.2	49.4	46.5	39.9
08/20/17	4:00	46.7	57.8	51.8	50.3	47.8	41.6
08/20/17	5:00	47.7	57.8	52.1	50.9	49.0	42.2
08/20/17	6:00	50.6	59.0	54.2	53.2	51.8	46.5
08/20/17	7:00	51.9	60.0	55.3	54.4	53.1	47.8
08/20/17	8:00	52.9	61.8	56.1	55.0	53.7	50.0
08/20/17	9:00	54.1	59.6	56.8	55.9	54.9	52.0
08/20/17	10:00	54.5	64.3	56.9	56.2	55.3	52.4
08/20/17	11:00	54.7	65.9	58.0	56.6	55.3	52.2

Date	Time	Leq	Lmax	L25	L8.3	L2.5	L90
08/20/17	12:00	55.7	73.7	58.1	57.1	56.2	53.8
08/20/17	13:00	55.4	65.2	58.1	57.0	56.1	53.0
08/20/17	14:00	55.5	63.8	58.9	57.3	56.2	53.2
08/20/17	15:00	56.0	65.3	58.4	57.5	56.7	53.9
08/20/17	16:00	55.6	69.6	57.9	57.2	56.4	53.2
08/20/17	17:00	55.1	70.7	57.9	56.9	55.8	52.5
08/20/17	18:00	54.5	63.8	57.3	56.4	55.3	51.8
08/20/17	19:00	54.5	70.8	58.7	56.5	55.1	51.1
08/20/17	20:00	53.9	67.8	57.3	56.0	54.6	51.3
08/20/17	21:00	52.6	67.2	55.3	54.3	53.3	50.1
08/20/17	22:00	51.8	60.8	54.8	53.8	52.7	48.9
08/20/17	23:00	49.9	61.3	54.8	52.8	50.8	45.4
08/21/17	0:00	47.4	64.8	52.1	50.5	48.6	41.9
08/21/17	1:00	46.5	64.9	52.4	50.1	47.3	40.8
08/21/17	2:00	44.6	54.9	49.8	47.8	45.5	40.7
08/21/17	3:00	47.3	61.7	52.5	50.3	48.0	41.9
08/21/17	4:00	51.5	59.8	55.3	54.2	52.7	46.9
08/21/17	5:00	53.4	63.9	56.4	55.6	54.3	50.4
08/21/17	6:00	54.5	65.2	57.8	56.5	55.4	51.5
08/21/17	7:00	55.1	67.8	58.3	56.8	55.6	52.9
08/21/17	8:00	54.9	68.3	58.1	56.8	55.6	52.1
08/21/17	9:00	53.9	68.4	57.3	55.6	54.4	51.4
08/21/17	10:00	53.8	67.6	57.2	55.9	54.6	51.2
08/21/17	11:00	54.3	71.2	57.8	55.9	54.8	51.7
08/21/17	12:00	53.4	75.6	56.3	55.1	54.0	51.0
08/21/17	13:00	53.2	64.8	56.4	55.1	53.8	50.8
08/21/17	14:00	53.8	71.2	56.8	55.6	54.5	51.2
08/21/17	15:00	54.3	66.9	56.9	55.7	54.8	51.8
08/21/17	16:00	54.8	69.3	57.8	56.2	55.2	52.6
08/21/17	17:00	54.7	64.1	57.0	56.3	55.4	52.8
08/21/17	18:00	54.0	64.2	56.9	56.0	54.9	51.4
08/21/17	19:00	54.9	72.3	58.1	57.1	55.8	51.4
08/21/17	20:00	53.7	67.0	56.5	55.7	54.5	51.1
08/21/17	21:00	53.5	70.6	56.5	55.3	54.1	50.5
08/21/17	22:00	51.9	65.0	55.3	54.1	52.8	48.7
08/21/17	23:00	50.3	61.4	55.0	53.3	51.3	45.9


SLM1
Sound Level (dBA)
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80
70
60
50
40
30
20
10
0
7:00
10:00
13:00
16:00
19:00
22:00
1:00
4:00
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08/21/17
08/22/17
Leq
Lmax

Table A- 2. Measured Sound Levels at SLM2 (dBA)

