25 October 2022

Attention: Stacey Sharp
BECA

Email: stacey.sharp@beca.com

ref. 14656.blh

Dear Stacey

RE: NORTHPORT EXPANSION CONSENTS

This letter is in response to the information request dated 16 October 2022.

Landscape and visual matters

(1) The Build Media visual simulations referred to in the Brown NZ Ltd (BNL) assessment were prepared at an earlier time, for an early iteration of the proposal which included a dry dock. As a result of the evolution of that early design, the dry dock is not part of the application currently before Council and should be disregarded when considering the simulations. While the simulations were used in part for the evaluation of effects by BNL, they could be confusing to members of the public. Notwithstanding this, we will provide the simulations to you separately so that they can be viewed by members of the public upon request.

(2) The Boffa Miskell plan for the pocket park is a concept only. With reference to the WSP plan 1-19278.01(03) (sheet C03) Revision D, this shows an envelope within which the tug berthing facility and fishing/water taxi pontoon will be located. While the final design of both the berthing facility and the fishing/water taxi pontoon will be determined at the detailed design stage, a likely configuration is depicted on the Northport plan D60-X attached.

Noise matters

(3) Please see attached additional information received from Marshall Day.

Stormwater matters

(4) Please see attached additional information received from Hawthorn Geddes.

If you have any questions, please do not hesitate to contact me.

Yours faithfully

Brett Hood
Director

Attachments:

1. Tug berthing facility concept plan (D60-X)
2. Marshall Day letter + attachments
3. Hawthorn Geddes email + plan

ATTACHMENT 1

TUG BERTHING FACILITY CONCEPT PLAN (D60-X)

ISSUE	DATE	DETAILS	APPRVD	BY

Northport
P.O BOX 44
RUAKAKA, NEW ZEALAND
TEL 09 432 5010
vision4growth.co.nz

Title:

NORTHPORT
RELOCATED TUG FACILITY
EASTERN END - CONCEPT PLAN

Path	Dwg No		Issue:
k:\engineer\gregb\consents\a vision for growth project\plans\eastern tug facility.dwg	D60-X		R0
Drawn: B SWEENY / Checked:	Scale: 1:500 (A1) 1:1000(A3)	Date: SEPT 2022	Sheet: 01

ATTACHMENT 2

MARSHALL DAY LETTER + ATTACHMENTS

MARSHALL DAY Acoustics

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www.marshallday.com

25 October 2022

Enviser
C/- Northport
PO Box 44
Ruakākā 0151

Attention: Jared Pettersson

NORTHPORT CONTAINER TERMINAL EXPANSION NOISE – REQUEST FOR FURTHER INFORMATION

Marshall Day Acoustics (MDA) has undertaken an assessment of noise effects for the proposed Container Terminal Expansion at Northport[1]. Our assessment reports have been reviewed by SLR Consulting NZ (SLR) on behalf of Whangārei District Council (WDC) and requested further information.

The SLR requests are reproduced below:

1. *Please provide comment on special audible characteristics (SACs) and whether this is considered relevant in assessing predicted levels and effects particularly when considering the predicted levels against the Whangārei District Plan (WDP) noise limits.*

   It is understood that SACs are not considered under the Port Noise Standard, but that they are under the WDP. Further information is requested to better understand the effects of the proposal when considered under the current, relevant planning framework.

2. *Please clarify if/how noise from Berth 4 operation has been accounted for in the modelling, assumptions and inputs.*

3. *When discussing internal noise levels and effects, a loss through open windows of 15 dB has been assumed. This is at the upper range of what would be commonly adopted (noting that NZS 6809 referred to in your assessment adopts 10 dB for NZ dwellings). Please provide evidence to support an assumption of 15 dB as typical for this specific context and receivers in question or otherwise update the relevant sections of the report if this assumption changes.*

4. *Please provide the MDA report and two memos noted as footnotes on pages 7 and 8 – required to understand the noise environment that effects have been assessed against.*

5. *Please provide an updated table of results (Appendix E) covering all receivers where predicted noise levels are at or above the WDP noise limits.*

Our response to each of the request is included sequentially overleaf.

[1] 'Rp 002 R07 20200547 BL Northport Container Terminal Expansion (Noise Assessment), dated 29 Sep 2022

1. **Please provide comment on special audible characteristics (SACs) and whether this is considered relevant in assessing predicted levels and effects particularly when considering the predicted levels against the Whangārei District Plan (WDP) noise limits.**

   It is understood that SACs are not considered under the Port Noise Standard, but that they are under the WDP. Further information is requested to better understand the effects of the proposal when considered under the current, relevant planning framework.

We respond to the application of the WDP noise rules first and the Port Noise Standard second.

WDP

The WDP permitted noise limits are specifically set for port noise emissions from the Port Zone received at Residential Zones (NAV.6.1). It requires assessment of the port noise emissions in accordance with NZS6802:2008 Acoustics – Environmental noise (NZS 6802) (NAV.5). At the outset, it is worth recording that port noise is excluded from the scope of NZS 6802 in clause 1.2.1 (emphasis added):

> *"**This Standard does not apply to** the assessment of sound where the source is within the scope of, and subject to, the application of other New Zealand Acoustical Standards, except as provided for in 1.2.3 and 1.2.4. In particular, assessment of specific sources of sound including road or rail transport, flight operations of fixed or rotary winged aircraft associated with airports or helicopter landing areas, construction, **port noise**, wind turbine generators, and impulsive sound (such as gunfire and blasting), requires special techniques that generally are outside the scope of this Standard. This Standard covers airborne sound, but does not cover structure borne sound and vibration."*

Nonetheless, we have carefully considered the possible application of SAC to the present case. Given the permitted noise limits established in the WDP, the audible character from consented and/or permitted port activities is reasonably expected at the Residential Zone interface. Therefore, the presence of representative port noise character is not 'special' in context (e.g., it would not apply to well managed log or container handling activities).

Residual outlier events are often the cause of residual noise complaints (e.g., one-off or unusual events during log loading if a ship hatch is closed hard). In this situation, residents are likely responding to an individual impulsive noise event that they consider to be unnecessary, avoidable, and unexpected -- and not a reasonable part of the operation if it was (or became) standard practice. Northport have noise management protocols in place for log loading activities to minimise the occurrence of such events, and a complaints response protocol to address residual events. This approach is discussed further overleaf.

Residual outlier events are not **representative** of normal operations because they are not regular, repeatable, or predictable. **Representative** sound is referred to repeatedly in NZS 6802 (emphasis added):

- Clause A1.3 states: "*The situation to be considered should be that which produces the highest sound level from a typical occurrence of the specific sound during the prescribed time frame. This **representative** level is not necessarily the highest measured LEQ during a noise survey*."
- Clause C7.2 states: "*The intention of L_{max} (L_{AFmax}) noise limits is to provide protection against the effects of 'typical maxima' of the specific sound and not the 'absolute maxima'. A noise nuisance does not generally arise from a single isolated incident. A single isolated noise event which exceeds an applicable limit might not be **representative** of the sound under investigation and should not be used as the sole basis for compliance action*".
- Clause 6.3.1 sets out the application of SAC. It requires "*… the **representative** sound level shall be adjusted to take this into account*" (where 'this' is SAC).

For the reasons above, and based on our subjective assessments during attended monitoring, we consider that a SAC adjustment is not warranted for representative Northport activities.

Port Noise Standard

NZS 6809:1999 *Acoustics – Port Noise Management and Land Use Planning* (the Port Noise Standard) Section A6.1 also addresses SAC. It states that:

> "*Sound that has special audible characteristics, such as tonality or impulsiveness, is likely to arouse adverse community response at lower sound levels than sound without such characteristics. When a sound under investigation is subjectively judged to contain prominent distinct tonal component(s), no further special investigation is required to determine that an adjustment is appropriate (k2). Where there is doubt about the prominence of tonal elements, an objective measurement procedure should be adopted (see A6.2).*"

By way of example, the Port Otago noise rules were the result of an extensive Environment Court Hearing[2]. The resulting District Plan rules provided clarity by stating[3] "*adjustments for any special audible character to any $L_{eq\,(15min)}$ made in accordance with clause 7.3 and A6 of NZS6809:1999 shall, except for audible warning devices, not apply to noise from log and container handling activities*". The reference to audible warning devices is linked to tonal reversing 'beepers'. In response to this ruling, broadband alarms or blue flashing lights are commonly used across New Zealand ports to avoid SAC adjustment. No sources operating at, or proposed for, Northport have 'beepers', so the noise predictions and assessment findings are unchanged.

We consider that the implementation of a Port Noise Management Plan in accordance with Section 8 of the Port Noise Standard is the best way to ensure port activities minimise community disruption from port character components. Noise character components are specifically addressed by the draft Port Noise Management Plan[4] attached as Appendix H of our noise assessment report.

2. Please clarify if/how noise from Berth 4 operation has been accounted for in the modelling, assumptions and inputs

Berth 4 operations have been accounted for in the following manner.

Section 5.2 of our assessment report addresses consented Berth 4 activities. Container activities on the Berth 4 and associated reclaimed land are part of the legal 'existing environment' for planning purposes. However, it is yet to be constructed, and therefore, is not included in the current port noise model.

Section 5.3 of our assessment addresses the future port activities, which includes those on current port land, the consented Berth 4 and the further reclaimed areas subject to this consent. This modelling scenario includes extensive container operations on the land associated with the Berth 4 consent. The future scenario assumptions are detailed in full in Figure G-6 'Future (2035) Peak Operations Scenario'.

3. When discussing internal noise levels and effects, a loss through open windows of 15 dB has been assumed. This is at the upper range of what would be commonly adopted (noting that NZS 6809 referred to in your assessment adopts 10 dB for NZ dwellings). Please provide evidence to support an assumption of 15 dB as typical for this specific context and receivers in question or otherwise update the relevant sections of the report if this assumption changes.

The relevant noise effects are those received inside bedrooms at night. The indoor noise level is generally controlled by any open window path, with the smaller the open area, the higher the performance. Other performance factors include how the window is hung, the directionality of the source and its angle of incidence on the window, room constants and number of windows.

---

[2] 'Careys Bay Association Inc. vs Dunedin City Council', Environment Court Decision C150/2003

[3] Dunedin City District Plan, Chapter 21 – Environmental Issues, rule 21.5.2 (l) (b)

[4] MDA report Rp 001 20170776 (Port Noise Management Plan), dated 3 Aug 2022

We consider that a partially open hinged window on a standard 100mm deep security stay is representative in a bedroom at night. The 15 dBA reduction is a common allowance, supported by the following documents:

- The Worth Health Organisation[5] states that: *"The differences between indoor and outdoor levels are usually estimated at around 10 dB for open,* ***15 dB for tilted or half-open*** *and about 25 dB for closed windows."*
- The DEFRA study[6] states a reduction of 12 – 17 dBA for road and rail noise, 13 – 18 dBA for aircraft noise and 14 – 19 dBA for low frequency noise sources (e.g., music) for a range of window arrangements and open areas.
- The IOA Acoustics Ventilation and Overheating Residential Design Guide[7] Appendix C is titled 'Sound insulation of a partially open window'. It cites a representative sound level differences ranging from 10 dBA for fully open windows to 16 decibels for hinged windows on security stays.

New Zealand Standard NZS 6809:1999 *Acoustics – Port Noise Management and Land Use Planning* predates the documents referenced above. Comment C5.2 conservatively suggests a sound level difference of 10 decibels "*assuming there is a window open*". We consider a partially open window, rather than fully open window is more relevant and representative in a bedroom at night. Therefore, we consider a value of 15 decibels is a more appropriate and representative assumption.

This assumption was also addressed in the Plan Change 88 (PC88) Appeal[8] Joint Witness Statement (JWS) on noise matters. JWS1, Appendix A notes: "*With outdoor noise levels of 45 dB $L_{Aeq\,(15min)}$, and assuming approximately 15 dB[5] through a typical open window on 100mm security stays into a bedroom, the resulting noise level would be 30 dB $L_{Aeq\,(15min)}$ inside.*" Footnote 5 states: "*Mr Finley and Mr Styles note that this range could be as low as 10 decibels with windows further open*".

4. Please provide the MDA report and two memos noted as footnotes on pages 7 and 8 – required to understand the noise environment that effects have been assessed against.

A report is referenced in a footnote on page 7 and two memos are referenced in footnotes on page 8. It is unclear which 2 of the 3 are sought, so all three are attached in Appendix B:

- MDA report Rp 001 20180532, titled 'Refining NZ and Northport Noise Measurements', dated 25 October 2018
- MDA memo Mm 003 20200547, dated 6 September 2021
- MDA memo Mm 004 20200547, dated 7 March 2022

[5] Section 2.2.2 of 'Environmental Noise Guidelines', World Health Organisation (2018)

[6] 'NANR116: 'OPEN/CLOSED WINDOW RESEARCH', Department for Environment, Food and Rural Affairs (February 2006)

[7] 'Acoustics Ventilation and Overheating Residential Design Guide', Institute of Acoustics (2020)

[8] Northport appeal to the Environment Court on the Whangārei District Plan review of the District Wide Port Noise Topic (ENV-2020-AKL-109)

5. **Please provide an updated table of results (Appendix E) covering all receivers where predicted noise levels are at or above the WDP noise limits.**

Section 6.1 of our assessment report assesses the predicted noise levels with the WDP limits. In summary, future peak port activities are predicted to continue to comply with the WDP 55 dB L_{day} and 75 dB L_{AFmax} noise limits but infringe the 45 dB $L_{Aeq\ (15min)}$ night-time limit at 55 dwellings in Reotahi and 7 in Marsden. The predicted infringement is up to 7 decibels at the most exposed dwellings and controlled by the proposed expanded container operations.

The detailed predicted noise levels for all 62 dwellings are now included in Table 1 of Appendix A.

