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Our Ref: SL:JM:6753/2021

24 January 2022

Lee Mason
Ipswich City Council
Ground Floor
1 Nicholas Street
IPSWICH QLD 4305

By email: Lee.Mason@ipswich.qld.gov.au

Dear Sir/Madam,

Environmental Protection Order issued by Ipswich City Council to Motoland Pty Ltd
Site address: 62 Coal Road, Chuwar, 145-179 Robin Street Chuwar and 136 Unnamed Road, Chuwar

1. We refer to:

   (a) the Amended Environmental Protection Order ("**EPO**") issued to our client on 15 December 2021; and

   (b) the letter received from Council on 13 January 2022 which provided reasons for the Council's decision not to grant any extensions of the timeframes contained in the EPO.

2. In accordance with the EPO, please find ***enclosed***:

   (a) Noise Impact Assessment prepared by Trinity Consultants Australia dated 24 January 2022; and

   (b) Preliminary Dust Review prepared by Trinity Consultants Australia dated 24 January 2022.

Noise Impact Assessment

3. Trinity Consultants Australia ("**Trinity**") has now provided its noise impact assessment. However, Council should note that:

   (a) data was collected for the period of 14 January 2022 until 24 January 2022. However, in order to meet Council's timeframe under the EPO, only data from 14 January 2022 until 18 January 2022 has been included in the assessment.

   (b) as consent was not provided from the owners of 2 Blackwall Road, Trinity was required to use an similar alternative location being, 72 Brodzig Road.

4. In any event, the noise assessment contains several recommendations for our client to implement in order to reduce the noise impact of the facility.

5. Our client is prepared to implement each of the recommendations contained in the noise assessment. However, our client understands that it will be required to obtain an occupational approval to carry out the earthworks required for the acoustic barrier/earth mounds.

6. To obtain such approval, our client will need to submit an application to Council including specifications and drawings prepared by an engineer. Our client has obtained initial advice that, due to the engineer's availability, it may take up to 2 months for our client to be in a position to submit its application to Council.

7. However, our client has taken steps where possible to implement the recommendations contained in the noise assessment by Trinity. Limitations have been placed on the use of heavy machinery on the beginner and intermediate tracks. The D3 Dozer will be significantly reduced and limited ongoing. Our client has also immediately introduce the use of a significantly smaller water truck.

8. Further, as a sign of good faith, our client intends to introduce limitations on rider activity on the main track until the acoustic barrier/earth mounds have been constructed. Our client proposes that riders on the main track will be limited to 20 riders at one time with the exception of one off events where our client has communicated with the community well in advance of the increased activity. It is our clients understanding that 20 riders will ensure compliance as identified by the data modelling contained in figure 7.1 of the noise assessment.

9. Once occupational approval has been received from Council, our client will take immediate steps to ensure that the acoustics barrier/earth mounds are installed as soon as practicable.

Dust Management

10. As identified in the initial assessment by Trinity, as a result of the current weather conditions, it would be more appropriate for the dust testing to be carried out at a later date outside of wet season.

11. At this stage, Trinity has recommended that our client implement some procedures to be observed until such testing can occur including:

    (a) review weather conditions prior to the operating hours to understand potential dust impacts that may occur;

    (b) during ride days, where visible dust plumes are seen dispersing from the tracks towards the road or nearby houses, undertake track watering as soon as possible;

    (c) be proactive and undertake track watering at times when dust emissions become more evident.

12. Our client agrees to implement such procedures immediately and will carry out the further testing once the wet season has passed.

Concluding Remarks

13. In light of the above, we are instructed to request that Council confirm that:

    (a) our client has complied with the requirements in the EPO; and

(b) Council agrees with our client's proposed steps moving forward.

14. We expressly reserve our client's rights.

Yours faithfully
Bugden Allen Graham Lawyers

Jaime McIver
Associate

Direct Line: 07 3905 9267
Email: jaime@bagl.com.au

Partner Responsible: Stella Lee

MOTOLAND MOTOCROSS FACILITY

62 Coal Road, Chuwar

Noise Impact Assessment

Motoland Australia

Date
24 January 2022

Report
227401.0005R01V01

DOCUMENT CONTROL

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227401.0005R01V01	24/01/2022	For Issue	Samuel Wong	Beau Weyers

Document Approval	
Approver Signature	
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Title	Senior Acoustic Engineer

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1. INTRODUCTION

1.1 Scope of Study

Trinity Consultants Australia (Trinity) was commissioned by Motoland Australia to conduct a noise assessment of their existing motocross facility at the old Tivoli Raceway at 62 Coal Road, Chuwar. The noise assessment has been undertaken in response to an Environmental Protection Order (EPO) issued by Ipswich City Council on the 15th of December 2021.

To provide an assessment of noise impacts, a range of noise monitoring tasks have been undertaken in and around the facility. The results of the monitoring have been compared to noise criteria detailed in the Queensland Environment Protection Act, EPO and other relevant documents. Where exceedances have been identified, recommendations for potential mitigation options are provided.

The following assessment tasks have been undertaken:

- Unattended and attended noise monitoring
- Analysis of noise data to review the compliance status of the facility
- Noise modelling
- Where exceedances of relevant criteria are identified, review of potential mitigation options for minimising noise impacts.

It is noted that the EPO requires a specific amount of noise monitoring to cover the various activities occurring on site (motorcycles, earthworks and water truck operation). To comply with this requirement, the monitoring was commenced on Friday 14th January 2021, with the intention to complete monitoring by Sunday 23rd January 2022. There were some delays in the monitoring in the first half of January due to periods of rainfall (greater than usual as a result of the La Nina weather patterns). At the time of preparing this report, only data collected up to Wednesday 18th January was available for analysis.

1.2 Environmental Protection Order

The EPO was issued by Ipswich Council on 15 December 2021. Specific requirements of the EPO are summarised in the following table, followed by a summary response and reference to relevant sections of the report.

Table 1.1: Summary of EPO Noise Requirements and Responses

Summary of EPO Requirement	Summary Response and Relevant Report Sections
The noise assessment must be undertaken by a Suitably qualified person, which means a person who has demonstrable professional qualifications, training, skills and/or experience relevant to the nominated subject matter and can give authoritative assessment, advice and analysis on performance relating to the subject matter using the relevant protocols, standards, methods or literature.	This noise assessment has been prepared by Samuel Wong (BEng(Chem)), a Senior Engineer and Member of the Australian Acoustical Society, with over 15 years of experience in acoustic assessments.
Noise logging locations: `Provisions and conduct for sound monitoring must include (but not limited to) a sound level meter and a noise logger from either within or at the boundary of a sensitive receptor from the following locations (but not limited to) listed below: ■ 135 Robin Street, Chuwar	Full details of the noise logging are presented in **Section 5** The following comments are made with regards to the noise logging locations: ■ 135 Robin Street – noise logging was undertaken at the boundary of 139 Robin Street, immediately east of the house, and nearest to the rider tracks. This is based on advice provided directly to Trinity by

Summary of EPO Requirement	Summary Response and Relevant Report Sections
■ 26 Coal Road, Chuwar ■ 2 Blackwall Road, Chuwar'	Ipswich City Council. It is noted that 139 Robin Street is closer to the tracks than 135 Robin Street. ■ 26 Coal Road – noise logging was undertaken along the boundary of the property, immediately north of the nearest house. ■ 2 Blackwall Road – permission to access this property was not given by the owner. Logging outside in the public road corridor was not adopted for security reasons. A representative location was adopted at 72 Brodzig Road, immediately east of the 2 Blackwall Road house.
Noise logging duration for each site activity: ■ Motorcycle activity – at least 4 days ■ Earthworks activity – at least 7 days ■ Water truck activity – at least 4 days	Full details of the noise logging are presented in **Section 5**. The number of activity days has been covered by logging commencing from 14th January (first full day) to a proposed end date of 24th January 2021. Specifically, the logging for this period is intended to cover the following: ■ Motorcycle activity – 5 days (14-16, 22, 23 Jan) ■ Earthworks activity – 8 days (14-17, 20-23 Jan) ■ Water truck activity – 5 days (14-16, 22, 23 Jan) It is noted that a data recording error occurred at the 139 Robin St logger on the 14th and 15th January.
Attended noise measurements of each activity: The monitoring from the sound level meter will require at least 6 samples (but not limited to) each with a 15-minute duration from each sensitive receptor on at least 3 separate dates when each activity occurs.	Full details of the noise logging are presented in **Section 5**. At least 6 x 15-minute measurements have been undertaken at each location, which have included each site activity. It is noted that, in some instances, multiple activities were occurring at the same time. For example, water truck and earthwork operations often occur simultaneously.
The assessment must provide 'recommendations as to how the activity affects the surrounding community including the sensitive receptor/s. The suitably qualified person must also recommend the type of control measures required to achieve acoustic quality objectives criteria at a sensitive receptor and the surrounding community'.	An analysis of the monitoring results is provided in **Sections 6** and **7**. Recommendations are provided in **Section 8**.

2. SUBJECT SITE

The Motoland motocross facility is located at 62 Coal Road, Chuwar. The site is bounded by Robin Street (north boundary) and Holdsworth Road (a undeveloped road corridor along the south-east boundary). The nearest sensitive receptors are residential houses located to the west, east and south. The nearest house is located at 26 Coal Road, approximately 120 metres from the Main riding track.

Other receptors in the area include the Tivoli Drive-in Theatre at 50 Coal Road. A church (Tivoli Miracle Centre) is located on the same property (church building approximately 300 metres south-east of the nearest track). Based on information provided on the Tivoli Drive-in website, movies commence at 7 pm, immediately outside of the Motoland operating hours.

Figure 2.1 presents the site location and surrounding land uses. Figure 2.1 additionally shows the general site layout, and further details are discussed in **Section 3**. It is noted that aerial photo was taken in 2020 and does not necessarily present the current layout of each track.

Figure 2.1 Site Location

3. SITE OPERATIONS

The Motoland facility comprises of 4 motorbike tracks, as described below (see also **Figure 2.1**):

- Pee Wee
- Beginner
- Intermediate
- Main

The tracks are open to the public from 8 am to 3 pm Friday to Sunday. It is noted that the Main track is only open on Saturday and Sunday.

On the Intermediate track, riders are allowed onto tracks in specific riding sessions controlled by Motoland staff. A session is up to 1 hour in duration. Sessions are arranged to separate junior and senior riders. Other tracks are freely accessible by riders during opening hours. However, Motoland can restrict the number of riders at its own discretion (e.g. track conditions may not allow for too many riders at any given time) and maintains ultimate control over the number of patrons accessing the site.

Outside of the riding operating hours, earthworks and track watering are undertaken to maintain the tracks and minimise dust emissions. The earthwork equipment on site includes a posi-track, tractor and D3 dozer. Track watering is undertaken using a water truck. There is normally one water truck on site, however, on the 15th of January during the monitoring, a second smaller water truck was being trialled. Motoland staff are in attendance at each track during operations to constantly observe track safety and conditions (including dust). Where required, watering may occur during opening hours to minimise dust emissions (i.e. a track may be temporarily closed for 15-30 minutes while watering takes place). The water truck is approved to operate from 7 am to 7 pm only, while the earthwork equipment is approved to operate from 6:30 am to 6:30 pm.

The majority of earthworks activities are required on the Main track. The Beginner and Intermediate track are generally maintained two times a week on a Friday and Saturday afternoon (less than 1-hour of earthworks and watering).

4. NOISE CRITERIA

4.1 Motorcycle Activity

The EPO identifies review of current and potential future operations against a noise limit of 70 dBA for motorcycle activity, measured as an $L_{Aeq,15\text{-}minute}$. This is consistent with the limit defined in Section 440X of the Queensland Environmental Protection Act for open-air events.

440X Open-air events

(1) An occupier of premises must not use, or permit the use of, the premises for an open-air event on any day—

(a) before 7a.m, if the use causes audible noise; or

(b) from 7a.m. to 10p.m, if the use causes noise of more than 70dB(A); or

(c) from 10p.m. to midnight, if the use causes noise of more than the lesser of the following—

(i) 50dB(A);

(ii) 10dB(A) above the background level.

(2) However, subsection (1) does not apply to licensed premises.

(3) Also, subsection (1)(b) does not apply if—

(a) the premises is, or is part of, an educational institution; and

(b) the use of the premises for an open-air event is organised by or for the educational institution for non-commercial purposes of the institution.

Section 440K defines open-air event as 'an open-air competition, concert, display, race or other activity'.

4.2 Water Truck and Earthworks Activity

For water truck activity, the EPO refers to Section 440T of the EP Act, which is applicable to pump noise. Section 440T states, the following criteria:

440T Pumps

(1) This section applies to premises at or for which there is a pump.

(2) An occupier of the premises must not use, or permit the use of, the pump on any day—

(a) before 7a.m, if it makes an audible noise; or

(b) from 7a.m. to 7p.m, if it makes a noise of more than 5dB(A) above the background level; or

(c) from 7p.m. to 10p.m, if it makes a noise of more than 3dB(A) above the background level; or

(d) after 10p.m, if it makes an audible noise.

(3) Subsection (2)(a), (c) and (d) do not apply to a noise made at an educational institution, that is not more than 5dB(A) above the background level.

(4) In this section—

pump—

(a) means an electrical, mechanical or pneumatic pump; and

Examples—

liquid pump, air pump, heat pump

(b) includes a swimming pool pump and a spa blower.

The intent of this section of the EP Act is to address continuous fixed plant pump operation (e.g. pool pumps), which is characterised by the L_{A90} noise parameter. This is reflected in the definition of a pump provided in the EP Act, and the fact that the Environmental Protection Regulation 2019 specifies that pump noise should be assessed using the L_{A90} parameter. The defining noise during watering of the tracks is the truck engine. Noise from the truck engine is variable as the truck accelerates, moves and slows down along the track. Therefore, watering is not defined by a continuous pump noise.

The Background Plus 5 dB limit is a commonly adopted noise criteria for all types of sources. However, the L_{Aeq} parameter is considered more appropriate for assessing compliance for water truck activity for the reasons described above.

4.3 Earthworks

For earthwork activity, no noise criteria are referred to in the EPO. It is proposed to adopt the same criteria as the water truck (i.e. Background Plus 5 dBA). The Background Plus 5 dB is also referred to in the older 2008 version of Environmental Protection (Noise) Policy, which defines a Background Plus 5 dB limit for variable noise sources, such as heavy earthwork machinery. This criteria approach is also consistent with that adopted by the NSW EPA in the NSW Noise Policy for Industry to prevent intrusive noise impacts.

4.4 Summary of Criteria

Based on the above review of criteria, **Table 4.1** presents a summary of the noise criteria adopted for the assessment. The background noise levels used to derive the Background Plus 5 criteria for earthworks and watering are based on the noise logging as presented in **Section 6.2.5**.

Table 4.1: Noise Criteria

Noise Source	$L_{Aeq,adj,T}$ Noise Limit
Motorcycle Activity	All Receptors: 70 dBA
Earthworks and Water Truck Activity	26 Coal Road: 48 dBA (L_{A90} background of 43 dBA + 5) 2 Blackwall Road: 41 dBA (L_{A90} background of 36 dBA + 5) 139 Robin Street: 48 dBA (L_{A90} background of 43 dBA + 5)

With regards to the relevant noise parameter, the Environmental Protection Regulation 2019 refers to an L_{Aeq} measured over a time period of 15-minutes and adjusted for annoying characteristics (tonality or impulsiveness). Based on site observations, heavy machinery or motorbike noise from the facility is not considered tonal or impulsive in nature. Therefore, no adjustments are considered necessary.

Through environmental authorities, the Department of Environment and Science specifies that noise criteria apply within the curtilage of a dwelling reasonably used by persons at that place. For the purpose of this assessment, noise impacts have been considered at the residential dwelling and the garden or other useable space directly around the dwelling where normal activities take place. For very small properties, the criteria may be applicable at the boundary. For very large properties, the dwelling and useable space may be at large distance from the property boundary and the curtilage may also be well within the property boundary

At 26 Coal Road, the noise monitoring was conducted at approximately 40 metres directly north of the nearest dwelling (along the northern boundary) to assess compliance. The location is noted to be at the end of the property's driveway roundabout, closest to the Main track[1]. At 139 Robin Street, the noise monitoring was conducted at eastern boundary of the property's garden.