Date	Time	L_{eq}	L_{max}	L_{25}	$L_{8.3}$	$L_{2.5}$	L_{90}
08/17/17	7:00	44.0	68.6	50.6	45.5	42.7	37.9
08/17/17	8:00	42.4	74.7	47.3	42.9	38.7	35.8
08/17/17	9:00	42.8	60.6	48.1	45.2	43.0	38.1
08/17/17	10:00	41.6	59.4	47.5	43.6	41.7	37.6
08/17/17	11:00	47.3	74.0	54.3	48.2	44.5	38.3
08/17/17	12:00	45.8	67.4	53.1	48.5	44.7	40.6
08/17/17	13:00	44.5	61.8	51.7	47.2	43.7	39.6
08/17/17	14:00	46.8	66.2	54.9	50.2	45.2	40.7
08/17/17	15:00	46.4	64.4	54.1	49.0	45.1	40.5
08/17/17	16:00	49.8	71.6	56.4	49.9	46.1	42.6
08/17/17	17:00	47.4	70.7	53.7	50.0	47.2	42.8
08/17/17	18:00	47.8	63.7	52.3	50.3	48.3	44.1
08/17/17	19:00	49.1	72.7	53.1	50.9	49.3	46.0
08/17/17	20:00	47.5	62.9	53.0	49.6	47.7	43.7
08/17/17	21:00	46.1	59.0	52.6	49.3	46.0	41.7
08/17/17	22:00	41.2	57.4	47.9	42.2	40.5	37.3
08/17/17	23:00	38.9	51.0	43.8	40.9	39.2	35.7
08/18/17	0:00	40.3	69.0	43.4	42.4	41.0	36.6
08/18/17	1:00	39.8	61.8	43.9	42.6	40.7	34.9
08/18/17	2:00	40.1	62.2	45.6	41.8	39.1	34.6
08/18/17	3:00	39.0	51.2	43.4	41.8	39.6	35.4
08/18/17	4:00	40.7	50.9	44.4	42.7	41.2	38.2
08/18/17	5:00	40.9	58.3	42.8	42.0	41.4	39.5
08/18/17	6:00	44.8	62.4	50.4	47.8	45.3	40.3
08/18/17	7:00	47.7	68.4	51.8	50.4	48.6	43.1
08/18/17	8:00	44.6	60.0	50.9	46.2	44.3	40.7
08/18/17	9:00	44.3	66.0	47.5	45.2	43.6	40.0
08/18/17	10:00	48.6	76.8	55.0	49.4	45.9	39.0
08/18/17	11:00	48.7	79.6	53.4	50.3	47.7	44.4
08/18/17	12:00	46.2	69.5	51.2	47.7	45.6	41.6
08/18/17	13:00	45.7	62.9	52.4	47.4	44.9	41.0
08/18/17	14:00	47.1	62.1	54.7	51.0	46.4	41.7
08/18/17	15:00	51.5	82.6	57.6	53.6	46.9	41.4
08/18/17	16:00	51.0	74.3	56.8	52.2	48.3	43.5
08/18/17	17:00	47.8	69.1	51.8	50.4	48.5	43.7
08/18/17	18:00	45.8	63.0	49.8	48.5	46.6	41.5
08/18/17	19:00	47.3	68.0	51.1	49.3	48.0	44.3
08/18/17	20:00	48.4	74.8	53.1	48.8	45.6	39.7

Date	Time	Leq	Lmax	L25	L8.3	L2.5	L90
08/18/17	21:00	41.7	61.5	44.5	43.6	42.4	38.6
08/18/17	22:00	42.3	79.5	44.2	43.0	41.6	37.4
08/18/17	23:00	37.6	45.8	41.1	39.8	38.4	35.0
08/19/17	0:00	36.8	46.8	39.5	38.5	37.4	34.8
08/19/17	1:00	35.6	40.6	38.2	37.5	36.4	33.3
08/19/17	2:00	37.1	46.2	43.4	41.3	37.1	32.4
08/19/17	3:00	37.4	45.4	42.7	40.6	38.3	32.9
08/19/17	4:00	36.6	46.1	40.8	39.5	37.6	32.1
08/19/17	5:00	36.2	55.6	40.6	38.8	36.8	32.6
08/19/17	6:00	36.2	52.0	39.6	37.8	36.5	33.9
08/19/17	7:00	40.1	67.9	48.1	39.8	37.3	34.8
08/19/17	8:00	44.8	68.5	52.3	45.0	39.7	36.1
08/19/17	9:00	42.8	66.1	46.4	42.1	40.6	36.8
08/19/17	10:00	46.0	67.3	53.8	47.0	43.1	38.6
08/19/17	11:00	45.3	67.3	51.3	46.8	43.6	39.7
08/19/17	12:00	44.1	69.2	50.3	44.8	42.6	39.5
08/19/17	13:00	42.8	65.3	47.7	43.9	42.4	39.9
08/19/17	14:00	49.4	84.0	49.9	45.9	44.2	40.3
08/19/17	15:00	45.0	66.4	51.9	47.0	43.0	39.5
08/19/17	16:00	48.3	73.2	56.9	52.3	45.0	41.0
08/19/17	17:00	51.3	78.4	56.9	47.3	43.6	39.9
08/19/17	18:00	44.6	63.5	51.8	46.9	43.9	38.5
08/19/17	19:00	46.7	73.5	54.4	48.5	43.3	38.9
08/19/17	20:00	43.0	72.3	45.7	43.1	42.0	39.9
08/19/17	21:00	43.2	61.4	46.8	44.3	42.9	39.8
08/19/17	22:00	43.0	60.5	48.2	44.7	42.8	38.7
08/19/17	23:00	41.9	57.5	46.5	44.7	42.6	38.0
08/20/17	0:00	39.7	54.1	44.3	41.4	39.8	36.1
08/20/17	1:00	38.8	53.7	43.3	40.9	39.2	35.9
08/20/17	2:00	37.7	53.4	42.6	40.3	38.2	34.3
08/20/17	3:00	37.0	52.3	43.3	40.2	36.9	32.2
08/20/17	4:00	38.4	51.3	43.0	40.7	38.9	34.7
08/20/17	5:00	40.6	50.9	44.6	43.1	41.4	37.3
08/20/17	6:00	44.2	67.3	49.2	46.3	44.0	39.6
08/20/17	7:00	43.5	62.6	47.8	46.0	44.0	40.0
08/20/17	8:00	42.0	58.9	47.3	45.0	42.9	36.8
08/20/17	9:00	45.2	77.3	53.1	46.1	40.9	36.8
08/20/17	10:00	43.9	65.5	49.9	44.3	41.1	38.0
08/20/17	11:00	49.2	79.8	54.7	48.9	42.7	37.4