Yours faithfully

MARSHALL DAY ACOUSTICS LTD

Craig Fitzgerald
Consultant

APPENDIX A PREDICTED NOISE LEVELS AT EXISTING DWELLINGS

Table 1: Existing dwellings with predicted port noise levels greater than 45 dB $L_{Aeq\ (15min)}$ on a peak night in 2035

Address	Current (2022)				Future (2035)			
	24 hr	Day	Night	**Night**	24Hr	Day	Night	**Night**
	dB $L_{dn\ (5\text{-}day)}$	dB L_{day}	dB L_{night}	**dB $L_{Aeq\ (15min)}$**	dB $L_{dn\ (5\text{-}day)}$	dB L_{day}	dB L_{night}	**dB $L_{Aeq\ (15min)}$**
24 Albany Rd, Marsden	47	42	41	42	52	47	46	**47**
28 Albany Rd, Marsden	48	42	41	43	53	47	46	**47**
30 Albany Rd, Marsden	48	42	41	43	53	47	46	**47**
32 Albany Rd, Marsden	48	42	41	43	53	47	46	**47**
34 Albany Rd, Marsden	48	42	41	43	53	47	46	**47**
36 Albany Rd, Marsden	48	42	41	43	53	47	47	**47**
38 Albany Rd, Marsden	48	42	41	43	54	48	47	**48**
3 Beach Rd, Reotahi	50	43	43	44	55	49	49	**49**
5 Beach Rd, Reotahi	50	44	43	44	53	47	47	**47**
7B Beach Rd, Reotahi	49	43	43	44	55	49	48	**49**
9 Beach Rd, Reotahi	51	45	45	**46**	57	51	51	**51**
11 Beach Rd, Reotahi	51	45	45	**46**	58	51	51	**52**
15 Beach Rd, Reotahi	51	45	45	**46**	55	49	49	**49**
17 Beach Rd, Reotahi	45	39	38	39	53	47	47	**48**
19 Beach Rd, Reotahi	49	43	43	44	55	49	49	**49**
21 Beach Rd, Reotahi	51	45	44	**45**	56	50	50	**50**
23 Beach Rd, Reotahi	51	45	45	**46**	57	51	51	**51**
25 Beach Rd, Reotahi	50	44	44	44	56	49	49	**50**
37 Darch Pt Rd, Reotahi	49	43	43	44	53	47	47	**47**
41 Darch Pt Rd, Reotahi	49	43	43	43	54	48	48	**48**
42 Darch Pt Rd, Reotahi	47	41	41	42	52	46	46	**46**
44 Darch Pt Rd, Reotahi	48	42	41	42	53	47	46	**47**
45 Darch Pt Rd, Reotahi	50	43	43	44	55	48	48	**49**
47 Darch Pt Rd, Reotahi	49	43	42	43	54	48	47	**48**
2 Matuku St, Reotahi	49	43	43	44	53	47	47	**47**
4 Matuku St, Reotahi	48	42	42	43	53	47	46	**47**
6 Matuku St, Reotahi	48	42	42	43	52	46	45	**46**
13 Norfolk Ave, Reotahi	46	41	40	41	53	47	46	**47**
15 Norfolk Ave, Reotahi	48	42	42	43	54	48	48	**48**

Address	Current (2022)				Future (2035)			
	24 hr	Day	Night	**Night**	24Hr	Day	Night	**Night**
	dB $L_{dn\ (5\text{-}day)}$	dB L_{day}	dB L_{night}	**dB $L_{Aeq\ (15min)}$**	dB $L_{dn\ (5\text{-}day)}$	dB L_{day}	dB L_{night}	**dB $L_{Aeq\ (15min)}$**
30 Norfolk Ave, Reotahi	49	43	43	44	54	48	48	**48**
32 Norfolk Ave, Reotahi	51	45	44	**45**	56	49	49	**50**
34 Norfolk Ave, Reotahi	52	46	45	**46**	57	51	51	**51**
38 Norfolk Ave, Reotahi	48	42	41	42	52	46	46	**46**
42 Norfolk Ave, Reotahi	50	44	43	44	54	48	47	**47**
46 Norfolk Ave, Reotahi	49	43	43	43	54	48	48	**48**
48 Norfolk Ave, Reotahi	50	44	43	44	55	49	49	**49**
50 Norfolk Ave, Reotahi	49	43	43	44	55	49	48	**49**
95 Reotahi Rd, Reotahi	47	41	40	41	51	45	45	**45**
103 Reotahi Rd, Reotahi	45	39	39	40	51	45	45	**46**
114 Reotahi Rd, Reotahi	49	43	42	43	54	48	48	**48**
116 Reotahi Rd, Reotahi	49	43	43	43	55	49	48	**49**
123 Reotahi Rd, Reotahi	49	43	43	44	55	49	49	**49**
126 Reotahi Rd, Reotahi	52	46	46	**47**	58	51	51	**52**
130 Reotahi Rd, Reotahi	51	44	44	45	54	48	48	**49**
131 Reotahi Rd, Reotahi	50	44	44	45	56	49	49	**50**
132 Reotahi Rd, Reotahi	51	45	45	**45**	55	49	48	**49**
133 Reotahi Rd, Reotahi	49	43	43	44	55	49	49	**49**
134 Reotahi Rd, Reotahi	51	45	45	**46**	55	49	49	**49**
135 Reotahi Rd, Reotahi	49	43	42	43	54	48	48	**48**
136 Reotahi Rd, Reotahi	51	45	44	**45**	55	49	48	**49**
1 The Heights, Reotahi	47	41	41	42	52	46	45	**46**
4 The Heights, Reotahi	48	42	42	43	54	48	48	**49**
4A The Heights, Reotahi	47	41	41	42	53	47	47	**48**
5 The Heights, Reotahi	45	40	39	40	53	47	47	**47**
5A The Heights, Reotahi	47	41	41	41	53	47	46	**47**
8 The Heights, Reotahi	46	40	40	41	53	46	46	**47**
9 The Heights, Reotahi	47	41	41	42	53	47	47	**47**
10 The Heights, Reotahi	47	41	41	42	53	47	47	**47**
11 The Heights, Reotahi	46	40	39	40	52	46	46	**46**
12 The Heights, Reotahi	47	41	41	41	53	47	47	**47**

Address	Current (2022)				Future (2035)			
	24 hr	Day	Night	**Night**	24Hr	Day	Night	**Night**
	dB $L_{dn\ (5\text{-}day)}$	dB L_{day}	dB L_{night}	**dB $L_{Aeq\ (15min)}$**	dB $L_{dn\ (5\text{-}day)}$	dB L_{day}	dB L_{night}	**dB $L_{Aeq\ (15min)}$**
13 The Heights, Reotahi	46	40	40	41	53	47	46	**47**
14 The Heights, Reotahi	48	42	42	43	55	48	48	**49**

APPENDIX B MONITORING REPORTS

The following referenced documents are attached overleaf to satisfy SLR request 4:

- MDA report Rp 001 20180532, titled 'Refining NZ and Northport Noise Measurements', dated 25 October 2018
- MDA memo Mm 003 20200547, dated 6 September 2021
- MDA memo Mm 004 20200547, dated 7 March 2022

MARSHALL DAY Acoustics

REFINING NZ AND NORTHPORT NOISE MEASUREMENTS

Rp 001 20180532 | 25 October 2018

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Project: **REFINING NZ AND NORTHPORT NOISE MEASUREMENTS**

Prepared for: **NZ Refining Co Ltd**
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PO Box 44
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New Zealand

Attention: **Steve Tyson and Greg Blomfield**

Report No.: **Rp 001 20180532**

Document Control

Status:	Rev:	Comments	Date:	Author:	Reviewer:
Approved	-	-	25 Oct 2018	Nicolas Courrier	Peter Ibbotson Craig Fitzgerald

EXECUTIVE SUMMARY

Noise emissions from Refining NZ and Northport were measured between May and July 2018. A shutdown at the refinery occurred during this time.

Both short duration attended measurements and long duration unattended logging measurements were carried out. Measurement were carried out to capture the following scenarios:

- When there was no appreciable noise generated by Northport or Refining NZ;
- Activity occurring only at Northport; and
- Normal activity occurring at both Northport and Refining NZ.

The purpose of the measurements was to establish the relevant contribution of Refining NZ and Northport to the overall average level of noise received in the surrounding residential areas.

The logging measurements showed that the average level of noise when both the Refining and Northport were operating was 47 dB L_{Aeq} at 14 The Heights when assessed over several night periods[1] in "downwind" conditions. The measurements indicate the following noise levels are received from each source:

- Northport: 43 dB L_{Aeq}
- Refinery: 44 dB L_{Aeq}
- Other environmental sources: 39 dB L_{Aeq}
- **TOTAL:** **47 dB L_{Aeq}**

The above results are commensurate with the noise levels measured during attended surveys.

Noise levels may be higher than the average noise level on some nights. It was noted that higher noise levels occurred under specific wind conditions, namely when average windspeeds were around 2m/s from a direction of 223 degrees compass. Under such circumstances, noise propagation from the port and refinery would have been considerably enhanced. Such meteorological conditions may sit outside the weather conditions defined in NZS6801:2008. Therefore, it is considered that higher noise levels in such conditions would not breach the District Plan noise standard.

Overall, the 2018 noise measurements indicate that the long-term average noise level from Refining NZ and Northport operations could be just compliant with the 45 dB L_{Aeq} District Plan night-time noise standard (when noise from each site is considered individually and when assessed at 14 The Heights).

[1] Assessed over 2200 to 0500 hours to avoid bird noise contamination

TABLE OF CONTENTS

1.0 INTRODUCTION

Marshall Day Acoustics (MDA) has been engaged by both Northport and Refining New Zealand to carry out noise measurements during the Marsden Point Refinery shut down. The purpose of the measurements is to quantify noise emissions from both Refining NZ and Northport as follows:

- Background and ambient noise measurements during the shutdown and in the absence of ship loading noise at Northport
- Noise from ship loading activity at Northport measured during the refinery shutdown
- Noise emissions from Refining NZ as quantified by measuring the increase in noise level once the refinery is operational again

This data would be of benefit to both Refining NZ and Northport.

A Glossary of Terminology is provided in Appendix A.

2.0 SITE OPERATION

Refining NZ carries out continuous refining of oil. During operation, the environmental noise emissions from the site are generally constant.

The operation of Northport is associated with the loading and unloading of ships, as well as other on-site activity as required.

3.0 MEASUREMENT LOCATIONS

The following measurement locations have been used as part of this assessment.

Table 1: Measurement Locations

REF	LOCATION	COORDINATES NZTM
MP1 (LOGGER #1)	14 The Heights[2]	1735422 6034339
MP3	Conservation reserve, Reotahi, 25 Beach Road	1735367 6034122
MP4	Beach Road, boat shed outside 21 Beach Road	1735275 6034505
MP5	Reotahi lookout	1735123 6034505
MP6	Taurikura Beach, 2345 Whangarei Heads Road	1738089 6034094
MP7	Urquharts Bay, outside 7 Urquharts Bay Road	1738719 6032596
MP8	Corner of Papich Road and Marsden Bay Drive	1733064 6032860
MP9	Marsden Bay, East end of Beach	1733284 6033261

The locations of the above measurement positions are indicated on the aerial map in Appendix B.

[2] This dwelling is one of the closest to NZ Refining and Northport and has an elevated view of both operations. It is considered representative of the most exposed dwellings in Reotahi.

4.0 NOISE PERFORMANCE STANDARDS

The Refining NZ site is zoned as "Business 4" in the Whangarei District Plan. Northport is zoned as "Marsden Point Port".

The District Plan was changed when PC110 became operative in 2016. Changes to the zone noise rules as part of that plan change are not significant: the daytime and night-time noise rules at the nearby Living Environments, Urban Transition and Countryside Environments are now 55 dB L_{Aeq} daytime and 45 dB L_{Aeq} / 75 dB L_{AFmax} night-time. Previously these L_{Aeq} noise limits were in terms of the L_{A10} parameter. The change in noise limit results in marginally more liberal limits applying to the operation of the Refinery in-terms of day-to-day noise.

The key noise limit from the District Plan is 45 dB L_{Aeq}. The noise limit of 75 dB L_{AFmax} may also require consideration although this would only potentially be breached by single loud impulsive noises.

A summary of the noise rules is included in Appendix E.

5.0 NOISE SURVEY

5.1 Long-Term Measurements

Long-term unattended measurements were carried out over the period 14th May to 10th July 2018. Weather conditions during this period were variable. Some periods of very heavy rain were experienced which resulted in no data being obtained on the 20th and 21st June 2018. Weather station data from a nearby NIWA weather station has been used to determine typical conditions over this period.

Refinery shutdown was scheduled between 15th to 24th May 2018, however it is understood that the shutdown duration was extended and the hydrocracker was not restarted until 25th June 2018. It is assumed that other plant would have been brought on line prior to the restarting of the hydrocracker, but this has not been confirmed by Refining NZ.

Noise measurements were generally carried out in accordance with the relevant New Zealand Standards.

Results from these surveys are summarised graphically in Appendix C. The excluded heavy rain periods[3] are yellow underlined on those graphs. Weather conditions throughout the majority of the measurement period were mostly suitable for noise measurement.

A summary of average noise levels measured over the night period (10pm to 5am) are summarised in the following tables. Note that night time noise measurements do not include the hour between 0600 and 0700 hours as this is typically dominated by bird calls.

[3] A level of greater than 6 mm/hr has been used as the threshold between "moderate rain" and "heavy rain".

Table 2: Summary of Unattended Environmental Noise Level Measurements

Measurement Date		Measured Night-Time Noise Levels (dB)			Meteorological Conditions Shading represents conditions considered to be representative of "downwind" conditions where windspeeds would not have resulted in elevated ambient noise levels.
		L_{A10}	L_{Aeq}	L_{A90}	
MP1 (14 The Heights, Reotahi). Downwind is 190 degrees from Refining NZ and 240 degrees from Northport[4]					
14-May	15-May	41	39	34	Average Wind 1.1 m/s, 184 degrees
15-May	16-May	44	41	37	Average Wind 1.1 m/s, 89 degrees
16-May	17-May	45	43	40	Average Wind 1.6 m/s, 133 degrees
17-May	18-May	46	45	42	Average Wind 0.5 m/s, 134 degrees
18-May	19-May	42	41	37	Average Wind 0.6 m/s, 125 degrees
19-May	20-May	42	41	38	Average Wind 0.9 m/s, 209 degrees
20-May	21-May	39	45	35	Average Wind 1.3 m/s, 260 degrees
21-May	22-May	45	43	39	Average Wind 1.2 m/s, 143 degrees
22-May	23-May	47	47	41	Average Wind 3.6 m/s, 323 degrees
23-May	24-May	48	48	43	Average Wind 1.2 m/s, 176 degrees
24-May	25-May	42	41	39	Average Wind 2.4 m/s, 296 degrees
25-May	26-May	45	45	39	Average Wind 1.4 m/s, 246 degrees
26-May	27-May	49	48	43	Average Wind 1.7 m/s, 244 degrees
27-May	28-May	51	49	47	Average Wind 0.8 m/s, 245 degrees
28-May	29-May	51	55	47	Average Wind 0.6 m/s, 171 degrees
29-May	30-May	46	45	42	Average Wind 0.4 m/s, 155 degrees
30-May	31-May	47	46	43	Average Wind 0.5 m/s, 158 degrees
31-May	1-Jun	48	47	45	Average Wind 0.4 m/s, 162 degrees
1-Jun	2-Jun	50	49	39	Average Wind 1.7 m/s, 86 degrees
2-Jun	3-Jun	54	53	44	Average Wind 3.2 m/s, 68 degrees
3-Jun	4-Jun	51	51	42	Average Wind 2.4 m/s, 92 degrees
4-Jun	5-Jun	48	47	44	Average Wind 2 m/s, 258 degrees
5-Jun	6-Jun	53	52	49	Average Wind 1.8 m/s, 223 degrees
6-Jun	7-Jun	49	50	44	Average Wind 1.3 m/s, 203 degrees

[4] Note that ISO1996-2 defines "downwind conditions" as within +/- 60 degrees during daytime and +/- 90 degrees during night-time. The value given is the direct downwind vector, but acoustically downwind conditions will occur when the wind direction is broadly between 120 and 300 degrees compass.

