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WICKHAM WOOL STORE 1, NEWCASTLE

Acoustic Assessment for DA

4 July 2017

Investec Australia Limited

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1 Introduction

This report presents an assessment of noise intrusion into, and operational noise from the proposed mixed-use redevelopment of the Wickham Wool Stores located at Milford Street, Maryville in Newcastle. This report addressed the residential reconversion of Wool Store 1 within the Wickham Wool Stores Development.

This study examines the effects of external noise intrusion on the proposed development from nearby ambient noise such as industrial and traffic noise. Noise surveys have been conducted by Renzo Tonin & Associates between Friday 31March 2017 to Friday 7th April 2017 at the development site to determine the existing levels of ambient noise at the site. These levels were used to predict noise levels within the property, and then assessed against the recommended internal noise criteria for the project.

As a result of our assessment, the following potential acoustic items were identified;

- Noise associated with the operation of the Caltex Site intruding into the development;
- Existing other industrial noise sources (mechanical plant and equipment) impacting on the proposed development;
- Local traffic noise associated with Milford and Annie Streets; and
- Noise emission from proposed mechanical plant impacting on existing residential and commercial receivers.

Traffic generation from the Wickham Wool Store site as a whole has been assessed in a separate report.

This report presents an assessment of the above acoustic components in terms of Council's Development Control Plans, State Environmental Planning Policy (Infrastructure) 2007 and Australian Standards.

The predicted traffic noise levels at the building facades were used to determine the sound insulation rating requirements for the external building elements in accordance with the acoustic criteria nominated for this development.

In regard to acoustic privacy, this is generally satisfied through the requirements of the National Construction Codes - Building Code of Australia which all new residential developments would need to comply.

Further detailed discussion of the identified acoustic factors is set out within this report.

The work documented in this report was carried out in accordance with the Renzo Tonin & Associates Quality Assurance System, which is based on Australian Standard / NZS ISO 9001. Appendix A contains a glossary of acoustic terms used in this report.

2 Site and Surrounds

The Wickham Wool Stores proposed development is to be located on the site bound by Annie Street to the south, Milford Street to the west, The Avenue to the North, and the Caltex site to the east. The development is to consist of the adaptive reuse of the three wool stores to residential apartments, an additional commercial/ retail building and a new residential building.

Wool Store 1 development is to consist of the adaptive reuse of Wool Store located on the corner of Annie and Milford Streets for residential use, including central car parking.

Long-term noise monitoring has been undertaken at the Annie Street, Milford Street and Caltex site boundaries to determine the existing acoustic environment.

Figure 1: Aerial photograph showing site and surrounds

Figure 2 - Woolstore One location

3 Internal Noise Criteria

3.1 Road Traffic Noise

A number of documents were taken into account when determining suitable criteria for the proposed development site. These included:

- State Environment Planning Policy (Infrastructure) 2007 (the "ISEPP')
- Department of Planning publication "Development Near Rail Corridors & Busy Roads – Interim Guideline" 2008
- Australian Standard AS2107:2016 "Recommended Design Sound Levels and Reverberation Times for Building Interiors"
- Newcastle City Council DCP 2012 ["DCP"]

It should be noted that Honeysuckle Drive is not identified as a road requiring a mandatory assessment (greater than AADT 40,000) or a recommended assessment (greater than AADT 20,000 but less than 40,000) on The Roads and Maritime Services (RMS) Traffic Volume Maps for ISEPP.

Nonetheless, given the urban environment surrounding the development, the Department of Planning publication "Development Near Rail Corridors & Busy Roads – Interim Guideline" 2008 is considered the most appropriate criteria for this development site and is summarised in the table below.

Table 1 below summaries the airborne traffic noise criteria recommended for the proposed developments.

Table 1: Recommended Internal Noise Criteria for Road Traffic Noise

Occupancy	Windows & Doors Condition	Design Noise Level	
		Day, $L_{Aeq\ (T)}$	Night, $L_{Aeq\ (T)}$
Bedrooms	Closed	-	35 dB(A), 9 hour
	Open	-	45 dB(A), 9 hour
All Other Habitable Areas	Closed	40 dB(A), 15 hour	40 dB(A), 9 hour
	Open	50 dB(A), 15 hour	50 dB(A), 9 hour

Notes:

Day and Night assessment periods are defined as follows.

1. Day is defined as 7:00am to 10:00pm
2. Night is defined as 10.00pm to 7.00am

Appendix C presents results of the unattended ambient noise survey conducted on site.

4 Measured and Predicted Noise Levels

4.1 Long-term Noise Survey

Three RTA Technology Environmental Noise Loggers were set up for the ambient noise survey from Friday 31 March 2017 to Friday 7 April 2017. One logger was set up at the proposed future development location on the corner of Milford Street and The Avenue. A second logger was located at the site boundary with Annie Street in front of Wool Store 4. A third logger was located at the site boundary with the Caltex Site at the rear of Wool Store 4.

The noise loggers record noise levels on a continuous basis and stores data every fifteen minutes. The noise logger was calibrated before and after measurements and no significant deviation in calibration was noted. The noise monitoring equipment used here complies with Australian Standard 1259.2-1990 "Acoustics - Sound Level Meters" and is designated as Type 2 instruments suitable for field use.

The dates of measurement and the results obtained from the logger survey are shown in Appendix C.

The unattended noise monitor was positioned to capture both noise from traffic, as well as the existing ambient noise at the development site. The measured ambient noise levels are presented below.

Table 2: Measured ambient external noise levels

Location	Noise Level Descriptor	Day 7am - 6pm	Evening 6pm - 10pm	Night 10pm - 7am
Location 1 - Milford Street	LAeq	60 dB(A)	55 dB(A)	50 dB(A)
	LA90	43 dB(A)	42 dB(A)	36 dB(A)
Location 2 - Annie Street	LAeq	59 dB(A)	61 dB(A)	50 dB(A)
	LA90	43 dB(A)	41 dB(A)	36 dB(A)
Location 3 - Caltex Site Boundary	LAeq	55 dB(A)	50 dB(A)	46 dB(A)
	LA90	47 dB(A)	42 dB(A)	38 dB(A)

Noise levels from the monitoring have been used to determine design external noise levels impacting on the development site and the acoustic design of the various facades of the proposed development.

Recommendations for the acoustic design of the glazed facades of the development are presented in Section 5 of this report.

The design external traffic noise levels are presented below.

Table 3: Predicted external traffic noise levels

Facade	Time Period	Design Noise Level $L_{Aeq,T}$
Facing Milford Street	Day time (7am to 10pm)	61 dB(A)
	Night time (10pm to 7am)	53 dB(A)
Facing Annie Street	Day time (7am to 10pm)	61 dB(A)
	Night time (10pm to 7am)	55 dB(A)

Facade	Time Period	Design Noise Level $L_{Aeq,T}$
Caltex Site Boundary	Day time (7am to 10pm)	56 dB(A)
	Night time (10pm to 7am)	50 dB(A)

Note: 1. at 1m from façade, centrally positioned along the façade width

Results from the noise surveys were used to calculate internal noise levels within the proposed development. Noise calculations were performed using glazing design software developed in this office which take into account external noise levels, facade transmission loss and room sound absorption characteristics.

5 Control of External Noise

5.1 Glazing

To achieve the criteria outlined in Table 1 with windows closed, the following table presents the recommended glazing acoustic performances for the proposed development.

Table 4: Recommended acoustic performance of glazing assembly

Facade	Level/Apartment	Room Description	Required Acoustic Rating of Glazing Assembly, R_W
Facing Milford Street	All units	Bedrooms	R_W 25
		Living/Dining	R_W 25
Facing Annie Street	All units	Bedrooms	R_W 25
	All units	Living/Dining	R_W 25
Northern and Eastern facades	All units	Bedrooms	R_W 25
		Living/Dining	R_W 25

Notes:

The client is advised not to commence detailing or otherwise commit to partition construction systems which have not been tested in an approved laboratory or for which an opinion only is available. Testing of partition construction systems is a component of the quality control of the design process and should be viewed as a priority because there is no guarantee the forecast results will be achieved thereby necessitating the use of an alternative which may affect the cost and timing of the project. No responsibility is taken for use of or reliance upon untested partition construction systems, estimates or opinions. The advice provided here is in respect of acoustics only.

The information in this table is provided for the purpose of Council approvals process and cost planning and shall not be used for construction unless otherwise approved in writing by the acoustic consultant.

The design in this table is preliminary and a comprehensive assessment shall be conducted prior to Construction Certification.

Before committing to any form of construction or committing to any builder, advice should be sought from an acoustic consultant to ensure that adequate provisions are made for any variations which may occur as a result of changes to the form of construction where only an "estimate" is available for the sound insulation properties of recommended materials.

The glazing supplier shall ensure that installation techniques will not diminish the Rw performance of the glazing when installed on site.

All openable glass windows and doors shall incorporate full perimeter acoustic seals equivalent to Q-Lon, which enable the Rw rating performance of the glazing to not be reduced.

The above glazing thicknesses should be considered the minimum thicknesses to achieve acoustical ratings. Greater glazing thicknesses may be required for structural loading, wind loading etc.

6 External Noise Emission

6.1 EPA Requirements

The NSW Environment Protection Authority (EPA) sets out noise criteria in its Industrial Noise Policy (INP) to control the noise emission from industrial sources.

The NSW Industrial Noise Policy (INP) sets criteria to protect noise amenity for residential receivers. The basis for its policy relies on two components:

- controlling intrusive noise impacts in the short term for residences, and
- maintaining noise level amenity for particular land uses for residences and other land uses.

Noise intrusiveness ensures that industrial noise does not exceed the existing background noise level by an excessive margin. This is commonly referred to as the 'background plus 5' criterion, that is, that the noise level from the new industrial development should not exceed the existing background noise level (measured in the absence of that development) by more than 5dB(A).

Noise amenity ensures that industrial noise levels do not increase without limit, for if a number of industrial noise sources are permitted to increase the background noise level by 5dB(A), in turn there would be a point where the ultimate noise level is unacceptable. A limit on the ultimate acceptable noise level is therefore included in the INP as a way of ensuring that cumulative noise impact from industrial growth is curtailed. This limit is referred to as the amenity goal. The appropriate limit in any circumstance relates to the land use category, for example, there are different limits for rural, suburban and urban areas. The table below presents the amenity criteria relevant to the receivers surrounding the proposed development site.

Table 5: INP Amenity Criteria - Recommended LAeq Noise Levels from Industrial Noise Sources [NSW INP Table 2.1]

Type of Receiver	Indicative Noise Amenity Area	Time of Day	Recommended $L_{Aeq\ (Period)}$ Noise Level	
			Acceptable	Recommended Maximum
Residence	Rural	Day	50	55
		Evening	45	50
		Night	40	45
	Suburban	Day	55	60
		Evening	45	50
		Night	40	45
	Urban	Day	60	65
		Evening	50	55
		Night	45	50
	Urban/Industrial Interface - for existing	Day	65	70
		Evening	55	60

	situations only	Night	50	55
Area specifically reserved for passive recreation (e.g. National Park)	All	When in use	50	55
Active recreation area (e.g. school playground, golf course)	All	When in use	55	60
Commercial premises	All	When in use	65	70
Industrial premises	All	When in use	70	75

Note:

Daytime 7.00 am to 6.00 pm; Evening 6.00 pm to 10.00 pm; Night-time 10.00 pm to 7.00 am

On Sundays and Public Holidays, Daytime 8.00 am - 6.00 pm; Evening 6.00 pm - 10.00 pm; Night-time 10.00 pm - 8.00 am.

The LAeq index corresponds to the level of noise equivalent to the energy average of noise levels occurring over a measurement period.

The modification factors in Table 2.2 of the INP (summarised in the table below) are to be applied where the total existing LAeq noise level from *industrial* sources are within 6dB of the acceptable noise level (ANL) presented in the table above.

Table 6: Modification to Acceptable Noise Level (ANL)* to Account for Existing Level of Industrial Noise [NSW INP Table 2.2]

Total Existing LAeq noise level from Industrial Noise Sources	Maximum L_{Aeq} Noise Level for Noise from New Sources Alone, dB(A)
≥ Acceptable noise level plus 2	If existing noise level is likely to decrease in future: acceptable noise level minus 10 If existing noise level is unlikely to decrease in future: existing noise level minus 10
Acceptable noise level plus 1	Acceptable noise level minus 8
Acceptable noise level	Acceptable noise level minus 8
Acceptable noise level minus 1	Acceptable noise level minus 6
Acceptable noise level minus 2	Acceptable noise level minus 4
Acceptable noise level minus 3	Acceptable noise level minus 3
Acceptable noise level minus 4	Acceptable noise level minus 2
Acceptable noise level minus 5	Acceptable noise level minus 2
Acceptable noise level minus 6	Acceptable noise level minus 1
< Acceptable noise level minus 6	Acceptable noise level

* ANL = recommended acceptable LAeq noise level for the specific receiver, area and time of day from Table 2.1 (INP)

From observations at the proposed development site, the current L_{Aeq} noise level measured at the proposed development site are dominated by existing industrial noise, therefore the modifying factors in Table 2.2 above have been applied to the measured L_{Aeq} noise levels.

The following table presents the site specific noise production criteria from industrial noise sources, namely mechanical plant.

Table 7: L_{Aeq} design criterion for noise production from mechanical plant (EPA INP) - Milford Street

Time of Day	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8
	Rating Background Level (RBL) L_{A90}	Intrusiveness Criterion (RBL+5)	Amenity Criterion - Acceptable	Measured L_{Aeq} Ambient Noise Levels	L_{Aeq} exceed amenity criterion?	Existing noise level likely to decrease in future?	Relevant modification to ANL?	Project Specific Design Criterion L_{Aeq}
Day (7am to 6pm)	43	48	55	60	Yes 5dB	No	Existing L_{Aeq} minus 10dB (50dBA)	48
Evening (6pm to 10pm)	42	47	45	55	Yes 5dB	No	Existing L_{Aeq} minus 10dB (40dBA)	40
Night (10pm to 7am)	46	51	40	50	Yes 6dB	No	Existing L_{Aeq} minus 10dB (36dBA)	36

Explanatory notes:

Column 3 – Recommended L_{Aeq} noise level based on 'Residence –suburban' area in Section 2.2, Table 2.1 Amenity Criteria (Recommended L_{Aeq} noise levels from industrial noise sources) of the EPA's INP.

Column 4 - Measured in accordance with the INP

Column 7 - Determined from Table 2.2 of the INP

Column 8 – Project Specific Design Criterion based on EPA's INP.

Table 8: L_{Aeq} design criterion for noise production from mechanical plant (EPA INP) - Annie Street

Time of Day	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8
	Rating Background Level (RBL) L_{A90}	Intrusiveness Criterion (RBL+5)	Amenity Criterion - Acceptable	Measured L_{Aeq} Ambient Noise Levels	L_{Aeq} exceed amenity criterion?	Existing noise level likely to decrease in future?	Relevant modification to ANL?	Project Specific Design Criterion L_{Aeq}
Day (7am to 6pm)	43	48	55	59	Yes 4dB	No	Existing L_{Aeq} minus 10dB (49dBA)	48
Evening (6pm to 10pm)	41	46	45	61	Yes 6dB	No	Existing L_{Aeq} minus 10dB (51dBA)	45
Night (10pm to 7am)	36	41	40	50	Yes 10dB	No	Existing L_{Aeq} minus 10dB (40dBA)	40

Explanatory notes:

Column 3 – Recommended L_{Aeq} noise level based on 'Residence –urban' area in Section 2.2, Table 2.1 Amenity Criteria (Recommended L_{Aeq} noise levels from industrial noise sources) of the EPA's INP.

Column 4 - Measured in accordance with the INP

Column 7 - Determined from Table 2.2 of the INP

Column 8 – Project Specific Design Criterion based on EPA's INP.

Table 9: L_{Aeq} design criterion for noise production from mechanical plant (EPA INP) - Caltex Site Boundary

Time of Day	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8
	Rating Background Level (RBL) L_{A90}	Intrusiveness Criterion (RBL+5)	Amenity Criterion - Acceptable	Measured L_{Aeq} Ambient Noise Levels	L_{Aeq} exceed amenity criterion?	Existing noise level likely to decrease in future?	Relevant modification to ANL?	Project Specific Design Criterion L_{Aeq}
Day (7am to 6pm)	47	52	55	55	No 0dB	No	ANL minus 8 (47dBA)	47
Evening (6pm to 10pm)	42	47	45	50	Yes 5dB	No	Existing L_{Aeq} minus 10dB (40dBA)	40
Night (10pm to 7am)	38	43	40	46	Yes 6dB	No	Existing L_{Aeq} minus 10dB (36dBA)	36

Explanatory notes:

Column 3 – Recommended L_{Aeq} noise level based on 'Residence –urban' area in Section 2.2, Table 2.1 Amenity Criteria (Recommended L_{Aeq} noise levels from industrial noise sources) of the EPA's INP.

Column 4 - Measured in accordance with the INP

Column 7 - Determined from Table 2.2 of the INP

Column 8 – Project Specific Design Criterion based on EPA's INP.

Where necessary, noise amelioration treatment will be incorporated in the design to ensure that noise levels comply with the recommended EPA's INP noise emission criteria noted above.

At this stage details of mechanical plant have not been finalised, the following in-principal recommendations are provided.

Acoustic assessment of mechanical services equipment will need to be undertaken during the detail design phase of the development to ensure that they shall not either singularly or in total emit noise levels which exceed the noise limits in EPA's Industrial Noise Policy or Council's requirements;

As noise control treatment can affect the performance of the mechanical services system, it is recommend that consultation with an acoustic consultant be made during the initial phase of mechanical services system design in order to reduce the need for revision of mechanical plant and noise control treatment;

Mechanical plant noise emission can be controllable by appropriate mechanical system design and implementation of common engineering methods that may include any of the following:

- procurement of 'quiet' plant,
- strategic positioning of plant away from sensitive neighbouring premises, maximising the intervening shielding between the plant and sensitive neighbouring premises,
- commercially available silencers or acoustic attenuators for air discharge and air intakes of plant;
- acoustically lined and lagged ductwork;

- acoustic screens and barriers between plant and sensitive neighbouring premises; and/or
- Partially-enclosed or fully-enclosed acoustic enclosures over plant.

Mechanical plant shall have their noise specifications and their proposed locations checked prior to their installation on site; and

Fans shall be mounted on vibration isolators and balanced in accordance with Australian Standard AS2625 "Rotating and Reciprocating Machinery – Mechanical Vibration".

We recommend a full and detailed assessment with fully documented acoustic treatments be undertaken at the detailed design phase of the development, followed by construction/installation supervision of mechanical plant and equipment acoustic treatment. Compliance testing following the installation of the plant should also be undertaken.

7 Internal Sound Insulation

As a minimum requirement, walls and floors and separation of services shall comply with the National Construction Code - Building Code of Australia 2016 (BCA).

7.1 NCC BCA 2017 - Class 2 or 3

The National Construction Code Series (NCC) 2014 - Volume 1, Building Code of Australia sets out the following acoustic provisions for Class 2 and 3 buildings:

F5.2 Determination of airborne sound insulation ratings

A form of construction required to have an airborne sound insulation rating must –

a. have the required value for weighted sound reduction index (Rw) or weighted sound reduction index with spectrum adaptation term (Rw + Ctr) determined in accordance with AS/NZS 1276.1 or ISO 717.1 using results from laboratory measurements; or

b. comply with Specification F5.2.

