



# Monthly compliance noise monitoring report

**Glebe Island / White Bay**

Port Authority of New South Wales

December 2022



→ The Power of Commitment

**GHD Pty Ltd | ABN 39 008 488 373**


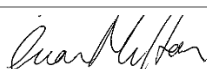
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# 1. Introduction

GHD Pty Ltd (GHD) has been engaged by Port Authority of New South Wales (Port Authority) to undertake compliance noise monitoring, as required by the *Port Noise Policy (Port Authority, 2020)*.

This report provides the details of the compliance noise monitoring for all vessels at berth during December 2022, as determined using the noise monitoring system. A detailed description of the permanent noise monitoring system including a map of monitoring locations is provided in the Noise Monitoring Plan, available on Port Authority's website.

# 2. Noise monitoring details and vessel schedule

Client	Company details	Noise monitor name	Noise monitor location	Noise monitor details / settings	Noise monitor serial numbers	Monthly calibration variance
Port Authority of New South Wales	GHD Pty Ltd  Member of the Association of Australasian Acoustical Consultants (AAAC)  Lead staff are Members of the Australian Acoustical Society (AAS)	L01	Grafton Street, Balmain	<b>Meter details</b> Norsonic Nor145 Sound Level Meter with Nor1297 Noise Compass  <b>Meter settings</b> A-weighted Fast time response 15 minute intervals	14529640	<b>Initial calibration level 92.6 dBA</b> Min. deviation = 0.2 dB Max. deviation = 0.3 dB
		L02	Maintenance Building on White Bay		14529642	<b>Initial calibration level 91.5 dBA</b> Min. deviation = 0.2 dB Max. deviation = 0.3 dB
		L03	Adjacent to White Bay 2		14529643	<b>Initial calibration level 91.7 dBA</b> Min. deviation = -0.1 dB Max. deviation = 0.2 dB
		L04	Onsite at Glebe Island		14529644	<b>Initial calibration level 92.3 dBA</b> Min. deviation = -0.1 dB Max. deviation = 0 dB
Vessel name	Arrival date and time	Departure date and time		Berth location	Applicable noise monitoring location/s	
<b>Bulk vessels</b>						
Elanora	December 2, 2022 / 16:07	December 6, 2022 / 00:40		GLB7	L03	
Wyuna	December 6, 2022 / 04:13	December 9, 2022 / 00:30		GLB8	L03	
Pioneer	December 6, 2022 / 07:25	December 10, 2022 / 18:56		GLB7	L03	

Wyuna	December 17, 2022 / 14:43	December 19, 2022 / 19:08	GLB8	L03
Adelie	December 25, 2022 / 07:24	December 29, 2022 / 03:30	GLB7	L03
Vessel name	Arrival date and time	Departure date and time	Berth location	Applicable noise monitoring location/s
Cruise vessels				
Seabourn Odyssey	December 4, 2022 / 12:20	December 4, 2022 / 21:47	WBCT	L01
Seabourn Odyssey	December 4, 2022 / 21:47	December 5, 2022 / 18:45	WHT4	L02
Pacific Adventure	December 8, 2022 / 10:36	December 8, 2022 / 21:05	WBCT	L01
Viking Orion	December 8, 2022 / 06:12	December 8, 2022 / 22:00	WBCT	L01
Viking Orion	December 8, 2022 / 22:00	December 9, 2022 / 18:10	WHT4	L02
Pacific Adventure	December 9, 2022 / 06:58	December 9, 2022 / 16:14	WBCT	L01
Pacific Adventure	December 12, 2022 / 06:50	December 12, 2022 / 16:47	WBCT	L01
Le Laperouse	December 15, 2022 / 20:45	December 16, 2022 / 18:13	WBCT	L01
Pacific Adventure	December 17, 2022 / 07:48	December 17, 2022 / 18:13	WBCT	L01
Silver Muse	December 20, 2022 / 07:18	December 20, 2022 / 19:00	WBCT	L01
Norwegian Spirit	December 21, 2022 / 11:35	December 21, 2022 / 20:15	WBCT	L01
True North	December 23, 2022 / 15:20	December 25, 2022 / 18:11	WHT3	L02
Viking Mars	December 27, 2022 / 06:10	December 27, 2022 / 22:23	WHT4	L02
Pacific Adventure	December 27, 2022 / 06:38	December 27, 2022 / 16:09	WBCT	L01
True North	December 29, 2022 / 07:21	December 30, 2022 / 17:41	WHT3	L02
Pacific Adventure	December 30, 2022 / 06:38	December 30, 2022 / 17:04	WBCT	L01
Azamara Quest	December 31, 2022 / 08:40	January 02, 2023 / 13:53	WHT4	L02
AIDAmar	December 31, 2022 / 10:10	January 01, 2023 / 22:04	WBCT	L01

## 3. Compliance summary

### 3.1 Bulk vessels

Vessel	Dates at berth	Monitor location	Vessel Noise Level, dBA (inclusive of any modifying factor penalties)			Vessel Noise Trigger Levels, dBA			Compliance <sup>1</sup>	
			Day <sup>2</sup> L <sub>Aeq</sub> (15 hr)	Night <sup>3</sup> L <sub>Aeq</sub> (1 hr)	Night <sup>3</sup> L <sub>Amax</sub>	Day <sup>2</sup> L <sub>Aeq</sub> (15 hr)	Night <sup>3</sup> L <sub>Aeq</sub> (1 hr)	Night <sup>3</sup> L <sub>Amax</sub>	Day	Night
Elanora	Dec 2 – Dec 6	L03	57	59 <sup>4</sup>	64	60	55	65	Yes	No
Wyuna	Dec 6 – Dec 8	L03	57 <sup>4</sup>	57 <sup>4</sup>	65	60	55	65	Yes	No
Pioneer	Dec 6 – Dec 10	L03	55	54	63	60	55	65	Yes	Yes
Wyuna	Dec 17 - Dec 19	L03	60 <sup>4</sup>	57 <sup>4</sup>	65	60	55	65	Yes	No
Adelie	Dec 25 - Dec 29	L03	53	53	61	60	55	65	Yes	Yes

Note: 1) If non-compliance is detected, a detailed investigation of the results will be undertaken and reported separately if required

Note: 2) Daytime period (7 am to 10 pm) – 15 hour logarithmic average

Note: 3) Night-time (10 pm to 7 am) – worst case 1 hour period

Note: 4) The noise from the Wyuna and Elanora during some periods was deemed to be tonal. As such, a 5 dB penalty has been applied in accordance with Fact Sheet 3 Corrections for annoying noise characteristics from the EPA's Noise Policy for Industry