Measurement Date		Measured Night-Time Noise Levels (dB)			Meteorological Conditions Shading represents conditions considered to be representative of "downwind" conditions where windspeeds would not have resulted in elevated ambient noise levels.
		L_{A10}	L_{Aeq}	L_{A90}	
7-Jun	8-Jun	50	49	46	Average Wind 1 m/s, 201 degrees
8-Jun	9-Jun	49	47	44	Average Wind 0.4 m/s, 170 degrees
9-Jun	10-Jun	44	43	39	Average Wind 0.3 m/s, 197 degrees
10-Jun	11-Jun	49	48	42	Average Wind 2.2 m/s, 157 degrees
11-Jun	12-Jun	49	48	46	Average Wind 2.2 m/s, 233 degrees
12-Jun	13-Jun	42	40	37	Average Wind 2.1 m/s, 290 degrees
13-Jun	14-Jun	45	44	40	Average Wind 0.5 m/s, 144 degrees
14-Jun	15-Jun	43	42	39	Average Wind 0.6 m/s, 154 degrees
15-Jun	16-Jun	44	42	38	Average Wind 0.6 m/s, 167 degrees
16-Jun	17-Jun	44	42	39	Average Wind 0.7 m/s, 165 degrees
17-Jun	18-Jun	43	41	38	Average Wind 1.1 m/s, 188 degrees
18-Jun	19-Jun	41	40	36	Average Wind 2.5 m/s, 265 degrees
19-Jun	20-Jun	43	42	37	Average Wind 0.4 m/s, 205 degrees
20-Jun[5]	21-Jun	-	-	-	Average Wind 5 m/s, 132 degrees
21-Jun	22-Jun	48	46	42	Average Wind 1.4 m/s, 176 degrees
22-Jun	23-Jun	45	44	40	Average Wind 0.4 m/s, 240 degrees
23-Jun	24-Jun	38	37	34	Average Wind 1 m/s, 101 degrees
24-Jun	25-Jun	44	45	38	Average Wind 2.6 m/s, 299 degrees
25-Jun	26-Jun	52	51	47	Average Wind 2.2 m/s, 286 degrees
26-Jun	27-Jun	51	50	47	Average Wind 0.7 m/s, 170 degrees
27-Jun	28-Jun	49	47	43	Average Wind 0.4 m/s, 164 degrees
28-Jun	29-Jun	49	48	45	Average Wind 0.4 m/s, 169 degrees
29-Jun	30-Jun	47	46	45	Average Wind 0.5 m/s, 154 degrees
30-Jun	1-Jul	46	44	42	Average Wind 0.4 m/s, 171 degrees
1-Jul	2-Jul	47	47	44	Average Wind 1 m/s, 182 degrees
2-Jul	3-Jul	51	50	47	Average Wind 0.6 m/s, 131 degrees

[5] Night excluded because of heavy rain (greater than 6mm/hr) and strong wind (greater than 5m/s) conditions.

Measurement Date		Measured Night-Time Noise Levels (dB)			Meteorological Conditions Shading represents conditions considered to be representative of "downwind" conditions where windspeeds would not have resulted in elevated ambient noise levels.
		L_{A10}	L_{Aeq}	L_{A90}	
3-Jul	4-Jul	50	49	47	Average Wind 1 m/s, 182 degrees
4-Jul	5-Jul	51	49	47	Average Wind 0.8 m/s, 178 degrees
5-Jul	6-Jul	45	44	41	Average Wind 0.4 m/s, 149 degrees
6-Jul	7-Jul	43	41	39	Average Wind 0.6 m/s, 177 degrees
7-Jul	8-Jul	44	42	38	Average Wind 0.7 m/s, 182 degrees
8-Jul	9-Jul	43	42	39	Average Wind 4.8 m/s, 324 degrees
9-Jul	10-Jul	47	45	42	Average Wind 3.5 m/s, 317 degrees
Average[6] over proposed shutdown period 14 May to 24 May		44	44	39	Downwind average only
Average over shutdown 14 May to 24 June		46	47	41	Downwind average only
Average post shutdown 24 June to 10 July		47	47	44	Downwind average only

[6] Arithmetic averages have been used for the L_{A10} and L_{A90} values. Energy averages have been used for the L_{Aeq} values.

5.2 Attended Noise Measurement Surveys

Short term attended measurements were also carried out on two nights: 14th May 2018 and 21th May 2018.

On the 14th May, Refining NZ was mostly shut down and Northport was not loading ships. Attended measurements during this period were of background in absence of activity. On the 21th May, refinery shut down, but bundle bay blasting was understood to be occurring, and three ships were observed at Northport.

These are summarised in the Table 3. Noise measurements are given chronologically.

Table 3: Summary of Environmental Noise Level Measurements

Measurement Position Date / Start time [mm:ss] Duration [mm:ss]		Measured Noise Levels [dB]				Noise Sources and Comments
		L_{A10}	L_{Aeq}	L_{A90}	L_{AFmax}	
MP5	14 May 2018 / 19:07 10:00 min duration Light wind, constant from north	36	35	33	39	Crickets and distant traffic on SH15 dominates. Human noises at significant distance and intermittent bird calls and dogs. Port and refinery close to inaudible (no ships on port). Little refining noise.
MP3	14 May 2018 / 19:26 10:00 min duration Light wind from variable directions.	40	38	34	38	Birds, and water from stream dominates. Distant human voice also contributes. No noise from refinery or port clearly audible.
MP4	14 May 2018 / 19:40 05:00 min duration Light wind from variable directions.	40	40	38	47	Water from stream (recent heavy rain) and crickets dominates. Intermittent people conversing in carpark also contribute. No noise from refinery or port clearly audible. Short measurement as consistent levels
MP6	14 May 2018 / 20:03 10:00 min duration Light wind from variable directions.	36	35	34	42	Crickets, transformer hum or spa dominates. Birds, wavelets lap on shore and occasional resident noise also contribute. Distant noise from direction of refinery but possibly boat.
MP7	14 May 2018 / 20:19 10:00 min duration Light wind occasionally from behind.	47	45	41	53	Wave slap on sea wall, insects and crickets dominate. Birds also contribute. No noise from refinery or port clearly audible.

Measurement Position Date / Start time [mm:ss] Duration [mm:ss]		Measured Noise Levels [dB]				Noise Sources and Comments
		L_{A10}	L_{Aeq}	L_{A90}	L_{AFmax}	
McLeod Bay[7]	14 May 2018 / 20:50 5:00 min duration Light wind variable	34	33	31	44	Not much noise, distant stream audible due to recent rain. Morepork, water noise. Port not audible.
MP8	14 May 2018 / 22:05 11:13 min duration Light wind variable	31	29	27	53	Not much noise here, distant drone from port area. No noise from refinery audible. Vehicle noise from the port area at time. No bangs audible. Wind felt is possibly from port direction at times. Bird noise and dog bark
MP9	14 May 2018 / 22:55 10:00 min duration Light wind variable	35	32	29	47	Ship arrives at 2254 at end of measurement. Prior to ship arrival, noise levels mainly set by loader noise behind stockpiles. Ship starts making new noise when docked at around 35 dB. Possibly generator or bow thruster noise.
MP9	14 May 2018 / 22:37 15:00 min duration Light wind variable	38	36	31	44	Measurement of ship noise post arrival. Comes and goes. Period of quiet after 2258. Shouted voices audible. Reversing beeper and mobile plant moving around. Port comes to life now. Deeper sound audible from 2302 and consistent. Bit of a drone.
MP5	21 May 2018 / 18:15 15:00 min duration Wind westerly.	45	44	42	63	Port dominates (ship being loaded continuously at western end of port). Crickets also contribute. Bundle bay not clearly audible. Mobile plant visible but not readily audible. Level of 63 dB L_{AFmax} sounds like high frequency tool hitting boat side. Sets L_{Aeq} and L_{A90}. Possibly some refinery hammering.

[7] 1923 Whangarei Heads Road, this position is not shown on the appended map.

Measurement Position Date / Start time [mm:ss] Duration [mm:ss]		Measured Noise Levels [dB]				Noise Sources and Comments
		L_{A10}	L_{Aeq}	L_{A90}	L_{AFmax}	
MP3	21 May 2018 / 18:45 13:00 min duration Light but constant westerly side wind.	45	43	40	48	Ship being loaded at refinery dominates. Port screened at this location by headland. Noise from ship undulates in level, almost cyclic over long period. Crickets and birds also contribute. Intermittent noise from chain on dinghy retrieval. Banging or port loading not obviously audible if at all.
MP4	21 May 2018 / 19:03 09:00 min duration Light wind from variable directions.	43	42	41	49	Crane at port dominates. Crickets, bird calls also contribute. Port crane noise varies and undulates. Little other extraneous noise or port noise. Occasional impulsive events, not as often as at Reotahi lookout. Motor crane noise stops at 19:12:33. No banging in evidence before or after this time.
MP6	21 May 2018 / 19:47 09:00 min duration Light wind from variable directions.	43	42	39	50	Ship loading at refinery dominates. Port screened at this location by headland. Small amount of thunder noise from brief heavy thunderstorm that just occurred. Bit of a drone from ship or ship loader. Intermittent distant music Water and tide noises, dripping water.
MP7	21 May 2018 / 20:21 15:00 min duration Light wind from East and West.	41	40	38	50	Ship loading at refinery and banging of cranes at port dominate. Water and tide noises. Intermittent bird noise. L_{AF} - Impulsive noise levels between 40 and 47 dB.
Mcleod Bay	21 May 2018 / 20:48 09:00 min duration Light wind from variable directions.	36	34	32	44	Port loading noise dominates. Frequent traffic paused out. Bangs at port are minor, around 40 dB L_{AFmax} at times. Very light winds. Birds calls are 40 to 45 dB. Crane motor is 30 to 35 dB L_{Aeq}.
MP8	21 May 2018 / 22:30 10:00 min duration Light wind from variable directions.	37	35	32	48	Port loading noise. Bangs and crane motors. crane motor noise 33 dBA approx. Bangs regular and up to 47 dBA at 2235. Bundle bay blasting not really audible here. Perhaps may have been just audible on arrival but not certain. High pitch bell ring type noise.

Measurement Position Date / Start time [mm:ss] Duration [mm:ss]		Measured Noise Levels [dB]				Noise Sources and Comments
		L_{A10}	L_{Aeq}	L_{A90}	L_{AFmax}	
MP9	21 May 2018 / 22:55 10:00 min duration Light wind from variable directions.	35	33	31	45	Lights on cranes at harbour and sea ends of wharf (still three ships in port). Cranes not moving during measurement up until 2304. Voices audible at times. Tide in.
MP9	21 May 2018 / 23:12 10:00 min duration Light wind from variable directions.	38	35	31	48	Seaward cranes moving, but no banging. Harbour cranes not moving. Motor whine is audible. Port noise is minor, but potentially bundle bay is audible at 2317 hours. Noise level is 37 to 39 dBA from refinery. Very constant sounds like sand blasting noise. Slight downwind felt during this part of measurement. Bangs from port at 2320 hours c. 42 dBA. Noise from refinery drops to around 34 dBA at times, possibly meteorological. If level measured is blasting, the noise level is 34 to 39 dBA in downwind or neutral conditions. Suggest around 36 dBA on average.

5.3 Special Audible Characteristics

New Zealand Standard NZS 6802:2008 *"Acoustics - Environmental Noise"* sets out situations when special audible characteristics corrections are appropriate. In situations where special audible characteristics are present, noise levels are adjusted upward to reflect the increased annoyance that may result in the community.

Historic measurements of noise from Refining NZ suggest that the noise is broadband, relatively benign in character and is not tonal or impulsive. A special audible characteristics correction to Refining NZ operations is not required.

Whether it is appropriate to apply a special audible characteristic correction to noise from Northport largely depends on the management of noise and expectations from the community. The character of noise emissions from the port are naturally transient and fluctuate in level, and the activity is also within a special zone where noise rules have potentially been set based on the known "character" of noise from the operation.

Noise from mobile plant (e.g. carriers), container operations and log loading are operations that residential landowners will recognise as necessary and appropriate use of the site. It is understood that when noise from Northport is raised as an issue by the community, it often relates to a one-off or unusual event during log loading, for example, potentially when a log is dropped into a ship hull rather than placed. In this situation, residents are likely responding to impulsive noise events that they consider to be unnecessary, avoidable and unexpected, and not a reasonable part of the operation if it was (or became) standard practice.

If the character and level of impulsive and tonal noise emissions from the port can be managed to minimise those "unnecessary and unexpected" events as far as practicable then it is considered that

special audible characteristic adjustments should not apply. This requires thorough and diligent noise management measures aligned with Section 8 of the Port Noise Standard NZS 6809:1999.

A special audible characteristic correction has not been applied to Northport on this basis.

6.0 COMPLIANCE DISCUSSION

Although the purpose of these measurements is not to necessarily determine whether compliance with the noise rule is being achieved, the measurement results demonstrate the following:

6.1 Long-Term Logging

- During the Refining NZ shutdown period (14th May to 24th May) the average night-time L_{Aeq} noise level at 14 The Heights was 44 dB L_{Aeq}. It is considered that the predominant environmental noise received at 14 The Heights over this period would have been primarily Northport. Other minor environmental noise would have also contributed to the noise level during this time.

  This is demonstrated by a comparison of the following periods[8]:

  - 14th May to 15th May (no ships in port at early part of evening): 39 dB L_{Aeq}
  - 21st to 22nd May (3 ships in port, ship at refinery at early part of evening): 43 dB L_{Aeq}

  During these periods, wind conditions were relatively light and were from similar directions. It can be seen that noise levels were around 4 decibels higher when ships were docked. A comparison of noise levels over both periods is provided in Appendix D.

  This level of noise would comply with the 45 dB L_{Aeq} night-time noise rule in the Whangarei District Plan.

- When the period 14th May to 25th June is considered (i.e. prior to the hydrocracker restarting), the overall average noise level increases to 47 dB L_{Aeq}. It is not known what additional sources of noise from the refinery operated during this period. It is notable that the background noise level over this longer period is only 2 decibels greater (the background increases from 39 dB L_{A90} to 41 dB L_{A90}). This indicates that some additional "constant" noise was audible after the 24th May which is likely related to the refinery operation.

- After the hydrocracker is restarted on the 25th June, it is assumed that Northport and Refining NZ operate typically. After this date, background noise levels increase to 44 dB L_{A90} which is likely due to the continuous hydrocracker operation (and potentially other associated refinery plant). The background noise level during this time is likely to be a reasonable approximation of the L_{Aeq} noise level that would be measured from Refining NZ in the absence of any noise from Northport.

- After the 25th June, the average measured ambient noise level is **47 dB L_{Aeq}**. This noise level is due to noise from operation from the Refining NZ, Northport and other environmental sources. From the data obtained over the period, it is considered that the indicative contribution from each source is as follows:

  - Northport: 43 dB L_{Aeq}
  - Refinery: 44 dB L_{Aeq}
  - Other environmental sources: 39 dB L_{Aeq}
  - **TOTAL: 47 dB L_{Aeq}**

[8] between 2200 and 0500 hours

It should be noted that there is uncertainty in the above assessment and the above should be considered only a guide as to the relative contribution from each source.

- It is noted that there are nights when the average noise level over than night period is above 45 dB L_{Aeq}. An example of a night when noise levels are elevated is the 5th to 6th June. On this night, noise levels were up to 52 dB L_{Aeq} with a background noise level of 49 dB L_{Aeq}.

  On this evening, an average wind speed of 1.8m/s was recorded with a direction of 223 degrees. Under these conditions, noise propagation from the port and refinery would have been considerably enhanced.

  The elevated background noise level suggests that noise from a fairly constant source was audible throughout the night. This suggests that noise from a constant source at the refinery could have been present, notwithstanding that transient noise from Northport could have also contributed to the overall noise level. As the logger is unattended, it cannot be determined that a third source was not present or that wind or wave noise contributed to the overall level. However, based on our analysis it is considered more likely that the elevated noise level on this night was due to refinery and/or Northport operations.