F5.3 Determination of impact sound insulation ratings

a. A floor in a building required to have an impact sound insulation rating must –

i. *have the required value for weighted normalised impact sound pressure level with spectrum adaptation term (Ln,w+CI) determined in accordance with AS/ISO 717.2 using results from laboratory measurements; or*

ii. *comply with Specification F5.2.*

b. A wall in a building required to have an impact sound insulation rating must –

i. *for a Class 2 or 3 building be of discontinuous construction;*

c. For the purposes of this part, discontinuous construction means a wall having a minimum 20 mm cavity between 2 separate leaves, and

i. *for masonry, where wall ties are required to connect leaves, the ties are of the resilient type; and*

ii. *for other than masonry, there is no mechanical linkage between leaves except at the periphery.*

F5.4 Sound insulation rating of floors

a. A floor in a Class 2 or 3 building must have an Rw + Ctr (airborne) not less than 50 and an Ln,w+CI (impact) not more than 62 if it separates –

i. *sole-occupancy units; or*

ii. *a sole-occupancy unit from a plant room, lift shaft, stairway, public corridor, public lobby or the like, or parts of a different classification.*

F5.5 Sound insulation rating of walls

a. A wall in a Class 2 or 3 building must –

i. *have an Rw + Ctr (airborne) not less than 50, if it separates sole-occupancy units; and*

ii. *have an Rw (airborne) not less than 50, if it separates a sole-occupancy unit from a plant room, lift shaft, stairway, public corridor, public lobby or the like, or parts of a different classification; and*

iii. *comply with F5.3(b) if it separates:*

(A) a bathroom, sanitary compartment, laundry or kitchen in one sole-occupancy unit from a habitable room (other than a kitchen) in an adjoining unit; or

(B) a sole-occupancy unit from a plant room or lift shaft.

b. A door may be incorporated in a wall in a Class 2 or 3 building that separates a sole-occupancy unit from a stairway, public corridor, public lobby or the like, provided the door assembly has an Rw not less than 30.

c. Where a wall required to have sound insulation has a floor above, the wall must continue to –

i. *the underside of the floor above; or*

ii. *a ceiling that provides the sound insulation required for the wall.*

F5.6 Sound insulation rating of services

a. If a duct, soil, waste or water supply pipe, including a duct or pipe that is located in a wall or floor cavity, serves or passes through more than one sole-occupancy unit, the duct or pipe must be separated from the rooms of any sole-occupancy unit by construction with an Rw+Ctr (airborne) not less than –

i. *40 if the adjacent room is a habitable room (other than a kitchen); or*

ii. *25 if the adjacent room is a kitchen or non-habitable room.*

b. If a storm water pipe passes through a sole-occupancy unit it must be separated in accordance with (a).

8 Construction Noise

8.1 Environmental protection authority's construction noise guidelines

The Environmental Protection Authority (EPA) released its Interim Construction Noise Guideline (ICNG) in 2009. This document is being referred to as EPA's standard policy for assessing construction noise on new projects.

The key components of the ICNG that can be incorporated into this assessment include:

1. Use of L_{Aeq} as the descriptor for measuring and assessing construction noise.

In recent years NSW noise policies including EPA's NSW Industrial Noise Policy (INP) and the NSW Environmental Criteria for Road Traffic Noise (ECRTN) have moved to the primary use of L_{Aeq} over any other descriptor. As an energy average, L_{Aeq} provides ease of use when measuring or calculating noise levels since a full statistical analysis is not required as when using, for example, the L_{A10} descriptor.

Consistent with the latest guideline (ICNG) the use of L_{Aeq} as the key descriptor for measuring and assessing construction noise may follow a 'best practice' approach.

2. Application of feasible and reasonable noise mitigation measures

As stated in the ICNG, a noise mitigation measure is feasible if it is capable of being put into practice, and is practical to build given the project constraints.

Selecting reasonable mitigation measures from those that are feasible involves making a judgement to determine whether the overall noise benefit outweighs the overall social, economic and environmental effects, including the cost of the measure.

3. Quantitative and qualitative assessment

The ICNG provides two methods for assessment of construction noise, being either a quantitative or a qualitative assessment.

A quantitative assessment is recommended for major construction projects of significant duration, and involves the measurement and prediction of noise levels, and assessment against set criteria.

A qualitative assessment is recommended for small projects with a short-term duration where works are not likely to affect an individual or sensitive land use for more than three weeks in total. It focuses on minimising noise disturbance through the implementation of feasible and reasonable work practices, and community notification.

Given the significant scale of the construction works proposed for this Project, a quantitative assessment is carried out herein, consistent with the ICNG's requirements.

4. Management Levels

Residences

Table 10 below (reproduced from Table 2 of the ICNG) sets out the noise management levels and how they are to be applied. The guideline intends to provide respite for residents exposed to excessive construction noise outside the recommended standard hours whilst allowing construction during the recommended standard hours without undue constraints.

The rating background level (RBL) is used when determining the management level. The RBL is the overall single-figure background noise level measured in each relevant assessment period (during or outside the recommended standard hours).

Table 10: Noise at residences using quantitative assessment

Time of Day	Management Level $L_{Aeq\ (15\ min)}$*	How to Apply
Recommended standard hours: Monday to Friday 7 am to 6 pm Saturday 8 am to 1 pm No work on Sundays or public holidays	Noise affected RBL + 10dB(A)	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured $L_{Aeq\ (15\ min)}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected 75dB(A)	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside recommended standard hours	Noise affected RBL + 5dB(A)	A strong justification would typically be required for works outside the recommended standard hours. The proponent should apply all feasible and reasonable work practices to meet the noise affected level. Where all feasible and reasonable practices have been applied and noise is more than 5dB(A) above the noise affected level, the proponent should negotiate with the community. For guidance on negotiating agreements see section 7.2.2.

* Noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5m above ground level. If the property boundary is more than 30 m from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30 m of the residence. Noise levels may be higher at upper floors of the noise affected residence.

Sensitive Land Use

Table 11 below (reproduced from Table 2 of the ICNG) sets out the noise management levels for various sensitive land use developments.

Table 11: Noise at other sensitive land uses using quantitative assessment

Land use	Management level, $L_{Aeq\ (15\ min)}$ – applies when land use is being utilised
Classrooms at schools and other educational institutions	Internal noise level 45 dB(A)
Hospital wards and operating theatres	Internal noise level 45 dB(A)
Places of worship	Internal noise level 45 dB(A)
Active recreation areas	External noise level 65 dB(A)
Passive recreation areas	External noise level 60 dB(A)
Community centres	Depends on the intended use of the centre. Refer to the 'maximum' internal levels in AS2107 for specific uses.

9 Conclusion

Renzo Tonin & Associates have completed an assessment of the potential noise impacts to and from the proposed Wool Store 1 of the Wickham Wool Stores development site located on the corner of Milford and Annie Streets. Maryville.

In order to control external noise intrusion and comply with the nominated criteria, glazing recommendations have been made in Section 5 above.

Recommendations to comply with noise emission criteria for the site, including mechanical plant and construction noise have also been presented in the body of this report.

In conclusion, the proposed site is capable of complying with all relevant acoustic criteria through means of standard acoustic treatment and management.

APPENDIX A Glossary of terminology

The following is a brief description of the technical terms used to describe noise to assist in understanding the technical issues presented.

Adverse weather	Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).
Ambient noise	The all-encompassing noise associated within a given environment at a given time, usually composed of sound from all sources near and far.
Assessment period	The period in a day over which assessments are made.
Assessment point	A point at which noise measurements are taken or estimated. A point at which noise measurements are taken or estimated.
Background noise	Background noise is the term used to describe the underlying level of noise present in the ambient noise, measured in the absence of the noise under investigation, when extraneous noise is removed. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period. This is represented as the L90 noise level (see below).
Decibel [dB]	The units that sound is measured in. The following are examples of the decibel readings of every day sounds: 0dB The faintest sound we can hear 30dB A quiet library or in a quiet location in the country 45dB Typical office space. Ambience in the city at night 60dB CBD mall at lunch time 70dB The sound of a car passing on the street 80dB Loud music played at home 90dB The sound of a truck passing on the street 100dB The sound of a rock band 115dB Limit of sound permitted in industry 120dB Deafening
dB(A)	A-weighted decibels. The A- weighting noise filter simulates the response of the human ear at relatively low levels, where the ear is not as effective in hearing low frequency sounds as it is in hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the "A" filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter.
dB(C)	C-weighted decibels. The C-weighting noise filter simulates the response of the human ear at relatively high levels, where the human ear is nearly equally effective at hearing from mid-low frequency (63Hz) to mid-high frequency (4kHz), but is less effective outside these frequencies.
Frequency	Frequency is synonymous to pitch. Sounds have a pitch which is peculiar to the nature of the sound generator. For example, the sound of a tiny bell has a high pitch and the sound of a bass drum has a low pitch. Frequency or pitch can be measured on a scale in units of Hertz or Hz.
Impulsive noise	Having a high peak of short duration or a sequence of such peaks. A sequence of impulses in rapid succession is termed repetitive impulsive noise.
Intermittent noise	The level suddenly drops to that of the background noise several times during the period of observation. The time during which the noise remains at levels different from that of the ambient is one second or more.
L_{Max}	The maximum sound pressure level measured over a given period.
L_{Min}	The minimum sound pressure level measured over a given period.

L_1	The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
L_{10}	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
L_{90}	The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L90 noise level expressed in units of dB(A).
L_{eq}	The "equivalent noise level" is the summation of noise events and integrated over a selected period of time.
Reflection	Sound wave changed in direction of propagation due to a solid object obscuring its path.
SEL	Sound Exposure Level (SEL) is the constant sound level which, if maintained for a period of 1 second would have the same acoustic energy as the measured noise event. SEL noise measurements are useful as they can be converted to obtain Leq sound levels over any period of time and can be used for predicting noise at various locations.
Sound	A fluctuation of air pressure which is propagated as a wave through air.
Sound absorption	The ability of a material to absorb sound energy through its conversion into thermal energy.
Sound level meter	An instrument consisting of a microphone, amplifier and indicating device, having a declared performance and designed to measure sound pressure levels.
Sound pressure level	The level of noise, usually expressed in decibels, as measured by a standard sound level meter with a microphone.
Sound power level	Ten times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power.
Tonal noise	Containing a prominent frequency and characterised by a definite pitch.

APPENDIX B Criteria and Design Methodology

B.1 State Environment Planning Policy (ISEPP)

The State Environment Planning Policy – Infrastructure 2007, Clause 102 states:

102 Impact of road noise or vibration on non-road development

(1) This clause applies to development for any of the following purposes that is on land in or adjacent to the road corridor for a freeway, a tollway or a transitway or any other road with an annual average daily traffic volume of more than 40,000 vehicles (based on the traffic volume data published on the website of the RTA) and that the consent authority considers is likely to be adversely affected by road noise or vibration:

(a) a building for residential use,

(b) a place of public worship,

(c) a hospital,

(d) an educational establishment or child care centre.

(2) Before determining a development application for development to which this clause applies, the consent authority must take into consideration any guidelines that are issued by the Director-General for the purposes of this clause and published in the Gazette.

(3) If the development is for the purposes of a building for residential use, the consent authority must not grant consent to the development unless it is satisfied that appropriate measures will be taken to ensure that the following LAeq levels are not exceeded:

(a) in any bedroom in the building—35 dB(A) at any time between 10 pm and 7am,

(b) anywhere else in the building (other than a garage, kitchen, bathroom or hallway)—40 dB(A) at any time.

(4) In this clause, freeway, tollway and transitway have the same meanings as they have in the Roads Act 1993.

B.2 Department of Planning – Development near Rail Corridors and Busy Roads

The Guideline provides direction for developments that may be impacted by rail corridors and/or busy roads and consideration for the Guideline is a requirement for development specified under the Infrastructure SEPP.

The Guideline recommends an acoustic traffic assessment be undertaken for roads having an AADT of greater than 20,000 and less than 40,000 vehicles per day and states an assessment is mandatory for roads having an AADT of greater than 40,000 vehicles per day.

Table 3.1 of the Guideline summarises noise criteria for noise sensitive developments

Residential Buildings		
Type of occupancy	Noise Level dBA	Applicable time period
Sleeping areas (bedroom)	35	Night 10 pm to 7 am
Other habitable rooms (excl. garages, kitchens, bathrooms & hallways	40	At any time
Non–Residential Buildings		
Type of occupancy		Recommended Max Level dBA
Educational Institutions including child care centres		40
Places of Worship		40
Hospitals - wards		35
-other noise sensitive areas		35

Note: airborne noise is calculated as Leq (9h) (night) and Leq (15h)(day). Ground-borne noise is calculated as Lmax (slow) for 95% of rail pass-by events.

APPENDIX C Location and results of the noise survey

C.1 Long Term minotiring details

Noise Logger Location	Survey Period
Annie Street boundary	Friday 31st March 2017 to Friday 7th April 2017
Milford Street boundary	Friday 31st March 2017 to Friday 7th April 2017
Caltex Site boundary	Friday 31st March 2017 to Friday 7th April 2017

Figure 3 - Annie Street logger location

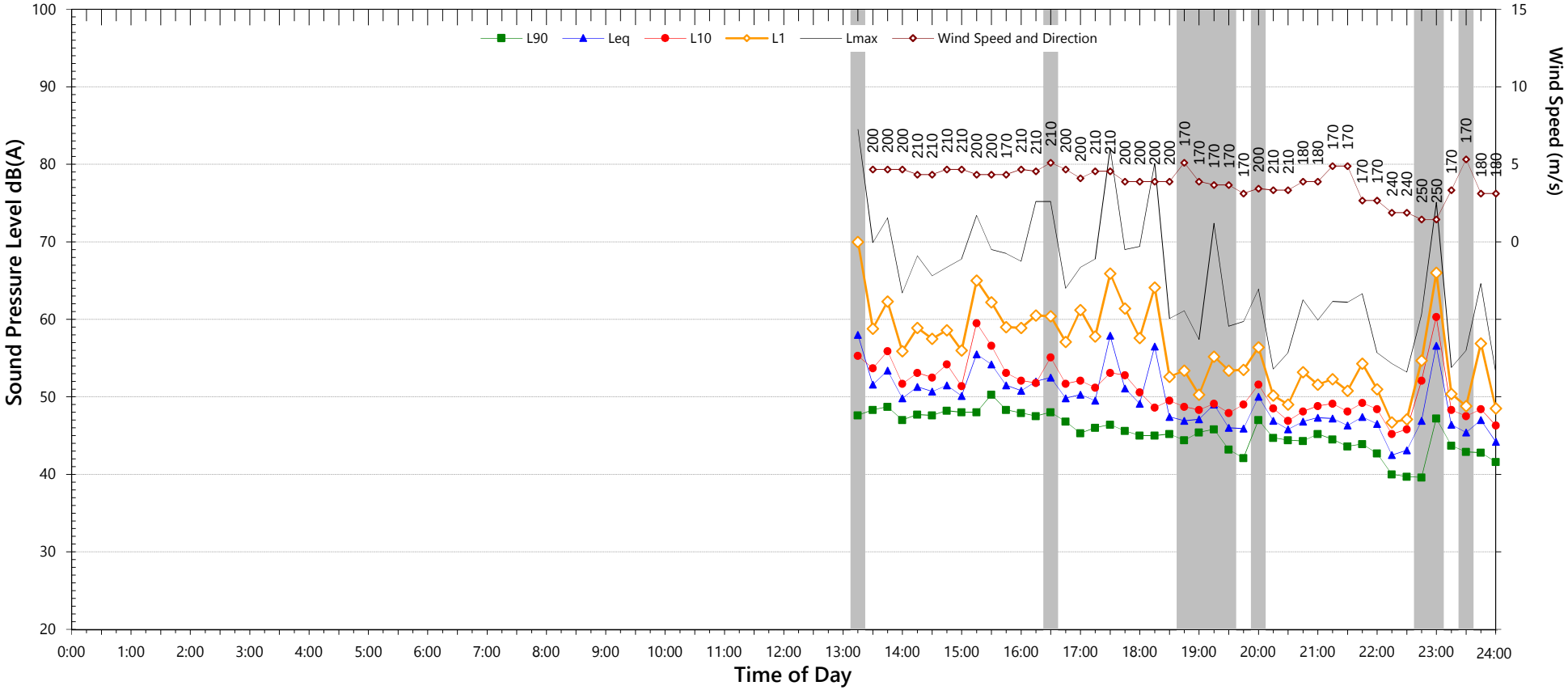
Figure 4 - Milford Street logger location

Figure 5 - Caltex Site boundary logger location

Unattended Noise Monitoring Results

Wickham Wool Stores - Caltex Site Boundary

Friday, 31 March 2017



NSW Industrial Noise Policy (Free Field)			
Descriptor	**Day[2]**	**Evening[3]**	**Night[4 5]**
L_{90}	-	-	-
LAeq	-	-	-

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	**Day**	**Night[5]**
	7am-10pm	**10pm-7am**
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	53.9	48.3
$L_{eq\ 1hr}$ upper 10 percentile	56.5	53.4
$L_{eq\ 1hr}$ lower 10 percentile	48.4	40.4

Night Time Maximum Noise Levels			(see note 7)
L_{Max} (Range)	72.2	to	72.2
L_{Max} - L_{eq} (Range)	18.6	to	21.3

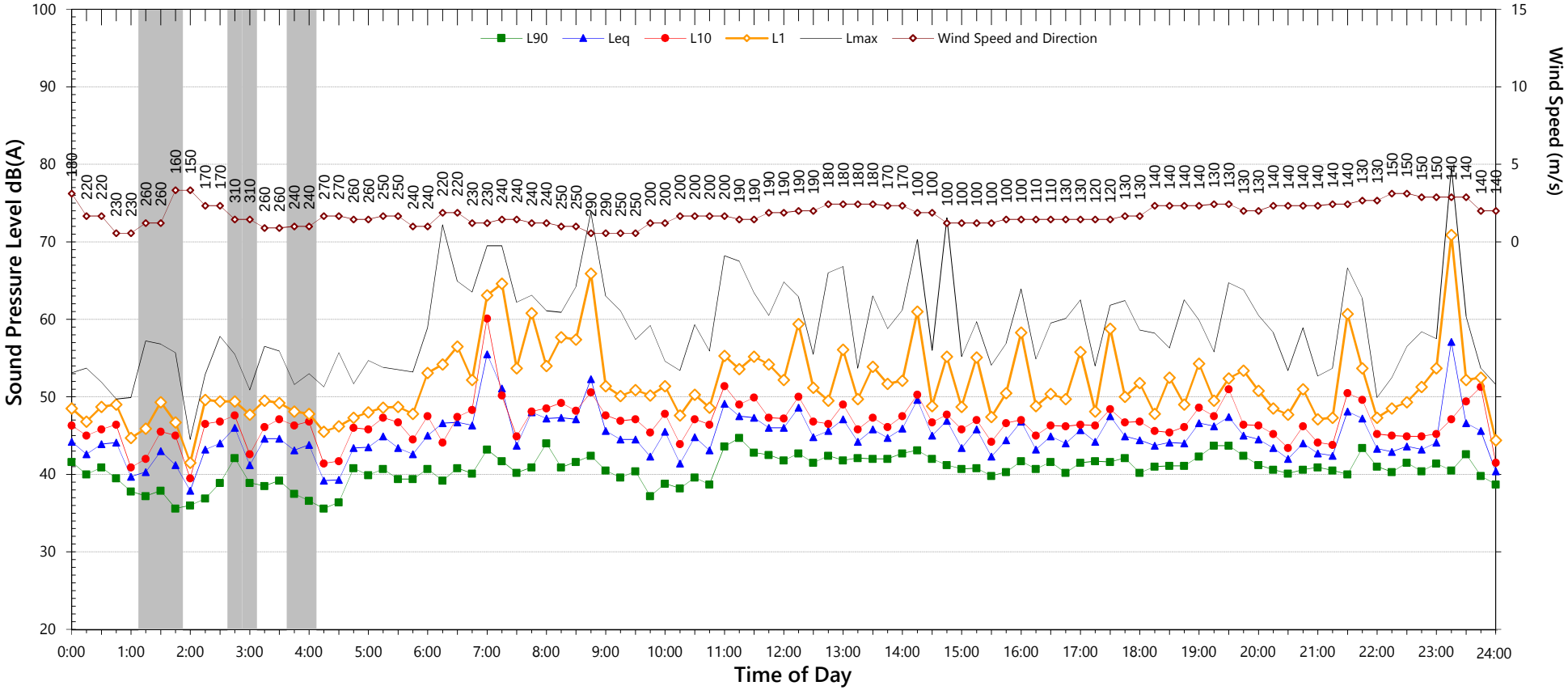
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am til 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. Night time L_{Max} values are shown only where L_{Max} >65dB(A) and where L_{Max}- Leq ≥15dB(A)

