koikas acoustics PTY LTD
CONSULTANTS IN NOISE & VIBRATION

Commercial 1 (Unit 27)
637-645 Forest Road
Bexley NSW 2207

+612 9587 9702
office@koikasacoustics.com
www.koikasacoustics.com

DELIVERING SOUND ADVICE

ABN: 12 058 524 771

ACOUSTICAL REPORT

PROPOSED MATERIALS RECOVERY FACILITY

132-144 WARREN ROAD, SMITHFIELD NSW

Date: Thursday, 23 June 2022

File Reference: 4595R20210825lm132-144WarrenRdSmithfield_DAv3

DOCUMENT CONTROL

Project title	Acoustical Report Proposed Materials Recovery Facility 132-144 Warren Road, Smithfield NSW
Project number	4595
Document reference	4595R20210825lm132-144WarrenRdSmithfield_DAv3
Document path	G:\Shared drives\KA Acoustics 2021\REPORT\Other\4595 (lm) 134-144 Warren Road, Smithfield\4595R20210825lm132-144WarrenRdSmithfield_DAv3.docx

Version	Date	Author	Review	Notes
V1	26/08/2021	LM	NK	Report version 1 available for issue
V2	13/04/2022	LM	NK	Report version 2 available for issue
V3	23/06/2022	LM	NK	Report version 3 available for issue

Approved by	Nick Koikas M.A.A.S Director
Client	MRA Consulting Attention: Esther Hughes Email: esther@mraconsulting.com.au

ACOUSTICAL REPORT

PROPOSED MATERIALS RECOVERY FACILITY

132-144 WARREN ROAD, SMITHFIELD NSW

CONTENTS

TABLE OF APPENDICES

1.0 INTRODUCTION

Koikas Acoustics Pty Ltd was engaged to prepare a noise impact assessment for the proposed materials recovery facility (MRF) at 132-144 Warren Road, Smithfield NSW.

For the DA proposal, the acoustic adequacy of the proposed design must be assessed in terms of standard planning guidelines issued by the Council in their Local Environment Plan (LEP) and Development Control Plan (DCP), and also in terms of other standard planning guidelines related to common sources of noise.

As per Council guidelines and other standard planning instruments, Koikas Acoustics has conducted a noise impact assessment of the following:

- A cumulative operational noise impact assessment from the operation of the material recovery facility to surrounding neighbouring premises,
- Construction noise and vibration assessment from construction activities to neighbouring premises, leading to the development of construction noise and vibration management plan.

This report presents the results and findings of an acoustic assessment for the subject proposal. In-principle acoustic treatments and noise control recommendations are included (where required) so that the premises may operate in compliance with the nominated acoustic planning levels.

2.0 THE PROPOSAL

The development is proposed to occupy the site at 132-144 Warren Road, Smithfield.

This location is situated in the Smithfield Industrial Zone and is classified as IN1 'General Industrial' as per relevant land zoning maps included in the Cumberland Council Local Environment Plan 2021. Surrounding properties are also predominantly industrial/commercial in classification, also located within IN1 Zoning.

The subject site and surrounding properties are identified in the aerial photograph in Figure 1.

Figure 1. Aerial photo of the subject site and surrounding area – Image from SixMaps

Prevailing ambient noise conditions on-site and in the local area are generally the result of typical environmental noise such as industrial noise and road traffic.

This acoustic report and any associated recommendations are based on the Facility Plan provided by MRA Consulting (document titled '20220412.1 SMF_MRF_DA LH', received by Koikas Acoustics on 12/04/2022). Additionally, the Project Scoping Report completed by MRA Consulting (document

titled 'SEARs Scoping Report 132-144 Smithfield Road MRF', received by Koikas Acoustics on 01/07/2021) has been referred to for more detailed information. Lastly, anticipate truck volumes have been provided by MRA Consulting (see the document '*Traffic distribution based on maximum tonnes in Monday to Friday*', supplied to Koikas Acoustics on 11/04/2022). Any unapproved changes to the design may impact the findings of this report and associated noise control recommendations.

As per the Facility Plan and Project Scoping Report, the proposed development will include:

- A single shed, divided into sections for the processing and storage of glass, paper, plastic, aluminium and steel
- An internal road for receiving and offtake of material by trucks, including a sealed hardstand in the receiving area, and two weighbridges
- 41 car parking spaces for staff and visitors

In addition, Koikas Acoustics has been advised of the following:

- The proposed hours of operations will be 24 hours a day, 7 days a week. This will be divided into two shifts (4 am to 4 pm, and 4 pm to 4 am), with each shift comprising up to 14 people. A further 8 staff (office and maintenance) will be present from 9 am to 5 pm.
- There are three main processes of the proposed facility:
    1. Drop off of waste by Council and commercial recycling collection vehicles. 73 trucks will drop off waste between 5 am and 10 pm, with Council trucks operating only on weekdays, and commercial trucks operating 7 days a week.
    2. The sorting and processing of waste materials, are done by: hoppers, conveyors, trommels, ballistic separators, air separators, dust collectors, over-band magnets, eddy current magnets, glass crushers, paper cleaning screens, sorting tables, balers, optical sorters, robotic sorters, and other material quality control systems.
    3. Offtake of processed bales by a variety of trucks and semitrailers at the loading dock on the western side of the site, and also some offtake on the eastern side. Forklifts/loaders with load 22 trucks with offtake material between 5 am and 10 pm, 7 days a week.
- Minor construction works are proposed to amend the site infrastructure including the development of internal roads, weighbridges, parking and hardstand, stormwater infrastructure, and fencing.

- A summary of the type of trucks used, the materials they carry and the loading bays they access is provided below.

Table 1. Summary of truck details [dB]

Truck type	Materials	Max capacity (tonnes)	Max length	Loading bay
Council sideloader	Commingled recyclables	5	10 m	D, C
B double tautliner, container or walking floor	Baled mixed plastic input	24	19 m	Alongside A, B
Articulated vehicle tautliner, container or walking floor	Fibre, plastic, glass, residual	24	19 m	Fibre – Loading Dock (H) Plastic – Alongside A, B Glass – Alongside E, F Residual – Alongside A
Articulated vehicle walking floor or container	Residual, commingled recyclables	34	26 m	Residual – Alongside A Recyclate – D
Semi-trailer tautliner, container or walking floor	Fibre, plastic, baled cans and residual	24	19 m	Fibre – Loading dock (H) Plastic – Alongside A, B Baled cans – Alongside A, B Residual – Alongside A, B
Hook lift truck	Residual	8 to 10	9 m	I
Truck and Dog	Glass and residual	32	19 m	Alongside E or F

3.0 AMBIENT NOISE SURVEYS

An unattended noise logging survey was conducted between 8 June 2021 and 14 June 2021. The microphone was placed in a tree on Iris Street near those residences at approximately 3 metres above the natural ground level in 'free-field' conditions.

A Convergence Instruments Noise Sentry RT-W was used for the survey. The instrument was set up to measure sound pressure levels as 'A' frequency weighting and 'Fast' time response. Noise levels were stored within the logger memory at recurring 1-second intervals.

A NATA calibrated and certified Larson Davis CAL200 precision acoustic calibrator was used to field calibrate the sound level meter before and after the noise survey. No system drift was observed for this sound level meter.

A review of the weather records from the Bureau of Meteorology and the noise level trends observed from the survey suggest that adverse weather conditions did not influence the noise environment during the measurement period. Observable short-duration extraneous noise events were removed from the survey data. BOM weather data is attached as **Appendix A** for reference.

A summary of the noise survey data is presented below.

Table 1. Summary of noise logger results [dB]

Location	Period, T [1]	Ambient noise level L_{Aeq}	Rating background level L_{A90}	Traffic noise level[2] $L_{Aeq, Period}$
Iris Street	Day	56	47	56
	Evening	54	46	
	Night	51	42	51

Notes

1. The **NSW EPA Noise Policy for Industry (NPfI)** refers to:
   Daytime: 7 am – 6 pm Monday to Saturday and 8 am to 6 pm Sunday and public holidays.
   Evening: 6 pm – 10 pm Monday to Sunday
   Night: 10 pm - 7 am Monday to Saturday and 10 pm to 8 am Sunday and public holidays.
2. The **EPA/RMS/NSW DoP** refers to:
   Daytime: 7 am – 10 pm seven days per week.
   Night: 10 pm - 7 am seven days per week

Daily logger graphs are attached in **Appendix B**.

4.0 ACOUSTICAL REQUIREMENTS

4.1 EPA NOISE POLICY FOR INDUSTRY

Noise emission design targets have been referenced from the NSW Environmental Protection Authority (EPA) Noise Policy for Industry (NPfI).

The NPfI is designed to assess environmental noise impacts associated with scheduled activities prescribed within the Protection of the Environment Operations Act 1997, Schedule 1. It is also used as a reference tool for establishing suitable planning levels for noise generated by mechanical plant and equipment and noise emission from commercial operations.

For residential receivers, the guideline applies limits on the short-term intrusive nature of a noise or noise-generating development (project intrusive noise level), as well as applying an upper limit on cumulative industrial noise emissions from all surrounding development/industry (project amenity noise level). The most stringent of the project intrusive noise level and project amenity noise level is applied as the **project noise trigger level (PNTL)**. To determine which of the intrusive and amenity noise criteria is more stringent, the underlying noise metrics must be the same. As the intrusive noise level is defined in terms of an $L_{Aeq,\ 15\ minutes}$ and the amenity noise level is defined in terms of an $L_{Aeq,\ Period}$, a correction +3 dB correction is applied to the project amenity noise level to equate the $L_{Aeq\ Period}$ to $L_{Aeq,\ 15\ minutes}$.

Non-residential receivers are assessed to project amenity noise levels relevant to the applicable receiver category (industrial/commercial). Project amenity noise levels (after the +3 dB correction) for commercial premises are 63 dB when in use, and for industrial premises, 68 dB when in use.

Where noise is measured or predicted below the project noise trigger level, the noise outcome is deemed acceptable. Above the project noise trigger level, management responses such as applying reasonable and feasible noise mitigation measures are to be recommended, along with assessing any residual noise impacts once noise mitigation has been considered.

The policy is designed in such a way that the assessing authority would consider the project noise trigger levels, reasonable and feasible mitigation measures, and any residual noise impacts when deciding on acceptable noise outcomes.

The site-specific project noise trigger levels need only be considered for the hours under which the noise or activity occurs.

Table 2. NPfI planning levels – $L_{Aeq, 15\ minutes}$ [dB]

Period,T (Note 1)	Intrusive		Amenity					Project noise trigger level
	RBL	RBL + 5	Area classification	Recommended amenity noise level	High traffic area	Project amenity noise level	+3dB correction	
Day	47	52	Urban	60	No	55	58	52
Evening	46	51	Urban	50	No	45	48	48
Night	42	47	Urban	45	No	40	43	43

Notes:
1. **EPA** defines the following periods:
   Day: 7 am to 6 pm Mon to Sat and 8 am to 6 pm Sun and public holidays,
   Evening: 6 pm to 10 pm Mon to Sun,
   Night: 10 pm to 7 am Mon to Sat and 10 pm to 8 am Sun and public holidays.
2. Project noise amenity level = recommended noise amenity level – 5dB, except where specific circumstances are met, such as high traffic.

4.1.1 Sleep disturbance/arousal

The EPA NPfI provides a guide for assessing potential sleep disturbance for residents affected by maximum noise level events from a particular development site. A detailed review of maximum noise levels should be conducted where noise levels exceed the following at the most affected point on or within the residential boundary (including upper floor windows and balconies):

- $L_{Aeq, 15\ minutes}$ 40 dB or the prevailing RBL plus 5 dB, whichever is the greater, and/or
- L_{Amax} 52 dB or the prevailing RBL plus 15 dB, whichever is the greater.

A detailed maximum noise level assessment would consider the subject noise relative to other typical sources of noise in the area, and as per other relevant noise guidelines such as the maximum internal noise levels provided in the EPA Road Noise Policy (RNP, 2011) that concludes:

- Internal noise levels of L_{Amax} 50 - 55 dB are unlikely to cause awakenings, and
- One (1) or two (2) noise events per night, with maximum internal noise levels of 65 - 70 dB(A), are not likely to significantly affect health and wellbeing.

From the data presented in Table 2, the sleep disturbance criteria, as recommended by the EPA, at the most noise affected point on or within the residential boundary are therefore identified as:

- $L_{Aeq,\ 15\ minutes} \leq 47$ dB, and/or
- $L_{Amax} \leq 57$ dB, whichever is greater.

4.2 OFFENSIVE NOISE (POEO ACT 1997 DEFINITION)

The definitions of 'offensive noise' in the Protection of the Environment Operations Act 1997means:

(a) that, by reason of its level, nature, character or quality, or the time at which it is made, or any other circumstances:

(i) is harmful to (or is likely to be harmful to) a person who is outside the premises from which it is emitted, or

(ii) interferes unreasonably with (or is likely to interfere unreasonably with) the comfort or repose of a person who is outside the premises from which it is emitted, or

(b) that is of a level, nature, character or quality prescribed by the regulations or that is made at a time, or in other circumstances, prescribed by the regulations.

