Floatel Noise Monitoring Survey - 1 (July 10-14, 2024)

Woodfibre LNG Project

September 16, 2024

123222160EN-RPT0052 Revision 1

Woodfibre LNG

Preamble

The Woodfibre Liquefied Natural Gas Project (the Project) is a liquefied natural gas export facility being constructed on the former Woodfibre Pulp and Paper Mill site in Átl'ka7tsem (Howe Sound), approximately seven kilometres south of Sḵwx̱wú7mesh (Squamish). The Project is on the historical location of a Sḵwx̱wú7mesh Úxwumixw (Squamish Nation) village known as Swiẏát. Swiẏát and Átl'ḵ'a7tsem (Howe Sound) are tied to the cultural well-being of Sḵwx̱wú7mesh Úxwumixw (Squamish Nation) members, their ancestors, and their descendants, and to other Indigenous groups as defined in the Project's Environmental Assessment Certificates. The Project is also operating within the traditional, ancestral, and unceded territory of the səlilwətaɬ (Tsleil-Waututh) Nation, and to other Indigenous groups as defined in the Project's Environmental Assessment Certificates. Woodfibre LNG General Partner Inc. recognizes the importance of these areas to the Sḵwx̱wú7mesh stélmexw (Squamish People), and other Indigenous groups. Woodfibre LNG General Partner Inc., as general partner on behalf of Woodfibre LNG Limited Partnership (Woodfibre LNG) seeks to construct and operate the Project in a manner that is respectful of Indigenous values. This Floatel Noise Monitoring and Mitigation Plan is primarily written in English with important place names, phrases, and passages provided in Sḵwx̱wú7mesh sníchim (the Squamish language).

Temíxwiẏiḵw chet wa naantem chet ti temíxw Swiẏát
Chet wa sméṅhemswit kwis ns7éyx̱nitas chet ti temíxw
We7ú chet kwis t'íchimwit iy íẇas chet eḵ' I tti.

Our ancient ancestors named this place Swiẏát
We, as their descendants safeguard these lands
We will continue to swim and fish in these clear waters.

Limitations and Sign-off

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Squamish-English Translations

Squamish	English
Átl'ka7tsem	Howe Sound
ínexwantas	monitoring
Skwxwú7mesh	Squamish
Skwxwú7mesh sníchim	Squamish Language
Skwxwú7mesh stélmexw	Squamish people
Skwxwú7mesh Úxwumixw	Squamish Nation
Swiỷát	Historic Squamish Nation village located at Woodfibre Site

Abbreviations

ANSI	American National Standards Institute
BC	British Columbia
BC EAO	British Columbia Environmental Assessment Office
BC ER	British Columbia Energy Regulator
dB	Decibel level
dBA	A-weighted decibel level
EAC	Environmental Assessment Certificate
HVAC	Heating, ventilation, and air-conditioning
Hz	Hertz
L_{max}	Maximum A-weighted equivalent sound level
L_d	Daytime equivalent sound level
L_{eq}	Energy equivalent sound level
L_n	Nighttime equivalent sound level
LNG	Liquified natural gas
MOE	Ministry of Environment and Climate Change Strategy
MOF	Material Offloading Facility
MOH	Ministry of Health
the Project	Woodfibre Liquefied Natural Gas Project
RMS	Root mean square
SPL	Sound pressure level
VCH	Vancouver Coastal Health
WHO	World Health Organization
Woodfibre LNG	Woodfibre LNG General Partner Inc.

Glossary

Adaptive Management	A systematic process for continually improving management policies and practices by learning from the outcomes of operational programs.
Bands (octave, 1/3 octave)	A series of electronic filters separate sound into discrete frequency bands, making it possible to know how sound energy is distributed as a function of frequency. Each octave band has a centre frequency that is double the centre frequency of the octave band preceding it.
daytime	The hours from 07:00 to 22:00.
dB - Decibel	A logarithmic unit associated with sound pressure levels and sound power levels.
dBA - decibel, A-weighted	A logarithmic unit where the recorded sound has been filtered using the A frequency weighting scale. A-weighting somewhat mimics the response of the human ear to sounds at different frequencies. A weighted sound pressure levels are denoted by the suffix 'A' (i.e., dBA), and the term pressure is normally omitted from the description (i.e., sound level or noise level).
energy equivalent sound level (L_{eq})	An energy-average sound level taken over a specified period of time. It represents the average sound pressure encountered for the period. The time period is often added as a suffix to the label (e.g., $L_{eq}(24)$ for the 24-hour equivalent sound level). L_{eq} is usually A-weighted. A L_{eq} value expressed in dBA is a good, single value descriptor of the annoyance of noise.
frequency	Number of cycles per unit of time. In acoustics frequency is expressed in hertz (Hz), i.e., cycles per second.
floatel	The marine-based work camp, associated facilities and mooring infrastructure dedicated to house approximately 650 Workers during the Construction of the Project.
hertz (Hz)	Unit of measurement of frequency, numerically equal to cycles per second.
L_d	Daytime sound level, an equivalent continuous sound level taken over 15 hours from 07:00 to 22:00.
L_{Amax}	The maximum value of the A-weighted sound pressure level during a measurement duration.

L_n	Nighttime sound level, an equivalent continuous sound level taken over 9 hours from 22:00 to 07:00.
nighttime	The hours from 22:00 to 07:00.
noise	Unwanted sound.
noise level	Same as sound level, except applied to unwanted sounds.
sound	A dynamic (fluctuating) pressure.
sound pressure level (SPL)	The logarithmic ratio of the root mean square (RMS) sound pressure to the sound pressure at the threshold of hearing. The sound pressure level is defined by the equation below where P is the RMS pressure due to a sound and P_0 is the reference pressure. P_0 is usually taken as 2.0×10^{-5} Pascals. SPL (dB) = 20 log (P_{RMS}/P_0)

1.0 INTRODUCTION

1.1 OVERVIEW

Woodfibre LNG General Partner Inc. (Woodfibre LNG) is constructing the Woodfibre Liquefied Natural Gas Project (the Project), which is located on the former Woodfibre Pulp Mill site approximately seven kilometres (km) southwest of Sḵwx̱wú7mesh (Squamish), British Columbia (BC).

Woodfibre LNG received an amendment to the Environmental Assessment Certificate (EAC) #E15-02 (Amendment #3) on November 1, 2023, approving the use of temporary accommodations for off-duty construction workers in a self-contained floating housing facility (floatel). The Amendment #3 includes conditions related to air quality and noise monitoring for the floatel occupants.

The floatel was mobilized and moored at the Project site on June 21, 2024, and will be continuously operating for approximately three years during the construction of the Project. The floatel will provide accommodation for approximately 650 persons at peak construction. In addition to the accommodation spaces, the floatel also includes a variety of ancillary service facilities such as medical, food and beverage, laundry, recreational and leisure, and office spaces. Figure 1 in Appendix A shows the site plan and location of the floatel.

1.2 FLOATEL NOISE MONITORING AND MITIGATION PLAN

Amendment #3 includes conditions regarding noise management for the floatel. Condition 30 of Amendment #3 states that:

> *30.1 The Holder must retain a Qualified Professional(s) to develop the following monitoring and mitigation plans, in consultation with MOE, MOH, BC Energy Regulator, VCH[1] and Aboriginal Groups:*
>
> *b) Noise Monitoring and Mitigation Plan.*

In accordance with the requirements of Condition 30, the Noise Monitoring and Mitigation Plan (the FNMMP) has been developed and finalized on July 17, 2024 (Rev.4) by the Stantec Qualified Professional and reviewed by the regulatory agencies. The FNMMP specifically includes the Noise Monitoring Plan, Noise Mitigation Plan and Adaptive Management Plan.

The FNMMP provides general guidance about how to assess workers' sleep disturbance due to Project related construction noise within the floatel cabins. The general guidance includes the monitoring method, sleep disturbance noise threshold, data analysis procedures, and reporting requirements.

[1] MOE: Ministry of Environment and Climate Change Strategy
MOH: Ministry of Health
VCH: Vancouver Coastal Health

1.3 OBJECTIVE

In accordance with the FNMMP, an initial noise monitoring program collected sound levels in the cabins on July 10 to July 14, 2024. The objectives include the following:

- Measure sound levels at the selected cabins.
- Analyze data gathered.
- Compare the measured sound levels with applicable sleep disturbance thresholds.
- Conduct interviews about noise with occupants.
- Assess compliance for sleep disturbance effect for sleeping quarter occupants.
- Recommend mitigation or adaptive management plan if required.

1.4 ENVIRONMENTAL NOISE DESCRIPTORS

All noise descriptors in this assessment are based on the A-weighted decibel (dBA) scale. The dBA unit is based on relative loudness of sound at different frequencies and is meant to reflect the human ear's response to noise.

Environmental noise typically varies over time. To account for this variation, single number descriptors are used. It is defined as the steady, continuous sound level over a specified time that has the same acoustic energy as the actual varying sound levels over the specified time. The noise descriptors energy equivalent sound level (L_{eq}), daytime equivalent A-weighted sound level (L_d), nighttime equivalent A-weighted sound level (L_n), and maximum A-weighted sound level (L_{Amax}) are commonly used to quantify noise effects for activities of a project. The following provides a general description for these descriptors:

- L_{eq} represents the energy-average sound pressure encountered for the period.
- L_d is the 15-hour energy equivalent A-weighted sound level during the daytime period from 07:00 to 22:00.
- L_n is a 9-hour energy equivalent A-weighted sound level during the nighttime period from 22:00 to 07:00.
- L_{Amax} is the maximum A-weighted sound level recorded over the measurement duration.

The Glossary section provides addition details for these descriptors.

2.0 CABIN SOUND LEVEL TARGETS

The construction noise may result in sleep disturbance to occupants of the floatel during the Project construction phase. This section focuses on the sleep disturbance threshold recommendations by Health Canada and room sound level criteria from another international standards (i.e., American National Standards Institute [ANSI]).

2.1 HEALTH CANADA SLEEP DISTURBANCE THRESHOLD

Noise may cause sleep disturbance for people and there is clear evidence that ongoing sleep disturbance is associated with a wide variety of health effects, such as cardiovascular effects, mental health and hearing impairment. Health Canada's Guidance for Evaluating Human Health Effects in Impact Assessment: NOISE, 2023 (Health Canada Noise Guidance) references the guidelines and recommendations of the World Health Organization (WHO) for community noise (WHO 1999) and Night Noise Guidelines for Europe regarding sleep disturbance (WHO 2009). The WHO 1999 guideline recommends a threshold for sleep disturbance as being an indoor sound level of no more than 30 dBA L_{eq} for continuous noise during the sleep period. For individual noise events, Health Canada also refers to WHO's recommendations that indoor sound levels should not exceed 45 dBA L_{Amax} more than 10 to 15 times per night to provide for a good sleep environment (WHO 1999). Health Canada recommends that an outdoor-to-indoor transmission loss with windows at least partially open is 15 dBA and fully closed windows are assumed to reduce outdoor sound levels by approximately 27 dBA (Health Canada 2023).