Unattended Noise Monitoring Results

Wickham Wool Stores - Caltex Site Boundary

Saturday, 1 April 2017



NSW Industrial Noise Policy (Free Field)			
Descriptor	**Day[2]**	**Evening[3]**	**Night[4 5]**
L_{90}	39.6	40.1	-
LAeq	46.4	45.1	-

Night Time Maximum Noise Levels			(see note 7)
L_{Max} (Range)	66.6	to	79.6
L_{Max} - L_{eq} (Range)	18.1	to	27.8

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	**Day**	**Night[5]**
	7am-10pm	**10pm-7am**
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	48.6	52.1
$L_{eq\ 1hr}$ upper 10 percentile	51.1	55.5
$L_{eq\ 1hr}$ lower 10 percentile	46.3	43.9

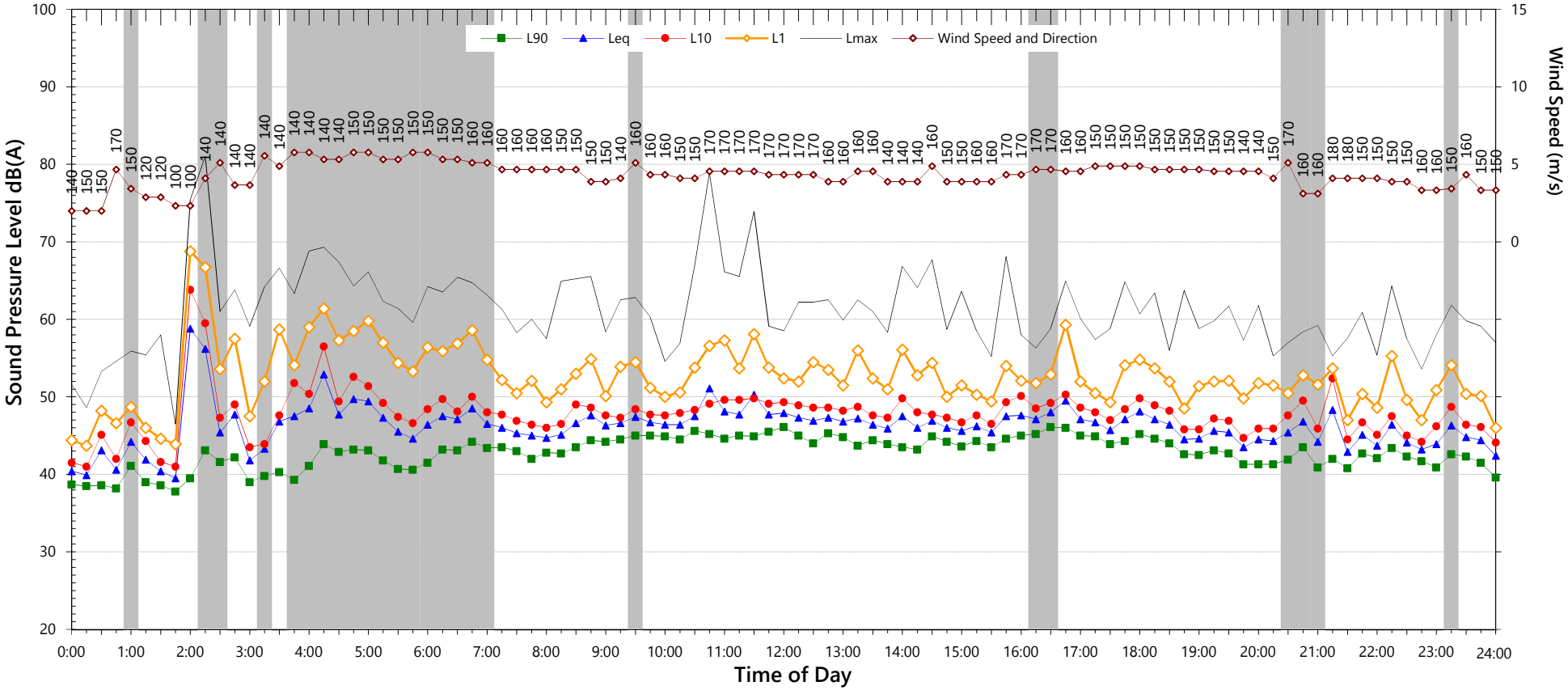
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am til 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. Night time L_{Max} values are shown only where L_{Max} >65dB(A) and where L_{Max}- Leq ≥15dB(A)

Unattended Noise Monitoring Results

Wickham Wool Stores - Caltex Site Boundary

Sunday, 2 April 2017



NSW Industrial Noise Policy (Free Field)			
Descriptor	**Day[2]**	**Evening[3]**	**Night[4 5]**
L_{90}	43.5	-	38.1
LAeq	47.3	-	46.1

Night Time Maximum Noise Levels			(see note 7)
L_{Max} (Range)	68.6	to	82.8
L_{Max} - L_{eq} (Range)	15.8	to	32.1

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	**Day**	**Night[5]**
	7am-10pm	**10pm-7am**
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	49.3	48.6
$L_{eq\ 1hr}$ upper 10 percentile	51.1	53.2
$L_{eq\ 1hr}$ lower 10 percentile	47.1	41.9

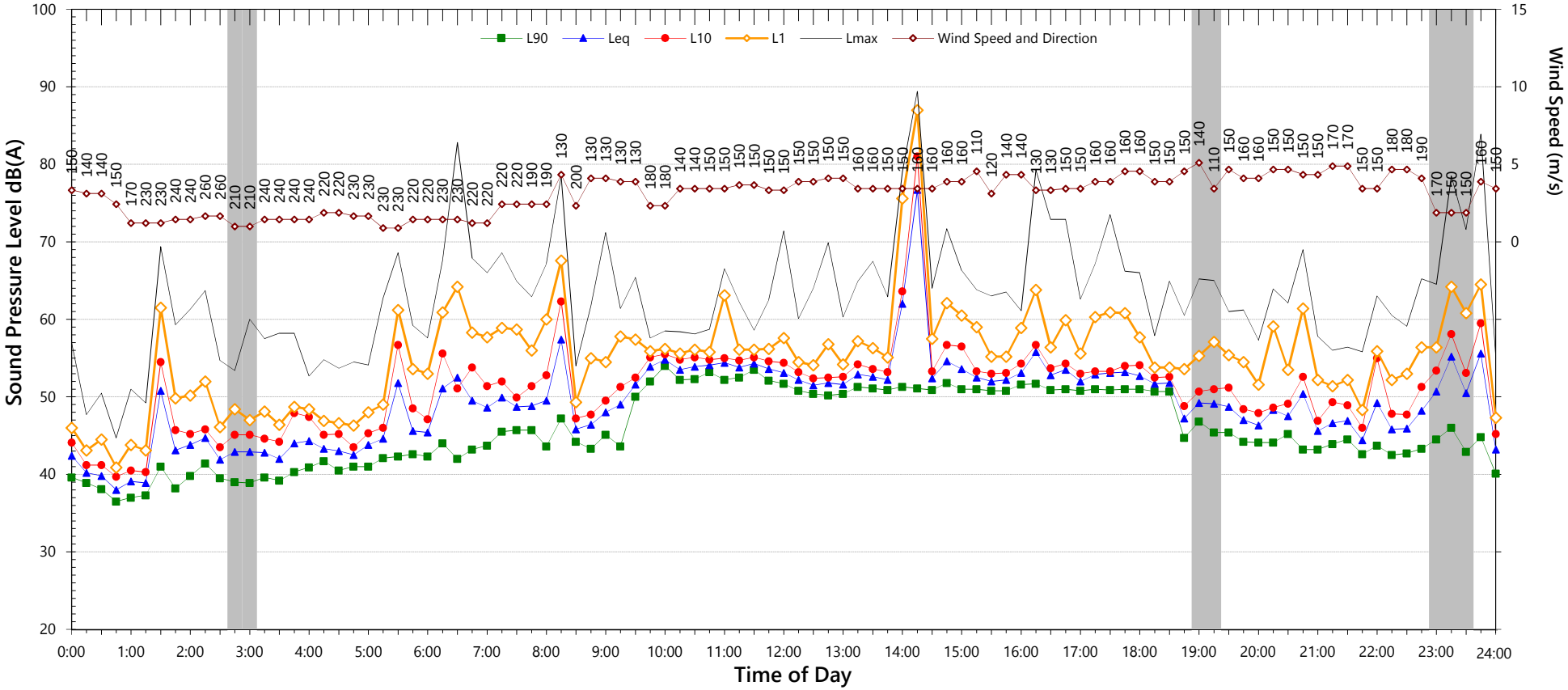
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am til 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. Night time L_{Max} values are shown only where L_{Max} >65dB(A) and where L_{Max}- Leq ≥15dB(A)

Unattended Noise Monitoring Results

Wickham Wool Stores - Caltex Site Boundary

Monday, 3 April 2017



NSW Industrial Noise Policy (Free Field)			
Descriptor	Day[2]	Evening[3]	Night[4 5]
L_{90}	45.1	43.2	-
LAeq	61.1	48.5	-

Night Time Maximum Noise Levels			(see note 7)
L_{Max} (Range)	65.2	to	83.9
L_{Max} - L_{eq} (Range)	15.1	to	31.1

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	62.5	51.6
$L_{eq\ 1hr}$ upper 10 percentile	70.4	57.1
$L_{eq\ 1hr}$ lower 10 percentile	49.8	43.8

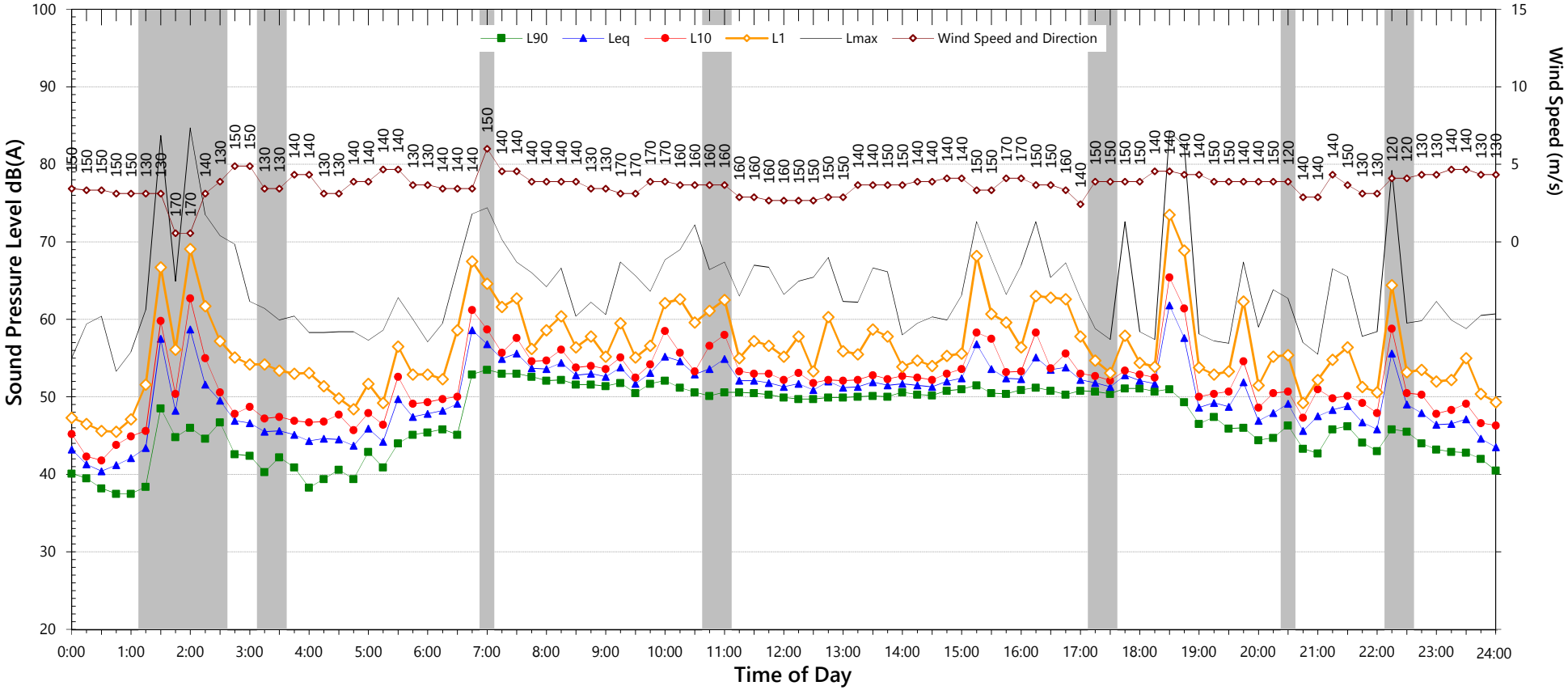
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am til 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. Night time L_{Max} values are shown only where L_{Max} >65dB(A) and where L_{Max}- Leq ≥15dB(A)

Unattended Noise Monitoring Results

Wickham Wool Stores - Caltex Site Boundary

Tuesday, 4 April 2017



NSW Industrial Noise Policy (Free Field)			
Descriptor	Day[2]	Evening[3]	Night[4 5]
L_{90}	49.9	43.0	37.0
LAeq	53.1	53.1	46.4

Night Time Maximum Noise Levels			(see note 7)
L_{Max} (Range)	71.7	to	71.7
L_{Max} - L_{eq} (Range)	15.0	to	19.5

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	55.6	48.9
$L_{eq\ 1hr}$ upper 10 percentile	58.8	54.7
$L_{eq\ 1hr}$ lower 10 percentile	49.8	44.9

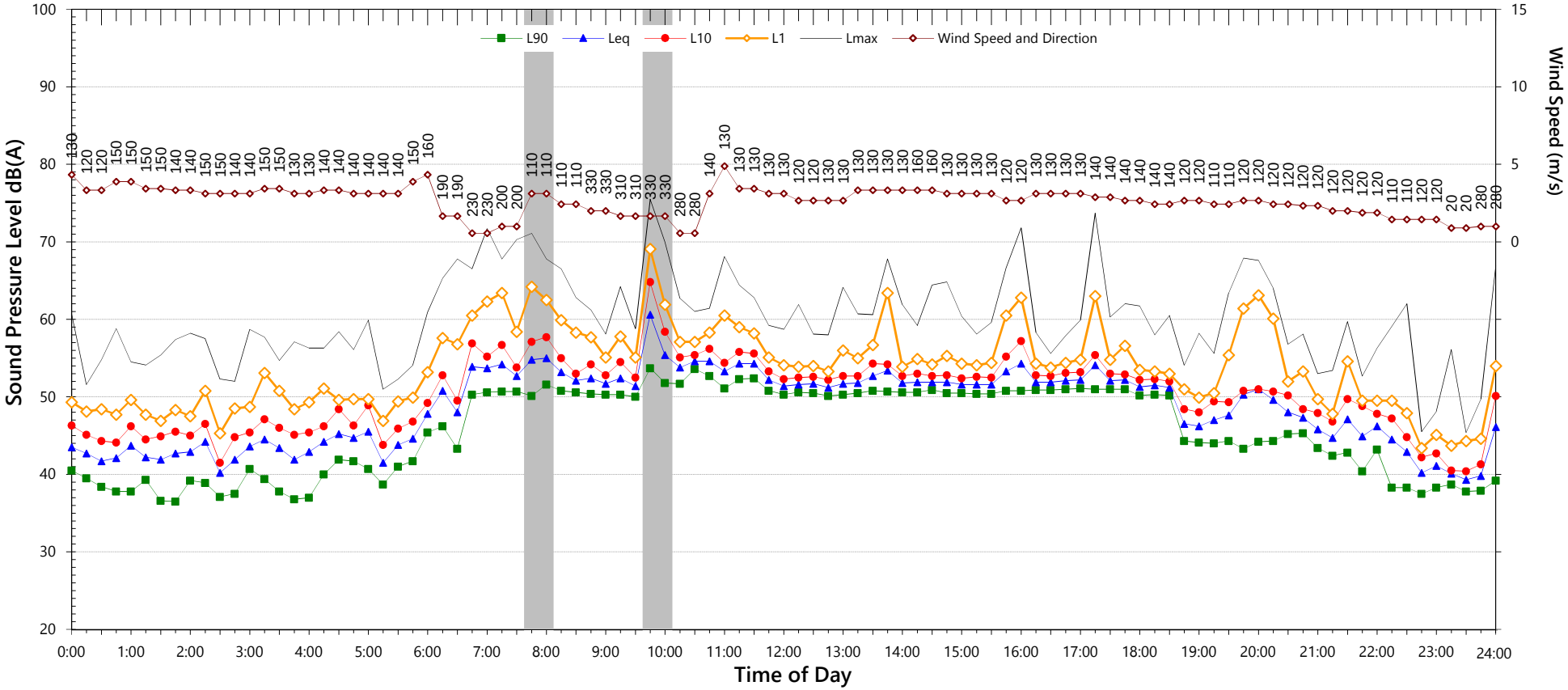
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am til 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. Night time L_{Max} values are shown only where L_{Max} >65dB(A) and where L_{Max}- Leq ≥15dB(A)

Unattended Noise Monitoring Results

Wickham Wool Stores - Caltex Site Boundary

Wednesday, 5 April 2017



NSW Industrial Noise Policy (Free Field)			
Descriptor	Day[2]	Evening[3]	Night[4 5]
L_{90}	50.3	42.4	-
LAeq	52.6	48.4	-

Night Time Maximum Noise Levels			(see note 7)
L_{Max} (Range)	66.9	to	78.4
L_{Max} - L_{eq} (Range)	17.3	to	24.5

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	54.3	51.2
$L_{eq\ 1hr}$ upper 10 percentile	56.3	57.7
$L_{eq\ 1hr}$ lower 10 percentile	49.5	44.9