4.3 EPA ROAD NOISE POLICY

Traffic generating development such as a child care centre will introduce additional vehicles onto the local road network. The noise that is associated with these additional vehicles forms part of the acoustical assessment of the proposed development.

The EPA RNP recommends that traffic noise levels should not exceed $L_{Aeq,\ 1\text{-}hour}$ 55 dB during daytime hours (7 am to 10 pm) at an assessment location of (one) 1 metre from the façade of an affected residential building and at a height of 1.5 metres above the ground. Outside of daytime hours, the objective becomes $L_{Aeq,\ 1\text{-}hour}$ 50 dB.

Furthermore, Section 3.4 of NSW Road Noise Policy states the following:

3.4 Applying the assessment and relative increase criteria

The process for applying the criteria involves firstly defining a study area. This helps ensure that noise is assessed and any necessary mitigation applied at those locations most affected. The *UK Design Manual for Roads and Bridges* (United Kingdom Highways Agency 2008) adopts a distance of 600 metres from a project as being adequate for this purpose.

Where existing traffic noise levels are above the noise assessment criteria, the primary objective is to reduce these through feasible and reasonable measures to meet the assessment criteria. A secondary objective is to protect against excessive decreases in amenity as the result of a project by applying the relative increase criteria.

In assessing feasible and reasonable mitigation measures, an increase of up to 2 dB represents a minor impact that is considered barely perceptible to the average person.

Section 3.4.1 provides a step-by-step procedure for applying the noise criteria to each type of project and development covered by the RNP.

Where the existing traffic noise levels are above the NSW Road Noise Policy (ECCW) assessment criteria, the increase in traffic noise levels due to the proposed development is not to exceed **2 dB**.

5.0 NOISE MODEL

Predictive modelling (CadnaA) has been used to assess noise levels at each of the identified residential receiver locations. The CadnaA prediction model calculates according to the standard sound propagation algorithms defined in ISO9613, considering the local topography, ground condition, and the presence of noise reflectors/barriers. Per the sound propagation algorithms adopted in the ISO standard, the output of the noise model is a downwind sound pressure level which constitutes an assessment of noise-enhancing weather conditions.

The acoustic assessments consider a range of design parameters that directly influence the output of the noise prediction model. A summary of the relevant design parameters is provided below:

- Ground absorption is generally taken as 0.7 for moderately porous ground, except for the subject site where a ground absorption of 0.02 is considered for the concrete hardstands.
- Cumulative noise levels are calculated for all existing and proposed noise sources, assessed over any 15-minutes. All plant and equipment and work processes are considered operational at the same time and no corrections for source duration are applied. This presents an absolute worst-case assessment scenario that is unlikely to occur during typical operation.

6.0 NOISE IMPACT ASSESSMENT

6.1 ASSESSMENT SCENARIOS

The following design scenarios are assessed. Relevant assessment criteria are also noted for reference.

Table 3. Design scenarios and assumptions

Scenario	Description and Assumptions	Assessment Criteria
1.1	(Day) Noise sources: Maximum 7 Council/commercial vehicles dropping off waste, moving on-site at 15 km/h Maximum 2 offtake vehicles moving on-site at 15 km/h, including reversing to the loading dock area All roller doors left open Breakout noise through roller doors and roof 28 staff vehicles entering/leaving the site during shift change, with associated noise from car doors and ignitions	Residential $L_{Aeq,15mins}$ = 52 dB Commercial $L_{Aeq,15mins}$ = 63 dB Industrial $L_{Aeq,15mins}$ = 68 dB
1.2	(Evening) Noise sources: Maximum 1 Council/commercial vehicles dropping off waste, moving on-site at 15 km/h Maximum 1 offtake vehicles moving on-site at 15 km/h, including reversing to the loading dock area All roller doors left open Breakout noise through roller doors and roof	Residential $L_{Aeq,15mins}$ = 48 dB Commercial $L_{Aeq,15mins}$ = 63 dB Industrial $L_{Aeq,15mins}$ = 68 dB
1.3	(Night) Noise sources: Maximum 5 Council/commercial vehicles dropping off waste, moving on-site at 15 km/h Maximum 1 offtake vehicles moving on-site at 15 km/h All roller doors left open Breakout noise through roller doors and roof 28 staff vehicles entering/leaving the site during shift change, with associated noise from car doors and ignitions	Residential $L_{Aeq,15mins}$ = 43 dB Commercial $L_{Aeq,15mins}$ = 63 dB Industrial $L_{Aeq,15mins}$ = 68 dB Sleep disturbance $L_{Aeq,15mins}$ = 47 dB, L_{Amax} = 57 dB

The truck volumes indicated above are the maximum hourly truck volumes during each assessment period. As the assessment criteria consider the loudest 15-minute period, it is assumed that all of the scheduled inbound and outbound loads occur for one hour occur within a single 15-minute period, which is a worst-case scenario that is unlikely to occur.

Additionally, and as noted in Section 5.0, it is assumed that all noise sources occur constantly over one 15-minute period, and no duration corrections have been applied to account for downtime within the facility.

Lastly, the largest number of staff vehicle movements will occur during the shift changes at 4 am and 4 pm. During these shift changes, it is expected that 14 staff will enter, and 14 will leave. Smaller numbers of movements occurring during the arrival and departure of office/maintenance staff at 9

am and 5 pm, where 8 staff will arrive/leave. The worst-case scenario during both the day and night is therefore the exodus associated with the shift change, and it has been assumed that all vehicle movements occur in one single 15-minute period. No vehicle movements are expected during evening hours.

6.2 EQUIPMENT AND ASSOCIATED SOUND LEVELS

As the proposed facility is not yet operating, attended noise level measurements taken previously of other MRFs of similar size by Koikas Acoustics were used to determine the anticipated noise levels. These measurements include typical sorting and processing operations, as well as the use of mobile plant and equipment within the building such as forklifts and loaders. Plant and equipment associated with loading externally onto trucks are included as a separate noise source within the model.

Analysis has also been conducted to determine whether any annoying characteristics are present, as guided by *AS1055:2018 Acoustics – Description and measurement of environmental noise* and Fact Sheet C of the NPfI. The annoying characteristics that have been considered are:

- Impulsive/intermittent/non-steady noise,
- Strong low-frequency content, and
- Tonal noise.

There is potential for some sources of noise to be intermittent/impulsive, namely the use of some stationary equipment such as the glass crusher. As the noise measurements conducted at a similar site do not specifically isolate the glass crusher, a 5 dB correction for intermittent noise will be applied to noise emanating from each of roller doors E and F, as these doors are proximate to the glass processing area. As per the NPfI, this correction is only applied during the night.

All noise sources have been examined to gauge whether they possess an unbalanced spectrum that may indicate strong low-frequency content. In all cases, the difference in the A- and C-weighted $L_{eq,T}$ noise levels were less than 15 dB, thus no correction is to be applied as per the process detailed in the NPfI Fact Sheet C.

The Traffic Impact Assessment identifies the potential for trucks to reverse back to the loading dock areas, and Koikas Acoustics recognises that other loading vehicles to be used near the loading dock

areas such as forklifts may also have reversing alarms fitted. Vehicle reversing alarms typically possess a distinct tone at around 1000 Hz, and therefore a tonal penalty of +5 dB is applied to this activity.

Table 4 includes a description of the noise sources and anticipated noise levels for them, inclusive of any corrections discussed above.

Table 4. Schedule of equipment and noise levels

Item	Descriptor	Noise level, [dBA]	Location
Internal facility noise	L_{Aeq}, spatial averaging	97	As breakout through the lightweight roof
Noise at roller doors	L_{Aeq}, spatial averaging	99 Note 1	As breakout through roller doors
External loading activities	L_{wAeq}, point source	99	Loading areas on the western side
Trucks moving on-site	L_{wAeq}, moving point source	94	Defined circuits on Facility Plan
Loading activities	L_{wAeq}, point source	99	Loading areas on the eastern and western sides
Vehicles reversing with alarms	L_{wAeq}, moving point source	104	Loading areas on the western side
Staff car moving on-site	L_{wAeq}, moving point source	82	Site carpark
Car door closing	L_{wAeq}, point source	55	Site carpark
Car engine starting	L_{wAeq}, point source	53	Site carpark

Note 1: for roller doors, E and F, a correction of +5 dB is applied during the night period to account for intermittent noise associated with the glass crusher, as identified earlier.

6.3 CALCULATED RECEIVER LEVELS

Operational noise levels have been predicted for nearby residential, commercial and industrial receivers by way of preparing an acoustic model and conducting point-to-point calculations based on standard sound propagation algorithms. All calculations consider the equipment as selected in the mechanical services plans, the associated sound levels and corresponding attenuators.

Reference should also be made to additional noise control recommendations included within Section 5.4 of this report, which also govern the calculated receiver noise levels.

Due to the size of the development, several potentially affected receiver locations must be assessed in terms of their respective noise exposure from mechanical plant and equipment associated with

the development. The most noise-sensitive receiver locations are summarised below and are shown in Figure 2.

Table 5. Assessment locations			
ID	**Receiver type**	**Address**	**Assessment Location**
R1	Commercial premise	191-193 McCredie Road	Rear yard
R2	Industrial premise	146 Warren Road	Main yard
R3	Industrial premise	39 Sturt Street	Rear storage yard
R4	Industrial premise	120-122 Warren Road	Main yard
R5	Industrial premise	128 Warren Road	Entrance along Warren Road
R6	Commercial premise	21 Percival Road	Entrance along Warren Road
R7	Industrial premise	111-121 Warren Road	Entrance along Warren Road
R8	Commercial premise	107-109 Warren Road	Entrance along Warren Road
R9	Residential dwelling	79 Warren Road	Residential boundary
R10	Residential dwelling	36 Iris Street	Residential boundary

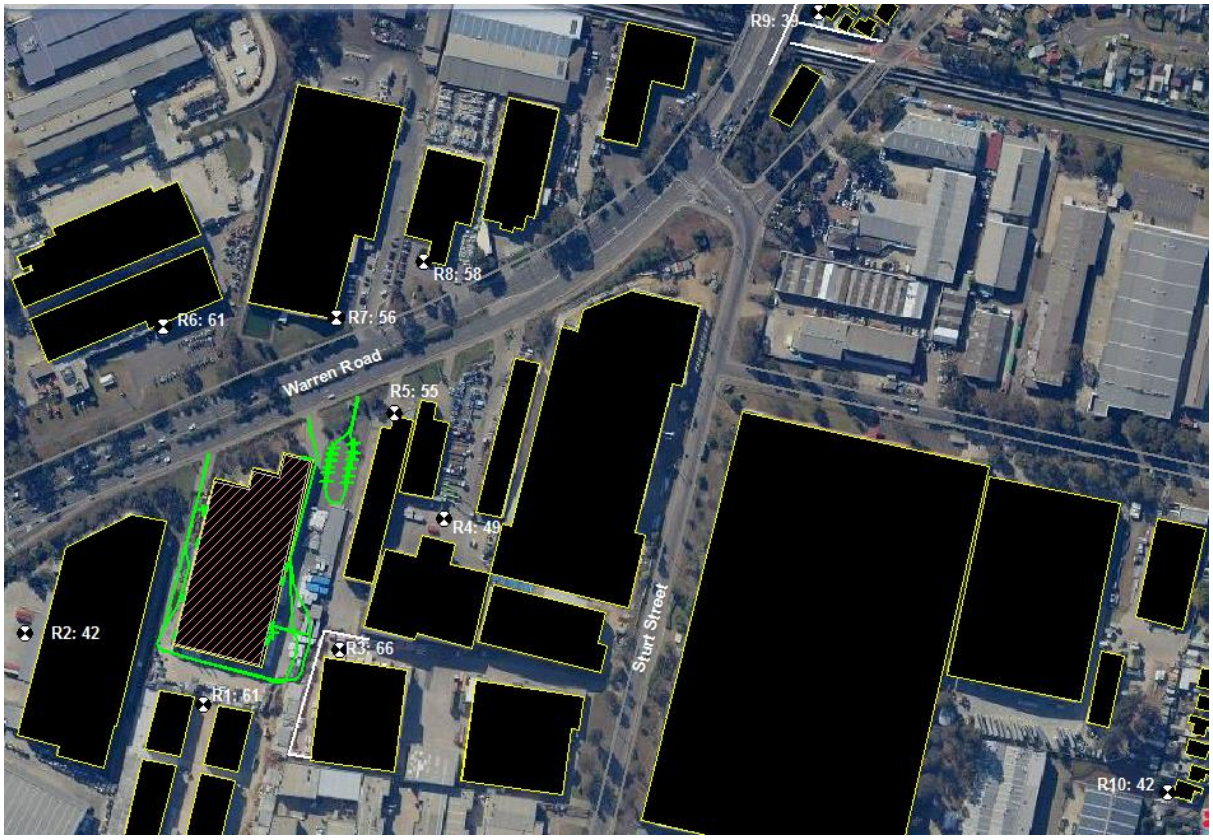


Figure 2. Receiver locations and ID's

Predicted operational noise levels, inclusive of all identified noise sources, as well as all recommendations listed in Section 5.4, are as follows:

Table 6. Operational Noise Levels at the Surrounding Premises – Scenario 1.1 and 1.2 [dB]				
Receivers		**Calculated External Noise Levels $L_{Aeq,15min}$**	**Project Noise Trigger Level $L_{Aeq,15min}$**	**Exceedance?**
Scenario 1.1 (day)	R1 (Commercial)	62	**63**	-
	R2 (Industrial)	43	**68**	-
	R3 (Industrial)	66		-
	R4 (Industrial)	49		-
	R5 (Industrial)	63		-
	R6 (Commercial)	63	**63**	-
	R7 (Industrial)	60	**68**	-
	R8 (Commercial)	60	**63**	-
	R9 (Residential)	41	**52**	-
	R10 (Residential)	42		-
Scenario 1.2 (evening)	R1 (Commercial)	62	**63**	-
	R2 (Industrial)	43	**68**	-
	R3 (Industrial)	66		-
	R4 (Industrial)	49		-
	R5 (Industrial)	63	**n/a[3]**	-
	R6 (Commercial)	63		-
	R7 (Industrial)	60		-
	R8 (Commercial)	60		-
	R9 (Residential)	41	**48**	-
	R10 (Residential)	42		-
Scenario 1.3 (night)	R1 (Commercial)	66	**63**	**+3**
	R2 (Industrial)	45	**68**	-
	R3 (Industrial)	66		-
	R4 (Industrial)	49		-
	R5 (Industrial)	63	**n/a[3]**	-
	R6 (Commercial)	65		-
	R7 (Industrial)	60		-
	R8 (Commercial)	60		-
	R9 (Residential)	41	**43**	-
	R10 (Residential)	42		-

Notes:

1. The above noise scenario is based on the worse-case/full capacity operations within one 15-minute period. Typical operation is less noisy and therefore the noise impact to surrounding premises is expected to be lower.