The Project construction work has potential to be scheduled 24 hours per day. For 24 hours per day construction, the sleep disturbance noise effect will be evaluated for the floatel occupants who may be off-duty and sleeping during the daytime or nighttime while construction is ongoing. The indoor sound level sleep disturbance thresholds of 30 dBA (L_{eq}) and quantities of occurrence of L_{max} > 45 dBA (i.e., 15 times) during both daytime (07:00 to 22:00) and nighttime (22:00 to 07:00) are recommended for the floatel.

Although the Heath Canada sleep disturbance threshold of 30 dBA is used it this assessment, it is better suited for private residential bedrooms with very quiet background noise. However, for the spaces with dense occupants, such as apartment buildings and hotel or motel rooms, where central heating, ventilation and air-conditioning (HVAC) systems and local activities are sources of background noise, a sound level of 30 dBA may not be achievable.

It is recommended that ANSI standard for room sound level criteria for the hotel or motel rooms be used as an additional reference target in the evaluation of interior noise on the floatel.

2.2 ANSI S12.2 SOUND LEVEL CRITERIA FOR ROOM

The ANSI S12.2-2019 (Reaffirmed in 2023) Criteria for Evaluating Room Noise is commonly used as a reference guide for assessment of sound level criteria for occupants in various interior environments. The ANSI standard specifies sound level criteria when evaluating the room noise by using the survey method that employs the A-weighted sound level. Table 2-1 lists the A-weighted sound level criteria for individual

rooms or suite in hotels and motels, based on ANSI sound level criteria for room of various uses (ANSI S12.2).

Table 2-1 A-weighted Sound Level Criteria for Rooms – Hotels and Motels

Occupancy	A-weighted Sound Level dBA
Hotels/motels	
Individual rooms or suites	39-44
Meeting/banquet rooms	35-44
Service support areas	48-57
Source: Table C.1 of ANSI S12.2	

As the floatel provides the worker accommodation and belongs to the hotels/motels category, the A-weighted sound level criteria of 39 to 44 dBA for individual rooms or suites are also included in the floatel noise evaluation.

3.0 NOISE MONITORING PROGRAM

In accordance with the FNMMP, a Stantec Qualified Professional conducted the initial noise monitoring program on the floatel from July 10 to July 14, 2024. The following sections outline the monitoring program details, including cabin locations, measurement instrumentation, measurement setup, Project construction activities occurring during the measurement period, and data analysis methods.

3.1 CABIN LOCATIONS

During continuous noise monitoring, the sound level meters were set up inside six representative cabins on different decks of the floatel. A representative cabin is an unoccupied cabin that is available for occupancy. The cabin is selected based on the highest potential noise impact (e.g., the closest proximity to, and in line of sight with the construction site) and availability for occupancy. Six cabins were selected for the noise monitoring: Cabin 2025, Cabin 5010, Cabin 6010, Cabin 7025, Cabin 9420 and Cabin 0107. Each of the selected cabins is located on a different deck, represented by the first number of the cabin number. For example, Cabin 2025 is located on Deck 2. Table 3-1 summarizes the selected cabins, general descriptions, and field observations. Figure 2 through Figure 4 illustrate these cabin locations on each deck of the floatel.

Table 3-1 Selected Cabins, Descriptions, and Observations

Cabin	Deck	Description and Observations during Monitoring Period	Reference Figures
2025	2	• Deck 2 is under the ship water line. • The 86 cabins on Deck 2 were only partially occupied by the crew members but no workers. • Some cabins are adjacent to the floatel operating facilities, including Engine Store (power generator) and workshop. • High noise emitted from Engine Store was observed. • Cabin 2025 ceiling ventilation was continuously operating during the noise monitoring period.	Figure 2 Figure 5
5010	5	• All 219 cabins on Deck 5 were unoccupied. • There are Vent Stores (ventilation room) and Service Workshop located at the stern of Deck 5. • Cabin 5010 ceiling ventilation was not in operation due to no occupancy on that deck level.	Figure 2 Figure 6
6010	6	• Total of 248 cabins, highest number of cabins per deck among all decks. • Cabins occupied by the construction workers. • Cabin ceiling ventilation was continuously operating	Figure 3 Figure 7
7025	7	• Total of 58 cabins. • Ancillary service facilities on Deck 7 including Reception, Gym, Games Lounge, and other facility rooms. • Cabins occupied by the construction workers • Cabin ceiling ventilation was continuously operating during the noise monitoring period	Figure 3 Figure 8
9420	9	• Total of 88 cabins. • There is an outdoor area at the stern and a smoking area on the west side of Deck 9. • Cabins occupied by the construction workers. • Some cabins are located underneath several Fan Rooms (rooms with ventilation fans) on Deck 10, e.g., Cabins 9420 to 9436. • Higher noise from Fan Rooms ventilation openings was observed at the smoke area. • Cabin ceiling ventilation was continuously operating during the noise monitoring period.	Figure 4 Figure 9
0107	10	• Total of 17 cabins with office areas. • Cabins were occupied by crew members and construction workers. • There are several Fan Rooms at Deck 10. • Cabin ceiling ventilation was continuously operating during the noise monitoring period.	Figure 4 Figure 10

3.2 MEASUREMENT INSTRUMENTATION

Noise monitoring was conducted with three Brüel & Kjær Model 2250 and one Brüel & Kjær Model 2270 sound level meters fitted with Brüel & Kjær 4189 type microphones. The sound level meters meet the

ANSI S1.4-2006 Type 1 and IEC 61672-1 Class 1 specifications. The sound level meters were field calibrated before and after each measurement period and have valid laboratory certificates. Laboratory certificates are considered valid within two-year period after last recalibration for the sound level meters and within one year period for the calibrator.

Table 4-1 summarizes details of the measurement instrumentation. Corresponding calibration certificates of sound level meters and calibrator are attached in Appendix D.

Table 4-2 Details of Measurement Instrumentation

Item	Description
Sound Level Meter	Brüel & Kjær Model 2250 s/n 2818093 Brüel & Kjær Model 2250 s/n 2809183 Brüel & Kjær Model 2250 s/n 3003408 Brüel & Kjær Model 2270 s/n 3002024
Microphone	Brüel & Kjær Model 4189 s/n 2799496 Brüel & Kjær Model 4189 s/n 2799510 Brüel & Kjær Model 4189 s/n 2866566 Brüel & Kjær Model 4189 s/n 3060527
Calibrator	Brüel & Kjær Model 4231 s/n 3009070
Bandwidth	1/3 Octave Band
Frequency Range	12.5 Hz – 20 kHz
Frequency Weightings	Z (Linear), A & C
Calibration Level	94 dB at 1 kHz

3.3 MEASUREMENT SETUP

Dayshift workers sleep during nighttime and nightshift workers sleep during daytime on the floatel. Therefore, continuous sound levels over 48 hours (i.e., over two daytime and two nighttime periods) were measured at the cabins.

Three sound level meters (Brüel & Kjær Model 2250), one per room, were deployed for continuous noise monitoring. The sound level meters were set to 1-minute logging intervals measuring L_{Amax} and L_{eq} sound levels in one-third octave band L_{eq} sound levels from 12.5 Hz to 20 kHz frequency range.

Sound level meters also recorded the continuous digital audio signal simultaneously for further data analysis and post-processing to remove (isolate)extraneous noise events from the dataset.

One sound level meter (Brüel & Kjær Model 2270) was used in spot measurements. L_{Amax} and L_{eq} sound levels in one-third octave band L_{eq} from 12.5 Hz to 20 kHz frequency range were measured up to 2-minute duration at each spot measurement location.

The microphones were set up at bed height (i.e., 1 metre above the room floor) at each cabin. Figure 5 though Figure 10 in Appendix A illustrate the sound level meter setup at each cabin.

The monitoring events are described as below:

- Three sound level meters were setup at Cabin 2025, Cabin 5010 and Cabin 6010 and continuous noise data was collected over 48 hours from July 10 to July 12.
- When the 48-hour duration was finished at the first three cabins, the sound level meters were switched to Cabin 7025, Cabin 9420 and Cabin 0107 to collect noise data for 48 hours.
- During noise monitoring periods, spot measurements at different locations (i.e., inside cabins and outside cabins along corridors) were conducted to investigate locations with potential high noise impacts.

Table 3-2 summarizes the measurement duration at each cabin during the noise monitoring period.

Table 3-3 Noise Monitoring Duration at Cabins

Cabin	Measurement Start		Measurement End		Measurement Duration (hrs mm)
	Date (mm/dd/yy yy)	Time (hh:mm)	Date (mm/dd/yy yy)	Time (hh:mm)	
2025	07/10/2024	18:07	07/12/2024	18:20	48 hrs 13 mins
5010	07/10/2024	18:39	07/12/2024	18:42	48 hrs 3 mins
6010	07/10/2024	18:20	07/12/2024	18:30	48 hrs 10 mins
7025	07/12/2024	18:56	07/14/2024	21:18	50 hrs 22 mins
9420	07/12/2024	19:07	07/14/2024	21:00	49 hrs 53 mins
0107	07/12/2024	19:17	07/14/2024	20:53	49 hrs 36 mins

3.4 PROJECT CONSTRUCTION ACTIVITIES

There were Project construction activities in both dayshift and nightshift during the noise monitoring period. The dayshift was from 07:00 to 17:00 and the nightshift was from 19:00 to 07:00. Figure 12 illustrates the construction areas onsite with Area ID #. Construction activities during the noise monitoring period included the following:

Daytime:

- Area 1300: Soil processing
- Area 1300: Temporary office trailer ground preparation
- Area 1300: Material Offloading Facility (MOF) pile in-fill
- Area 1200B: Overburden removal on hill
- Area 1200C: Fill placement
- Area 4100: Floatel Temp office work preparation
- Area 1100: Clay pocket excavation

Nighttime:

- Area 1200D: Clay pocket excavation

- Area 8/1200: North barge ramp, loading barge for soil export

3.5 DATA ISOLATION ANALYSIS

The FNMMP prescribes that measured noise data that are not representative of the existing acoustic environment, non-anthropogenic sound, or non-representative weather conditions can be isolated from the data set prior to the calculation of any average values. During the noise monitoring, the weather conditions were representative (i.e., no high wind and rain) and therefore, isolation was not applied for the weather conditions.

Noise events isolated from the data set included:

- Qualified Professional activities (e.g., equipment setup and disassembly, daily regular checkups).
- Period during safety drill from 07:23 to 08:21 on July 14, noise from the Public Announcement System (PA) and people activities during the drill.
- Door knocking at the monitored cabin.

