ATTACHMENT TEN
Assessment of Airborne Noise Effects (Styles Group)

McCALLUM BROS LTD
Established 1904

StylesGroup
Acoustics & Vibration Consultants

ASSESSMENT OF AIRBORNE NOISE EFFECTS

SAND EXTRACTION
TE ĀKAU BREAM BAY

PREPARED FOR

McCallum Brothers Limited

DATE

13 January 2026

Assessment of airborne noise effects prepared by Styles Group for McCallum Brothers Limited.

REVISION HISTORY

Rev:	Date:	Comment:	Version:	Prepared by:	Reviewed by:
1	25/09/24		Draft	Jon Styles Director and Principal Styles Group	Gemma Sands Consultant Styles Group
2	03/10/24		Final draft		
3	02/04/25		Final draft		
4	03/04/25	Updates following Project Team feedback	Updated final draft		
5	13/01/26	Minor updates	Final		

CODE OF CONDUCT REFERENCE FOR APPLICATION MATERIAL

Although this is not a hearing before the Environment Court, I (Jon Styles, the author) record that I have read and agree to comply with the Environment Court's Code of Conduct for Expert Witnesses as specified in the Environment Court's Practice Note 2023 as relevant to preparation of a report for this Fast-track application. In particular, I confirm that this report is within my area of expertise, except where I state that I rely upon the evidence or reports of other expert witnesses lodged forming part of the project's application material. I have not omitted to consider any material facts known to me that might alter or detract from the opinions expressed.

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Table of contents

Appendices

Executive summary

Styles Group has assessed the airborne noise effects of proposed sand extraction activities in the Te Ākau Bream Bay embayment. This report has been prepared to accompany the resource consent application and Assessment of Environmental Effects for the proposal.

Styles Group has used computer noise modelling software to predict the airborne noise that will be received at the coastal interface of Te Ākau Bream Bay and the adjacent land from the trailing suction hopper dredge (TSHD) vessel operating in the sand extraction area. The noise model has been calibrated using noise measurements of the proposed TSHD vessel, the *William Fraser*. The noise level predictions have been prepared for onshore meteorological conditions for comparison with the noise limits prescribed by Condition 22 of the Proposed Northland Regional Plan February 2024 (**PNRP**).

Condition 22 of the PNRP requires that noise generated from within the coastal marine area must not exceed 55 dB L_{Aeq} during the daytime and 45 dB L_{Aeq} and 75 dB L_{AFmax} during the nighttime when measured and assessed at any noise sensitive activity.

The noise level predictions show that in the most favourable conditions for the propagation of noise towards the foreshore, the noise generated from sand extraction will be less than 15dB L_{Aeq} on the beach. The noise levels received at the closest noise sensitive activities (dwellings) will be much lower. This level of noise will be inaudible.

The noise from the proposed sand extraction activities will comply with the relevant PRNP noise limits by a significant margin, including at night when the noise limit applying at any noise sensitive activity is 45 dB L_{Aeq}.

Styles Group has also undertaken a series of ambient noise measurements at the coastal interface of Te Ārai and Pākiri Beach. These measurements assist to characterise the noise levels of sand extraction in the context of an open coastal environment where waves break on the shore more-or-less constantly. Our experience from projects and time spent in both areas is that the noise environment on the shoreline of is very similar to the noise environment of Te Ārai and Pākiri Beach.

The ambient noise measurements show that the ambient noise on the beach environment is primarily controlled by wave action on the shore. The ambient measurements show that the noise levels on the beach fluctuate considerably depending on wind and swell conditions. Our assessment is that the noise from sand extraction will be inaudible on the beach and further inland.

1.0 Introduction

McCallum Brothers Limited (**MBL**) has engaged Styles Group to predict and assess the airborne noise generated from proposed sand extraction activities in the coastal marina area of Te Ākau Bream Bay and received at the coastal interface.

This report provides an assessment of the airborne noise effects of the proposal and includes:

i. Noise level predictions of sand extraction activities prepared using Brüel & Kjær Predictor noise modelling software.

ii. An assessment of the noise levels in accordance with the noise levels prescribed by the Proposed Northland Regional Plan February 2024 (**PNRP**), when measured and assessed in accordance with relevant New Zealand acoustics standards.

iii. Recommended noise management measures and conditions of consent based on our findings.

Our assessment is based on our understanding of the proposal following discussions with the project team. This report should be read in conjunction with the application site plans and the Assessment of Environmental Effects. A glossary of acoustical terms used within this document is attached as Appendix A.

2.0 The proposal and key noise considerations

MBL is seeking a coastal permit to undertake sand extraction in the Te Ākau Bream Bay embayment for up to 35 years. Figure 1 shows the proposed sand extraction area and distances (m) to shore.

The proposed extraction volumes are:

- 150,000 m^3 per annum for the first 3 years, and;
- Maximum of 250,000 m^3 per annum for the remaining 32 years.

The trailing suction hopper dredge (**TSHD**) vessel, the *William Fraser* is expected to operate inside Te Ākau Bream Bay over several days per week, for approximately 3.5 hours per day.

This assessment is focussed on the airborne noise levels generated from the TSHD vessel operating within the sand extraction area. We have considered the worst-case noise levels from the vessel operating within the parts of the sand extraction area that are closest to land.

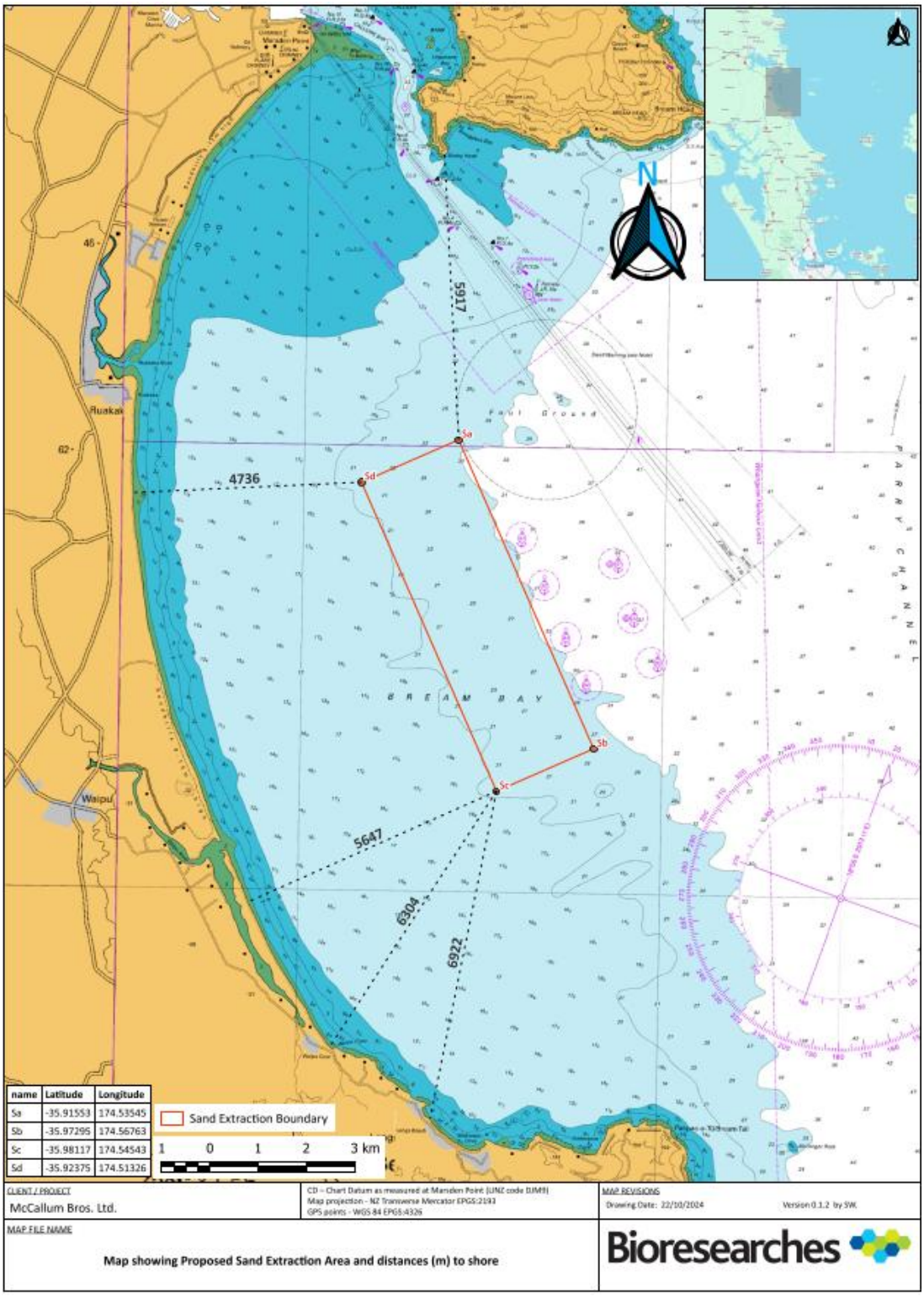


Figure 1 Map showing the proposed extraction area and distances (m) to shore

3.0 Noise standards applying to the proposal

We understand all rules in the PRNP must be treated as operative. We have assessed the noise levels from the proposal in term of the relevant noise limits in Condition 22 of the PNRP.

The proposed sand extraction area is in the General Marine Zone (GMZ) of the PNRP. Condition 22 of the PNRP controls noise generated from the coastal marine area and received at the notional boundary of any noise sensitive activity[1] on land.

C.1.8(22) requires:

> 22) Noise from any activity within the coastal marine area (except for construction noise and noise from helicopters) must comply with Table 4: Noise limits at the notional boundary of any noise sensitive activity:
>
> Table 4: Noise limits

Time (Monday to Sunday)	$L_{Aeq(15min)}$	L_{AFmax}
0700 to 2200	55 dB	Not applicable
2200 to 0700	45 dB	75 dB

> a) noise must be measured in accordance with New Zealand Standard. Acoustics – Measurement of Environmental Sound (NZS 6801:2008) and assessed in accordance with New Zealand Standard. Acoustics – Environmental Noise (NZS 6802:2008)

In summary, Condition 22 requires noise generated from the coastal marine area must not exceed 55 dB L_{Aeq} during the daytime and 45 dB L_{Aeq} and 75 dB L_{AFmax} during the nighttime, when measured and assessed at any noise sensitive activity.

The nearest closest noise sensitive activities (dwellings) are generally consolidated in the coastal settlements of Waipū and Langs Beach, with a low density of development scattered between the settlements. Figure 2 displays the varied zoning pattern according to the Whangārei District Plan. The land closest to the coastal marine area is generally zoned Open Space and is not occupied by noise sensitive land use (i.e. dwellings). The closest zones that are occupied by dwellings are in the Settlement Zone or Rural Production Zone.

We note that the noise levels in Condition 22 of the PNRP are consistent with the permitted noise environment prescribed in NAV-R2 of the Whangārei District Plan for noise generated and received between sites in the Rural Production Zone. The permitted noise environment

[1] "Noise sensitive activity" is defined by the PRNP as:

> Any dwelling, visitor accommodation, boarding house, marae, papakāinga, integrated residential development, retirement village, supported residential care facility, care centre, lecture theatre in a tertiary education facility, classroom in an education facility, and a healthcare facility with an overnight stay facility.

inside the Settlement Zone is 5 dB lower (50 dB L_{Aeq} during the daytime and 40 dB L_{Aeq} and 70 dB L_{AFmax} during the nighttime).