## 3.2 Cruise vessels

Vessel	Dates at berth	Monitor location	Vessel Noise Level, dBA (inclusive of any modifying factor penalties)		Vessel Noise Trigger Levels, dBA		Compliance	
			Day <sup>1</sup> L <sub>Aeq</sub> (15 hr)	Night <sup>2</sup> L <sub>Aeq</sub> (9 hr)	Day <sup>1</sup> L <sub>Aeq</sub> (15 hr)	Night <sup>2</sup> L <sub>Aeq</sub> (9 hr)	Day	Night
Seabourn Odyssey (WBCT)	Dec 4	L01	51	47	58	58	Yes	Yes
Seabourn Odyssey (WHT4)	Dec 5	L02	58	-	58	58	Yes	-
Viking Orion (WBCT)	Dec 8-9	L01	54	-	58	58	Yes	-
Pacific Adventure (WBCT)	Dec 9	L01	60		58	58	No	-
Pacific Adventure (WBCT)	Dec 12	L01	58		58	58	Yes	-
Le Laperouse (WBCT)	Dec 15	L01	55	52	58	58	Yes	Yes
Le Laperouse (WBCT)	Dec 16	L01	56	-	58	58	Yes	-
Pacific Adventure (WBCT)	Dec 17	L01	60	-	58	58	No	-
Silver Muse (WBCT)	Dec 20	L01	56	-	58	58	Yes	-
Norwegian Spirit (WBCT)	Dec 21	L01	58		58	58	Yes	-
True North (WHT3)	Dec 23	L02	54	55	58	58	Yes	Yes
True North (WHT3)	Dec 24	L02	53	49	58	58	Yes	Yes
True North (WHT3)	Dec 25	L02	51	-	58	58	Yes	-
Viking Mars (WHT4)	Dec 27	L02	58	51 <sup>3</sup>	58	58	Yes	Yes
Pacific Adventure (WBCT)	Dec 27	L01	60		58	58	No	-
True North (WHT3)	Dec 29	L02	56	54	58	58	Yes	Yes
True North (WHT3)	Dec 30	L02	56	-	58	58	Yes	
Pacific Adventure (WBCT)	Dec 30	L01	60	-	58	58	No	-

Vessel	Dates at berth	Monitor location	Vessel Noise Level, dBA (inclusive of any modifying factor penalties)		Vessel Noise Trigger Levels, dBA		Compliance	
			Day <sup>1</sup> L <sub>Aeq</sub> (15 hr)	Night <sup>2</sup> L <sub>Aeq</sub> (9 hr)	Day <sup>1</sup> L <sub>Aeq</sub> (15 hr)	Night <sup>2</sup> L <sub>Aeq</sub> (9 hr)	Day	Night
Azamara Quest (WHT4)	Dec 31	L02	55	50	58	58	Yes	Yes
AIDamar (WBCT)	Dec 31	L01	56	49	58	58	Yes	Yes

Note: 1) Daytime period (7 am to 10 pm) – 15 hour logarithmic average

Note: 2) Night-time (10 pm to 7 am) – 9 hour logarithmic average

Note: 3) Note that this level was for the period between 6:10 am and 7:00 am on 27 December

## 4. Detailed results – bulk vessels

### 4.1 Elanora – December 2 – December 6, 2022 (GLB7)

#### 4.1.1 Daily noise monitoring results

Date	Time period <sup>1</sup>	Monitor location	Noise descriptor	Vessel noise level dBA <sup>2</sup>	Tonal	LFN <sup>3</sup>	Vessel Noise Trigger Levels, dBA	Compliance
December 2, 2022	Day	L03	L <sub>Aeq</sub> , 15 hour <sup>1</sup>	54	No	No	60	Yes
	Night		L <sub>Aeq</sub> , 1 hour <sup>1</sup>	59 <sup>4</sup>	Yes	No	55	No
			L <sub>Amax</sub>	59	-	-	65	Yes
December 3, 2022	Day	L03	L <sub>Aeq</sub> , 15 hour <sup>1</sup>	57	No	No	60	Yes
	Night		L <sub>Aeq</sub> , 1 hour <sup>1</sup>	51	No	No	55	Yes
			L <sub>Amax</sub>	60	-	-	65	Yes
December 4, 2022	Day	L03	L <sub>Aeq</sub> , 15 hour <sup>1</sup>	50	No	No	60	Yes
	Night		L <sub>Aeq</sub> , 1 hour <sup>1</sup>	56 <sup>5</sup>	No	Yes	55	No
			L <sub>Amax</sub>	58	-	-	65	Yes
December 5, 2022	Day	L03	L <sub>Aeq</sub> , 15 hour <sup>1</sup>	54	No	Yes	60	Yes
	Night		L <sub>Aeq</sub> , 1 hour <sup>1</sup>	50	No	Yes	55	Yes
			L <sub>Amax</sub>	64	-	-	65	Yes

Notes

1) Daytime period (7 am to 10 pm) – 15 hours

Night-time period (10 pm to 7 am) – worst case 1 hour

2) Inclusive of any penalties for modifying factors

3) LFN = Low Frequency Noise

4) The Elanora was determined to be tonal at 1000 Hz between 10 pm and 11 pm. A review of the audio confirmed this