These noise events were identified using audio recordings and also based on the Qualified Professional's field notes, and then removed from the valid measurement data. Noise from local anthropogenic activities from neighbour occupants (e.g., toilet flushing, foot traffic and conversation in the corridor) and crew member activities (e.g., regular operations, cleaning and maintenance activities) was considered to be part of the existing acoustic environment and was not isolated.

After the data isolation, L_{eq}, L_d, L_n, and L_{Amax} values were determined for the different measurement periods. Once the data isolation analysis was completed, the resulting valid noise data set (i.e., with invalid data removed) was logarithmically averaged over the corresponding time periods using the following formula:

$$L_{Aeq}(isolated, ave) = 10lg_{10}\left[\frac{1}{N_V}\sum_{i=1}^{N_V} 10^{(0.1L_{A,eq})}\right] dBA$$

where N_V = number of valid 1-minute logging periods in the measurement data set.

4.0 MEASUREMENT RESULTS

This section summarizes the analysis results. The L_d, L_n, the occurrence of L_{Amax} higher than 45 dBA (i.e., Health Canada threshold) are analyzed and presented in tables herein. There are total of more than 17,280 minutes logged measurement values at six cabins during the monitoring period.

4.1 MEASUREMENT RESULTS AT CABINS

Table 4-1 provides an overall summary of the noise monitoring results at each noise monitoring cabin.

Table 4-1: Summary of Measurement Results

Cabin	Deck	Average Daytime L_d, dBA		Average Nighttime L_n, dBA		Highest Occurrence of L_{Amax} > 45 dBA	
		Low	High	Low	High	Daytime	Nighttime
2025	2	41.4	41.9	41.7	42.0	482	144
5010	5	27.9	30.1	27.4	27.6	73	4
6010	6	34.6	35.7	34.4	34.9	65	28
7025	7	38.1	38.3	38.3	38.3	56	19
9420	9	35.9	36.0	35.9	36.0	64	5
0107	10	38.0	38.4	38.1	38.2	64	6

Details of daily measurement results at each cabin are described in the following sections. The daily results are compared to the Health Canada sleep disturbance thresholds and ANSI room sound level criteria of 39 to 44 dBA.

4.1.1 Cabin 2025

Table 4-2 summarizes the daily L_d and L_n sound levels, and quantities of occurrence with L_{Amax} > 45 dBA at Cabin 2025.

Table 4-2: Summary of Daily L_d and L_n at Cabin 2025

Date (mm/dd/yyyy)	Average Daytime L_d, dBA	Average Nighttime[1] L_n, dBA	Daytime Quantity of L_{Amax} > 45 dBA	Nighttime Quantity of L_{Amax} > 45 dBA	Health Canada		ANSI S12.2
					L_{eq}, dBA	Qty. of L_{Amax} > 45 dBA	L_{eq}, dBA
07/10/2024[2]	41.9	41.7	140	144	30	15	39 to 44
07/11/2024	41.8	42.0	482	129	30	15	39 to 44
07/12/2024	41.4	-[3]	291	-[3]	30	15	39 to 44

Note: [1] Unless otherwise specified, nighttime begins at 22:00 hours to 07:00 hours in next date in following tables.
[2] The measurements started at 18:07.
[3]. "-" indicates no data was measured. The survey ended at 18:20.

Monitoring results for Cabin 2025 are summarized as follows:

- High noise emitted from the Engine Store was observed and measured from the spot measurements in the corridor of Deck 2.
- L_d and L_n are higher than the Health Canada noise threshold of 30 dBA but below the recommended ANSI S12.2 room sound level criteria upper limit of 44 dBA.
- Occurrences with L_{Amax} > 45 dBA are more than 15 times during both daytime and nighttime periods, due to its adjacency to the Engine Stores and regularly operating activities outside the cabins.
- Construction noise was negligible in Cabin 2025 because Deck 2 is under the water line.

4.1.2 Cabin 5010

Table 4-3 summarizes the daily L_d and L_n sound levels, and quantities of occurrence with L_{Amax} > 45 dBA at Cabin 5010.

Table 4-3: Summary of Daily L_d and L_n at Cabin 5010

Date (mm/dd/yyyy)	Average Daytime L_d, dBA	Average Nighttime L_n, dBA	Daytime Quantity of L_{Amax}> 45 dBA	Nighttime Quantity of L_{Amax} > 45 dBA	Health Canada		ANSI S12.2
					L_{eq}, dBA	Qty. of L_{Amax} > 45 dBA	L_{eq}, dBA
07/10/2024[1]	28.3	27.6	17	2	30	15	39 to 44
07/11/2024	27.9	27.4	29	4	30	15	39 to 44
07/12/2024	30.1	-[2]	73	-[2]	30	15	39 to 44

Note: [1] The measurements started at 18:39.
[2] "-" indicates no data was measured. The survey ended at 18:42.

Monitoring results for Cabin 5010 are summarized as follows:

- L_d and L_n are lower than or equal to the Health Canada noise threshold of 30 dBA.
- L_d and L_n are lower than recommended ANSI room sound level criteria lower limit of 39 dBA.
- Quantities of occurrence with L_{Amax} > 45 dBA are more than 15 times during the daytime periods.
- Quantities of occurrence with L_{Amax} > 45 dBA are less than 15 times during the nighttime periods

4.1.3 Cabin 6010

Table 4-4 summarizes the daily L_d and L_n sound levels, and quantities of occurrence with L_{Amax} > 45 dBA at Cabin 6010.

Table 4-4: Summary of Daily L_d and L_n at Cabin 6010

Date (mm/dd/yyyy)	Average Daytime L_d, dBA	Average Nighttime L_n, dBA	Daytime Quantity of L_{Amax}> 45 dBA	Nighttime Quantity of L_{Amax} > 45 dBA	Health Canada		ANSI S12.2
					L_{eq}, dBA	Qty. of L_{Amax} > 45 dBA	L_{eq}, dBA
07/10/2024[1]	34.6	34.4	25	28	30	15	39 to 44
07/11/2024	35.7	34.9	65	21	30	15	39 to 44
07/12/2024	35.7	-[2]	35	-[2]	30	15	39 to 44

Note: [1] The measurements started at 18:20.
[2] "-" indicates no data was measured. The survey ended at 18:30.

Monitoring results for Cabin 6010 are summarized as follows:

- L_d and L_n sound levels are higher than the Health Canada noise threshold of 30 dBA.
- L_d and L_n sound levels are lower than the ANSI S12.2 room sound level criteria lower limit of 39 dBA.
- Quantities of occurrence with L_{Amax} > 45 dBA are more than 15 times during both daytime and nighttime periods due to the highest density of occupancy at Deck 6.

4.1.4 Cabin 7025

Table 4-5 summarizes the daily L_d and L_n sound levels, and quantities of occurrence with L_{Amax} > 45 dBA at Cabin 7025.

Table 4-5: Summary of Daily L_d and L_n at Cabin 7025

Date (mm/dd/yyyy)	Average Daytime L_d, dBA	Average Nighttime L_n, dBA	Daytime Quantity of L_{Amax}> 45 dBA	Nighttime Quantity of L_{Amax} > 45 dBA	Health Canada		ANSI S12.2
					L_{eq}, dBA	Qty. of L_{Amax} > 45 dBA	L_{eq}, dBA
07/12/2024[1]	38.3	38.3	13	19	30	15	39-44
07/13/2024	38.1	38.3	56	16	30	15	39-44
07/14/2024	38.4	-[2]	41	-[2]	30	15	39-44

Note: [1] The measurements started at 18:56.
[2] "-" indicates no data was measured. The survey ended at 21:18.

Monitoring results for Cabin 7025 are summarized as follows:

- L_d and L_n sound levels are higher than the Health Canada noise threshold of 30 dBA.
- L_d and L_n sound levels are lower than the ANSI S12.2 room sound level criteria lower limit of 39 dBA.
- Quantities of occurrence with L_{Amax} > 45 dBA are more than 15 times during the daytimes of July 13 and July 14, and less than 15 times during the daytimes of July 12 (total of 3 hours duration).
- Quantities of occurrence with L_{Amax} > 45 dBA are more than 15 times during the nighttime periods due to Deck 7 is the service deck with more local activities.

4.1.5 Cabin 9420

Table 4-6 summarizes the daily L_d and L_n sound levels, and quantities of occurrence with L_{Amax} > 45 dBA at Cabin 9420.

Table 4-6: Summary of Daily L_d and L_n at Cabin 9420

Date (mm/dd/yyyy)	Average Daytime L_d, dBA	Average Nighttime L_n, dBA	Daytime Quantity of L_{Amax}> 45 dBA	Nighttime Quantity of L_{Amax} > 45 dBA	Health Canada		ANSI S12.2
					L_{eq}, dBA	Qty. of L_{Amax} > 45 dBA	L_{eq}, dBA
07/12/2024[1]	35.9	35.9	4	5	30	15	39 to 44
07/13/2024	36.0	36.0	64	5	30	15	39 to 44
07/14/2024	36.0	-[2]	47	-[2]	30	15	39 to 44

Note: [1] The measurements started at 19:07.
[2] "-" indicates no data was measured. The survey ended at 21:00.

Monitoring results for Cabin 9420 are summarized as follows:

- L_d and L_n at Cabin 9420 are higher than the Health Canada noise threshold of 30 dBA.
- L_d and L_n sound levels are lower than the ANSI S12.2 room sound level criteria lower limit of 39 dBA.

- Quantities of occurrence with L_{Amax} > 45 dBA are more than 15 times during the daytimes of July 13 and July 14, and less than 15 times during the daytime of July 12 (total of 2.9 hours duration).
- Quantities of occurrence with L_{Amax} > 45 dBA are less than 15 times during the nighttime periods.

4.1.6 Cabin 0107

Table 4-7 summarizes the daily L_d and L_n sound levels, and quantities of occurrence with L_{Amax} > 45 dBA at Cabin 0107.

Table 4-7: Summary of Daily L_d and L_n at Cabin 0107

Date (mm/dd/yyyy)	Average Daytime L_d, dBA	Average Nighttime L_n, dBA	Daytime Quantity of L_{Amax}> 45 dBA	Nighttime Quantity of L_{Amax} > 45 dBA	Health Canada		ANSI S12.2
					L_{eq}, dBA	Qty. of L_{Amax} > 45 dBA	L_{eq}, dBA
07/12/2024[1]	38.0	38.1	4	3	30	15	39 to 44
07/13/2024	38.2	38.2	40	6	30	15	39 to 44
07/14/2024	38.4	-[2]	64	-[2]	30	15	39 to 44

Note: [1] The measurements started at 19:17.
[2] "-" indicates no data was measured. The survey ended at 21:53.