[1] It is noted that the NSW EPA in the Noise Policy for Industry (2017) specifies that noise criteria are applied up to 30 metres from a dwelling if the house is more than 30 metres from the property boundary. This policy adopts a more specific approach to defining useable space where acoustic amenity is to be protected.

5. NOISE MONITORING METHODOLOGY

5.1 Overview

Noise logging commenced on Thursday 13th January 2022 and currently remains in place. At the time of preparing this report, only the data collected up until Wednesday 18th January was available.

Noise logging was undertaken at 3 locations based on the EPO requirements and discussions with Ipswich City Council. These locations were:

- **26 Coal Road** – the boundary of the property, immediately north of the nearest house, closest to the Main track.[2]
- **72 Brodzig Road** – the EPO specifies 2 Blackwall Road, however permission to access this property was not given by the owner. Logging outside in the public road corridor was not adopted for security reasons. A representative location was adopted at 72 Brodzig Road, immediately east of the 2 Blackwall Road house.
- **139 Robin Street** – the EPO specifies logging at 135 Robin Street. Based on later email advice provided to Trinity by Ipswich City Council, noise logging was undertaken at 139 Robin Street, immediately east of the house, and nearest to the rider tracks. It is noted that 139 Robin Street is closer to the tracks than 135 Robin Street. [3]

Attended noise measurements were also undertaken to supplement the logger data each location. Unlike the logging, the attended monitoring was able to be undertaken at the boundary of 2 Blackwall Rd.

Table 5.1 presents a summary of the noise monitoring locations, and the dates/times when noise logging and attended noise measurements were completed. **Figure 5.1** presents an aerial photo showing the monitoring locations.

Table 5.1: Attended Noise Measurement Details

Location	Noise Logging	Attended Noise Measurements and Activities Occurring
26 Coal Road	Commenced 13/1/22	12:57 pm Friday 14/1/22 – tractor, large water truck, motorbikes 1:28 pm Friday 14/1/22 – tractor, large water truck 7:11 am Saturday 15/1/22 – tractor, small water truck 7:27 am Saturday 15/1/22 – large/small water truck, tractor 8:47 am Saturday 15/1/22 – motorbikes 9:04 am Saturday 15/1/22 – motorbikes 3:36 pm Saturday 15/1/22 – tractor, large water truck 3:53 pm Saturday 15/1/22 – tractor, large water truck 7:30 am Sunday 16/1/22 – no activity (cars arriving) 9:57 am Sunday 16/1/22 - motorbikes 10:13 am Sunday 16/1/22 – motorbikes 10:28 am Saturday 22/1/22 – motorbikes, water truck 4:24 pm Saturday 22/1/22 – tractor, posi-track
2 Blackwall Road	Commenced 13/1/22	11:25 am Friday 14/1/22 – Posi-track, water truck, motorbikes (Junior/Intermediate) 11:42 am Friday 14/1/22 – Posi-track, water truck, motorbikes (Junior/Intermediate)

[2] Noise logger was originally setup about 80 metres west of the dwelling in an undeveloped area along the north-western boundary. The logger was relocated at 2:00 pm 14/1/2022 to the identified/final location to represent the curtilage of the property.
[3] Noise logger was originally setup outside the northern property boundary, as permission to access the property was not provided. Access was provided on the morning of 14/1/2022 and the logger was relocated to the identified/final location at 10:30 am.

Location	Noise Logging	Attended Noise Measurements and Activities Occurring
		7:11 am Saturday 15/1/22 – tractor, small water truck 7:27 am Saturday 15/1/22 – large/small water truck, tractor 9:27 am Saturday 15/1/22 – motorbikes, water truck 9:42 am Saturday 15/1/22 – motorbikes 4:15 pm Saturday 15/1/22 – tractor, large water truck 7:28 am Sunday 16/1/22 – no activity (cars arriving) 7:47 am Sunday 16/1/22 – no activity (cars arriving) 8:53 am Sunday 16/1/22 – motorbikes 9:10 am Sunday 16/1/22 – motorbikes 3:50 pm Saturday 22/1/22 – posi-track
139 Robin Street	Commenced 13/1/22	10:39 am Friday 14/1/22 – Posi-track, water truck 10:55 am Friday 14/1/22 – Posi-track, water truck, motorbikes (Junior/Intermediate) 7:50 am Saturday 15/1/22 – tractor, small water truck, motorbikes 8:07 am Saturday 15/1/22 – motorbikes 8:22 am Saturday 15/1/22 – motorbikes 10:24 am Saturday 15/1/22 – motorbikes 3:00 pm Saturday 15/1/22 – tractor, large water truck 7:52 am Sunday 16/1/22 – large water truck, motorbikes 8:12 am Sunday 16/1/22 – motorbikes 8:29 am Sunday 16/1/22 – motorbikes 3:21 pm Saturday 22/1/22 – posi-track 3:37 pm Saturday 22/1/22 – posi-track 5:30 pm Saturday 22/1/22 – water truck

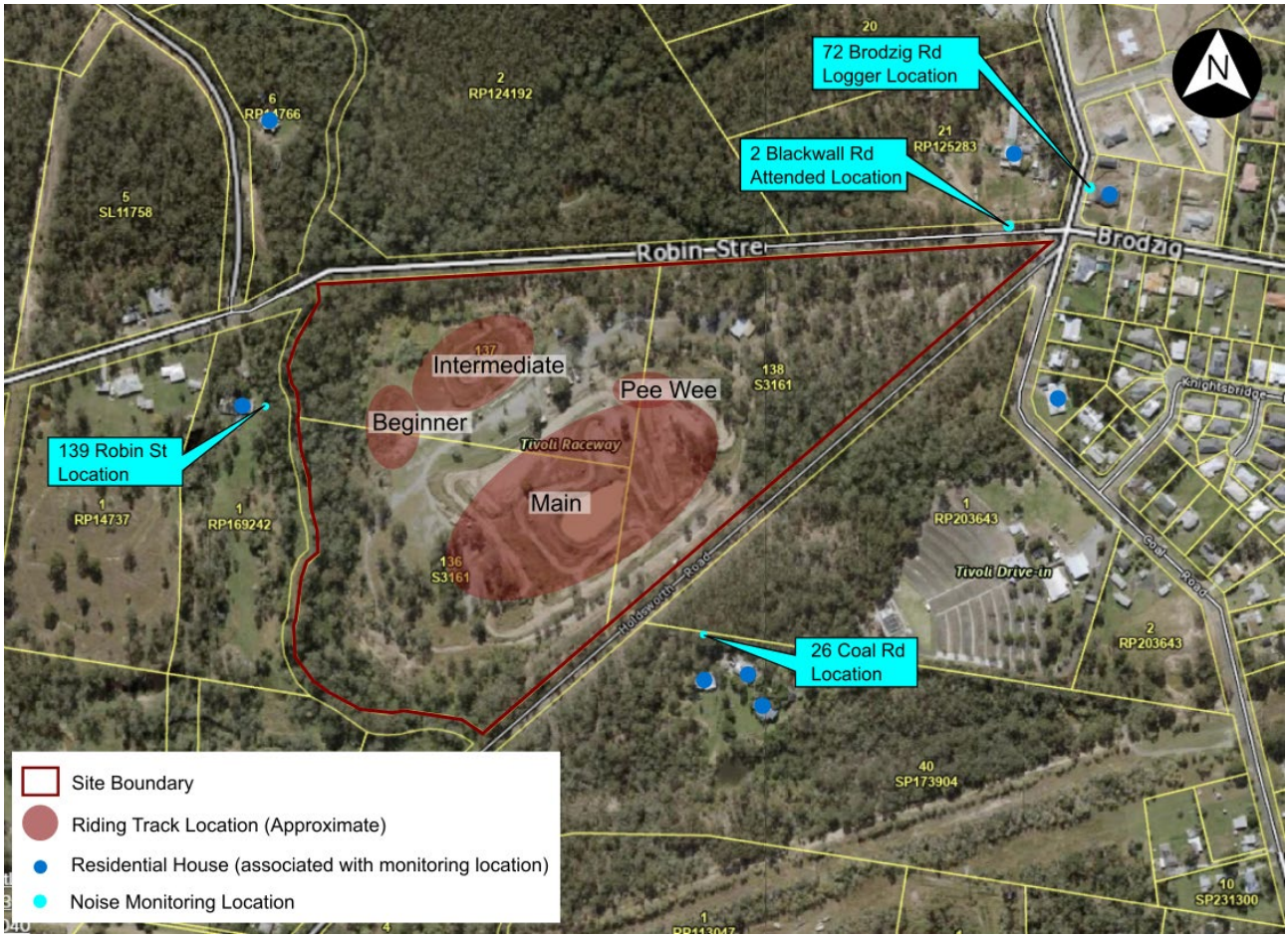


Figure 5.1 Noise Monitoring Locations

5.2 Monitoring Methodology

The noise monitoring was undertaken in the Department of Environment and Science (DES) Noise Measurement Manual (2020).

Larson Davis LD831 Environmental Noise Loggers (Type 1) and Bruel & Kjaer 2250 Lite Sound Level Meters were utilised for the logging and attended measures, respectively. The serial numbers and calibration information for the monitoring instrument and field calibrator are presented in **Table 5.2**.

Table 5.2: Summary of Monitoring Equipment

Monitoring Location	Instrument Model	Instrument Serial	Monitoring Period	Instrument NATA Calibration Due Date
26 Coal Road	LD831 Sound Level Meter	10837	Commenced 13/1/22	26/07/2023
72 Brodzig Road	LD831 Sound Level Meter	10838	Commenced 13/1/22	12/07/2023
139 Robin Street	LD831 Sound Level Meter	10839	Commenced 13/1/22	17/06/2023
Attended	Bruel & Kjaer 2250	3006647	14-16, 22/1/22	28/9/23
Attended	Bruel & Kjaer 2250	2741105	15-16, 22/1/22	12/7/23

Monitoring Location	Instrument Model	Instrument Serial	Monitoring Period	Instrument NATA Calibration Due Date
-	Pulsar Acoustic Calibrator Model 105	78233	-	28/09/22

An averaging time of 15 minutes was adopted. The microphones were positioned in a free-field position at the height of 1.5 metres above ground level and fitted with a windshield throughout the measurements. The microphone at 72 Brodzig Road was setup at approximately 2.5 metres above ground, above the height of an existing 1.8 metre fence (overlapping timber panels). This approach was taken so that noise measurements would not be shielded from site activity (to represent 2 Blackwall Road, which did not have a boundary barrier).

The instruments were checked before and after monitoring with a 94 dB calibrator and found to be within ±0.5 dB of 94 dB.

5.3 Weather Conditions

A review of meteorological data for the nearest Bureau of Meteorology station at Amberley (9.5 km south-east of the site) was undertaken to determine periods of rain and wind speeds above 5 m/s.

Rainfall and/or winds above 5 m/s occurred during the following periods:

- 12:30 - 4:00 am 16/1/22 – 8.6 mm of rain and wind speeds up to 7 m/s
- 5:30 pm 17/1/22 – 6 m/s winds.

It is noted that site observations made during the attended measurements suggest that wind speeds at Amberley are higher than those experienced 9.5 km away at the site. A local weather station was also setup on the Motoland property; however, data has not been made available at the time of preparing this report.

A particular focus of this report is site activity occurring on Saturday 15th January, which represented the busiest (and noisiest) day of the available monitoring data. On this day, weather conditions were generally calm based on site observations. The calm conditions are considered suitable for assessing compliance. The DES Planning for Noise Control Guideline (2004 and draft 2013 version) specifies that source-to-receiver winds be considered if it is feature of an area. Wind is a feature of an area if source-to-receiver winds (at 10 m) of 3 m/s or less occur for at least 30 percent of the time. Based on historical wind rose data at the Amberley BOM station (see **Figure 5.2**), wind occurs in each direction for less than 30% of the time. Therefore, there is no dominant source-to-receiver winds that need to be considered when assessing compliance.

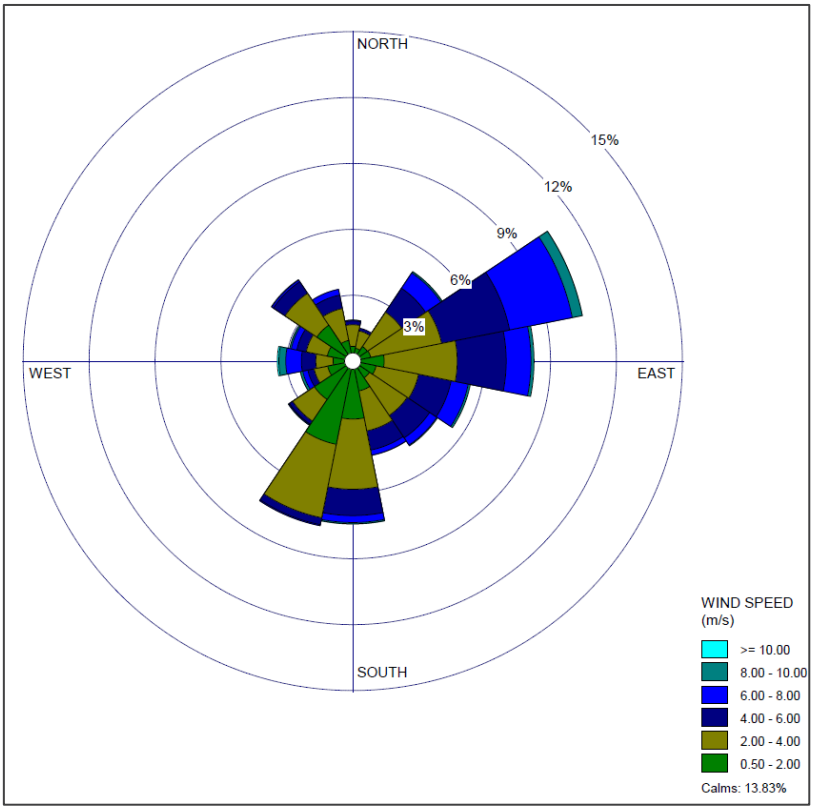


Figure 5.2 2017-2018 Amberley BOM Station Wind Rose

5.4 Site Activity During Monitoring

Site activity data was obtained by Trinity staff during site visits and from information provided by Motoland describing the specific times for motorcycle activity, and when each on-site heavy machinery item was operating (large water truck, small water truck, dozer, tractor and posi-track).

Table 5.3 to **Table 5.5** presents the site activity log provided by Motoland for Friday 14th to Sunday 16th January. On Monday 17th January, the D3 dozer was the only source operating from 9:30 am to 5:30 pm. No site activity was occurring Tuesday 18th and Wednesday 19th January.