5) This exceedance occurred between 6:00 am and 7:00 am



## 4.1.2 Additional information

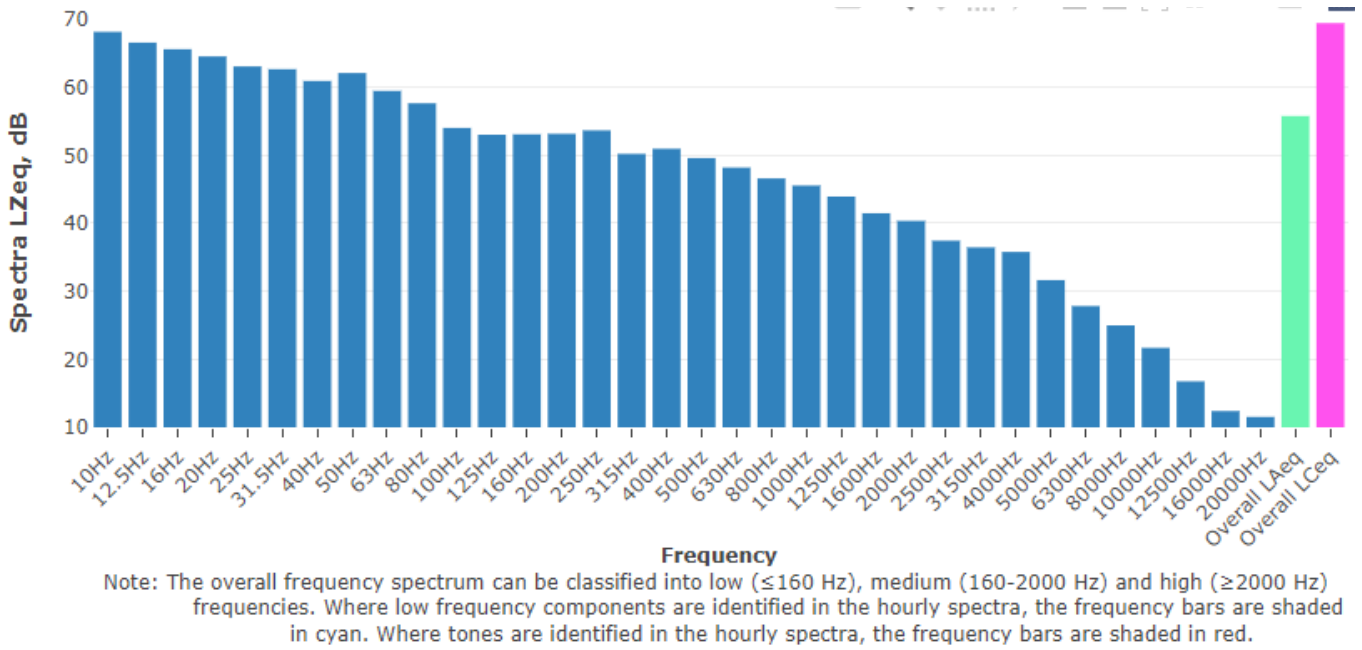


Figure 4.1 Typical vessel spectrum – noise level at L03

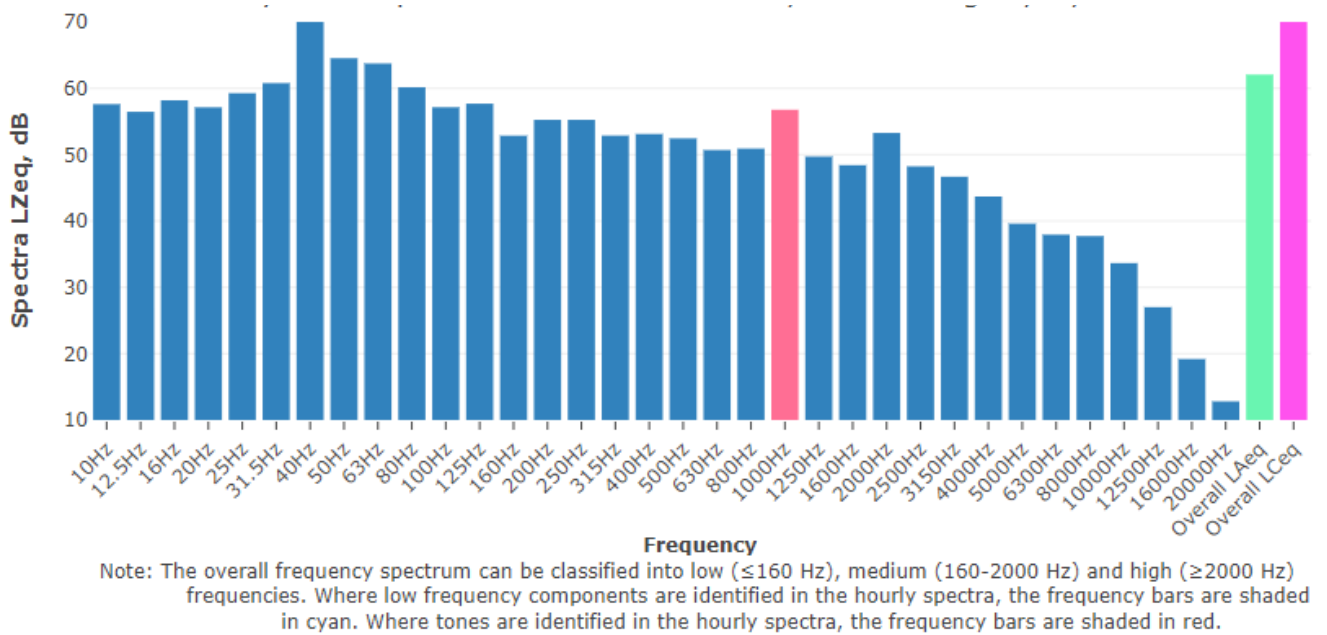


Figure 4.2 Vessel spectrum showing tone at 1000 Hz– noise level at L03

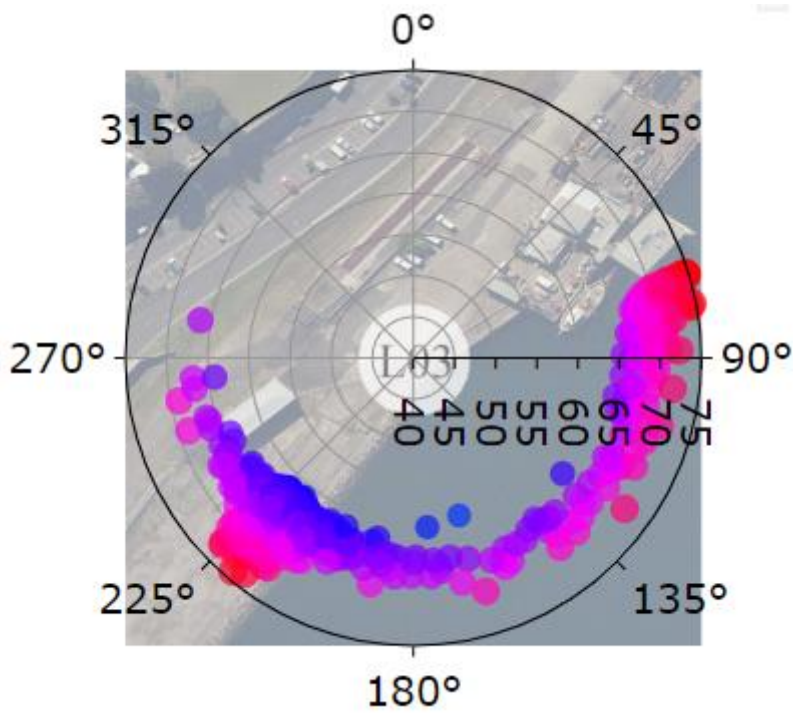


Figure 4.3 Typical vessel polar (directional) plot

## 4.2 Wyuna – December 6 – December 8, 2022 (GLB8)

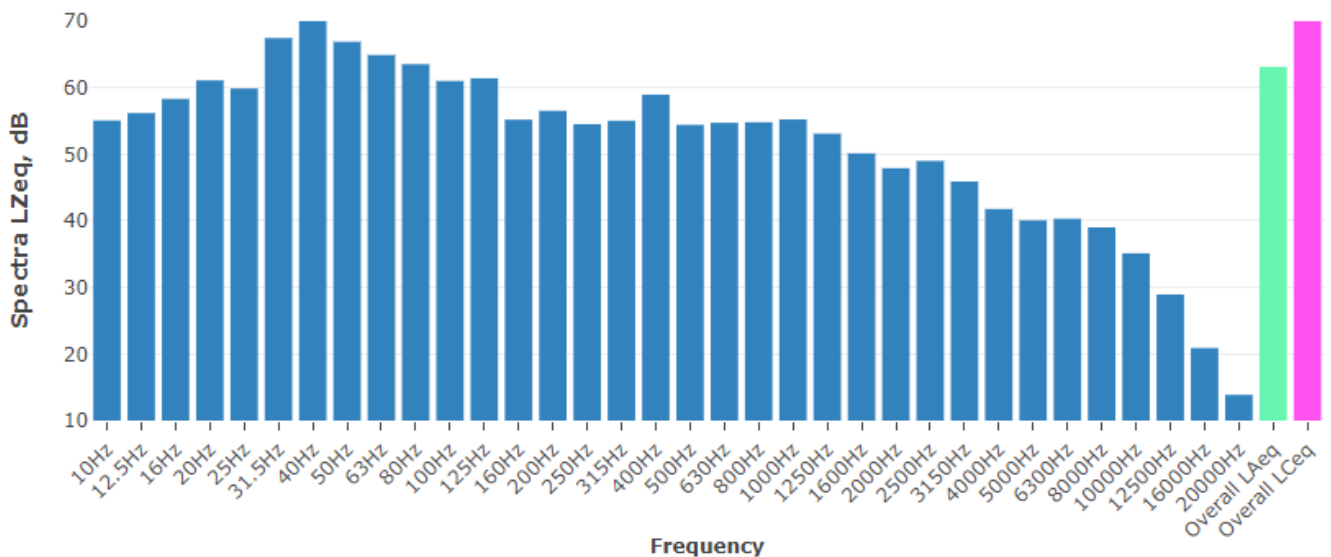
### 4.2.1 Daily noise monitoring results

Date	Time period <sup>1</sup>	Monitor location	Noise descriptor	Vessel noise level dBA <sup>2</sup>	Tonal	LFN <sup>3</sup>	Vessel Noise Trigger Levels, dBA	Compliance
December 6, 2022	Day	L03	L <sub>Aeq</sub> , 15 hour <sup>1</sup>	Pioneer (GLB7) and Wyuna (GLB8) were both present at this time. See discussion in Section 4.5 below. Noise was attributed to the Pioneer at this time				
	Night		L <sub>Aeq</sub> , 1 hour <sup>1</sup>					
			L <sub>Amax</sub>					