Monitoring results for Cabin 0107 are summarized as follows:

- L_d and L_n at Cabin 0107 are higher than the Health Canada noise threshold of 30 dBA.
- The L_d and L_n sound levels are lower than the ANSI S12.2 room sound level criteria lower limit of 39 dBA.
- Quantities of occurrence with L_{Amax} > 45 dBA are more than 15 times during the daytimes of July 13 and July 14, and less than 15 times during the daytime of July 12 (total of 2.5 hours duration).
- Quantities of occurrence with L_{Amax} > 45 dBA are less than 15 times during the nighttime periods.

4.2 SPOT MEASUREMENTS

Spot measurements were conducted at different locations inside and outside the cabins at each deck on the floatel to investigate the locations with potential high noise levels. Sound levels were collected along the corridors outside the cabins, and inside other available vacant cabins in addition to selected cabins (in Table 3.1) during the daytime and nighttime periods. Spot measurements were collected during the periods with minimum local activities at each deck.

Details of the measurement time, locations, and L_{eq} sound level results from the spot measurements are summarized in Appendix B. Figure 12 through Figure 17 (Appendix A) show the measurement locations and corresponding L_{eq} sound levels.

Observations regarding the acoustic environment at each deck are summarized as follows:

Table 4-8 Selected Locations, Descriptions and Observations during Spot Measurements

Deck	Description and Observations during Monitoring Period	Reference Figure (Appendix A)
2	• High noise emissions were measured in the corridors due to adjacency to the Engine Stores with operating power generators. • The highest L_{eq} sound levels were 52.2 dBA during the daytime and 57.9 dBA during the nighttime.	Figure 12
5	• Ceiling ventilation inside Cabin 5402 was operating and short-term L_{eq} sound level was 51.6 dBA. • Ceiling ventilation inside Cabin 5414 was not in operation and the short-term L_{eq} sound level was 38 dBA. • Noise from the operating ceiling ventilation has significant contributions for sound level inside the cabin. • Sound levels in corridor were lower than 45 dBA during the daytime and nighttime periods.	Figure 13
6	• Short-term daytime L_{eq} sound levels along the corridor ranged from 32.8 dBA to 40.3 dBA. • Short-term nighttime L_{eq} sound levels along the corridor ranged from 32.9 dBA to 41.8 dBA.	Figure 14
7	• Short-term daytime L_{eq} sound levels along the corridor ranged from 31.5 dBA to 40.4 dBA. • Short-term nighttime L_{eq} sound levels along the corridor ranged from 29 dBA to 40 dBA.	Figure 15
9	Outdoor areas: • Noise from the construction activities is audible at outdoor areas. • L_{eq} sound level at smoke area outside Cabins 9402 and 9404 were 60.4 dBA daytime and 57.3 dBA nighttime. • The west side smoke area is underneath the Fan Rooms No. 3 and No. 5 at Deck 10. - Short term daytime L_{eq} sound levels were 65.3 dBA to 71.2 dBA. - Short term nighttime L_{eq} sound levels were 61.8 dBA to 71.7 dBA. Interior along corridor: • Short term daytime L_{eq} sound levels along the corridor ranged from 35.2 dBA to 50.8 dBA. • Short term nighttime L_{eq} sound levels along the corridor ranged from 37 dBA to 52.6 dBA. • Higher sound levels were observed at locations close to the Engine Casing and Vent Pipe.	Figure 16
10	• Fan Rooms are located at Deck 10, higher noise emissions were measured in the corridor. - Short term daytime L_{eq} sound levels were 45.1 dBA to 46.9 dBA. - Short term nighttime L_{eq} sound levels were 45.1 dBA to 49.3 dBA.	Figure 17

5.0 NOISE INTERVIEWS

During the initial noise monitoring period on the floatel, the Qualified Professional interviewed various cabin occupants. The purpose of the interview is to obtain an initial understanding of the noise effects of interest to the occupants; and perform an investigation if there are any potential noise issues identified on the floatel. The floatel management has not received noise complaints from the occupants to date.

Fifteen occupants were randomly selected for the interviews, which represents about 5% of the total occupants at the time. Total occupants were approximately 300 during monitoring period. Four questions were asked regarding noise issues:

1. General evaluation for your sleeping at the floatel.
2. Does the ceiling ventilation (or AC) in cabin bother you?
3. Can you hear outside construction noise? and
4. Any noise concern/complaints.

Details of the interviews, including interviewee ID #, interview date, cabin location, and work shift; and answers for the questions are included in Appendix C.

Feedback for the questions from the interviewees is summarized as below:

- No interviewees have noise concerns or complaints.
- No interviewees report sleep disturbance issues during the stay on the floatel, including sleeping during the daytime period.
- Ceiling ventilation does not cause noise annoyance to the interviewees.
- Interviewees do not perceive construction noise inside the cabins.
- Occasional noise events were perceptible and mentioned by the interviewees (e.g., toilet flushing, cart moving on floor above, and weight dropping on the Gym floor).

6.0 DISCUSSION

Table 6-1 summarizes the measurement results when compared to the Health Canada noise threshold and ANSI S12.2 room sound level criteria.

Table 6-1: Summary of Measurement Results

Cabin	Deck	Meet Health Canda Indoor L_{eq} Threshold of 30 dBA		Meet Health Canada L_{Amax} > 45 dBA Occurrence Less Than 15 Times		Meet ANSI S12.2 Room Sound Level Criteria of 39 to 44 dBA	
		Daytime	Nighttime	Daytime	Nighttime	Daytime	Nighttime
2025	2	No	No	No	No	Yes	Yes
5010	5	Yes	Yes	No	Yes	Yes	Yes
6010	6	No	No	No	No	Yes	Yes
7025	7	No	No	Yes/No[1]	No	Yes	Yes
9420	9	No	No	Yes/No[1]	Yes	Yes	Yes
0107	10	No	No	Yes/No[1]	Yes	Yes	Yes

Note: [1] Meet threshold on July 12 but exceed threshold on July 13 and July 14.

Most cabins are above the Health Canada sleep disturbance threshold of 30 dBA. The only exception is Cabin 5010, where the ventilation in the cabin is off. Without the ceiling ventilation in operation, L_d and L_n results meet 30 dBA. The primary factors that contribute to the cabin sound levels are the ventilation system except Deck 2. On Deck 2, the measurement results are the highest and noise contribution from adjacent Engine Stores is the main noise contributor. At all decks, noise from construction activities during the monitoring period does not affect the floatel interior acoustic environment.

In terms of meeting the 45 dBA L_{Amax} or above occurrence less than 15 times, the key factors are local activities level rather than cabin ventilation. Cabin 2025 has the highest occurrence results due to its adjacency to Engine Stores with lots of local operating activities. Cabin 5010 has the lowest nighttime occurrence results due to the vacant Deck 5. The daytime results are generally higher due to much more local activities (e.g., regular operating activities including room services, people walking along corridors, Gym, and facility rooms), and the nighttime results are lower due to much less local activities when most workers are resting.

All cabins do not have the option to open the window. The ceiling ventilation is essential to keep the cabins in comfortable conditions for the occupants, similar to any hotel rooms. Turning off ventilation will affect the air circulation and temperature for cabin occupants. Therefore, the measurement results are compared to the ANSI S12.2 room sound level criteria for the hotel/motel rooms. All cabins are within the ANSI S12.2 room sound level criteria range of 39 dBA to 44 dBA. Results at most cabins are below the lower limit of 39 dBA, the only exception is Cabin 2025 at Deck 2. Results at Cabin 2025 are below the upper limit of 44 dBA threshold.

The interview results also indicate that there were no sleep disturbance issues and no noise concerns or complaints raised by the interviewed occupants during the noise monitoring period.

7.0 MITIGATION MEASURES

To prevent future noise concerns or complaints, potential noise mitigation measures and management controls that can be considered are summarized below:

- Grid power supply was scheduled to be connected to the floatel after the dates of the initial noise monitoring survey. The engines inside the Engine Stores would be shut down thereafter and used only in emergency situations. Cabin sound level at Deck 2 is expected to reduce.
- Prior to the grid power line connection, workers cabin allocation to Deck 2 should be reduced to improve occupant comfort.
- Impact noise from weight dropping (e.g., deadlifts) on the Gym floor can be reduced by installing thicker rubber mats within the activity areas. In addition, floatel management has posted additional signage to remind users that dropping the weights should be minimized or avoided.
- Where possible, schedule product delivery and cart moving activities during shift change to avoid the periods during late night and early morning.
- Should the floatel management receive noise complaints, administration controls can be implemented to select specific corridors or decks that are quiet for the workers who must sleep during the daytime.
- Maintain the Communication Protocol and Complaint Response Procedure to address and manage any future noise concerns or complaints by the floatel occupants.

8.0 CONCLUSIONS

The initial noise monitoring program was conducted on the floatel from July 10 to July 14, 2024 to fulfill the requirements of Condition 30 of EAC. In accordance with the Noise Monitoring and Mitigation Plan, continuous sound levels over 48 hours were collected at six selected cabins, and short-term spot measurements were conducted at each deck on the floatel. Measured noise data were analyzed and compared with the Health Canada sleep disturbance thresholds, as well as ANSI S12.2 room sound level criteria and assess the compliance. Interviews with occupants for noise concerns were performed. Mitigation and an adaptive management plan were recommended.

The measurement results are above the Health Canada thresholds with the cabin ventilation in operation. However, measurement results meet the ANSI S12.2 room sound level criteria for hotel and motel rooms. There are no sleep disturbance issues and noise concerns or complaints received from the floatel occupants. Noise from the Project construction activities does not affect the floatel interior acoustic environment. In addition, the Communication Protocol and Complaint Response Procedure will be maintained to address and manage any noise concerns or complaints by the floatel occupants.

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Stantec 2024. Floatel Noise Monitoring and Mitigation Plan – Woodfibre LNG Project. April 2024.

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Woodfibre LNG 2023. Application for a Temporary Use Permit for the District of Squamish – Floatel. August 2023.