Date	Time	Leq	Lmax	L25	L8.3	L2.5	L90
08/20/17	12:00	63.4	93.7	67.9	53.1	42.2	37.4
08/20/17	13:00	56.6	84.9	57.6	47.3	41.6	37.6
08/20/17	14:00	51.2	80.6	52.8	46.1	43.6	38.2
08/20/17	15:00	45.1	61.9	50.2	47.3	45.2	40.3
08/20/17	16:00	44.3	60.7	50.1	46.3	44.3	39.4
08/20/17	17:00	45.2	63.7	50.2	47.7	45.2	39.8
08/20/17	18:00	42.0	63.9	47.5	43.5	41.6	38.8
08/20/17	19:00	47.9	71.4	53.1	44.8	41.0	37.8
08/20/17	20:00	43.1	62.4	47.4	43.6	42.2	39.6
08/20/17	21:00	41.8	52.8	44.4	43.1	42.2	40.1
08/20/17	22:00	42.6	56.2	47.7	44.2	42.6	39.7
08/20/17	23:00	41.2	57.5	45.1	43.3	41.6	37.6
08/21/17	0:00	39.8	50.9	44.1	42.6	40.8	35.9
08/21/17	1:00	38.4	55.8	43.3	40.6	38.5	34.5
08/21/17	2:00	38.2	56.7	42.6	40.5	38.5	34.4
08/21/17	3:00	40.1	51.2	44.1	42.5	40.9	37.0
08/21/17	4:00	40.2	51.0	43.9	42.1	40.4	38.2
08/21/17	5:00	42.5	55.2	46.6	44.6	42.9	39.8
08/21/17	6:00	44.3	67.0	48.9	45.5	43.9	40.7
08/21/17	7:00	42.3	58.1	47.1	43.5	41.9	39.4
08/21/17	8:00	45.0	67.7	52.5	47.0	43.3	39.8
08/21/17	9:00	45.0	64.6	53.2	46.0	42.0	39.0
08/21/17	10:00	52.8	82.3	48.0	43.0	41.1	38.2
08/21/17	11:00	48.8	80.4	50.7	44.6	41.2	38.8
08/21/17	12:00	44.7	67.3	51.1	46.7	44.2	40.5
08/21/17	13:00	46.7	68.3	53.4	49.9	46.0	41.4
08/21/17	14:00	45.1	64.1	50.8	47.2	44.9	40.8
08/21/17	15:00	45.8	64.6	50.7	47.4	45.4	41.8
08/21/17	16:00	44.3	60.0	49.9	46.6	44.3	40.9
08/21/17	17:00	44.2	61.6	48.6	45.8	44.3	41.2
08/21/17	18:00	44.2	58.7	50.2	45.8	44.2	40.4
08/21/17	19:00	46.0	64.7	53.0	49.9	46.1	40.1
08/21/17	20:00	46.5	65.2	49.9	47.9	46.5	42.3
08/21/17	21:00	45.8	58.1	48.3	47.3	46.3	43.8
08/21/17	22:00	43.8	53.7	47.0	45.9	44.6	41.3
08/21/17	23:00	43.3	56.6	48.5	45.7	43.6	39.8
08/22/17	00:00:00	41.2	53.3	46.4	43.3	41.6	37.9
08/22/17	01:00:00	45.4	86.5	44.8	42.9	41.1	36.7
08/22/17	02:00:00	39.6	55.1	44.0	41.9	40.2	36.1

Date	Time	L_{eq}	L_{max}	L_{25}	$L_{8.3}$	$L_{2.5}$	L_{90}
08/22/17	03:00:00	41.8	51.6	46.5	44.8	42.8	37.7
08/22/17	04:00:00	46.4	57.3	49.7	48.7	47.5	42.5
08/22/17	05:00:00	47.7	57.2	50.3	49.5	48.5	45.5
08/22/17	06:00:00	49.9	55.8	52.5	51.6	50.5	48.0
08/22/17	07:00:00	49.9	66.8	53.1	51.8	50.5	47.7
08/22/17	08:00:00	49.2	66.9	52.7	51.2	49.7	45.6
08/22/17	09:00:00	51.3	74.4	56.4	52.8	51.0	48.2
08/22/17	10:00:00	49.7	63.4	53.3	51.6	50.2	46.9
08/22/17	11:00:00	48.6	73.1	53.6	50.1	48.6	44.7
08/22/17	12:00:00	51.9	66.8	59.8	55.8	51.7	44.1
08/22/17	13:00:00	47.1	62.2	52.2	49.5	47.5	43.8
08/22/17	14:00:00	48.0	65.4	54.9	50.7	47.2	43.3
08/22/17	15:00:00	49.8	65.8	55.3	52.9	49.6	46.0