December 7, 2022	Day	L03	L <sub>Aeq</sub> , 15 hour <sup>1</sup>					
	Night		L <sub>Aeq</sub> , 1 hour <sup>1</sup>					
			L <sub>Amax</sub>					
December 8, 2022	Day	L03	L <sub>Aeq</sub> , 15 hour <sup>1</sup>					
	Night		L <sub>Aeq</sub> , 1 hour <sup>1</sup>					
			L <sub>Amax</sub>					

Notes

- Daytime period (7 am to 10 pm) – 15 hours  
Night-time period (10 pm to 7 am) – worst case 1 hour
- Inclusive of any penalties for modifying factors
- LFN = Low Frequency Noise

### 4.2.2 Additional information



Note: The overall frequency spectrum can be classified into low ( $\leq 160$  Hz), medium (160-2000 Hz) and high ( $\geq 2000$  Hz) frequencies. Where low frequency components are identified in the hourly spectra, the frequency bars are shaded in cyan. Where tones are identified in the hourly spectra, the frequency bars are shaded in red.

Figure 4.4 Typical vessel spectrum – noise level at L03 (Pioneer and Wyuna combined)

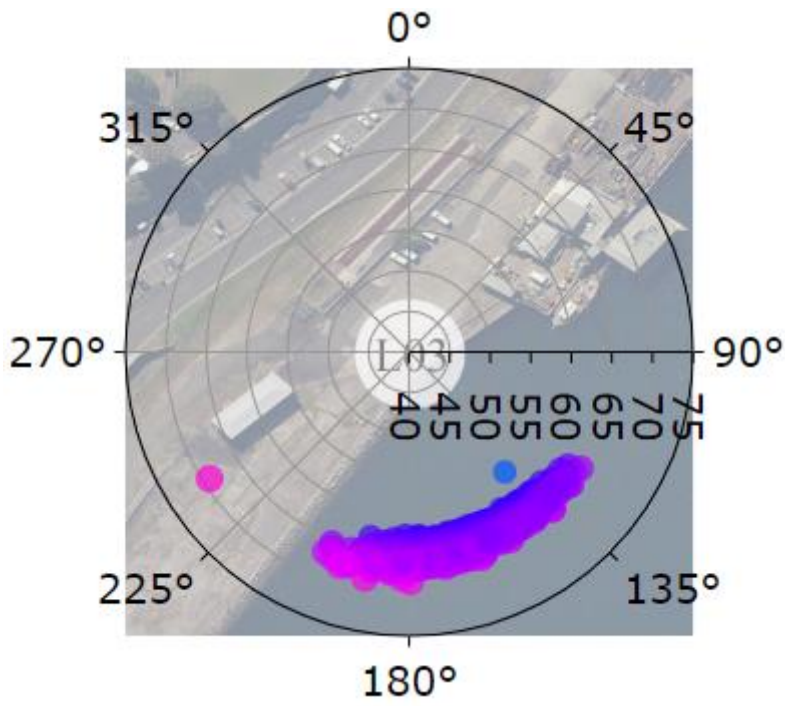


Figure 4.5 Typical vessel polar (directional) plot (Pioneer and Wyuna combined)