APPENDIX A FIGURES

Figure 1: Site Plan with Floatel Location

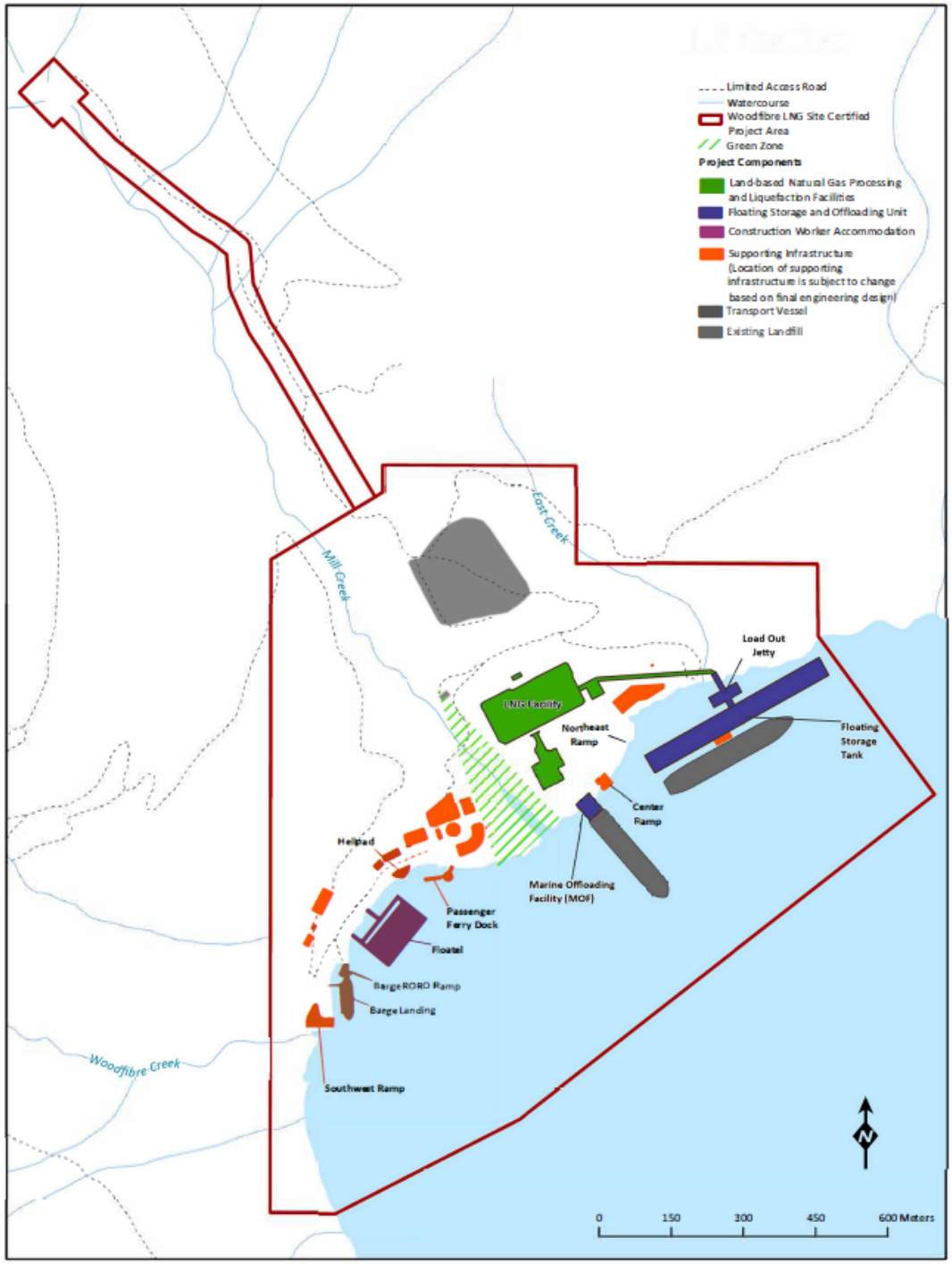


Figure 2: Measurement Location at Cabin 2025 and Cabin 5010 (Deck 2 and Deck 5)

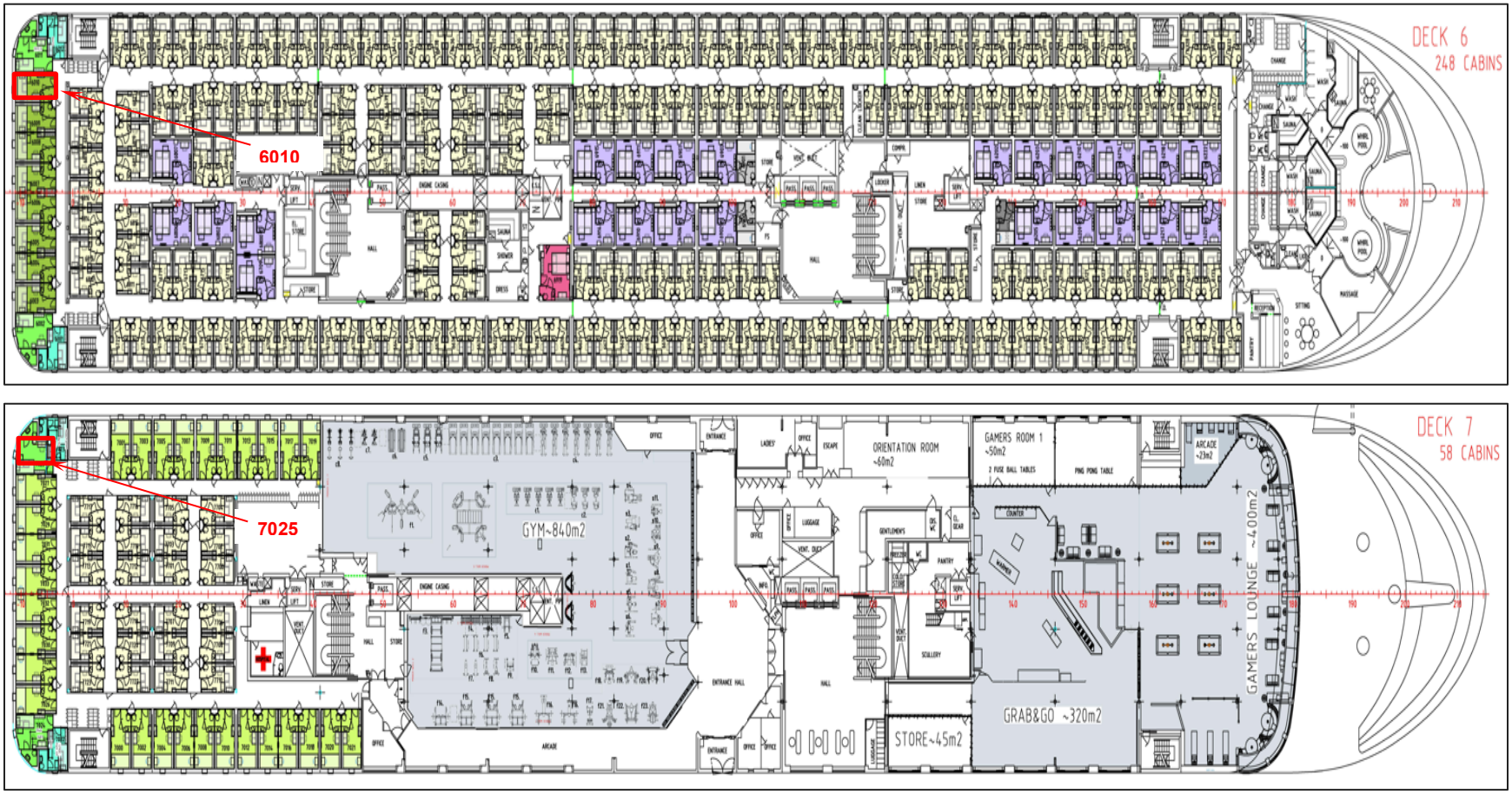
Legend

Noise monitoring cabin

Quantity of cabins per deck (unless otherwise indicated, applies to all figures with cabins)

	TYPE 1A-1	TYPE 1A-2	TYPE 1A-3	TYPE 1B-1	TYPE 1B-2	TYPE 1B-3	TYPE 1B-4	TYPE 1B-5	TYPE 1B-6	TYPE 1B-7	TYPE 1B-8	TYPE 1C-1	TYPE 1C-2	TYPE 1D	TYPE 1E-1	TYPE 1E-2	TYPE 1F-1	TYPE 1F-2	TYPE 2A	TYPE 2B	TYPE 2C	TYPE 3A	TYPE 3B	TYPE 4A	TYPE 4B	QUANTITY OF CABINS PER DECK
DECK 10				9																				8		17
DECK 9	18			8								30				2		2	7	1	17	4	2		1	88
DECK 7	24											30														58
DECK 6	208												8		2		2		24	1					3	248
DECK 5	102	6	44		15	5	9	10	7	1	1			4					14						1	219
DECK 2	34																								52	86
CABINS PER TYPE	386	6	44	17	15	5	9	10	7	1	1	60	8	4	2	2	2	2	45	2	17	4	2	8	57	716

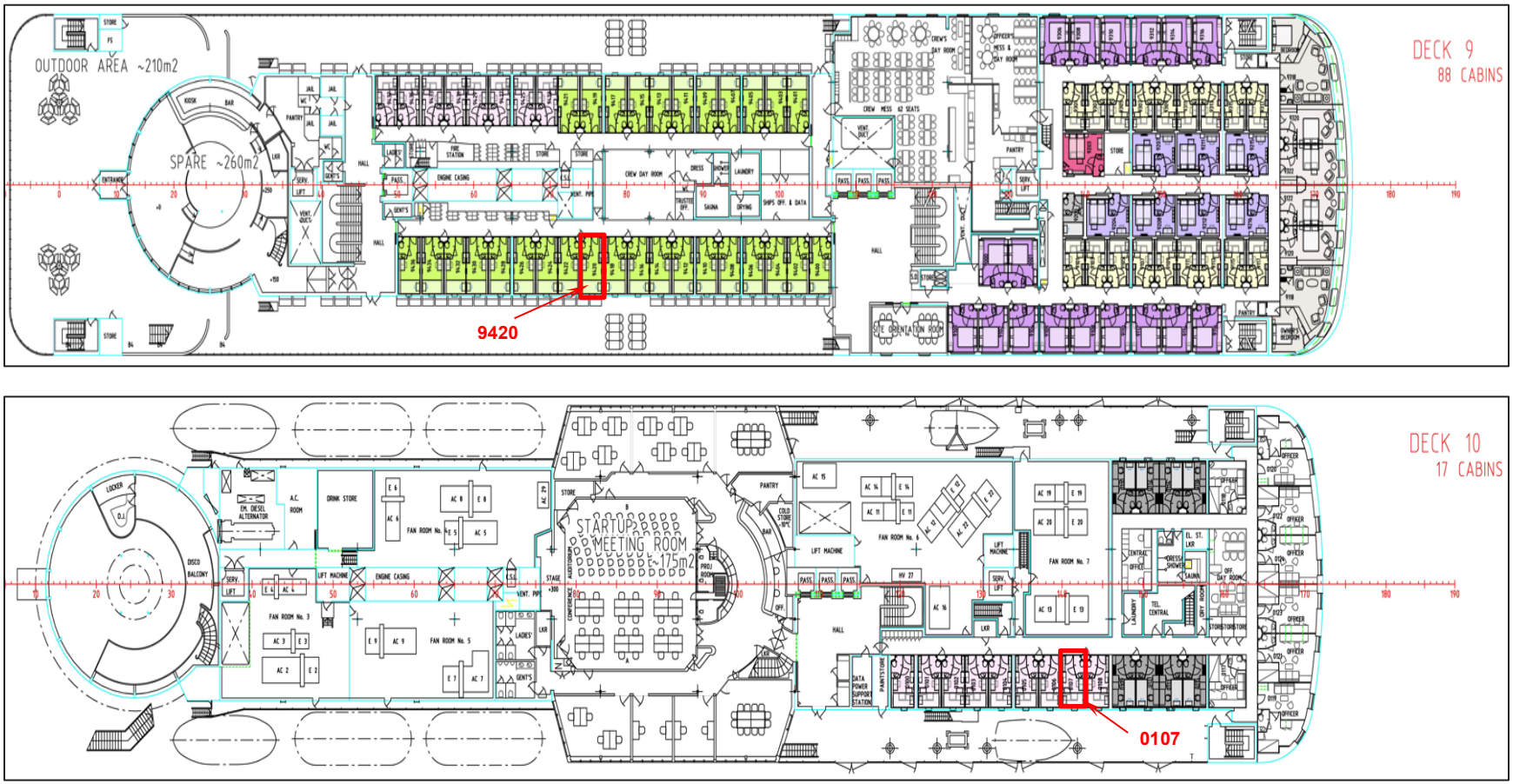
Figure 3: Measurement Location at Cabin 6010 and Cabin 7025 (Deck 6 and Deck 7)