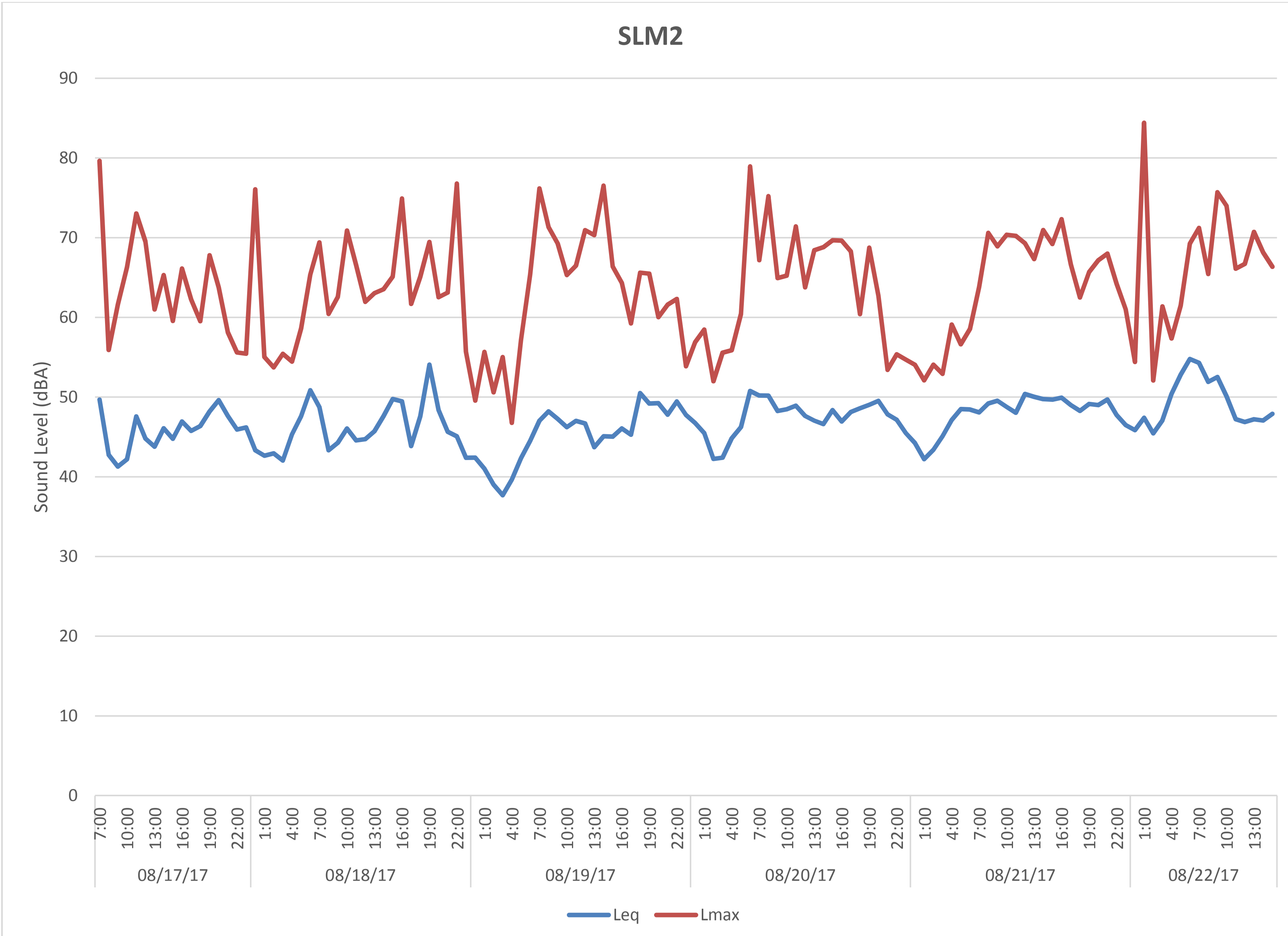

SLM2
Sound Level (dBA)
0
10
20
30
40
50
60
70
80
90
7:00 10:00 13:00 16:00 19:00 22:00
08/17/17
1:00 4:00 7:00 10:00 13:00 16:00 19:00 22:00
08/18/17
1:00 4:00 7:00 10:00 13:00 16:00 19:00 22:00
08/19/17
1:00 4:00 7:00 10:00 13:00 16:00 19:00 22:00
08/20/17
1:00 4:00 7:00 10:00 13:00 16:00 19:00 22:00
08/21/17
1:00 4:00 7:00 10:00 13:00
08/22/17
Leq
Lmax

Table A- 3. Measured Sound Levels at SLM3 (dBA)