## 4.3 Pioneer – December 6 – December 10, 2022 (GLB7)

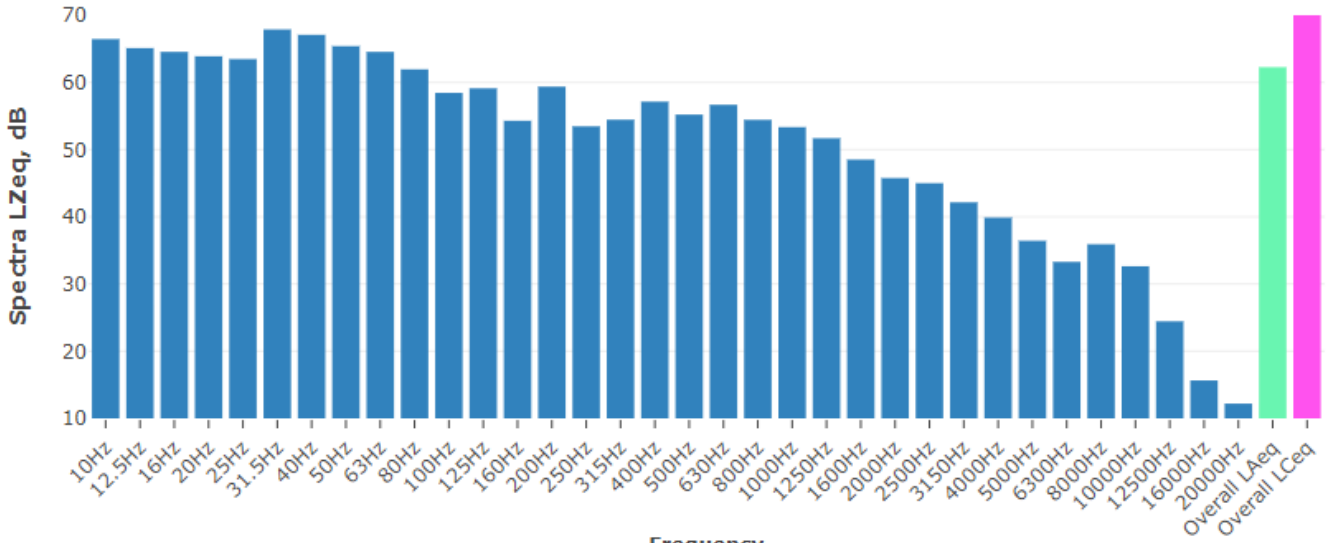
### 4.3.1 Daily noise monitoring results

Date	Time period <sup>1</sup>	Monitor location	Noise descriptor	Vessel noise level dBA <sup>2</sup>	Tonal	LFN <sup>3</sup>	Vessel Noise Trigger Levels, dBA	Compliance
December 6, 2022	Day	L03	L <sub>Aeq</sub> , 15 hour <sup>1</sup>	Pioneer (GLB7) and Wyuna (GLB8) were both present at this time. See discussion in Section 4.4 below. Noise was attributed to the Pioneer at this time				
	Night		L <sub>Aeq</sub> , 1 hour <sup>1</sup>					
			L <sub>Amax</sub>					
December 7, 2022	Day	L03	L <sub>Aeq</sub> , 15 hour <sup>1</sup>					
	Night		L <sub>Aeq</sub> , 1 hour <sup>1</sup>					
			L <sub>Amax</sub>					
December 8, 2022	Day	L03	L <sub>Aeq</sub> , 15 hour <sup>1</sup>					
	Night		L <sub>Aeq</sub> , 1 hour <sup>1</sup>					
			L <sub>Amax</sub>					
December 9, 2022	Day	L03	L <sub>Aeq</sub> , 15 hour <sup>1</sup>	54	No	No	60	Yes
	Night		L <sub>Aeq</sub> , 1 hour <sup>1</sup>	57 <sup>4</sup>	Yes	No	55	No
			L <sub>Amax</sub>	62	-	-	65	Yes
December 10, 2022	Day	L03	L <sub>Aeq</sub> , 15 hour <sup>1</sup>	53	No	Yes	60	Yes
	Night		L <sub>Aeq</sub> , 1 hour <sup>1</sup>	-	-	-	55	-
			L <sub>Amax</sub>	-	-	-	65	-

**Notes**

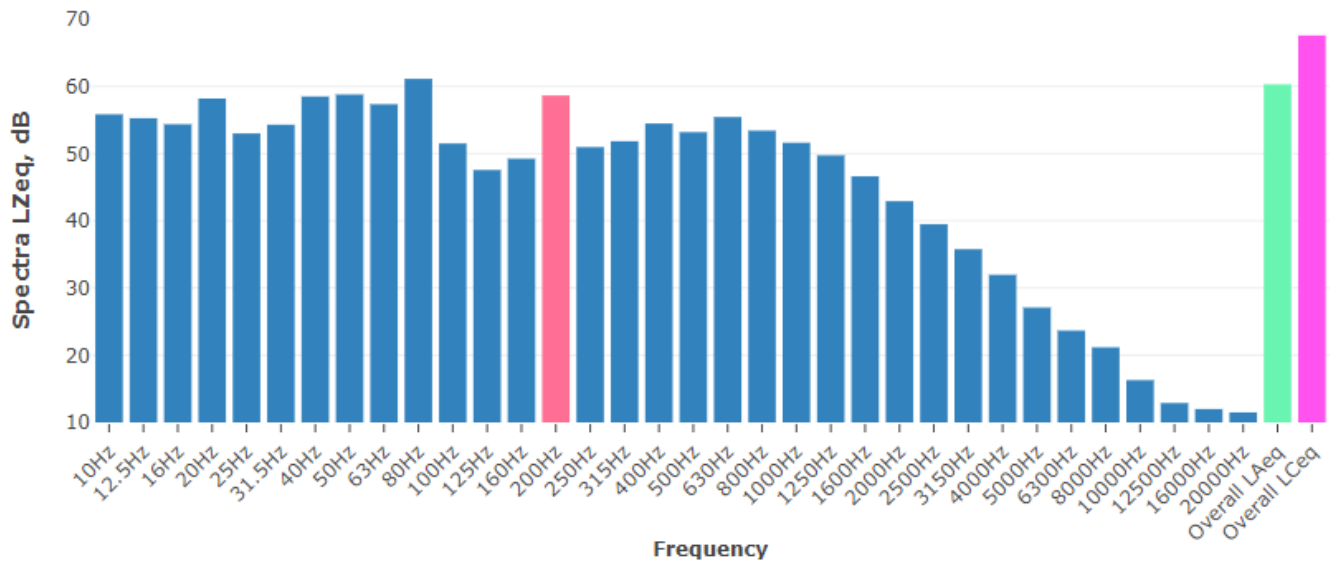
- 1) Daytime period (7 am to 10 pm) – 15 hours  
Night-time period (10 pm to 7 am) – worst case 1 hour
- 2) Inclusive of any penalties for modifying factors
- 3) LFN = Low Frequency Noise
- 4) The Pioneer was determined to be tonal at 200 Hz 2 x 1 hour periods on this day. The vessel was compliant at all other times.

