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1 INTRODUCTION

Acoustic Logic Consultancy (ALC) have been engaged to conduct an acoustic assessment of the proposed TIC Group Mattress Recycling Warehouse to be located at 29 Chifley Street, Smithfield.

In this report we have conducted an assessment of noise emissions from the operation of the site at the nearest noise affected receivers.

Noise impacts from the proposed warehouse activities have been assessed against the requirements of the Fairfield City Council DCP and the NSW EPA 'Industrial Noise Policy' and the EPA Guidelines for Sleep Arousal (Application Notes to the Industrial Noise Policy).

This noise assessment is based on the architectural drawings provided by Axis Architectural, project number 161104 and dated 27/03/2017.

2 SITE DESCRIPTION/PROPOSED DEVELOPMENT

The site is located at 29 Chifley Street, Smithfield. The proposed development will be a mattress recycling warehouse operated by TIC Group.

The proposed warehouse will have two loading zones: one on the eastern façade of the warehouse for incoming deliveries, and another on the southern façade of the warehouse for outbound trucks.

An additional ten on-site car parking spaces will be made available, located directly south of the warehouse. All vehicles will access the site using the driveway located to the east of the warehouse, which is accessed via Chifley Street.

The proposed hours of operation for the site will be 6am to 4pm Mondays to Fridays.

The main noise sources associated with the proposed warehouse are as follows:

- Plant used to shred mattresses. All plant used for shredding mattresses will be located within the warehouse. Plant includes the following:
    - Mattress Dissector
    - Metal Shredder
    - Wind Sifter
    - Compressor
    - Dust Extractor
- Noise from forklifts operating both inside and outside the warehouse during the proposed operating hours of the warehouse.
- Noise from truck movements entering and leaving the site.
    - This office has been advised that there will be up to 10 pallet truck deliveries to the warehouse each weekday, between 1pm and 4pm.
    - In addition, there will be up to three outbound truck movements carrying recycled and waste material.
- Noise from cars entering/exiting the site's carpark.

The nearest noise sensitive development to be impacted by the operation of the proposed warehouse are:

- Receiver 1: Residential development located approximately 100m to the south-west of the site;
- Receiver 2: Industrial development located to the immediate west of the site.
- Receiver 3: Industrial development located to the immediate north of the site.
- Receiver 4: Industrial development located east of the site.
- Receiver 5: Industrial development to the south of the site across Chifley Street.

Refer figure 1 for an aerial photograph of the site with measurement locations and noise sensitive receivers.

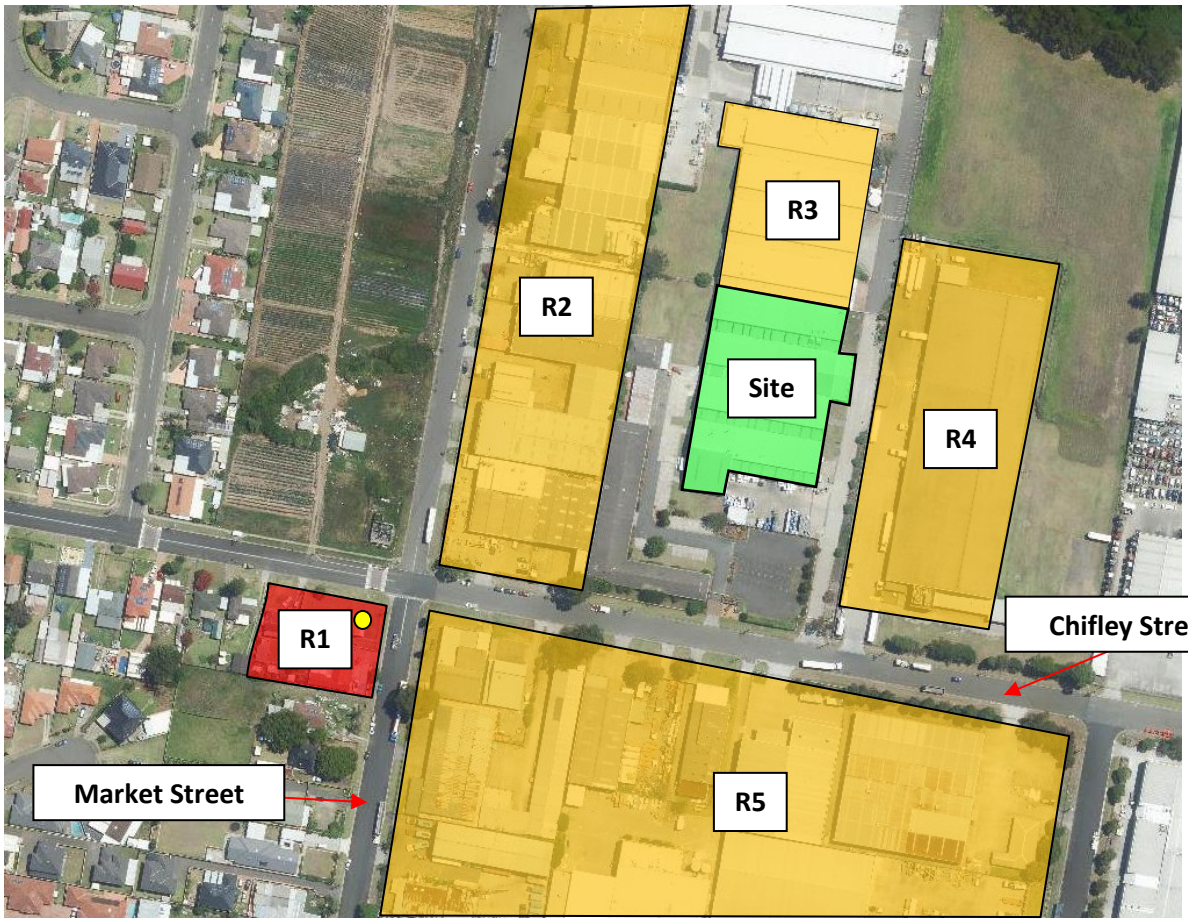


Figure 1: Site Map and Sensitive Receiver Locations

North

Unattended Noise Monitor Location

Site

Residential Receivers

Industrial Receivers

3 EXISTING ACOUSTIC ENVIRONMENT

Environmental noise constantly varies. Accordingly, it is not possible to accurately determine prevailing environmental noise conditions by measuring a single, instantaneous noise level.

To accurately determine the environmental noise a 15-20 minute measurement interval is utilised. Over this period, noise levels are monitored on a continuous basis and statistical and integrating techniques are used to determine noise description parameters.

In analysing environmental noise, three-principle measurement parameters are used, namely L_{10}, L_{90} and L_{eq}.

The L_{10} and L_{90} measurement parameters are statistical levels that represent the average maximum and average minimum noise levels respectively, over the measurement intervals.

The L_{10} parameter is commonly used to measure noise produced by a particular intrusive noise source since it represents the average of the loudest noise levels produced by the source.

Conversely, the L_{90} level (which is commonly referred to as the background noise level) represents the noise level heard in the quieter periods during a measurement interval. The L_{90} parameter is used to set the allowable noise level for new, potentially intrusive noise sources since the disturbance caused by the new source will depend on how audible it is above the pre-existing noise environment, particularly during quiet periods, as represented by the L_{90} level.

The L_{eq} parameter represents the average noise energy during a measurement period. This parameter is derived by integrating the noise levels measured over the 15 minute period. L_{eq} is important in the assessment of environmental noise impact as it closely corresponds with human perception of a changing noise environment; such is the character of environmental noise.