Table 5.3: Site Activity Log – Friday 14th January 2022

Time Start	Motorbike Tracks	Earthworks	Water Truck
6:30		Tractor (Main)	
6:45		Tractor (Main)	
7:00		Tractor (Main)	Large (Beginner / Intermediate)
7:15		Tractor (Main)	Large (Beginner / Intermediate)
7:30		Tractor (Main)	Large (Beginner / Intermediate)
7:45		Tractor (Main)	
8:00	Beginner / Intermediate	Tractor (Main)	
8:15	Beginner / Intermediate	Tractor (Main)	
8:30	Beginner / Intermediate	Tractor (Main)	
8:45	Beginner / Intermediate	Tractor (Main)	
9:00	Beginner / Intermediate	Posi-Track (Main)	Large (Main)
9:15	Beginner / Intermediate	Posi-Track (Main)	Large (Main)
9:30	Beginner / Intermediate	Posi-Track / Tractor (Main)	Large (Main)
9:45	Beginner / Intermediate	Posi-Track / Tractor (Main)	Large (Main)
10:00	Beginner / Intermediate	Posi-Track / Tractor (Main)	Large (Main)
10:15	Beginner / Intermediate	Posi-Track / Tractor (Main)	Large (Main)
10:30	Beginner / Intermediate	Posi-Track / Tractor (Main)	Large (Main)
10:45	Beginner / Intermediate	Posi-Track / Tractor (Main)	Large (Main)
11:00	Beginner / Intermediate	Tractor (Main)	Large (Main)
11:15	Beginner / Intermediate	Tractor (Main)	Large (Main)
11:30	Beginner / Intermediate	Tractor (Main)	Large (Main)
11:45	Beginner / Intermediate	Tractor (Main)	Large (Main)
12:00	Beginner / Intermediate	Tractor (Main)	
12:15	Beginner / Intermediate	Tractor (Main)	
12:30	Beginner / Intermediate	Tractor (Main)	
12:45	Beginner / Intermediate	Tractor (Main)	
13:00	Beginner / Intermediate	Tractor (Main)	
13:15	Beginner / Intermediate	Tractor (Main)	
13:30	Beginner / Intermediate	Tractor (Main)	
13:45	Beginner / Intermediate	Tractor (Main)	
14:00	Beginner / Intermediate	Tractor (Main)	
14:15	Beginner / Intermediate	Tractor (Main)	
14:30	Beginner / Intermediate	Tractor (Main)	
14:45	Beginner / Intermediate	Tractor (Main)	
15:00		Tractor (Main)	
15:15		Tractor (Main)	
15:30		Tractor (Main)	
15:45		Tractor (Main)	
16:00			Small (Main)
16:15			Small (Main)
16:30			Small (Main)
16:45			Small (Main)

Time Start	Motorbike Tracks	Earthworks	Water Truck
17:00			Small (Main)
17:15			Small (Main)
17:30			Small (Main)
17:45			Small / Large (Main)
18:00			Small (Main)
18:15			Small (Main)
18:30			Small (Main)
18:45			Small (Main)

Table 5.4: Site Activity Log – Saturday 15th January 2022

Time Start	Motorcycle Tracks Bike Numbers in Brackets (Beginner/Intermediate/Main)	Earthworks	Water Truck
6:30		Tractor (Main)	
6:45		Tractor (Main)	
7:00		Tractor (Main)	Small (Main)
7:15		Tractor (Main)	Small (Main)
7:30		Tractor (Main)	Small (Main)
7:45		Tractor (Main)	Small (Intermediate)
8:00	All Tracks Open (2/2/6)	Tractor (Main)	
8:15	All Tracks Open (5/7/12)	Tractor (Main)	
8:30	All Tracks Open (4/14/25)	Tractor (Main)	
8:45	All Tracks Open (4/11/30)		
9:00	All Tracks Open (4/12/30)		
9:15	All Tracks Open (0/12/18)		
9:30	All Tracks Open (6/0/32)		
9:45	All Tracks Open (11/5/4)		
10:00	All Tracks Open (5/28/0)		Small (Main)
10:15	All Tracks Open (10/12/0)		Small (Main)
10:30	All Tracks Open (6/15/35)		Small (Intermediate)
10:45	All Tracks Open (8/20/35)		
11:00	All Tracks Open (-/-/35)		
11:15	All Tracks Open		
11:30	All Tracks Open		
11:45	All Tracks Open		
12:00			Small (Main)
12:15			Small (Main)
12:30			Small (Intermediate)
12:45	All Tracks Open		
13:00	All Tracks Open		
13:15	All Tracks Open		
13:30			
13:45			Small (Beginner/Intermediate)
14:00			
14:15			
14:30		Tractor (Main)	Large (Main)
14:45		Tractor (Main)	Large (Main)
15:00		Tractor (Main)	Large (Main)
15:15		Tractor (Main)	Large (Main)

Time Start	Motorcycle Tracks Bike Numbers in Brackets (Beginner/Intermediate/Main)	Earthworks	Water Truck
15:30		Tractor (Main)	Large (Main)
15:45		Tractor (Main)	Large (Main)
16:00		Tractor (Main)	Large (Main)
16:15		Tractor (Main)	Large (Main)
16:30		Tractor (Main)	Large (Main)
16:45		Tractor (Main)	Large (Main)
17:00		Tractor (Main)	Large (Main)
17:15		Tractor (Main)	Large (Main)
17:30		Posi-Track (Main)	Large (Main)
17:45		Posi-Track (Main)	Large (Main)
18:00		Posi-Track (Main)	Large (Main)
18:15		Posi-Track (Main)	Large (Main)
18:30			Large (Main)
18:45			Large (Main)

Table 5.5: Site Activity Log – Sunday 16th January 2022

Time Start	Motorcycle Tracks Bike Numbers in Brackets (Beginner/Intermediate/Main)	Earthworks	Water Truck
6:30			
6:45			
7:00			
7:15			
7:30			
7:45		Tractor (Main)	
8:00	All Tracks Open (0/3/0)		
8:15	All Tracks Open (0/4/0)		
8:30	All Tracks Open (0/12/0)		
8:45	All Tracks Open (0/16/0)		
9:00	All Tracks Open (0/10/0)		
9:15	All Tracks Open (0/9/0)		
9:30	All Tracks Open (0/10/0)		
9:45	All Tracks Open (5/4/12)		
10:00	All Tracks Open (7/24/13)	Posi Track (Main)	
10:15	All Tracks Open (7/10/11)		
10:30	All Tracks Open		
10:45	All Tracks Open		
11:00	All Tracks Open		
11:15			Large (Beginner/Intermediate)
11:30			Large (Beginner/Intermediate)
11:45			Large (Beginner/Intermediate)
12:00	All Tracks Open		
12:15	All Tracks Open		
12:30	All Tracks Open		
12:45	All Tracks Open		
13:00	All Tracks Open		

Time Start	Motorcycle Tracks Bike Numbers in Brackets (Beginner/Intermediate/Main)	Earthworks	Water Truck
13:15	All Tracks Open		
13:30	All Tracks Open		
13:45	All Tracks Open		
14:00	All Tracks Open		
14:15	All Tracks Open		
14:30	All Tracks Open	Tractor (Main)	
14:45	All Tracks Open	Tractor (Main)	
15:00		Tractor (Main)	
15:15		Tractor (Main)	
15:30		Tractor (Main)	
15:45		Tractor (Main)	
16:00		Tractor (Main)	
16:15		Tractor (Main)	
16:30		Tractor (Main)	
16:45		Tractor (Main)	
17:00		Tractor (Main)	
17:15		Tractor (Main)	
17:30			
17:45			
18:00			
18:15			
18:30			
18:45			

6. NOISE MONITORING RESULTS

6.1 Attended Monitoring

The results of the attended noise monitoring conducted from 14th January to 16th January, as well as 21st and 22nd January 2022 are presented in the following tables.

Table 6.1: Attended Monitoring Results – Friday 14th January 2022

Location	Time Start	Measured Levels dBA	Description/Observations
139 Robin Rd	10:39 am	L_{Aeq} 66.4 L_{Amax} 76.1 L_{A1} 74.8 L_{A10} 70.8 L_{A90} 57.1	Cicada noise dominant. Motorbikes on Junior/Intermediate track clearly audible. Heavy machinery engine audible on one occasion. Max defined by cicada noise.
139 Robin Rd	10:55 am	L_{Aeq} 67.5 L_{Amax} 79.1 L_{A1} 77.3 L_{A10} 70.2 L_{A90} 59.9	Cicada noise dominant. Motorbike noise continuous, observed at 60-65 dBA when insect noise was low. Posi-track was just audible on one occasion. L_{Aeq} with insect noise filtered out was 62.0 dBA.
On-site observation	11:20 am	-	The large water truck was observed on the Intermediate track. 6 bikes were on the Beginner track and 2 on the Pee Wee track.
2 Blackwall Rd	11:25 am	L_{Aeq} 55.5 L_{Amax} 68.8 L_{A1} 64.5 L_{A10} 60.0 L_{A90} 44.5	Large water truck and motorbike noise was just audible at times. Overall, noise was defined by other sources (e.g. insects, local traffic). Concrete cutting commenced along the footpath near 72 Brodzig Road in the last few minutes of the measurement, which was clearly audible.
On-site observation	11:42 am	-	Large water truck was on the Main track and posi-track was operating at the western end of the Main track. Bike numbers: 2 on Pee Wee, 6 on Beginner and 3 on Intermediate.
2 Blackwall Rd	11:52 am	L_{Aeq} 58.5 L_{Amax} 75.5 L_{A1} 66.4 L_{A10} 62.2 L_{A90} 50.5	Site activity was not audible during the measurement. Noise was defined by other noise sources east of the monitoring location and unrelated to Motoland (e.g. local traffic, concrete saw, tractor on nearby residential property, water pump).
On-site observation	12:43 pm	-	Tractor operating. Bike numbers: 4 on Beginner and 9 on Intermediate.
26 Coal Rd	12:57 pm	L_{Aeq} 56.7 L_{Amax} 65.2 L_{A1} 61.5 L_{A10} 59.5 L_{A90} 52.1	Large water truck and tractor were operating on Main track. Water truck was up to 60 dB when passing along nearest part of track. Motorbike noise was barely audible at times. Other noise includes insects and birds. Cicadas were continuous and around 53 dBA.
26 Coal Rd	1:28 pm	L_{Aeq} 53.9 L_{Amax} 64.9 L_{A1} 57.7 L_{A10} 55.4 L_{A90} 52.2	Tractor was barely audible for most of measure (couldn't visually observe exact location). Tractor noise was up to 54 dBA on one occasion. No water truck activity during measurement. Insect noise around 53 dBA, and traffic from Warrego Highway was just audible in the background.

Table 6.2: Attended Monitoring Results – Saturday 15th January 2022

Location	Time Start	Measured Levels dBA	Description
26 Coal Rd	7:11 am	L_{Aeq} 56.9 L_{Amax} 75.0 L_{A1} 60.7 L_{A10} 59.2 L_{A90} 53.3	Tractor and small water truck operating on Main track. Tractor noise levels ranged from 55-60 dBA. The water truck was barely audible. Other noise sources included birds and insects.
2 Blackwall Rd	7:11 am	L_{Aeq} 64.0 L_{Amax} 84.8 L_{A1} 73.3 L_{A10} 67.3 L_{A90} 51.5	Noise from tractor and small water truck operating were not audible. Cars near Motoland entry was audible (around 58 dBA). Other noise sources were dominant e.g. local traffic up to 73 dBA, truck passby 84 dBA, birds 68-72 dBA.
26 Coal Rd	7:27 am	L_{Aeq} 58.0 L_{Amax} 63.9 L_{A1} 62.0 L_{A10} 59.3 L_{A90} 56.2	Large and small water truck operating. Large water truck up to 62.2 dBA. Tractor was operating on site but not audible. Other sources include birds and insects. Insects were dominant and continuous around 57 dBA.
2 Blackwall Rd	7:27 am	L_{Aeq} 53.9 L_{Amax} 67.0 L_{A1} 62.9 L_{A10} 58.3 L_{A90} 45.6	Water trucks or tractor not audible. Cars arriving at Motoland frequent (50-63 dBA). Other sources included birds, insects (48 dBA) and local traffic.
139 Robin Rd	7:50 am	L_{Aeq} 74.0 L_{Amax} 92.9 L_{A1} 78.5 L_{A10} 77.6 L_{A90} 63.3	Cicada noise was dominant (cycling from 62-78 dBA throughout measurement). Faint engine hum was audible at times. Motorbike activity began at 8 am (engines revving, one or two bikes audible but intermittent). Nearby dog bark caused max.
139 Robin Rd	8:07 am	L_{Aeq} 72.4 L_{Amax} 95.0 L_{A1} 77.0 L_{A10} 75.1 L_{A90} 63.5	Cicada noise was dominant (cycling from 63-78 dBA throughout measurement). Motorcycle noise was audible. When insect noise was lowest, motorbike noise was around 63-66 dBA. Nearby dog bark caused max.
139 Robin Rd	8:22 am	L_{Aeq} 71.6 L_{Amax} 83.8 L_{A1} 77.9 L_{A10} 75.7 L_{A90} 63.6	Cicada noise was dominant (up to 78 dB). Motorcycle noise was audible. When insect noise was lowest, motorbike noise was around 62-68 dBA. Nearby dog bark caused max.
26 Coal Rd	8:47 am	L_{Aeq} 71.4 L_{Amax} 83.1 L_{A1} 77.8 L_{A10} 74.1 L_{A90} 67.3	Motorbike noise on Main track was defining noise levels. Insect noise was barely audible. Light easterly wind was noted. Motorbike noise caused max of 83.1 dBA.
26 Coal Rd	9:04 am	L_{Aeq} 71.9 L_{Amax} 83.5 L_{A1} 78.5 L_{A10} 74.6	Motorbike noise on Main track was defining noise levels. Insect noise was barely audible. Motorbike noise caused max of 83.5 dBA.

Location	Time Start	Measured Levels dBA	Description
		L_{A90} 66.7	
2 Blackwall Rd	9:27 am	L_{Aeq} 55.0 L_{Amax} 72.5 L_{A1} 63.4 L_{A10} 56.0 L_{A90} 51.8	Motorbike noise audible. Lawnmower operating in distance for duration of measure. Other sources included cars entering Motoland and local traffic. When other sources were minimal towards end of measure, noise from bikes was 52-55 dBA.
2 Blackwall Rd	9:42 am	L_{Aeq} 53.9 L_{Amax} 71.5 L_{A1} 64.6 L_{A10} 56.0 L_{A90} 44.0	Motorbike noise audible, but competing with other noise in the area. Other sources included local traffic, insects and birds. When other noise was minimal, noise levels from bikes ranged from 51-57 dBA. Max caused by local traffic.
139 Robin Rd	10:24 am	L_{Aeq} 70.4 L_{Amax} 79.4 L_{A1} 78.4 L_{A10} 75.5 L_{A90} 62.0	Cicada noise was dominant (up to 79 dB). Motorcycle noise was audible. When insect noise was lowest, motorbike noise was around 62-68 dBA. Max noise from motorbike was 73 dBA on two occasions (bike revving). Nearby dog bark caused max. Weather conditions noted to be calm.
139 Robin Rd	3:00 pm	L_{Aeq} 63.7 L_{Amax} 75.9 L_{A1} 73.6 L_{A10} 67.1 L_{A90} 55.5	Cicada noise up to 74 dBA. Noise from tractor and water truck audible on a few occasions only (including a tonal reversing beeper once, which was possibly from the small temporary water truck, as Motoland equipment did not have tonal beepers).
26 Coal Rd	3:36 pm	L_{Aeq} 54.6 L_{Amax} 64.8 L_{A1} 57.9 L_{A10} 56.5 L_{A90} 52.0	Tractor and large water truck on Main track. Tractor up to 58 dBA and large water truck up to 57 dBA. Other noise included insects and birds.
26 Coal Rd	3:53 pm	L_{Aeq} 55.6 L_{Amax} 64.8 L_{A1} 57.9 L_{A10} 56.5 L_{A90} 52.0	Tractor and large water truck on Main track. Large water truck up to 62 dBA. Other noise included insects and birds.
2 Blackwall Rd	4:15 pm	L_{Aeq} 52.3 L_{Amax} 79.2 L_{A1} 58.7 L_{A10} 48.9 L_{A90} 42.3	Tractor and water truck activity not audible. Noise sources included cars leaving the site, birds and insects.

Table 6.3: Attended Monitoring Results – Sunday 16th January 2022

Location	Time Start	Measured Levels dBA	Description
2 Blackwall Rd	7:28 am	L_{Aeq} 51.3 L_{Amax} 76.9 L_{A1} 60.2 L_{A10} 50.3 L_{A90} 44.1	No earthwork or water truck activity occurring on site. Cars arriving at site 50-54 dBA. Birds up to 62 dBA. Small aircraft up to 57 dBA.