### 4.3.2 Additional information



Note: The overall frequency spectrum can be classified into low ( $\leq 160$  Hz), medium (160-2000 Hz) and high ( $\geq 2000$  Hz) frequencies. Where low frequency components are identified in the hourly spectra, the frequency bars are shaded in cyan. Where tones are identified in the hourly spectra, the frequency bars are shaded in red.

Figure 4.6 Typical vessel spectrum – noise level at L03



Note: The overall frequency spectrum can be classified into low ( $\leq 160$  Hz), medium (160-2000 Hz) and high ( $\geq 2000$  Hz) frequencies. Where low frequency components are identified in the hourly spectra, the frequency bars are shaded in cyan. Where tones are identified in the hourly spectra, the frequency bars are shaded in red.

Figure 4.7 Vessel spectrum showing tone at 200 Hz – noise level at L03

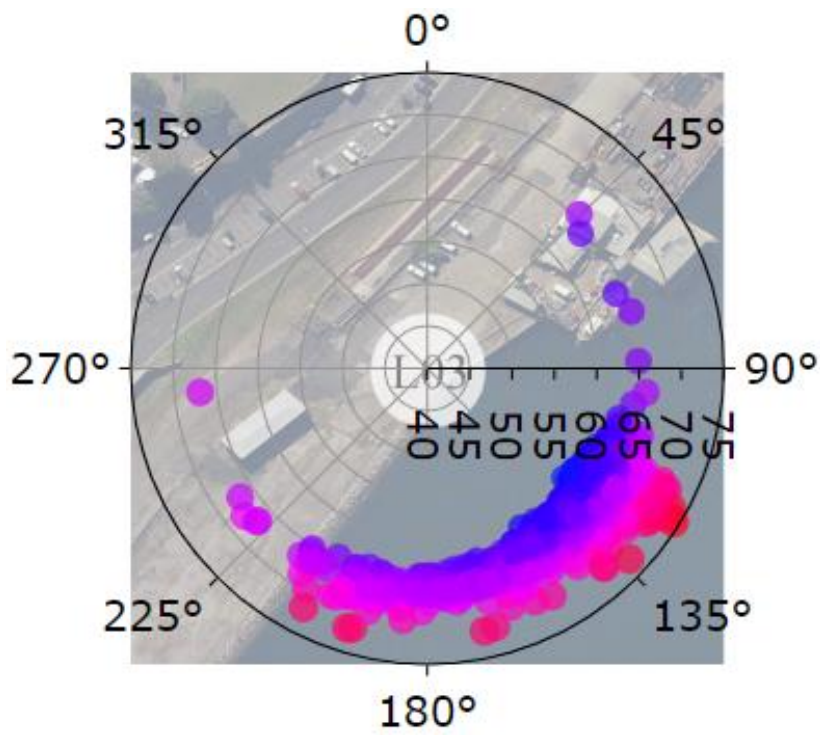


Figure 4.8 Typical vessel polar (directional) plot

## 4.4 Wyuna – December 17 – December 19, 2022 (GLB8)

### 4.4.1 Daily noise monitoring results

Date	Time period <sup>1</sup>	Monitor location	Noise descriptor	Vessel noise level dBA <sup>2</sup>	Tonal	LFN <sup>3</sup>	Vessel Noise Trigger Levels, dBA	Compliance
December 17, 2022	Day	L03	L <sub>Aeq, 15 hour</sub> <sup>1</sup>	57 <sup>4</sup>	Yes	Yes	60	Yes
	Night		L <sub>Aeq, 1 hour</sub> <sup>1</sup>	57 <sup>4</sup>	Yes	No	55	No
			L <sub>Amax</sub>	63	-	-	65	Yes
December 18, 2022	Day	L03	L <sub>Aeq, 15 hour</sub> <sup>1</sup>	56 <sup>4</sup>	Yes	Yes	60	Yes
	Night		L <sub>Aeq, 1 hour</sub> <sup>1</sup>	57 <sup>4</sup>	Yes	No	55	No
			L <sub>Amax</sub>	63	-	-	65	Yes
December 19, 2022	Day	L03	L <sub>Aeq, 15 hour</sub> <sup>1</sup>	60 <sup>4</sup>	Yes	Yes	60	Yes
	Night		L <sub>Aeq, 1 hour</sub> <sup>1</sup>	-	-	-	55	-
			L <sub>Amax</sub>	-	-	-	65	-
<b>Notes</b> 1) Daytime period (7 am to 10 pm) – 15 hours Night-time period (10 pm to 7 am) – worst case 1 hour 2) Inclusive of any penalties for modifying factors 3) LFN = Low Frequency Noise 4) See discussion below regarding tonal noise								

### 4.4.2 Detailed tonal assessment

Upon reviewing the audio data for the Wyuna during this visit, a noticeable tone was, however this was not seen in the 1/3 octave data on IMS. As such, a penalty would not be applicable in accordance with Table C1 of the Noise Policy for Industry (NPfI) (EPA, 2017).

Table C1 of the NPfI also states the following:

*narrow band analysis using the reference method in ISO1996-2:2007, Annex C may be required by the consent/regulatory authority where it appears that a tone is not being adequately identified e.g. where it appears that the tonal energy is at or close to the third octave band limits of contiguous bands.*

The notes of Table C1 also states the following:

*3. Where narrow-band analysis using the reference method is required, as outlined in column 5, the correction will be determined by the ISO1996-2:2007 standard.*

A narrow band assessment (Fast Fourier Transform (FFT) analysis) was undertaken using audio recordings of the Wyuna, which determined that a penalty should be applied in accordance with ISO1996-2:2007 due to a noticeable tone at approximately 1773 Hz. As such, a 5 dB penalty has been applied to all measured results in IMS.