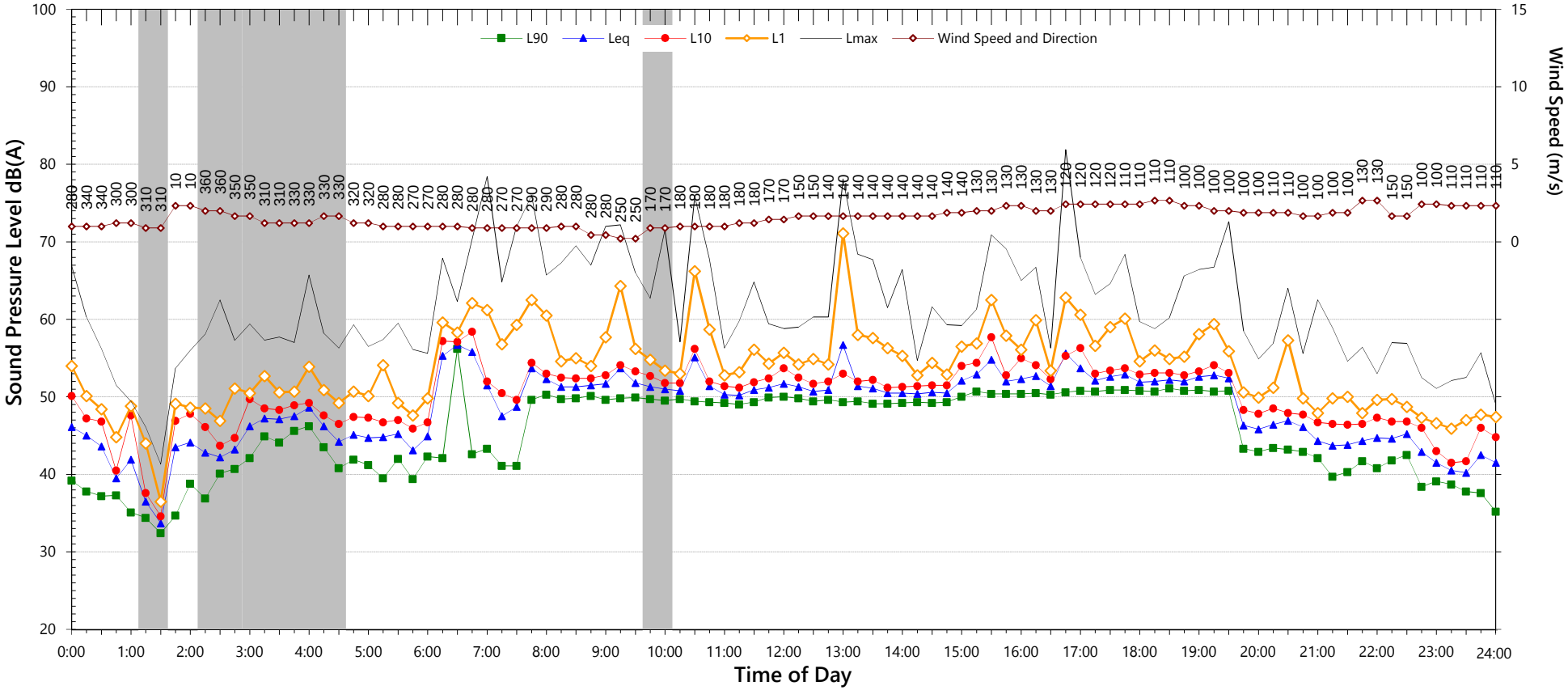
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am til 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. Night time L_{Max} values are shown only where L_{Max} >65dB(A) and where L_{Max}- Leq ≥15dB(A)

Unattended Noise Monitoring Results

Wickham Wool Stores - Caltex Site Boundary

Thursday, 6 April 2017



NSW Industrial Noise Policy (Free Field)			
Descriptor	Day[2]	Evening[3]	Night[4 5]
L_{90}	49.1	40.3	37.6
LAeq	52.2	49.3	46.1

Night Time Maximum Noise Levels			(see note 7)
L_{Max} (Range)	69.7	to	71.0
L_{Max} - L_{eq} (Range)	20.4	to	21.6

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	54.1	48.6
$L_{eq\ 1hr}$ upper 10 percentile	55.9	52.9
$L_{eq\ 1hr}$ lower 10 percentile	47.7	43.8

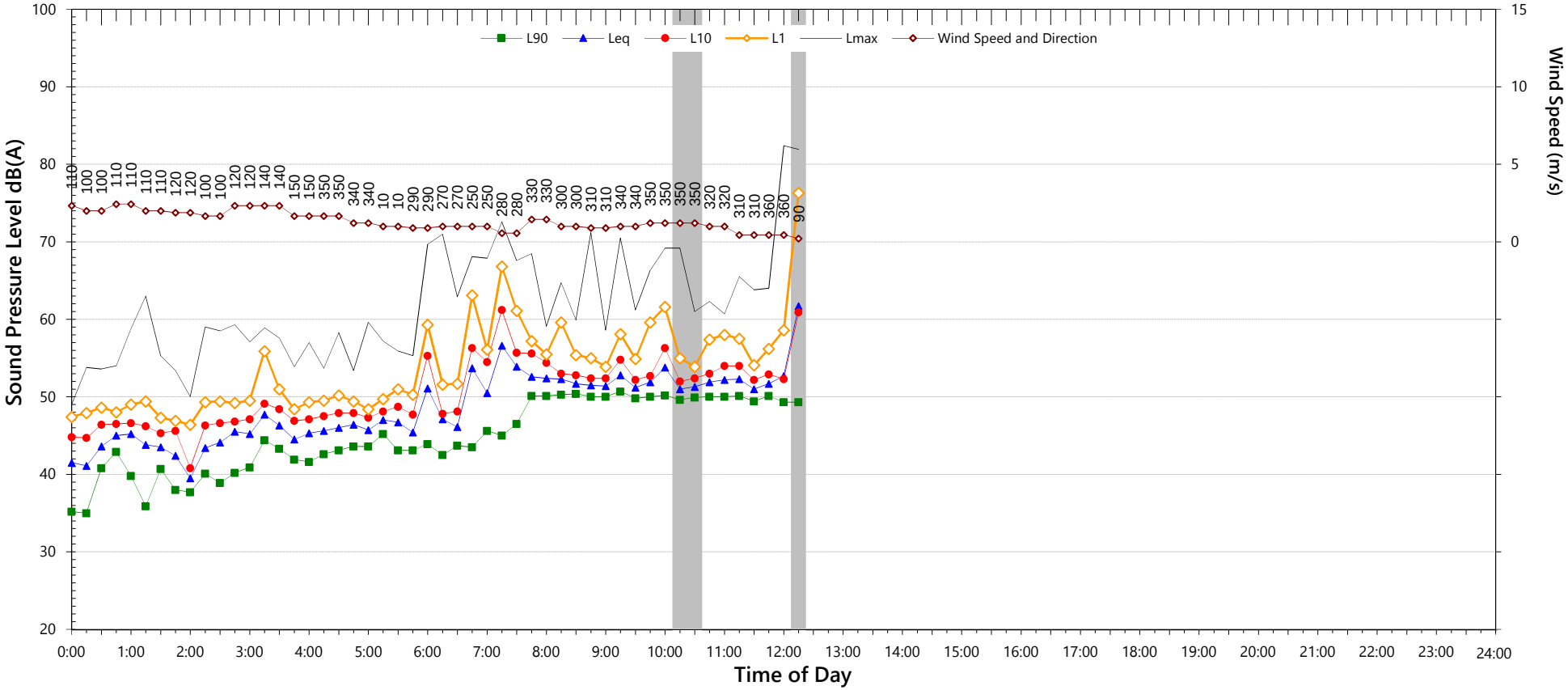
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am til 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. Night time L_{Max} values are shown only where L_{Max} >65dB(A) and where L_{Max}- Leq ≥15dB(A)

Unattended Noise Monitoring Results

Wickham Wool Stores - Caltex Site Boundary

Friday, 7 April 2017



NSW Industrial Noise Policy (Free Field)			
Descriptor	**Day[2]**	**Evening[3]**	**Night[4 5]**
L_{90}	-	-	-
LAeq	-	-	-

Night Time Maximum Noise Levels			(see note 7)
L_{Max} (Range)	-	to	-
L_{Max} - L_{eq} (Range)	-	to	-

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	**Day**	**Night[5]**
	7am-10pm	**10pm-7am**
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	55.2	-
$L_{eq\ 1hr}$ upper 10 percentile	56.7	-
$L_{eq\ 1hr}$ lower 10 percentile	54.2	-

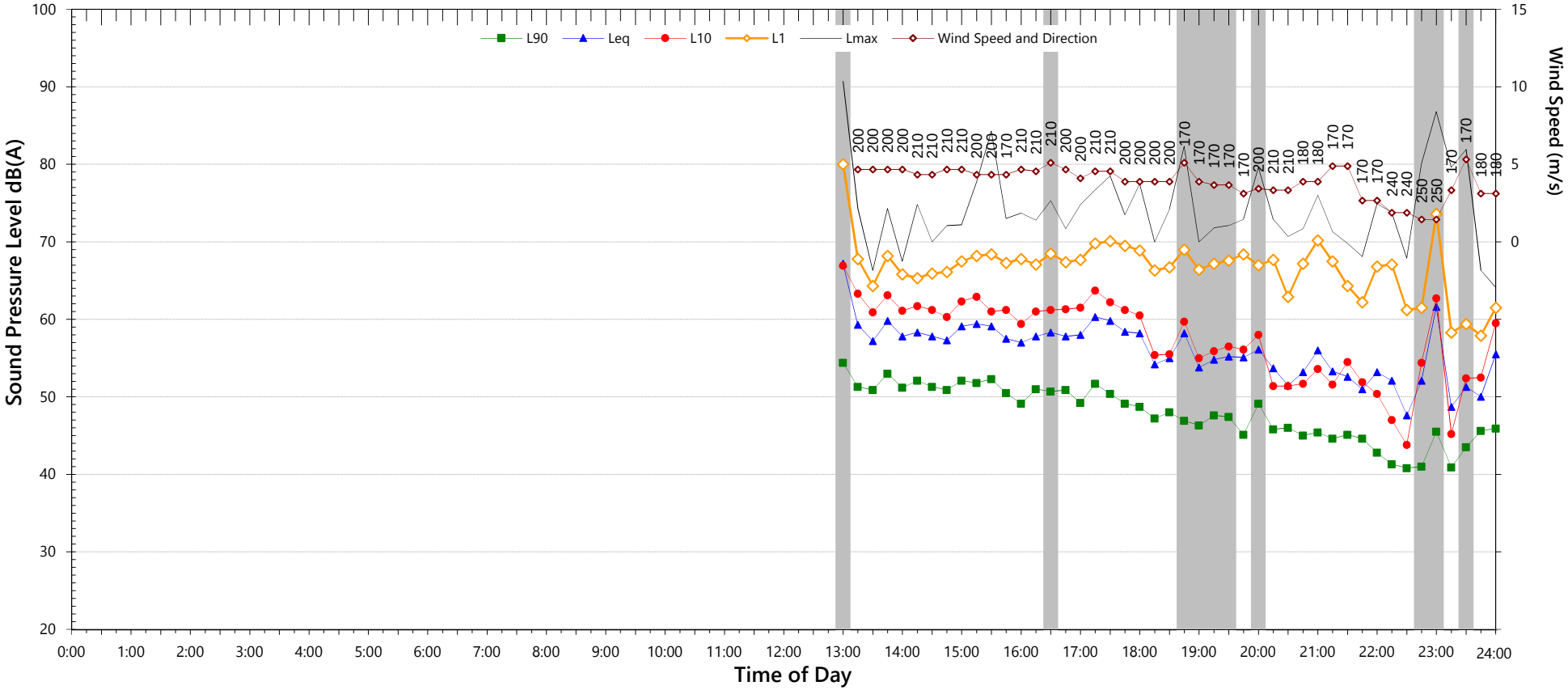
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am til 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. Night time L_{Max} values are shown only where L_{Max} >65dB(A) and where L_{Max}- Leq ≥15dB(A)

Unattended Noise Monitoring Results

Wickham Wool Stores - Annie Street

Friday, 31 March 2017



NSW Industrial Noise Policy (Free Field)			
Descriptor	**Day[2]**	**Evening[3]**	**Night[4 5]**
L_{90}	-	-	-
LAeq	-	-	-

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	**Day**	**Night[5]**
	7am-10pm	**10pm-7am**
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	59.8	55.2
$L_{eq\ 1hr}$ upper 10 percentile	61.8	60.4
$L_{eq\ 1hr}$ lower 10 percentile	55.1	42.0

Night Time Maximum Noise Levels			(see note 7)
L_{Max} (Range)	69.9	to	80.9
L_{Max} - L_{eq} (Range)	17.2	to	28.9

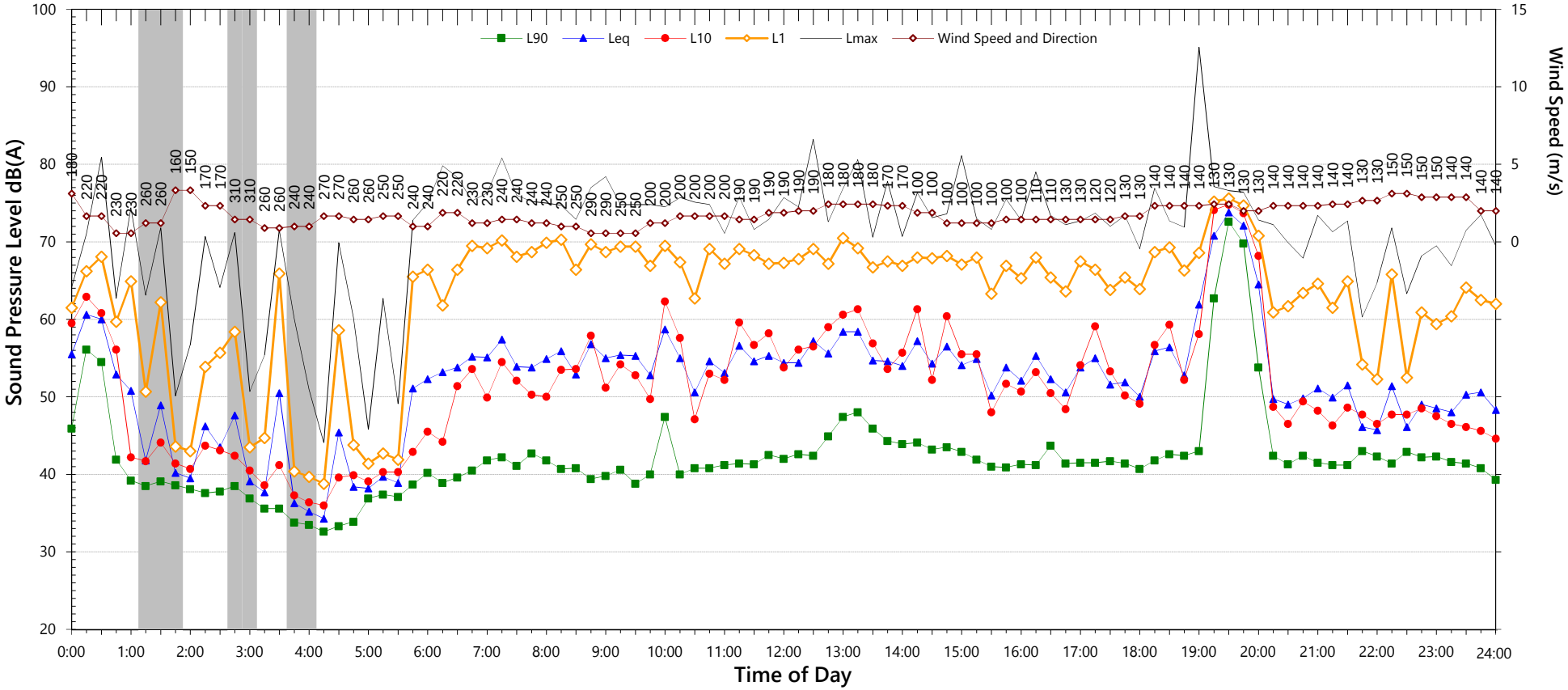
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am til 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. Night time L_{Max} values are shown only where L_{Max} >65dB(A) and where L_{Max}- Leq ≥15dB(A)

Unattended Noise Monitoring Results

Wickham Wool Stores - Annie Street

Saturday, 1 April 2017



NSW Industrial Noise Policy (Free Field)			
Descriptor	**Day[2]**	**Evening[3]**	**Night[4 5]**
L_{90}	40.0	41.2	-
LAeq	55.0	65.6	-

Night Time Maximum Noise Levels			(see note 7)
L_{Max} (Range)	70.9	to	81.7
L_{Max} - L_{eq} (Range)	18.5	to	26.0

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	**Day**	**Night[5]**
	7am-10pm	**10pm-7am**
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	63.3	55.8
$L_{eq\ 1hr}$ upper 10 percentile	71.1	60.3
$L_{eq\ 1hr}$ lower 10 percentile	52.0	50.3

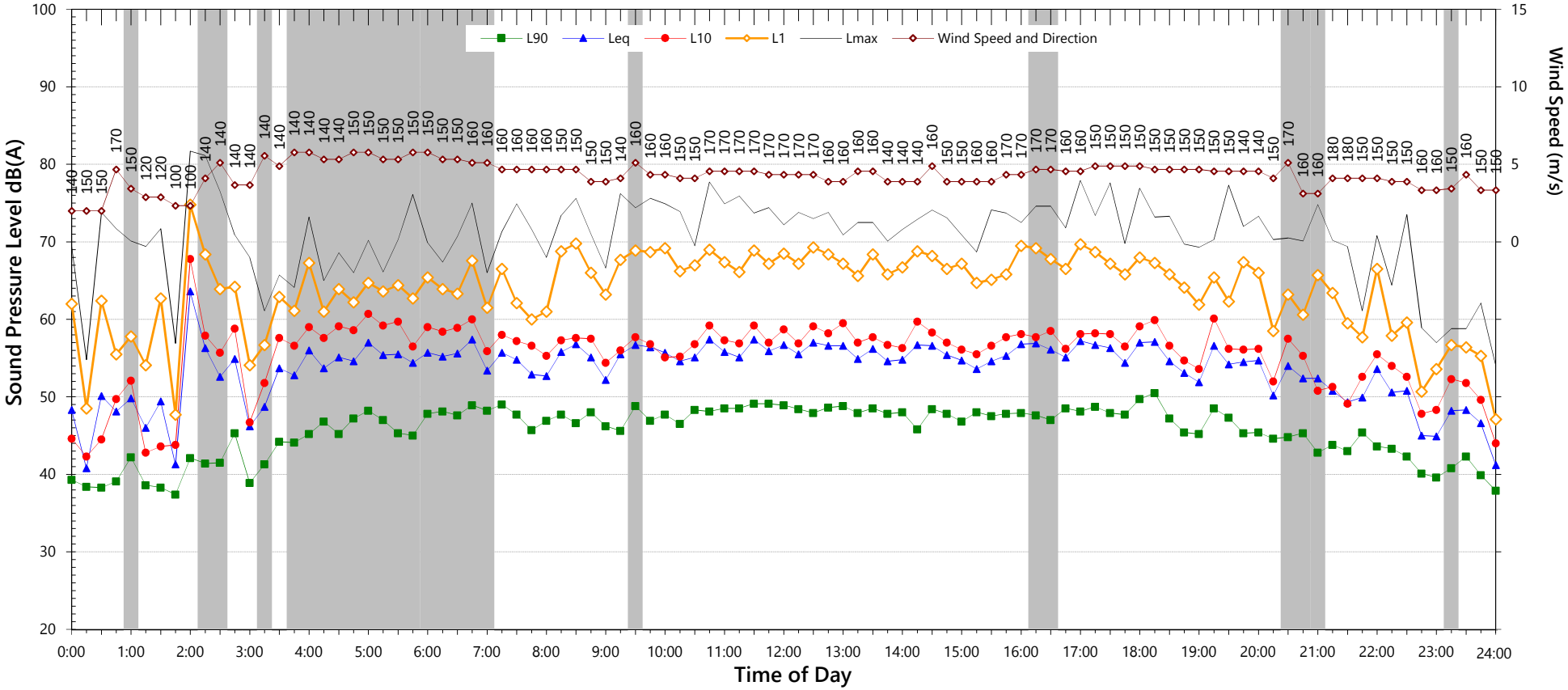
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am til 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. Night time L_{Max} values are shown only where L_{Max} >65dB(A) and where L_{Max}- Leq ≥15dB(A)