2. Indicated commercial and industrial receivers are not open during the night period, and thus are not assessable under the NPfI. All other commercial/industrial receivers are either operating during the night, or information was not available to determine their status during this time, in which case it has been assumed that they will be operating.

Compliance with the EPA NPfI is achieved during the day and evening. An exceedance of 3 dB is calculated during the night period to receiver R1. As such, further noise mitigation measures will be required. Koikas Acoustics proposes either the scheduled closing of several key roller doors or the construction of a 3-metre solid noise barrier along to rear boundary. Noise levels at R1 are calculated to comply with the limiting criteria when either of these measures is included in the noise model.

Compliance has therefore been achieved with the adopted noise criteria of the EPA's Noise Policy for Industry, pending the implementation of all noise mitigation measures detailed in Section 6.4.

Refer to **Appendix C** for the receiver locations and Cadna/A noise contour maps.

6.3.1 Offensive noise checklist (EPA Noise Guide for Local Government, 2013)

The EPA NGLG provides a checklist that is proposed to assist with establishing if a particular noise is offensive. The checklist is summarised as follows:

- Is the noise loud in an absolute sense? Is it loud relative to other noise in the area?
  No, predicted ambient $L_{Aeq,\ Daytime}$ noise levels at residential receivers were found to be similar to or above the calculated noise levels. Typical activities are predicted to blend in with existing ambient noise, and thus will be inaudible.
- Does the noise include characteristics that make it particularly irritating?
  The noise may be considered impulsive or intermittent, however, based on its loudness, it is not expected to be audible to residential receivers.
- Does the noise occur at times when people expect to enjoy peace and quiet?
  The noise will occur during night-time hours, but due to the existent ambient noise levels, it is not anticipated to impact this enjoyment of peace and quiet at residential receivers.
- Is the noise atypical for the area?
  No, there are surrounding industrial premises.
- Does the noise occur often?

The noise may occur often during the proposed operating hours, however, it is expected to be inaudible inside the most noise-affected residential receivers.

- Are a number of people affected by the noise?

  Residential premises along Iris Street, Warren Road and the Cumberland Highway. Compliant noise levels are predicted for each of these premises.

6.3.2 Sleep disturbance/arousal

No sleep disturbance is expected to occur at residential receivers experiencing no more than $L_{Aeq,\ 15\ minutes}$ 47 dB or L_{Amax} 57 dB. For this proposed development during night-time operations, the most noise-affected residential receivers are predicted to experience noise levels of $L_{Aeq,\ 15\ minutes}$ 42 dB and L_{Amax} 52 dB, and thus no sleep disturbance is expected from this development.

6.3.3 Increased traffic volumes

The 2018 Average Daily Traffic Count (ADTC) recorded by the RMS along Warren Road was 63,646 vehicles. It is expected that with such high traffic volumes, existing traffic noise levels will be above the NSW RNP assessment criteria. As such, the increase in traffic noise levels due to the proposed development should not exceed 2 dB. A preliminary assessment using the road traffic module within Cadna predicts a negligible (< 0.5 dB) increase in road traffic noise from the operation of the proposed materials recovery facility.

6.4 RECOMMENDATIONS

The following recommendations are required to fully satisfy the acoustic requirements for this development:

- The operation of vehicles transporting raw and finished material is to be kept to the defined schedule detailed in Section 2.0. It is noted that the noise from vehicle movements is found to be relatively low compared to the breakout noise from the facility, so minor increases in these vehicle volumes are acceptable without the need for review.
- Appropriate processes for complaints handling are to be established following the recommendations outlined later on in Section 6.4 of this report.
- One of the two following options is to be implemented:

  Option 1: Roller doors

  Roller doors A, F and I are each to be kept closed during the night period (from 10 pm to 7 am, or to 8 am on Sundays and Public Holidays). In addition to this, it is recommended that

roller doors C, D and E, which also make significant contributions to the noise levels at R1, be fitted with fast-acting roller doors so that they can be closed whenever not in use during the night period. Fast-acting rapid-roller doors may optionally be installed on all other doors where desired.

Option 2: Noise barrier

A 3-metre high noise barrier is to be constructed along the rear boundary of the site (see Figure 3 below). The barrier is to be of solid construction with no air gaps, with possible construction materials being:

- 9 mm fibre cement sheets fixed to a suitable framing structure, or
- Masonry 70-110 mm thick, or
- Proprietary modular type wall systems such as SlimWall by Modular Walls or the likes.

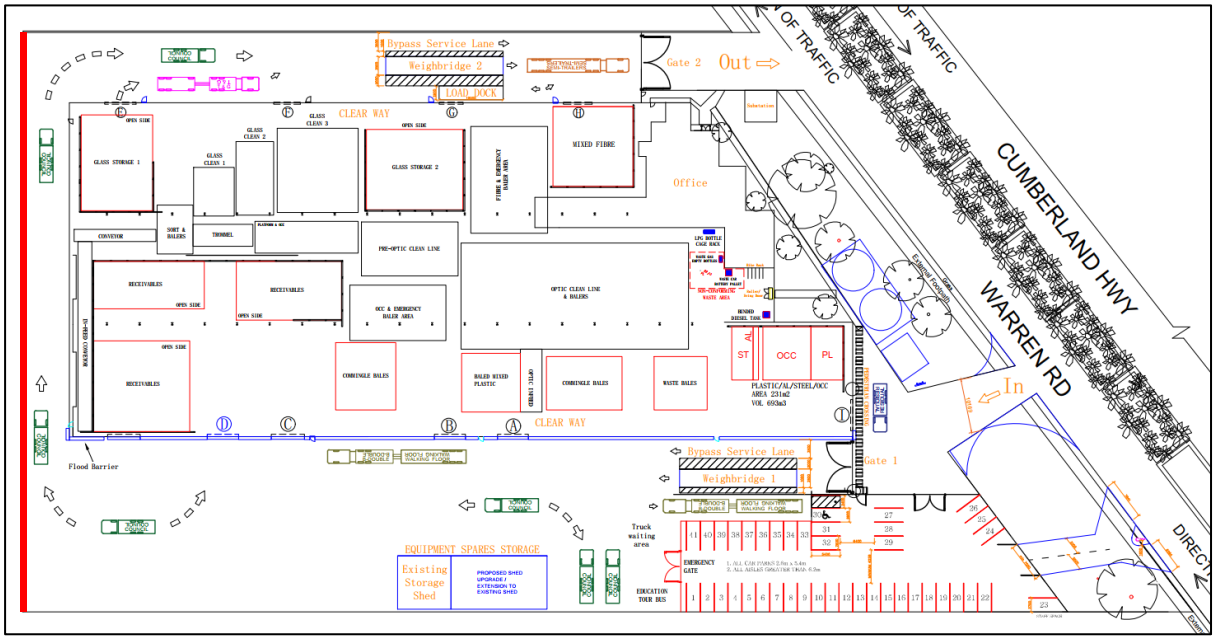


Figure 3. Extent of noise barrier (red)

7.0 CONSTRUCTION NOISE AND VIBRATION MANAGEMENT PLAN

7.1 CONSTRUCTION NOISE

7.1.1 Construction noise sources and sound levels

The range of typical construction noise levels depends on the process or sources involved. Construction noise levels are included in:

- Australian Standard 2436-2010 Guide to noise and vibration control on construction, demolition and maintenance sites and
- the Department for Environment, Food and Rural Affairs (DEFRA – UK) Update of Noise Database for Prediction of Noise on Construction and Open Sites, December 2004.

Koikas Acoustics has determined that for the tasks detailed in the scoping report – development of internal roads, weighbridges, parking and hardstand, stormwater infrastructure, fencing and landscaping – that the demolition/excavation/construction may require the following equipment:

- **Demolition and excavation**
    - 30T excavator
    - Trucks for removing spoil
- **Construction**
    - Trucks
    - Electric tower crane
    - Concrete pumps/trucks

Table 7. Construction activity typical sound levels, [dB]

Works stage	Equipment	Typical sound power level – L_w	Reference noise level – L_{Aeq} at 10 m
Demolition and excavation	Excavator breaking and spreading rubble	110	82
	Truck	107	79
	Excavator loading a truck (brick rubble)	113	85
	Excavator (ground removal)	99	71
Construction	Truck	107	79
	Electric tower crane	105	77
	Concrete pump truck	108	80

7.1.2 Calculated construction noise levels

The level of noise predicted at a specific receiver location is governed by:

- The source noise level,
- The duration of the noise source,
- The distance between the source and receiver. As the location of plant and equipment on construction sites is not always at a fixed point, the distance between the noise source and receiver location can vary, and
- The screening between the source and receiver sound propagation path.

The following calculation parameters are assumed:

- Omni-directional point source radiating over hard ground.
- Shielding attenuation in the form of a barrier is equivalent to a 1.8 m high. This will provide some additional shielding between the site and the most noise-affected residences
- Source-receiver distances are calculated from the centre of the construction site, resulting in the following source-receiver distances:
    - 391 metres from the site boundary to the closest boundary of the residence at 4 Vale Street, Smithfield
    - 591 metres from the site boundary to the closest boundary of the residence at 34 Iris Street, Smithfield
- Duration corrections presuming:
    - Excavator breaking and spreading rubble for demolition constant over 15 minutes
    - Truck noise was apparent for 2 of 15 minutes
    - Truck loading occurs for 10 of 15 minutes
    - The ground excavation was constant for over 15 minutes
    - The concrete pump and truck were constant for over 15 minutes
    - The electric tower crane was operating for 10 of the 15 minutes

Construction noise levels were calculated at the nearest residential property boundaries. The calculated construction noise levels can vary on account of the duration of use, the method of use, and the location of the plant and equipment at any moment throughout the construction site.

Table 8. Estimated construction noise levels to surrounding receivers – $L_{Aeq,\ 15\ minutes}$ [dB]		
Equipment	**Noise assessment receiver location**	
	4 Vale Street	**34 Iris Street**
Excavator breaking and spreading rubble	45	42
Truck	33	30
Excavator loading a truck (brick rubble)	46	43
Excavator (ground removal)	34	31
Truck	40	37
Electric tower crane	40	37
Concrete pump truck	43	40
Notes 1.	Predicted construction noise levels are estimated only due to the large variance in noise levels generated by comparable plant performing similar tasks on different construction sites. Should complaints arise it may be necessary to survey noise being generated on-site to determine the actual working noise levels.	

The presented noise levels are of a similar order of magnitude to the daytime background noise levels of 47 dB at residential receivers as indicated earlier in this report in Table 2. The construction noise is, therefore, not anticipated to impact the amenity of residents at these receiver locations.

7.2 VIBRATION ASSESSMENT

Ground vibration during excavation and earthworks for the basement may impact adjoining buildings and occupants depending on the local geology. Of particular sensitivity are the adjacent buildings to the east, west and south, given that they share a site boundary with the works zone.

Excavating loose soil, sand and clays with an excavator and standard bucket and grab attachments is not expected to generate any significant vibration impacts on adjoining residents or structures. Excavation of sandstone bedrock will, however, typically require the use of excavators with hydraulic breaker attachments. This equipment can generate significant levels of vibration. Based on the information provided to Koikas Acoustics, no rock breaking of bedrock is expected to occur.

The proximate location of adjoining buildings may require alternative work practices to impact-driven excavations along site boundaries if the minimum safe working distances as detailed cannot be achieved. In the case where excavation of bedrock is required, rock sawing and/or rock grinding are alternatives to impact-driven rock breaking that generate far less vibration and should be used for the removal of hard rock in areas where the minimum is safe working distances cannot be achieved.