The L_1 parameter represents the noise level exceeded for 1% of a measurement period.

4 NOISE EMISSION CRITERIA

Noise emissions from the operation of the proposed warehouse should be assessed to ensure that the acoustic amenity of nearby land users is not adversely affected.

Primary potential noise sources from the operation of the proposed warehouse are as follows:

- Noise generated by mechanical plant servicing the development.
- Noise from inbound and outbound truck movements from the site.
- Noise from forklifts operating inside and outside the warehouse.
- Noise from internal operations within the warehouse. The primary noise source within the warehouse will be from the mattress recycling plant.
- Noise from vehicles manoeuvring in the carpark located to the south of the warehouse.

The nearest potentially affected noise receivers from the proposed extension are:

- Receiver 1: Residential development located approximately 100m to the south-west of the site;
- Receiver 2: Industrial development located to the immediate west of the site.
- Receiver 3: Industrial development located to the immediate north of the site.
- Receiver 4: Industrial development located east of the site.
- Receiver 5: Industrial development to the south of the site across Chifley Street.

Noise emission criteria will be determined based on the following documents:

- Fairfield Citywide DCP 2013;
- NSW EPA Industrial Noise Policy;
- EPA Guidelines for Sleep Arousal (Application Notes to the Industrial Noise Policy).

4.1 EXISTING BACKGROUND NOISE LEVELS

Existing background noise levels on site were also measured by the unattended noise monitor.

Long term noise monitoring was conducted using an unattended noise monitor installed in the front yard of 78 Market Street, the nearest residential receiver to the proposed development (refer Figure 1 and figure 2 below).

Figure 2: Noise Monitor Location

An Acoustic Research Laboratories noise monitor was used for the long term monitoring, set to record continuously on an A-weighted fast response mode. The monitor was calibrated at the start and end of the monitoring period using a Rion NC-73 calibrator. No significant drift was noted. Noise logging was conducted from the 27th July to the 3rd August 2017. Unattended noise logging data is attached in Appendix 1 below.

The measured background noise levels have been corrected for meteorological conditions (excessive wind and/or rain), as required by section 3.4 of the EPA Industrial Noise Policy. Exceedances of the 5m/s average wind speed limit of the EPA were noted and corrected for in determining the background noise levels. Periods during the long term monitoring affected by adverse weather conditions, have been highlighted in the logging data in Appendix 1.

Measured rating background noise levels are presented in the table below.

Table 2 – Rating Background Noise Levels

Location	Time Period	Rating Background Noise Levels dB(A)L_{90}
Residential Receiver 1 to the South-West of the Site (see figure 1)	Day (7am-6pm)	46*
	Early Morning (6am-7am)	46*

*Background noise levels have been adjusted by -2.5dB(A) to account for façade reflection.

4.2 NOISE EMISSION OBJECTIVES

4.2.1 Fairfield Citywide Council Development Control Plan (DCP) 2013

The Fairfield Citywide DCP 2013 does not have any quantitative noise emission criteria for industrial development. Given this, noise emissions from the proposed development will be assessed with reference to the NSW EPA Industrial Noise Policy.

4.2.2 NSW EPA - Industrial Noise Policy

The Industrial Noise Policy provides guidelines for assessing noise impacts from industrial developments. The recommended assessment objectives vary depending on the potentially affected receivers, the time of day, and the type of noise source. The Industrial Noise Policy has two requirements which both have to be complied with, namely an amenity criterion and an intrusiveness criterion.

4.2.2.1 Intrusiveness Criterion

The guideline is intended to limit the audibility of noise emissions at residential receivers and requires that noise emissions measured using the L_{eq} descriptor do not exceed the background noise level by more than 5dB(A). Where applicable, the intrusive noise level should be penalised (increased) to account for any annoying characteristics such as tonality.

Background noise levels adopted are presented in Section 4.1. Noise emissions from the site should comply with the noise levels presented below when measured at nearby property boundary.

Table 1 – INP Intrusiveness Criteria

Time of day	Background Noise Level dB(A) L_{90}	Intrusiveness Criteria (Background+5dB(A)) dB(A)L_{eq}
Day (7am-6pm)	46	51
Early Morning (6am-7am)	46	51

4.2.2.2 Amenity Criterion

The guideline is intended to limit the absolute noise level from all noise sources to a level that is consistent with the general environment.

The NSW EPA Industrial noise policy sets out acceptable noise levels for various localities. Table 2.1 on page 16 of the policy indicates 4 categories to distinguish different areas. They are rural, suburban, urban and urban/industrial interface. This site is categorised by suburban receivers.

For the purposes of this condition:

- Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays;
- Evening is defined as the period from 6pm to 10pm.
- Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sunday and public holidays.

Table 2 – INP Amenity Criteria

Type of Receiver	Indicative Noise Amenity Area	Period/Time	Recommended L_{Aeq} Noise Level dB(A) $L_{eq(Period)}$
Nearby Residences	Suburban	Day (7am-6pm)	55
		Evening (6pm-10pm)	45
		Night (10pm-7am)	40
Industrial premises	All	When in use	70

4.2.3 Sleep Arousal Assessment (Peak Noise Events)

Given that the proposed warehouse development will operate during the night time period (10pm to 7am), the site will be assessed for sleep arousal impacts from activities taking place before 7am.

Short duration, intermittent noise events (such as such as truck/car doors closing or engine starts) are typically assessed with reference to additional acoustic criteria specifically to assess potential sleep disturbance.

Potential impacts have been assessed using the recommended procedure in the Application Notes to the EPA Industrial Noise Policy. The procedure is detailed below:

- The sleep arousal criteria "emergence test" states that the L_1 noise level of any specific noise source should not exceed the background noise level (L_{90}) by more than 15 dB(A) outside a resident's bedroom window between the hours of 10pm and 7am. If the noise events are within this, then sleep arousal impacts are unlikely and no further analysis is needed. This is consistent with the Noise Guide for Local Government. The guideline level is set out below.

Table 3 – Sleep Arousal Criteria ("Emergence"/Background+15dB(A) Test)

Location	Time Period	Background Noise Level dB(A)$_{L90}$	Emergence Level dB(A) $L_{1(1min)}$
All Potentially Affected Residential Properties	Night (6am-7am)	46	61

4.2.4 Summarised Noise Emission Criteria

The summarised noise emission criteria are presented in the tables below:

Table 4 – INP Intrusiveness Criteria

Time of day	Background Noise Level dB(A) L_{90}	Intrusiveness Criteria (Background+5dB(A)) dB(A)L_{eq}
Day (7am-6pm)	46	51
Night (6am-7am)	46	51

Table 5 – INP Amenity Criteria

Type of Receiver	Indicative Noise Amenity Area	Period/Time	Recommended L_{Aeq} Noise Level dB(A) $L_{eq(Period)}$
Nearby Residences	Suburban	Day (7am-6pm)	55
		Evening (6pm-10pm)	45
		Night (10pm-7am)	40
Industrial premises	All	When in use	70

Table 6 – Sleep Arousal Criteria ("Emergence"/Background+15dB(A) Test)

Location	Time Period	Background Noise Level dB(A)$_{L90}$	Emergence Level dB(A) $L_{1(1min)}$
All Potentially Affected Residential Properties	Night (6am-7am)	46	61

4.3 ASSESSMENT OF NOISE IMPACTS

This section of the report presents our assessment of noise emissions from the proposed warehouse facility.