Date	Time	L_{eq}	L_{max}	L_{25}	$L_{8.3}$	$L_{2.5}$	L_{90}
08/16/17	15:00	53.8	63.3	57.1	56.1	54.6	51.1
08/16/17	16:00	53.9	64.3	57.2	55.9	54.7	51.5
08/16/17	17:00	55.7	74.0	58.7	57.7	56.6	52.9
08/16/17	18:00	55.8	69.2	58.9	57.8	56.6	53.4
08/16/17	19:00	57.2	68.0	60.4	59.5	58.2	54.2
08/16/17	20:00	54.9	67.7	58.9	57.8	56.3	50.5
08/16/17	21:00	52.4	64.4	56.7	55.3	53.5	48.1
08/16/17	22:00	47.0	60.9	51.2	49.6	47.8	42.6
08/16/17	23:00	47.7	63.2	53.3	51.0	48.4	42.1
08/17/17	0:00	45.5	64.5	50.6	48.8	46.3	40.0
08/17/17	1:00	45.0	58.9	50.6	48.7	45.9	39.1
08/17/17	2:00	44.9	60.0	50.4	48.3	45.7	39.7
08/17/17	3:00	46.9	57.8	51.9	50.3	48.2	40.9
08/17/17	4:00	51.3	60.0	55.1	53.9	52.4	47.2
08/17/17	5:00	52.3	60.3	55.2	54.2	53.1	49.7
08/17/17	6:00	52.1	64.6	54.9	53.9	52.7	49.9
08/17/17	7:00	51.6	62.9	54.1	53.4	52.4	49.0
08/17/17	8:00	50.6	76.2	56.7	52.0	49.7	45.9
08/17/17	9:00	53.3	80.0	54.4	53.3	52.3	48.6
08/17/17	10:00	51.8	68.2	54.6	53.6	52.5	49.0
08/17/17	11:00	52.4	65.2	55.7	54.3	53.0	49.3
08/17/17	12:00	64.5	65.0	75.2	56.0	54.3	50.0
08/17/17	13:00	63.5	84.6	73.1	65.9	53.6	49.4
08/17/17	14:00	52.1	65.0	56.2	54.3	52.8	49.0