Legend

Noise monitoring cabin

Figure 4: Measurement Location at Cabin 9420 and Cabin 0107 (Deck 9 and Deck 10)



Legend

Noise monitoring cabin

Figure 5: Sound Level Meter Setup at Cabin 2025

Figure 6: Sound Level Meter Setup at Cabin 5010

Figure 7: Sound Level Meter Setup at Cabin 6010

Figure 8: Sound Level Meter Setup at Cabin 7025

Figure 9: Sound Level Meter Setup at Cabin 9420

Figure 10: Sound Level Meter Setup at Cabin 0107

Figure 11: Example of Cabin Ceiling Ventilator

Figure 12: Construction Areas Onsite

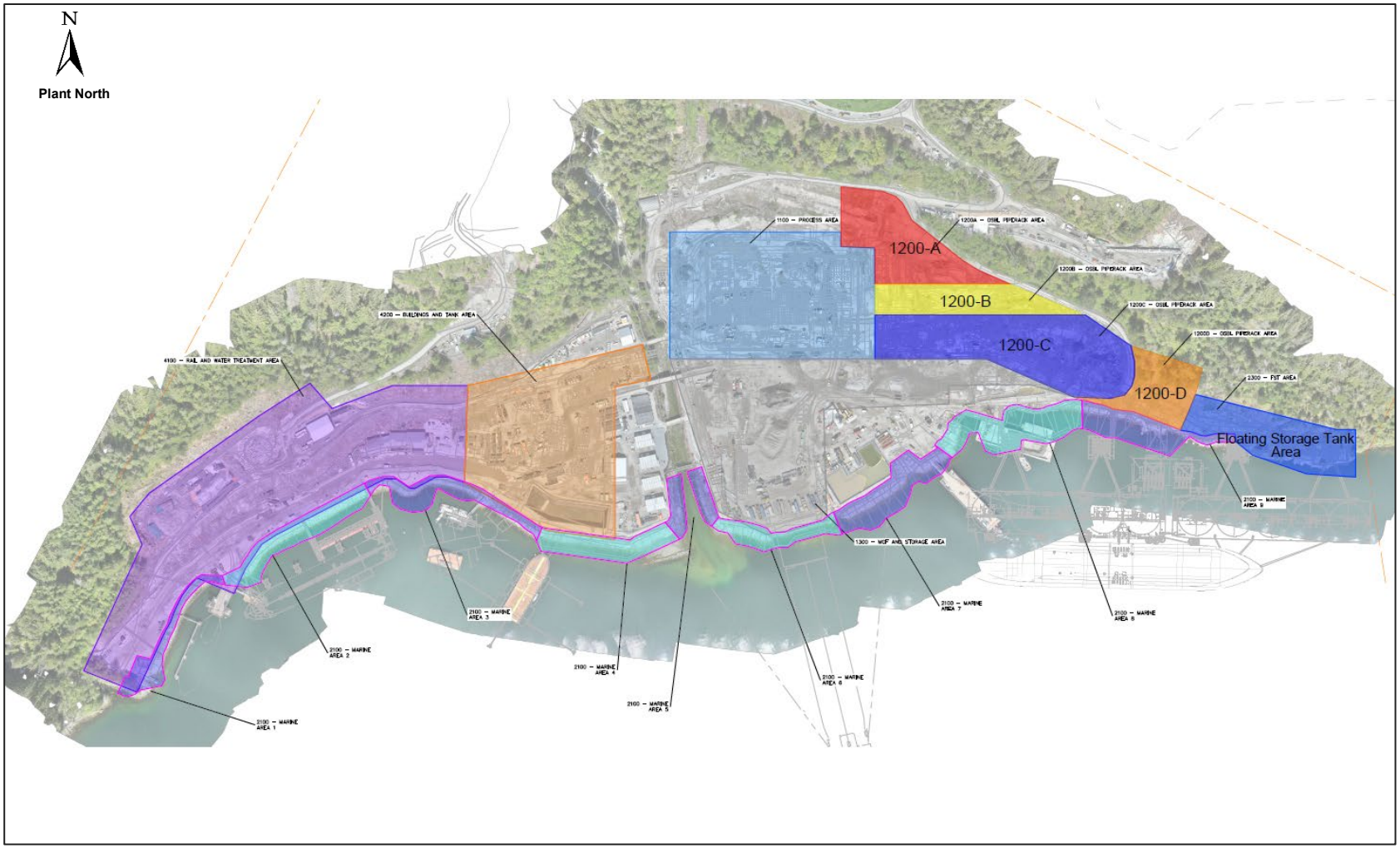
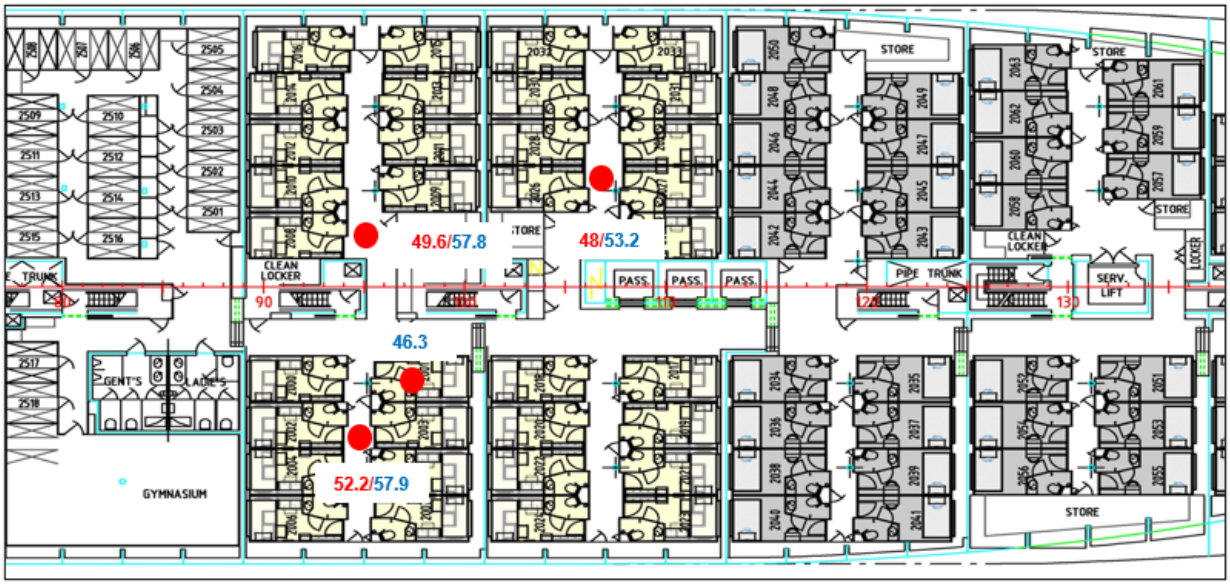


Figure 13: Spot Measurement Locations and Sound Levels – Deck 2



Legend

Measurement Location

49.6/57.8 Red – Measured daytime sound level, dBA Blue – Measured nighttime sound level, dBA

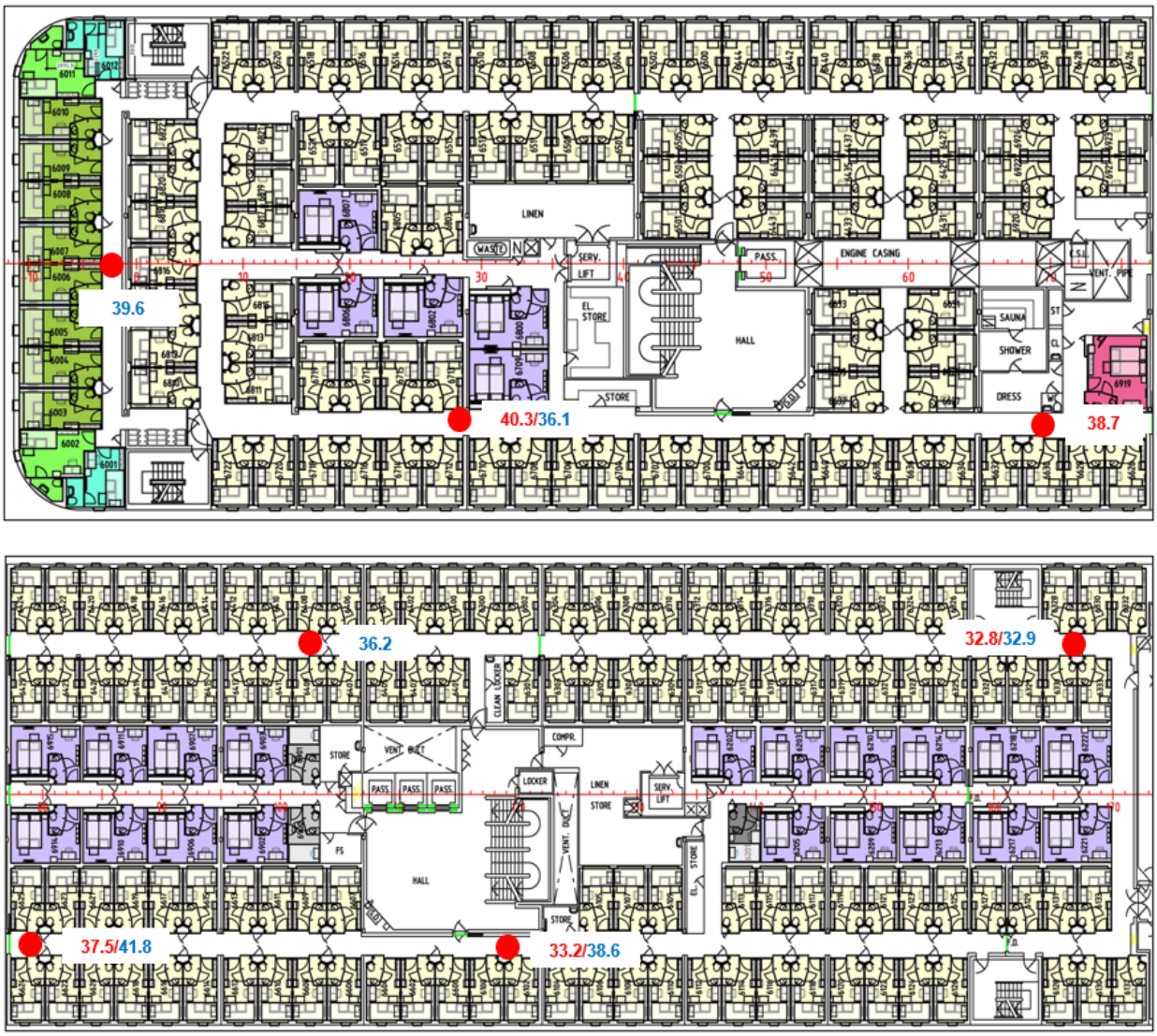
Figure 14: Spot Measurement Locations and Sound Levels – Deck 5