Unattended Noise Monitoring Results

Wickham Wool Stores - Annie Street

Sunday, 2 April 2017



NSW Industrial Noise Policy (Free Field)			
Descriptor	Day[2]	Evening[3]	Night[4 5]
L_{90}	46.5	-	37.1
LAeq	55.9	-	50.1

Night Time Maximum Noise Levels			(see note 7)
L_{Max} (Range)	66.4	to	79.7
L_{Max} - L_{eq} (Range)	15.9	to	27.1

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	57.8	52.6
$L_{eq\ 1hr}$ upper 10 percentile	58.9	59.6
$L_{eq\ 1hr}$ lower 10 percentile	53.3	45.5

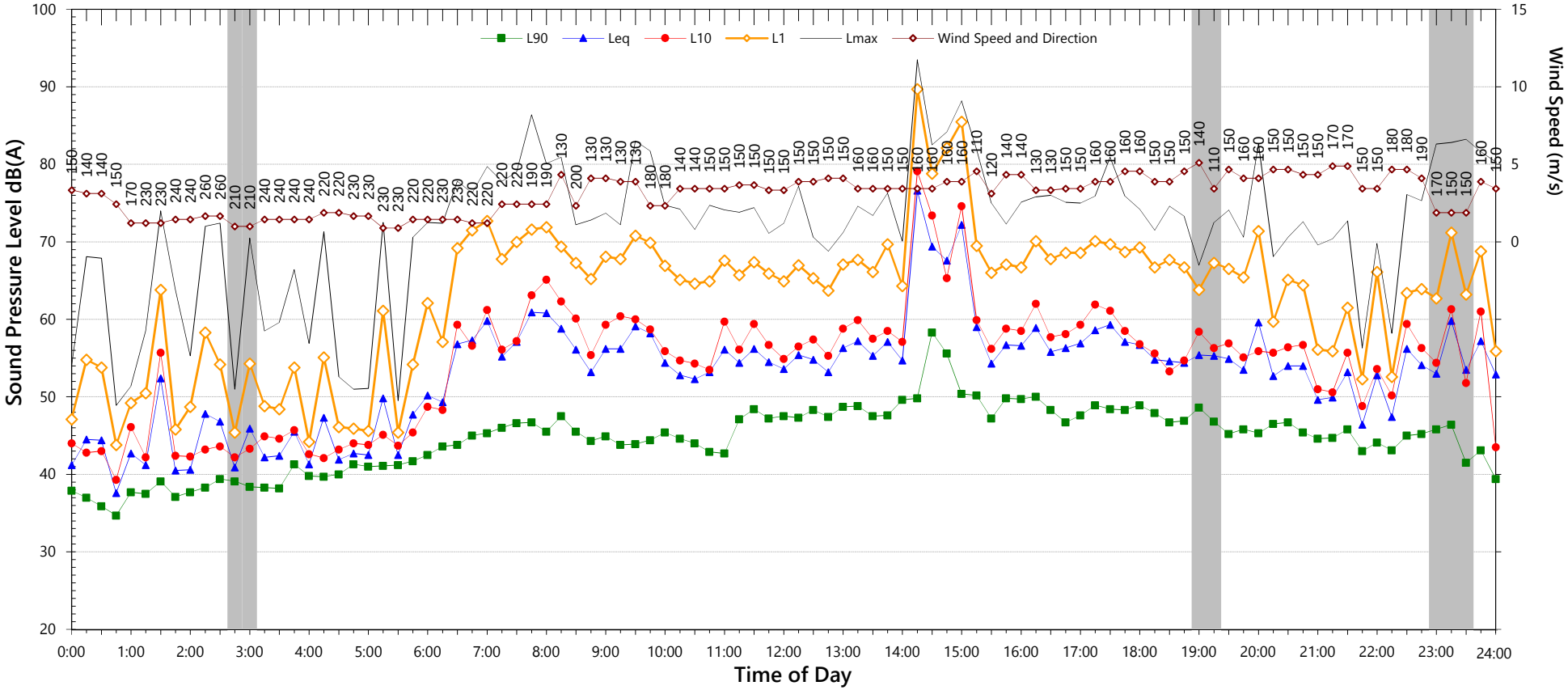
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am til 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. Night time L_{Max} values are shown only where L_{Max} >65dB(A) and where L_{Max}- Leq ≥15dB(A)

Unattended Noise Monitoring Results

Wickham Wool Stores - Annie Street

Monday, 3 April 2017



NSW Industrial Noise Policy (Free Field)			
Descriptor	**Day[2]**	**Evening[3]**	**Night[4 5]**
L_{90}	44.0	44.1	-
LAeq	63.4	54.1	-

Night Time Maximum Noise Levels			(see note 7)
L_{Max} (Range)	66.9	to	81.6
L_{Max} - L_{eq} (Range)	18.4	to	27.3

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	**Day**	**Night[5]**
	7am-10pm	**10pm-7am**
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	64.8	57.5
$L_{eq\ 1hr}$ upper 10 percentile	72.5	64.4
$L_{eq\ 1hr}$ lower 10 percentile	54.7	48.3

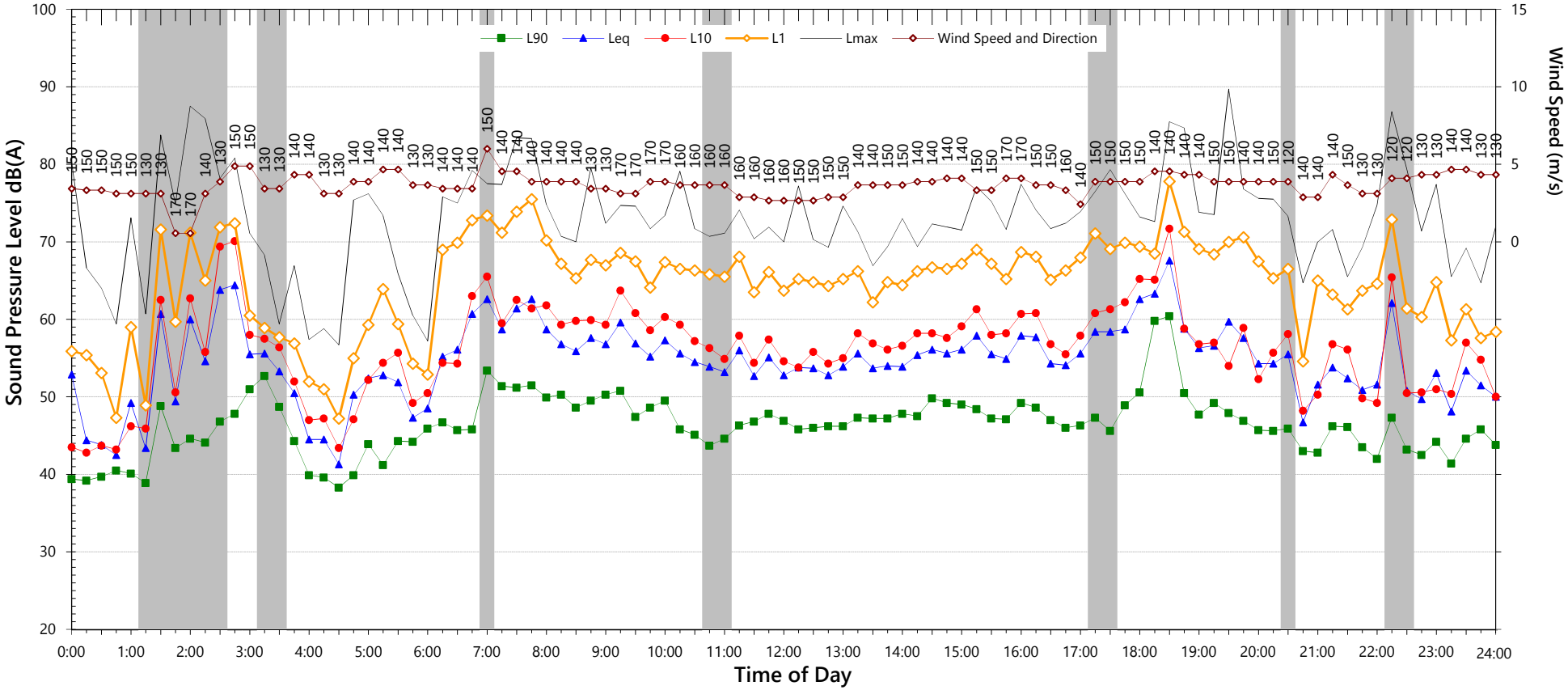
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am til 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. Night time L_{Max} values are shown only where L_{Max} >65dB(A) and where L_{Max}- Leq ≥15dB(A)

Unattended Noise Monitoring Results

Wickham Wool Stores - Annie Street

Tuesday, 4 April 2017



NSW Industrial Noise Policy (Free Field)			
Descriptor	Day[2]	Evening[3]	Night[4 5]
L_{90}	46.0	42.8	35.8
LAeq	57.0	59.2	49.6

Night Time Maximum Noise Levels			(see note 7)
L_{Max} (Range)	65.5	to	79.6
L_{Max} - L_{eq} (Range)	20.8	to	28.5

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	60.2	52.1
$L_{eq\ 1hr}$ upper 10 percentile	65.0	56.5
$L_{eq\ 1hr}$ lower 10 percentile	54.6	43.8

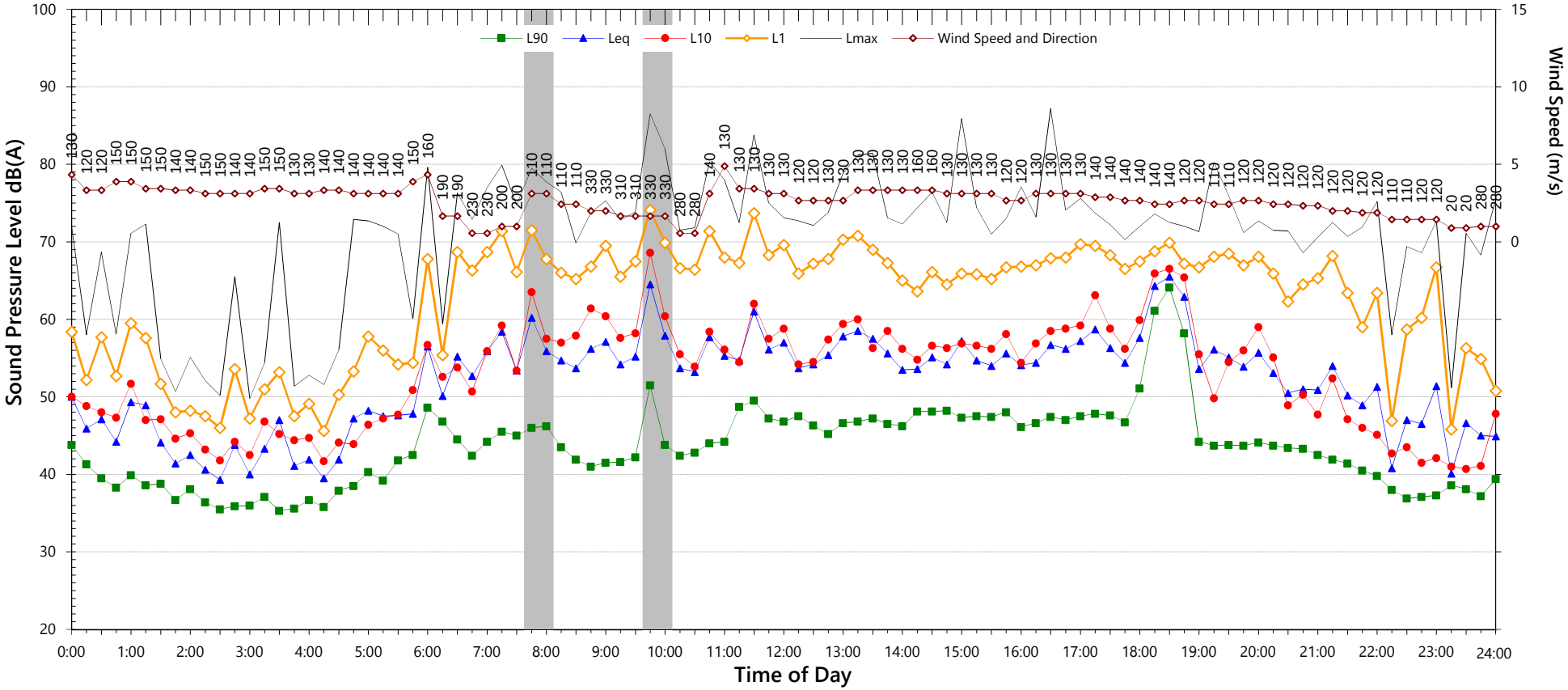
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am til 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. Night time L_{Max} values are shown only where L_{Max} >65dB(A) and where L_{Max}- Leq ≥15dB(A)

Unattended Noise Monitoring Results

Wickham Wool Stores - Annie Street

Wednesday, 5 April 2017



NSW Industrial Noise Policy (Free Field)			
Descriptor	Day[2]	Evening[3]	Night[4 5]
L_{90}	42.1	40.5	-
LAeq	56.1	58.3	-

Night Time Maximum Noise Levels			(see note 7)
L_{Max} (Range)	71.4	to	80.0
L_{Max} - L_{eq} (Range)	19.6	to	30.8

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	59.4	55.2
$L_{eq\ 1hr}$ upper 10 percentile	63.8	60.3
$L_{eq\ 1hr}$ lower 10 percentile	54.0	43.2

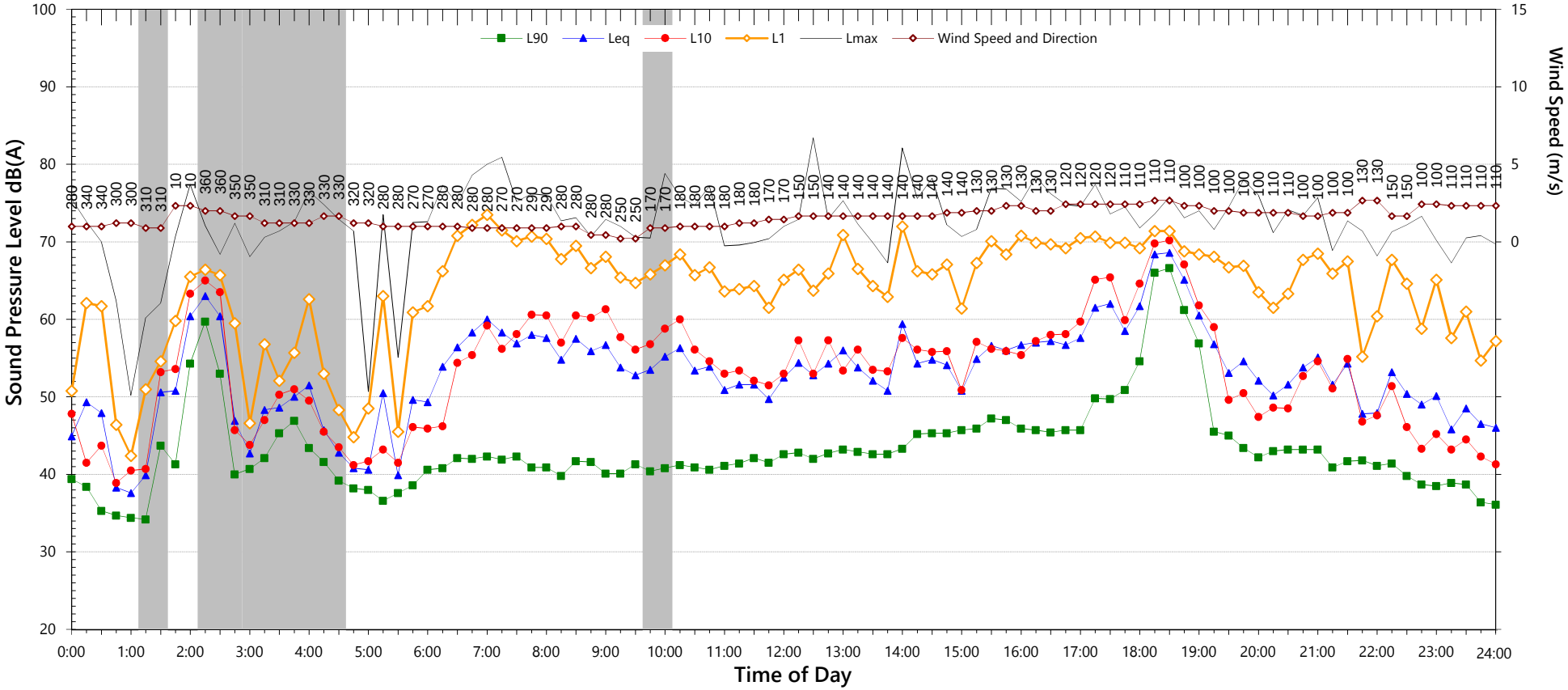
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am til 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. Night time L_{Max} values are shown only where L_{Max} >65dB(A) and where L_{Max}- Leq ≥15dB(A)

Unattended Noise Monitoring Results

Wickham Wool Stores - Annie Street

Thursday, 6 April 2017



NSW Industrial Noise Policy (Free Field)			
Descriptor	**Day[2]**	**Evening[3]**	**Night[4 5]**
L_{90}	40.9	41.1	36.1
LAeq	56.4	61.2	50.1

Night Time Maximum Noise Levels			(see note 7)
L_{Max} (Range)	65.8	to	77.4
L_{Max} - L_{eq} (Range)	20.5	to	28.5

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	**Day**	**Night[5]**
	7am-10pm	**10pm-7am**
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	60.8	52.6
$L_{eq\ 1hr}$ upper 10 percentile	67.2	59.4
$L_{eq\ 1hr}$ lower 10 percentile	53.9	43.6