Based on the ISO1996-2:2007 narrow-band analysis, the maximum 6 dB penalty has been applied to the estimated vessel contribution outlined in section **Error! Reference source not found.**, rather than the NPfI 5 dB penalty which is applied when tonal noise is identified using the 1/3 octave data. Additional information



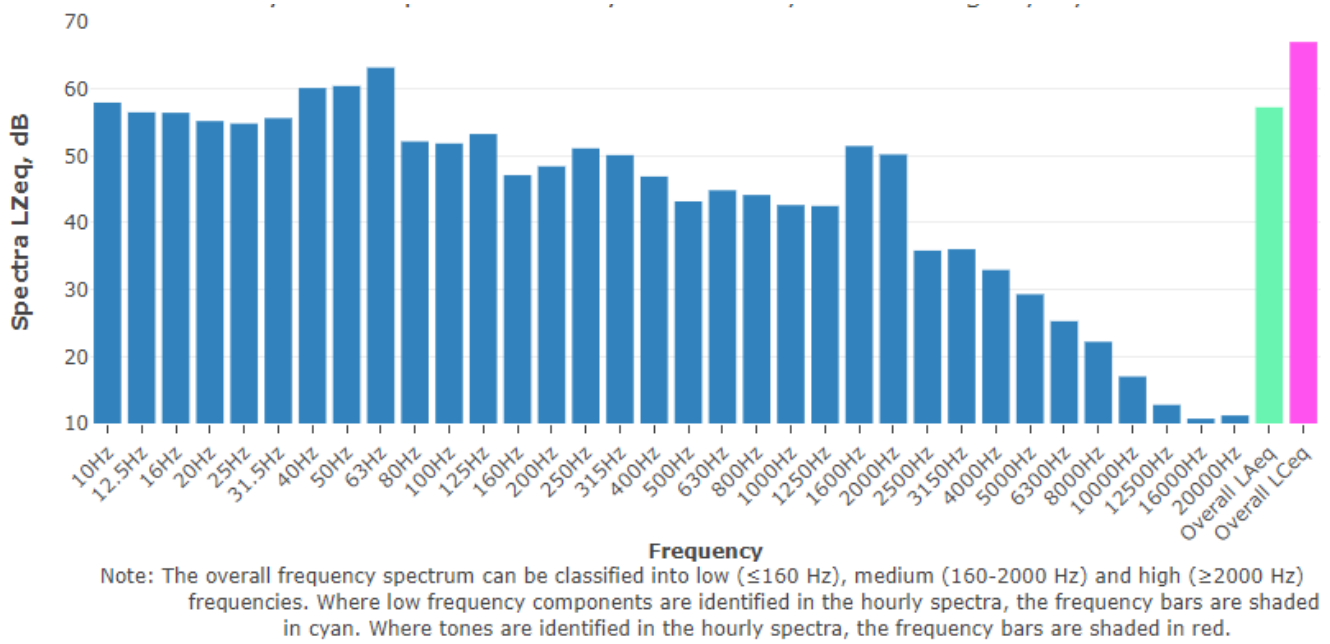


Figure 4.9 Typical vessel spectrum – noise level at L03

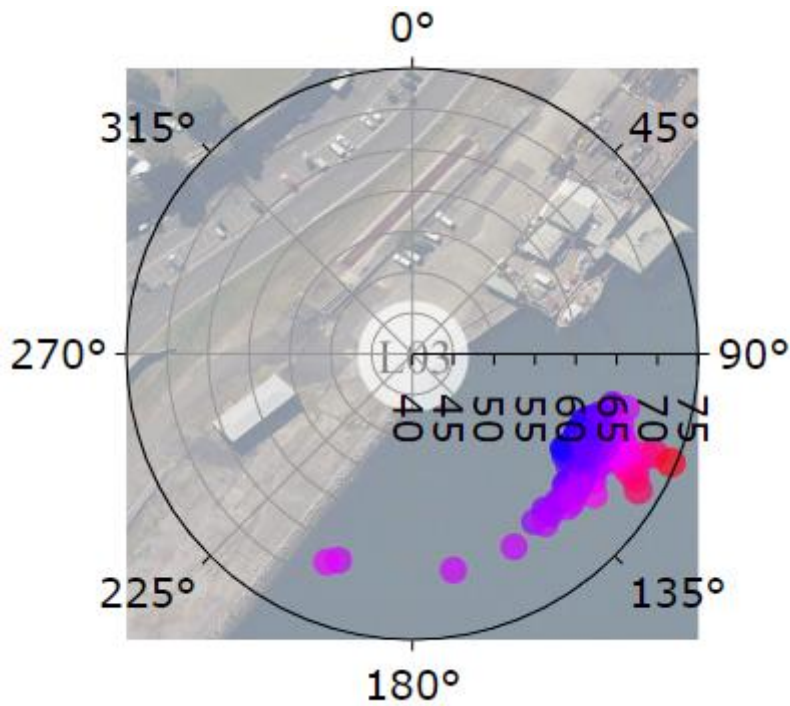


Figure 4.10 Typical vessel polar (directional) plot

## 4.5 Discussion regarding Pioneer and Wyuna

Between December 6 and December 8, 2022, the Pioneer (GLB7) and Wyuna (GLB8) were simultaneously at berth. During this period, the noise monitoring system attributed the measured noise levels to the Pioneer. The noise monitoring system indicated that there was a potential exceedance of the Vessel Noise Trigger Levels, therefore a detailed analysis was undertaken to determine the contribution from each vessel.

A review of the data was undertaken from this period, along with previously measured data. The contribution of the Wyuna has been estimated based on the following:

- Analysis of the measured noise levels from historical visits of the Pioneer, including data obtained following the departure of the Wyuna
- Analysis of the measured noise levels between 6 and 8 November 2022 when both the Pioneer and Wyuna were berthed.

Note that the noise level for the Pioneer has been established from data following the departure of the Wyuna. The level was 54 dBA during the day and 57 dBA (inclusive a 5 dB tonal correction) at night.

The estimated contribution is as follows:

Vessel	Assessment period	Noise descriptor	Estimated contribution, dBA <sup>2</sup>
Wyuna	Day	L <sub>Aeq</sub> , 15 hour <sup>1</sup>	57 <sup>3</sup>
	Night	L <sub>Aeq</sub> , 1 hour <sup>1</sup>	57 <sup>3</sup>
Notes 1) Daytime period (7 am to 10 pm) – 15 hours Night-time period (10 pm to 7 am) – worst case 1 hour 2) Inclusive of any penalties for modifying factors 3) This level is inclusive of a 5 dB penalty for tonal noise			