Noise emissions from the operation of the site will be assessed against the noise emission criteria outlined in section 4.2.

4.3.1 General Operational Noise

4.3.1.1 Loading Zone (6am-6pm)

This assessment will cover noise emissions from trucks entering/exiting the site using the driveway running off from Chifley Street (along the eastern façade of the warehouse). This assessment covers the noise from the proposed pallet truck deliveries and waste pickup trucks entering and exiting the site.

This assessment is based on the following assumptions:

- Sound power level (SWL) of 100dB(A) for a truck travelling forward at 10 km/hr;
- SWL of 105dB(A) for a truck reversing at 10 km/hr (based on measurements conducted by this office);
- Peak traffic volume of one truck entering and exiting the southern façade loading zone, and one truck entering and exiting the eastern façade loading zone within a 15 minute period.

This office has been advised that truck movements within the site will not commence until 6am.

4.3.1.2 Forklifts Operating Externally

Measurements conducted by this office of indicate that noise emissions from the forklifts are as follows:

- Sound power level (SWL) of 95dB(A) for a truck travelling forward at 10 km/hr;
- SWL of 100dB(A) for a forklift reversing at 10 km/hr.

It is assumed that on average, there will be one forklift in the southern façade external loading zone at any given time, and that half of the time will be spent with the forklift travelling forward and the other half of the time with the forklift in reverse.

It is assumed that forklifts movements in the southern external loading zone will not commence prior to 6am.

4.3.1.3 Internal Activities Within Proposed Warehouse

The primary noise source within the proposed warehouse will be from equipment used to shred mattresses as discussed in section 2. As part of this assessment, noise measurements have been conducted by this office of the mattress shredding plant at the existing TIC warehouse in Victoria.

Measurements were conducted on the 2nd of September, 2016. Measurements were conducted using a Norsonics Type 140 precision sound level analyser, set to A-weighted fast response. The precision sound level analyser was calibrated before and after the measurements using a Norsonics 1251 sound level calibrator. No significant drift was recorded.

Details of the measured equipment and noise levels are presented in the table below. Measurements were conducted during typical day of operation at the facility.

Table 7 – Measured Noise Levels at Victoria TIC Warehouse

Equipment	Measured Noise level dB(A)L_{eq}
Wind Sifter at 2m	94
Metal Shredder at 2m	83
Mattress Dissector at 3m	93
Compressor at 1m	84
Dust Extractor at 4m	81
Spatially Averaged Internal Noise Level within Warehouse	85

For the purposes of this assessment, noise emissions from the proposed warehouse will be based on a spatially averaged internal noise level of 85dB(A)L_{eq} within the warehouse, as was measured at the Victorian TIC warehouse.

This office has been advised that the equipment proposed to be used in the proposed development will be identical to the equipment used in the Victorian TIC warehouse.

4.3.1.4 Car Park

The primary noise source will be vehicle movements through the carpark area, with the car engine (sound power level of 84dB(A)L_{eq}), being the dominant noise source. Measurements have been conducted by this office of vehicles moving at 10km/hr at a distance of 5.5m.

This assessment assumes a peak traffic flow of 10 vehicles into the carpark within a one hour period. This assessment will cover car movements into the site commencing at 6am.

4.3.2 Predicted Noise Levels with Section 5.1 Recommendations Implemented

The predicted noise levels form all noise generating activities at the nearest receivers are based on the assumptions listed above. Predictions factor in losses due to distance attenuation and barrier effects. Furthermore, predictions assume that the recommendations presented in section 5.1 have been implemented.

Noise emissions will be assessed against the more stringent of the Intrusiveness and Amenity criteria of the Industrial Noise Policy (see section 4.2).

The predicted noise levels with all of the recommendations in section 5.1 implemented are presented in the table below.

Table 8 – Predicted Noise Levels At Nearest Receivers with Section 5.1 Recommendations Implemented

Receiver Location	Noise Source	Predicted Noise Level dB(A)$L_{eq\ 15min}$	Noise Level Criteria dB(A)$L_{eq\ 15min}$	Complies
Receiver 1: Residential Receiver to South-West	Internal Warehouse Noise	31	Day – 51 Night - 40	Yes
	Truck Movements to Loading Zones	32		Yes
	Forklifts Externally	36		Yes
	Cars Entering Site	< 20		Yes
	Cumulative Noise Impact	38		Yes
Receiver 2: Industrial Receiver to the West	Internal Warehouse Noise	51	70	Yes
	Truck Movements to Loading Zones	50		Yes
	Forklifts Externally	54		Yes
	Cars Entering Site	26		Yes
	Cumulative Noise Impact	57		Yes
Receiver 3: Industrial Receiver to the North	Internal Warehouse Noise	51	70	Yes
	Truck Movements to Loading Zones	52		Yes
	Forklifts Externally	30		Yes
	Cars Entering Site	24		Yes
	Cumulative Noise Impact	54		Yes

Table 8 (continued) – Predicted Noise Levels At Nearest Receivers with Section 5.1 Recommendations Implemented

Receiver Location	Noise Source	Predicted Noise Level dB(A)$L_{eq\ 15min}$	Noise Level Criteria dB(A)$L_{eq\ 15min}$	Complies
Receiver 4: Industrial Receiver to the East	Internal Warehouse Noise	55	70	Yes
	Truck Movements to Loading Zones	54		Yes
	Forklifts Externally	56		Yes
	Cars Entering Site	35		Yes
	Cumulative Noise Impact	60		Yes
Receiver 5: Industrial Receiver to the South	Internal Warehouse Noise	47	70	Yes
	Truck Movements to Loading Zones	49		Yes
	Forklifts Externally	50		Yes
	Cars Entering Site	25		Yes
	Cumulative Noise Impact	54		Yes

Predicted noise levels reveal that the cumulative noise impact from all activities on site will be compliant at all nearby receivers provided the recommendations in section 5.1 are implemented.

4.3.3 Predicted Noise Levels without Section 5.1 Recommendations Implemented

As an additional exercise, predicted noise levels will be presented at the nearest receivers in the absence of the recommendations presented in section 5.1, namely:

- Highlight glass louvres are left open/unrepaired; and
- Trucks leave their engines on during idling (assumed idle with engine running during period between entering and exiting the loading zones).

The predicted noise levels are presented in the table below.