  It should be noted that NZS6801:2008 specifically directs that measurements should only be taken in the "upper limits of the meteorological category". Depending on cloud cover, the evening of the 5th to 6th June may be above the "upper limits of the meteorological category". In that situation, the noise levels would be excluded from any compliance assessment.

6.2 Attended Measurement Results

The short-term attended measurement results demonstrate the following:

No Refining NZ, No Northport Noise

- When the refinery is shut down and Northport is relatively quiet (i.e. no ships in port), ambient noise levels are relatively low in Reotahi and surrounding bays to the north of the channel. Ambient noise levels of between 35 to 40 dB L_{Aeq} and background noise levels of 30 to 38 dB L_{A90} were measured during the still, settled evening conditions at positions not affected by wave noise. At one location, wavelets on the nearby seawall resulted in ambient noise levels of 45 dB L_{Aeq}.
- The above noise measurements demonstrate that ambient noise levels are quite low, but there is still sufficient "residual" noise in the area to potentially affect future noise measurement made of the port or refinery. Therefore, any future measurements of refining or port noise should be adjusted appropriately for the level of "residual noise" present in the measurement. Typically, this adjustment will be only around one to two decibels. While this is not a significant adjustment, it should nevertheless be included in any future assessment.
- In the Marsden Bay Area (Albany Road and Papich Road), ambient noise levels are marginally lower. At these measurement locations, there is less likely to be residual noise affecting measurements of port or refining noise in still settled conditions.

Noise from ship loading operations (both sites)

- Measurements conducted when ships were being loaded at Northport indicate that noise levels of 40 to 44 dB L_{Aeq} were measured at various locations around Reotahi and surrounding bays. These measurements are commensurate with the long-term noise logging results. In the Marsden Bay Area (Albany Road and Papich Road), port activity was lower with noise levels of around 35 dB L_{Aeq}.

7.0 SUMMARY

Noise emissions from Refining NZ and Northport were measured between May and July 2018. A shutdown at the refinery occurred during this time.

Both short duration attended measurements and long duration unattended logging measurements were carried out. Measurement were carried out to capture the following scenarios:

- When there was no appreciable noise generated by Northport or Refining NZ;
- Activity occurring only at Northport; and
- Normal activity occurring at both Northport and Refining NZ.

The purpose of the measurements was to establish the relevant contribution of Refining NZ and Northport to the overall average level of noise received in the surrounding residential areas.

The logging measurements showed that the average level of noise when both the Refining and Northport were operating was 47 dB L_{Aeq} at 14 The Heights when assessed over the night period[9] in "downwind" conditions. The measurements indicate the following noise levels are received from each source:

- Northport: 43 dB L_{Aeq}
- Refinery: 44 dB L_{Aeq}
- Other environmental sources: 39 dB L_{Aeq}
- **TOTAL: 47 dB L_{Aeq}**

The above results are commensurate with the noise levels measured during attended surveys.

Noise levels may be higher than the average noise level on some nights. It was noted that higher noise levels occurred under specific wind conditions, namely when average windspeeds were around 2m/s from a direction of 223 degrees compass. Under such circumstances, noise propagation from the port and refinery would have been considerably enhanced. Such meteorological conditions may sit outside the weather conditions defined in NZS6801:2008. Therefore, it is considered that higher noise levels in such conditions would not breach the District Plan noise standard.

Overall, the 2018 noise measurements indicate that the long-term average noise level from Refining NZ and Northport operations could be just compliant with the 45 dB L_{Aeq} District Plan night-time noise standard (when noise from each site is considered individually and when assessed at 14 The Heights).

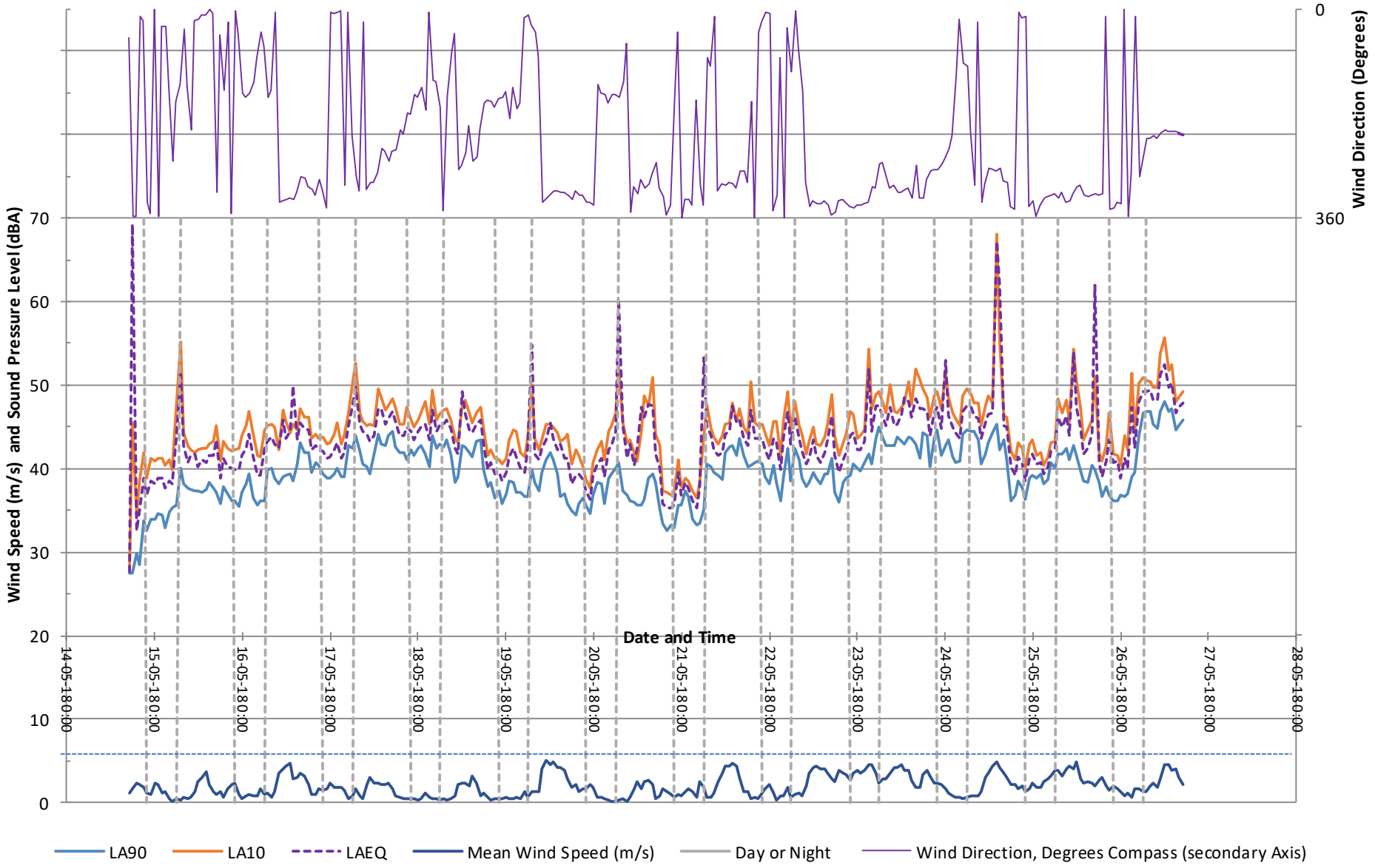
[9] Assessed over 2200 to 0500 hours to avoid bird noise contamination

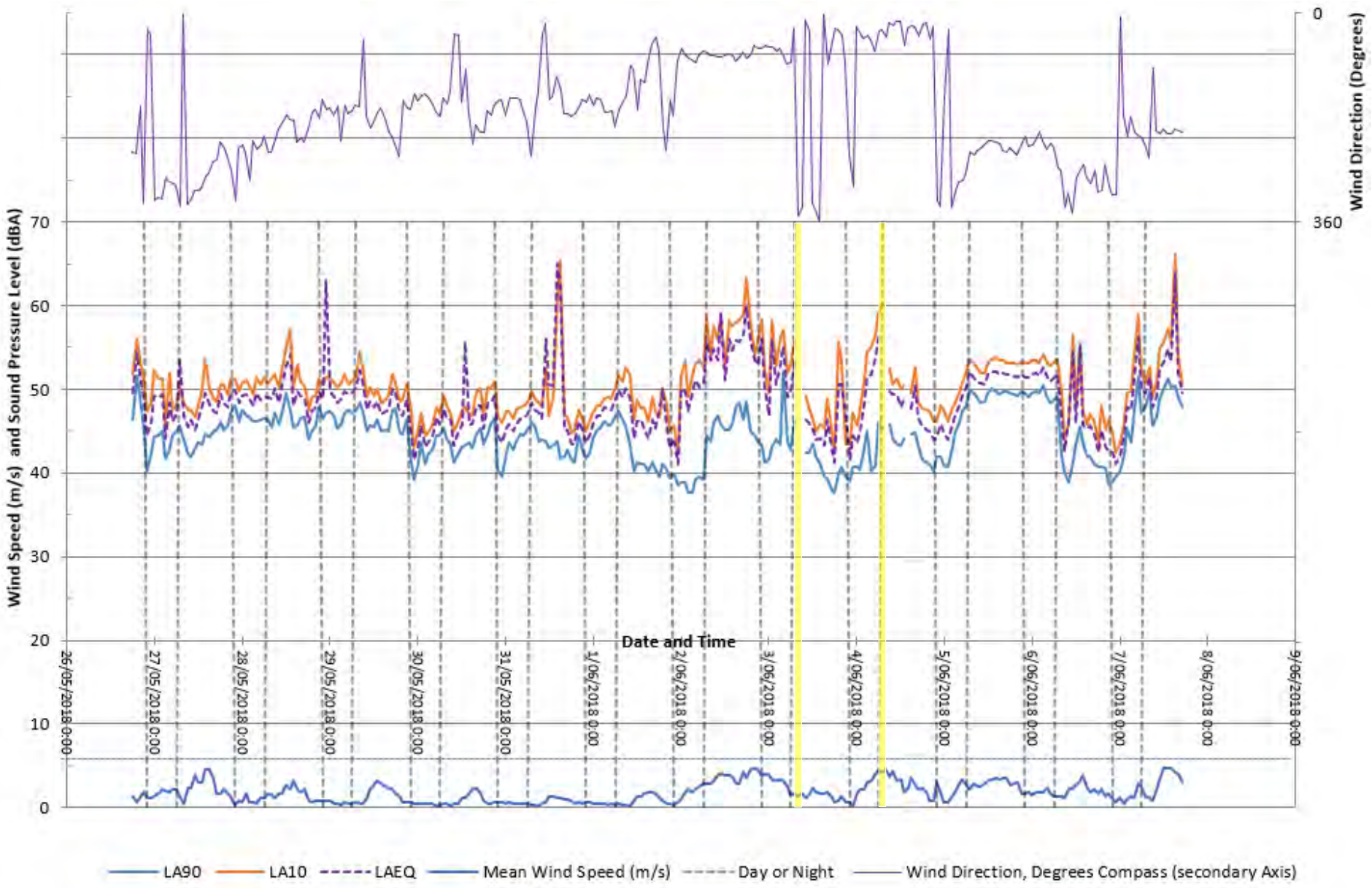
APPENDIX A GLOSSARY OF TERMINOLOGY

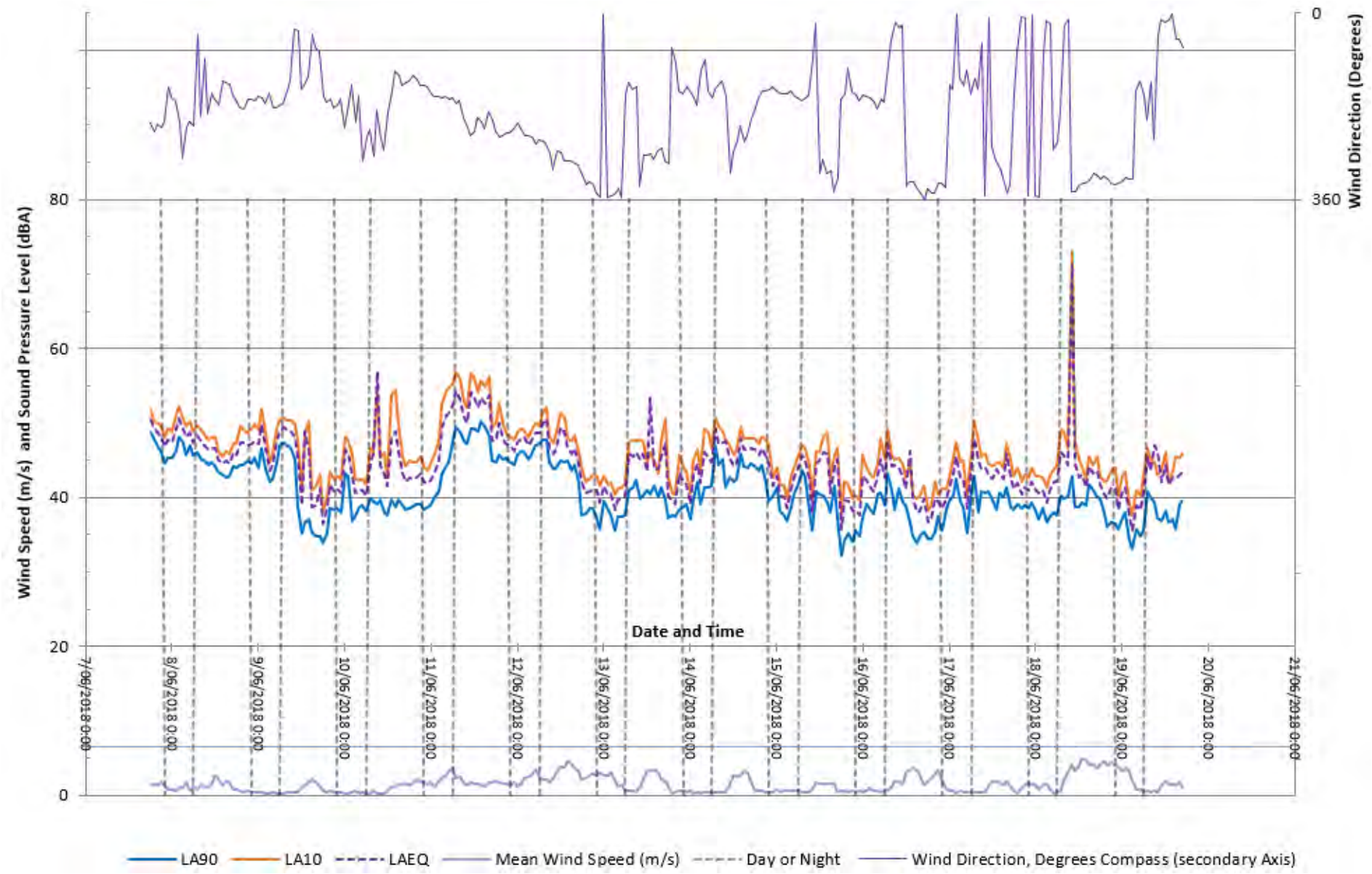
dBA	A measurement of sound level which has its frequency characteristics modified by a filter (A-weighted) so as to more closely approximate the frequency bias of the human ear.
L_{eq}	The time averaged sound level (on a log/energy basis) over the measurement period (normally A-weighted).
L_{10}	The sound level which is equalled or exceeded for 10% of the measurement period. L_{10} is an indicator of the mean maximum noise level and is used in New Zealand as the descriptor for intrusive noise (normally A-weighted).
L_{max}	The maximum sound level recorded during the measurement period (normally A-weighted).
Noise	A sound that is unwanted by, or distracting to, the receiver.
Ambient	The ambient noise level is the noise level measured in the absence of the intrusive noise or the noise requiring control. Ambient noise levels are frequently measured to determine the situation prior to the addition of a new noise source.
Rating Level	A derived level used for comparison with a noise limit
Special Audible Characteristics	Distinctive characteristics of a sound which are likely to subjectively cause adverse community response at lower levels than a sound without such characteristics. Examples are tonality (e.g. a hum or a whine) and impulsiveness (e.g. bangs or thumps).
NZS 6801:1999	New Zealand Standard NZS 6801:1999 *"Acoustics -Measurement of Environmental Sound".*
NZS 6802:1991	New Zealand Standard NZS 6802:1991 *"Assessment of Environmental Sound".*
NZS 6803P:1984	New Zealand Standard NZS 6803P:1984 *"The Measurement and Assessment of Noise from Construction, Maintenance and Demolition Work".*