If rock breakers are proposed to be used, it is recommended that vibration monitoring is conducted to ensure that safe vibration levels are not exceeded. At the point where excavation with rock breakers results in vibration levels exceeding the nominated threshold levels at the site boundary, alternative excavation methodologies must be implemented such as rock grinding and/or sawing.

A guide to safe work distances for typical vibration-generating construction works is given in Table 2 of the *Construction Noise and Vibration Guideline (RMS, 2016)*.

Table 9. Reproduced in part from Table 2 of the RMS construction noise and vibration guide

Plant item	Rating / Description	Minimum working distance	
		Cosmetic damage (BS7385)	Human response (Assessing vibration: A technical guideline)
Vibratory roller	< 50kN (Typically 1-2 tonnes)	5 m	15 m to 20 m
	< 100kN (Typically 2-4 tonnes)	6 m	20 m
Small hydraulic hammer	300kg – 5 to 12t excavator	2 m	7 m
Medium Hydraulic Hammer	900kg – 12 to 18t excavator	7 m	23 m
Jackhammer	Handheld	1 m (nominal)	2 m

7.3 NOISE AND VIBRATION CONTROLS

The NSW Department of Environment, Climate Change and Water (DECCW) recognise that there is a need to balance the existing noise amenity of residents along with the necessity to continue growth within the region. The fundamental principle involved in the development and success of each noise policy is maintaining open and free channels of communication between developers and residents alike.

Construction noise policies are implemented to limit noise exposure for premises surrounding construction sites. Noise controls and mitigation strategies must be reasonable and feasible and applied on a case-by-case basis to ensure the best possible outcome for all parties involved.

In urban residential areas, it is often the case that a construction site will share a boundary with another residential property. Due to proximity, construction noise levels will generally exceed any adopted criterion. For this particular development, which lies in an industrial area far from the closest residence, construction noise levels will most likely not exceed the Noise Affected Level of the ICNG.

Minimising the impact of noise from construction sites to surrounding land uses can be achieved through treatment of the noise sources themselves, treating noise along its propagation path and/or by consulting with the community and scheduling noise-intensive works during less noise-sensitive times of the day. Consideration needs to be given to each source in identifying the most practical and efficient noise controls where treatment is necessary.

Table C3 in AS2436-2010 states the relevant effects of various types of noise control measures typically employed on construction sites.

Table 10. AS2436-2010 Table C3 – Relative effectiveness of various forms of noise control	
Control by	**Nominal noise reduction possible, in total A-weighted sound pressure level L_{pA} [dB]**
Distance	Approximately 6 for each doubling of distance
Screening	Normally 5 to 10, maximum 15
Enclosure	Normally 15 to 25, maximum 50
Silencing	Normally 5 to 10, maximum 20

7.3.1 General control measures

The following general noise and vibration control measures are recommended:

- Construction works are to occur during standard hours only as follows:
    - Monday to Friday from 7 am to 6 pm
    - Saturday 8 am to 1 pm
    - No work on Sundays and public holidays
- Use appropriately sized plant and equipment and ensure that the equipment is operated in a manner that reduces noise emissions such as turning off equipment when not in use.
- Trucks removing material from the site should not be left to idle at any time whilst on-site and as being filled.
- Plant and equipment with broadband reversing alarms should be used in lieu of tonal reversing alarms.
- Ensure that all plant and equipment is appropriately maintained such that it remains in good working order.
- Avoid 'clustering' of plant and equipment in localised areas.
- The minimum work distances as tabled within this report should be observed at all times, especially regarding vibration damage guidelines.
- Where breaking of bedrock is required, rock sawing or grinding is recommended along the eastern, western and southern site boundary where the advised minimum safe working

distances cannot be achieved. Rock breaking must be conducted outside of the safe working distances and should use a hydraulic pointed 'cone' type hammer attachment in place of a flat 'block' type hammer.

- Extended periods of continuous vibration-generating work should be avoided to limit the potential for dynamic magnification due to resonance in neighbouring buildings/structures.

7.3.2 Additional control measures

Should substantiated complaints arise during construction works that cannot be managed through work schedules, the following noise controls may be considered:

- Providing respite periods that are agreed upon through consultation with site management and the community.
- Exhaust silencers could be considered for motorised plant and equipment such as excavators.
- Continuous vibration monitoring is advised along the south site boundary during excavation to ensure vibration levels do not reach a point where the structural integrity of surrounding buildings is compromised.

  The monitors are to provide real-time feedback in the form of visual and audible alarms to site management and equipment operators regarding the level of vibration being generated by certain work activities. Vibration monitors with a two-stage alarm system should be used and provisionally set as per the below guidelines, being the limiting structural damage guidelines within DIN4150. Site-specific threshold levels may be determined by conducting a series of attended vibration surveys to derive a suitable transfer function for vibration propagation.

  Stage 1: Provisional vibration alarm – vibration threshold level set at 4 mm/s Peak Particle Velocity (PPV)

  Stage 2: Stop-work alarm level - vibration threshold level set at 5 mm/s Peak Particle Velocity (PPV)

  Should vibration levels trigger the Stage 1 alarm, the equipment operators are to proceed with caution, ensuring that all care is taken to minimise unnecessary vibration during works. Should the Stage 2 alarm be triggered, the offending equipment and site activity must cease

immediately and not recommence until further investigation is carried out by an acoustical or geotechnical engineer. Any recommendations made by the consulting engineer concerning vibration control must be implemented before work recommences.

7.4 COMPLAINTS HANDLING

A site-specific complaint handling procedure must be established, implemented, and managed on the construction site by a suitable complaint handling representative (representative to be determined by Project/Site Management). As a guide, the following procedure should be followed and actioned:

Contact information

1. Distribute via letterbox drops and publish on the site notice board the contact information (Name/24-hour contact phone number/Email) for the Complaint Handling Representative.

Receiving complaints

2. Establish a Complaint Register that is to be managed by the Complaint Handling Representative. The register should include as a minimum:
    a. Date and time of the complaint,
    b. The person receiving a complaint,
    c. Complainant contact information,
    d. Site contact to who the complaint was referred for action,
    e. Description of the complaint,
    f. Action to be taken,
    g. The proposed time frame for action to be implemented.

Responding to a complaint

3. Receipt of a complaint should be acknowledged by the Complaint Handling Representative with the complainant as soon as practicable upon receiving the complaint, preferably within the first hour of receiving the complaint and no later than 24 hours after receiving the complaint.
4. The response must include a follow-up to discuss in detail the nature of the complaint so that a suitable investigation of the complaint may be undertaken. During the follow-up consultation with the complainant, the verification process and scheduled completion of the verification process is to be advised.

Verifying a complaint

5. In the event of receiving a noise or vibration complaint, action must be taken to verify the complaint as to its merit concerning the associated development approval conditions. For a noise and/or vibration complaint, this will involve commissioning a noise and/or vibration audit of the offending work/s. The process to engage a suitable noise/vibration consultant to investigate site works must be initiated immediately after responding to the complainant.

Remediation

6. Where a complaint is verified by the consultant, the recommended rectification measures must be implemented and re-evaluated to ensure that the issue is effectively resolved such that the works are conducted under the development approval conditions.

Periodic review of the complaints handling procedure

7. The complaints handling procedure is to be periodically reviewed to maintain its effective delivery. Where the complaints handling procedure is amended/updated, the local community must be notified via letterbox drops and notifications posted on the site notice board.

8.0 CONCLUSION

Koikas Acoustics was requested to prepare an acoustical report for the proposed materials recovery facility at 132-144 Warren Road, Smithfield NSW. The assessment considers potential noise impacts to surrounding premises from the existing and proposed materials recovery facility.

Acoustic planning levels have been referenced from current EPA and other relevant acoustic planning guidelines and requirements.

To conduct the assessment and formulate reliable conclusions, reference is made to the information and drawings provided by MRA Consulting as detailed in Section 2.0. Furthermore, noise measurements were required to quantify the prevailing ambient background noise level.

Our assessment concludes the following concerning the assessed components of noise:

1. Operational noise assessment of the materials recycling facility operational noise impact on surrounding premises was found to achieve the project noise trigger levels, pending the implementation of additional noise mitigation measures as detailed in Section 6.4.
2. Construction noise and vibration management plan have been provided. Construction noise levels are anticipated to have no or minimal impact on the most noise-affected residences, and construction vibration levels may be managed pending recommendations outlined in Sections 6.2 and 6.3.

In our professional opinion, there is sufficient scope within the proposed development and design to achieve the applied acoustic planning guidelines.

APPENDIX A

APPENDIX A

APPENDIX A

Horsley Park, New South Wales
June 2021 Daily Weather Observations

Australian Government
Bureau of Meteorology

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9am						3pm					
		Min	Max				Dirn	Spd	Time	Temp	RH	Cld	Dirn	Spd	MSLP	Temp	RH	Cld	Dirn	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	eighths		km/h	hPa	°C	%	eighths		km/h	hPa
1	Tu	4.4	18.8	0			WSW	9	08:41	8.0	96			Calm		16.1	54		N	4	
2	We	5.7	21.3	0			N	11	13:01	10.8	79		WNW	4		20.8	38		NE	2	
3	Th	7.4	13.3	0			WNW	9	09:07	10.8	90			Calm		12.2	99			Calm	
4	Fr	6.5	19.2	12.0			SW	35	11:33	13.2	86		WSW	7		16.6	51		W	9	
5	Sa	5.7	16.7	0			SW	19	09:19	10.2	74		WSW	9		16.0	42		NE	4	
6	Su	3.0	19.4				WSW	22	10:05	11.7	64		WSW	7		19.2	37		WSW	2	
7	Mo	4.0	18.6	0			NW	13	22:02	8.9	93			Calm		18.2	53		N	6	
8	Tu	8.8	18.4	0			N	33	13:52	12.5	63		N	9		17.2	49		NNE	9	
9	We	7.1	14.8	3.8			NW	35	14:39	9.5	87		NW	2		12.8	48		NW	17	
10	Th	2.5	8.9	0.2			NE	20	12:08	5.7	95		ESE	6		8.3	90		N	9	
11	Fr	1.6	15.5	8.0			NW	19	12:50	6.8	100		NNW	6		14.8	59		WNW	6	
12	Sa	5.8	16.8	0			NW	28	12:13	12.0	68		NNW	7		16.4	43		NNW	11	
13	Su	3.6	17.7	0			W	26	13:19	9.3	76		NNW	6		17.3	42		WSW	9	
14	Mo	5.1	18.1	0			WSW	15	10:56	9.0	81		NW	2		16.5	60		SE	4	
15	Tu	9.0	17.9	0			SE	17	12:35	11.5	86		NW	4		16.7	61			Calm	
16	We	4.7	18.8	0			WSW	31	23:40	8.1	100		NNW	2		16.9	58		NW	2	
17	Th	5.8	16.5	6.4			WNW	41	13:24	13.1	62		NE	6		15.7	44		WNW	17	
18	Fr	5.3	18.4	0			SW	35	18:37	11.9	70		NNE	6		16.7	46		WSW	15	
19	Sa	9.9	15.3	2.4			SSW	56	14:36	13.9	52		SW	20		15.1	62		SSW	26	
20	Su	10.8	15.2	0			SSW	37	02:16	12.7	67		SW	13		12.3	89		SSW	11	
21	Mo	10.2	16.6	4.2			SW	22	08:12	12.2	77		SSW	13		13.9	85			Calm	
22	Tu	7.0	18.2	1.0			SW	13	05:31	11.6	83		SW	6		15.8	71			Calm	
23	We	6.7	17.2	0			N	20	15:14	9.3	100			Calm		16.6	63		N	9	
24	Th	9.3	21.5	0			NNW	52	13:13	15.4	69		N	9		20.2	52		NNW	17	
25	Fr	8.5	18.5	1.2			WNW	39	13:40	14.1	67		NNW	6		18.0	40		WNW	17	
26	Sa	5.0	17.8	0			WSW	30	16:18	11.8	73		N	2		16.1	43		W	9	
27	Su	3.0	18.4	0			SW	24	21:21	9.2	82		N	2		17.9	32		SW	4	
28	Mo	7.4	16.1	0			SW	22	03:17	10.8	72		WSW	9		15.6	61		SE	11	
29	Tu	8.5	15.6	0			SW	20	03:58	10.2	86		W	4		14.8	81		SSW	6	
30	We	8.8	19.0	2.2			NW	13	14:04	12.0	100		WNW	4		17.0	67		N	4	
Statistics for June 2021																					
	Mean	6.4	17.3							10.9	79			5		16.1	57			8	
	Lowest	1.6	8.9							5.7	52			Calm		8.3	32			Calm	
	Highest	10.8	21.5	12.0			SSW	56		15.4	100		SW	20		20.8	99		SSW	26	
	Total			41.4																	