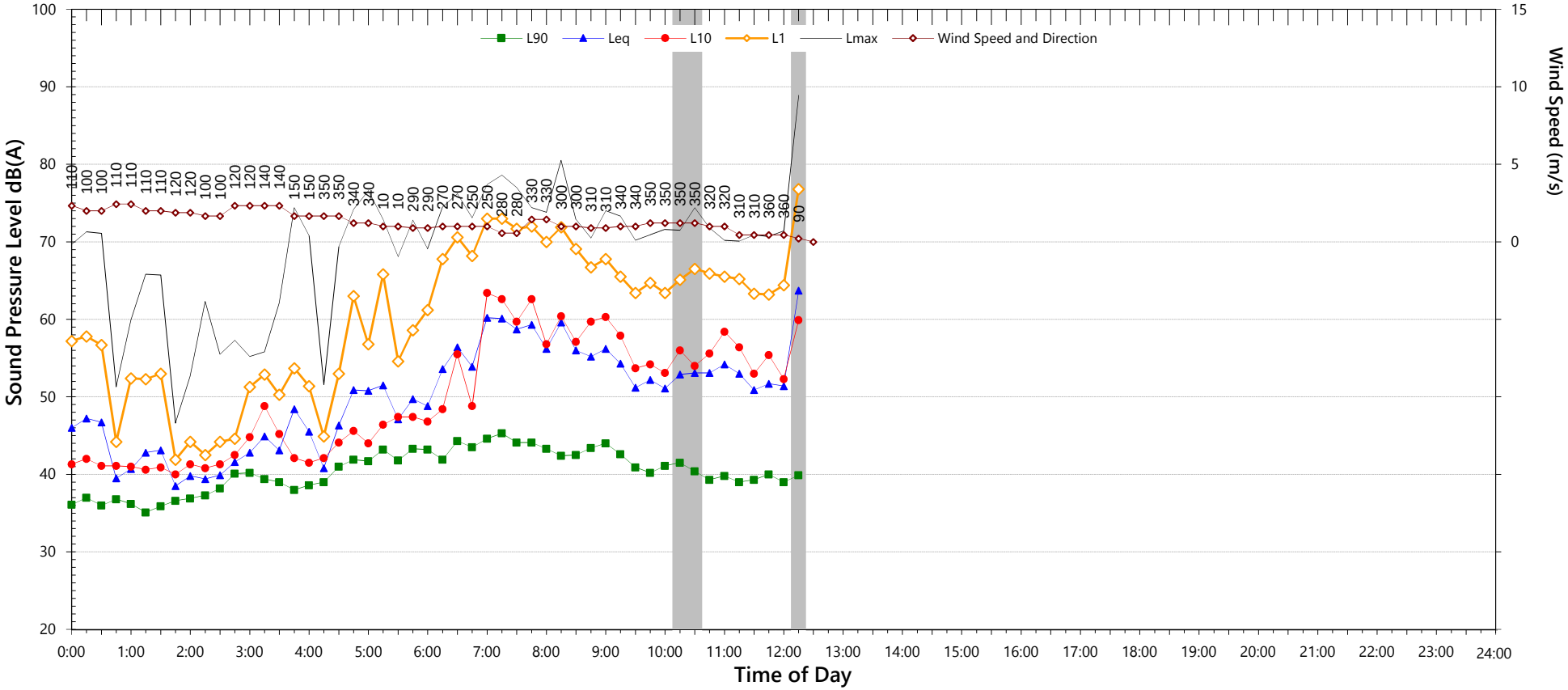
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am til 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. Night time L_{Max} values are shown only where L_{Max} >65dB(A) and where L_{Max}- Leq ≥15dB(A)

Unattended Noise Monitoring Results

Wickham Wool Stores - Annie Street

Friday, 7 April 2017



NSW Industrial Noise Policy (Free Field)			
Descriptor	**Day[2]**	**Evening[3]**	**Night[4 5]**
L_{90}	-	-	-
LAeq	-	-	-

Night Time Maximum Noise Levels			(see note 7)
L_{Max} (Range)	-	to	-
L_{Max} - L_{eq} (Range)	-	to	-

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	**Day**	**Night[5]**
	7am-10pm	**10pm-7am**
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	58.3	-
$L_{eq\ 1hr}$ upper 10 percentile	61.3	-
$L_{eq\ 1hr}$ lower 10 percentile	54.3	-

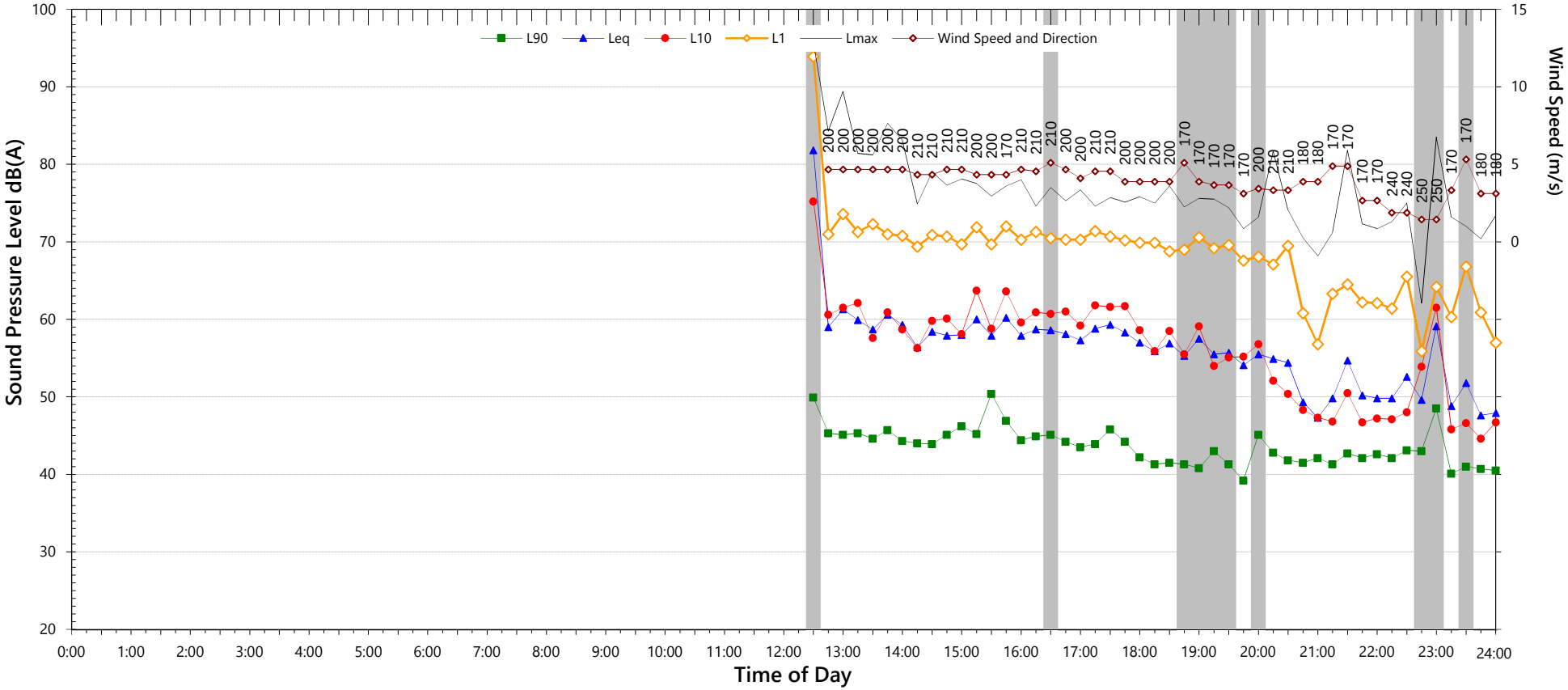
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am til 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. Night time L_{Max} values are shown only where L_{Max} >65dB(A) and where L_{Max}- Leq ≥15dB(A)

Unattended Noise Monitoring Results

Wickham Wool Stores - Milford Street

Friday, 31 March 2017



NSW Industrial Noise Policy (Free Field)			
Descriptor	**Day[2]**	**Evening[3]**	**Night[4 5]**
L_{90}	-	-	-
LAeq	-	-	-

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	**Day**	**Night[5]**
	7am-10pm	**10pm-7am**
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	60.2	50.7
$L_{eq\ 1hr}$ upper 10 percentile	62.8	53.9
$L_{eq\ 1hr}$ lower 10 percentile	54.2	43.8

Night Time Maximum Noise Levels			(see note 7)
L_{Max} (Range)	67.8	to	75.7
L_{Max} - L_{eq} (Range)	23.6	to	27.2

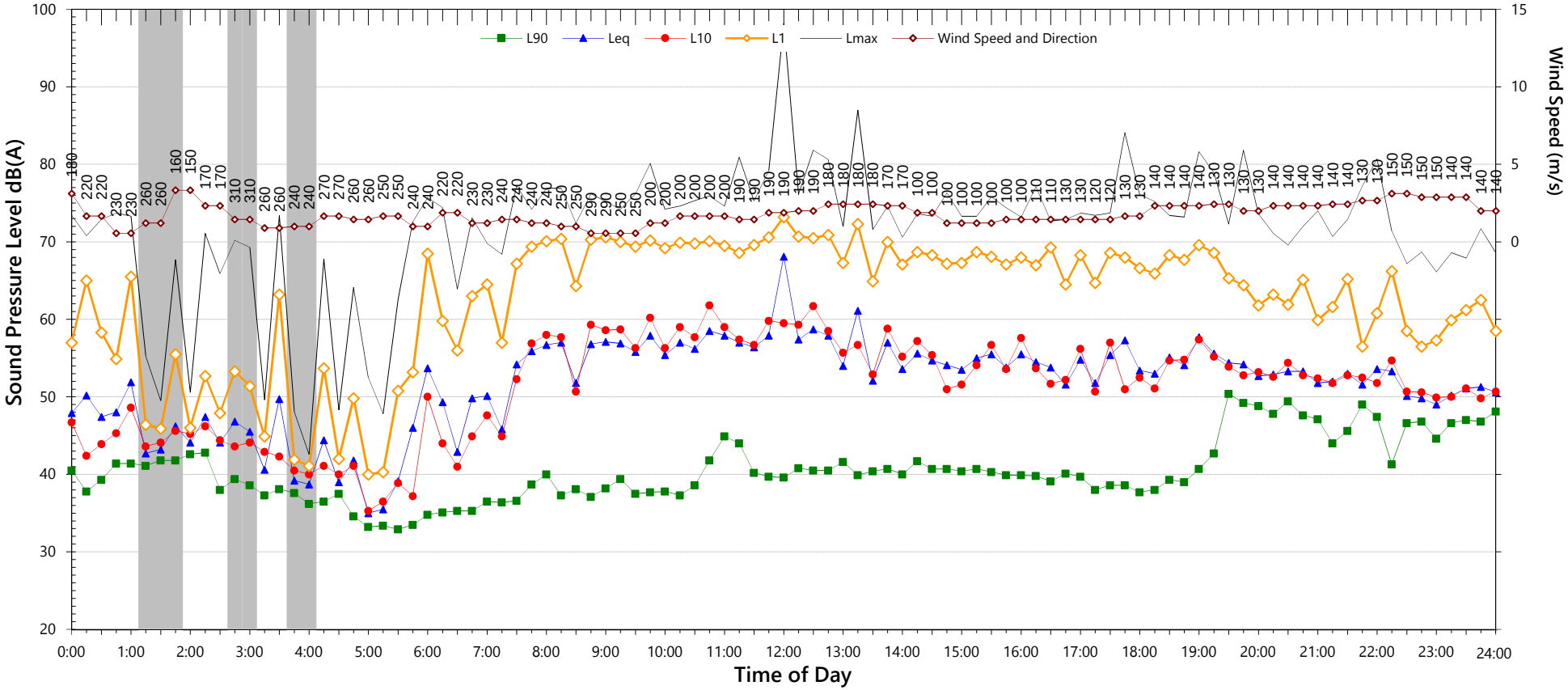
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am til 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. Night time L_{Max} values are shown only where L_{Max} >65dB(A) and where L_{Max}- Leq ≥15dB(A)

Unattended Noise Monitoring Results

Wickham Wool Stores - Milford Street

Saturday, 1 April 2017



NSW Industrial Noise Policy (Free Field)			
Descriptor	**Day[2]**	**Evening[3]**	**Night[4 5]**
L_{90}	37.3	39.0	-
LAeq	57.3	53.9	-

Night Time Maximum Noise Levels			(see note 7)
L_{Max} (Range)	71.1	to	79.5
L_{Max} - L_{eq} (Range)	16.8	to	29.0

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	**Day**	**Night[5]**
	7am-10pm	**10pm-7am**
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	59.2	54.6
$L_{eq\ 1hr}$ upper 10 percentile	63.6	58.1
$L_{eq\ 1hr}$ lower 10 percentile	55.2	49.0

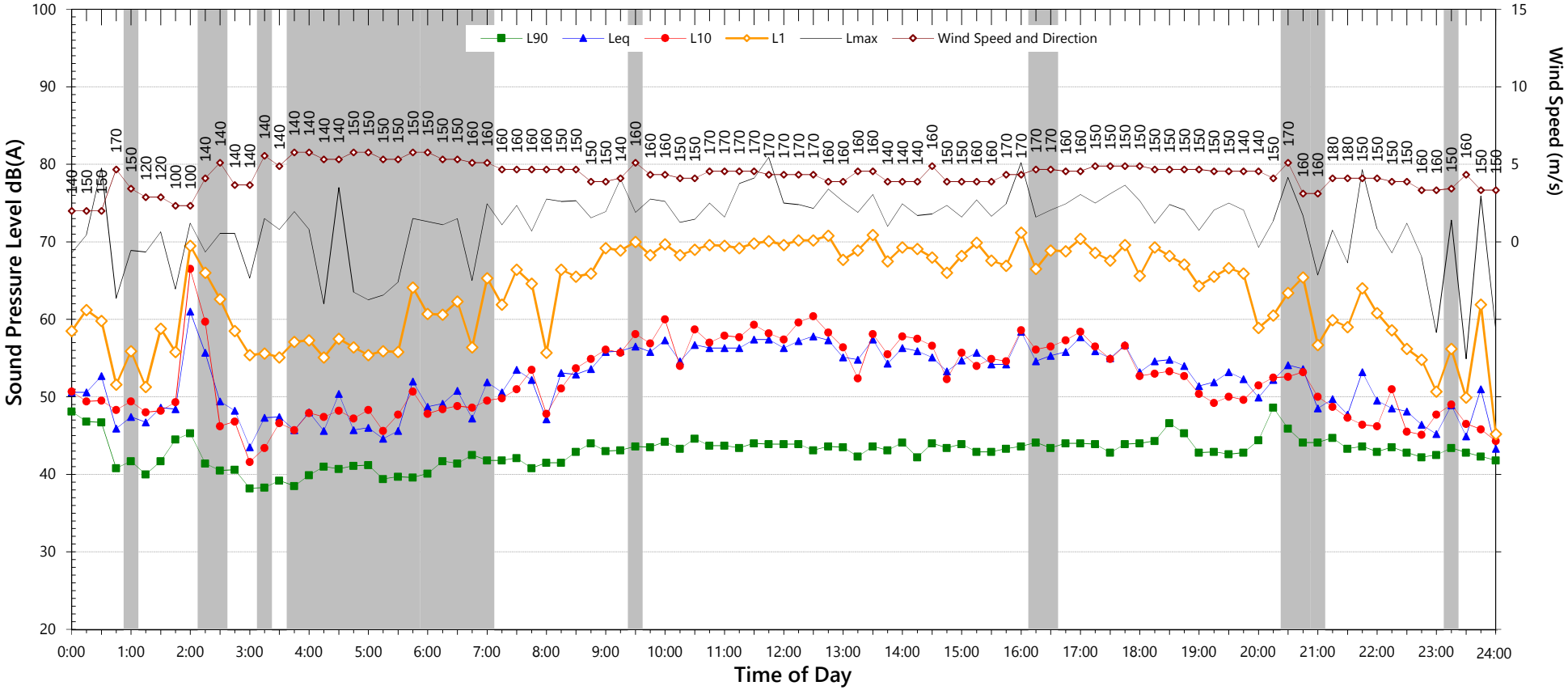
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am til 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. Night time L_{Max} values are shown only where L_{Max} >65dB(A) and where L_{Max}- Leq ≥15dB(A)

Unattended Noise Monitoring Results

Wickham Wool Stores - Milford Street

Sunday, 2 April 2017



NSW Industrial Noise Policy (Free Field)			
Descriptor	Day[2]	Evening[3]	Night[4 5]
L_{90}	42.8	-	36.0
LAeq	56.0	-	50.7

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	57.6	53.2
$L_{eq\ 1hr}$ upper 10 percentile	59.4	60.0
$L_{eq\ 1hr}$ lower 10 percentile	53.5	45.5

Night Time Maximum Noise Levels			(see note 7)
L_{Max} (Range)	70.6	to	87.6
L_{Max} - L_{eq} (Range)	22.9	to	31.8

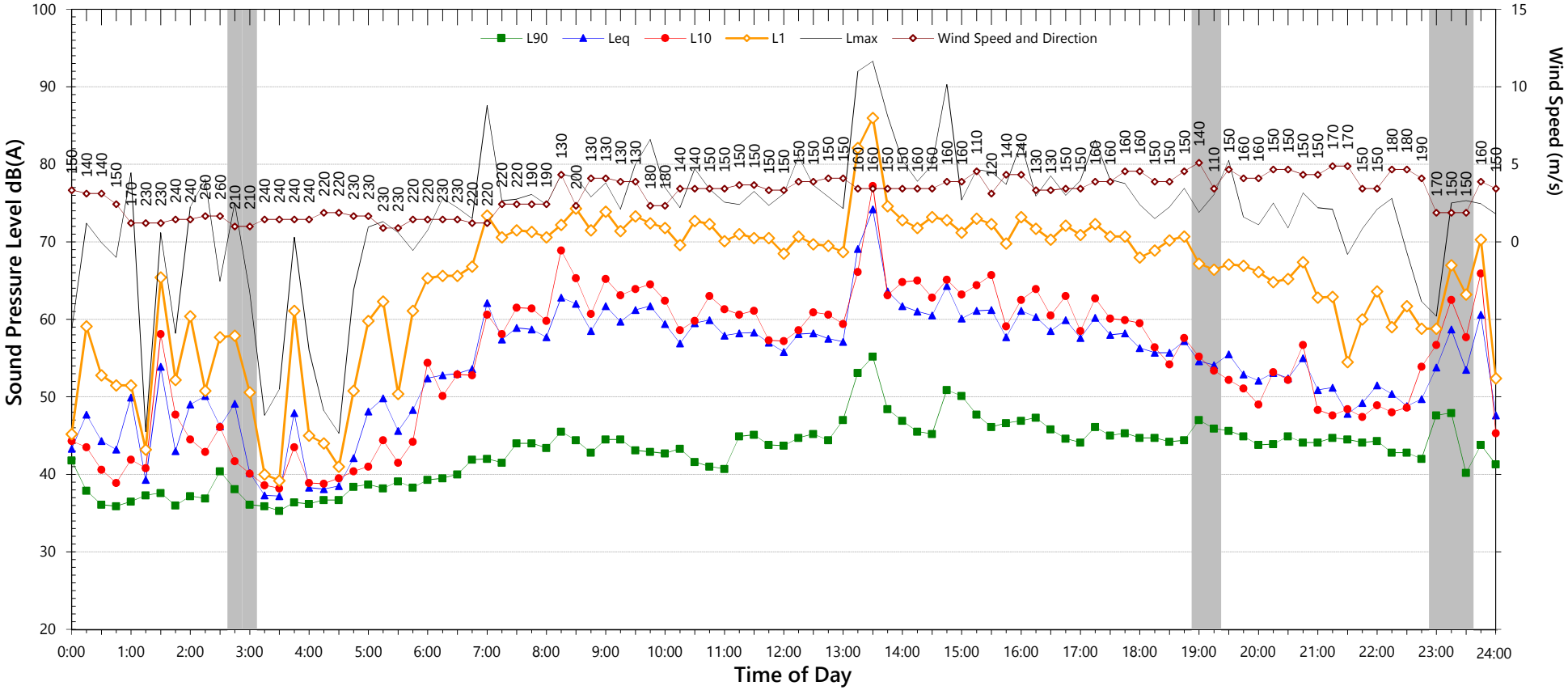
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am til 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. Night time L_{Max} values are shown only where L_{Max} >65dB(A) and where L_{Max}- Leq ≥15dB(A)