Table 9 – Predicted Noise Levels At Nearest Receivers without Section 5.1 Recommendations

Receiver Location	Noise Source	Predicted Noise Level dB(A)$L_{eq\ 15min}$	Noise Level Criteria dB(A)$L_{eq\ 15min}$	Complies
Receiver 1: Residential Receiver to South-West	Internal Warehouse Noise	34	Day – 51 Night - 40	Yes
	Truck Movements to Loading Zones	37		Yes
	Forklifts Externally	36		Yes
	Cars Entering Site	< 20		Yes
	Cumulative Noise Impact	41		Marginal Exceedance of Night Time Criteria
Receiver 2: Industrial Receiver to the West	Internal Warehouse Noise	52	70	Yes
	Truck Movements to Loading Zones	56		Yes
	Forklifts Externally	54		Yes
	Cars Entering Site	26		Yes
	Cumulative Noise Impact	59		Yes
Receiver 3: Industrial Receiver to the North	Internal Warehouse Noise	51	70	Yes
	Truck Movements to Loading Zones	57		Yes
	Forklifts Externally	30		Yes
	Cars Entering Site	24		Yes
	Cumulative Noise Impact	58		Yes

Table 9 (continued) – Predicted Noise Levels At Nearest Receivers without Section 5.1 Recommendations

Receiver Location	Noise Source	Predicted Noise Level dB(A)$L_{eq\ 15min}$	Noise Level Criteria dB(A)$L_{eq\ 15min}$	Complies
Receiver 4: Industrial Receiver to the East	Internal Warehouse Noise	56	70	Yes
	Truck Movements to Loading Zones	59		Yes
	Forklifts Externally	56		Yes
	Cars Entering Site	35		Yes
	Cumulative Noise Impact	62		Yes
Receiver 5: Industrial Receiver to the South	Internal Warehouse Noise	50	70	Yes
	Truck Movements to Loading Zones	53		Yes
	Forklifts Externally	50		Yes
	Cars Entering Site	25		Yes
	Cumulative Noise Impact	56		Yes

4.3.4 Sleep Arousal Assessment (Short Term Peak Noise Events Before 7am)

The following activities are proposed to take place during the 6am-7am night time period:

- Truck movements into and out of the loading zones.
- External forklift movements in the container yard.
- Operation of mattress shredding equipment within the warehouse.
- Cars entering the site's car park.

Given that these activities are proposed to take place during the night time period (10pm-7am), short term peak noise events associated with these activities should be assessed for sleep disturbance.

The noise events that will be covered in the sleep arousal assessment for the period of 6am-7am are as follows:

- Truck engine start-up with sound power level of 100dB(A)L_1 (based on measurements conducted by this office);
- Reversing forklift with sound power level of 105dB(A)L_1 (based on measurements conducted by this office).
- Internal sound pressure level of 93dB(A)L_1 within the warehouse from the operation of the mattress shredding equipment (based on measurements conducted at the existing TIC facility in Victoria).
- Car door closing with sound power level of 90dB(A)L_1 (based on measurements conducted by this office).

4.3.4.1 Predicted Noise Levels

The predicted noise levels at the nearest residential receivers are based on the assumptions outlined in sections 4.3.4. Predictions factor in losses due to distance attenuation and barrier effects. Predictions also assume that the recommendations in section 5.1 have been adopted.

Noise emissions will be assessed against the EPA's Sleep Arousal "Emergence" Criteria as outlined in section 4.2.3.

Table 10 – Predicted Noise Levels At Nearest Residential Receiver (Sleep Arousal)

Receiver Location	Noise Source	Predicted Noise Level dB(A) $L_{1(1min)}$	Noise Level Criteria dB(A) (6am-7am) $L_{1(1min)}$	Complies
Receiver 1: Residential Receiver to the South-West	Truck Engine Start-Up	60	61	Yes
	Reversing Forklift	58	61	Yes
	Internal Warehouse Noise (Primarily Mattress Shredding Plant)	43	61	Yes
	Car Door Closing	31	61	Yes

Predicted noise levels reveal that noise impacts from the site for the period prior to 7am complies with the EPA Industrial Noise Policy's sleep arousal "emergence" criteria.

4.3.5 Noise Emissions from External Mechanical Plant

Mechanical plant items are not typically selected at DA stage.

Detailed review of all external mechanical plant should be undertaken at construction certificate stage (once plant selections and locations are finalised). Acoustic treatments should be determined in order to control plant noise emissions to the levels set out in this section of this report.

All plant can be satisfactorily attenuated to levels complying with noise emission criteria through appropriate location and (if necessary) standard acoustic treatments such as noise screens, enclosures, in-duct treatments (silencers/lined ducting) or similar.

5 RECOMMENDATIONS

5.1 NOISE EMISSIONS CONTROL

In order to ensure ongoing compliance with the noise emission requirements, we make the following recommendations:

- All highlight glass louvres of the warehouse are to be made good and are to remain closed during the operating hours of the facility.
- Truck and forklift movements on the site are not to commence prior to 6am.
- All vehicles (including trucks, forklifts and staff cars) are to switch off their engines during idling to reduce noise impacts on surrounding receivers.
- All mattress shredding plant is not to commence operation prior to 6am.
- All mattress shredding plant is to be well maintained.
- Detailed acoustic review of any proposed new mechanical plant to undertaken at CC stage, once plant selections and locations are finalised.

6 CONCLUSION

This report presents our acoustic assessment of the proposed TIC mattress recycling facility to be located at the 29 Chifley Street, Smithfield.

Noise emission criteria have been determined based on background noise measurements conducted on site and the requirements of the Fairfield Citywide Council DCP 2013, the NSW EPA Industrial Noise Policy and the EPA Guidelines for Sleep Arousal (Application Notes to the Industrial Noise Policy). The resultant criteria are presented in Section 4.2. Noise from any new mechanical plant items associated with the proposed development should comply with these criteria. Detailed design of mechanical plant items should be carried out during the CC stage.

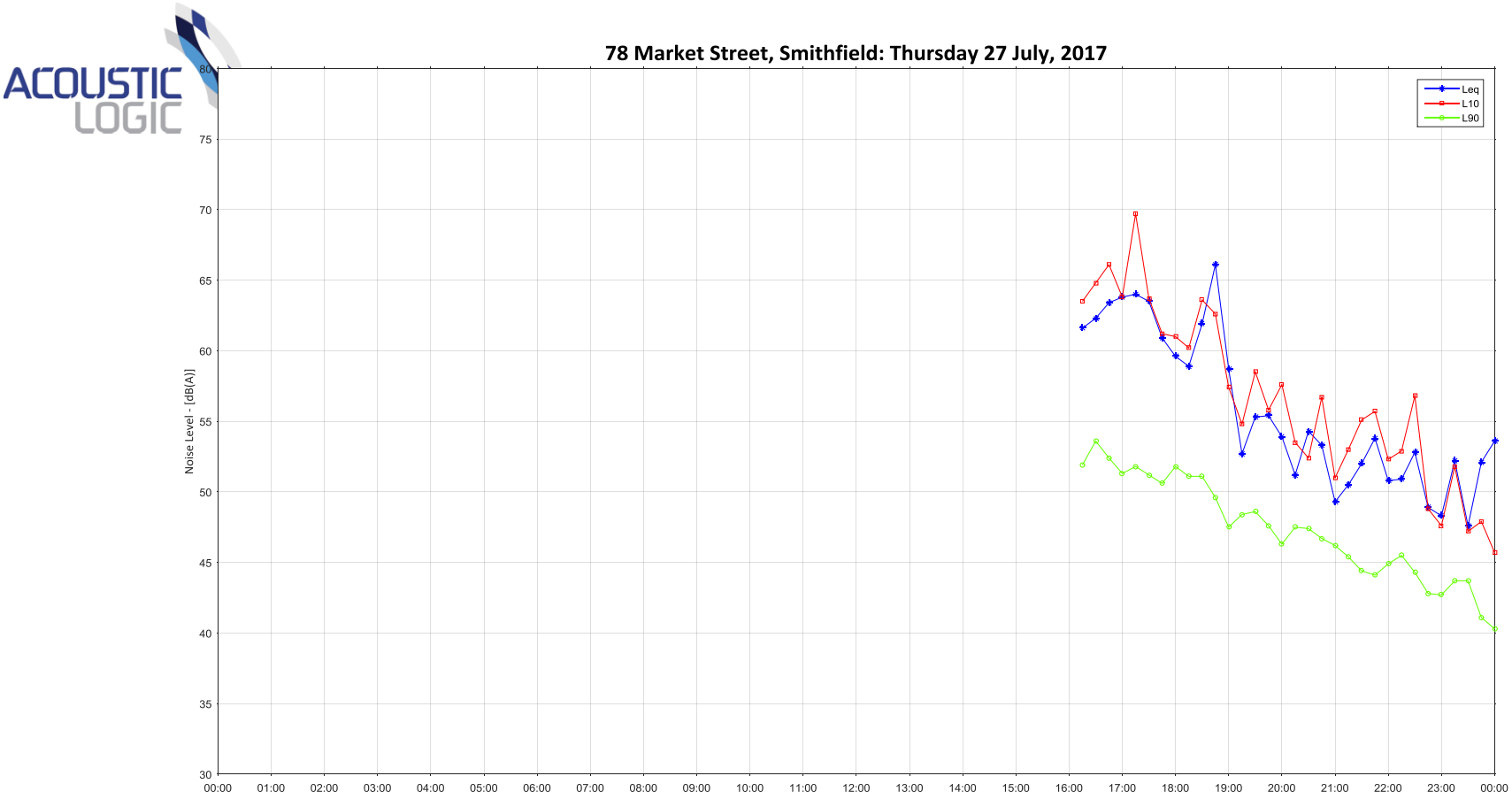
Noise emissions from all activities associated with the proposed warehouse have been assessed at the nearest residential and industrial receivers (refer to section 4.3). The recommended acoustic treatments/management controls have been presented in section 5.1 to ensure no adverse acoustic impacts on the surrounding development.