Figure 2 Land-based zoning arrangements adjacent to the proposed sand extraction area

4.0 Noise modelling and predictions

We have used Brüel & Kjær Predictor computer noise modelling software to determine the sand extraction noise levels that are likely to be received on the land adjacent to the extraction area, for a range of meteorological conditions.

The Brüel & Kjær Predictor software is globally recognised and has been successfully implemented on a large number of projects throughout New Zealand. The computer noise

model is three-dimensional and takes into account the topography of the adjacent land, meteorological conditions and the physical attributes of the TSHD vessel, the *William Fraser*.

4.1 TSHD vessel

The sand extraction will be undertaken using the modern[2] TSHD vessel, the *William Fraser*.

The sand extraction noise model has been calibrated using noise measurements of the *William Fraser*. The noise measurements were obtained while the *William Fraser* extraction systems were operating and the draghead was in the water. The noise measurements were performed on the morning of the 29 November 2019, in calm conditions with low wind speeds. The noise level measurements were undertaken from above the bow of another stationary vessel using a Bruel and Kjær 2250 sound level meter. The frequency spectrum and noise levels, logged in 1 second intervals, were recorded simultaneously with a high-quality sound recording of the pass-by, for later analysis.

The test procedure involved the measurement vessel remaining stationary as the *William Fraser* passed by the bow at a distance of approximately 20m from the sound level meter. The *William Fraser* extraction equipment was operating, the draghead was in the water and all systems were operational. Several pass-bys were undertaken with noise levels measured from the port and starboard side of the vessel.

[2] Commissioned in 2019

Figure 3 TSHD vessel- the *William Fraser* (2019)

4.2 Noise model parameters

Noise level predictions have been calculated based on the methods in International Standard ISO 9613-1/2 *Attenuation of sound during propagation outdoors*. Terrain contours, building footprints and parcel boundaries were imported from Land Information New Zealand. The topographical contours encompass the entire site and a large area of the surrounding land. We have ensured the integrity of the noise model by careful scrutiny of the final three-dimensional model.

The input parameters for the noise model are set out in Table 1.

Table 1: Predictor noise model input parameters

Parameters/calculation settings	Details
Software	Brüel & Kjær Predictor V2024
Calculation method	ISO 9613.1/2
Meteorological parameters	CONCAWE calculation method, Stability Class D and Easterly winds at 1.5m/s
Ground attenuation over land	General method, ground factor: 1 (sand / scrub / forestry)
Ground attenuation over water	General method, ground factor: 0 (flat water)

Parameters/calculation settings	Details
Air temperature	287.15K
Atmospheric pressure	101.33kPa
Air humidity	70%
Calculation contour height	1.5m above ground
Vessel speed	≈ 1.5 - 2.5 knots

4.2.1 Noise rating level calculation adjustments

The noise level predictions do not include any adjustment for duration or special audible character due to the large separation distance between the sand extraction area and the shoreline, and the low level of noise predicted to be received on shore. The low noise levels predicted mean that any tonal character present close to the vessel (if present at all) will be indistinguishable on the shore and adjacent land.

4.2.2 Meteorological conditions

We have prepared noise level predictions meteorological conditions that enhance propagation towards the shore. The model is based on the CONCAWE method, adopting a stability class of D, and easterly (onshore) winds of 1.5m/s. This is essentially a “worst case” scenario. The noise levels on shore will be lower in other meteorological conditions.

4.2.3 TSHD tracks

We have modelled two scenarios:

1) The ‘long track’ model, where the TSHD traverses the full length of the long side of the sand extraction area. This has the effect of ‘spreading out’ the propagation.
2) The ‘short track’ model, where the TSHD works in a much smaller area. This has the effect of concentrating the source of noise and increasing the level of noise on the closest section of shoreline.

Both scenarios are hypothetical for the purposes of predicting the worst-case noise levels. We stress that these are not the same as the tracks that the TSHD is proposed to travel.

4.3 Noise rating level contours

The predicted noise level contours for the meteorological conditions described above are provided in Appendix B. The contours illustrate the spatial extent of the noise propagation across the surrounding marine area and coastal environment.

The noise level contours demonstrate that the extraction noise levels experienced on the beach will be in the range of approximately 10-15B L_{Aeq}. This is below the threshold of human hearing in this context.

We expect that it would be remarkable if the TSHD could be heard on shore. If it was ever audible, the noise level would be very low, and the meteorological conditions and wave heights would have to be unusually calm.

5.0 Ambient noise measurements

Styles Group has undertaken a series of noise measurements at the Te Ārai and Pākiri Beach coastal interface. These measurements assist to identify and assess the potential audibility of sand extraction noise that will be experienced on the beach environment of Te Ākau Bream Bay. The beach environment of Te Ākau Bream Bay is generally similar to the beach environment of Te Ārai and Pākiri Beach, with ambient noise levels primarily controlled by wave action. We note that Te Ārai and Pākiri Beach are generally well separated from anthropogenic noise (i.e. major transport corridors), however parts of the Te Ākau Bream Bay shoreline are exposed to road-traffic noise from State Highway 1 (SH1) which is 700m from Uretiti Beach at its' closest point.

The noise measurements were performed in a variety of meteorological and swell conditions to provide an accurate and comprehensive description of the noise environment in the weather conditions commonly found on a beach environment where waves break on the shore more-or-less constantly.

The noise level measurement position in each case was near the top of the dunes or grass above the beach, at the border of the coastal environment and the hinterland. All noise measurements were attended and were performed with Bruel & Kjaer 2250 or 2270 sound level meters on tripods and with wind screens used. All noise measurements were performed in accordance with NZS6801:2008. Although some measurements were undertaken in wind speeds slightly exceeding 5m/s measured in the open, care was taken to ensure that the microphone was well protected from the higher wind speeds and our careful review of the data confirms that the wind gusts did not affect the measured levels.

The measurements undertaken on 22 May 2019 included four planes passing overhead. The effect of these aircraft pass-bys on the noise level is obvious when observing the $L_{Aeq(1sec)}$ data. The effects of the aircraft have been removed from the $L_{Aeq(15min)}$ and L_{A90} levels that are presented on the relevant results.

In every case, the noise levels in the environment were controlled by waves on the shore (aside from the four overhead aircraft in one sample). The coastal environment comprises relatively open coastline where waves break on the shore more-or-less constantly.

The meteorological and swell conditions for each of the measurements are displayed in Table 2.

Table 2 Wind and swell conditions during ambient noise measurements

Date	Wind Direction	Wind Speed	Mean Swell Height
3 May 2019	ENE (on shore)	1.9 m/s to 2.9 m/s	0.7 m
3 May 2019	ENE (on shore)	2.5 m/s to 2.9 m/s	0.7 m
3 May 2019	ENE (on shore)	Nil (wind dropped)	0.7 m
7 May 2019	E (on shore)	4.1 m/s to 5.4 m/s	0.8 m
7 May 2019	E (on shore)	3.3 m/s to 5 m/s	0.8 m
7 May 2019	E (on shore)	3.1 m/s to 4.5 m/s	0.8 m
22 May 2019	n/a	Nil	0.5 m
22 May 2019	n/a	Nil	0.5 m
22 May 2019	n/a	Nil	0.5 m
13 June 2019	NW (offshore)	1.5 m/s to 2.9 m/s	0.8 m
13 June 2019	NW (offshore)	1.5 m/s to 3 m/s	0.8 m
11 July 2019	N (on shore)	under 1 m/s	0.5 m
11 July 2019	NW (offshore)	0.5 m/s to 1.5 m/s	0.5 m
11 July 2019	NW (offshore)	0 m/s to 0.5 m/s	0.5 m

The results of the noise level measurements are shown graphically in Appendix C. The graphs set out the noise levels in terms of:

1) The $L_{Aeq(15min)}$ levels – being the energy-average of the noise levels in each 15 minute measurement period;

2) The L_{A90} noise level – being the 'background' noise level that is equalled or exceeded 90% of the time. This level is characteristic of the quieter periods between waves breaking on the shore; and

3) The $L_{Aeq(1sec)}$ levels – being the short term noise level recorded in 1-second time intervals. This shows the actual variations in noise level for the full measurement durations, including the lowest L_{Aeq} levels measured during the period.

The ambient measurements show that the noise levels at the coastal interface fluctuate considerably depending on wind and swell conditions.

In the calmest of the conditions measured, the $L_{Aeq(15min)}$ levels are typically around 50dB, with background L_{A90} levels typically between 40dB and 45dB. The lowest $L_{Aeq(1sec)}$ levels are between 30dB and 35dB. By our observations, the lowest noise levels are observed over very short periods of time (1-2 seconds) when there is a lull between the breaking waves.

On days when the wind is blowing on shore, the $L_{Aeq(15min)}$ noise levels are typically as high as 65dB, with background L_{A90} levels generally around 60dB. The $L_{Aeq(1sec)}$ noise level typically stays above 60dB on the windy days. The breaking waves are constant along the beach and there are no 'lulls' or quiet periods.

6.0 Assessment of noise effects

Condition 22 of the PNRP requires that noise generated from within the coastal marine area must not exceed 55 dB L_{Aeq} during the daytime and 45 dB L_{Aeq} and 75 dB L_{AFmax} during the nighttime, when measured and assessed at any noise sensitive activity.

Noise sensitive activity" is defined by the PRNP as:

> Any dwelling, visitor accommodation, boarding house, marae, papakāinga, integrated residential development, retirement village, supported residential care facility, care centre, lecture theatre in a tertiary education facility, classroom in an education facility, and a healthcare facility with an overnight stay facility

The beach and dune area is not occupied by any activity defined as a "noise sensitive activity", however it is used by recreational beach users, walkers, land-based anglers and horse riders. We have therefore prepared an assessment of noise effects that considers the noise effects likely to be received at the coastal interface, as well as the closest noise sensitive activities (i.e. dwellings) on the adjacent land.

6.1 Noise effects on Te Ākau Bream Bay beach users

The predicted extraction noise levels received on Te Ākau Bream Bay beach range from approximately 12dB to 13dB in easterly winds. The noise level will vary depending on where the extraction is taking place.

When the wind speeds are zero or close to zero, the ambient noise levels on the beach are at their lowest, but the low wind speed will not strongly enhance the propagation of extraction noise towards the shore (as shown in our 'worst-case' noise modelling). In these conditions, the predicted noise levels on the beach are approximately 12-13dB L_{Aeq}.

Our ambient noise measurements show that even during lulls in the noise of waves breaking on the shore, the ambient noise level does not drop below 30dB even for very short periods of 1 second.

We expect that it would be remarkable if the TSHD could be heard on shore. If it was ever audible, the noise level would be very low, and the meteorological conditions and wave heights would have to be unusually calm.

6.2 Noise effects on closest noise sensitive activities

The predicted sand extraction noise levels range received at the closest dwellings will be less than 12dB. This level will be inaudible. The predicted noise levels readily comply with both the daytime and nighttime noise limits prescribed by Condition 22 of the PNRP.

We expect that it would be remarkable if the TSHD could be heard on shore. If it was ever audible, the noise level would be very low, and the meteorological conditions and wave heights would have to be unusually calm.