Unattended Noise Monitoring Results

Wickham Wool Stores - Milford Street

Monday, 3 April 2017



NSW Industrial Noise Policy (Free Field)			
Descriptor	Day[2]	Evening[3]	Night[4 5]
L_{90}	42.7	43.9	-
LAeq	62.3	53.6	-

Night Time Maximum Noise Levels			(see note 7)
L_{Max} (Range)	65.8	to	79.4
L_{Max} - L_{eq} (Range)	17.1	to	27.4

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	63.8	54.2
$L_{eq\ 1hr}$ upper 10 percentile	69.9	60.3
$L_{eq\ 1hr}$ lower 10 percentile	54.4	45.3

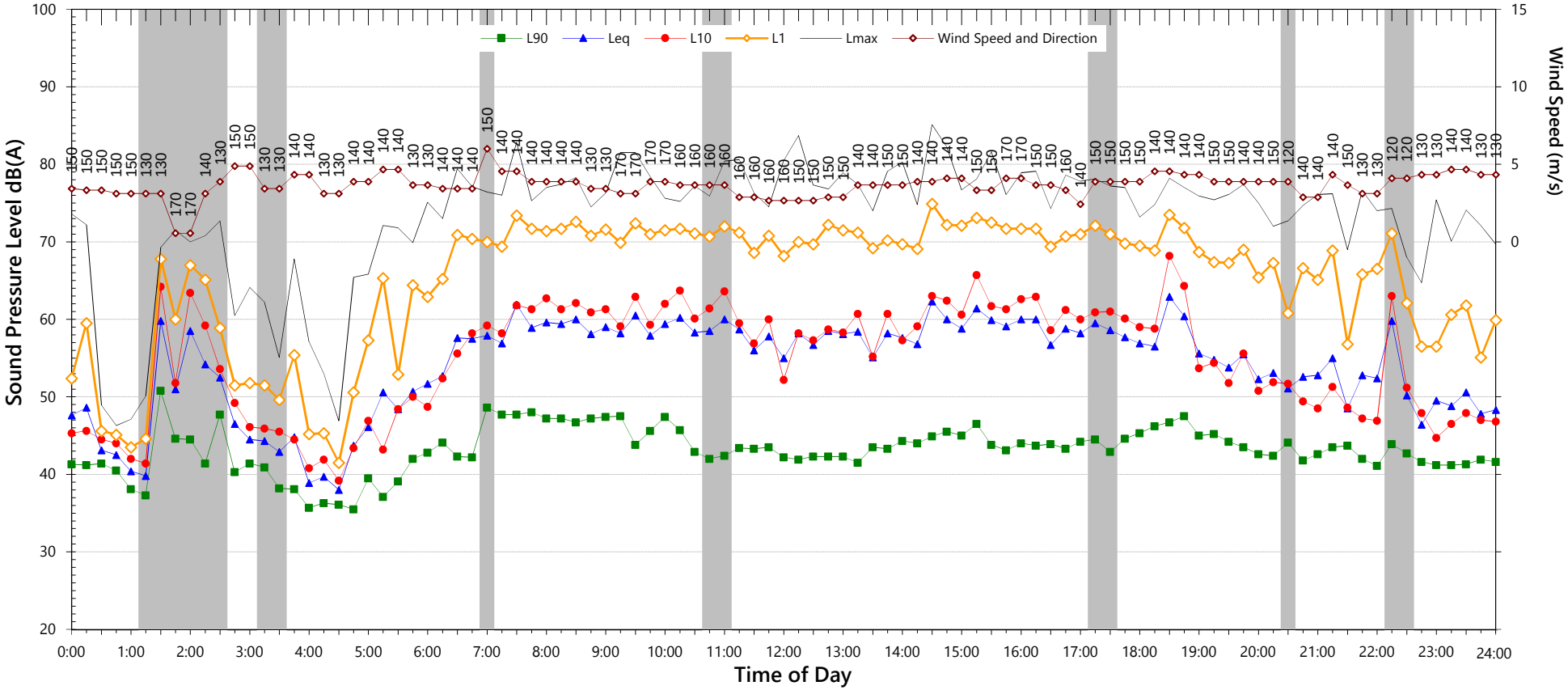
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am til 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. Night time L_{Max} values are shown only where L_{Max} >65dB(A) and where L_{Max}- Leq ≥15dB(A)

Unattended Noise Monitoring Results

Wickham Wool Stores - Milford Street

Tuesday, 4 April 2017



NSW Industrial Noise Policy (Free Field)			
Descriptor	Day[2]	Evening[3]	Night[4 5]
L_{90}	42.3	41.8	35.9
LAeq	58.9	56.2	49.6

Night Time Maximum Noise Levels			(see note 7)
L_{Max} (Range)	66.3	to	80.7
L_{Max} - L_{eq} (Range)	15.4	to	28.1

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	60.8	52.1
$L_{eq\ 1hr}$ upper 10 percentile	62.6	59.3
$L_{eq\ 1hr}$ lower 10 percentile	55.3	41.1

Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
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3. "Evening" is the period from 6pm till 10pm
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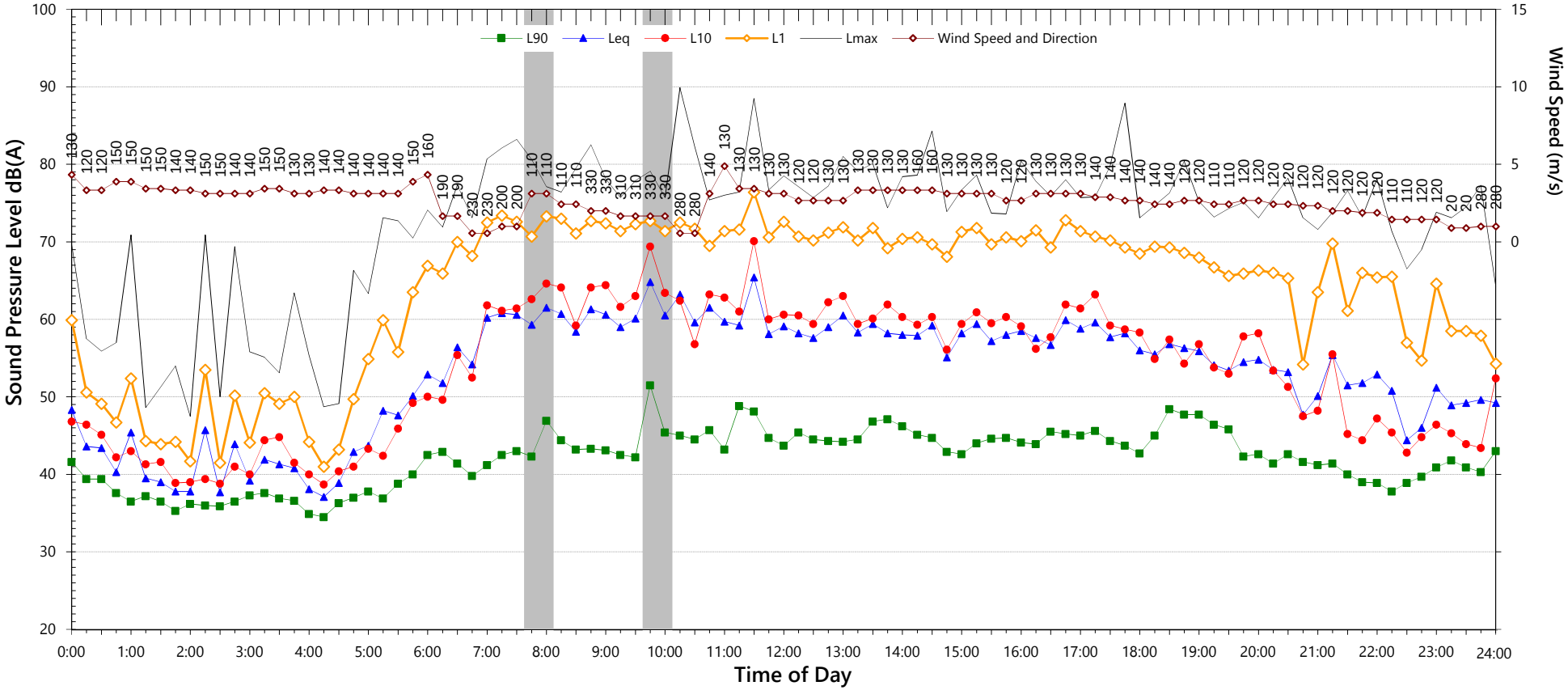
7. Night time L_{Max} values are shown only where L_{Max} >65dB(A) and where L_{Max}- Leq ≥15dB(A)

Unattended Noise Monitoring Results

Wickham Wool Stores - Milford Street

Wednesday, 5 April 2017



NSW Industrial Noise Policy (Free Field)			
Descriptor	Day[2]	Evening[3]	Night[4 5]
L_{90}	42.7	39.0	-
LAeq	59.6	54.1	-

NSW Road Noise Policy (1m from facade)	(see note 6)	
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	61.1	54.8
$L_{eq\ 1hr}$ upper 10 percentile	63.9	60.5
$L_{eq\ 1hr}$ lower 10 percentile	55.0	49.9

Night Time Maximum Noise Levels			(see note 7)
L_{Max} (Range)	71.5	to	88.0
L_{Max} - L_{eq} (Range)	23.3	to	32.2

Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
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3. "Evening" is the period from 6pm till 10pm
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5. "Night" relates to period from 10pm on this graph to morning on the following graph.
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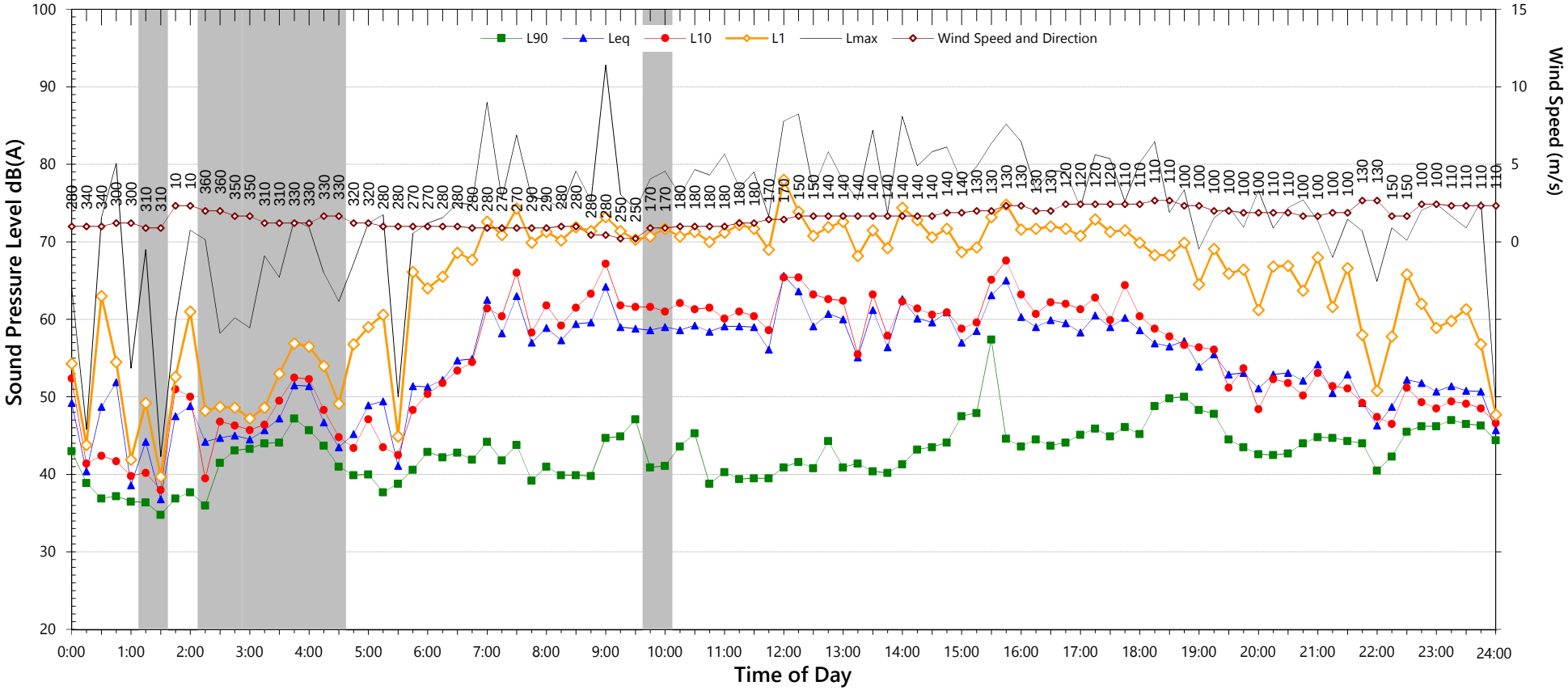
7. Night time L_{Max} values are shown only where L_{Max} >65dB(A) and where L_{Max}- Leq ≥15dB(A)

Unattended Noise Monitoring Results

Wickham Wool Stores - Milford Street

Thursday, 6 April 2017



NSW Industrial Noise Policy (Free Field)			
Descriptor	**Day[2]**	**Evening[3]**	**Night[4 5]**
L_{90}	39.5	42.5	41.3
LAeq	60.4	53.8	50.1

Night Time Maximum Noise Levels			(see note 7)
L_{Max} (Range)	72.2	to	78.9
L_{Max} - L_{eq} (Range)	21.0	to	29.4

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	**Day**	**Night[5]**
	7am-10pm	**10pm-7am**
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	61.8	52.6
$L_{eq\ 1hr}$ upper 10 percentile	64.5	57.5
$L_{eq\ 1hr}$ lower 10 percentile	54.5	46.0

Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
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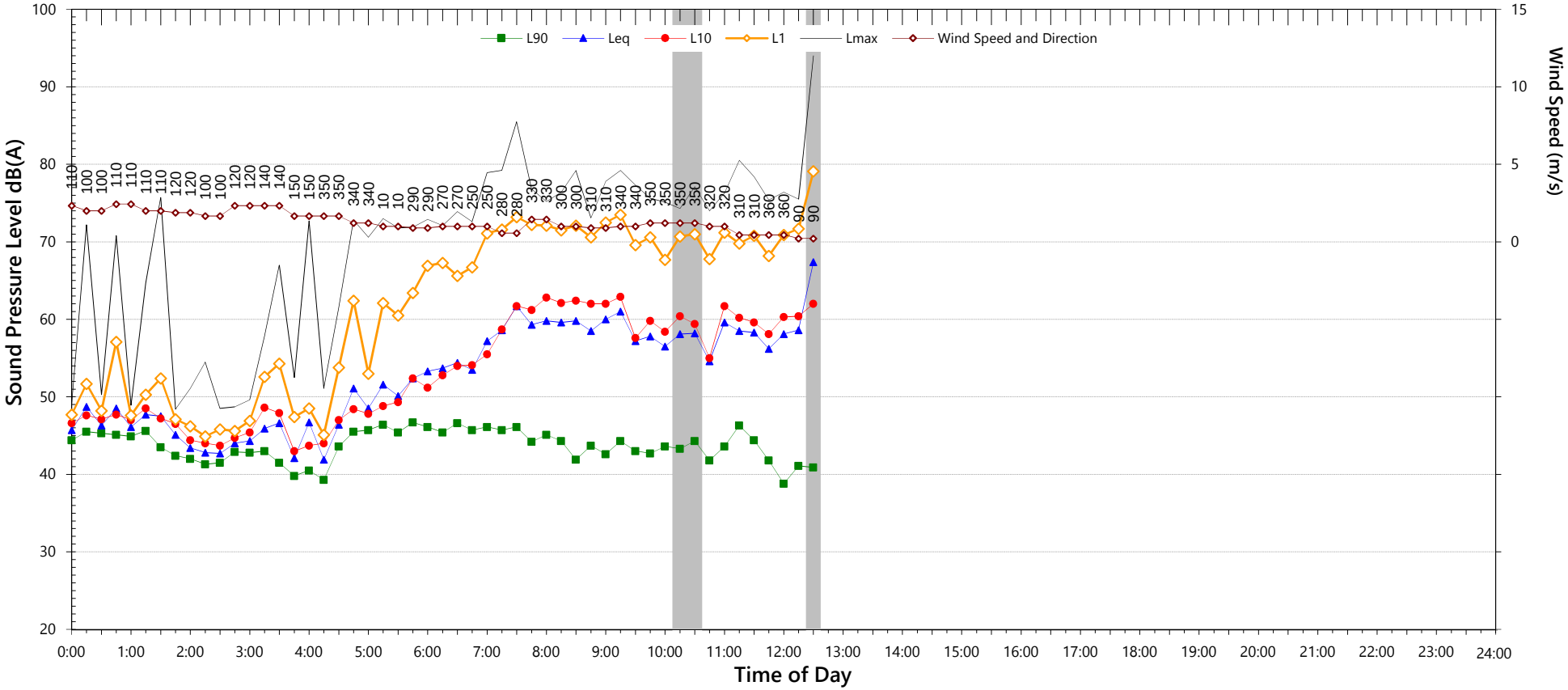
Unattended Noise Monitoring Results

Wickham Wool Stores - Milford Street

Friday, 7 April 2017



NSW Industrial Noise Policy (Free Field)			
Descriptor	**Day[2]**	**Evening[3]**	**Night[4 5]**
L_{90}	-	-	-
LAeq	-	-	-

Night Time Maximum Noise Levels			(see note 7)
L_{Max} (Range)	-	to	-
L_{Max} - L_{eq} (Range)	-	to	-

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	**Day**	**Night[5]**
	7am-10pm	**10pm-7am**
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	61.4	-
$L_{eq\ 1hr}$ upper 10 percentile	62.5	-
$L_{eq\ 1hr}$ lower 10 percentile	60.3	-

Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am til 6pm on other days
3. "Evening" is the period from 6pm till 10pm
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6. Graphed data measured in free-field; tabulated results facade corrected
7. Night time L_{Max} values are shown only where L_{Max} >65dB(A) and where L_{Max}- Leq ≥15dB(A)

RENZO TONIN & ASSOCIATES
inspired to achieve

Acoustics
Vibration
Structural Dynamics

WICKHAM WOOLSTORES

Traffic noise generation assessment

4 July 2017

Investec

TJ639-01F03 Traffic noise generation (r0).docx

Sydney Melbourne Brisbane Gold Coast Kuwait
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Attention:	Ivan Goodman

Document control

Date	Revision history	Non-issued revision	Issued revision	Prepared	Instructed	Authorised
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Figure 5 - Caltex Site boundary logger location 12

1 Introduction

Renzo Tonin & Associates was engaged to asses traffic noise generation for the proposed Wickham Wool Stores Development at Newcastle.

The work documented in this report was carried out in accordance with the Renzo Tonin & Associates Quality Assurance System, which is based on Australian Standard / NZS ISO 9001. Appendix A contains a glossary of acoustic terms used in this report.

2 Site and surrounds

The Wickham Wool Stores proposed development is to be located on the site bound by Annie Street to the south, Milford Street to the west, The Avenue to the North, and the Caltex site to the east. The development is to consist of the adaptive reuse of the three wool stores to residential apartments, an additional commercial/ retail building and a new residential building.

Long-term noise monitoring has been undertaken at the Annie Street, Milford Street and Caltex site boundaries to determine the existing acoustic environment.