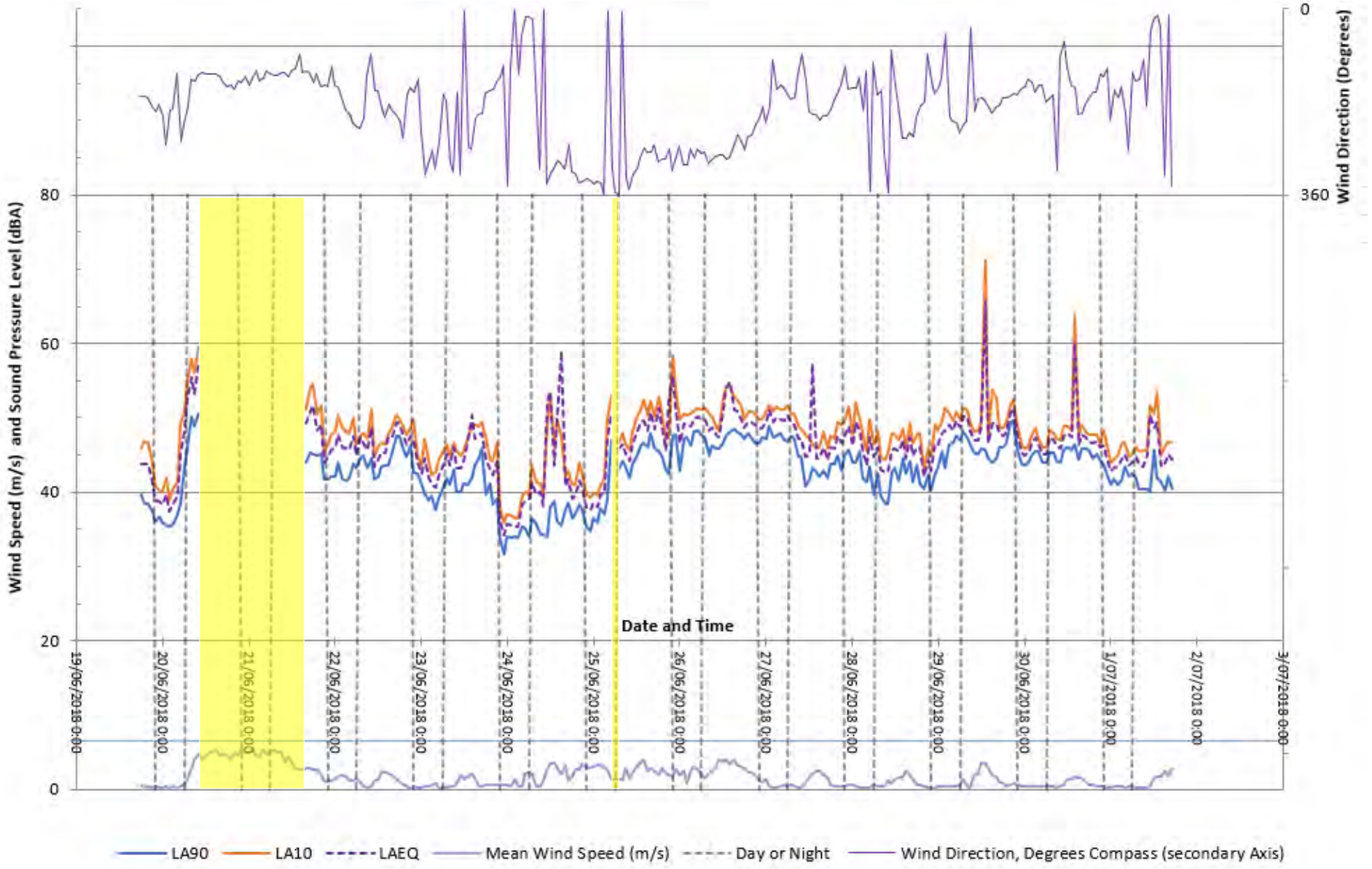
APPENDIX B RECEIVER AND MEASUREMENT POSITIONS

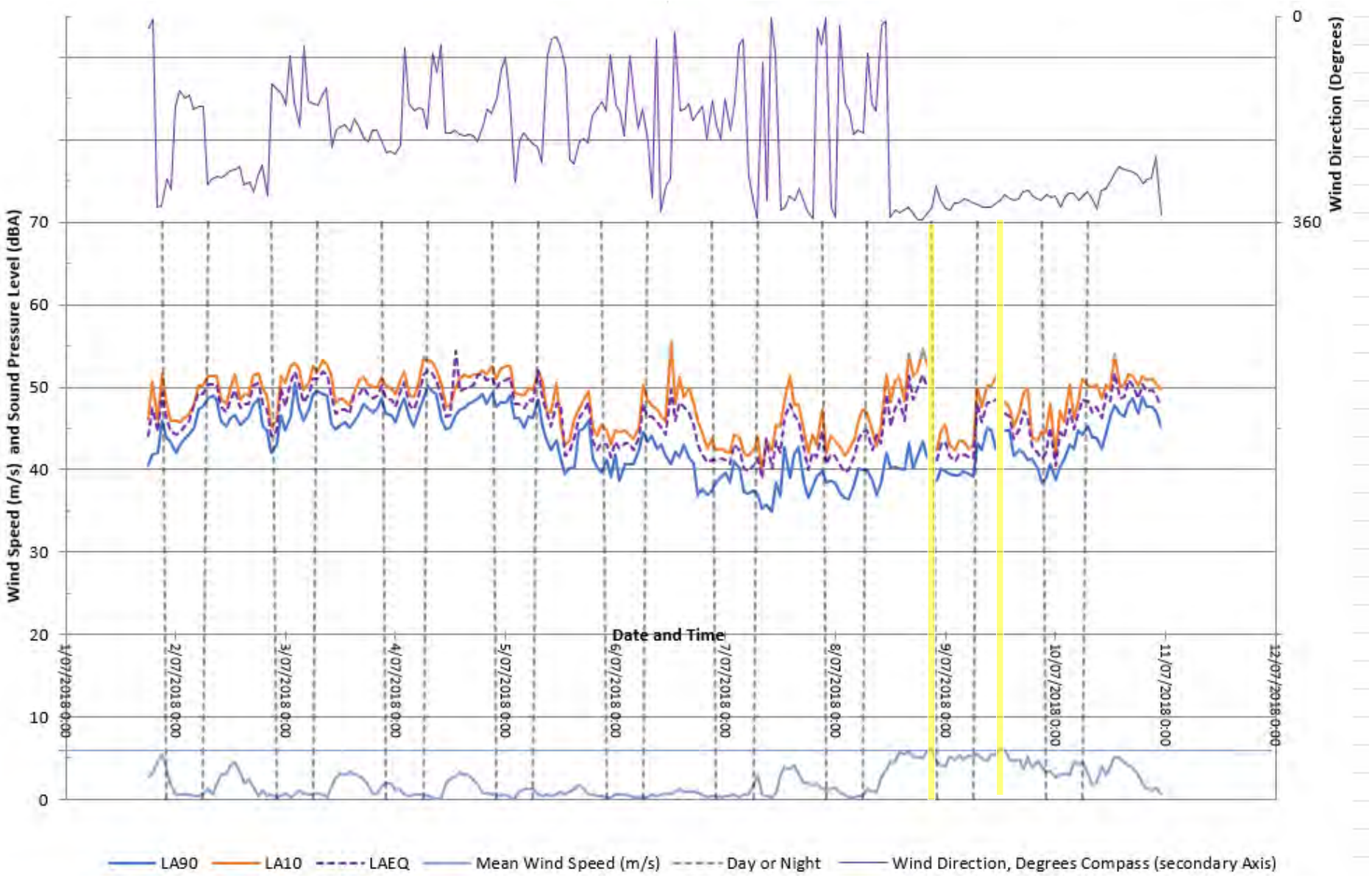
APPENDIX C UNATTENDED NOISE MEASUREMENTS. MP1 – 14 THE HEIGHTS, REOTAHI



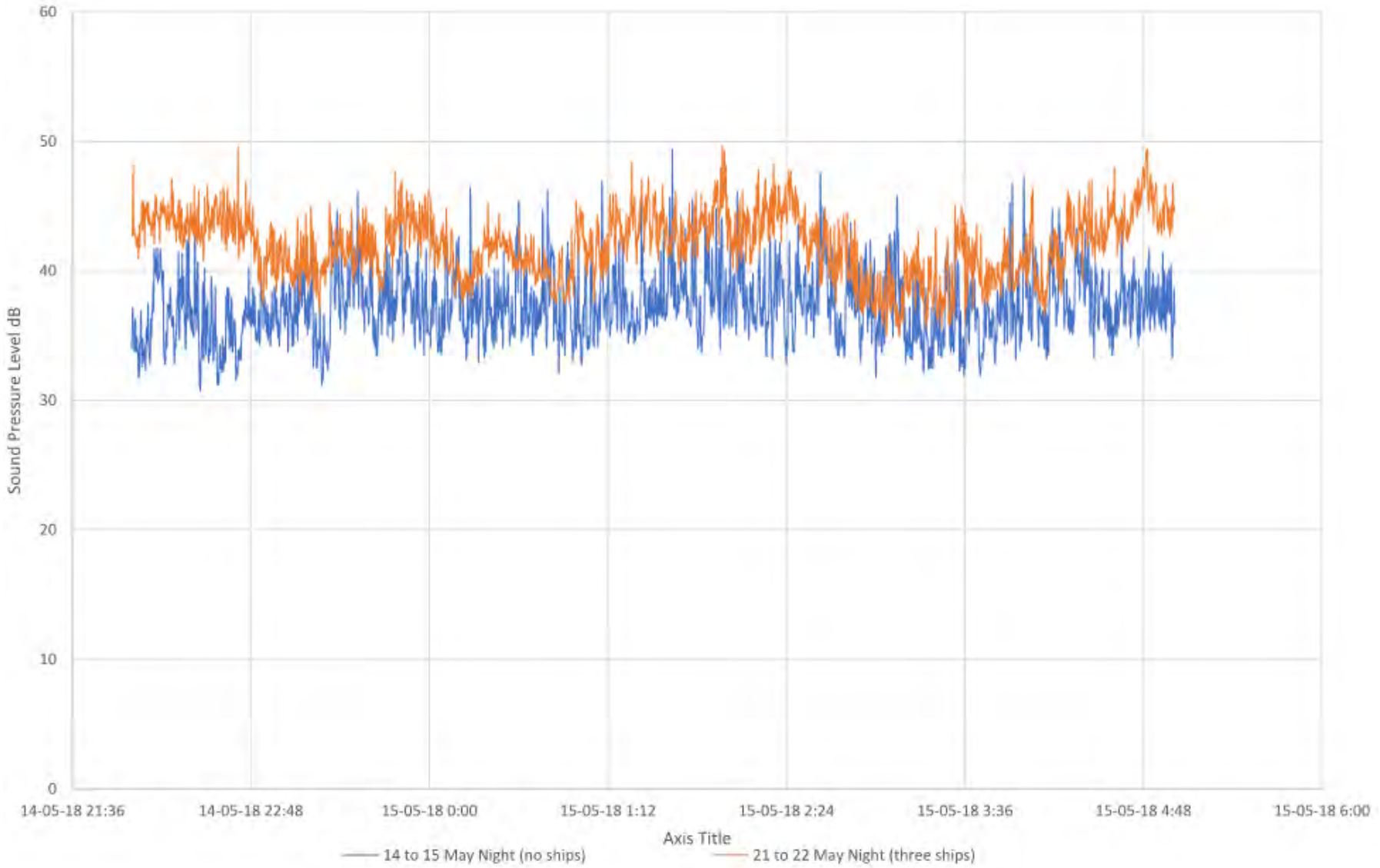








APPENDIX D SHUTDOWN COMPARISON



APPENDIX E DISTRICT PLAN NOISE LIMIT

Operative Noise Limits

Noise and Vibration

NAV.6.1 Noise Arising from Activities within Environments

The following noise limits shall apply within and between Environments:

Noise emitted from any site in the following Environment	Noise measured within the applicable boundary of any of the following Environments (refer to following table for applicable assessment location)	Daytime 0700 to 2200 hours	Night-time 2200 to 0700 hours		Notes 8,9
		dB L_{Aeq}	dB L_{Aeq}	dB L_{AFmax}	
Business 2 ~~Business 4~~ ~~Marsden Point Port~~	Living 1, 2, 3 Open Space Coastal Countryside Urban Transition Countryside Kamo Low/Medium Density Living	55	45	75	
Business 4 Marsden Point Port	Living 1, 2, 3 Urban Transition Countryside	55	45	75	

The above noise rules shall apply within the relevant boundary assessment location as set out below:

Site boundary	Notional Boundary
• Living 1, 2 • Kamo Low / Medium Density Living • Bulk Format Retail • Kamo Activity Precinct • Open Space • Business 1, 2, 3, 4 • Town Basin • Airport • Marsden Point Port • Port Nikau - Noise Zone 1 and 2 • Marsden Primary Centre - Noise Zone 1 and 2 • Marsden Primary Centre - Town Centre	• Living 3 • Coastal Countryside • Urban Transition • Countryside • Any noise sensitive activity not owned or controlled by the quarry owner or operator in a mineral extraction area

MEMO

MARSHALL DAY Acoustics

Project:	Northport Vision for Growth - Container Ship Unloading	**Document No.:**	Mm 003		
To:	Northport	**Date:**	6 September 2021		
Attention:	Greg Blomfield	**Cross Reference:**			
Delivery:	email	**Project No.:**	2020547A		
From:	Peter Ibbotson	**No. Pages:**	10	**Attachments:**	No
CC:					
Subject:	Container Ship Unloading - Measurement Summary				