Observations were drawn from Horsley Park Equestrian Centre AWS {station 067119}

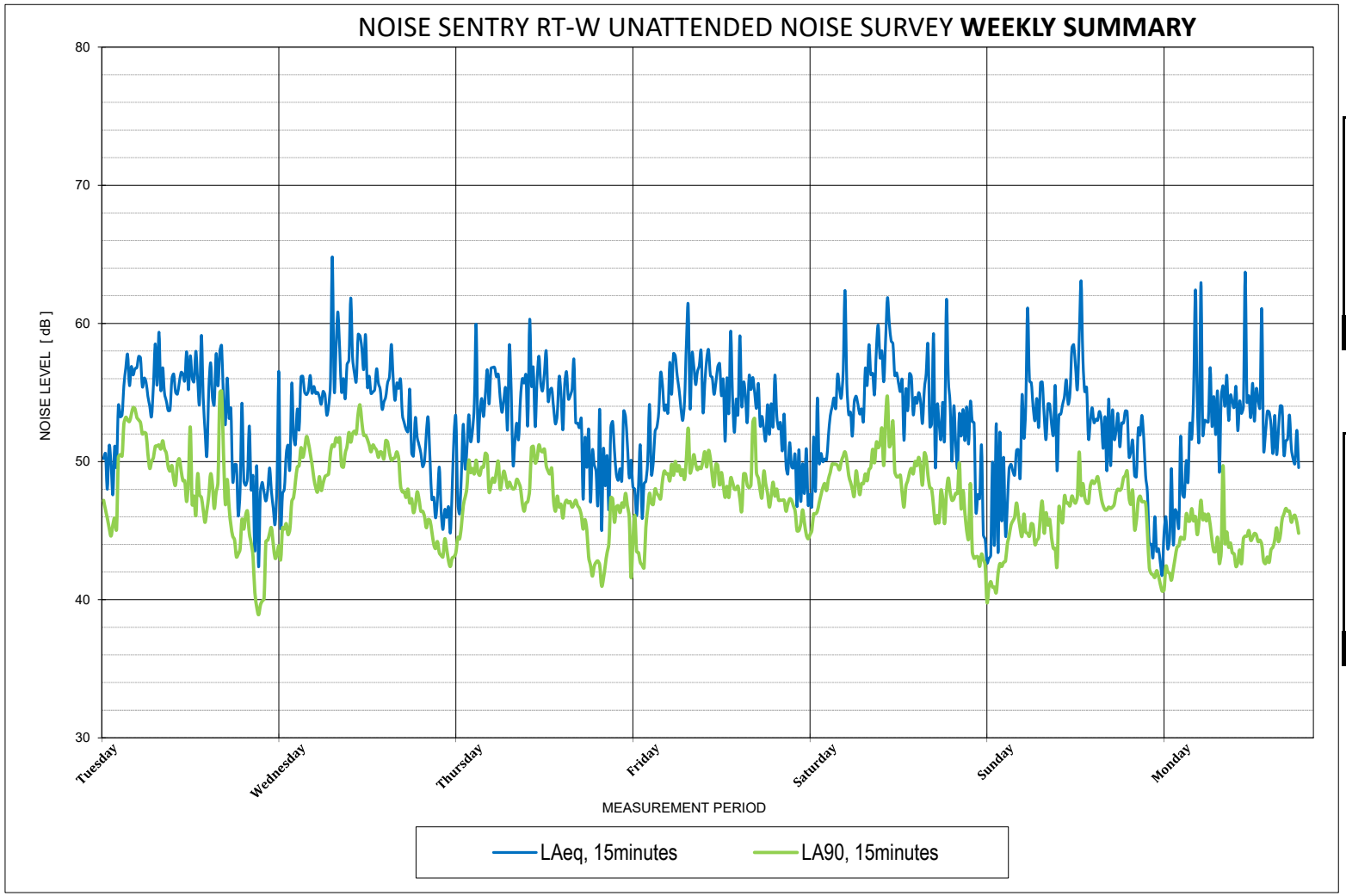
IDCJDW2062.202106 Prepared at 13:00 UTC on 11 May 2022

APPENDIX B

APPENDIX B

APPENDIX B

WEEKLY SUMMARY **LOGGER LOCATION:** 120-122 Warren Road, Smithfield **PERIOD:** 8th to the 14th June 2021



SUMMARY OF AMBIENT NOISE LEVELS

	LA90 Daytime	*LA90* Evening	*LA90* Night-time
Day 1	47	44	44
Day 2	49	47	40
Day 3	47	44	43
Day 4	48	47	42
Day 5	48	46	45
Day 6	44	47	41
Day 7	43	44	42
RBL	**47**	**46**	**42**

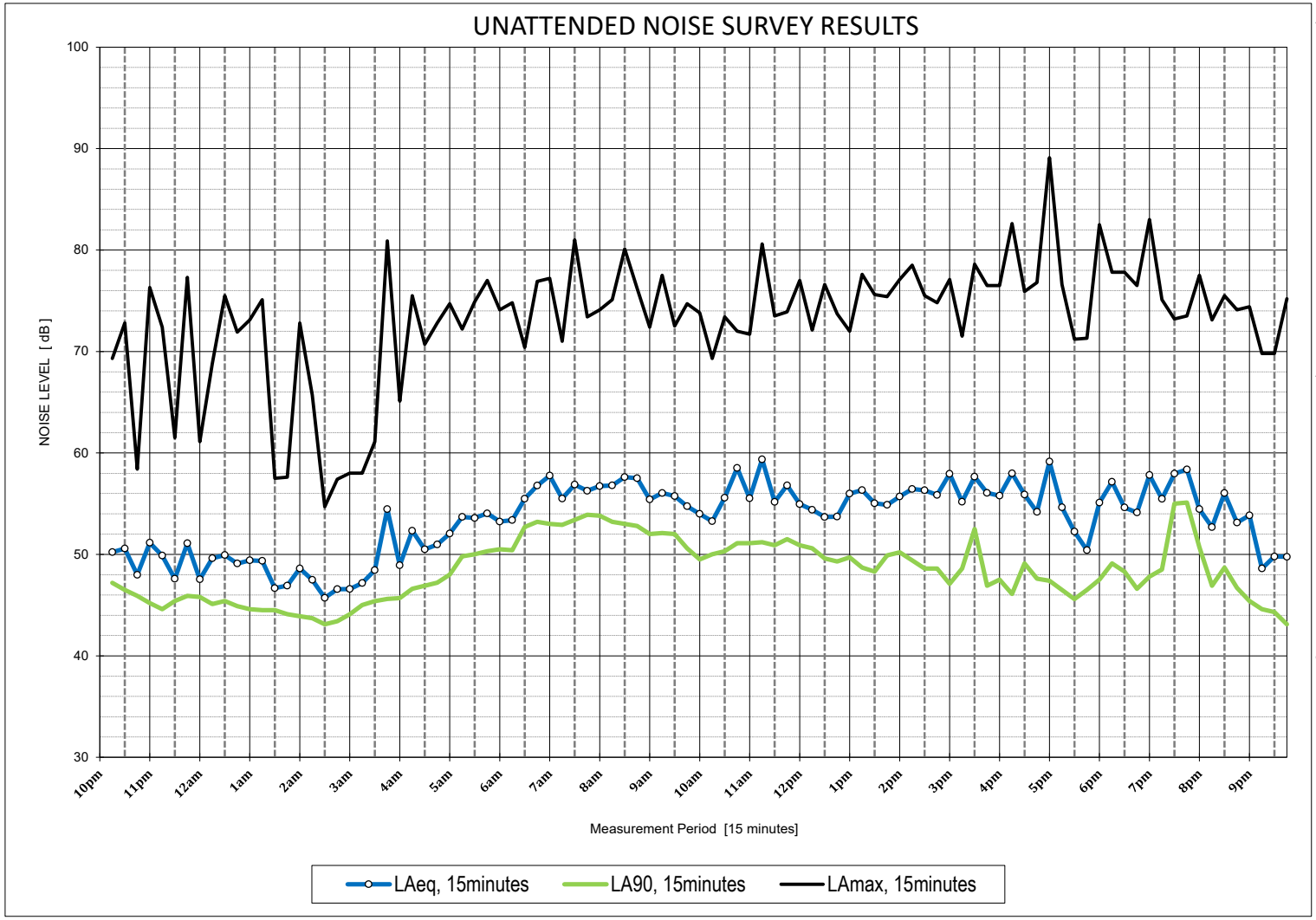
	LAeq Daytime	*LAeq* Evening	*LAeq* Night-time
Day 1	56	55	51
Day 2	57	55	51
Day 3	55	54	51
Day 4	56	55	50
Day 5	57	55	52
Day 6	56	53	52
Day 7	56	52	49
Average	**56**	**54**	**51**

SUMMARY OF TRAFFIC & MISC. NOISE LEVELS

LAeq 15 hrs	0700-2200	56	dB
LAeq 9 hrs	2200-0700	51	dB
Max LAeq 1 hr	0700-2200	58	dB
Max LAeq 1 hr	2200-0700	53	dB

* *Sundays and Public Holidays the hours change to*

DAY 1 **LOGGER LOCATION:** 120-122 Warren Road, Smithfield **DATE:** Tuesday, 8 June 2021



AMBIENT BACKGROUND NOISE METRICS

Descriptor	Period	Level	Units
LA90 Daytime	0700-1800	47	dB
LA90 Evening	1800-2200	44	dB
LA90 Night-time	2200-0700	44	dB

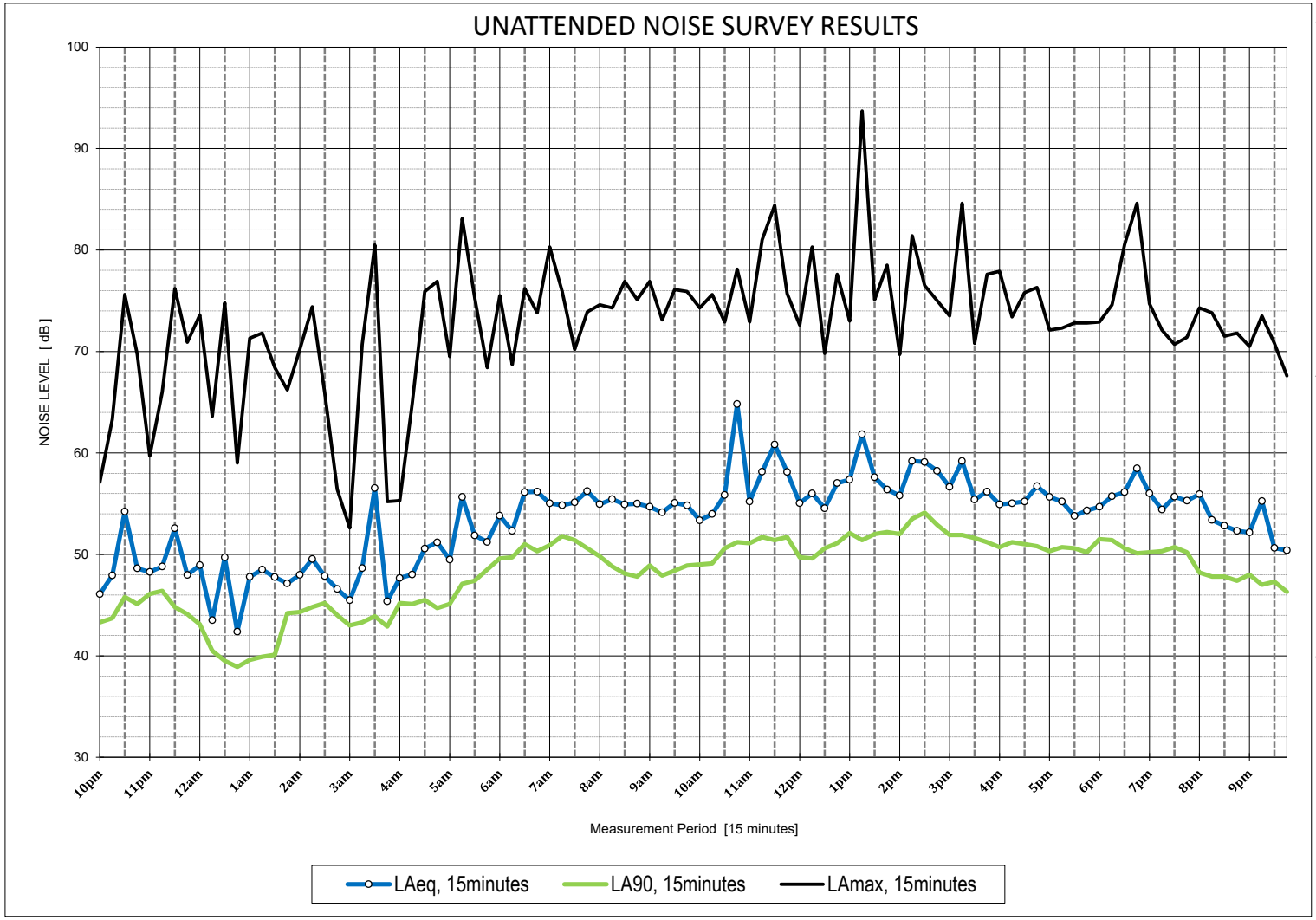
AMBIENT NOISE METRICS

LAeq Daytime	0700-1800	56	dB
LAeq Evening	1800-2200	55	dB
LAeq Night-time	2200-0700	51	dB