## 4.6 Adelie – December 25 – December 29, 2022 (GLB7)

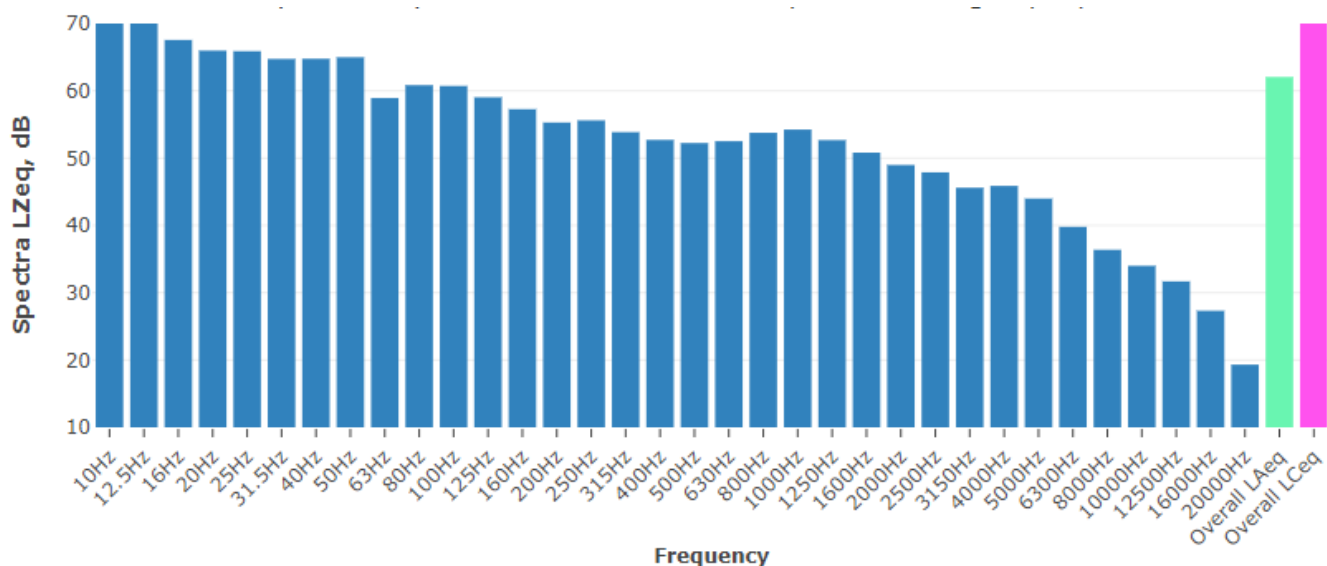
### 4.6.1 Daily noise monitoring results

Date	Time period <sup>1</sup>	Monitor location	Noise descriptor	Vessel noise level dBA <sup>2</sup>	Tonal	LFN <sup>3</sup>	Vessel Noise Trigger Levels, dBA	Compliance
December 25, 2022	Day	L03	L <sub>Aeq</sub> , 15 hour <sup>1</sup>	46	No	Yes	60	Yes
	Night		L <sub>Aeq</sub> , 1 hour <sup>1</sup>	51	No	Yes	55	Yes
			L <sub>Amax</sub>	60	-	-	65	Yes
December 26, 2022	Day	L03	L <sub>Aeq</sub> , 15 hour <sup>1</sup>	52	No	Yes	60	Yes
	Night		L <sub>Aeq</sub> , 1 hour <sup>1</sup>	52	No	Yes	55	Yes
			L <sub>Amax</sub>	59	-	-	65	Yes
December 27, 2022	Day	L03	L <sub>Aeq</sub> , 15 hour <sup>1</sup>	53	No	Yes	60	Yes
	Night		L <sub>Aeq</sub> , 1 hour <sup>1</sup>	53	No	Yes	55	Yes
			L <sub>Amax</sub>	61	-	-	65	Yes
December 28, 2022	Day	L03	L <sub>Aeq</sub> , 15 hour <sup>1</sup>	52	No	Yes	60	Yes
	Night		L <sub>Aeq</sub> , 1 hour <sup>1</sup>	49	No	Yes	55	Yes
			L <sub>Amax</sub>	58	-	-	65	Yes

#### Notes

- 1) Daytime period (7 am to 10 pm) – 15 hours  
Night-time period (10 pm to 7 am) – worst case 1 hour
- 2) Inclusive of any penalties for modifying factors
- 3) LFN = Low Frequency Noise
- 4) The Pioneer was determined to be tonal at 200 Hz 2 x 1 hour periods on this day. The vessel was compliant at all other times.

### 4.6.2 Additional information



Note: The overall frequency spectrum can be classified into low ( $\leq 160$  Hz), medium (160-2000 Hz) and high ( $\geq 2000$  Hz) frequencies. Where low frequency components are identified in the hourly spectra, the frequency bars are shaded in cyan. Where tones are identified in the hourly spectra, the frequency bars are shaded in red.

Figure 4.11 Typical vessel spectrum – noise level at L03

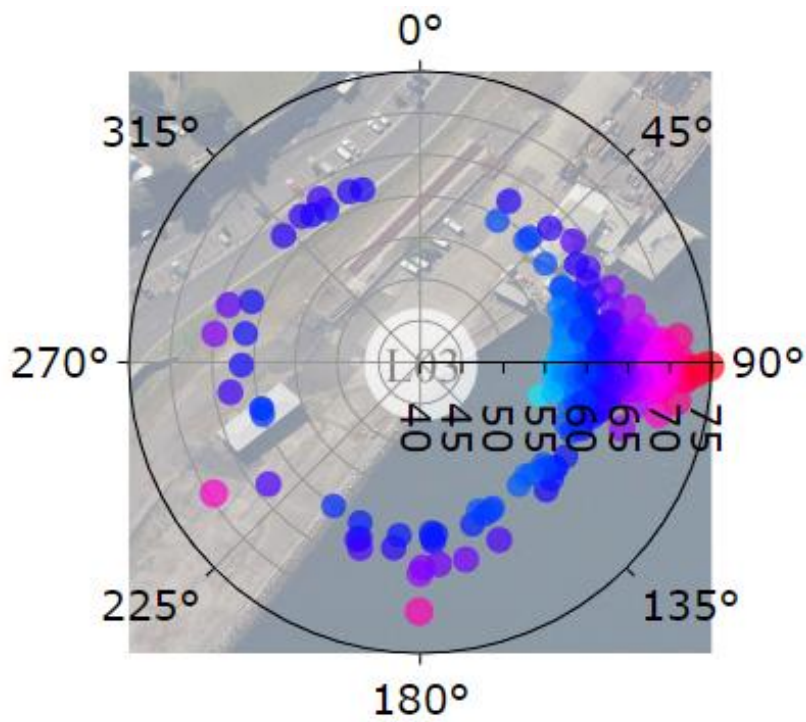


Figure 4.12 Typical vessel polar (directional) plot



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