Location	Time Start	Measured Levels dBA	Description
26 Coal Rd	7:30 am	L_{Aeq} 56.5 L_{Amax} 73.8 L_{A1} 60.0 L_{A10} 57.6 L_{A90} 54.4	No earthwork or water truck activity occurring on site. Cars arriving on site audible at times (55-60 dBA). Other noise sources include birds (up to 73 dBA), insects (54-57 dBA) and distant traffic (55 dBA).
2 Blackwall Rd	7:47 am	L_{Aeq} 56.5 L_{Amax} 77.3 L_{A1} 68.8 L_{A10} 56.1 L_{A90} 50.8	Cars arriving on site mid 50 dBA. Other sources include birds (70 dBA) and local traffic (up to 77 dBA).
139 Robin Rd	7:52 am	L_{Aeq} 71.4 L_{Amax} 78.2 L_{A1} 77.3 L_{A10} 75.4 L_{A90} 62.0	Cicadas cycled from 60-78 dBA. Water truck noise audible at start of measurement (60-63 dBA). Motorbikes commence at 8:00 am, 60-68 dBA. Other sources include birds (60-65 dBA) and dog barking.
139 Robin Rd	8:12 am	L_{Aeq} 72.8 L_{Amax} 78.5 L_{A1} 77.8 L_{A10} 76.5 L_{A90} 62.6	Cicadas cycled from 60-78 dBA. Motorbike noise 60-70 dBA.
139 Robin Rd	8:29 am	L_{Aeq} 71.4 L_{Amax} 78.8 L_{A1} 76.4 L_{A10} 75.1 L_{A90} 62.4	Cicadas cycled from 60-77 dBA. Motorbike noise from 60-69 dBA. Motorbike noise can be described as "zippy", engine rumble and "brap-brap".
2 Blackwall Rd	8:53 am	L_{Aeq} 55.1 L_{Amax} 74.8 L_{A1} 63.3 L_{A10} 55.8 L_{A90} 51.1	Motorbike noise continuous throughout measurement 50-60 dBA. Other noise sources included insects (45-48 dBA) and local traffic (58-75 dBA).
2 Blackwall Rd	9:10 am	L_{Aeq} 55.1 L_{Amax} 77.0 L_{A1} 66.2 L_{A10} 55.1 L_{A90} 50.2	Motorbike noise continuous throughout measurement 50-55 dBA. Other noise sources included insects (45-48 dBA) and local traffic (up to 77 dBA).
26 Coal Road	10:13 am	L_{Aeq} 66.7 L_{Amax} 79.8 L_{A1} 72.6 L_{A10} 69.1 L_{A90} 63.2	Motorbike noise on Main track was defining noise levels (generally 61-75 dBA). Insect noise 55-61 dBA. Motorbike noise caused max of 79.8 dBA.
26 Coal Road	9:57 am	L_{Aeq} 67.7 L_{Amax} 79.4 L_{A1} 73.5 L_{A10} 69.7 L_{A90} 64.7	Motorbike noise on Main track was defining noise levels (generally 64-75 dBA). Insect noise 55-64 dBA. Motorbike noise caused max of 79.4 dBA.

Table 6.4: Attended Monitoring Results – Saturday 22nd January 2022

Location	Time Start	Measured Levels	Description
26 Coal Rd	10:28 am	L_{Aeq} 56.7 L_{Amax} 73.1 L_{A1} 60.1 L_{A10} 58.2 L_{A90} 55.1	Large water truck operating on Main track. Motorbikes on Intermediate truck audible. Water truck up to 59 dBA. Insects around 56-60 dBA.
139 Robin St	3:21 pm	L_{Aeq} 60.6 L_{Amax} 60.0 L_{A1} 65.4 L_{A10} 64.8 L_{A90} 54.4	Posi-track just audible throughout on Beginner/Intermediate track. Main noise sources are birds, insects and highway traffic.
139 Robin St	3:37 pm	L_{Aeq} 61.8 L_{Amax} 92.0 L_{A1} 64.8 L_{A10} 63.9 L_{A90} 50.5	Posi-track just audible throughout on Beginner/Intermediate track. Noise level reducing compared to previous measure (posi-track likely moving east). Main noise sources are birds, insects and highway traffic.
2 Blackwall Rd	3:59 pm	L_{Aeq} 52.9 L_{Amax} 73.9 L_{A1} 64.3 L_{A10} 52.8 L_{A90} 46.2	Posi-track inaudible. Main noise sources are birds, insects and traffic (local and along highway). Moderate easterly breeze throughout measurement.
26 Coal Rd	4:24 pm	L_{Aeq} 51.7 L_{Amax} 59.6 L_{A1} 55.1 L_{A10} 52.9 L_{A90} 49.9	Posi-track operating on Intermediate track, but not audible. Tractor operating at eastern section of Main track (barely audible against highway traffic and insects).
139 Robin St	5:30 pm	L_{Aeq} 58.3 L_{Amax} 68.3 L_{A1} 66.6 L_{A10} 60.6 L_{A90} 53.4	Large water truck operating on Beginner/Intermediate track for duration of measure. Water truck audible (variable, engine hum and acceleration). Insect and highway traffic audible. Filtering out prominent insect noise in the affected frequencies, results in an L_{Aeq} of 50 dBA (representing water truck and highway traffic).

6.2 Noise Logging

6.2.1 Overview

The following sections presents a summary of the noise logging data collected at 26 Coal Road, 72 Brodzig Road and 139 Robin Street. Daily time history graphs are also shown for each location, with the 70 dBA motorcycle noise limit and 41 to 48 dBA earthworks/water truck limit marked.

Some data is noted to be missing due to a data recording error associated with logging of full sound recordings to an external storage drive. The majority of data at 139 Robin St is missing on the 14th and 15th January, followed by some occasional periods of missing data on subsequent days. Only occasional periods of data is missing at the other logger locations.