SUMMARY

- **Noise measurements of container vessel Antwerp Bridge were carried out on 4 August 2021 at three locations:**
  1. **Norfolk Avenue Lookout**
  2. **Darch Point Road / Matuku St (on beach)**
  3. **Beach Road (southern end)**
- **Total noise levels (including all port, refinery and other natural and manmade sounds) were below 45 dB L_{Aeq} at all measurement locations**
- **Port noise levels emissions were very low overall. Occasional "noise events" were audible.**
- **The refinery was dominant at MP1 (Norfolk Avenue Lookout). This would have been the case at all dwellings that have direct line-of-sight to the refinery and the port.**
- **From the measurements of port noise events, we approximate port noise levels to have been around 27 dB $L_{Aeq\ (15\ min)}$ at the closest dwelling during unloading, however the exact level of noise is difficult to determine due to low levels of emission (and may be lower than calculated)**
- **Our overall subjective impression is that container handling appeared to be carried out carefully, with many container movements generating no audible noise at the measurement position. Container handling "noise events" did not dominate the environment overall and for the most part these cannot be readily separated from other noise events that occur in the area (e.g. bird calls, dog barks, boat movements)**

This memo summarises noise measurements carried out for Northport. Details of measurements are as follows:

Table 1: Noise measurement summary

Date	4 August 2021
Time	1912 to 2221 hours
Location	All measurements carried out in Reotahi. Refer Appendix A. MP1: Norfolk Avenue Lookout, southwest of playground. Line of sight to refinery and port MP2: Darch Point Road / Matuku St, on beach at end of walkway. Position chosen to remove contribution of refinery (which was screened by southern promontory) MP3: Beach Road, south end near 23 Beach Road. Screened from Refinery by recreation area headland
Meteorological Conditions	Overcast (4 to 8 Octas). Predominantly still, but with light downwind or sidewind (SW to SE) drift observed on smokestack (<0.5m/s). Northerly gusts started to develop late in measurement period but did not create significant extraneous noise. Likely Meteorological Class 4 or 5 conditions as defined by NZS6801:2008
Methodology	Measurements at each location included: • One 15 minute attended measurement (significant extraneous noises excluded). The results of this are summarised in Table 1 • A 1s logging period over 15 to 30 minutes. The results of this are summarised in Table 2 and in the graphs in Appendix B. These periods included some smoko / dinner breaks at the port
Operation	• Two cranes in operation lifting containers • "Antwerp Bridge" in port (2300 hrs, 3 Aug to 0600 hrs 08 Aug 2021) • Operation stopped at 2000 hrs and restarted at 2040 hrs (approx.)

Table 2: Attended Measurement Summary

		Measured levels (dB)			Dominant source, other sources
Position	**Date, time**	L_{Aeq}	L_{A90}	L_{AFmax}	
MP1	Norfolk Avenue Lookout **Attended measurement** (refer to appendix for separate logger measurement at same location) 4/08/2021 7:12:43 pm DUR: 15:12 mm:ss	43	42	49	Refinery. Six or seven audible port events, but refinery sets the level. Refinery is broadband benign noise level. Distant Plane, motorcycle, crickets, gull
MP2	Darch Point / Matuku Street Position **Attended measurement** (refer to appendix for separate logger measurement at same location) 4/08/2021 9:07:24 pm DUR: 15:01 mm:ss	36	34	45	Natural sounds: water trickling Large flock of birds unsettled at start of measurement (distant), Kiwi call, neighbour noise audible at times (including shower / water), minor port noise audible by few events (3 noted), distant traffic and music, wavelets Minor throb of diesel engine / generator is audible
MP3	Beach Road **Attended measurement** (refer to appendix for separate logger measurement at same location) 4/08/2021 10:04:17 pm DUR: 15:01 mm:ss	34	33	47	Various Wind starts to move from north at times, but still 80% still, plover shriek at end of measurement sets 47 dB L_{AFmax}, port noise L_{AFmax} events around 38 dBA. Around 4 audible port events measured.

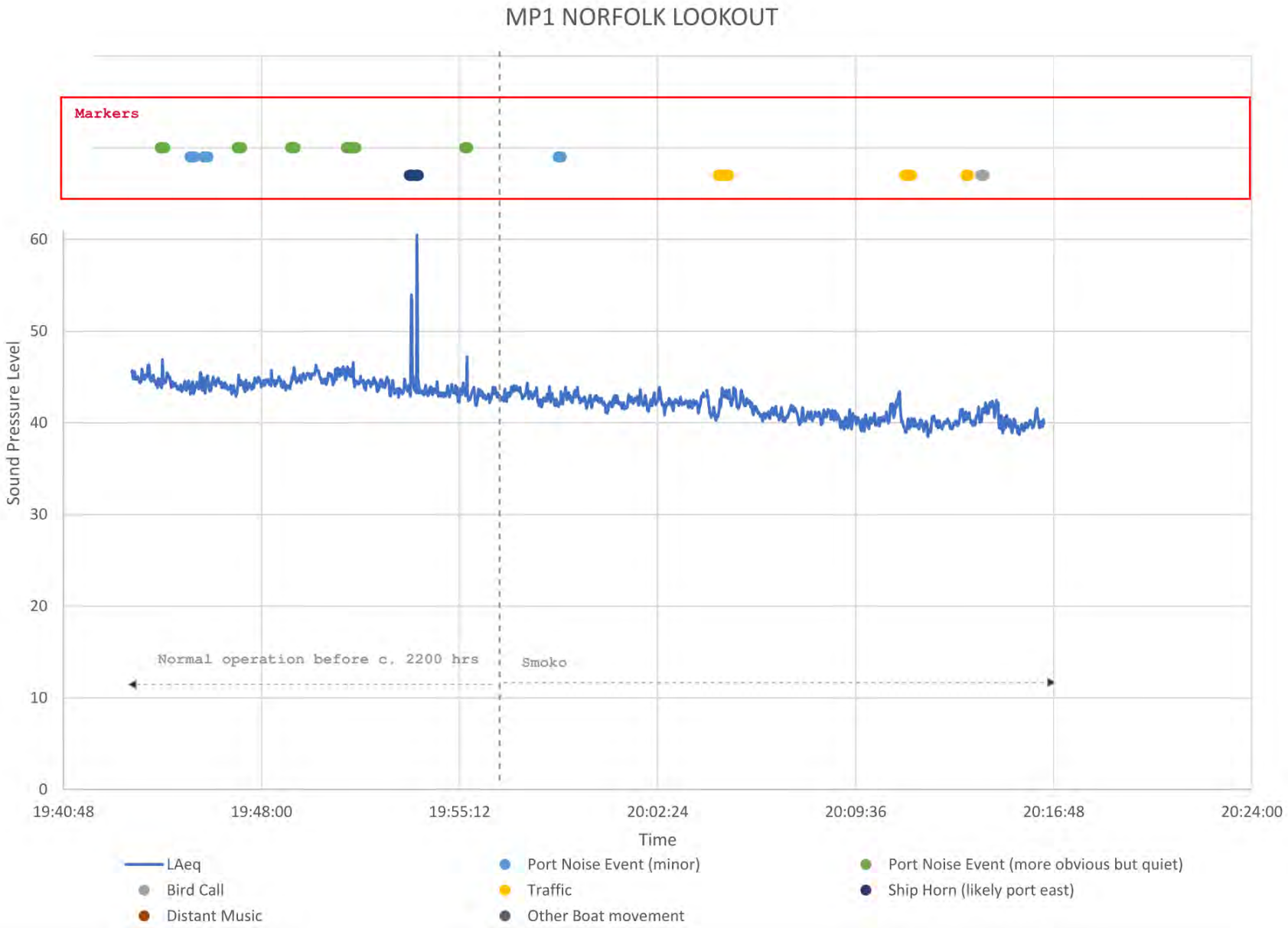
Table 3: Logger Measurement Summary

		Measured levels (dB)			Dominant source, other sources
Position	**Date, time**	**L_{Aeq}**	**L_{A90}**	**L_{AFmax}**	
MP1	Norfolk Avenue Lookout **Logger** 4/08/2021 7:43:17 pm DUR: 33:11 mm:ss	43	40	62	See graph in Appendix A L_{AFmax} set by two ship horn soundings. This did not appear to be from the Moana Chief, though it was difficult to tell.
MP2	Darch Point / Matuku Street Position **Logger** 4/08/2021 8:33:04 pm DUR: 29:33 mm:ss	38	35	45	See graph in Appendix A
MP3	Beach Road **Logger** 4/08/2021 9:43:33 pm DUR: 17:38 mm:ss	35	33	43	See graph in Appendix A

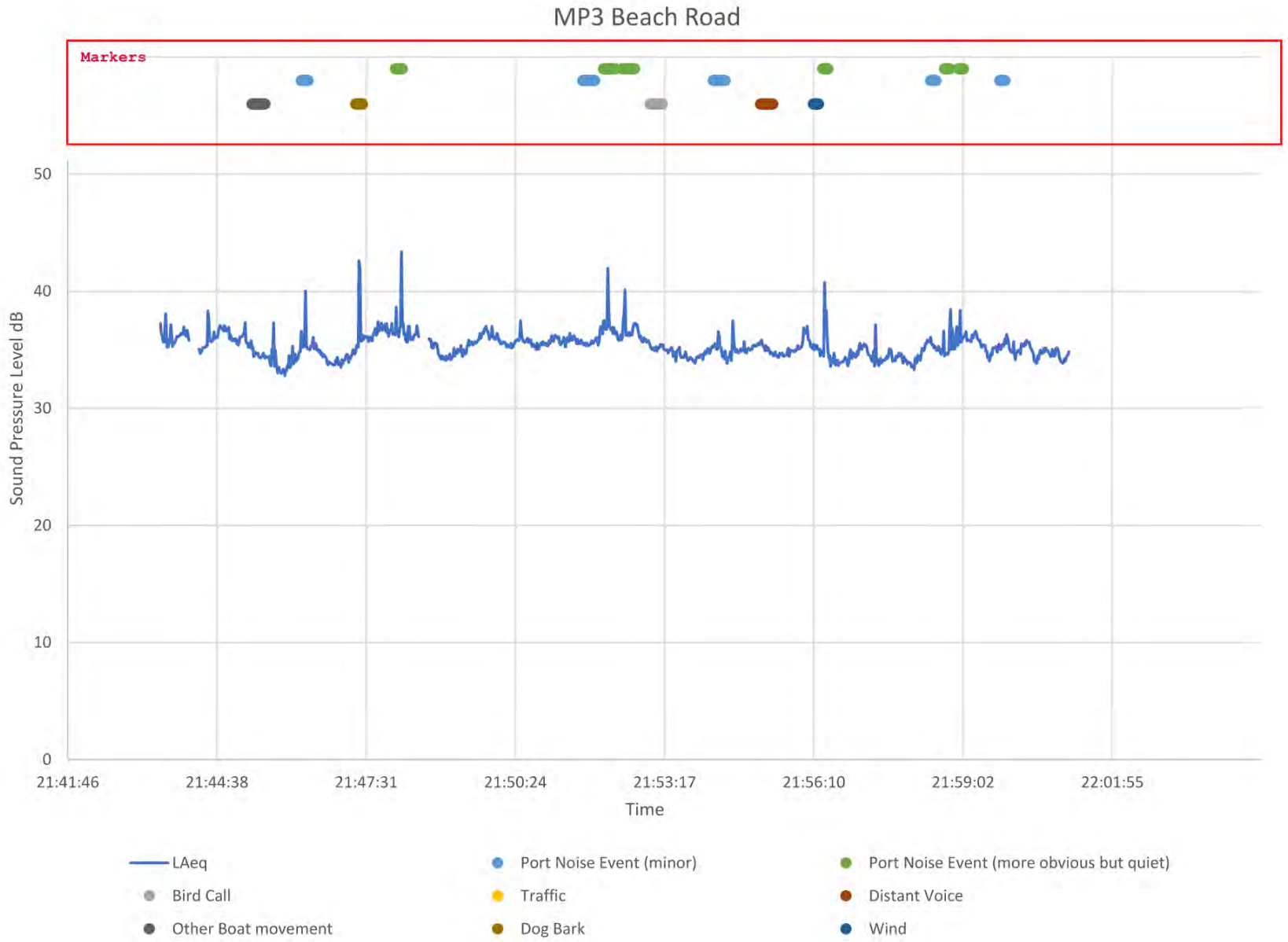
APPENDIX A MEASUREMENT LOCATIONS

APPENDIX B LOGGING RESULTS

(SEE OVER)


MP1 NORFOLK LOOKOUT
Markers
Sound Pressure Level
60
50
40
30
20
10
0
Normal operation before c. 2200 hrs
Smoko
19:40:48
19:48:00
19:55:12
20:02:24
20:09:36
20:16:48
20:24:00
Time
LAeq
Port Noise Event (minor)
Port Noise Event (more obvious but quiet)
Bird Call
Traffic
Ship Horn (likely port east)
Distant Music
Other Boat movement


MP2 Darch Point Road
Markers
Sound Pressure Level
50
40
30
20
10
0
Smoko
Operation continues
20:31:12
20:38:24
20:45:36
20:52:48
21:00:00
Time
Noise Level dB LAEQ (1 s)
Traffic
Boat Movement
Port Noise (Minor)
Bird
Dog Bark
Port Noise (more obvious, still quiet)
Distant Music


MP3 Beach Road
Markers
Sound Pressure Level dB
50
40
30
20
10
0
21:41:46
21:44:38
21:47:31
21:50:24
21:53:17
21:56:10
21:59:02
22:01:55
Time
LAeq
Port Noise Event (minor)
Port Noise Event (more obvious but quiet)
Bird Call
Traffic
Distant Voice
Other Boat movement
Dog Bark
Wind

APPENDIX C PHOTO OF SHIP UNLOADING

MEMO

MARSHALL DAY Acoustics

Project:	Northport Vision for Growth Container Ship Unloading MSC Vaiga III	**Document No.:**	Mm 004		
To:	Northport	**Date:**	7 March 2022		
Attention:	Greg Blomfield	**Cross Reference:**			
Delivery:	email	**Project No.:**	2020547A		
From:	Peter Ibbotson	**No. Pages:**	12	**Attachments:**	No
Subject:	Container Ship Unloading – Noise Measurement Summary				

SUMMARY

- Noise measurements of the unloading of container vessel MSC Vaiga III were carried out on 7 December 2021 at three locations in Reotahi:
  1. Norfolk Avenue Lookout
  2. Darch Point Road / Matuku St (on beach)
  3. Beach Road (southern end)
- Total noise levels (including all port, refinery and other natural and manmade sounds) were below 45 dB L_{Aeq} at all attended and unattended measurement locations
- Port noise levels were very low overall. Container handling "noise events" were audible at times.
- Measured noise levels at the Norkfolk Avenue Lookout during smoko (when cranes were not active) were very similar to noise levels measured once cranes resumed operation (43 dB L_{Aeq} vs 42 dB L_{Aeq} - very slightly louder during smoko). This indicates that the port did not materially add to overall noise levels in that part of Reotahi at that time.
- In addition to the above, longer term unattended noise monitoring was carried out at 4 The Heights. Measurements were carried out between 7 to 10 December 2021 at this location.
- The unattended logger was set to record audio when noise levels exceeded 60 dB L_{AFmax} at night. This was triggered frequently by dog and bird noise, mainly in the evening and morning. The logger was triggered only once by port noise (at 0217 hrs on 9 Dec 2021) due to what sounds like a container being moved. The L_{AFmax} noise level of this event was 61 dB $L_{AFmax.}$
- Noise levels at 4 The Heights ranged from 36 to 43 dB L_{Aeq} and 57 to 65 dB L_{AFmax} over the three nights of logging (analysed between 10pm and 5:15am to minimise influence of bird noise). The loudest noise event of 65 dB L_{AFmax} was due to a ruru (morepork) calling in the middle of the night.
- Our overall subjective impression is that container handling appeared to be carried out carefully, with many container movements generating no audible noise at the measurement position. Container handling "noise events" did not dominate the environment overall and for the most part these cannot be readily separated from other noise events that occur in the area based on review of the noise levels only (e.g. bird calls, dog barks, boat movements)