TRAFFIC & MISC. NOISE METRICS

LAeq 15 hours	0700-2200	56	dB
LAeq 9 hours	2200-0700	51	dB
Max LAeq 1 hour	0700-2200	57	dB
Max LAeq 1 hour	2200-0700	54	dB

DAY 2 **LOGGER LOCATION:** 120-122 Warren Road, Smithfield **DATE:** Wednesday, 9 June 2021



AMBIENT BACKGROUND NOISE METRICS

Descriptor	Period	Level	Units
LA90 Daytime	0700-1800	49	dB
LA90 Evening	1800-2200	47	dB
LA90 Night-time	2200-0700	40	dB

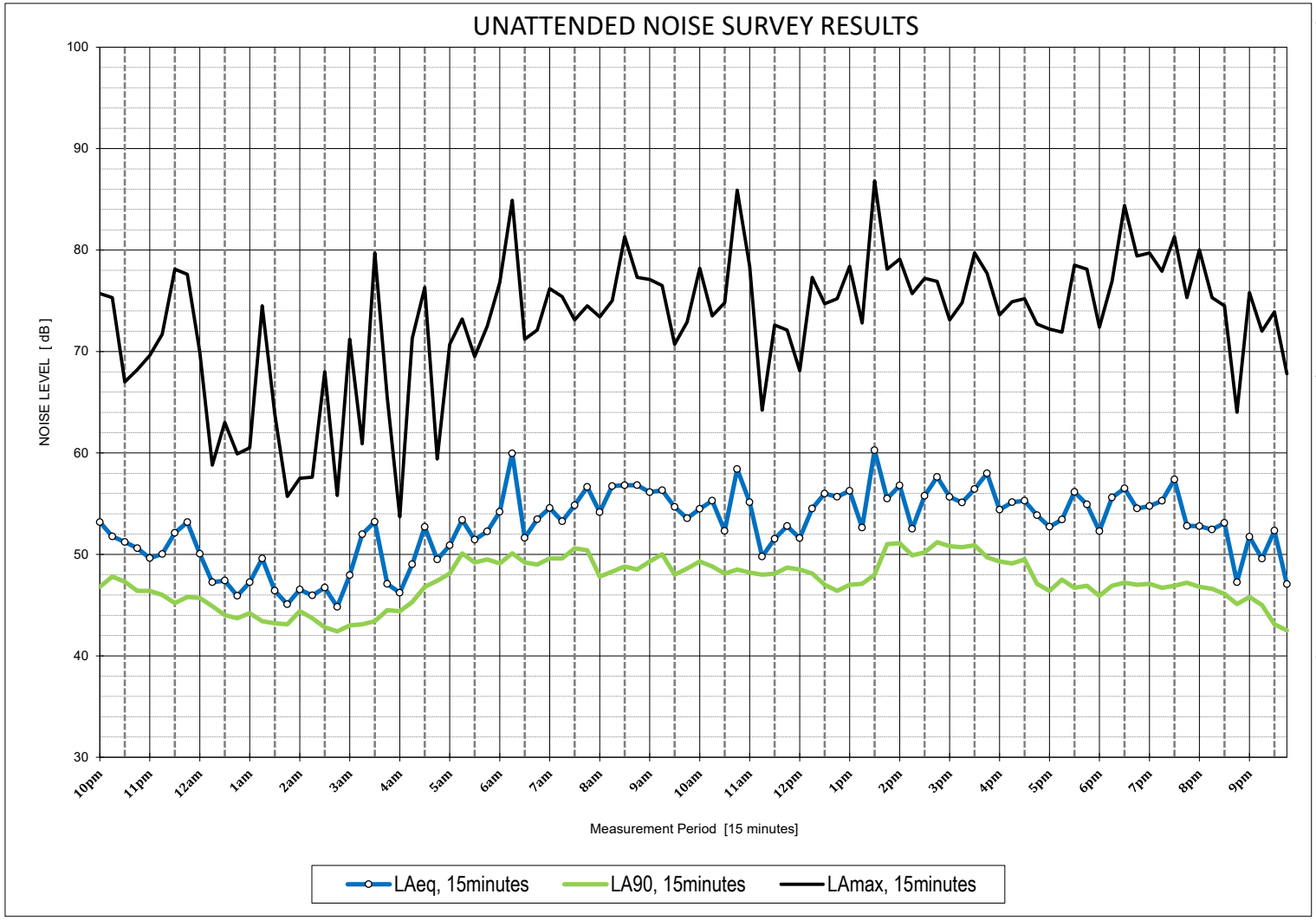
AMBIENT NOISE METRICS

LAeq Daytime	0700-1800	57	dB
LAeq Evening	1800-2200	55	dB
LAeq Night-time	2200-0700	51	dB

TRAFFIC & MISC. NOISE METRICS

LAeq 15 hours	0700-2200	57	dB
LAeq 9 hours	2200-0700	51	dB
Max LAeq 1 hour	0700-2200	59	dB
Max LAeq 1 hour	2200-0700	53	dB

DAY 3 **LOGGER LOCATION:** 120-122 Warren Road, Smithfield **DATE:** Thursday, 10 June 2021



AMBIENT BACKGROUND NOISE METRICS

Descriptor	Period	Level	Units
LA90 Daytime	0700-1800	47	dB
LA90 Evening	1800-2200	44	dB
LA90 Night-time	2200-0700	43	dB

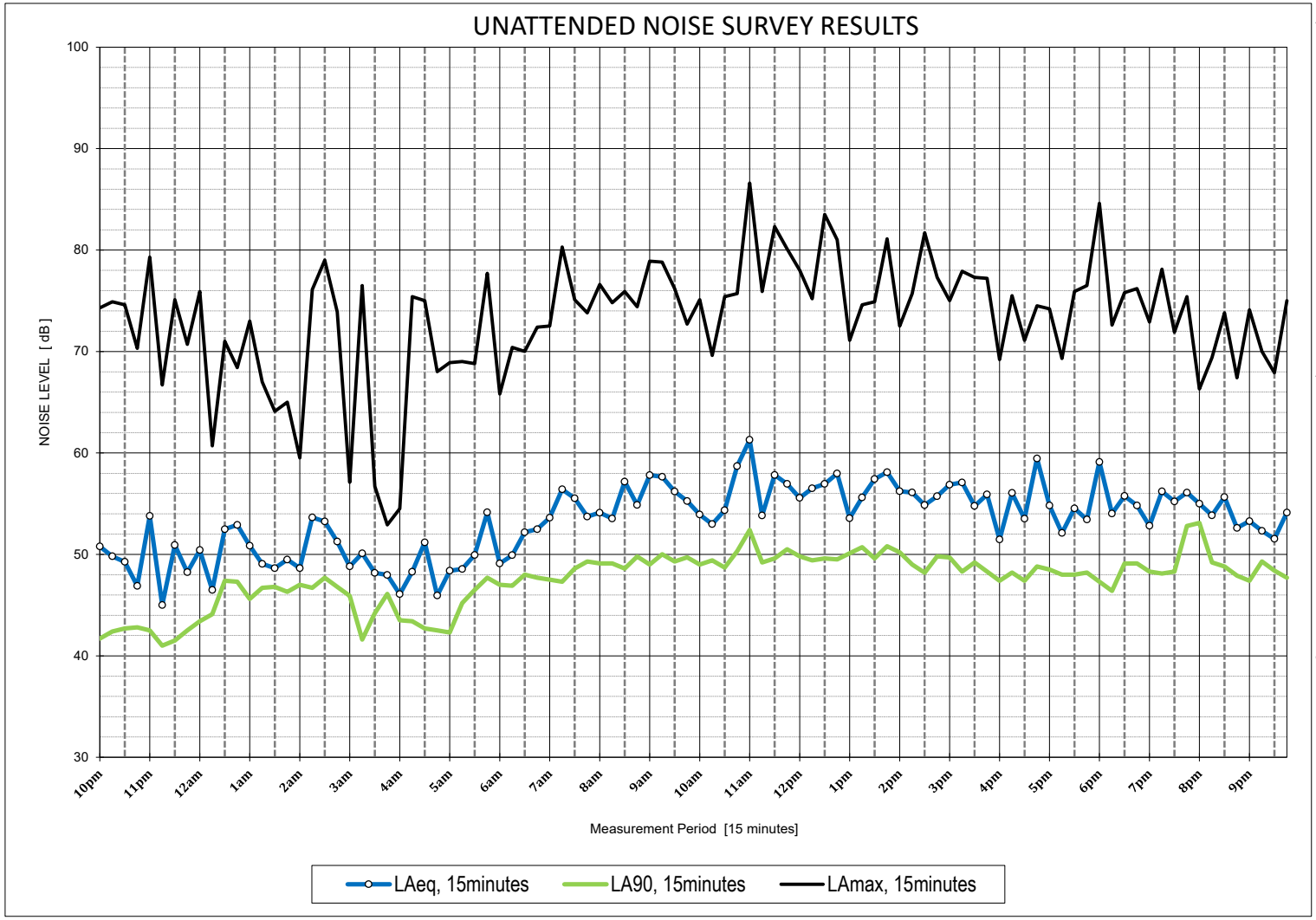
AMBIENT NOISE METRICS

LAeq Daytime	0700-1800	55	dB
LAeq Evening	1800-2200	54	dB
LAeq Night-time	2200-0700	51	dB

TRAFFIC & MISC. NOISE METRICS

LAeq 15 hours	0700-2200	55	dB
LAeq 9 hours	2200-0700	51	dB
Max LAeq 1 hour	0700-2200	56	dB
Max LAeq 1 hour	2200-0700	53	dB

DAY 4 **LOGGER LOCATION:** 120-122 Warren Road, Smithfield **DATE:** Friday, 11 June 2021



AMBIENT BACKGROUND NOISE METRICS

Descriptor	Period	Level	Units
LA90 Daytime	0700-1800	48	dB
LA90 Evening	1800-2200	47	dB
LA90 Night-time	2200-0700	42	dB

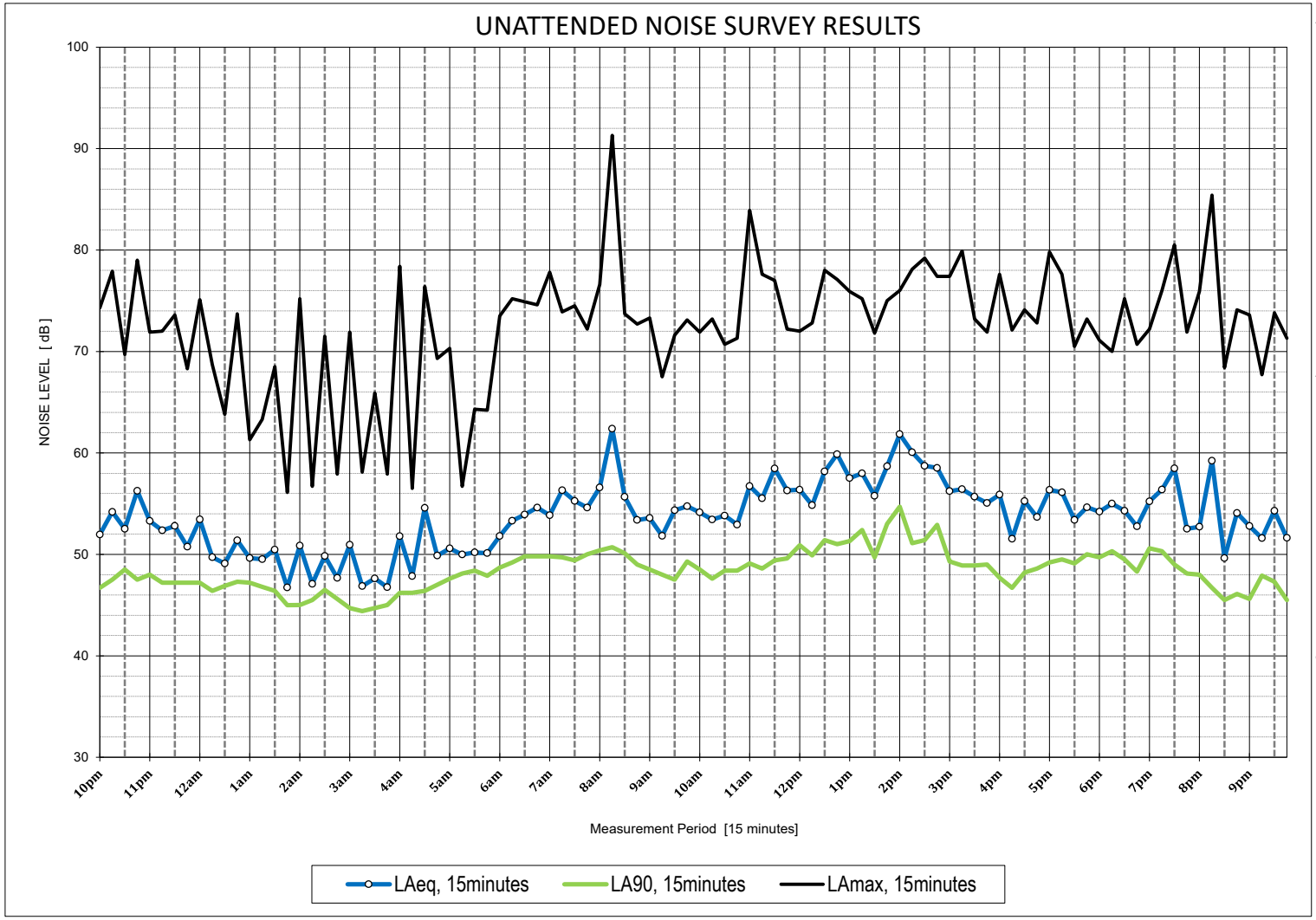
AMBIENT NOISE METRICS

LAeq Daytime	0700-1800	56	dB
LAeq Evening	1800-2200	55	dB
LAeq Night-time	2200-0700	50	dB