6.2.2 26 Coal Road

Figure 6.1 Noise Logger Data – 26 Coal Road – Friday 14th January 2022

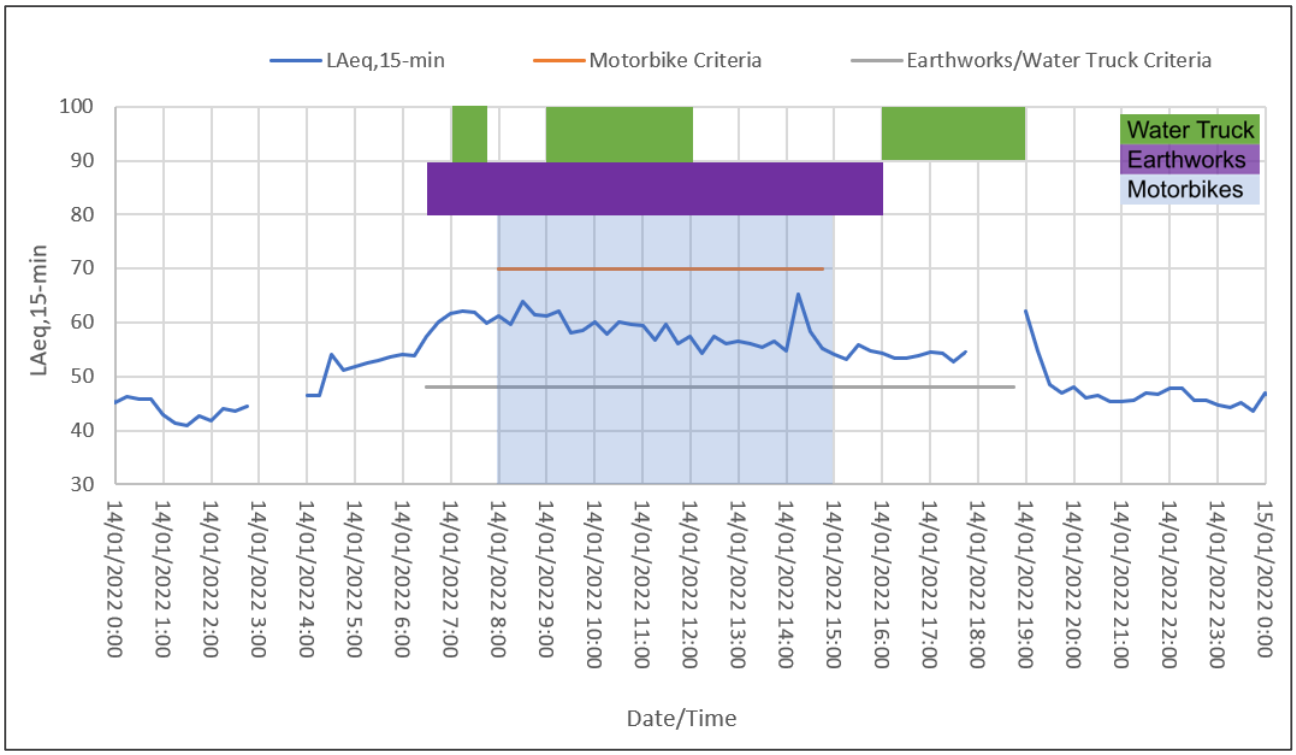


Figure 6.2 Noise Logger Data – 26 Coal Road – Saturday 15th January 2022

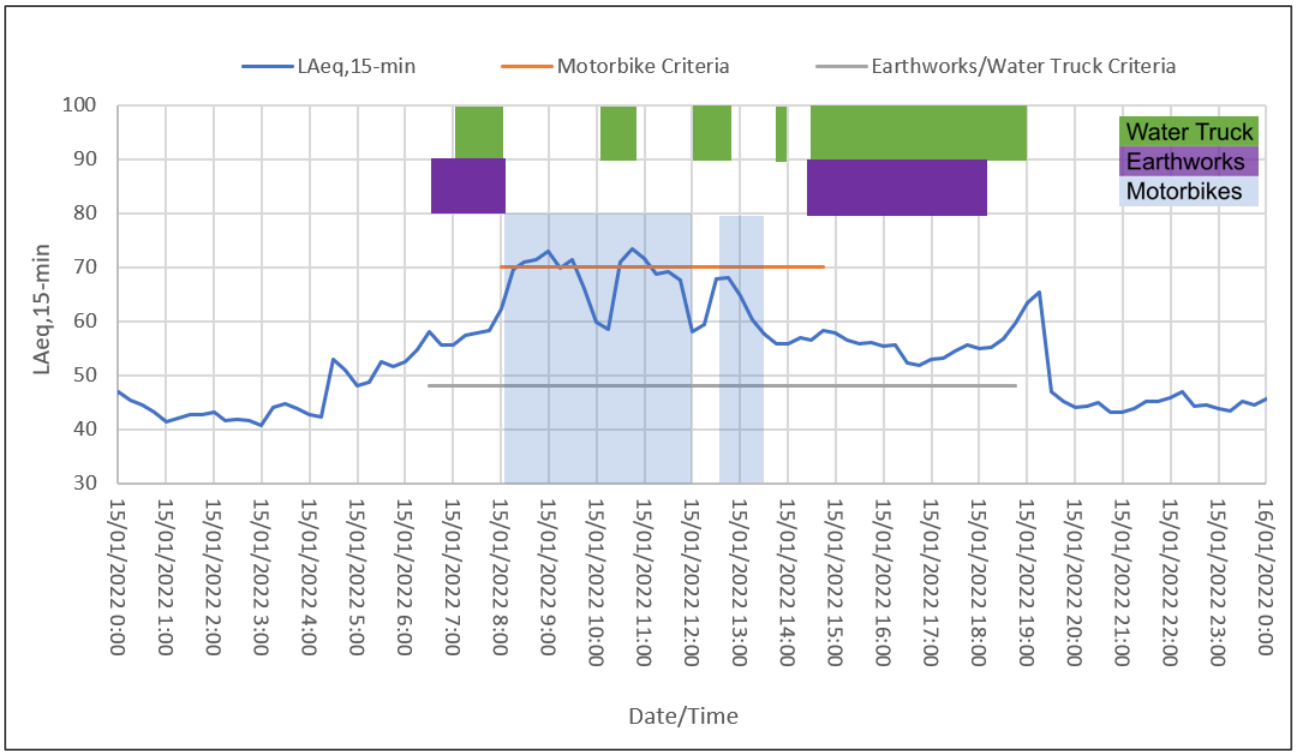


Figure 6.3 Noise Logger Data – 26 Coal Road – Sunday 16th January 2022

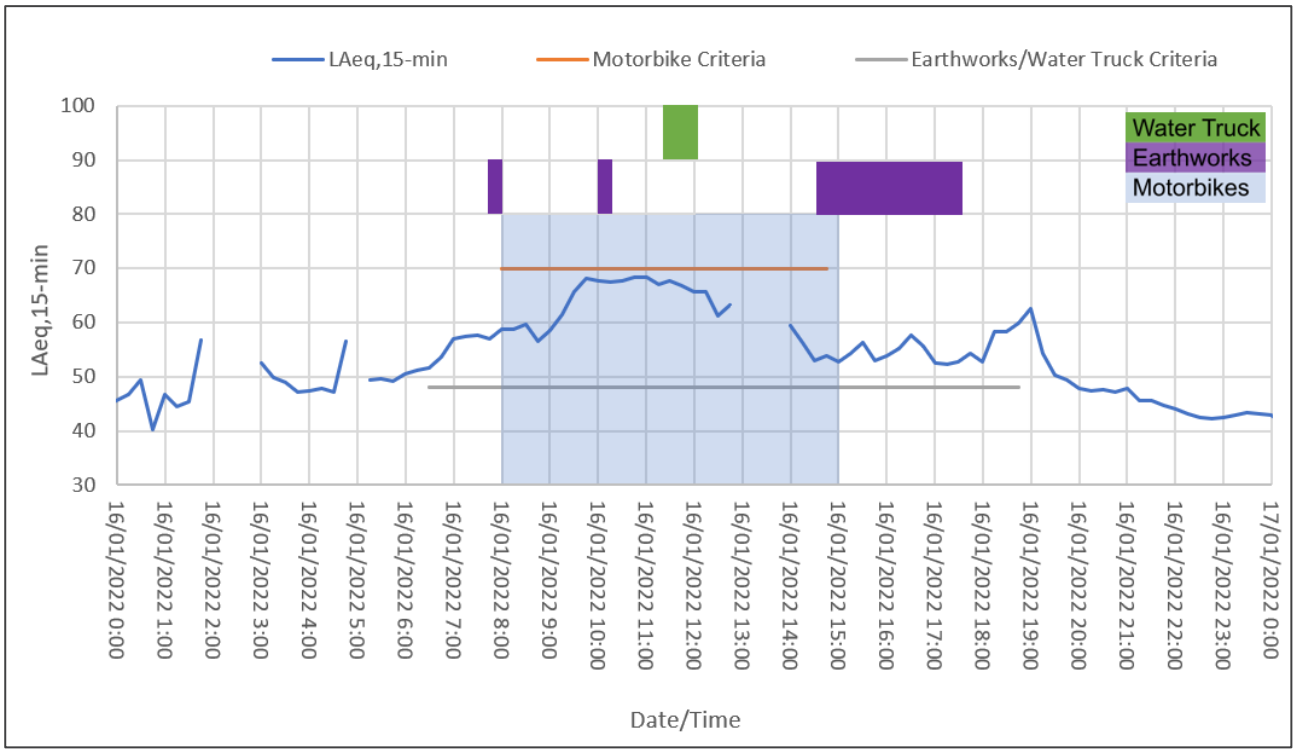


Figure 6.4 Noise Logger Data – 26 Coal Road – Monday 17th January 2022

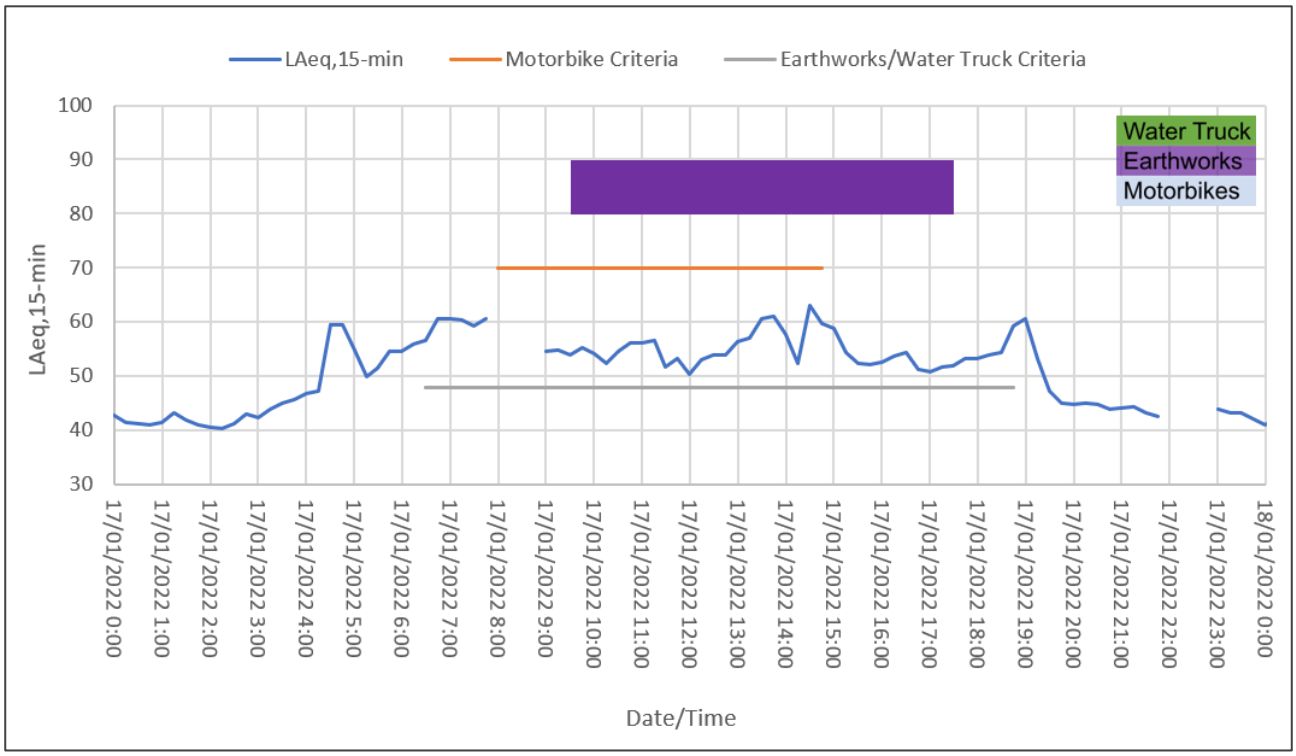
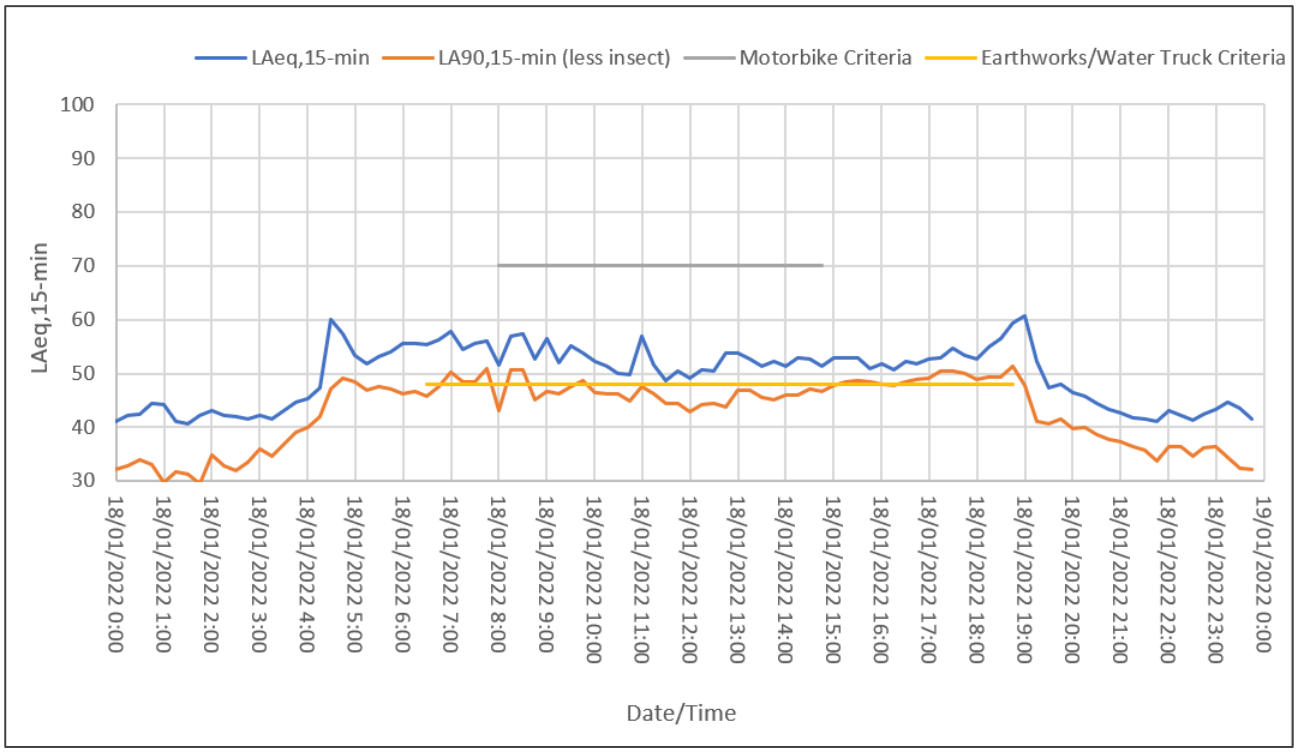


Figure 6.5 Noise Logger Data – 26 Coal Road – Tuesday 18th January 2022 (Background)