Legend

Measurement Location

29.3/42.4 Red – Measured daytime sound level, dBA Blue – Measured nighttime sound level, dBA

Figure 15: Spot Measurement Locations and Sound Levels – Deck 6

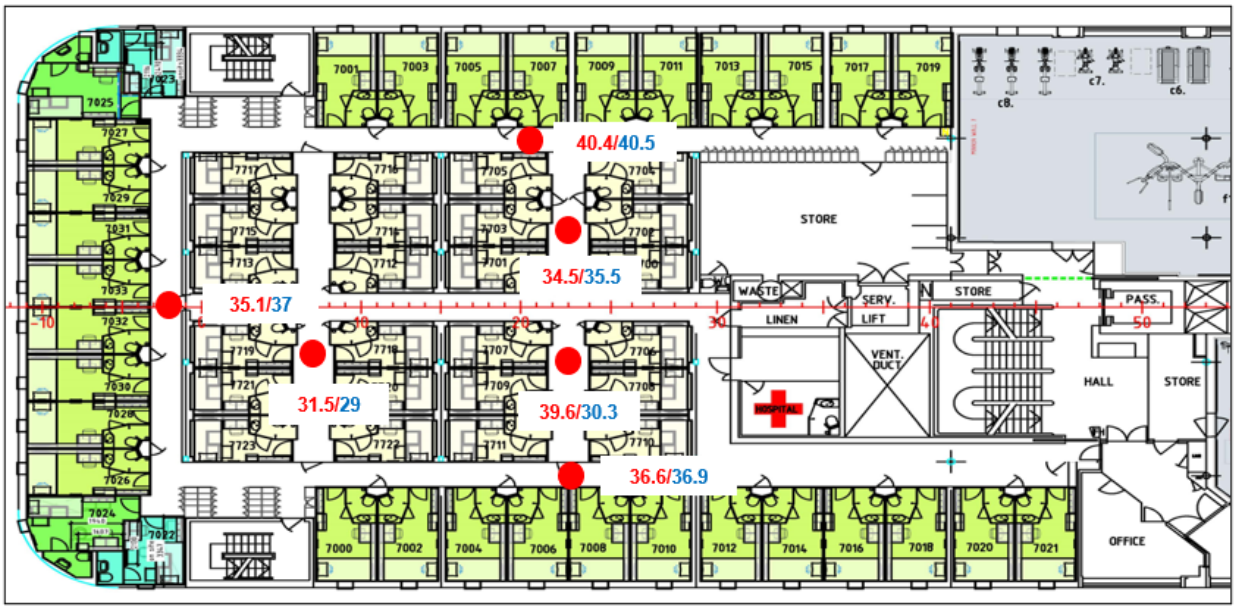


Legend

● Measurement Location

40.3/36.1 Red – Measured daytime sound level, dBA Blue – Measured nighttime sound level, dBA

Figure 16: Spot Measurement Locations and Sound Levels – Deck 7

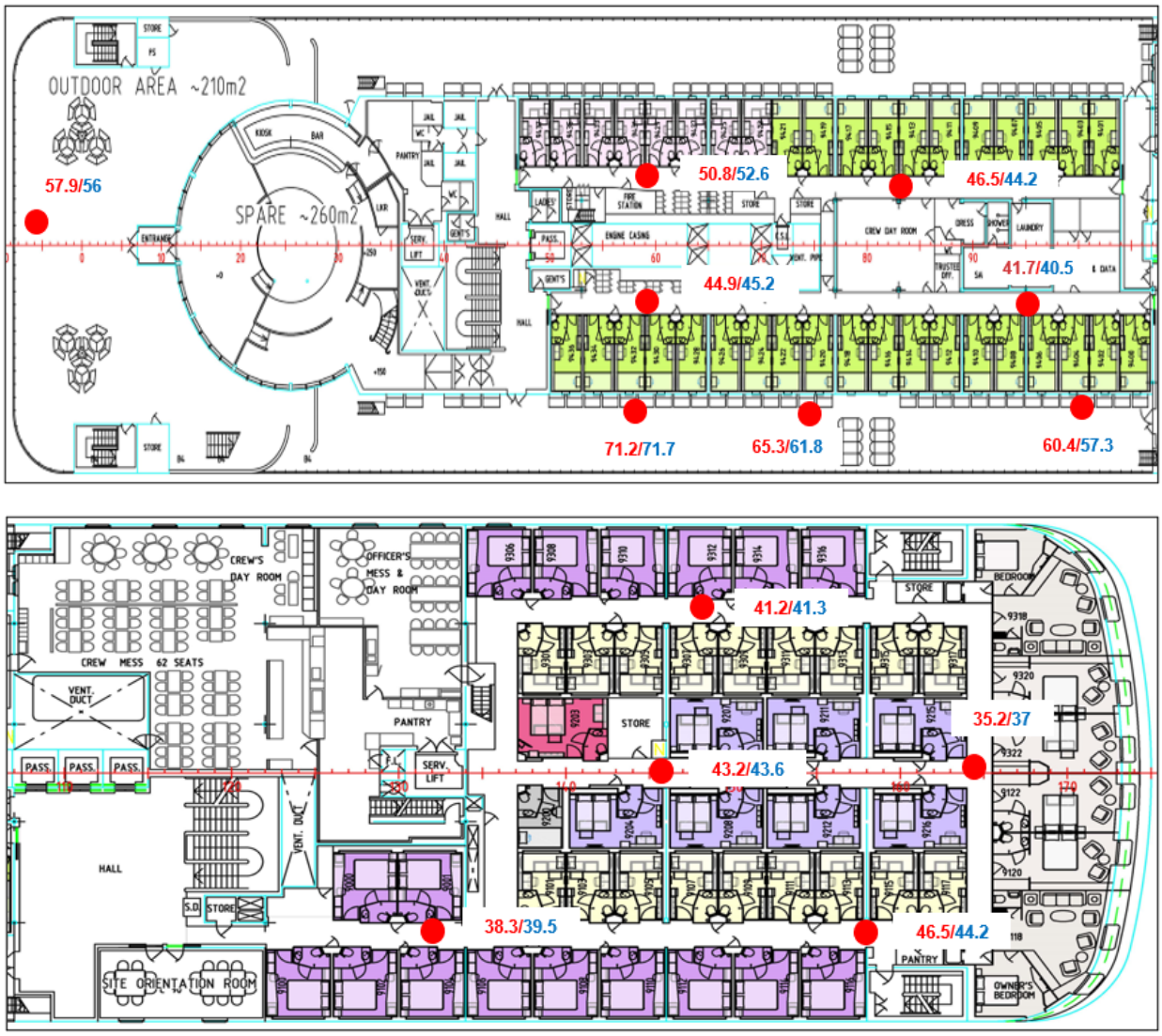


Legend

Measurement Location

35.1/37 Red – Measured daytime sound level, dBA Blue – Measured nighttime sound level, dBA

Figure 17: Spot Measurement Locations and Sound Levels – Deck 9

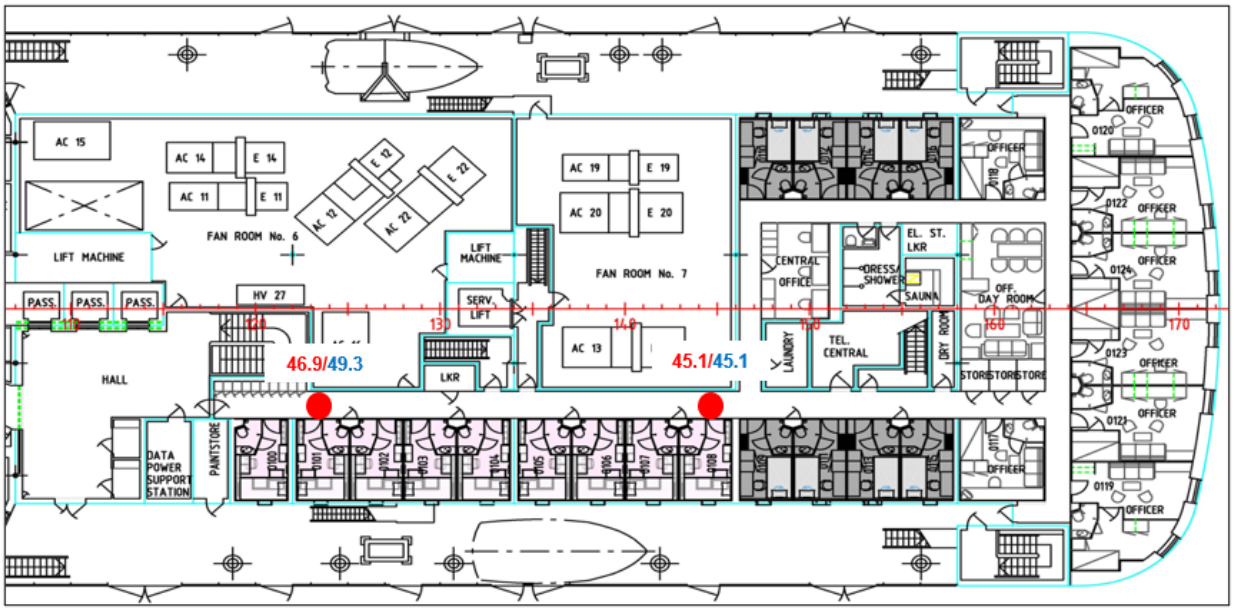


Legend

● Measurement Location

38.3/39.5 Red – Measured daytime sound level, dBA Blue – Measured nighttime sound level, dBA