This memo summarises noise measurements carried out for Northport. Details of measurements are as follows:

Table 1: Noise measurement summary

Date and time	**Attended measurements:**	1958 hrs to 2230 hrs, 7 December 2021
	Unattended logging:	1915 hrs 7 December to 0900 hrs 10 December 2021
Location	All measurements carried out in Reotahi. Refer Appendix A for measurement locations. **Attended positions** **MP1 NZTM 1735096E, 6034483N**: Norfolk Avenue Lookout, southwest of playground. Line of sight to refinery and port **MP2 NZTM 1735009E, 6034725N**: Darch Point Road / Matuku St, on beach at end of walkway. Position chosen to remove contribution of refinery (which was screened by southern headland) **MP3 NZTM 1735260E, 6034200N**: Beach Road, south end near 23 Beach Road. Screened from Refinery by recreation area headland **Unattended logging position** **MP4 NZTM 1735337E, 6034348N**: 4 The Heights. Line of sight to refinery and port. Position as directed and agreed with Sarah Brick as suitable and representative.	
Meteorological Conditions	**Attended positions** Overcast (8 Octas). Initially a light northerly (<1m/s) falling to negligible winds with light drift at times for majority of measurements (likely <0.5m/s from variable direction). Likely Meteorological Class 4 conditions as defined by NZS6801:2008 **Unattended logging position** Whangarei weather station shows predominantly light winds over the period (0 to 2m/s during the night period and 1 to 3m/s during the day period). Whangarei wind directions were variable (north and south directions) on the night of 7 to 8 December, predominantly south/south-east on the night of 8 to 9 December, and from variable direction (east, south-east, and north) on the night of 9 to 10 December.	
Methodology	Measurements at each location included: **Attended Positions** • A 1s logging period over approx. 30 to 60 minutes. Continuous observations made of sources of noise. The results of this are summarised in Table 2 and in the graphs in Appendix B. The measurement at MP1 included a period when the port was not unloading the ship (dinner/smoko) followed by a period of unloading. **Unattended position** • A 15 min logging period over the three-night duration. The results of these measurements are summarised in Table 3 and in the graphs in Appendix B[1].	
Operation	**Northport** • Two cranes in operation lifting containers • "MSC Vaiga III" in port from 06/12/2021 at 1130hrs to 09/12/2021 at 1100 hrs. • During attended monitoring, container handling ceased at 2000 hrs and restarted at 2038 hrs on the 7 Dec 2021 **Refinery** • "Kokako" in port discharging crude oil from 5/12/2021 at 2130 hrs (prior to measurements period) to 8/12/2021 at 1200 hrs (Jetty 1) • "Kokako" in port loading refined products from 8/12/2021 at 1400 hrs to 11/12/2021 at 1600 hrs (after measurements end) (Jetty 2)	

Table 2: Attended Measurement Summary

		Measured levels (dB)			Dominant source, other sources
Position	**Date, time**	L_{Aeq}	L_{A90}	L_{AFmax}	
MP1	Norfolk Avenue Lookout **Smoko (No container unloading)** 7/12/2021 19:58:58 pm to 20:37:13 pm DUR: 38:15 mm:ss	43	41	60	Bird call noise regular throughout measurements (L_{AFmax} is due to bird call) Broadband noise from port audible at times, varies in level potentially in the order of 40 to 45 dB L_{AFmax} during periods of higher level. Container handling not occurring. Refinery noise always present. Two periods noted when level increases for brief period (likely due to meteorology) Diesel engine modulation noted at times
	Norfolk Avenue Lookout **Container Unloading** 7/12/2021 20:37:13 pm to 21:00:38 pm DUR: 23:25 mm:ss	42	42	59	As above, but with fewer bird calls and regular port noise events (audible, but not loud). (L_{AFmax} is due to port noise) Dog barks audible at times Diesel engine modulation noted at times
MP2	Darch Point / Matuku Street Position **Container Unloading** 7/12/2021 21:10:34 pm to 21:49:31 pm DUR: 48:57 mm:ss	38	35	53	Natural sounds: waves and water (L_{AFmax} is due to waves / wakes) Regular port noises audible, but not loud (typically 38 to 43 dB L_{AFmax}) Bird calls at times. Domestic noises audible at times
MP3	Beach Road **Container Unloading** 7/12/2021 21:58:55 to 22:30:10 DUR: 31:15 mm:ss	42	41	59	Various (L_{AFmax} is set by traffic) Bird calls and wavelets. Regular port noises audible, but not loud (typically 40 to 45 dB L_{AFmax}) Diesel modulation audible at times

[1] A trigger was set up to record when noise levels were above 60 dB L_{AFmax}. This was triggered frequently by dog and bird noise, mainly in the evening and morning. The logger was triggered only once by port noise (at 0217 hrs on 9 Dec 2021) due to what sounds like a container being moved. The noise level of this event was 61 dB L_{AFmax} .

Table 3: Logger Measurement Summary

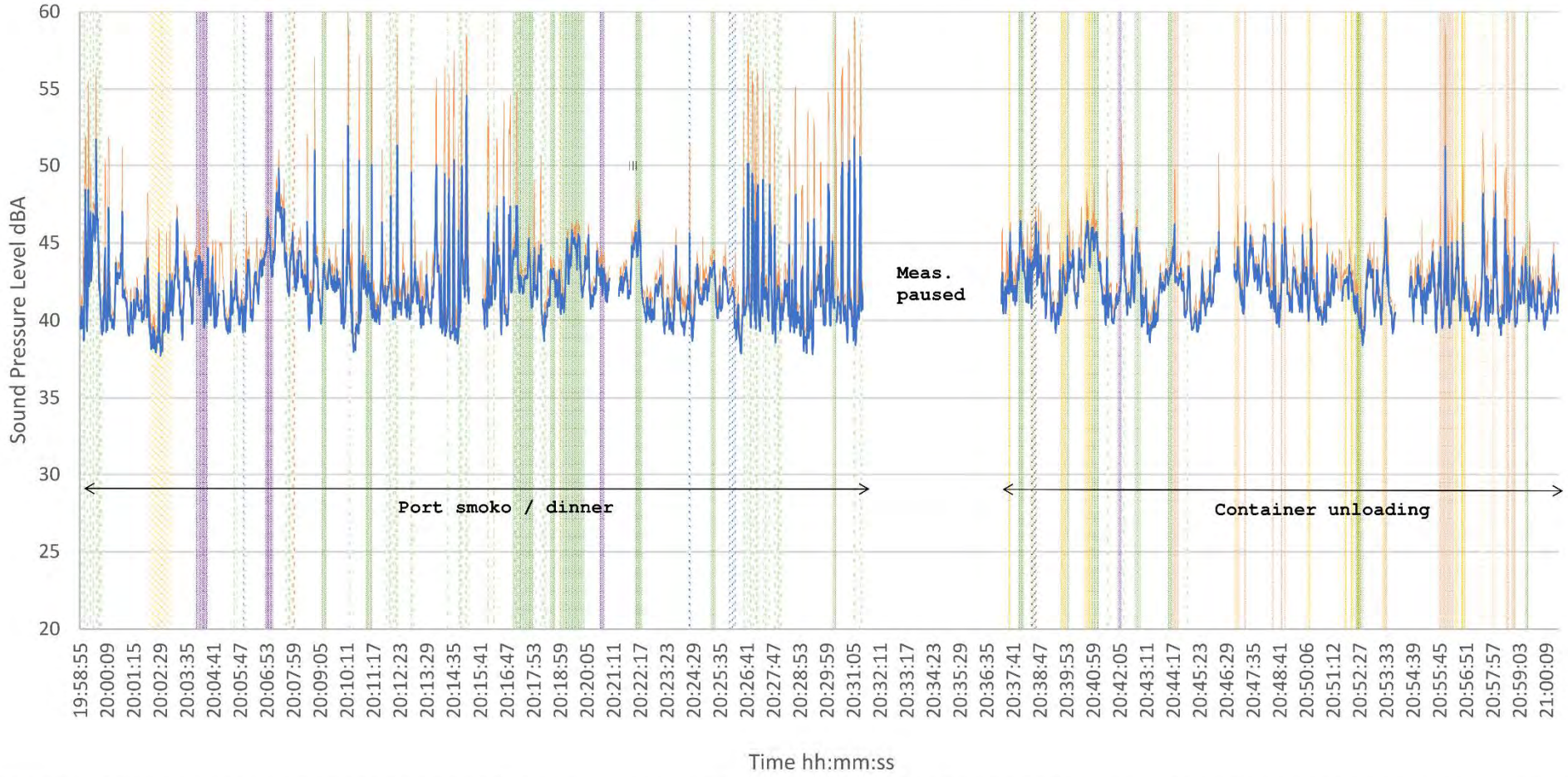
		Measured levels (dB)			Observations (from recordings)
Position	**Date, time**	**L_{Aeq}**	**L_{A90}**	**L_{AFmax}**	
MP1 4 The Heights	22:00:00 on 7/12/2021 to 05:15:00 on 8/12/2021	41	38	57	**Prior to 2200hrs:** Evening bird and dog noise recordings on logger (prior to measurement summary period) **During 2200 to 0515 hrs "night" period:** No levels above 60 dB L_{AFmax} measured over this period **After 0515hrs:** Birds begin to call loudly at 05:27am (after measurement summary period ceases)
	22:00:00 on 8/12/2021 to 05:15:00 on 9/12/2021	43	40	61	**Prior to 2200hrs:** Evening bird and dog noise recordings on logger (prior to measurement summary period) **During 2200 to 0515 hrs "night" period:** One container noise event recorded at above 60 dB L_{AFmax} (61 dB L_{AFmax} at 02:17:48 hrs on 09/12/2021)
	22:00:00 on 9/12/2021 to 05:15:00 on 10/12/2021	36	33	65	**Prior to 2200hrs:** evening tool use, distant lawnmower and bird noise recordings on logger (prior to measurement summary period) **During 2200 to 0515 hrs "night" period:** Ruru (morepork) calls at 01:49:10 hrs through to 01:50:45 hrs at 65 dB L_{AFmax} No port noise events measured at above 60 dB L_{AFmax} **After 0515hrs:** Birds begin to call loudly at 05:27am (after measurement summary period ceases)

APPENDIX A MEASUREMENT LOCATIONS

APPENDIX B ATTENDED LOGGING RESULTS AT THREE LOGGING POSITIONS

(SEE OVER)

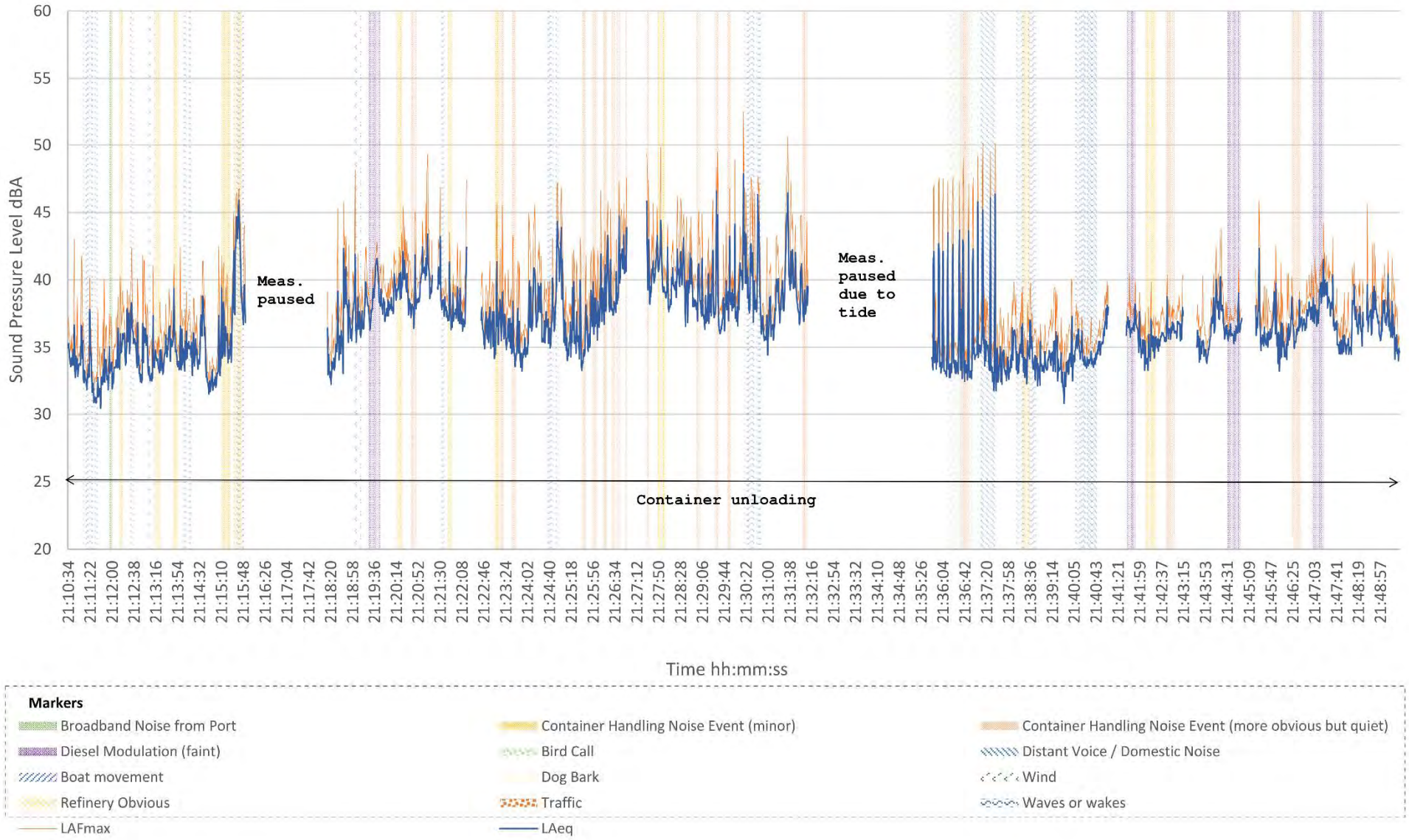
MP1 NORFOLK LOOKOUT
MSC Vaiga III, 7 Dec 2022