We have no concerns relating to cumulative noise effects from the operation of the TSHD and the contribution from other commercial and recreational vessels in Te Ākau/ Bream Bay. The noise level predictions demonstrate that the TSHD vessel will generate a very low level of noise (likely inaudible) when received onshore. The noise environment at the shoreline will be controlled by wave activity and the noise from vessels operating much closer to the shore. The TSHD will not add to the noise level of other vessels in the area when observed on land.

6.3 Noise effects on avifauna (birds)

This Assessment concludes that the activity will generate a very low level of noise at the shoreline. We are not avifauna experts however based on the level of noise on the shoreline, and the level of sound generated by birds communicating on the shoreline and back-dune areas, we have not identified the potential for the activity to disturb or impede communication amongst birds. Other noise sources in the general coastal environment will be considerably noisier than the operation of the TSHD.

6.4 Proposed noise limits

The PNRP controls the noise emissions from activities in the coastal marine area by setting noise limits that apply on land where the receivers of the noise effects are located.

We recommend that the conditions of consent should require compliance with the noise limits in the PNRP when assessed on land where the receivers are and in accordance with the standards and principles of the PNRP.

7.0 Conclusion

Styles Group has used computer noise modelling software to predict the airborne noise that will be received at the coastal interface of Te Ākau Bream Bay and the adjacent land from the proposed TSHD vessel, the *William Fraser*, operating in the sand extraction area. The noise model has been calibrated using noise measurements of the *William Fraser*. The noise level predictions have been prepared for meteorological conditions that enhance propagation towards the shore for comparison with the noise limits prescribed by Condition 22 of the PNRP.

The noise level predictions show that in the most favourable conditions for the propagation of noise towards the foreshore, the noise generated from sand extraction will be approximately

12-13dB L_{Aeq} on the beach. The noise levels received at the closest noise sensitive activities (dwellings) will be less. This level of noise will be inaudible.

The noise from the proposed sand extraction activities will comply with the relevant PRNP noise limits by a significant margin, including at night when the noise limits applying at any noise sensitive activity is 45 dB L_{Aeq}.

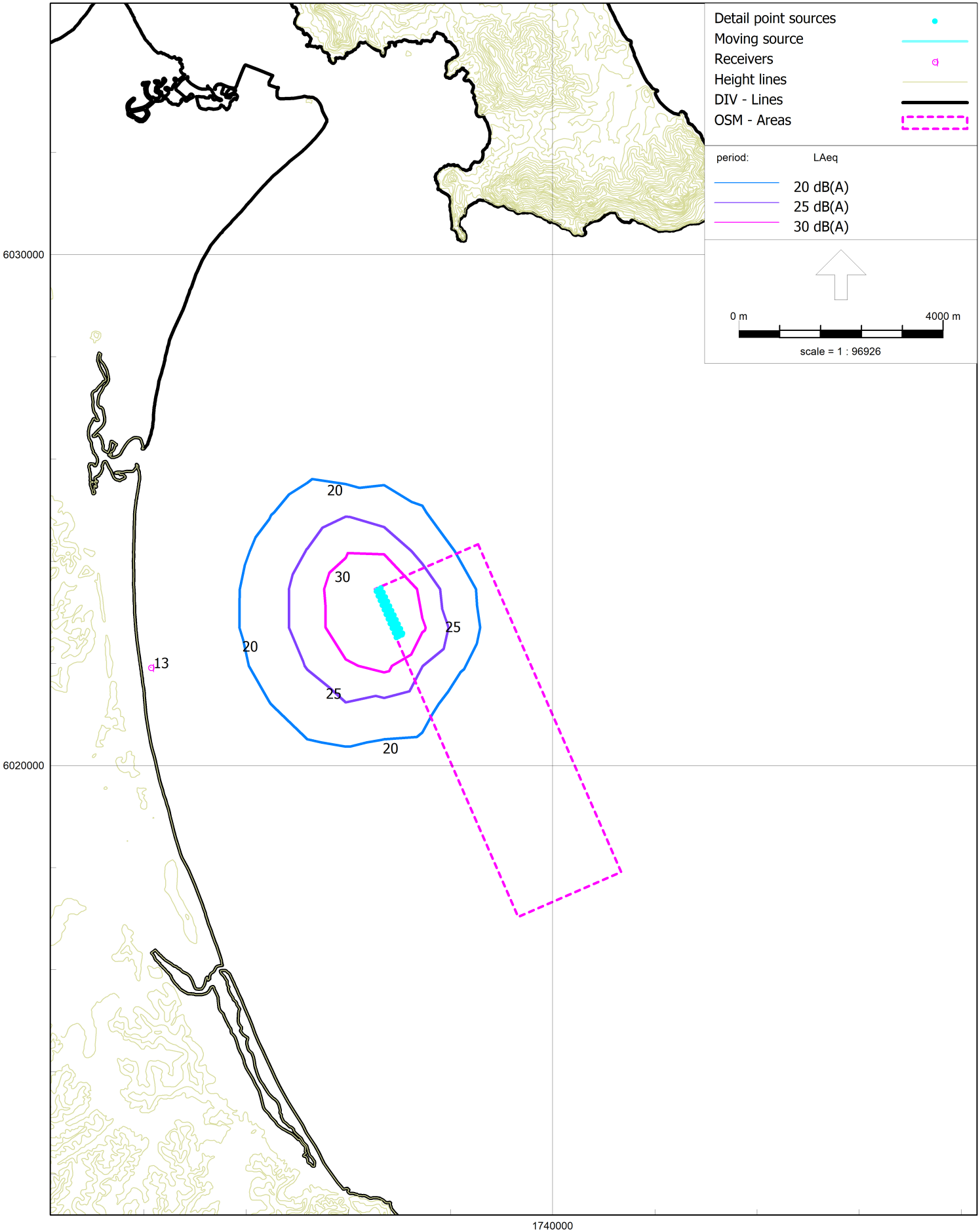
Appendix A Glossary of terms

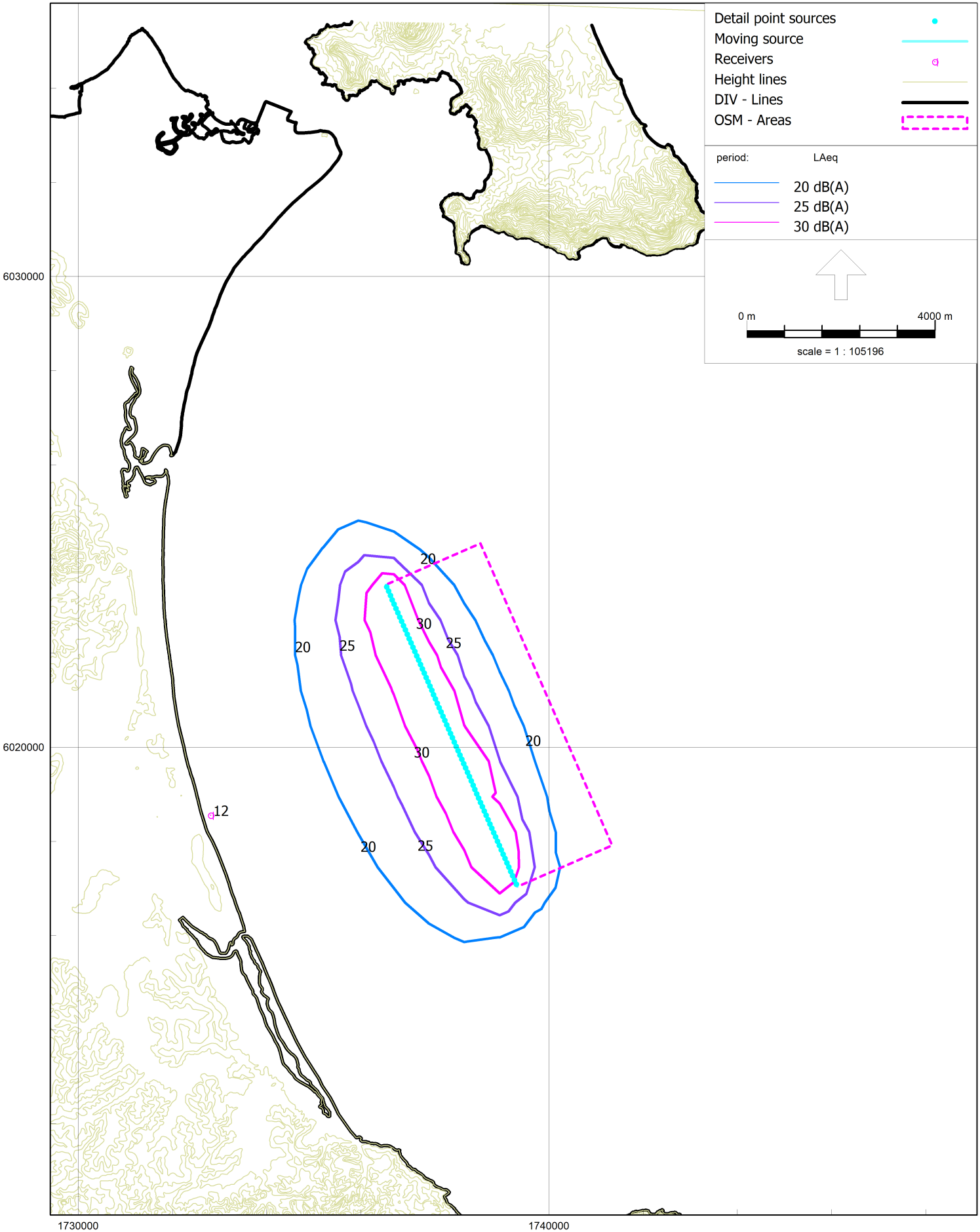
Noise	A sound which serves little or no purpose for the exposed persons and is commonly described as 'unwanted sound'. The definition of noise includes vibration under the Resource Management Act.
dB (decibel)	The basic measurement unit of sound. The logarithmic unit used to describe the ratio between the measured sound pressure level and a reference level of 20 micropascals (0 dB).
A-weighting	A frequency filter applied to the full audio range (20 Hz to 20 kHz) to approximate the response of the human ear at lower sound pressure levels.
Ambient noise	Ambient noise is the total of all noise within a given environment, comprising a composite of sounds from sources near and far.
$L_{A90(t)}$ (dB)	The A-weighted sound level in decibels equalled or exceeded for 90% of the of the measurement interval. It is the component of the total sound that subjectively is perceived as continuously present. Used in New Zealand as the descriptor for background noise in the 2008 versions of the N.Z. Standards NZS 6801 and NZS 6802.
$L_{Aeq(t)}$ (dB)	The A-weighted equivalent sound pressure level with the same energy content as the measured varying acoustic signal over a sample period (t). The preferred metric for sound levels that vary over time because it takes into account the total sound energy over the time period of interest.
L_{AFmax} (dB)	The maximum A-weighted sound pressure level recorded during the measurement period using a fast time-weighting response.
Noise rating level	A derived noise level used for comparison with a noise limit.
Notional boundary	A line 20 metres from any side of a residential unit or other building used for a noise sensitive activity, or the legal boundary where this is closer to such a building.
NZS 6801:2008	N.Z. Standard NZS 6801:2008 Acoustics – Measurement of environmental sound.
NZS 6802:2008	N.Z. Standard NZS 6802:2008 Acoustics – Environmental noise.
ISO 9613-1/2	International Standard ISO9613-1/2 Attenuation of sound during propagation outdoors