Figure 18: Spot Measurement Locations and Sound Levels – Deck 10



Legend

● Measurement Location

46.9/49.3 Red – Measured daytime sound level, dBA Blue – Measured nighttime sound level, dBA

APPENDIX B SPOT MEASUREMENT RESULTS

Item	Measurement Time (mm/dd/yyyy hh:mm)	Measurement Location	Sound Level L_{eq}, dBA	Reference Figure
1	7/10/2024 22:07	Along corridor from 6004 - 6010	33.3	Figure 15
2	7/10/2024 22:25	Deck 9, at outdoor lounge area	56.0	Figure 17
3	7/11/2024 13:17	Deck 5, at corridor, at door 5006	29.3	Figure 13
4	7/11/2024 13:29	Deck 5, at corridor, at 5310/5312	41.4	Figure 14
5	7/11/2024 13:31	Deck 5, inside Cabin 5402	51.6	Figure 14
6	7/11/2024 13:33	Deck 5, inside Cabin 5402, under ceiling vent	50.7	Figure 14
7	7/11/2024 13:36	Deck 5, inside Cabin 5414, ceiling vent not operating	38.0	Figure 14
8	7/11/2024 13:45	Deck 6, at corridor, near 6816	39.4	Figure 15
9	7/11/2024 13:48	Deck 6, at corridor, at 6712/6710	40.3	Figure 15
10	7/11/2024 13:50	Deck 6, at corridor, between 6630/6632	38.7	Figure 15
11	7/11/2024 13:53	Deck 6, at corridor, between 6100/6102	33.2	Figure 15
12	7/11/2024 13:56	Deck 6, at corridor, between 6330/6328	32.8	Figure 15
13	7/11/2024 14:00	Deck 6, at corridor, at 6624/6625	37.5	Figure 15
14	7/11/2024 14:06	Deck 2, at corridor, at door 2026	48.0	Figure 13
15	7/11/2024 14:08	Deck 2, at corridor, at 2000/2002 (close to engine room)	52.2	Figure 13
16	7/11/2024 14:10	Deck 2, at corridor, at door 2008	49.6	Figure 13
17	7/11/2024 14:15	Deck 9, outside, smoke area	61.0	Figure 17
18	7/11/2024 14:18	Deck 9, outside, outdoor lounge	57.9	Figure 17
19	7/11/2024 22:18	Deck 2, at corridor, at door 2026	53.2	Figure 13
20	7/11/2024 22:22	Deck 2, at corridor, at 2000/2002 (close to engine room)	57.9	Figure 13
21	7/11/2024 22:23	Deck 2, at corridor, at door 2008	57.8	Figure 13
22	7/11/2024 22:25	Deck 2, inside Cabin 2001	46.3	Figure 13
23	7/11/2024 22:32	Deck 6, at corridor, between 6330/6328	32.9	Figure 15
24	7/11/2024 22:35	Deck 6, at corridor, at 6409/6408	36.2	Figure 15
25	7/11/2024 22:39	Deck 6, at corridor, at 6624/6625	41.8	Figure 15
26	7/11/2024 22:40	Deck 6, at corridor, between 6100/6102	38.6	Figure 15

Item	Measurement Time (mm/dd/yyyy hh:mm)	Measurement Location	Sound Level L_{eq}, dBA	Reference Figure
27	7/11/2024 22:43	Deck 6, at corridor, at door 6710/6712	36.1	Figure 15
28	7/11/2024 22:44	Deck 6, at corridor, at door 6816	36.2	Figure 15
29	7/11/2024 22:47	Deck 6, at corridor, at door 6006	39.6	Figure 15
30	7/11/2024 22:52	Deck 5, at corridor, at door 5006	42.4	Figure 14
31	7/11/2024 22:54	Deck 5, at corridor, at door 5414	58.3	Figure 14
32	7/11/2024 22:58	Deck 5, at corridor, at door 5310/5312	41.8	Figure 14
33	7/11/2024 22:59	Deck 5, at corridor, at door 5510/5509	45.9	Figure 14
34	7/11/2024 23:02	Deck 5, at corridor, at door 5606/5604	36.9	Figure 14
35	7/12/2024 22:14	Deck 10, at corridor, door 0101 (near fan room)	49.3	Figure 18
36	7/12/2024 22:19	Deck 10, at corridor, door 0108 (near fan room)	45.1	Figure 18
37	7/12/2024 22:28	Deck 7, at corridor, at door 7006/7008	36.9	Figure 16
38	7/12/2024 22:30	Deck 7, at corridor, at door 7032/7033	37.0	Figure 16
39	7/12/2024 22:35	Deck 7, at corridor, at door 7007/7005	40.5	Figure 16
40	7/12/2024 22:39	Deck 7, at corridor, at door 7703/7702	35.5	Figure 16
41	7/12/2024 22:40	Deck 7, at corridor, at door 7718/7719	29.0	Figure 16
42	7/12/2024 22:43	Deck 7, at corridor, at door 7709/7707	30.3	Figure 16
43	7/13/2024 10:06	Deck 10, at corridor, door 0108 (near fan room)	45.1	Figure 18
44	7/13/2024 10:09	Deck 10, at corridor, door 0101 (near fan room)	46.9	Figure 18
45	7/13/2024 10:13	Deck 7, at corridor, at door 7703/7702	34.5	Figure 16
46	7/13/2024 10:15	Deck 7, at corridor, at door 7707/7709	39.6	Figure 16
47	7/13/2024 10:17	Deck 7, at corridor, at door 7718/7719	31.5	Figure 16
48	7/13/2024 10:20	Deck 7, at corridor, at door 7032/7033	35.1	Figure 16
49	7/13/2024 10:22	Deck 7, at corridor, at door 7005/7007	40.4	Figure 16
50	7/13/2024 10:25	Deck 7, at corridor, at door 7006/7008	36.6	Figure 16
51	7/13/2024 10:35	Deck 9, at corridor, at door 9413/9415	46.5	Figure 17
52	7/13/2024 10:38	Deck 9, at corridor, at door 9429/9431	50.8	Figure 17
53	7/13/2024 10:43	Deck 9, at corridor, at door 9406/9408	41.7	Figure 17
54	7/13/2024 10:45	Deck 9, at corridor, at door 9430/9432	44.9	Figure 17
55	7/13/2024 10:46	Deck 9, outside, Cabin 9420 window	65.3	Figure 17

Item	Measurement Time (mm/dd/yyyy hh:mm)	Measurement Location	Sound Level L_{eq}, dBA	Reference Figure
56	7/13/2024 10:50	Deck 9, at corridor, at door 9001/9104	38.3	Figure 17
57	7/13/2024 10:53	Deck 9, at corridor, at door 9113/9116	44.5	Figure 17
58	7/13/2024 10:54	Deck 9, at corridor, at door 9122/9322	35.2	Figure 17
59	7/13/2024 10:57	Deck 9, at corridor, at door 9204/9208	43.2	Figure 17
60	7/13/2024 11:00	Deck 9, at corridor, at door 9307/9312	41.2	Figure 17
61	7/13/2024 11:02	Deck 9, outside, Cabin 9402/9404 window	60.4	Figure 17
62	7/13/2024 11:05	Deck 9, outside, Cabin 9432/9434 window (under fan room outlets)	71.2	Figure 17
63	7/13/2024 22:09	Deck 9, at corridor, at door 9406/9408	40.5	Figure 17
64	7/13/2024 22:10	Deck 9, at corridor, at door 9430/9432	45.2	Figure 17
65	7/13/2024 22:13	Deck 9, at corridor, at door 9429/9431	52.6	Figure 17
66	7/13/2024 22:14	Deck 9, at corridor, at door 9413/9415	44.2	Figure 17
67	7/13/2024 22:19	Deck 9, at corridor, at door 9001/9104	39.5	Figure 17
68	7/13/2024 22:21	Deck 9, at corridor, at door 9113/9116	43.2	Figure 17
69	7/13/2024 22:22	Deck 9, at corridor, at door 9122/9322	37.0	Figure 17
70	7/13/2024 22:25	Deck 9, at corridor, at door 9307/9312	41.3	Figure 17
71	7/13/2024 22:27	Deck 9, at corridor, at door 9204/9208	43.6	Figure 17
72	7/13/2024 22:31	Deck 9, outside, Cabin 9420 window	61.8	Figure 17
73	7/13/2024 22:33	Deck 9, outside, Cabin 9432/9434 window (under fan room outlets)	71.7	Figure 17
74	7/13/2024 22:35	Deck 9, outside, Cabin 9402/9404 window	57.3	Figure 17

APPENDIX C NOISE INTERVIEW RECORDS

Interviewer: Yong Ma, P. Eng.				Interview Questionnaire			
Interviewee Information							
ID # of Interviewee	**Interview Date**	**Living Deck**	**Work Shift**	**1.General evaluation for your sleeping at Floatel**	**2.Does AC in cabin bother you?**	**3.Can you hear outside construction noise?**	**4. Any noise concerns/ complaints**
#1	July 10	10	Night	Good sleep in daytime	No, it's Ok	No	Everything is fine, no concerns
#2	July 10	10	Night	Sleep is good	It's Ok	Not hearing from outside construction	No noise issues
#3	July 10	7	Day	Excellent sleep condition	No	No sound heard from construction	No concerns
#4	July 11	7	Day/ Night	Sleeping is good	No	Nothing heard from outside construction	Everything is fine
#5	July 11	6	Day	Sleeping is good	It's Ok	Nothing heard from construction	No concerns
#6	July 11	6	Day	Sleeping well	It's Ok	No sound heard from construction	No concerns
#7	July 12	7	Day	No noise issue for sleeping	No	Not hearing from construction	No issues for noise
#8	July 12	6	Day	Nothing for sleep disturbance	Ok	Not hearing from construction other than toilet flushing	No concerns for noise
#9	July 12	6	Day	Generally Ok	No disturbance	Not hearing from construction (living at side of Floatel)	No complaints for noise, other than sometimes heard toilet flushing noise
#10	July 13	7	Day	No noise issue for sleep	It's Ok and get used to	Nothing heard from construction	No noise concerns
#11	July 12	9	Day	Nothing for sleep disturbance	Ok	Not hearing from construction	So far so good, no complaints
#12	July 13	6	Day	Generally Ok	AC is Ok	Nothing heard from outside construction	No complaints; sometimes heard cart moving above; and heard weight dropping on Gym floor above
#13	July 13	7	Day	Nothing for sleep disturbance	No	Nothing heard from construction	All good
#14	July 13	9	Day	No noise issue for sleep	AC is Ok	Not hearing from construction	No noise concerns
#15	July 13	9	Day	No noise issue for sleep	AC is Ok	Not hearing from construction	No noise concerns

APPENDIX D INSTRUMENTATION CALIBRATION CERTIFICATION