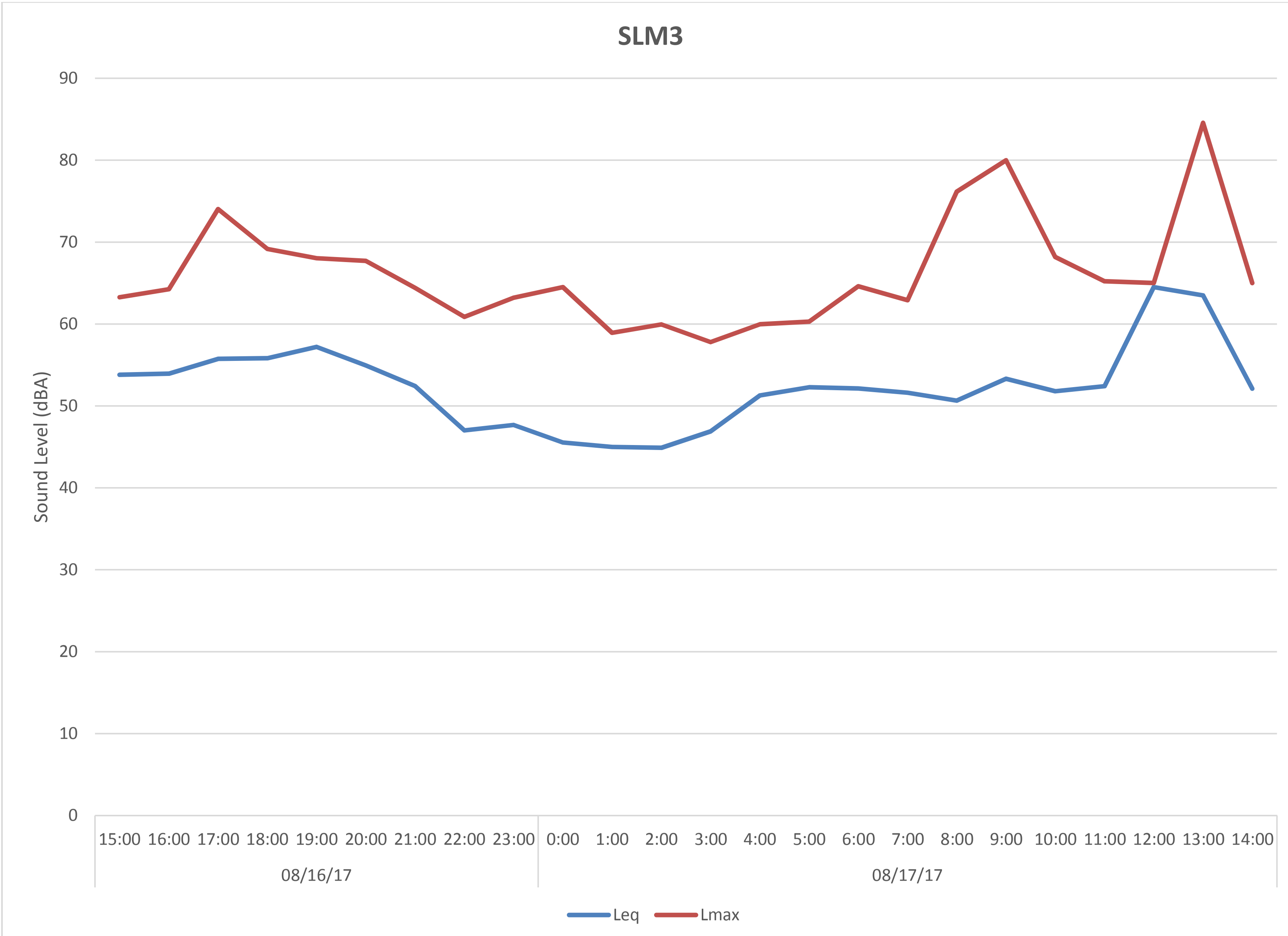
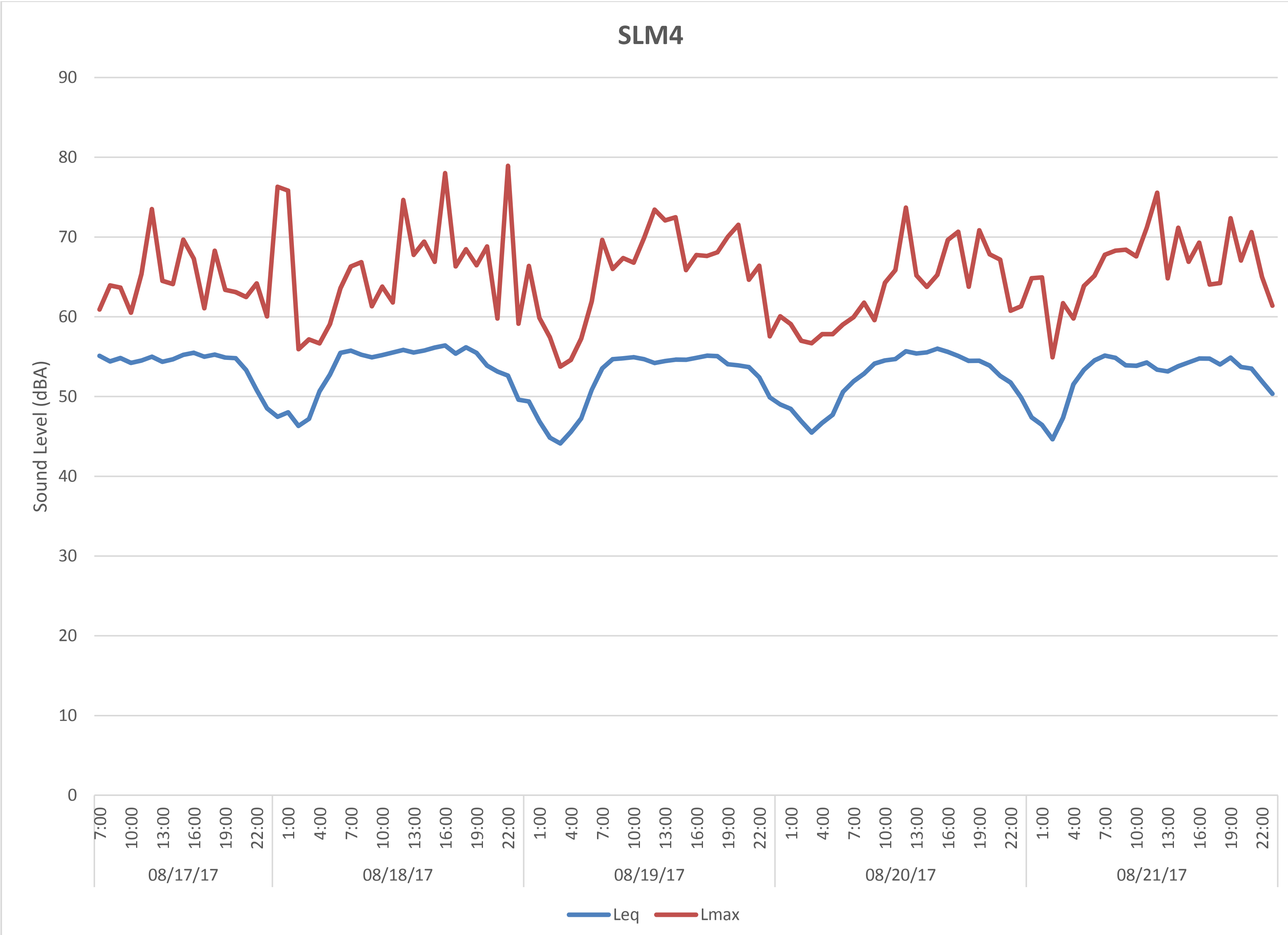

SLM3
90
80
70
60
50
40
30
20
10
0
Sound Level (dBA)
15:00 16:00 17:00 18:00 19:00 20:00 21:00 22:00 23:00 0:00 1:00 2:00 3:00 4:00 5:00 6:00 7:00 8:00 9:00 10:00 11:00 12:00 13:00 14:00
08/16/17
08/17/17
Leq
Lmax