Appendix B Noise rating level contours

BREAM BAY W Fraser E 1.5ms short track

Styles Group, NZ




Detail point sources
Moving source
Receivers
Height lines
DIV - Lines
OSM - Areas
period: LAeq
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25 dB(A)
30 dB(A)
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1730000
1740000
12
20
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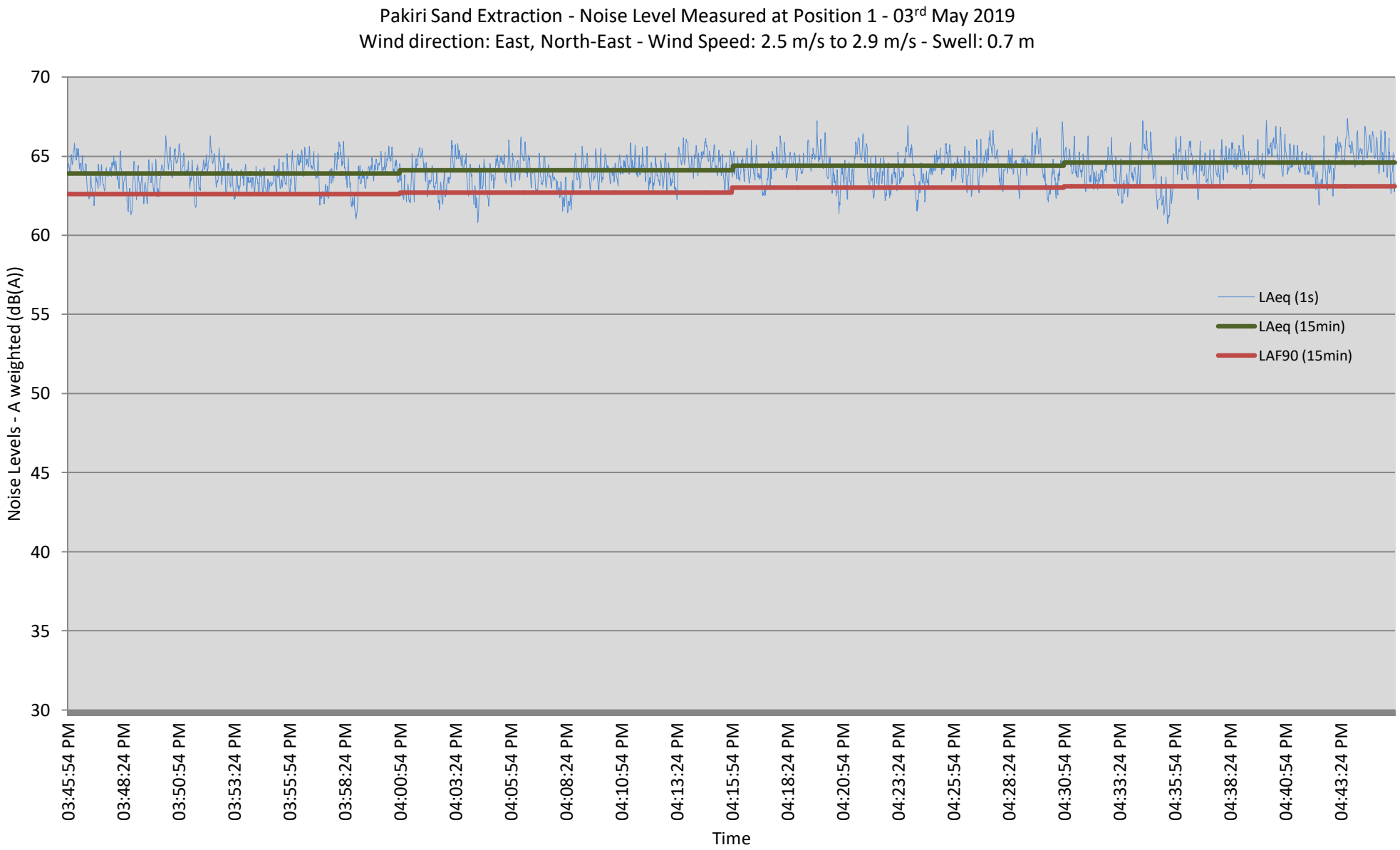
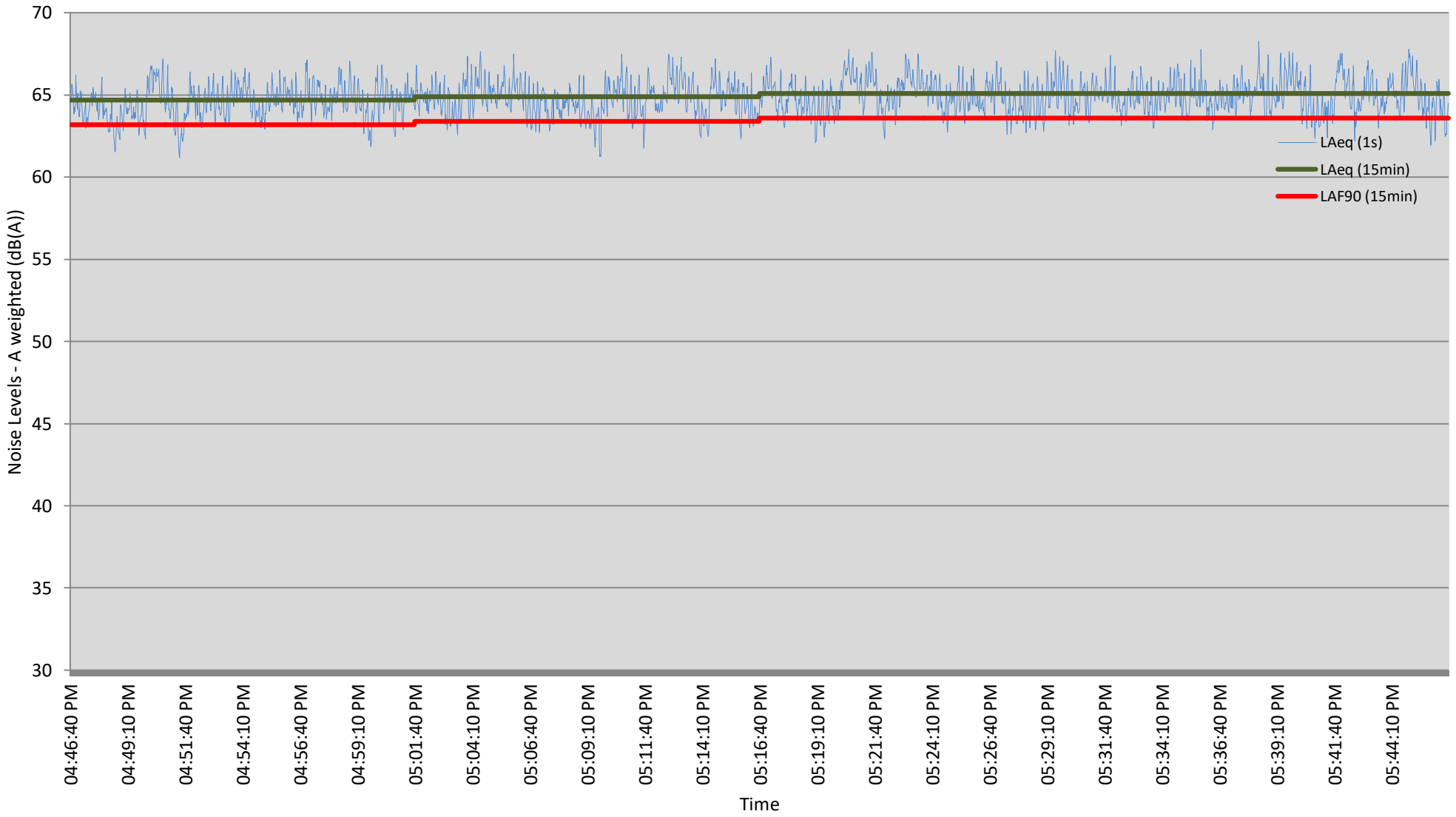
30

Appendix C Ambient noise measurement data



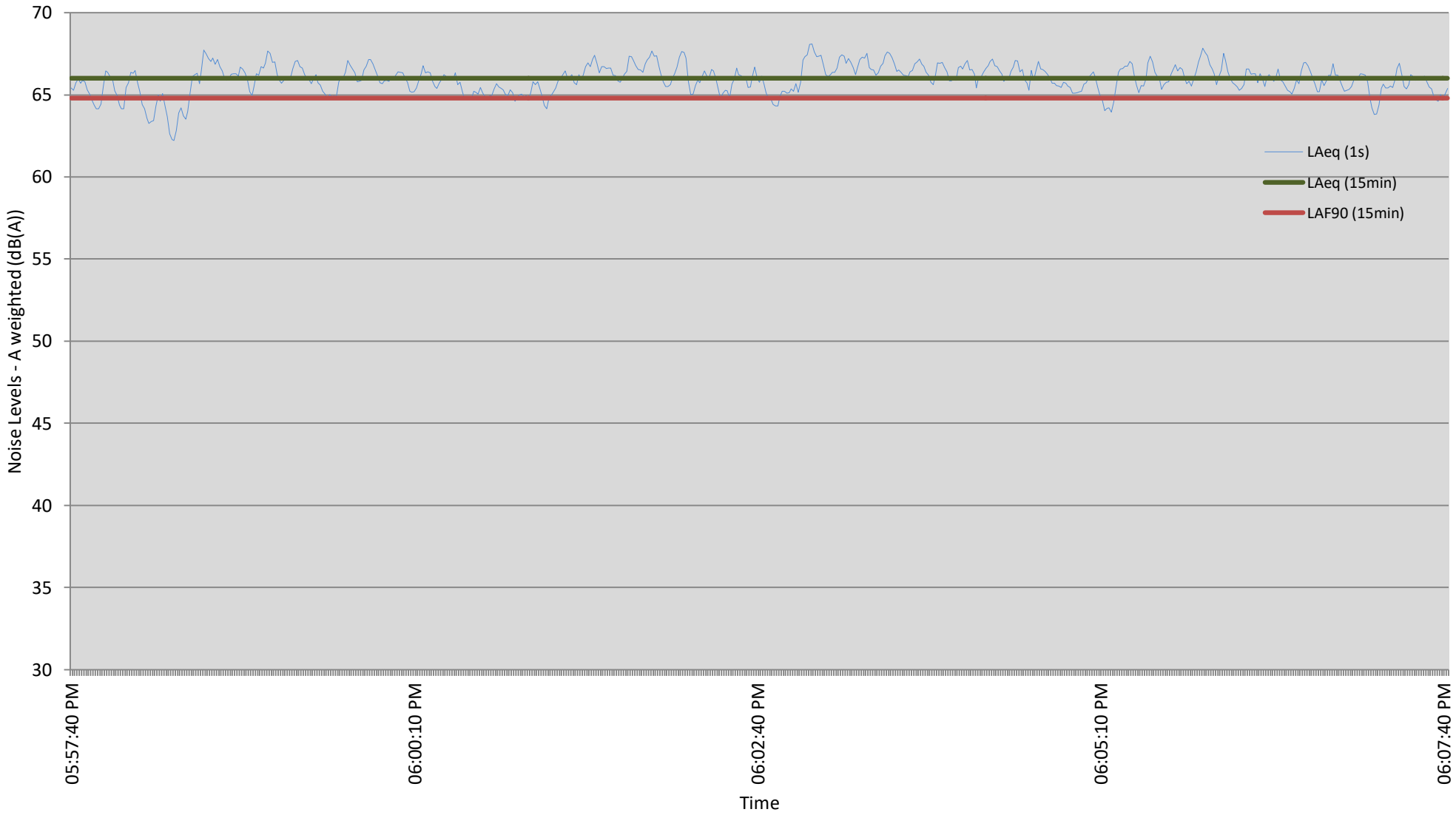
Styles Group
Acoustics & Vibration Consultants