TRAFFIC & MISC. NOISE METRICS

LAeq 15 hours	0700-2200	56	dB
LAeq 9 hours	2200-0700	50	dB
Max LAeq 1 hour	0700-2200	57	dB
Max LAeq 1 hour	2200-0700	52	dB

DAY 5 **LOGGER LOCATION:** 120-122 Warren Road, Smithfield **DATE:** Saturday, 12 June 2021



AMBIENT BACKGROUND NOISE METRICS

Descriptor	Period	Level	Units
LA90 Daytime	0700-1800	48	dB
LA90 Evening	1800-2200	46	dB
LA90 Night-time	2200-0700	45	dB

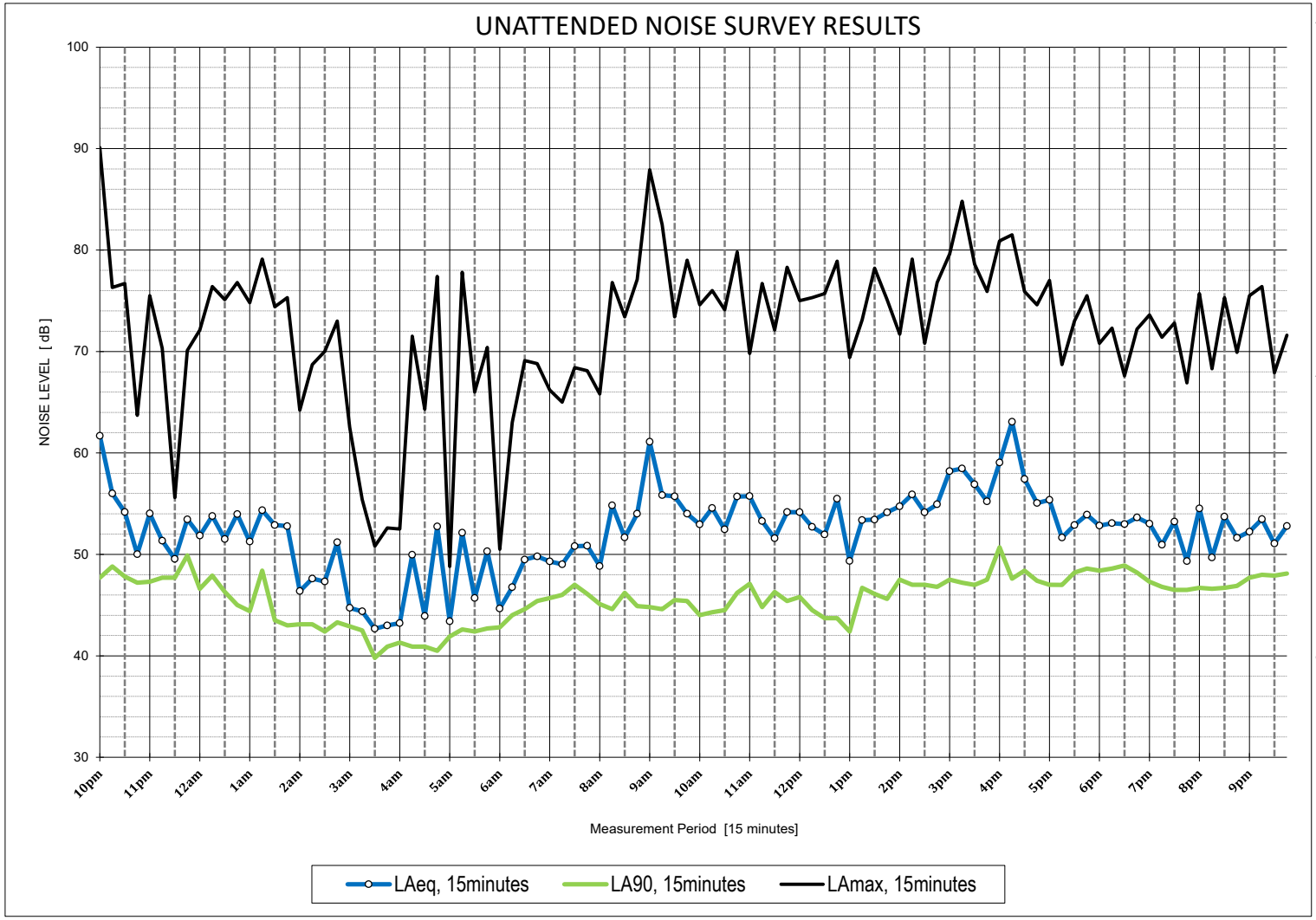
AMBIENT NOISE METRICS

LAeq Daytime	0700-1800	57	dB
LAeq Evening	1800-2200	55	dB
LAeq Night-time	2200-0700	52	dB

TRAFFIC & MISC. NOISE METRICS

LAeq 15 hours	0700-2200	56	dB
LAeq 9 hours	2200-0700	52	dB
Max LAeq 1 hour	0700-2200	58	dB
Max LAeq 1 hour	2200-0700	54	dB

DAY 6 **LOGGER LOCATION:** 120-122 Warren Road, Smithfield **DATE:** Sunday, 13 June 2021



AMBIENT BACKGROUND NOISE METRICS

Descriptor	Period	Level	Units
LA90 Daytime	0800-1800	44	dB
LA90 Evening	1800-2200	47	dB
LA90 Night-time	2200-0800	41	dB

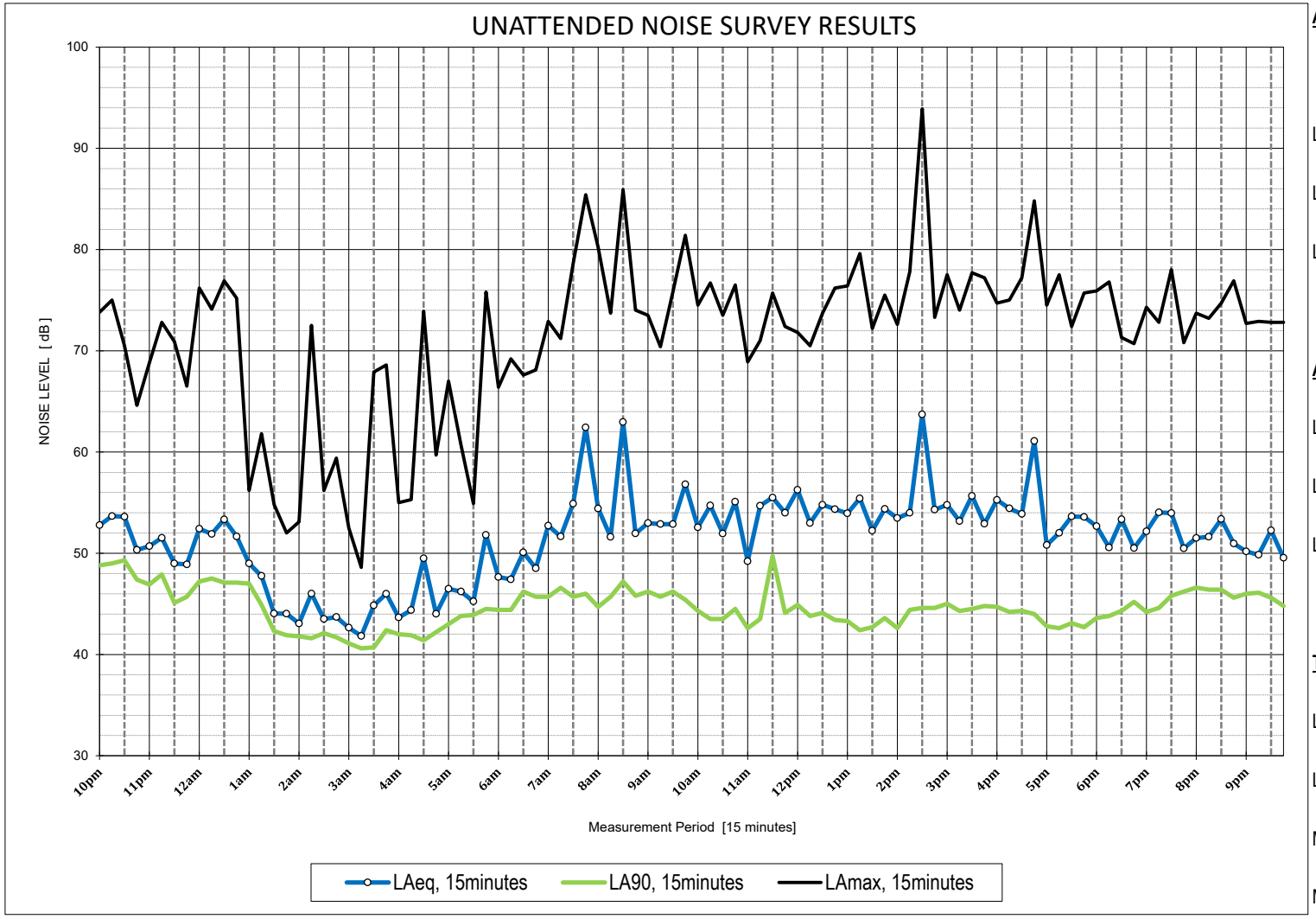
AMBIENT NOISE METRICS

LAeq Daytime	0800-1800	56	dB
LAeq Evening	1800-2200	53	dB
LAeq Night-time	2200-0800	52	dB

TRAFFIC & MISC. NOISE METRICS

LAeq 15 hours	0700-2200	55	dB
LAeq 9 hours	2200-0700	52	dB
Max LAeq 1 hour	0700-2200	58	dB
Max LAeq 1 hour	2200-0700	53	dB

DAY 7 **LOGGER LOCATION:** 120-122 Warren Road, Smithfield **DATE:** Monday, 14 June 2021



AMBIENT BACKGROUND NOISE METRICS

Descriptor	Period	Level	Units
LA90 Daytime	0700-1800	43	dB
LA90 Evening	1800-2200	44	dB
LA90 Night-time	2200-0700	42	dB

AMBIENT NOISE METRICS

LAeq Daytime	0700-1800	56	dB
LAeq Evening	1800-2200	52	dB
LAeq Night-time	2200-0700	49	dB

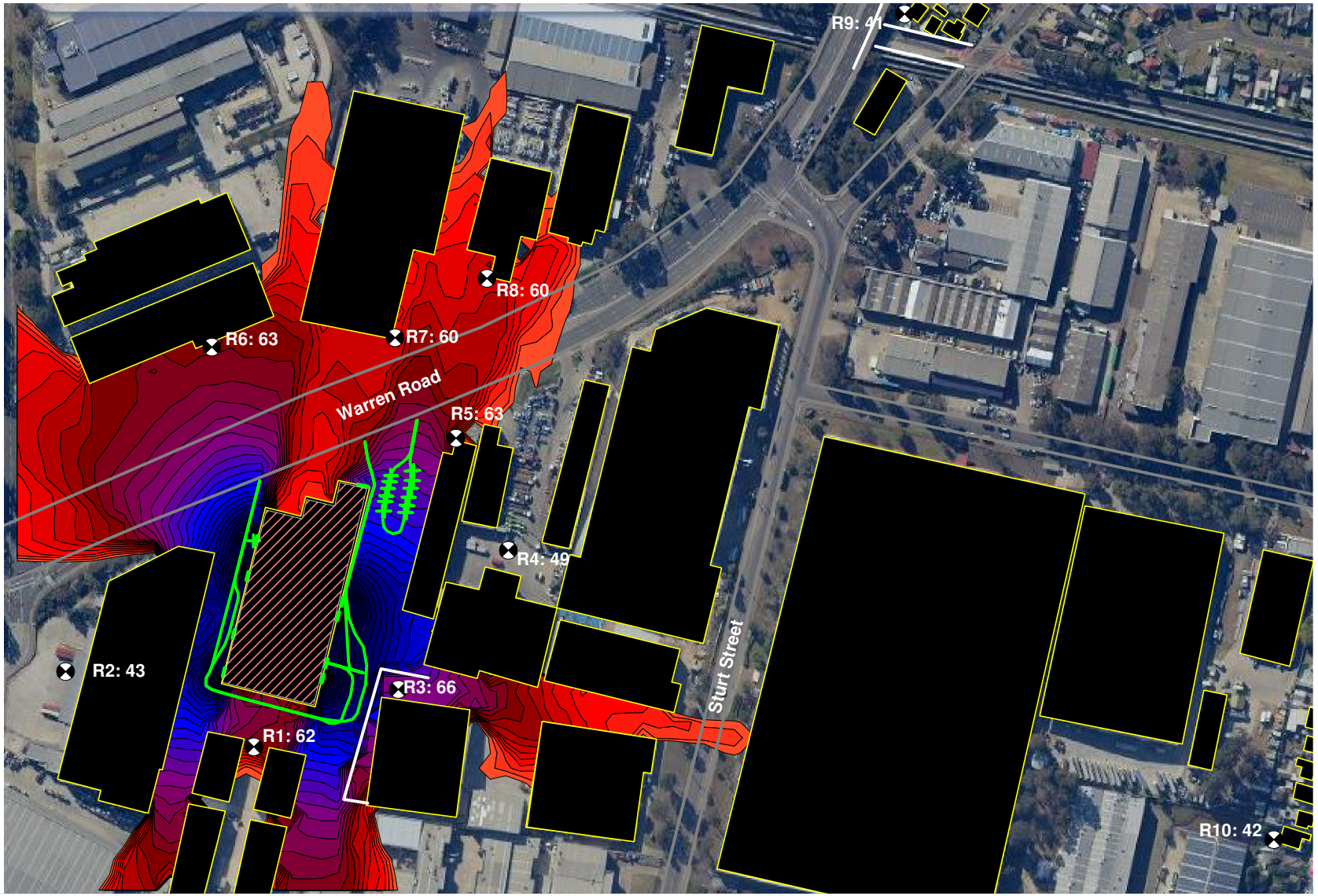
TRAFFIC & MISC. NOISE METRICS

LAeq 15 hours	0700-2200	55	dB
LAeq 9 hours	2200-0700	49	dB
Max LAeq 1 hour	0700-2200	58	dB
Max LAeq 1 hour	2200-0700	52	dB