6.2.3 72 Brodzig Rd

Figure 6.6 Noise Logger Data – 72 Brodzig Rd – Friday 14th January 2022

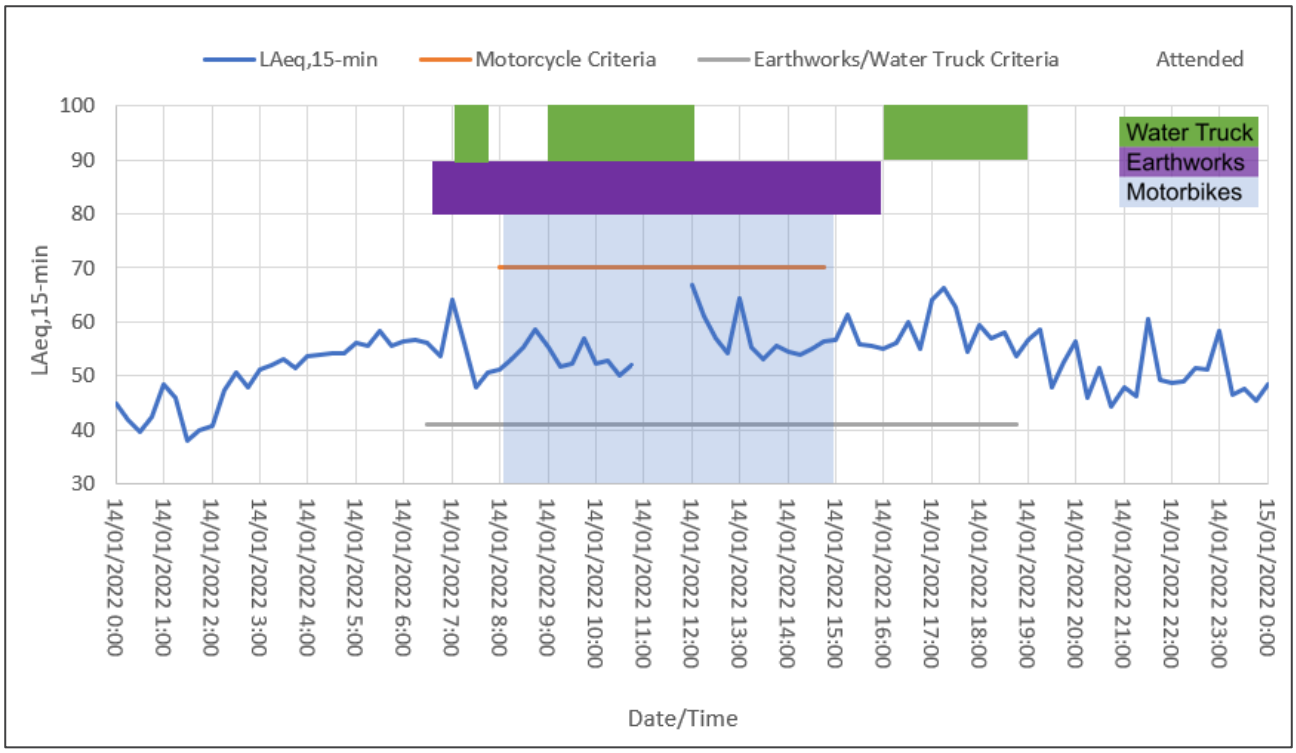


Figure 6.7 Noise Logger Data – 72 Brodzig Rd – Saturday 15th January 2022

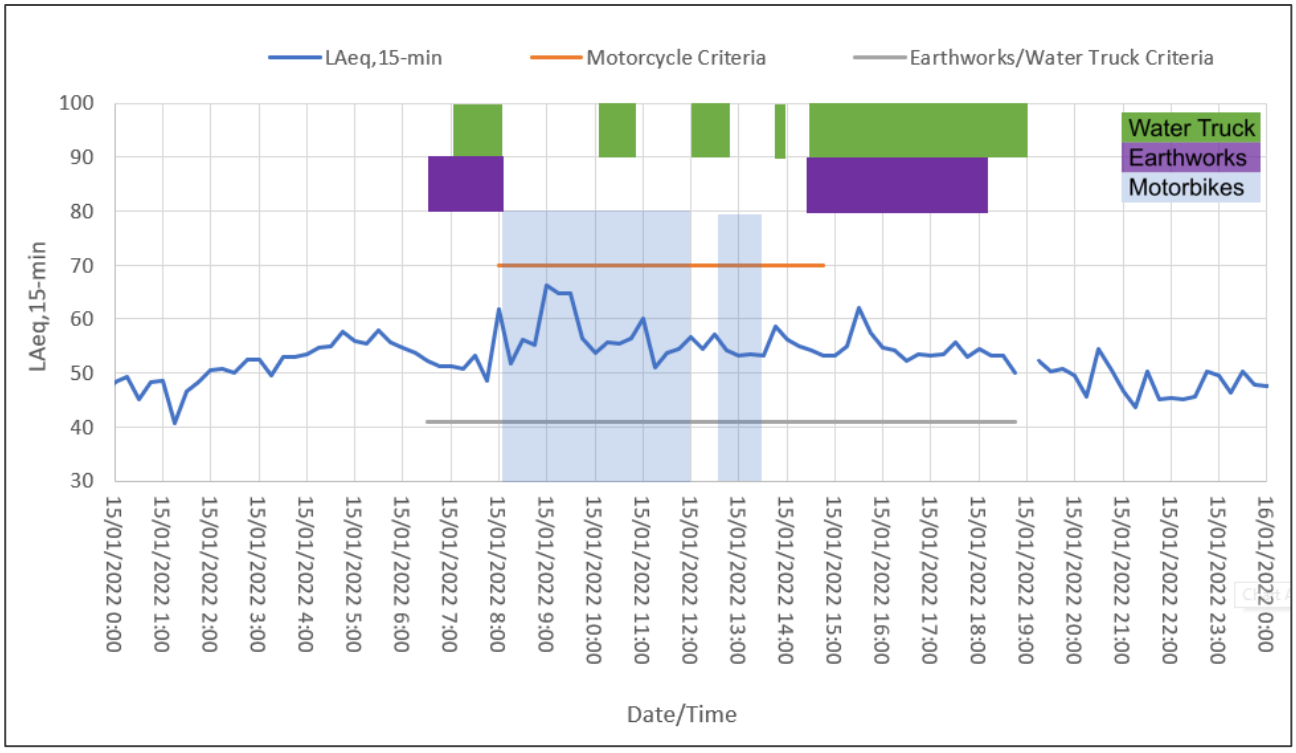


Figure 6.8 Noise Logger Data – 72 Brodzig Rd – Sunday 16th January 2022

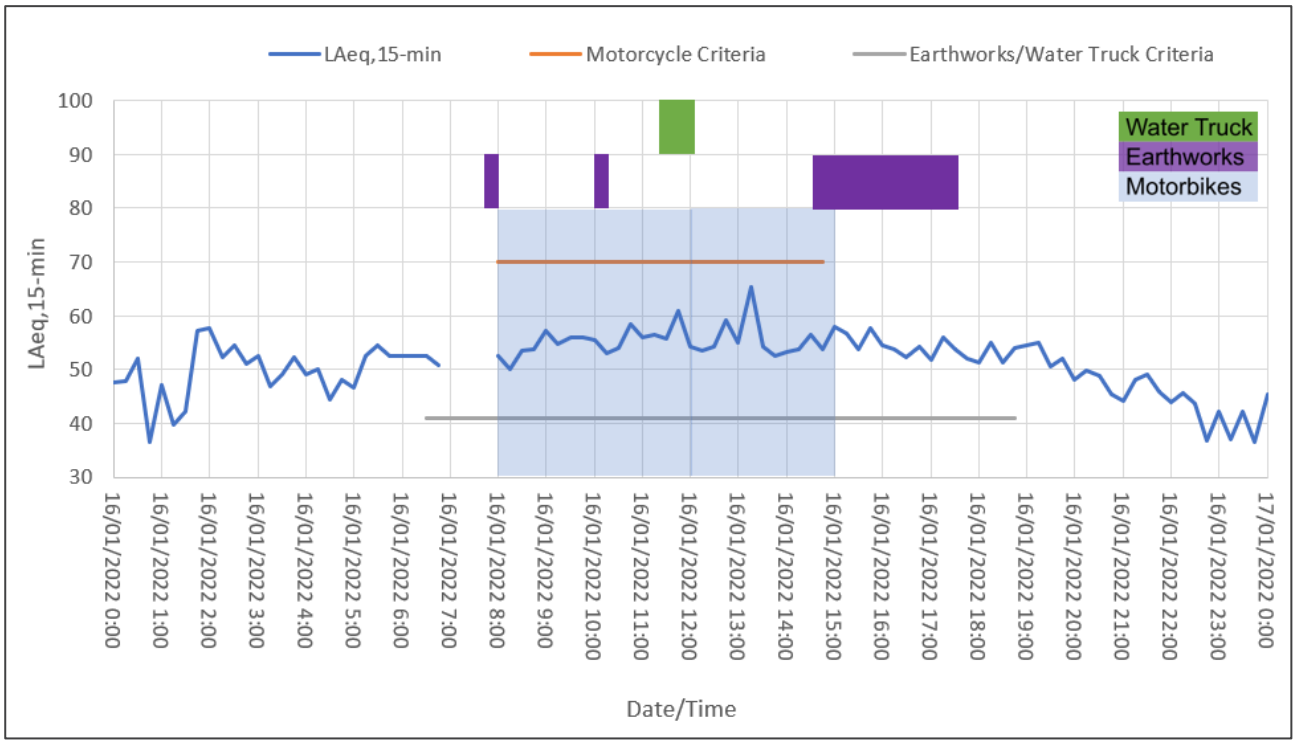


Figure 6.9 Noise Logger Data – 72 Brodzig Rd – Monday 17th January 2022

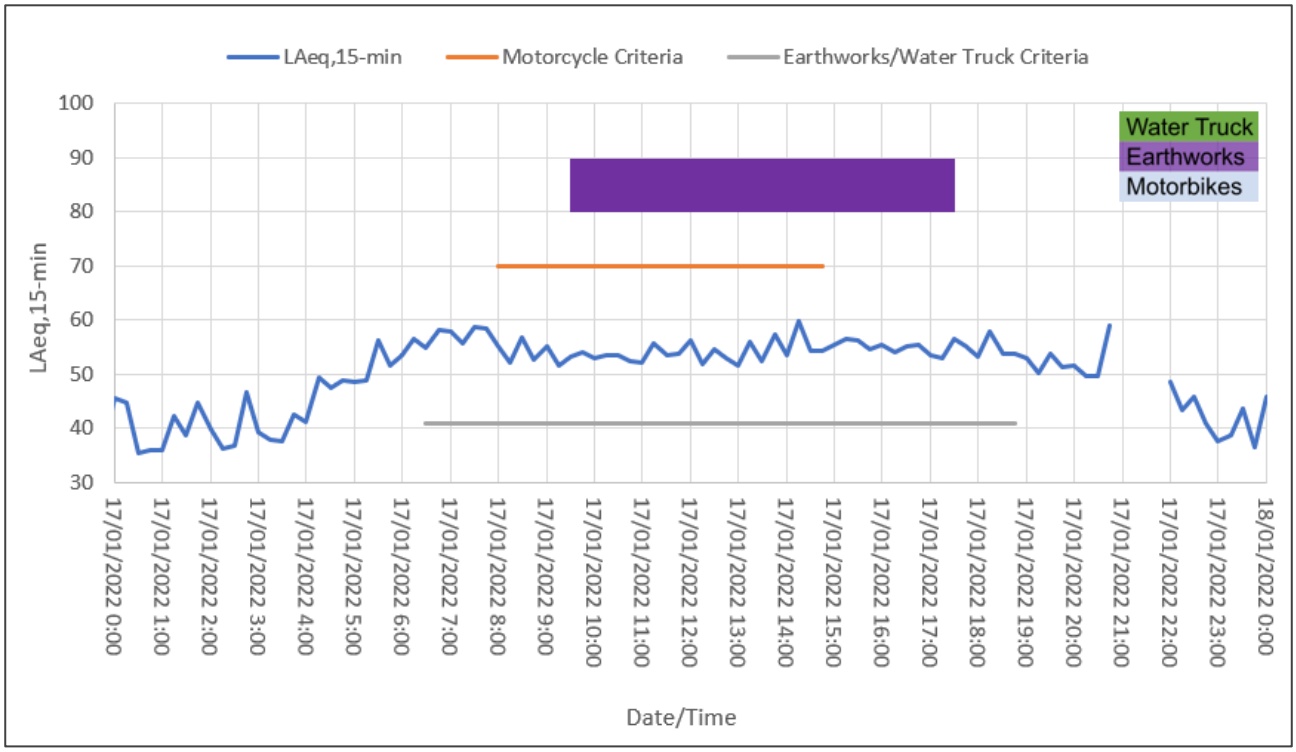
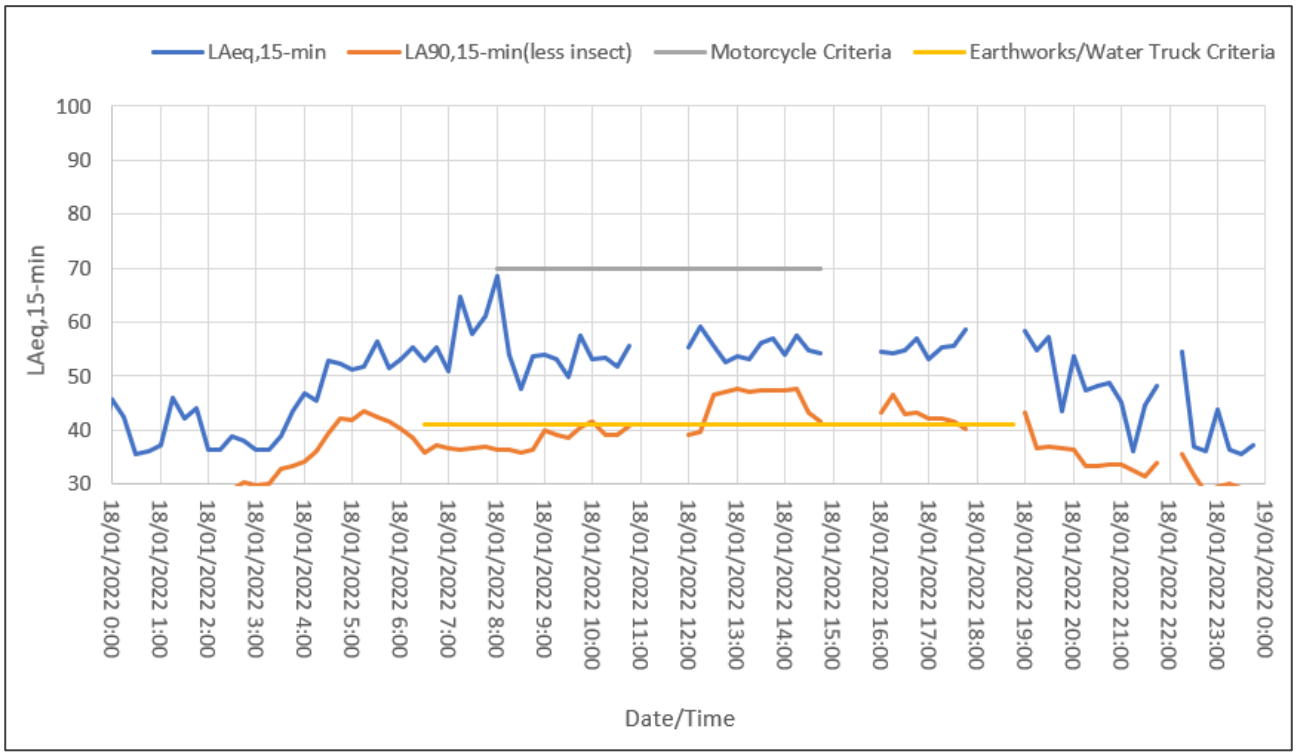


Figure 6.10 Noise Logger Data – 72 Brodzig Rd – Tuesday 18th January 2022 (Background)