Pakiri Sand Extraction - Noise Level Measured at Position 2 - 03rd May 2019
Wind direction: East, North-East - Wind Speed: 1.9 m/s to 2.9 m/s - Swell: 0.7 m

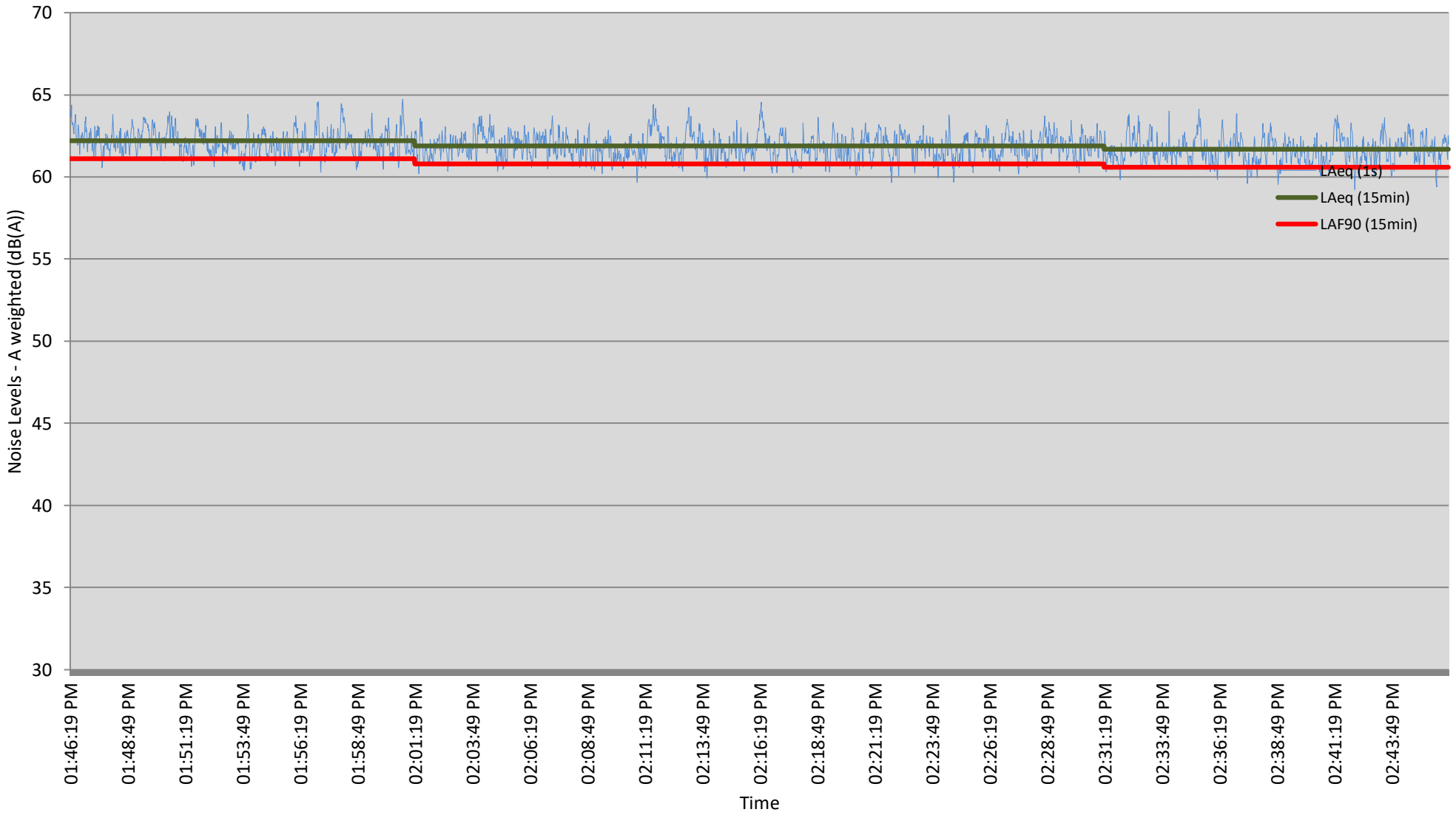


P. 09 308 9015 E. info@stylesgroup.co.nz W. www.stylesgroup.co.nz Saatchi & Saatchi Building, L2, 125 The Strand, Parnell. PO Box 37857, Parnell, Auckland 1151

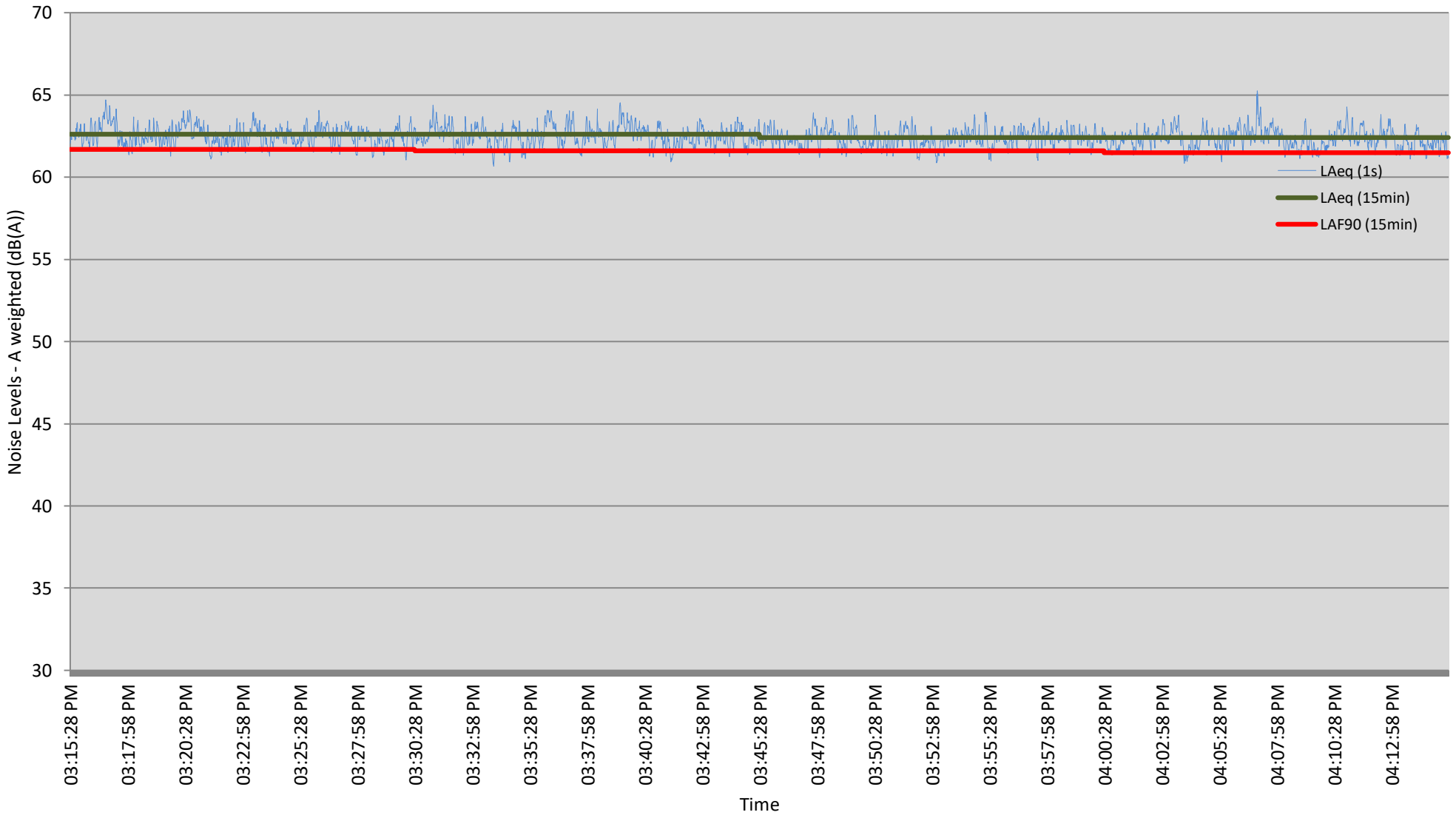
Pakiri Sand Extraction - Noise Level Measured at Position 3 - 03rd May 2019
Wind direction: East, North-East - Wind Speed: Nil - Swell: 0.7 m



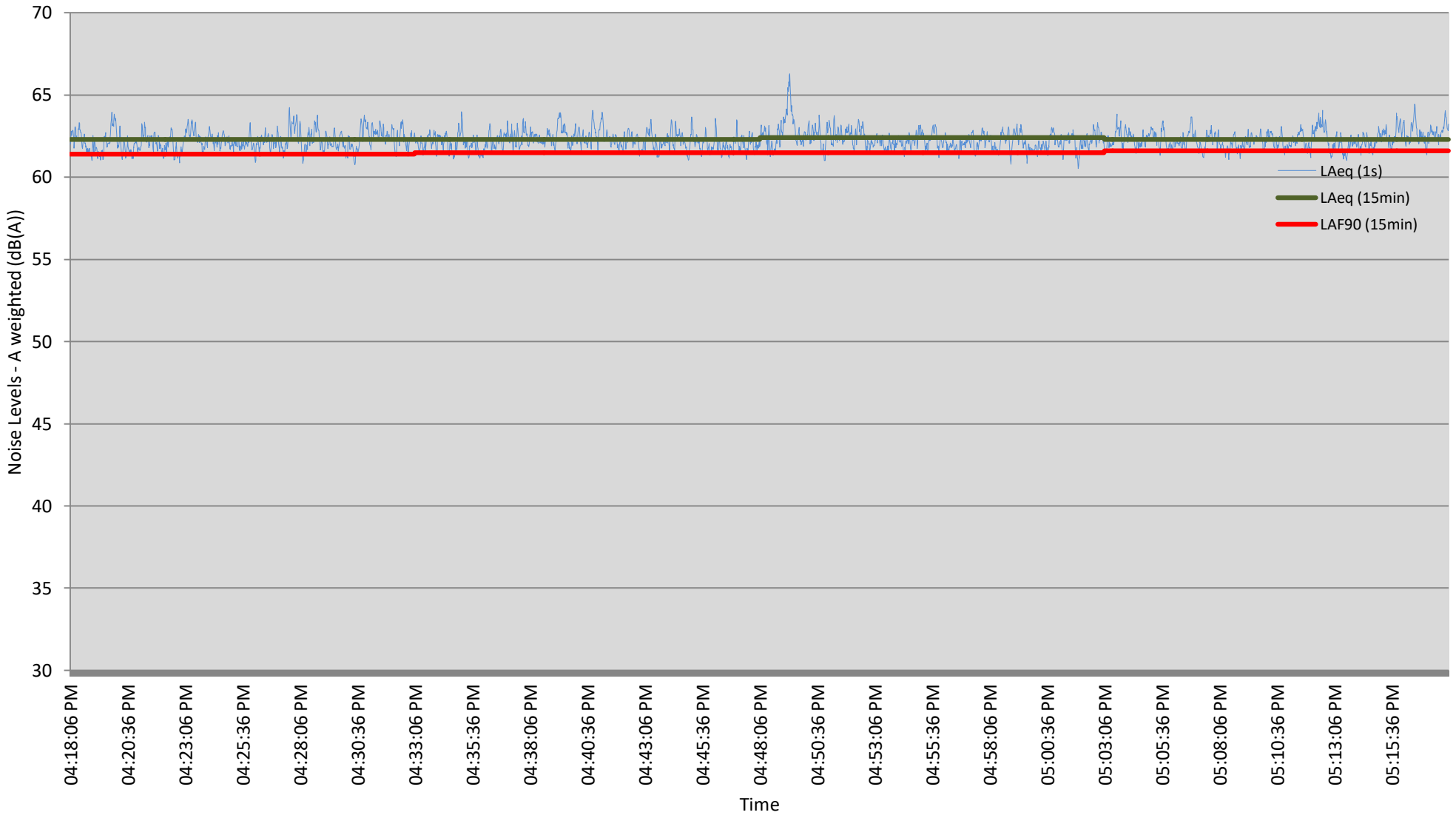
Pakiri Sand Extraction - Noise Level Measured at Position 1 - 07th May 2019
Wind direction: East - Wind Speed: 3.1 m/s to 4.5 m/s - Swell: 0.8 m