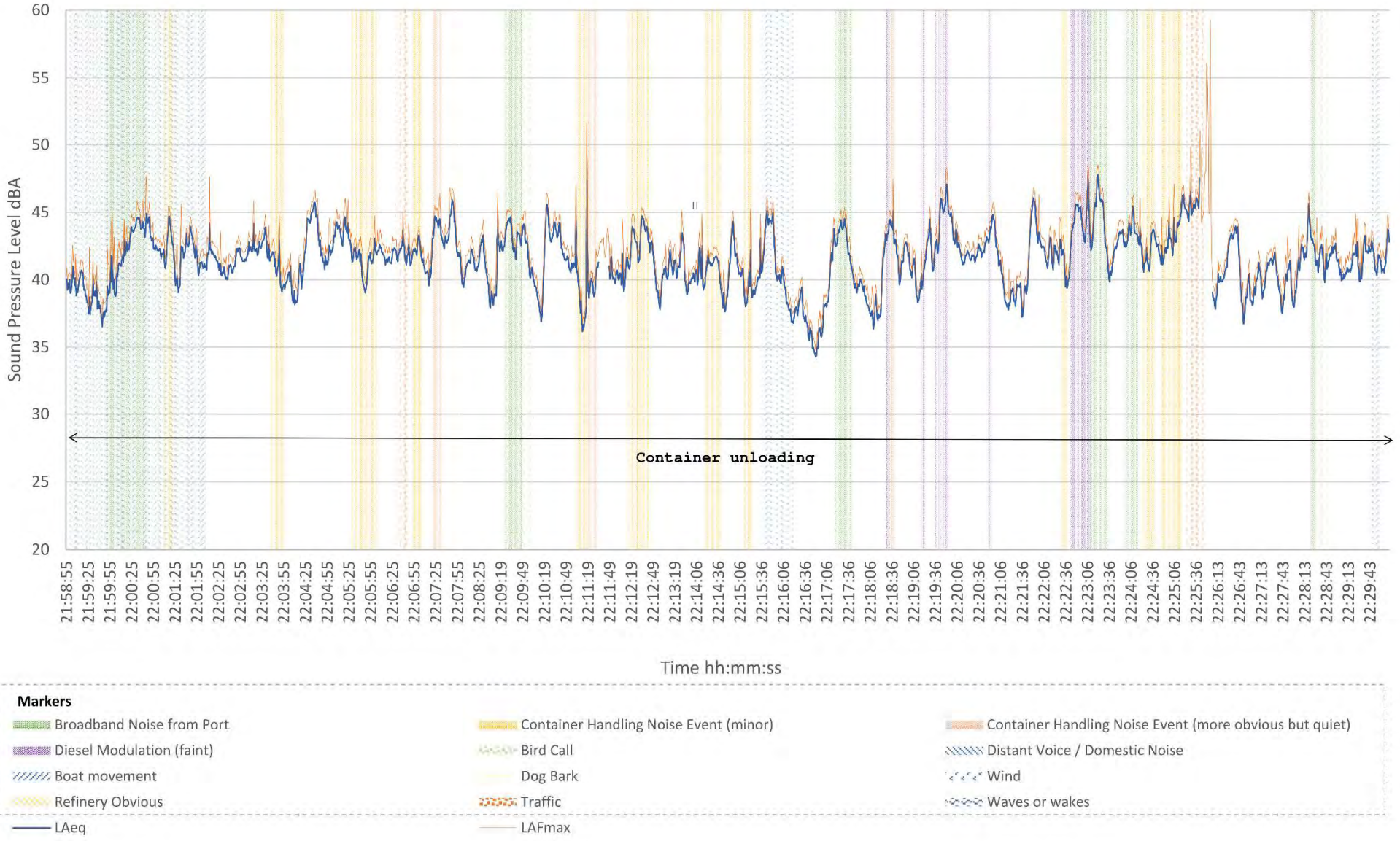
Markers

- Broadband Noise from Port
- Container Handling Noise Event (minor)
- Container Handling Noise Event (more obvious but quiet)
- Diesel Modulation (faint)
- Bird Call
- Distant Voice / Domestic Noise
- Boat movement
- Dog Bark
- Wind
- Refinery Obvious
- Traffic
- Waves or wakes
- LAFmax
- LAeq

MP2 DARCH POINT FORESHORE
MSC Vaiga III, 7 Dec 2022

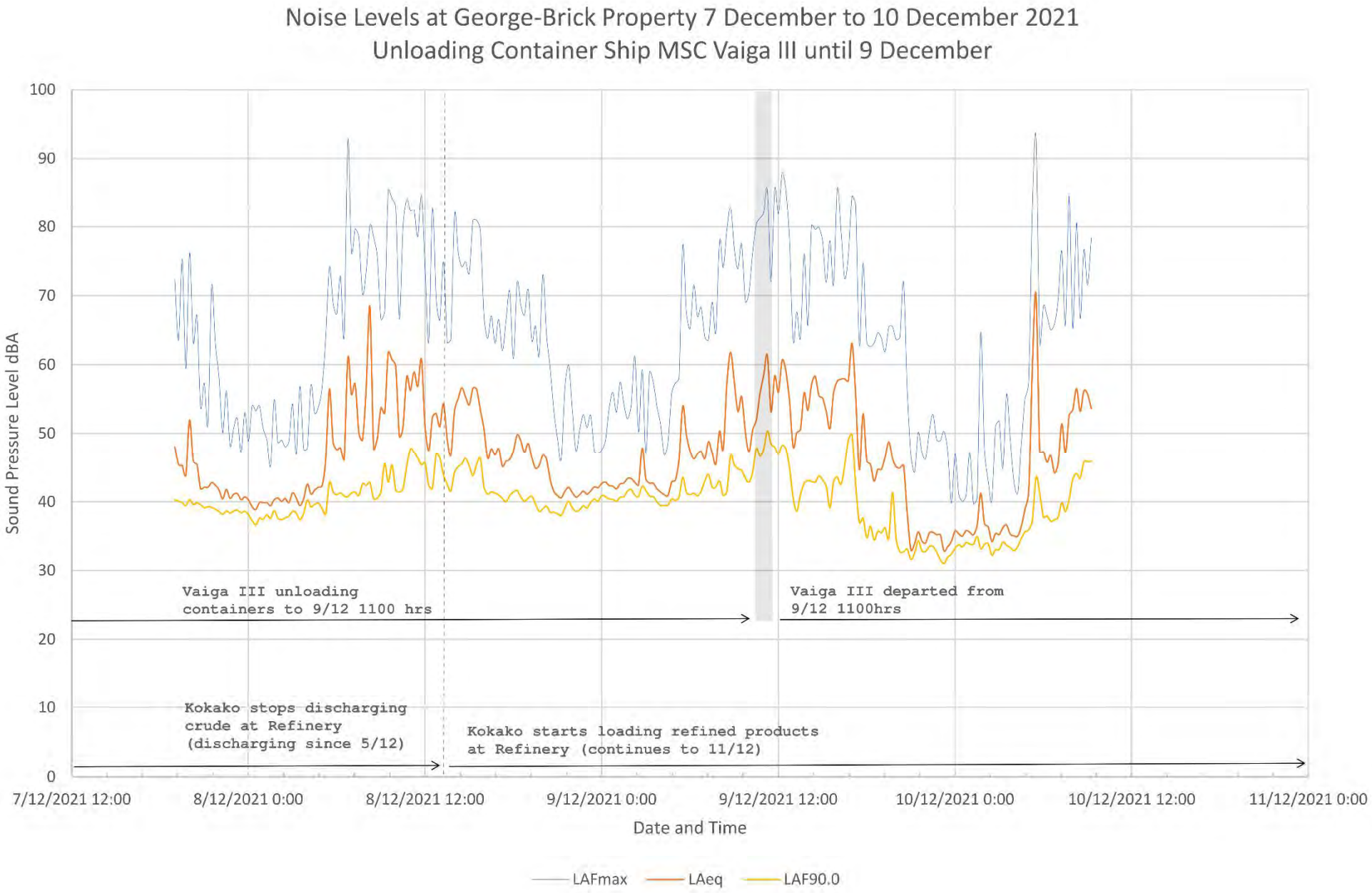


MP3 BEACH ROAD FORESHORE
MSC Vaiga III, 7 Dec 2022



APPENDIX C UNNATTENDED LOGGING RESULTS AT 4 THE HEIGHTS GEORGE-BRICK PROPERTY

(SEE OVER)


Noise Levels at George-Brick Property 7 December to 10 December 2021
Unloading Container Ship MSC Vaiga III until 9 December
Sound Pressure Level dBA
100
90
80
70
60
50
40
30
20
10
0
Vaiga III unloading containers to 9/12 1100 hrs
Vaiga III departed from 9/12 1100hrs
Kokako stops discharging crude at Refinery (discharging since 5/12)
Kokako starts loading refined products at Refinery (continues to 11/12)
7/12/2021 12:00
8/12/2021 0:00
8/12/2021 12:00
9/12/2021 0:00
9/12/2021 12:00
10/12/2021 0:00
10/12/2021 12:00
11/12/2021 0:00
Date and Time
LAFmax
LAeq
LAF90.0

APPENDIX D UNATTENDED LOGGER PHOTO

ATTACHMENT 3

HAWTHORN GEDDES EMAIL + PLAN

Reyburn and Bryant

From: Stacey Gibson <sg@hgcs.co.nz>
Sent: Tuesday, 18 October 2022 4:00 PM
To: Brett Hood
Subject: 12377 - Northport Expansion - RFI
Attachments: 12377 221018 Catchment Plan-Fig 02.pdf

Hi Brett,

In response to the queries you forwarded regarding the Northport Expansion – Stormwater Pond assessment report, please see below.

1. Overall catchment plan of the Port to match the calculations is attached.
2. The Northport Pond has been modelled with current climate rainfall data from Hirds V4. Climate change scenarios have not been applied or discussed in the report.

   The Northport Pond design has been based on Auckland TP10 (WQV) of which climate change adjusted rainfall is not considered. However, if an additional 20% allowance for climate change was to be considered for the Northport Pond (including the proposed expansion) the additional WQV requirement could be accommodated within the existing pond with the lifting of the pump switch levels. This would result in an increase in the static water level of the second pond basin of approximately 180mm.

   Climate change effect would see both the western spillway and pond overflow (scruffydome) operating for more frequent events. The western spillway operating during events in excess of the 5-year ARI storm event (climate change adjusted rainfall) compared to events in excess of the 10-year ARI event (current climate rainfall), and the scruffydome operating during events in excess of the 2-year ARI storm event (climate change adjusted rainfall) compared to events in excess of the 5-year ARI event (current climate rainfall).

   For the stormwater network to have the capacity to address the 100-year (climate change adjusted) the eastern spillway would need to be extended from 10m in length to 35m or lowered by 120mm. This resulting in a peak discharge rate of 1.9m³/s (0.56m³/s for current climate) and a total discharge volume of 62,800m³ (21,420m³ for current climate). The lowering of the spillway will not increase the frequency of spills over that resulting from the 35m spillway length.

Limitation

Regards,

Stacey Gibson
Civil Engineer

Hawthorn Geddes
engineers & architects ltd

7 Selwyn Ave, Whangarei 0110
PO Box 575, Whangarei 0140
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Fax: (09) 430 0711

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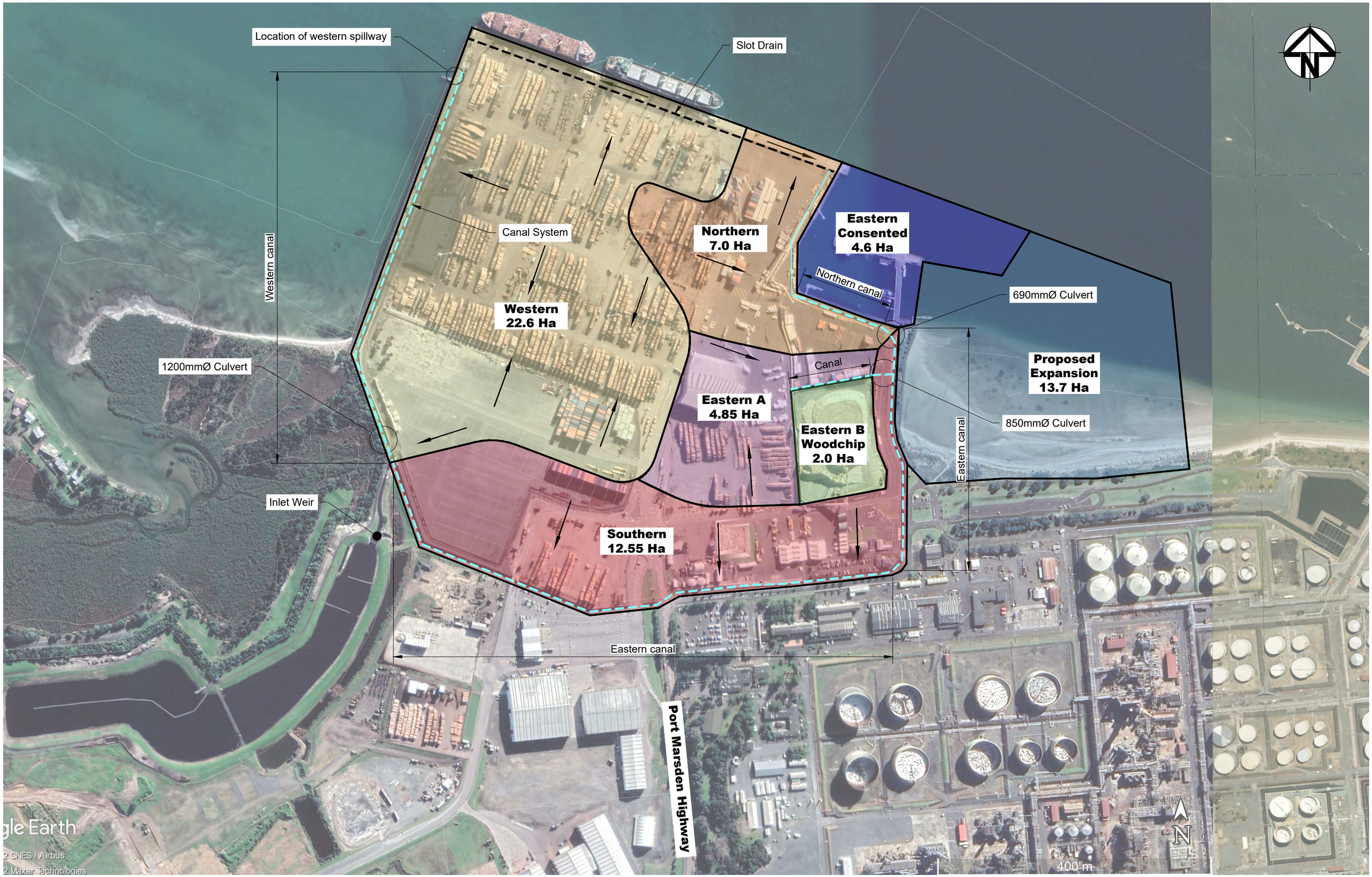

TO BE READ ONLY IN CONJUNCTION WITH ASSOCIATED REPORT

USE WRITTEN DIMENSIONS. DO NOT SCALE FROM DRAWING.

SITE PLAN
SCALE - 1:5000

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CLIENT **NORTHPORT LTD**
PROJECT **FUTURE DEVELOPMENT**
PORT MARSDEN HIGHWAY, MARSDEN POINT
DRAWING **CATCHMENT PLAN**

SCALE @ A3 1:5000
PROJECT No. **12377**
FIGURE No. **02**
REV. **R1**

18/10/2022 12:35:26 pm K:\12377 Northport Ltd - Future Development; Scope TBC - Ship Maintenance Facility, Marsden Point\12377 220711 Overall Site Plan.dwg