6.2.4 139 Robin Street

Figure 6.11 Noise Logger Data – 139 Robin St – Friday 14th January 2022

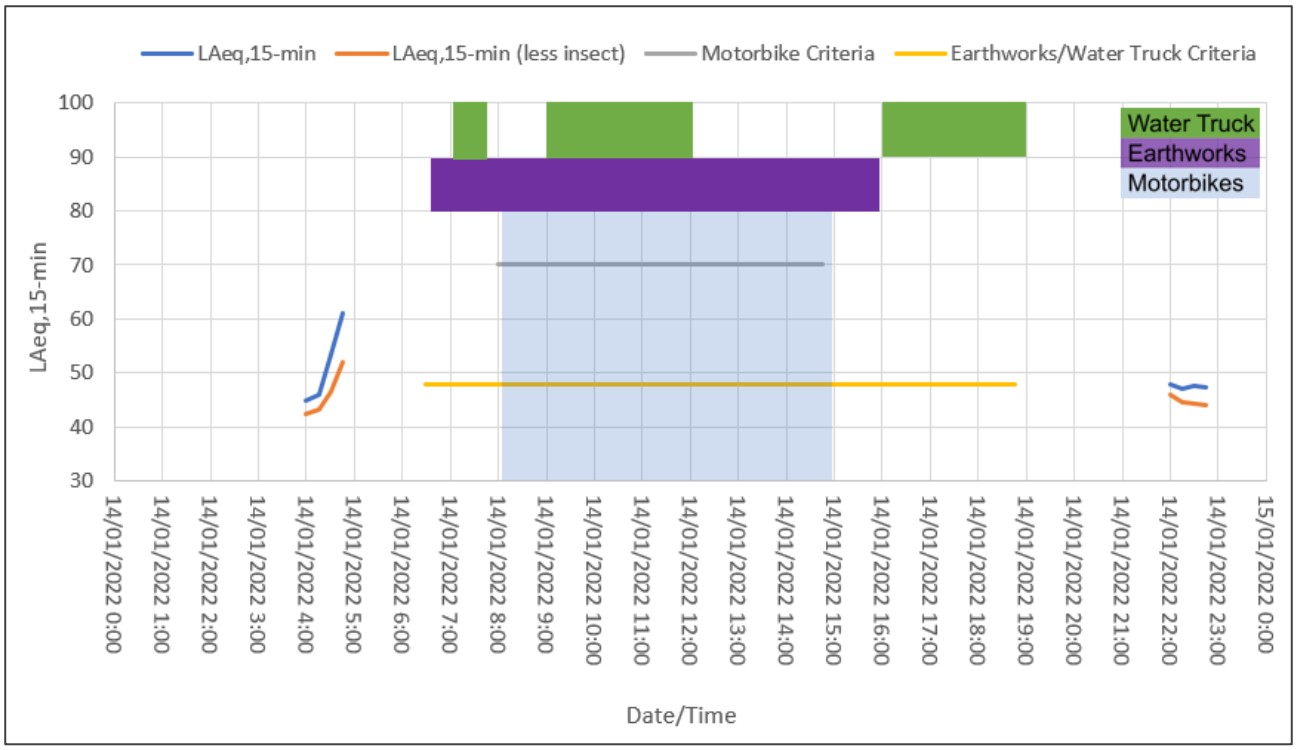


Figure 6.12 Noise Logger Data – 139 Robin St – Saturday 15th January 2022

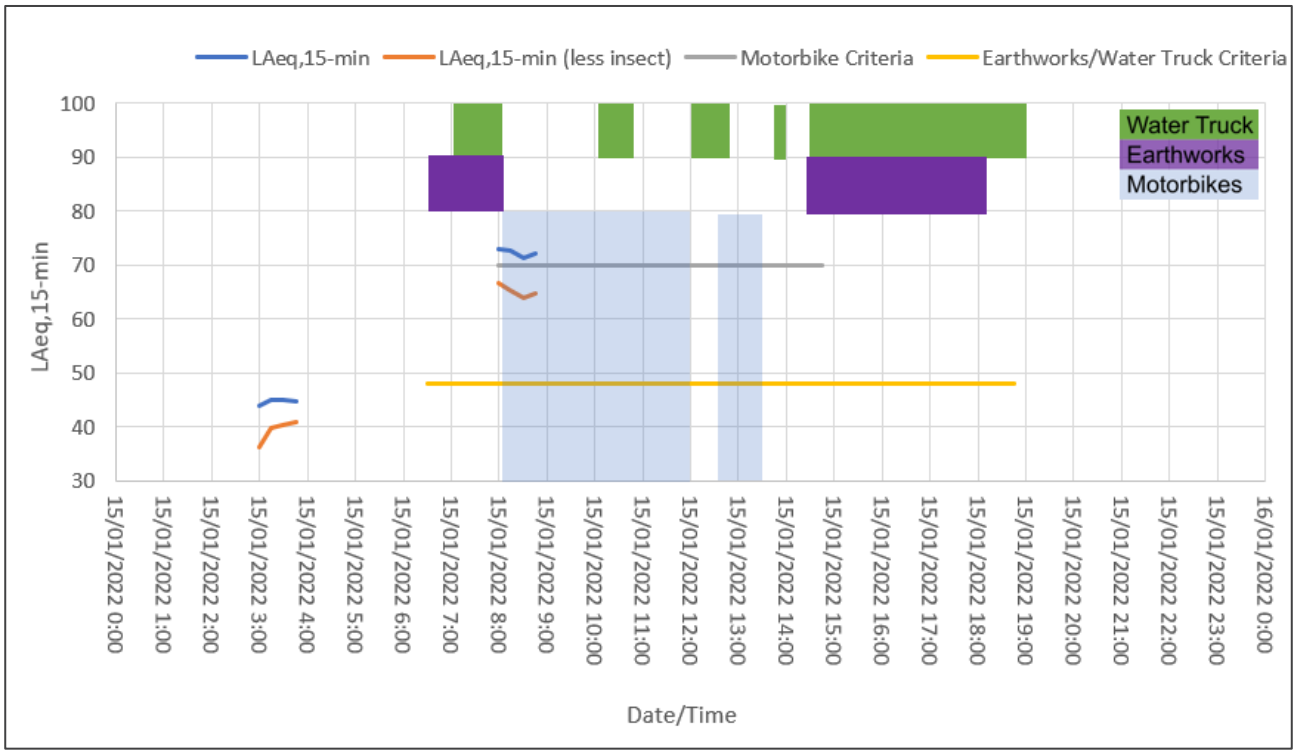


Figure 6.13 Noise Logger Data – 139 Robin St – Sunday 16th January 2022

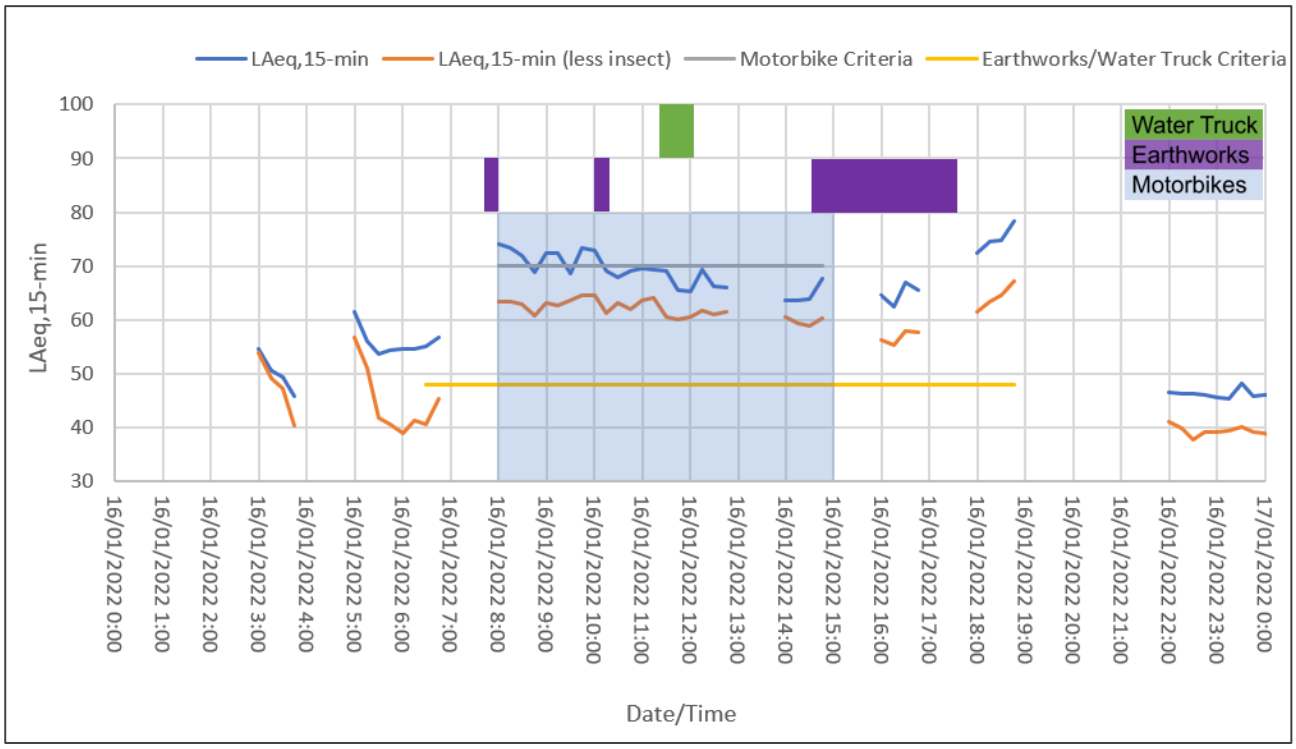


Figure 6.14 Noise Logger Data – 139 Robin St – Monday 17th January 2022

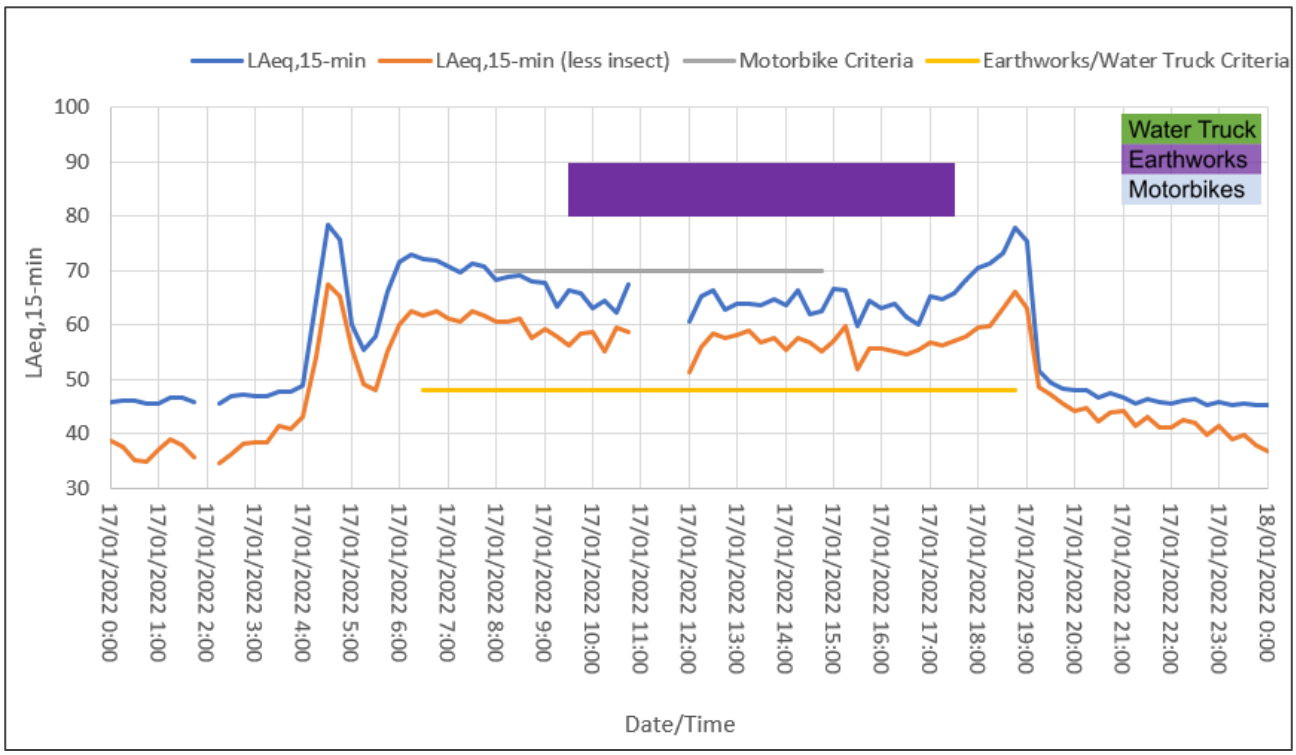
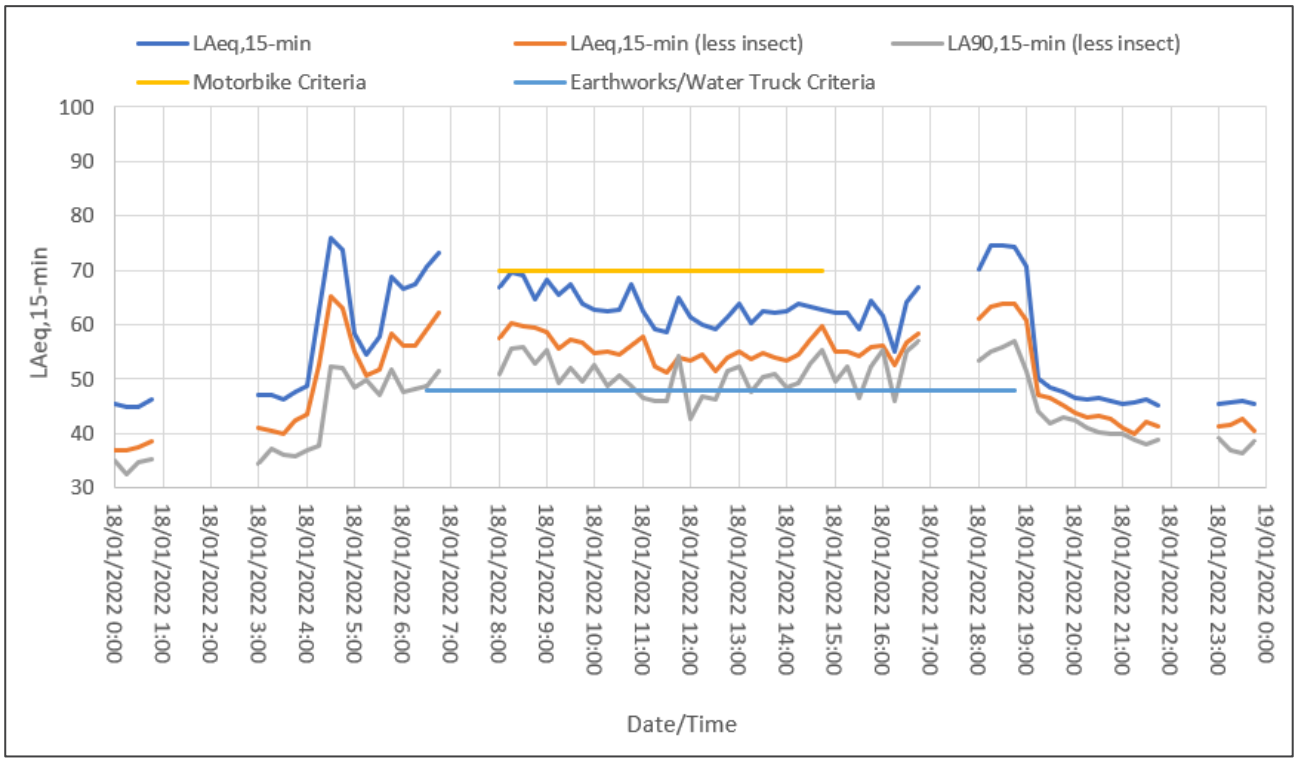


Figure 6.15 Noise Logger Data – 139 Robin St – Tuesday 18th January 2022 (Background)



6.2.5 Background Noise Levels

In order to derive the noise criteria for earthworks and water truck operations (as discussed in **Section 4**), it is necessary define a background noise level for each sensitive receptor location. It is common practice to undertake noise logging for a 1 week period and utilise the median of the lowest 10th percentile L_{A90} across each period and day of monitoring. Given the frequent operation of the site, it is not possible to obtain 1 week of monitoring data unaffected by site activity noise. It is however noted that, on Tuesday 18th January, the site was not operational with no motorbike, earthworks or water truck activity. The data collected on this day can be considered representative of background levels unaffected by the site. The following table presents a summary of measured L_{A90} background levels on the 18th of January between operating hours of 6:30 am to 7:00 pm.

Table 6.5: Background Noise Levels (6:30 am to 7:00 pm) – Tuesday 18th January 2022 (No Site Operations)

Location	Minimum $L_{Aeq,15\text{-},min}$ (Insects filtered out)	Lowest 10th Percentile $L_{A90,15\text{-}min}$ (Insects filtered out)	Minimum $L_{A90,15\text{-}min}$ (Insects filtered out)
26 Coal Road	46	44	43
72 Brodzig Rd	47	36	36
139 Robin St	51	46	43

Note: Insects filtered at 4 kHz 1/1 octave band

Given the limited days of available background data, the minimum L_{A90} has been adopted (instead of the lowest 10th percentile) for each location. The use of the minimum also accounts for the possibility that background noise levels could be lower on the weekend. Background levels are noted to be higher at 26 Coal Road and 139 Robin Street compared to 72 Brodzig Road. This is consistent with attended observations, which identified Warrego Highway traffic (particularly heavy vehicles) having a notable influence on background levels at 26 Coal Road and 139 Robin Street.

7. DISCUSSION

7.1 Motorcycle Activity

7.1.1 Attended Data

A review of the attended monitoring data indicates the following with regards to motorcycle activity noise:

- 26 Coal Road – motorbike activity from the Main track was the dominant noise source. The measured L_{Aeq} was 72 dBA when 30 motorbikes were on the Main track.
- 2 Blackwall Road – motorbike activity was audible but competed with other noise sources in the area (e.g. local traffic, birds, insects).
- 139 Robin Street – motorbike activity was audible, and typically between 60-70 dBA, however, noise levels at this location were significantly affected by cicada noise (63-79 dBA).

Based on the attended noise data alone, it is concluded that exceedances of the 70 dBA limit occurred at 26 Coal Road by up to 2 dB. Compliance was measured at 2 Blackwall Street. The total L_{Aeq} noise levels from all sources (motorcycle activity and background sources unrelated to Motoland) were up to 55 dBA.

At 139 Robin Street, the measured L_{Aeq} levels were between 70 dBA and 74 dBA on the busiest day of monitoring (Saturday 15th January). As noted above, these L_{Aeq} levels were defined by cicada noise, which fluctuated in repeated/cyclic nature between 63-79 dBA. Noise levels from motorbike activity typically ranged from 60-70 dBA and hence, it is expected that L_{Aeq} levels at 139 Robin St are within the 70 dBA limit. After filtering out of insect noise (4 kHz 1/1 octave frequency), the L_{Aeq} noise levels during the attended monitoring are as follows:

- Friday 14th January – 62 dBA
- Saturday 15th January – 64-66 dBA
- Sunday 16th January – 62 dBA

These levels are within the 70 dBA limit, and are consistent with the measured range of sound pressure levels observed (60-70 dBA).

7.1.2 Logger Data

A review of the noise logger data identifies the following periods of interest:

- 26 Coal Road – L_{Aeq} noise levels were up to 73 dBA, 3 dBA above the 70 dBA limit. This occurred at 10:45 am on Saturday 15th January, which coincided with a period of 35 riders on the Main track. Noise levels on Sunday 16th January were noted to be lower, reaching up to 68-69 dBA during peak hours.
- 72 Brodzig Road (near 2 Blackwall Rd) – the measured L_{Aeq} did not exceed 70 dBA for the duration of the monitoring. During periods of motorbike activity, L_{Aeq} levels were generally below 60 dBA. The highest L_{Aeq} levels were around 65 dBA on a few occasions, however, this was due to extraneous noise sources (e.g. on Saturday 15th January at 9:00 am, concrete saw cutting was occurring near the logger location).
- 139 Robin Street – L_{Aeq} noise levels were above 70 dBA on a number of occasions, however, as determined through the attended measures, these L_{Aeq} levels were defined by cicada noise. Removing the 4 kHz contribution from the cicadas results in an L_{Aeq} of up to 67 dBA on Saturday 15th January and up to 65 dBA at 9:45-10:45 am on Sunday 16th January. This is consistent with the attended measurements (filtered L_{Aeq} from 62-66 dBA) and the range of measured sound pressure levels from motorbike noise (typically 60-70 dBA).

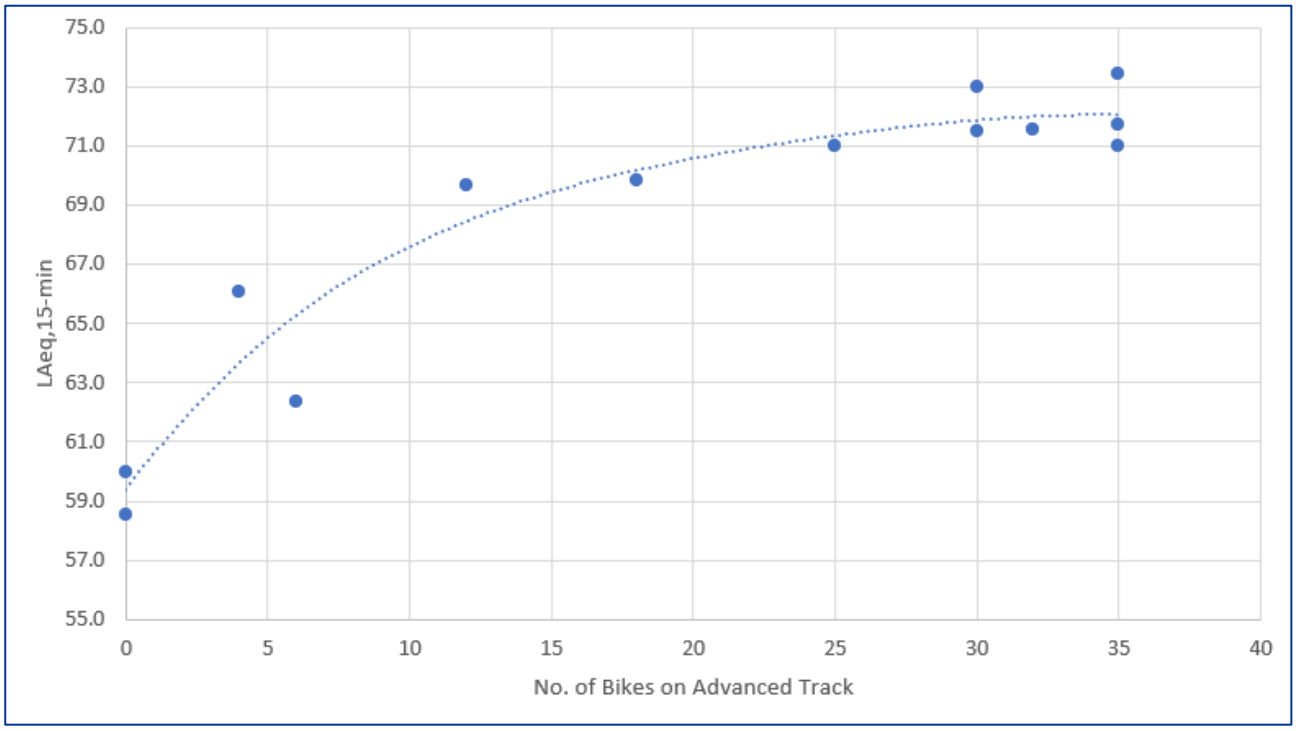
It is noted that there was a data recording error on the 139 Robin St logger, and data was not recorded on the 14th of January and most of the 15th of January (except for 8:00 am to 9:00 am). However, the attended measurements on Saturday 15th January included a measurement at 10:24-10:39 am, during a peak period (35 bikes on Main, 15 bikes on Intermediate and 6 bikes on Beginner). Furthermore, the noise logger data on the 16th of January covered a busy period on the Intermediate track (24 bikes).

Overall, the noise logging data confirms the observations made during the attended measurements (i.e. exceedances at 26 Coal Road, while compliance is achieved at 139 Robin Street and 2 Blackwall Road).

7.1.3 Motorbike Numbers

During the site visits on Saturday 15th January and Sunday 16th January, the number of motorbikes on each track was recorded by Trinity staff (during the first half of the morning). **Figure 7.1** presents a graph of the measured L_{Aeq} noise levels at 26 Coal Road and the number of bikes on the Main Track. The graph shows a gradual increase in noise levels as bike numbers increase, however, after around 30 bikes, L_{Aeq} values level out. If bikes numbers were to increase slightly higher than 35, the L_{Aeq} levels will not necessarily increase. In any case, the 35 bikes on the Main Track on the 15th of January represents a typical worst-case scenario.

Figure 7.1 Measured L_{Aeq} vs Number of Bikes on Main Track – 26 Coal Road



7.2 Earthworks and Water Truck

7.2.1 Monitoring Data

Assessing the L_{Aeq} contribution from earthwork and water truck activity was difficult due to the contribution from other ambient noise sources, including insects, birds and traffic. While such activity has a potential to be clearly audible from the noise monitoring locations, noise levels are highly variable depending on the location of the associated mobile plant over a given time period. Some basic observations that can be made from the attended noise measurements include:

- 26 Coal Road:
  - The large water truck resulted in a passby noise level of up to 62 dBA at 26 Coal Road while operating on the Main track (this passby level occurred when the truck was travelling on the nearest path to the monitoring location).
  - The small water truck was barely audible on the Main track and it was not possible to determine noise levels while in operation. Also, when the large water truck was operating simultaneously, the small water truck was inaudible.
  - Tractor noise levels were below 60 dBA.
- 139 Robin St:
  - While the large water truck was on the Beginner/Intermediate track, the truck was clearly distinguishable at 139 Robin Street, however, noise levels competed with insects and distant traffic from the Warrego Highway. The measured total L_{Aeq} was 58 dBA, which was significantly affected by insects and distant highway traffic. Filtering insect noise out results in an L_{Aeq} of 50 dBA.
  - Posi-track activity was just audible while operating on either the Main or Beginner/Intermediate track.
  - Tractor noise was just audible while operating on the Main track.
- 2 Blackwall Rd:
  - Large water truck and earthworks activity was generally inaudible (there were only occasional periods when equipment was just audible).

Further review of logger data was undertaken for 26 Coal Road to identify the peak L_{Aeq} levels observed from approximately 1:30 pm to 2:30 pm on the 17$^{th\ of}$ January. On this day, the D3 dozer was operating from 9:30 am to 5:00 pm. The sound recordings identify noise similar to a dozer causing L_{Aeq} levels up to 63 dBA at 26 Coal Road. It is concluded that the D3 dozer was working close to the south-eastern boundary of the Motoland site, closest to the logger location. Based on the separation distance, ground/air absorption and the measured level, a sound power level of 113 dBA is estimated for the dozer. This is consistent an on-site measurement of the dozer operating at 40 metres which corresponded to a sound power level of 110 dBA.