We trust this information is satisfactory. Please contact us should you have any further queries.

Yours faithfully,

Acoustic Logic Consultancy Pty Ltd
Justin Leong

APPENDIX 1 – UNATTENDED NOISE MONITORING DATA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Leq
L10
L90
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65
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35
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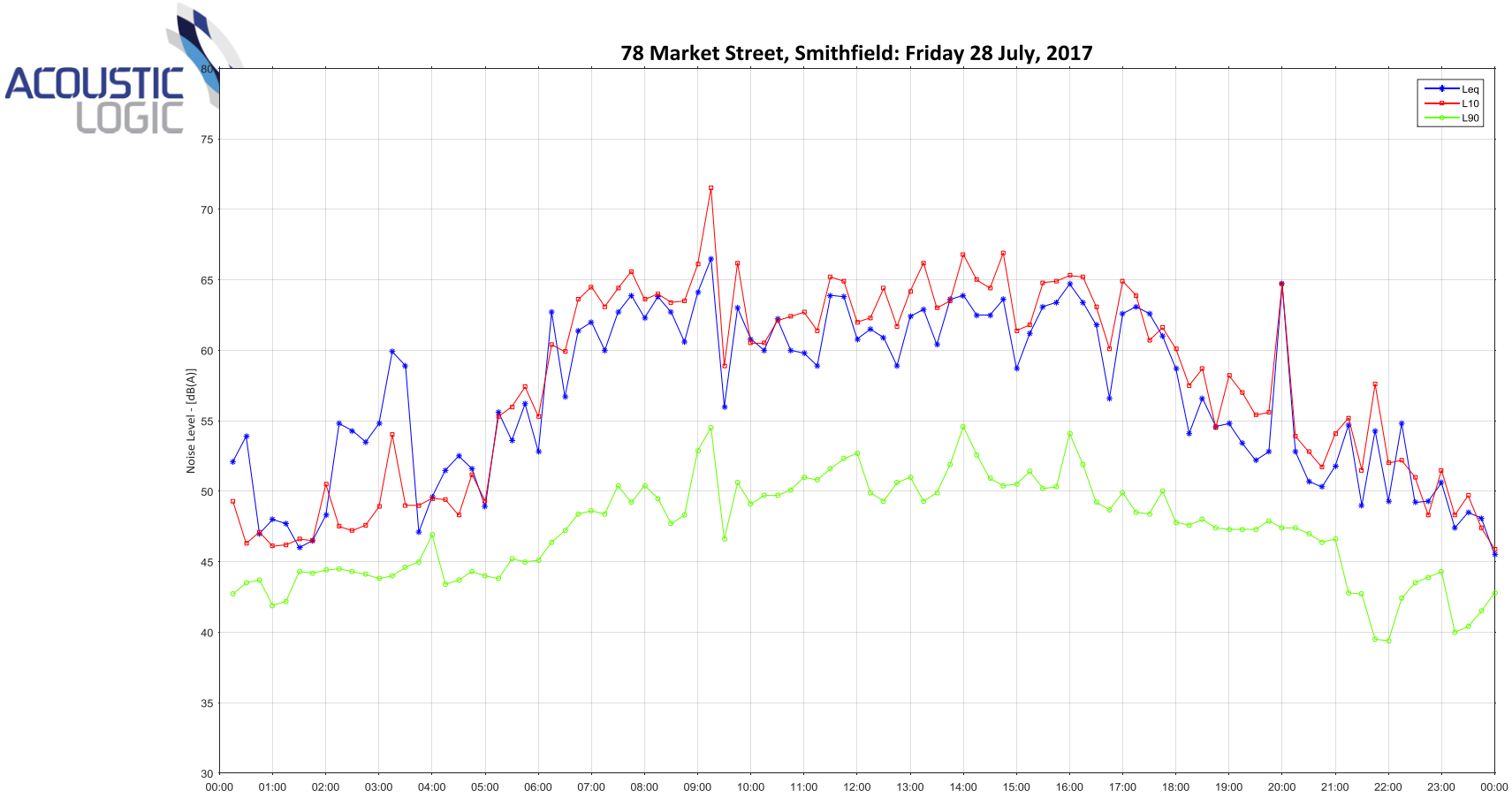
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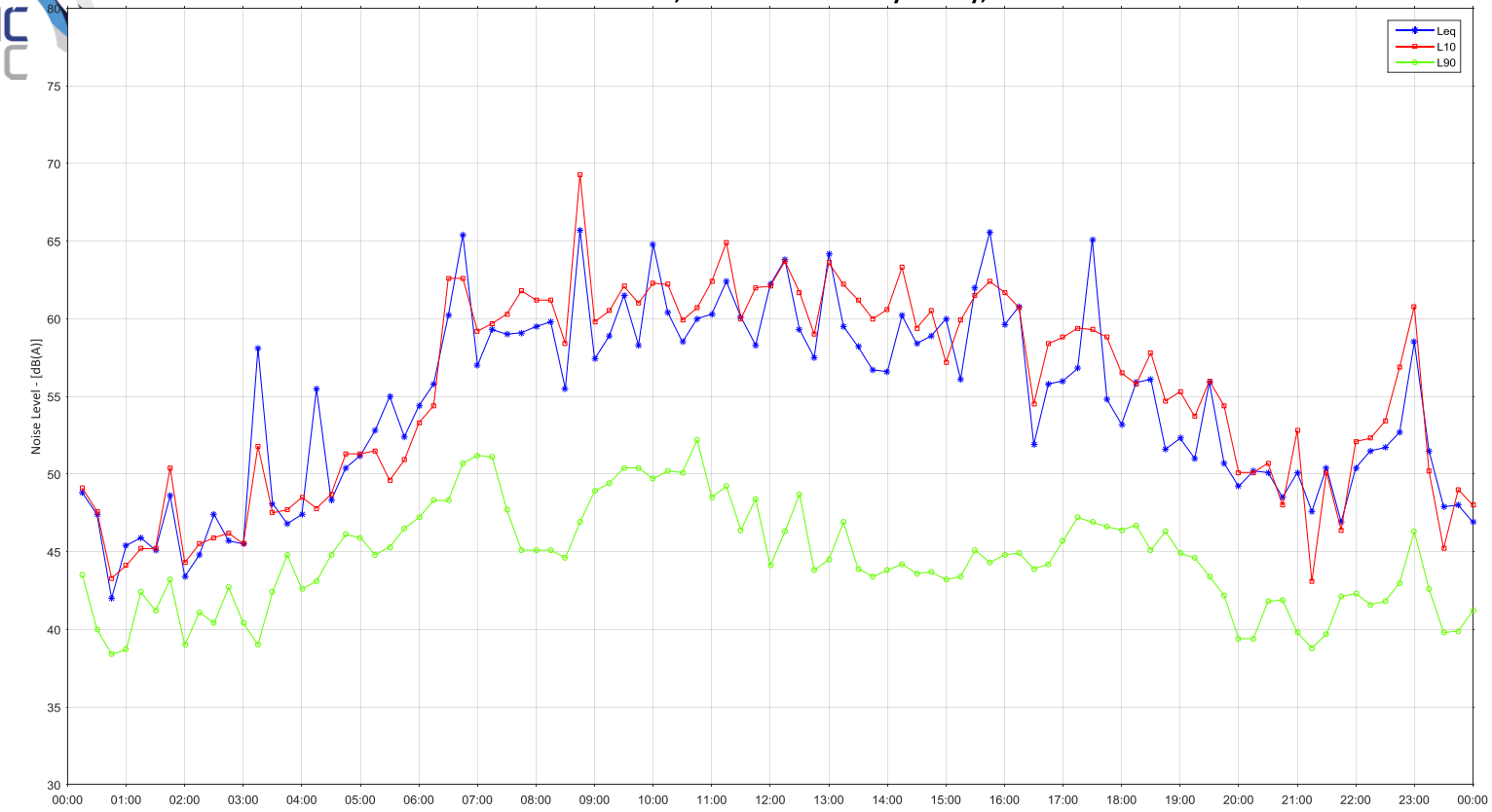
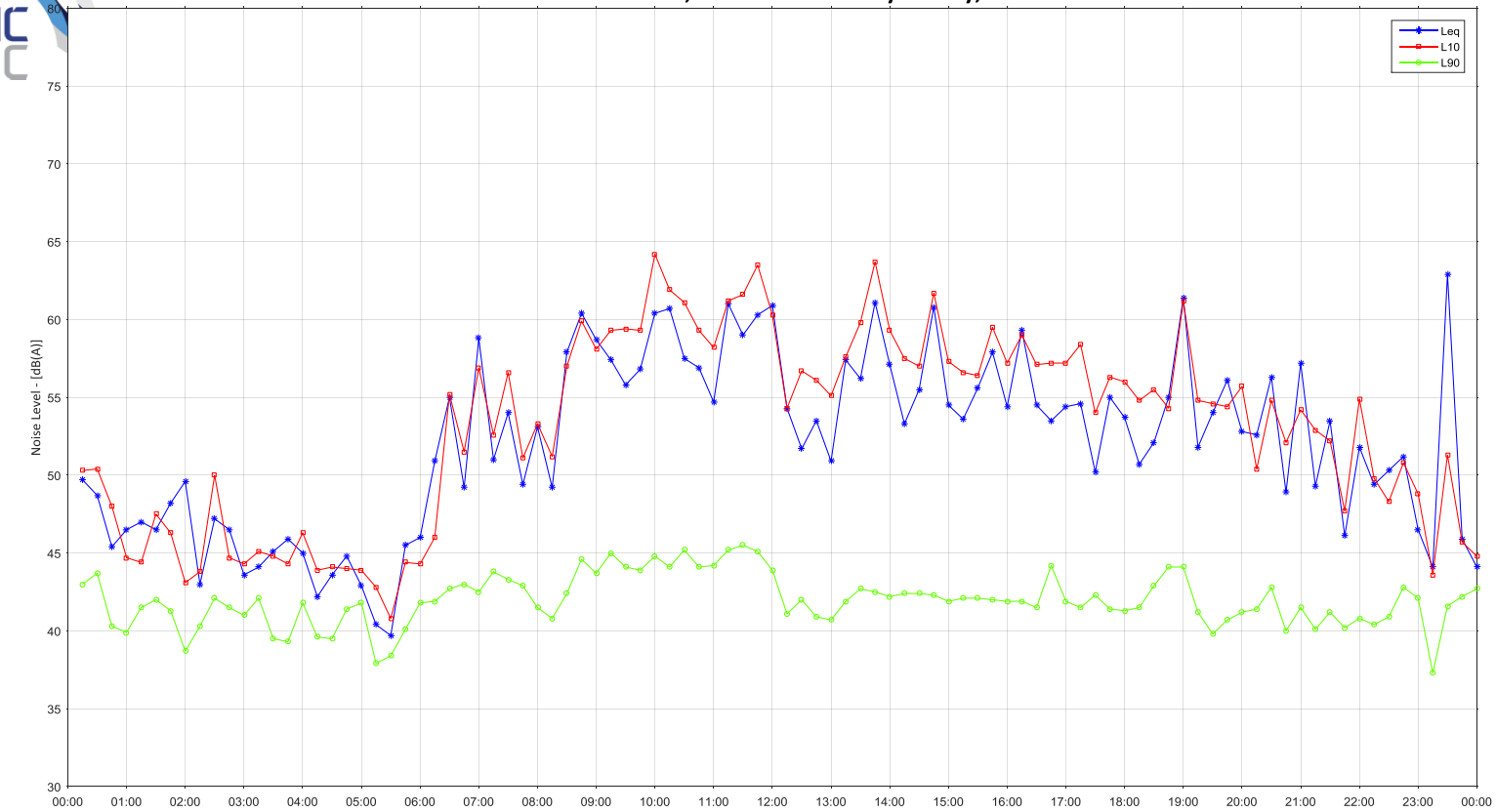
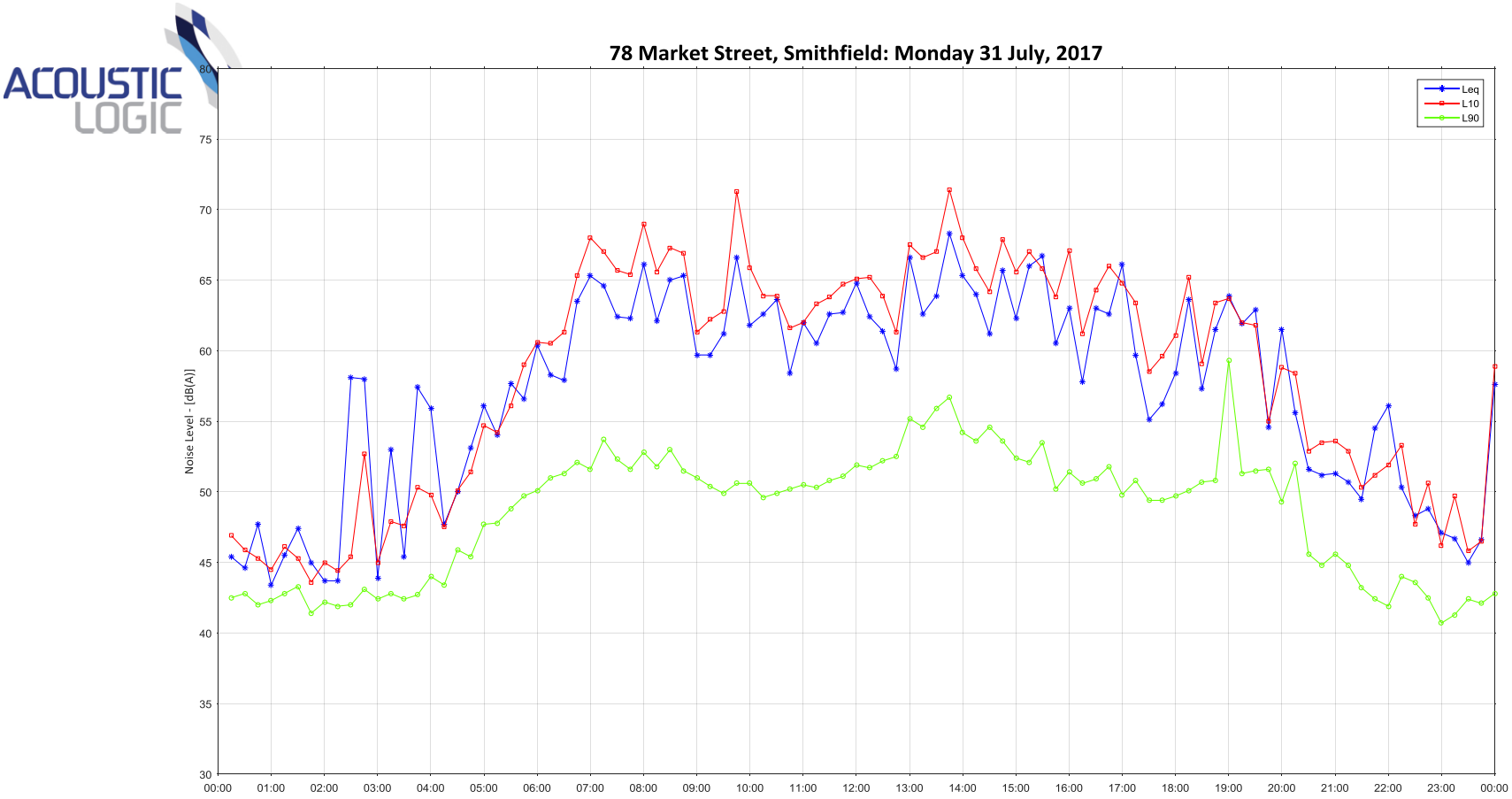
78 Market Street, Smithfield: Saturday 29 July, 2017