Pakiri Sand Extraction - Noise Level Measured at Position 2 - 07th May 2019
Wind direction: East - Wind Speed: 4.1 m/s to 5.4 m/s - Swell: 0.8 m



Pakiri Sand Extraction - Noise Level Measured at Position 3 - 07th May 2019
Wind direction: East - Wind Speed: 3.3 m/s to 5 m/s - Swell: 0.8 m



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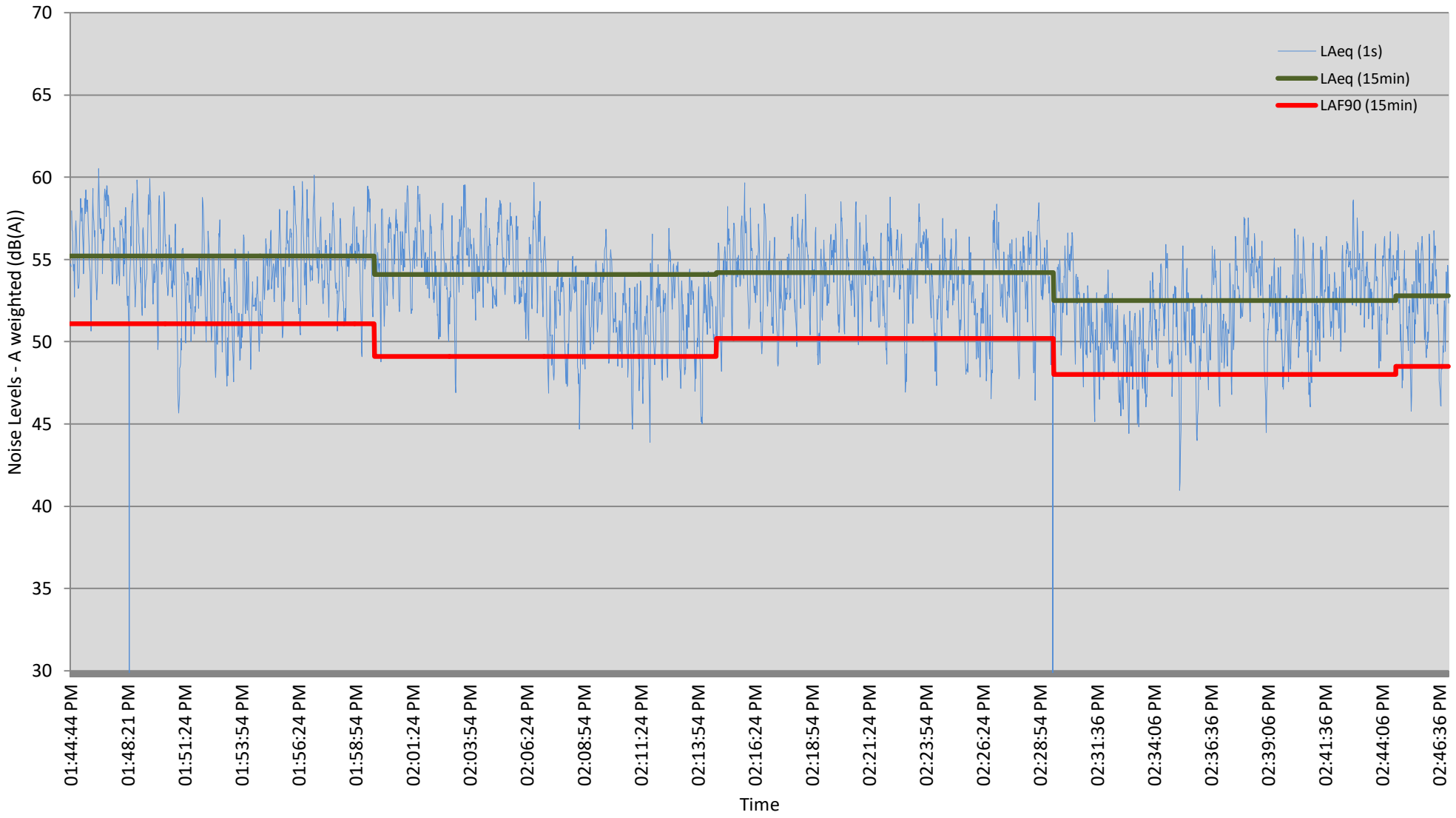
Pakiri Sand Extraction - Noise Level Measured at Position 4 - 22nd May 2019
Wind: Nil - Swell: 0.5 m



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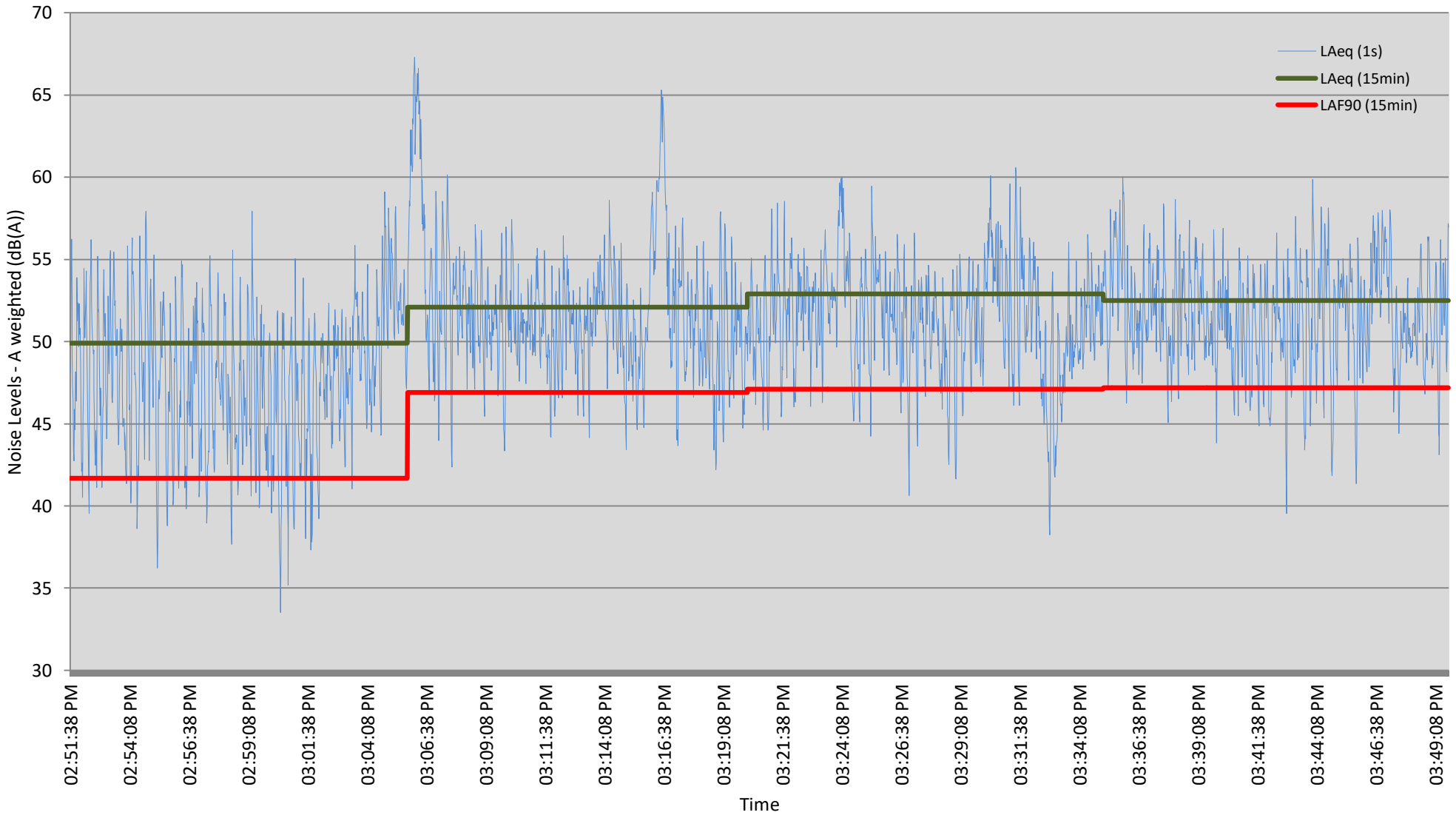
Pakiri Sand Extraction - Noise Level Measured at Position 5 - 22nd May 2019
Wind: Nil - Swell: 0.5 m