APPENDIX C

APPENDIX C

APPENDIX C



Scenario 1.1
(Day)
**** NOISE SOURCES ****

~7 commercial or council vehicles moving on-site at 15 km/h
~2 offtake vehicles moving on-site at 15 km/h
~Breakout noise through roller doors (all open) and roof
~28 staff vehicles entering/leaving, noise from car doors and ignitions

Note:
- LAeq,15minutes noise contours are at a height of 1.5 m above the natural ground level

- All receiver points are located 1.5 m above the ground.

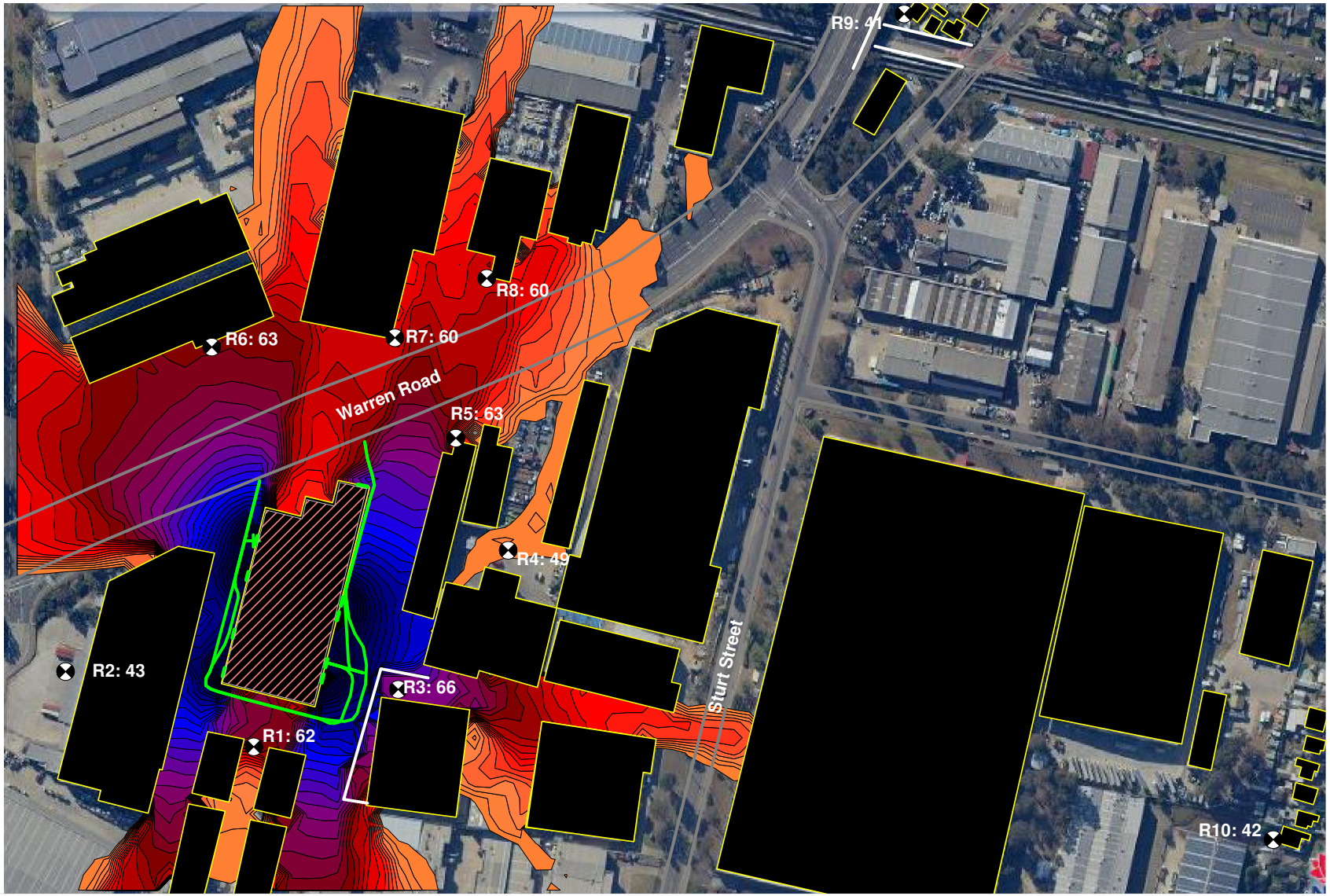
PRINT DATE: 15/06/2022

- Point Source
- Line Source
- Area Source
- vert. Area Source
- Building
- Barrier
- Ground Absorption
- Contour Line
- Receiver
- Calculation Area
- Vertical Grid

- > 50.0 dB
- > 55.0 dB
- > 60.0 dB
- > 65.0 dB
- > 70.0 dB
- > 75.0 dB
- > 80.0 dB

koikas acoustics PTY LTD
CONSULTANTS IN NOISE & VIBRATION

JOB NUMBER: 4595
CLIENT: MRA Consulting
SITE ADDRESS: 132-144 Warren Road, Smithfield
ASSESSED TO: NSW EPA NPfI
LIMITING CRITERIA: Residences: 52 dB(A). Commercial: 63 dB(A). Industrial: 68 dB(A).



Scenario 1.2
(Evening)
**** NOISE SOURCES ****

~1 commercial or council vehicle moving on-site at 15 km/h
~1 offtake vehicle moving on-site at 15 km/h
~Breakout noise through roller doors (all open) and roof

Note:
- LAeq,15minutes noise contours are at a height of 1.5 m above the natural ground level

- All receiver points are located 1.5 m above the ground.

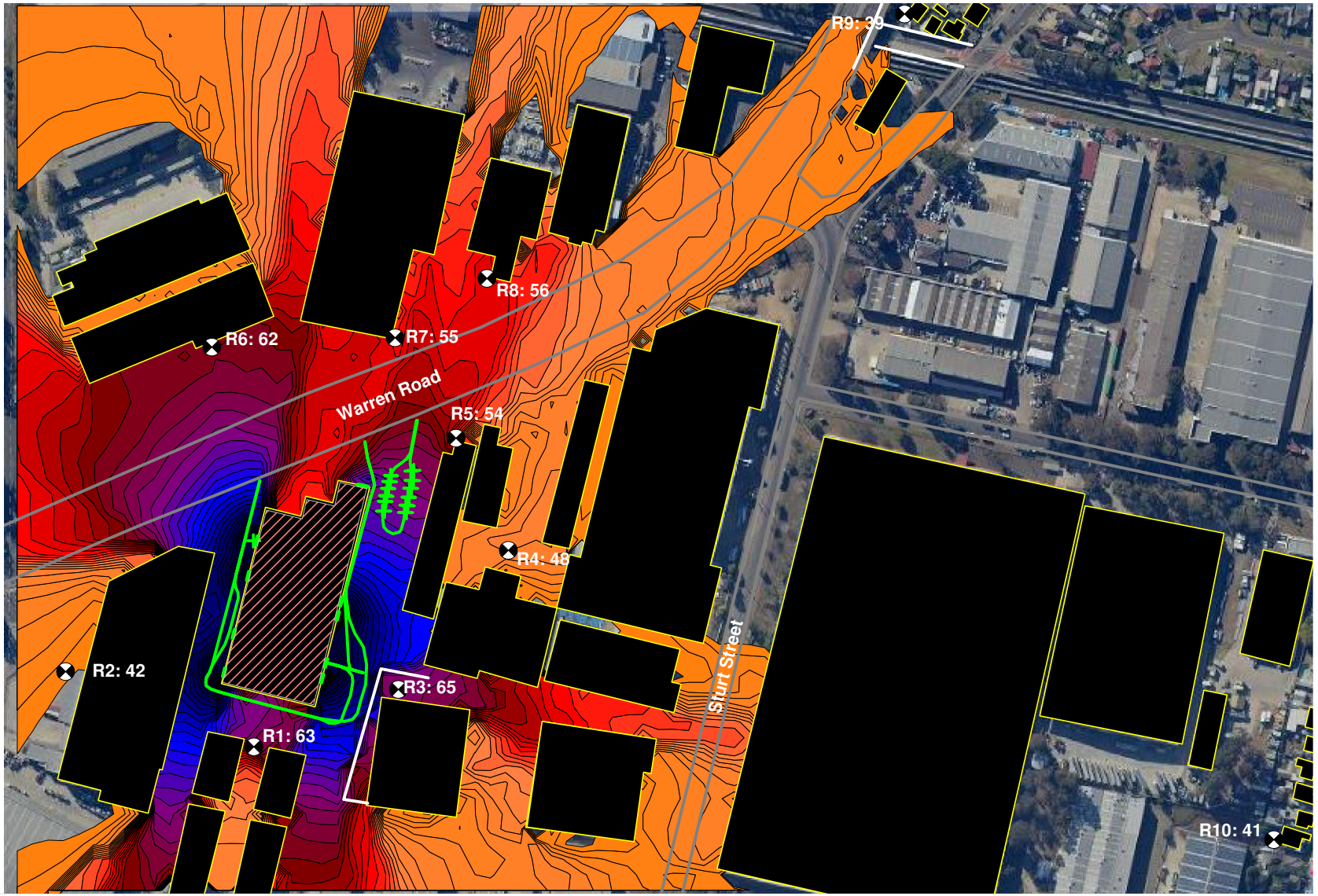
PRINT DATE: 15/06/2022

- Point Source
- Line Source
- Area Source
- vert. Area Source
- Building
- Barrier
- Ground Absorption
- Contour Line
- Receiver
- Calculation Area
- Vertical Grid

- > 40.0 dB
- > 50.0 dB
- > 55.0 dB
- > 60.0 dB
- > 65.0 dB
- > 70.0 dB
- > 75.0 dB
- > 80.0 dB

koikas acoustics PTY LTD
CONSULTANTS IN NOISE & VIBRATION

JOB NUMBER: 4595
CLIENT: MRA Consulting
SITE ADDRESS: 132-144 Warren Road, Smithfield
ASSESSED TO: NSW EPA NPfI
LIMITING CRITERIA: Residences: 48 dB(A). Commercial: 63 dB(A). Industrial: 68 dB(A).



Scenario 1.3
(Night)
**** NOISE SOURCES ****

~5 commercial or council vehicles moving on-site at 15 km/h
~1 offtake vehicle moving on-site at 15 km/h
~Breakout noise through roller doors (A, F, I closed) and roof
~28 staff vehicles entering/leaving, noise from car doors and ignitions

Note:
- LAeq,15minutes noise contours are at a height of 1.5 m above the natural ground level

- All receiver points are located 1.5 m above the ground.

PRINT DATE: 15/06/2022

- Point Source
- Line Source
- Area Source
- vert. Area Source
- Building
- Barrier
- Ground Absorption
- Contour Line
- Receiver
- Calculation Area
- Vertical Grid

- > 40.0 dB
- > 50.0 dB
- > 55.0 dB
- > 60.0 dB
- > 65.0 dB
- > 70.0 dB
- > 75.0 dB
- > 80.0 dB

koikas acoustics PTY LTD
CONSULTANTS IN NOISE & VIBRATION

JOB NUMBER: 4595
CLIENT: MRA Consulting
SITE ADDRESS: 132-144 Warren Road, Smithfield
ASSESSED TO: NSW EPA NPfI
LIMITING CRITERIA: Residences: 42 dB(A). Commercial: 63 dB(A). Industrial: 68 dB(A).