Table A- 4. Measured Sound Levels at SLM4 (dBA)

Date	Time	Leq	Lmax	L25	L8.3	L2.5	L90
08/17/17	7:00	55.1	60.9	57.7	56.9	55.9	52.9
08/17/17	8:00	54.4	63.9	56.9	56.0	55.1	52.3
08/17/17	9:00	54.8	63.7	57.7	56.6	55.6	52.3
08/17/17	10:00	54.2	60.5	56.9	56.1	55.1	51.6
08/17/17	11:00	54.5	65.4	57.5	56.4	55.4	51.4
08/17/17	12:00	55.0	73.5	57.9	56.7	55.6	51.9
08/17/17	13:00	54.4	64.5	57.2	56.2	55.2	51.3
08/17/17	14:00	54.7	64.1	57.9	56.8	55.5	51.9
08/17/17	15:00	55.2	69.7	58.0	56.9	55.9	53.0
08/17/17	16:00	55.5	67.3	59.3	57.0	55.8	53.0
08/17/17	17:00	55.0	61.1	57.1	56.4	55.6	53.1
08/17/17	18:00	55.3	68.3	58.4	56.8	55.8	52.7
08/17/17	19:00	54.9	63.4	57.8	56.7	55.7	51.6
08/17/17	20:00	54.8	63.1	57.7	56.8	55.6	52.2
08/17/17	21:00	53.3	62.5	56.7	55.6	54.2	50.0
08/17/17	22:00	50.8	64.2	54.6	53.1	51.7	46.0
08/17/17	23:00	48.5	60.0	53.0	51.5	49.5	43.9
08/18/17	0:00	47.5	76.3	52.0	50.3	48.4	42.1
08/18/17	1:00	48.0	75.8	51.7	49.4	47.1	41.0
08/18/17	2:00	46.3	55.9	52.1	50.2	47.4	40.7
08/18/17	3:00	47.2	57.2	52.3	50.5	48.5	41.3
08/18/17	4:00	50.7	56.7	54.2	53.3	51.8	46.6
08/18/17	5:00	52.8	59.1	55.9	55.0	53.8	49.4
08/18/17	6:00	55.5	63.6	58.4	57.2	56.2	53.0
08/18/17	7:00	55.8	66.3	58.3	57.6	56.6	53.1
08/18/17	8:00	55.2	66.9	57.9	57.0	56.0	52.6
08/18/17	9:00	54.9	61.3	57.4	56.6	55.7	52.7
08/18/17	10:00	55.2	63.8	58.4	57.2	55.9	52.5
08/18/17	11:00	55.5	61.8	57.9	57.2	56.3	53.1
08/18/17	12:00	55.9	74.6	58.4	57.2	56.4	53.1
08/18/17	13:00	55.5	67.8	59.0	57.5	56.2	52.4
08/18/17	14:00	55.8	69.4	59.1	57.4	56.2	53.4
08/18/17	15:00	56.1	66.9	60.6	58.1	56.4	53.9
08/18/17	16:00	56.4	78.0	58.8	57.1	56.0	53.5
08/18/17	17:00	55.4	66.3	57.6	56.9	56.0	53.4
08/18/17	18:00	56.2	68.5	59.2	57.8	56.6	54.1
08/18/17	19:00	55.5	66.5	58.1	57.2	56.3	52.9

Date	Time	L_{eq}	L_{max}	L_{25}	$L_{8.3}$	$L_{2.5}$	L_{90}
08/18/17	20:00	53.9	68.8	57.1	55.9	54.7	50.5
08/18/17	21:00	53.1	59.8	56.2	55.3	54.2	50.0
08/18/17	22:00	52.6	78.9	56.4	55.1	53.6	48.4
08/18/17	23:00	49.6	59.1	53.8	52.5	50.8	45.1
08/19/17	0:00	49.4	66.4	54.5	52.3	50.2	44.4
08/19/17	1:00	46.9	59.9	51.7	49.8	47.8	42.6
08/19/17	2:00	44.8	57.4	50.4	48.3	45.9	39.6
08/19/17	3:00	44.1	53.8	49.2	47.8	45.4	39.1
08/19/17	4:00	45.6	54.6	50.6	49.1	46.8	40.0
08/19/17	5:00	47.3	57.3	52.2	50.3	48.3	41.6
08/19/17	6:00	50.8	61.9	54.7	53.5	52.0	46.8
08/19/17	7:00	53.5	69.6	56.7	55.6	54.3	50.5
08/19/17	8:00	54.7	66.0	58.1	56.8	55.4	51.9
08/19/17	9:00	54.8	67.4	57.5	56.5	55.5	52.5
08/19/17	10:00	54.9	66.8	57.7	56.7	55.6	52.8
08/19/17	11:00	54.7	69.9	57.7	56.3	55.3	52.3
08/19/17	12:00	54.2	73.4	57.4	55.7	54.5	50.8
08/19/17	13:00	54.5	72.1	57.1	56.0	54.9	52.2
08/19/17	14:00	54.6	72.5	57.4	56.0	54.9	51.9
08/19/17	15:00	54.6	65.9	57.9	56.3	55.2	52.3
08/19/17	16:00	54.9	67.7	58.3	56.7	55.5	52.3
08/19/17	17:00	55.1	67.6	58.0	56.9	55.9	52.2
08/19/17	18:00	55.1	68.1	58.0	56.9	55.7	52.1
08/19/17	19:00	54.0	70.0	57.0	56.0	54.9	51.3
08/19/17	20:00	53.9	71.5	56.7	55.6	54.5	51.4
08/19/17	21:00	53.7	64.6	57.5	55.8	54.4	50.3
08/19/17	22:00	52.4	66.4	56.7	54.8	53.1	48.3
08/19/17	23:00	49.9	57.5	53.7	52.7	51.0	45.7
08/20/17	0:00	49.0	60.1	53.9	51.8	49.9	44.4
08/20/17	1:00	48.5	59.1	53.1	51.3	49.5	43.9
08/20/17	2:00	46.9	57.0	52.4	50.5	48.0	41.8
08/20/17	3:00	45.5	56.7	51.2	49.4	46.5	39.9
08/20/17	4:00	46.7	57.8	51.8	50.3	47.8	41.6
08/20/17	5:00	47.7	57.8	52.1	50.9	49.0	42.2
08/20/17	6:00	50.6	59.0	54.2	53.2	51.8	46.5
08/20/17	7:00	51.9	60.0	55.3	54.4	53.1	47.8
08/20/17	8:00	52.9	61.8	56.1	55.0	53.7	50.0
08/20/17	9:00	54.1	59.6	56.8	55.9	54.9	52.0
08/20/17	10:00	54.5	64.3	56.9	56.2	55.3	52.4