78 Market Street, Smithfield: Sunday 30 July, 2017

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L10
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80
75
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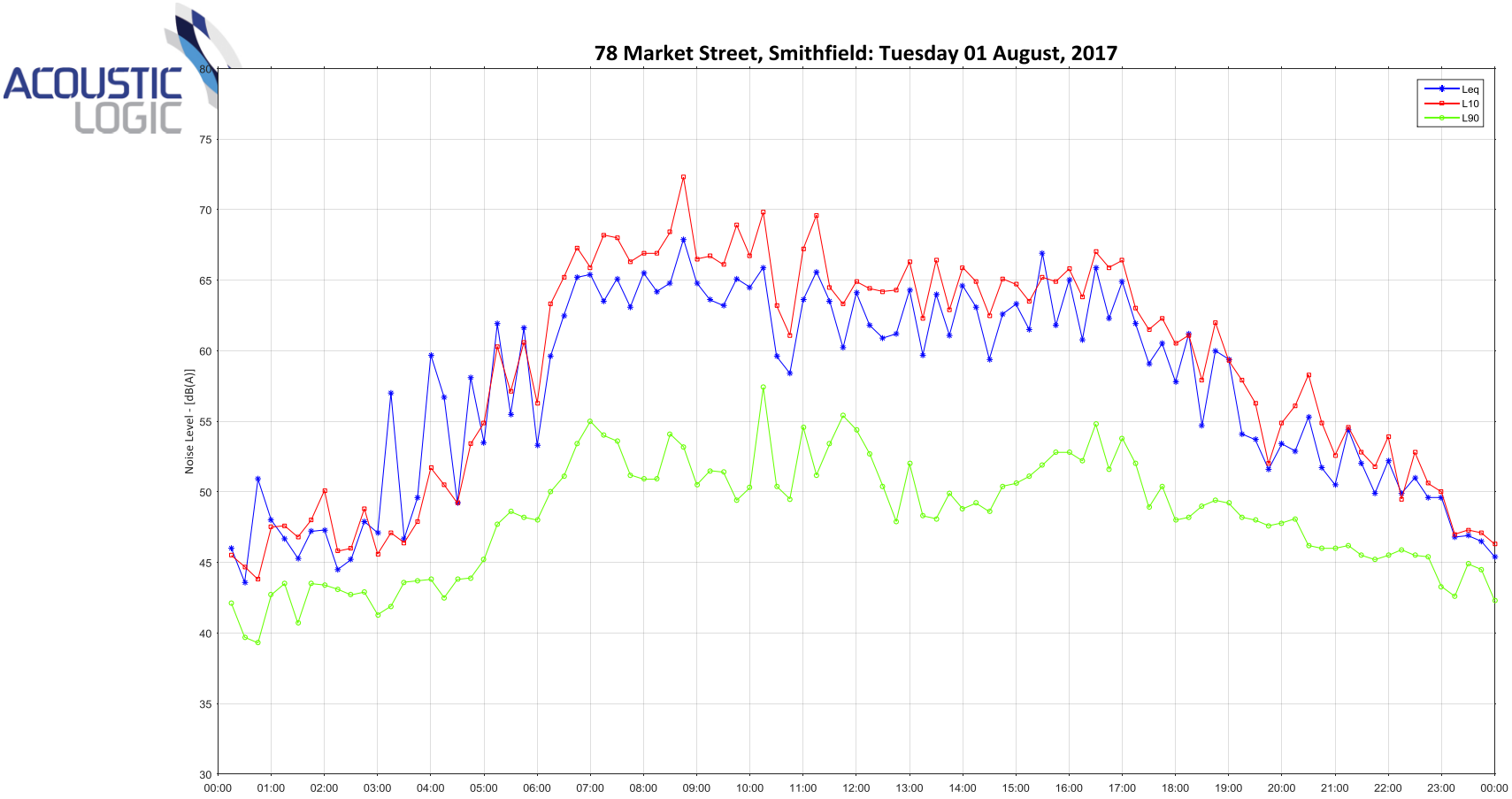
78 Market Street, Smithfield: Tuesday 01 August, 2017
Noise Level - [dB(A)]
Leq
L10
L90
80
75
70