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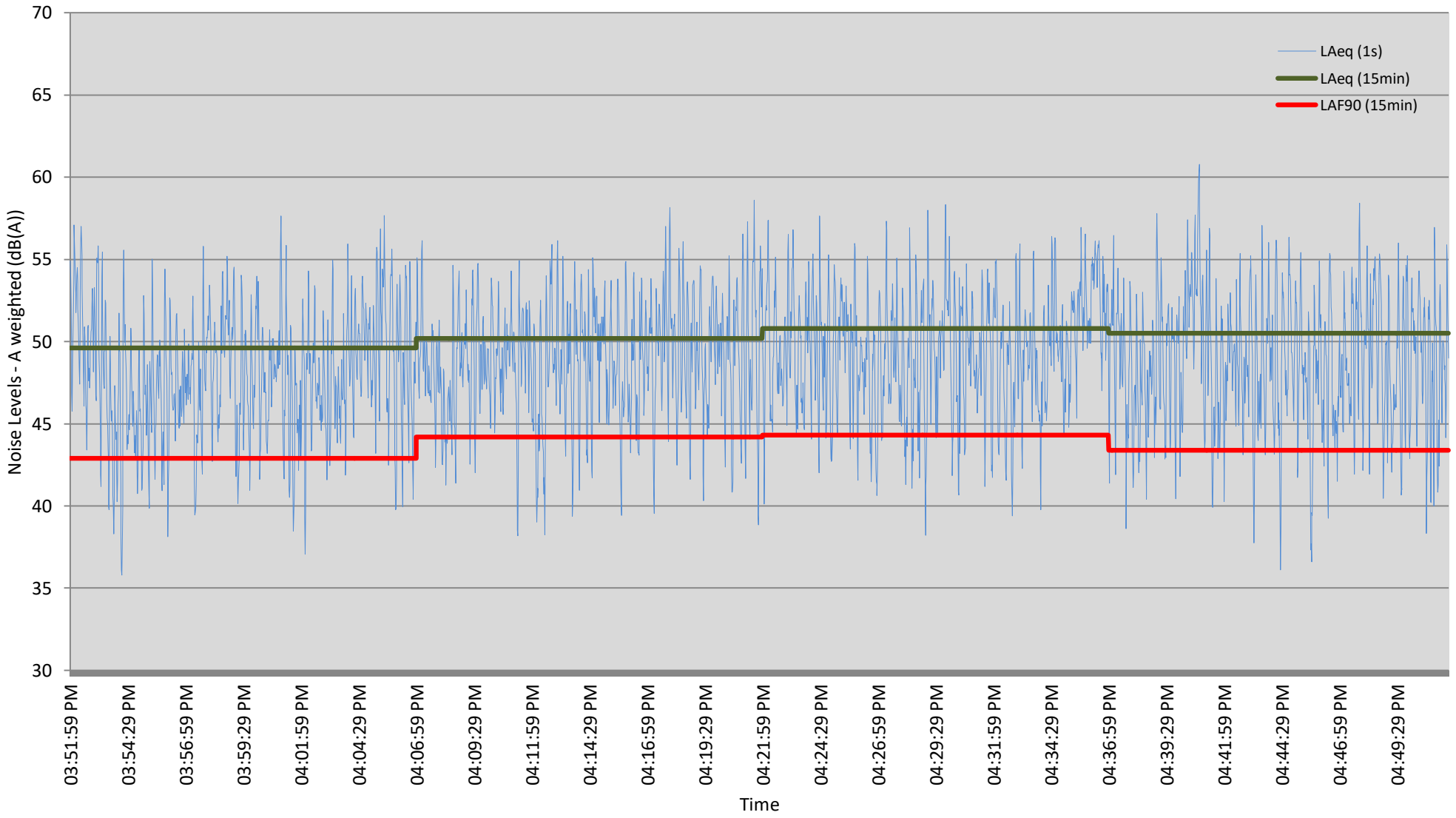
Pakiri Sand Extraction - Noise Level Measured at Position 6 - 22nd May 2019
Wind: Nil - Swell: 0.5 m



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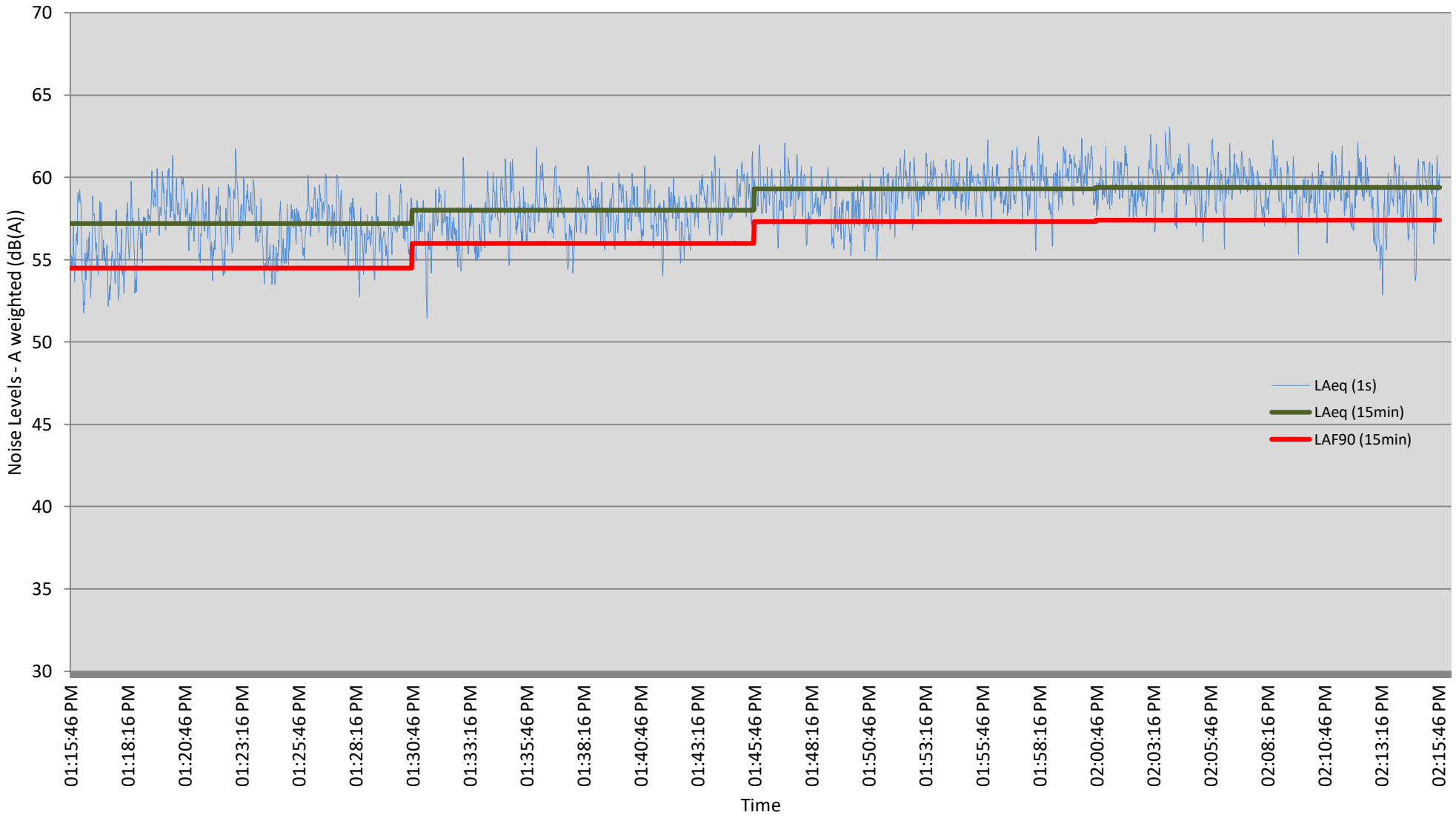
Pakiri Sand Extraction - Noise Level Measured at Position 1 - 13rd June 2019
Wind direction: North-West - Wind Speed: 1.5 m/s to 2.9 m/s - Swell: 0.8 m



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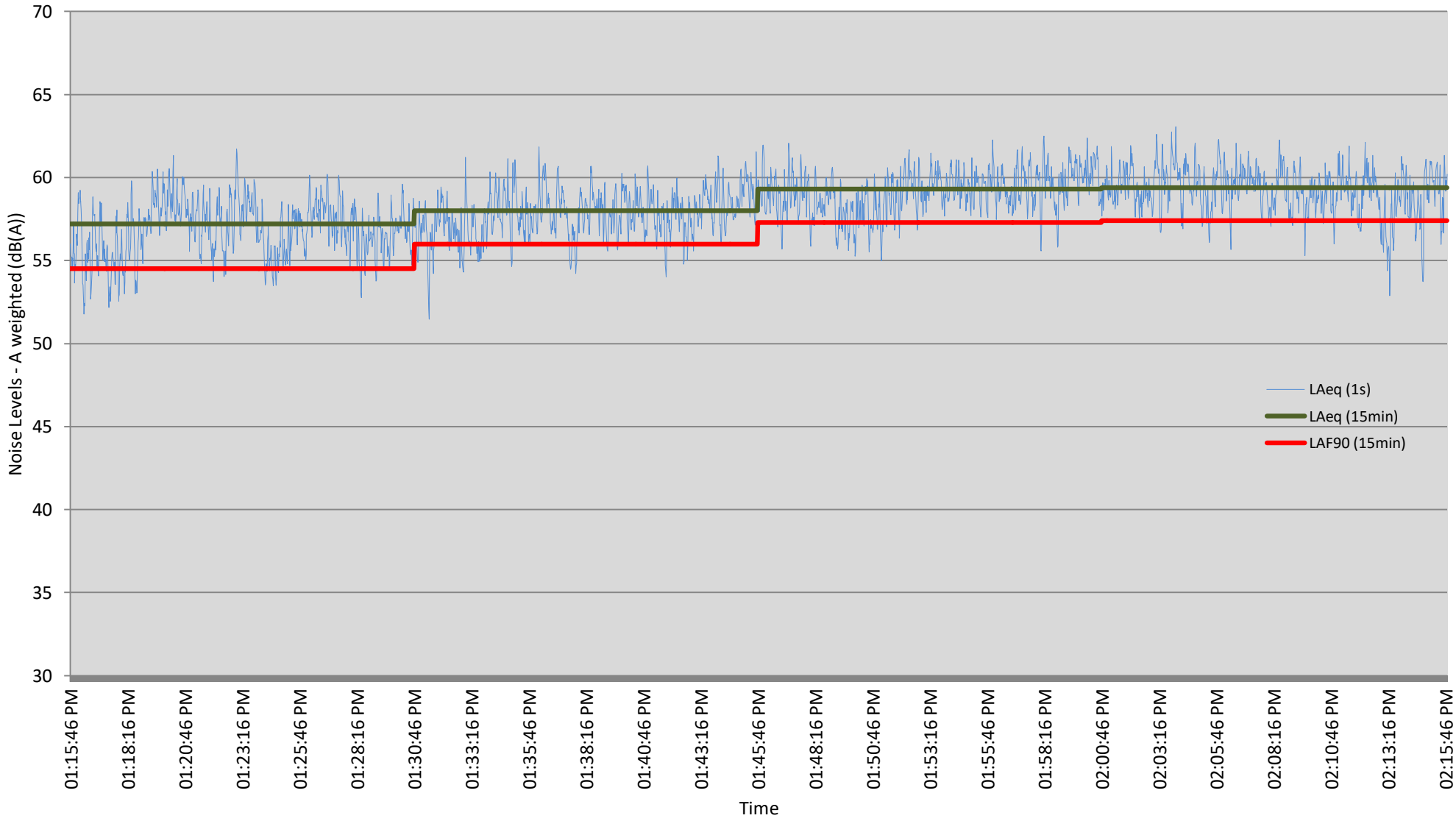
Pakiri Sand Extraction - Noise Level Measured at Position 2 - 13rd June 2019
Wind direction: North-West - Wind Speed: 1.5 m/s to 3 m/s - Swell: 0.8 m