Date	Time	Leq	Lmax	L25	L8.3	L2.5	L90
08/20/17	11:00	54.7	65.9	58.0	56.6	55.3	52.2
08/20/17	12:00	55.7	73.7	58.1	57.1	56.2	53.8
08/20/17	13:00	55.4	65.2	58.1	57.0	56.1	53.0
08/20/17	14:00	55.5	63.8	58.9	57.3	56.2	53.2
08/20/17	15:00	56.0	65.3	58.4	57.5	56.7	53.9
08/20/17	16:00	55.6	69.6	57.9	57.2	56.4	53.2
08/20/17	17:00	55.1	70.7	57.9	56.9	55.8	52.5
08/20/17	18:00	54.5	63.8	57.3	56.4	55.3	51.8
08/20/17	19:00	54.5	70.8	58.7	56.5	55.1	51.1
08/20/17	20:00	53.9	67.8	57.3	56.0	54.6	51.3
08/20/17	21:00	52.6	67.2	55.3	54.3	53.3	50.1
08/20/17	22:00	51.8	60.8	54.8	53.8	52.7	48.9
08/20/17	23:00	49.9	61.3	54.8	52.8	50.8	45.4
08/21/17	0:00	47.4	64.8	52.1	50.5	48.6	41.9
08/21/17	1:00	46.5	64.9	52.4	50.1	47.3	40.8
08/21/17	2:00	44.6	54.9	49.8	47.8	45.5	40.7
08/21/17	3:00	47.3	61.7	52.5	50.3	48.0	41.9
08/21/17	4:00	51.5	59.8	55.3	54.2	52.7	46.9
08/21/17	5:00	53.4	63.9	56.4	55.6	54.3	50.4
08/21/17	6:00	54.5	65.2	57.8	56.5	55.4	51.5
08/21/17	7:00	55.1	67.8	58.3	56.8	55.6	52.9
08/21/17	8:00	54.9	68.3	58.1	56.8	55.6	52.1
08/21/17	9:00	53.9	68.4	57.3	55.6	54.4	51.4
08/21/17	10:00	53.8	67.6	57.2	55.9	54.6	51.2
08/21/17	11:00	54.3	71.2	57.8	55.9	54.8	51.7
08/21/17	12:00	53.4	75.6	56.3	55.1	54.0	51.0
08/21/17	13:00	53.2	64.8	56.4	55.1	53.8	50.8
08/21/17	14:00	53.8	71.2	56.8	55.6	54.5	51.2
08/21/17	15:00	54.3	66.9	56.9	55.7	54.8	51.8
08/21/17	16:00	54.8	69.3	57.8	56.2	55.2	52.6
08/21/17	17:00	54.7	64.1	57.0	56.3	55.4	52.8
08/21/17	18:00	54.0	64.2	56.9	56.0	54.9	51.4
08/21/17	19:00	54.9	72.3	58.1	57.1	55.8	51.4
08/21/17	20:00	53.7	67.0	56.5	55.7	54.5	51.1
08/21/17	21:00	53.5	70.6	56.5	55.3	54.1	50.5
08/21/17	22:00	51.9	65.0	55.3	54.1	52.8	48.7
08/21/17	23:00	50.3	61.4	55.0	53.3	51.3	45.9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Sound Level (dBA)
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20
30
40
50
60
70
80
90
7:00
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13:00
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19:00
22:00
1:00
4:00
08/17/17
08/18/17
08/19/17
08/20/17
08/21/17
Leq
Lmax