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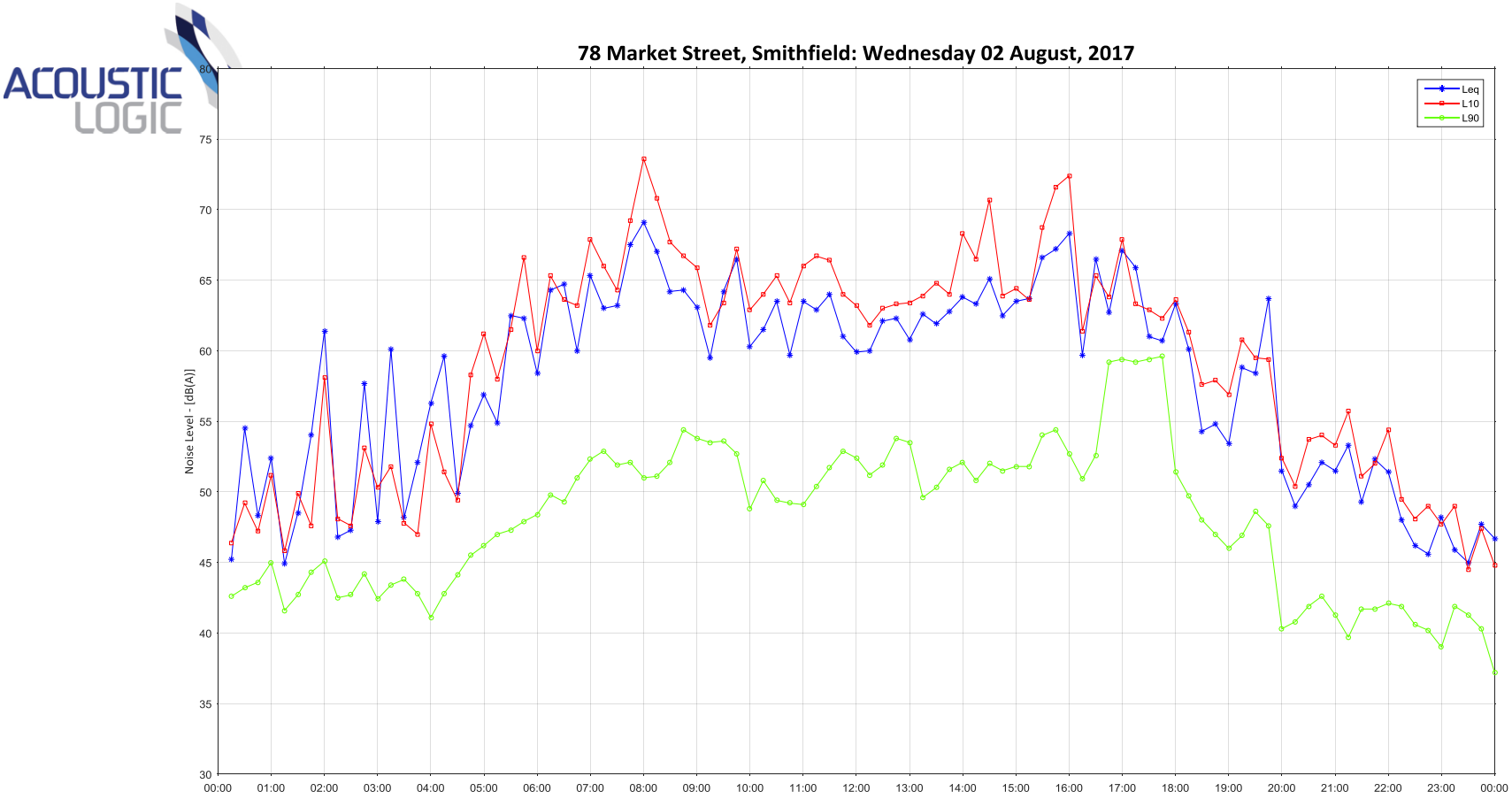
78 Market Street, Smithfield: Wednesday 02 August, 2017
Noise Level - [dB(A)]
Leq
L10
L90
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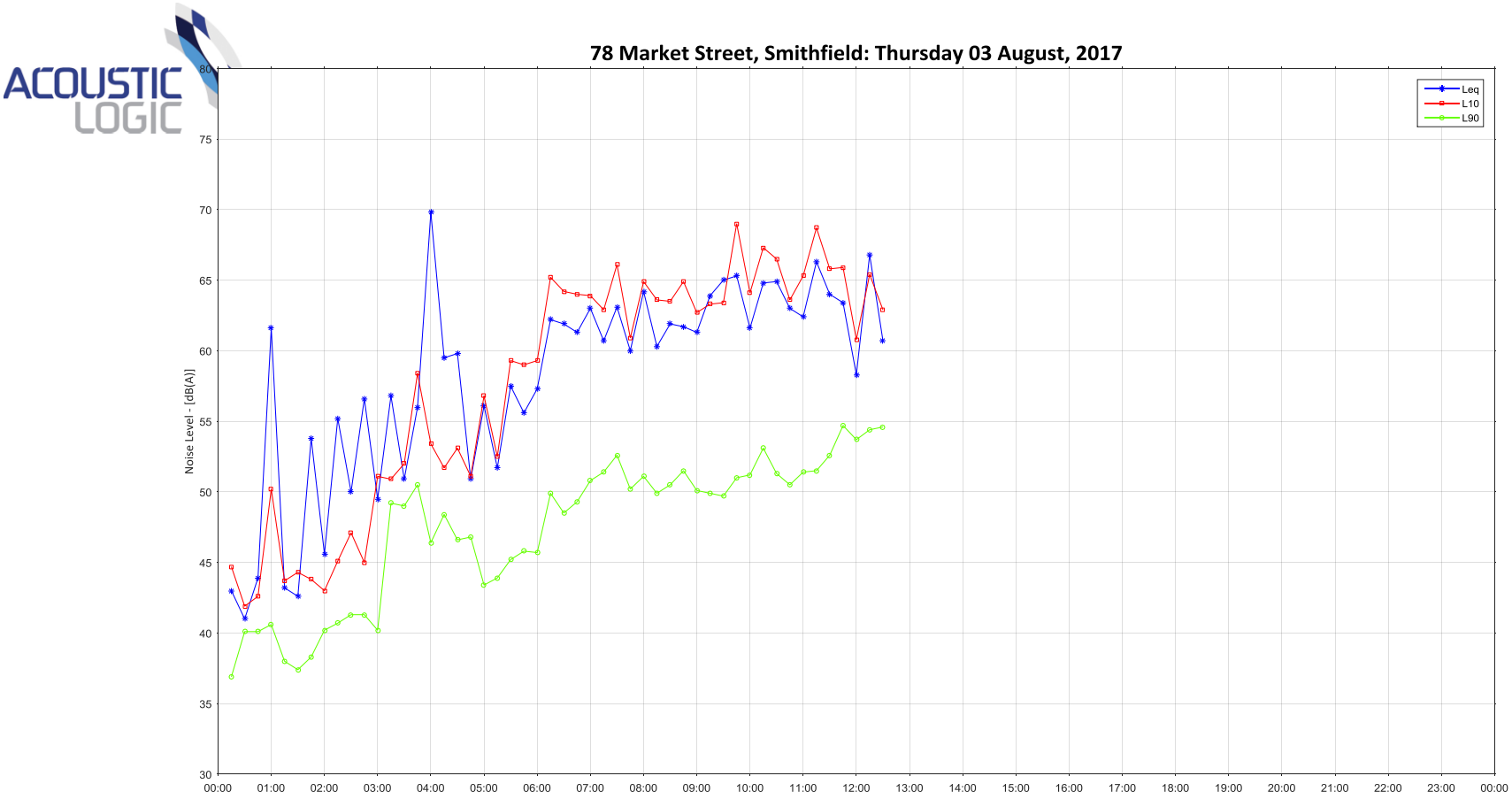
78 Market Street, Smithfield: Thursday 03 August, 2017
Noise Level - [dB(A)]
Leq
L10
L90
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