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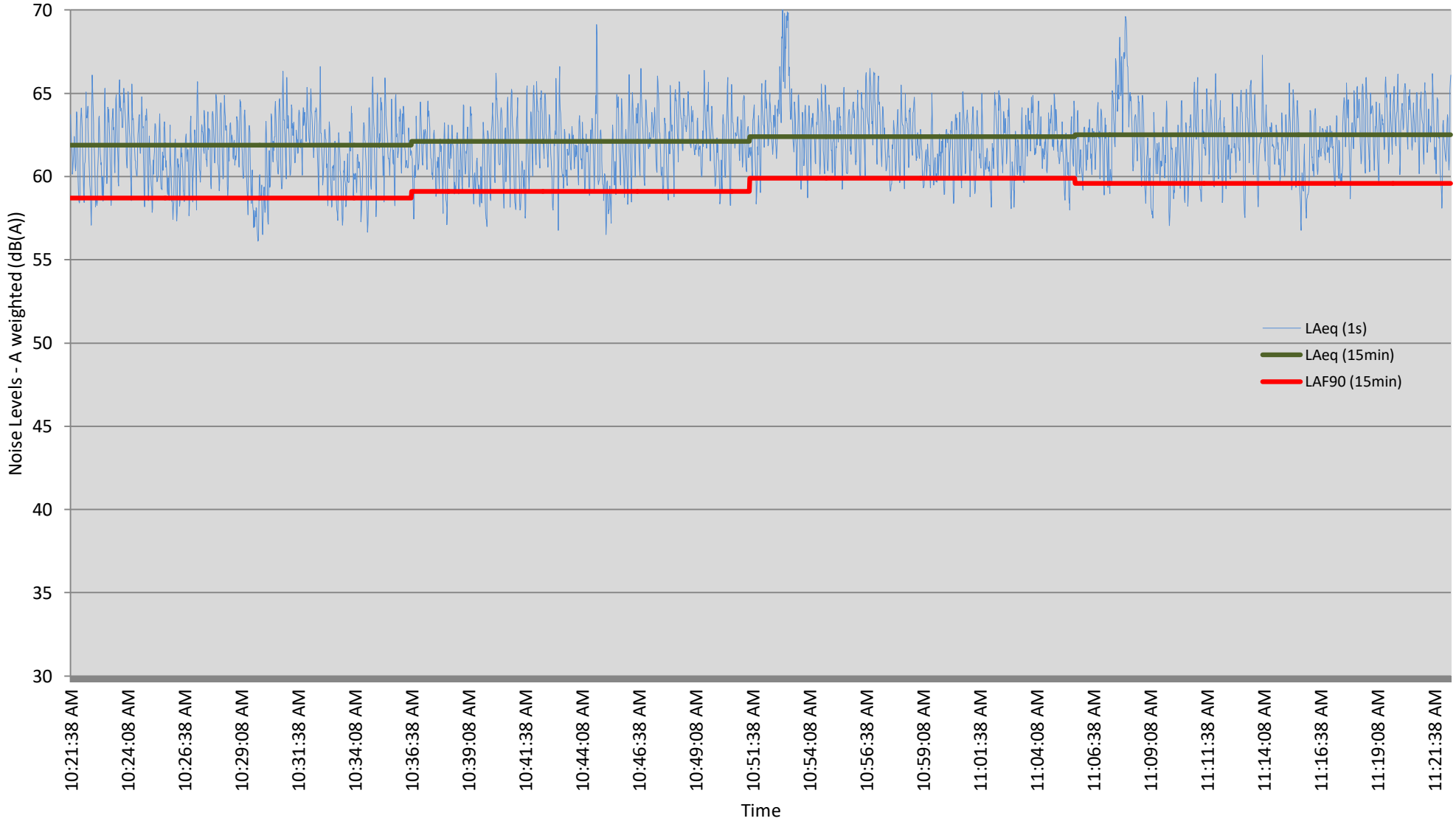
Pakiri Sand Extraction - Noise Level Measured at Position 4 - 11th July 2019
Wind direction: North-West - Wind Speed: 0 m/s to 0.5 m/s - Swell: 0.5 m



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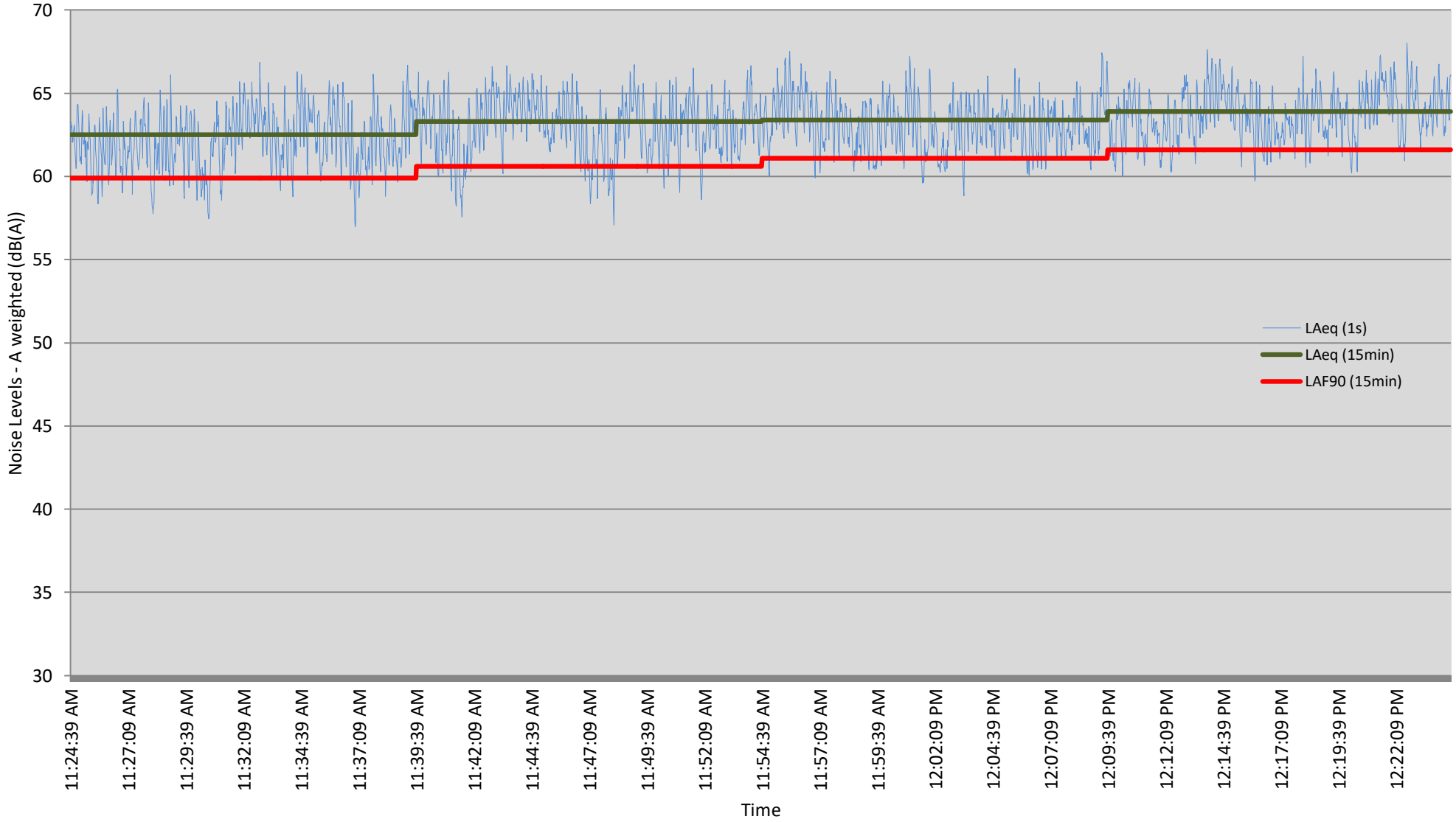
Pakiri Sand Extraction - Noise Level Measured at Position 5 - 11th July 2019
Wind direction: North-West - Wind Speed: 0.5 m/s to 1.5 m/s - Swell: 0.5 m



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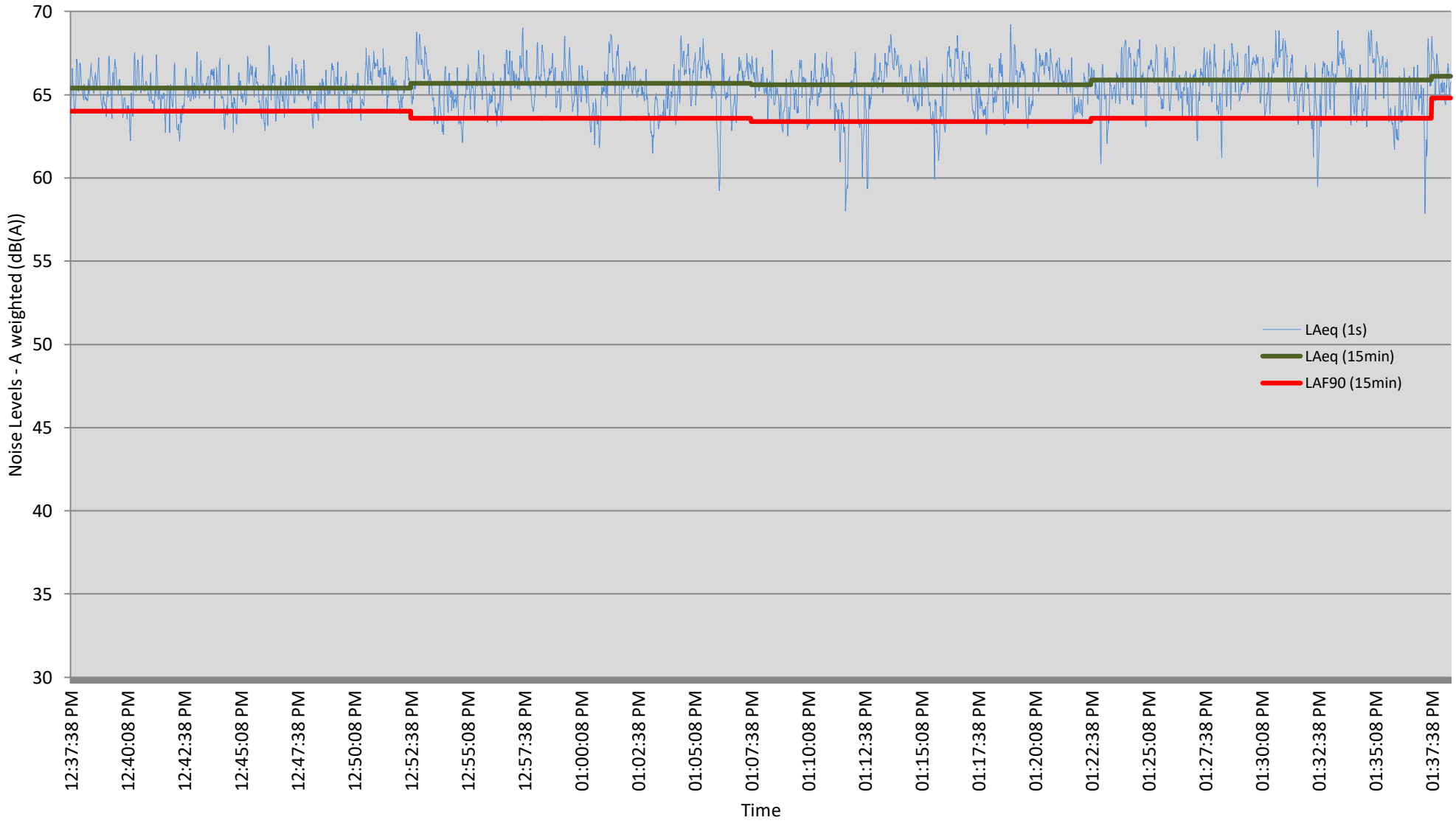
Pakiri Sand Extraction - Noise Level Measured at Position 6 - 11th July 2019
Wind direction: North - Wind Speed: under 1 m/s - Swell: 0.5 m



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