7.2.2 Noise Predictions

It was not always possible to capture worst-case operating locations during the attended measurements. Furthermore, detailed information on source locations was not able to be determined for data collecting during the noise logging (general information on which track activity occurred on was provided). Given some of the challenges in determining actual worst-case noise levels from water truck and earthwork activity, noise modelling has been undertaken to predict noise levels at the nearest sensitive receptors. The noise modelling takes into account the local topography and noise source data obtained via close-up source noise measurements to each heavy machinery item. The source noise measurements have identified the following ranking of equipment in terms of L_{AMax} passby levels:

- Large water truck – 115 dBA
- D3 Dozer – 113 dBA
- Tractor – 110 dBA
- Posi-track – 100 dBA

On the Main track, the operation of the water truck and tractor simultaneously, or D3 dozer at location nearest to the boundary, represents a worst-case scenario for 26 Coal Road and 2 Blackwall Rd. Based on site observations, only one equipment item operates at the Beginner and Intermediate track at any given time. Furthermore, it is noted that the tractor is not normally required on the Beginner and Intermediate track.

Therefore, a worst-case scenario for 139 Robin Street is considered to be the large water truck or D3 Dozer operating on the Beginner/Intermediate track and the tractor operating on the Main track.

A summary of the noise modelling is as follows:

- Modelling undertaken in the CadnaA proprietary noise modelling software.
- The large water truck has been modelled as a moving point source and has been calibrated based on noise measurements at 139 Robin Street and 26 Coal Road.
- The tractor has been modelled as an area source, covering the track area nearest to the sensitive receptors.
- D3 Dozer has been modelled as a point source (assuming it works in one location for 15-minute period) nearest to the sensitive receptor of interest.

Table 7.1 presents predicted L_{Aeq} noise levels associated with the above-mentioned worst-case scenarios.

Table 7.1: Predicted Earthworks/Water Truck Activity Noise Levels

Location	Scenario	Predicted L_{Aeq}	Noise Criteria
26 Coal Rd	Water truck and tractor on Main track	59	48
26 Coal Rd	D3 Dozer	63	48
2 Blackwall Rd	Water truck and tractor on Main track	46	41
2 Blackwall Rd	D3 Dozer	44	41
139 Robin St	Water truck on Beginner/Intermediate track Tractor on Main track	53	48
139 Robin St	D3 Dozer on Beginner/Intermediate track Tractor on Main track	59	48

The results of the modelling show predicted exceedance of the noise criteria at each of the sensitive receptor locations. The highest exceedance is predicted at 26 Coal Road, by up to 15 dBA (during D3 dozer operation at a location closest to the monitoring location).

The L_{Aeq} results for the water truck on the main track are potentially conservative as the predicted L_{Aeq} of 58 dBA (source only) is noted to be higher than the total L_{Aeq} levels (source plus ambient noise) measured at 26 Coal Road while the tractor and large water truck were operating on the main track. For example, from 2:30 pm to 5:30 pm on Saturday 15th January, while both equipment items were operating on the Main track, total L_{Aeq} levels (source plus ambient noise) ranged from 52-58 dBA.

Overall, given the potential for exceedances to occur for all activities under consideration (motorbikes, earthworks and water truck), noise mitigation is necessary to minimise potential impacts. The following section presents potential mitigation measures.

8. RECOMMENDATIONS

To review potential mitigation options, the 3D noise model described in **Section 7.2.2** was utilised. For motorbike noise, each track was modelled as a line source using measured source noise data, and the model was calibrated to reflect the highest measured noise levels at the worst-case receptor locations (139 Robin Street and 26 Coal Road).

Iterative modelling was then undertaken to identify a compliant scenario for motorbike activity and earthworks/water truck activity. The iterations considered various noise barriers, earth mounds, and restrictions to operations , as well as sound power level restrictions (SWL) of water trucks and earth moving equipment.

Based on the modelling, compliance is predicted to be achieved provided that the following measures are in place:

- An alternative quieter water truck is used (instead of the large yellow water truck). For the purpose of the modelling, a maximum passby sound power level of 107 dBA has been considered (which is 8 dBA lower than the large water truck).
- Restrict the use of D3 dozer or tractor to the Main track. On the Beginner/Intermediate track, limit heavy machinery to the posi-track and quieter water truck (described above).
- Acoustic barriers/earth mounds
  - 5.0 m high barrier (relative to existing ground heights) constructed near the boundary of the Main track, closest to 26 Coal Road. See **Figure 8.1** for modelled barrier location (250 metres in length).
  - The barrier can be a combination of an acoustic barrier on top of an earth mound (e.g. 2 metre barrier on top of a 3.0 metre earth mound). Acoustic barriers should be continuous with no air gaps have a minimum mass density of 12.5 kg/m^2.

Figure 8.1 Recommended Barrier Location

Table 8.1 and **Table 8.2** presents the results of the noise modelling with and without the noise measures in place for motorbike activity and water truck/earthwork activity.

Table 8.1: Predicted Noise Levels – Motorbike Activity

Location	Predicted L_{Aeq} Noise Level		
	No Mitigation	With Mitigation	Noise Criteria
26 Coal Road	**73**	66	70
2 Blackwall Road	61	61	70
139 Robin Street	68	68	70

Table 8.2: Predicted Noise Levels – Water Truck/Earthwork Activity

Location	Scenario	Predicted L_{Aeq} (No Mitigation)	Predicted L_{Aeq} (With Mitigation)	Noise Criteria
26 Coal Rd	Water truck and tractor on Main track	**58**	48	48
26 Coal Rd	D3 Dozer	**63**	**50**	48
2 Blackwall Rd	Water truck and tractor on Main track	**46**	40	41
2 Blackwall Rd	D3 Dozer	**44**	**44**	41
139 Robin St	Water truck on Beginner/Intermediate track Tractor on Main track	**53**	48	48
139 Robin St	Posi-track on Beginner/Intermediate track Tractor on Main track	-	47	48

The results of the modelling show predicted compliance with the noise criteria with the above mentioned noise measures in place, except for the D3 Dozer operation. Despite the predicted exceedance, the potential for nuisance impacts from the dozer are likely to be low given the following:

- The dozer is not a frequently used equipment, and is required on an as needs basis (earthworks are generally undertaken using the tractor and posi-track).
- In the case of 2 Blackwall Road, the predicted level of 44 dBA for the dozer is noted to be 3 dB below the lowest L_{Aeq} background level of 47 dBA (see **Table 6.5**).

It is recommended that the posi-track be used in preference of the D3 dozer where possible.

The main noise sources defining the barrier heights are the water truck and earthworks activity (given the 15 dB exceedance, compared to 3 dB for motorbike activity). If both machines could be replaced with quieter equipment, then the barrier heights could potentially be reduced.

9. CONCLUSION

A noise assessment has been undertaken for the existing Motoland motocross facility at 62 Coal Road, Chuwar. The assessment has involved noise monitoring and modelling to determine potential impacts of site activities (motorbikes, earthworks and water truck). The results have been compared against L_{Aeq} noise criteria defined in the Environmental Protection Act. The main conclusions of the assessment are summarised below:

- Motorbike activity:
  - Motorbike activity from the Main track defined noise levels at 26 Coal Road. At 139 Robin Street, motorbikes were clearly audible, but at the time of the monitoring, insect/traffic noise was significant. At 2 Blackwall Road, motorbike noise was audible but competed with other ambient noise sources (e.g. traffic, insects, birds).
  - Exceedance of the 70 dBA noise limit was measured at 26 Coal Road by up to 3 dBA during a very busy operating day (which included up to 35 motorbikes on the Main track, close to 26 Coal Rd).
  - Compliance was measured at 139 Robin Street (up to 67 dBA) and 2 Blackwall Road (below 60 dBA).
- Earthworks and water truck activity:
  - It was difficult to establish the L_{Aeq} noise contribution from earthwork and water truck activity due to ambient noise in the area. Heavy machinery also moved continuously along the tracks and were often inaudible or barely audible. To supplement off-site monitoring data, source noise measurements and noise predictions were undertaken to determine noise impacts.
  - The following exceedances were predicted for simultaneous operation of earthwork and water truck machinery:
    - 26 Coal Road – 15 dBA
    - 2 Blackwall Road – 6 dBA
    - 139 Robin Street – 5 dBA
- In order to achieve predicted compliance, the following measures are recommended:
  - Adopt a quieter water truck. For the purpose of the modelling, a maximum passby sound power level of 107 dBA was considered (which is 8 dBA lower than the large water truck).
  - Restrict the use of the D3 dozer or tractor to the Main track. On the Beginner/Intermediate track, limit heavy machinery to the posi-track and quieter water truck (described above). The posi-track is 8-10 dB quieter than the D3 dozer and tractor.
  - Install acoustic barriers/earth mounds:
    - 5.0 m high barrier (relative to existing ground heights) constructed near the boundary of the Main track, closest to 26 Coal Road (as per **Figure 8.1**).
    - The barrier can be a combination of an acoustic barrier on top of an earth mound (e.g. 2 metre barrier on top of a 3.0 metre earth mound). Acoustic barriers should be continuous with no air gaps have a minimum mass density of 12.5 kg/m^2.
  - There is a potential for noise levels from the D3 Dozer to exceed the criteria at 26 Coal Road (by up to 2 dB) and 2 Blackwall Rd (by up to 3 dB) with the above measures in place. Given the limited frequency of use, the potential for nuisance impacts are low. It is further recommended that the posi-track be used in preference over the D3 dozer where possible.
  - The main noise sources defining the barrier heights are the water truck and tractor (given the 10 dB exceedance, compared to 3 dB for motorbike activity). If both machines could be replaced with quieter equipment, then the barrier heights could possibly be reduced.

APPENDIX A: GLOSSARY

Parameter or Term	Description
dB	The decibel (dB) is the unit measure of sound. Most noises occur in a range of 20 dB (quiet rural area at night) to 120 dB (nightclub dance floor or concert).
dBA	Noise levels are most commonly expressed in terms of the 'A' weighted decibel scale, dBA. This scale closely approximates the response of the human ear, thus providing a measure of the subjective loudness of noise and enabling the intensity of noises with different frequency characteristics (e.g. pitch and tone) to be compared.
Day	The period between 7am and 6pm.
Evening	The period between 6pm and 10pm.
Night	The period between 10pm and 7am.
Free-field	The description of a noise receiver or source location which is away from any significantly reflective objects (e.g. buildings, walls).
L_1	The noise level exceeded for 1% of the measurement period.
L_{10}	The noise level exceeded for 10% of the measurement period. It is sometimes referred to as the average maximum noise level.
L_{90}	The noise level exceeded for 90% of the measurement period. This is commonly referred to as the background noise level.
L_{eq}	The equivalent continuous sound level, which is the constant sound level over a given time period, which is equivalent in total sound energy to the time-varying sound level, measured over the same time period.
$L_{eq,1hour}$	As for Leq except the measurement intervals are defined as 1 hour duration.
L_{max}	Maximum A-weighted sound pressure level.
L_{eq}(24 hour)	The average Leq noise level over the 24-hour period from midnight to midnight.
L_{10}(18 hour)	The arithmetic average of the one-hour L10 values between 6am and midnight. This parameter is used in the assessment of road traffic noise.
Acoustic fence	Solid, gap free fence with minimum panel surface density of 12.5kg/m^2.

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Date: 24 January 2022

Ref: 227401.0005L01V01

To: Kelly Bailey

Company: Motoland Australia

Author: Samuel Wong/BC

Subject: Preliminary Dust Review – Motoland Motocross Facility

Pages: 1 of 2

Dear Kelly,

This report letter presents an initial review for the motorbike activity occurring at the Motoland facility located at 26 Coal Road, Chuwar. It is understood that an Environmental Protection Order (EPO) was issued by Ipswich City Council on 15 December 2021 requesting Motoland to undertake a dust assessment of the site operations.

Based on a review of the EPO, nuisance dust is the key issue with respect to dust emissions from the site. Ipswich Council observed visible dust coming from the site on 6th October and 9th November 2021, and concluded that there could be potential impacts to driver "visibility" [sic assuming this is intended to be "vision"] and nuisance impacts in general. Driver vision will depend on the airborne concentration of fine particulates that scatter light. However such dust clouds are typically associated with high levels of larger dust particles that may cause nuisance due to deposition.

Trinity Consultants Australia has been commissioned to undertake the dust assessment. We propose to undertake the following tasks:

- Attend the site on 3 occasions for a 3-hour period to inspect dust emissions from the site. As per the EPO, the site visits would be undertaken during dry conditions and during motorcycle activity. Observations will be made with respect to weather conditions, on-site activity levels and locations, evidence of dust plumes reaching nearby properties and adopted dust emission controls.
- Over the same weekend of at least 1 of the site inspects, complete dust deposition sampling. Typically, the wind direction will vary throughout the sampling period so it is important to have a background location some distant upwind. Two locations at different distances downwind could potentially be adopted to understand the off-site impact at different sensitive locations. The locations will be chosen considering the predicted predominant wind direction.
- Dust deposition sampling will take place from approximately Friday to Monday to cover the period of on-site activity (i.e. earthworks/track preparation and motorcycle activity). Note that samples shorter than 3 or 4 days of dust deposition sampling would provide low sample sensitivity to compare with the nuisance dust criterion e.g. the limit of reporting for a few days of sampling will be approximately 10% of the criterion so shorter periods are not recommended.
- Setup a weather station to monitor wind and rainfall conditions during the monitoring.
- Sampling will be undertaken in accordance with *AS 3580.10.1 – 2016, Methods for sampling and analysis of ambient air - Determination of particulate matter – Deposited matter – Gravimetric Method*.

Conditions during January 2022 have not been dry. Rainfall has occurred on each of the 4 weekends thus far, with rainfall volumes of 25.2 mm, 6.2 mm, 8.6 mm and 0.6 mm for each weekend period (starting from 1-2 January), as measured at the Amberley Bureau of Meteorology station. The most recent weekend (22-23 January) recorded only 0.6 mm rain, however, this was preceded by 68.4 mm of rainfall on the Thursday and Friday prior.

Given the weather conditions, it considered more appropriate to undertake the dust sampling at a later date outside the wet season. This will provide the best conditions for reviewing dust emissions and controls for the site.

It is understood that track watering is undertaken using a water truck in the days prior to motorbike operations (which occur from Friday to Saturday) and during ride days. It is also understood that Motoland staff are in attendance at each track during operations to constantly observe track safety and conditions (including dust). Where required, watering may occur during opening hours to minimise dust emissions (i.e. a track may be temporarily closed for 15-30 minutes while watering takes place).

During site visits on a busy and dry operating day (Saturday 15th January), dust emissions were considered to be managed well. A water truck was used prior to 8 am before riders arrived, and twice during opening hours on both the Intermediate and Main track. The water truck was then used in the afternoon from approximately 2:30 pm onwards. Dust emissions were observed from the track during riding, however, visible dust was limited to directly around the track. Conditions were generally calm on the day, and further observations can be made during additional site inspections.

Additional procedures that can be formalised and expanded on in a site management plan includes the following

- Review weather conditions (wind and rainfall) prior to the weekend to understand potential dust impacts that occur and to provide a particular focus for dust management (e.g. if winds were northerly towards 26 Coal Road, particular attention may need to be given to the Main track closest to this property).
- During ride days, where visible dust plumes are seen dispersing from the tracks towards the road or nearby houses, undertake track watering as soon as possible to minimise emissions.
- Be proactive – understand the typical duration between when watering occurs to when dust emissions become more evident. This may be affected by weather conditions and the amount of bike activity on track. Track watering could then be implemented prior to when dust emissions become an issue.

Overall, dust emissions from the site can be managed by a sufficient amount of track watering. It is then a case of staff remaining attentive to dust emissions from each track throughout the weekend and developing an understanding of conditions (weather/operational) and their effects on dust emissions in order to be proactive.

Please feel free to contact me should you have any queries regarding the above matters.

Yours faithfully

Trinity Consultants Australia

Samuel Wong
Environmental Manager