Figure 1 - Site and Surrounds

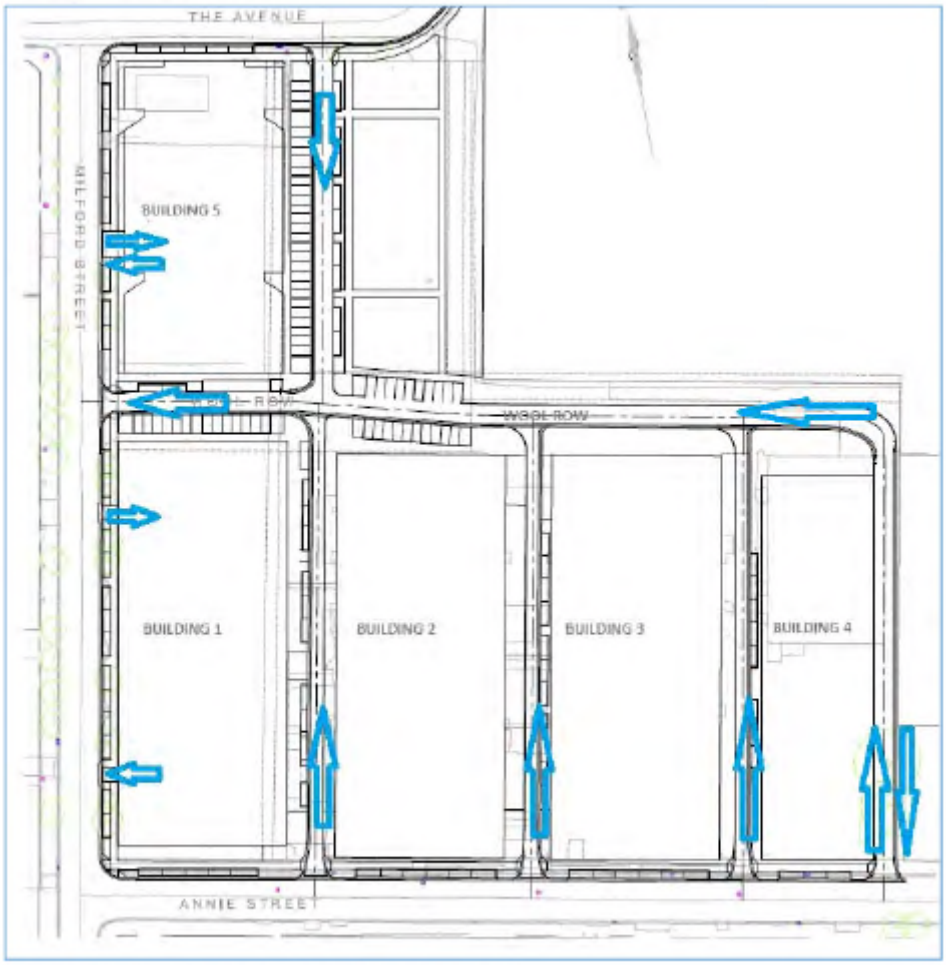


Figure 4 Site layout and proposed access system.

Figure 2 - Site layout and proposed site access [Better Traffic Solutions - Traffic Impact Statement, Figure 4, May 2017]

3 Existing acoustic environment

3.1 Long-term Noise Survey

Three RTA Technology Environmental Noise Loggers were set up for the ambient noise survey from Friday 31 March 2017 to Friday 7 April 2017. One logger was set up at the proposed future development location on the corner of Milford Street and The Avenue. A second logger was located at the site boundary with Annie Street in front of Wool Store 4. A third logger was located at the site boundary with the Caltex Site at the rear of Wool Store 4.

The noise loggers record noise levels on a continuous basis and stores data every fifteen minutes. The noise logger was calibrated before and after measurements and no significant deviation in calibration was noted. The noise monitoring equipment used here complies with Australian Standard 1259.2-1990 "Acoustics - Sound Level Meters" and is designated as Type 2 instruments suitable for field use.

The dates of measurement and the results obtained from the logger survey are shown in Appendix C.

The unattended noise monitor was positioned to capture both noise from traffic, as well as the existing ambient noise at the development site.

Table 1: Measured external noise levels

Location	Noise Level Descriptor	Day 7am - 6pm	Evening 6pm - 10pm	Night 10pm - 7am
Location 1 - Milford Street	LAeq	60 dB(A)	55 dB(A)	50 dB(A)
	LA90	43 dB(A)	42 dB(A)	36 dB(A)
Location 2 - Annie Street	LAeq	59 dB(A)	61 dB(A)	50 dB(A)
	LA90	43 dB(A)	41 dB(A)	36 dB(A)
Location 3 - Caltex Site Boundary	LAeq	55 dB(A)	50 dB(A)	46 dB(A)
	LA90	47 dB(A)	42 dB(A)	38 dB(A)

4 Acoustic criteria for traffic generation

4.1.1 Road Traffic Noise Criteria

The Leq noise level or the "equivalent continuous noise level" correlates best with the human perception of annoyance associated with traffic noise. The NSW Road Noise Policy 2011 uses the LAeq(15hr), LAeq(9hr) and LAeq(1hr) to assess traffic noise impact. The Road Noise Policy is used to assess the potential traffic noise impact from the site onto residential receivers only.

Table 3 in the Road Noise Policy, 'Road Traffic Noise Assessment Criteria for Residential Land Uses', divides land use developments into different categories and lists the respective noise criteria for each case. The main access to the site will be via Harrow Road.

Milford Street, The Avenue and Annie Street are categorised as a local roads. The applicable criteria for the day and night periods are summarised in Table 2 below.

Table 2 – Applicable Road Traffic Noise Criteria, dB(A)

Type of Development	Day (7am-10pm)	Night (10pm-7am)
3. Existing residences affected by additional traffic on existing local roads generated by land use developments.	LAeq(1hr) 55	LAeq(1hr) 50

It should be noted that existing traffic noise levels along both Milford Street and Annie Street currently exceed the nominated criteria presented above.

The table below presents the average afternoon peak LAeq (4pm - 6pm) along Annie Street and Milford Street.

Table 3 – Applicable Road Traffic Noise Criteria, dB(A)

Receiver Location	Measured Afternoon Peak LAeq (1hr)
Annie Street residents	LAeq(1hr) 63
Milford Street residents	LAeq(1hr) 60

4.1.2 Predicted Road Traffic Noise

Traffic movements in and out of the development driveway will be the main source of traffic generated by the site. It has been estimated by Better Transport Futures that there will be an additional 404 AM peak hour movements and 539 PM peak hour movements (the worst case scenario) in total, generated by the proposed development site.

It is assumed that 50% of these movements will be along Annie Street and 50% via Milford Street/ The Avenue.

The existing traffic noise levels which represent residential receivers along Annie and Milford Streets are presented in Table 4 below, along with the predicted traffic noise generated directly from the proposed development site.

Table 4 – Traffic Noise Levels at Residences

Period	Location	Existing Traffic Noise Level LAeq (1 hr)	Peak Traffic Noise Generated from Site LAeq (1 hr)	Cumulative Traffic Noise Level LAeq (1 hr)
Day	Annie Street	63 dB(A)	57 dB(A)	64 dB(A)
	Milford Street	60 dB(A)	57 dB(A)	61 dB(A)

Based on the results presented in the above table, it is predicted that overall traffic noise levels along Annie Street and Milford Street will increase by a negligible margin as a result of traffic movements to and from the proposed development. It should be noted that a difference of 1-2 dB is not detectable to the human ear.

5 Conclusion

Renzo Tonin & Associates has completed an assessment of traffic noise generation as a result of the proposed Wickham Wool Store development, Newcastle.

Traffic noise generation has been assessed at the worst affected existing residential receivers along Annie Street and Milford Street opposite site entrances.

Traffic noise generated by the site was found to have a negligible impact on the existing acoustic environment. There acoustic attenuation measures are not required.

APPENDIX A Glossary of terminology

The following is a brief description of the technical terms used to describe noise to assist in understanding the technical issues presented.

Adverse weather	Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).
Ambient noise	The all-encompassing noise associated within a given environment at a given time, usually composed of sound from all sources near and far.
Assessment period	The period in a day over which assessments are made.
Assessment point	A point at which noise measurements are taken or estimated. A point at which noise measurements are taken or estimated.
Background noise	Background noise is the term used to describe the underlying level of noise present in the ambient noise, measured in the absence of the noise under investigation, when extraneous noise is removed. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period. This is represented as the L90 noise level (see below).
Decibel [dB]	The units that sound is measured in. The following are examples of the decibel readings of every day sounds: 0dB The faintest sound we can hear 30dB A quiet library or in a quiet location in the country 45dB Typical office space. Ambience in the city at night 60dB CBD mall at lunch time 70dB The sound of a car passing on the street 80dB Loud music played at home 90dB The sound of a truck passing on the street 100dB The sound of a rock band 115dB Limit of sound permitted in industry 120dB Deafening
dB(A)	A-weighted decibels. The A- weighting noise filter simulates the response of the human ear at relatively low levels, where the ear is not as effective in hearing low frequency sounds as it is in hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the "A" filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter.
dB(C)	C-weighted decibels. The C-weighting noise filter simulates the response of the human ear at relatively high levels, where the human ear is nearly equally effective at hearing from mid-low frequency (63Hz) to mid-high frequency (4kHz), but is less effective outside these frequencies.
Frequency	Frequency is synonymous to pitch. Sounds have a pitch which is peculiar to the nature of the sound generator. For example, the sound of a tiny bell has a high pitch and the sound of a bass drum has a low pitch. Frequency or pitch can be measured on a scale in units of Hertz or Hz.
Impulsive noise	Having a high peak of short duration or a sequence of such peaks. A sequence of impulses in rapid succession is termed repetitive impulsive noise.
Intermittent noise	The level suddenly drops to that of the background noise several times during the period of observation. The time during which the noise remains at levels different from that of the ambient is one second or more.
L_{Max}	The maximum sound pressure level measured over a given period.
L_{Min}	The minimum sound pressure level measured over a given period.

L_1	The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
L_{10}	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
L_{90}	The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L90 noise level expressed in units of dB(A).
L_{eq}	The "equivalent noise level" is the summation of noise events and integrated over a selected period of time.
Reflection	Sound wave changed in direction of propagation due to a solid object obscuring its path.
SEL	Sound Exposure Level (SEL) is the constant sound level which, if maintained for a period of 1 second would have the same acoustic energy as the measured noise event. SEL noise measurements are useful as they can be converted to obtain Leq sound levels over any period of time and can be used for predicting noise at various locations.
Sound	A fluctuation of air pressure which is propagated as a wave through air.
Sound absorption	The ability of a material to absorb sound energy through its conversion into thermal energy.
Sound level meter	An instrument consisting of a microphone, amplifier and indicating device, having a declared performance and designed to measure sound pressure levels.
Sound pressure level	The level of noise, usually expressed in decibels, as measured by a standard sound level meter with a microphone.
Sound power level	Ten times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power.
Tonal noise	Containing a prominent frequency and characterised by a definite pitch.

APPENDIX B Noise Monitoring Results and Locations

B.1 Long Term minotiring details

Noise Logger Location	Survey Period
Annie Street boundary	Friday 31st March 2017 to Friday 7th April 2017
Milford Street boundary	Friday 31st March 2017 to Friday 7th April 2017
Caltex Site boundary	Friday 31st March 2017 to Friday 7th April 2017

Figure 3 - Annie Street logger location

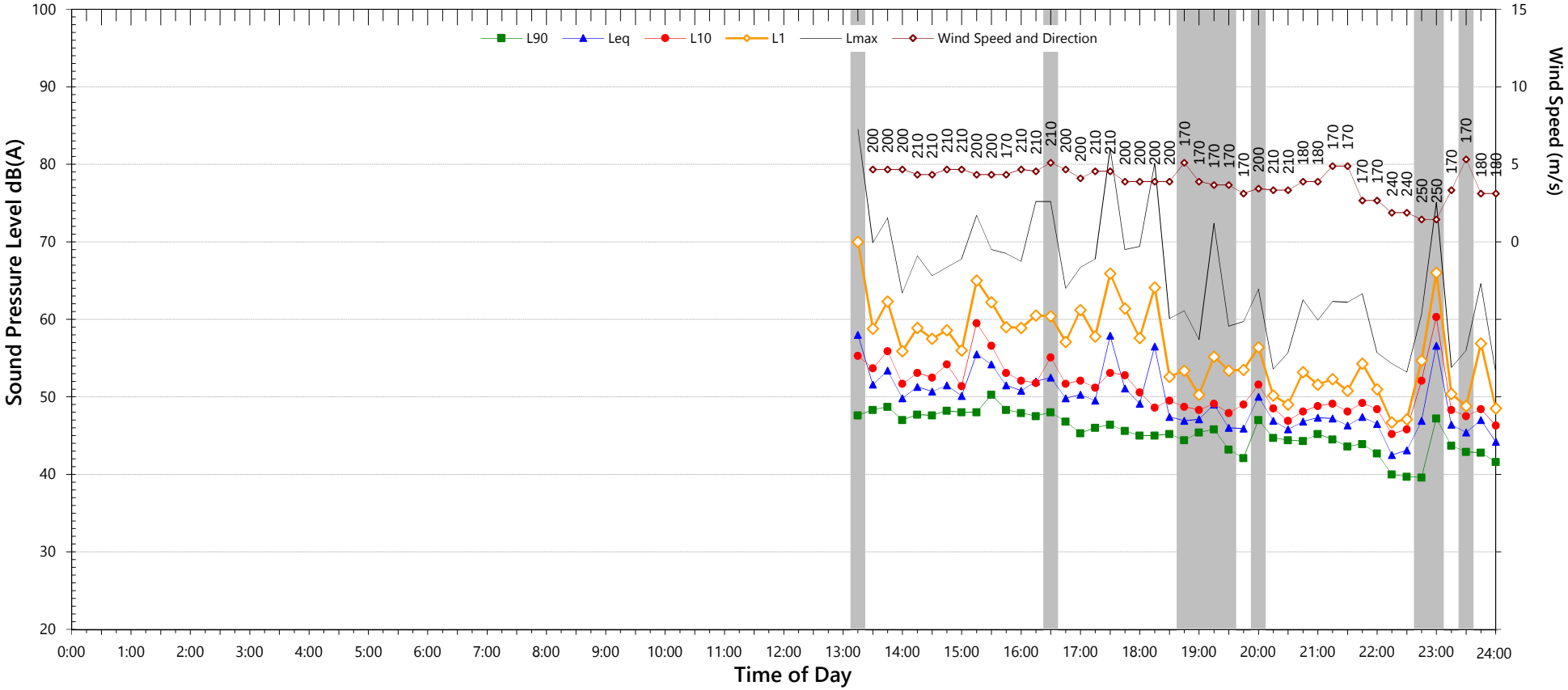
Figure 4 - Milford Street logger location

Figure 5 - Caltex Site boundary logger location

Unattended Noise Monitoring Results

Wickham Wool Stores - Caltex Site Boundary

Friday, 31 March 2017



NSW Industrial Noise Policy (Free Field)			
Descriptor	**Day[2]**	**Evening[3]**	**Night[4 5]**
L_{90}	-	-	-
LAeq	-	-	-

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	**Day**	**Night[5]**
	7am-10pm	**10pm-7am**
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	53.9	48.3
$L_{eq\ 1hr}$ upper 10 percentile	56.5	53.4
$L_{eq\ 1hr}$ lower 10 percentile	48.4	40.4

Night Time Maximum Noise Levels			(see note 7)
L_{Max} (Range)	72.2	to	72.2
L_{Max} - L_{eq} (Range)	18.6	to	21.3

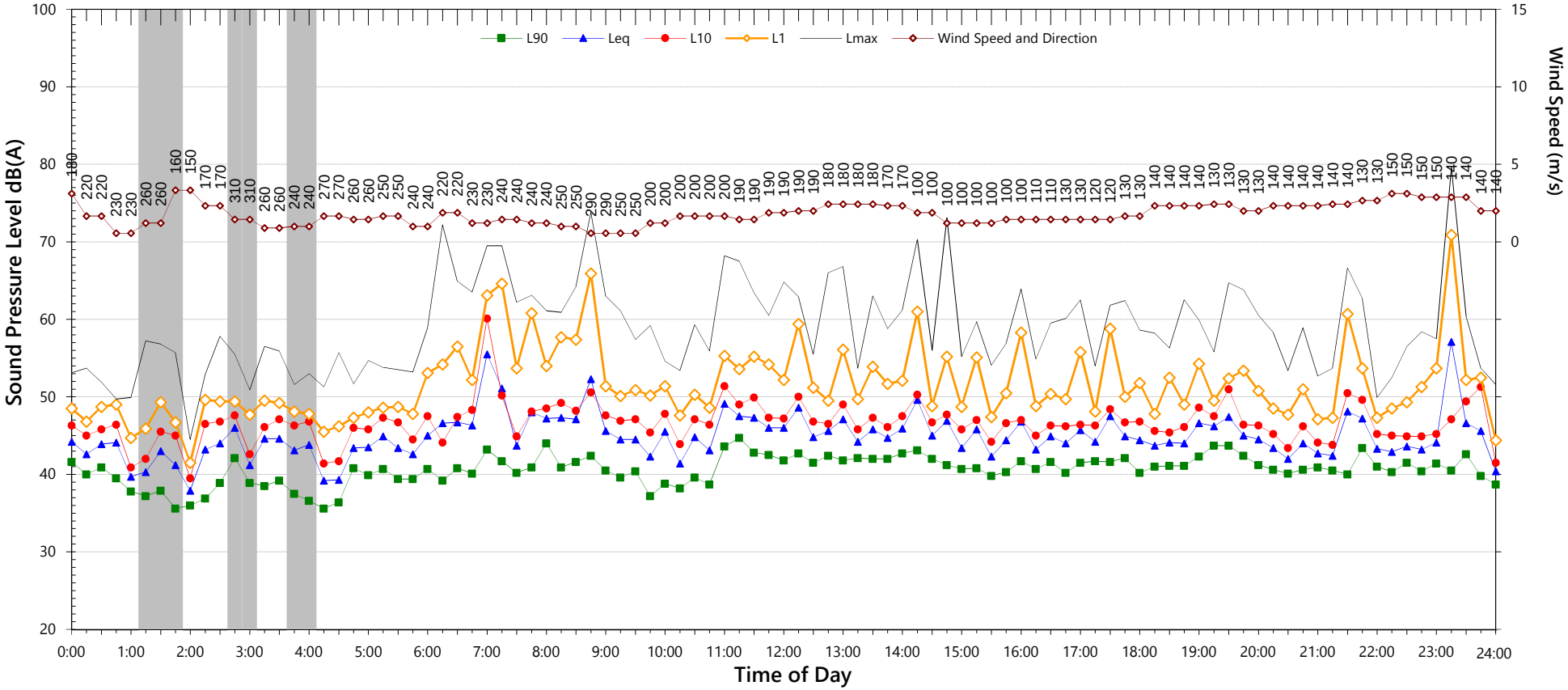
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am til 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. Night time L_{Max} values are shown only where L_{Max} >65dB(A) and where L_{Max}- Leq ≥15dB(A)

Unattended Noise Monitoring Results

Wickham Wool Stores - Caltex Site Boundary

Saturday, 1 April 2017



NSW Industrial Noise Policy (Free Field)			
Descriptor	**Day[2]**	**Evening[3]**	**Night[4 5]**
L_{90}	39.6	40.1	-
LAeq	46.4	45.1	-

Night Time Maximum Noise Levels			(see note 7)
L_{Max} (Range)	66.6	to	79.6
L_{Max} - L_{eq} (Range)	18.1	to	27.8

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	**Day**	**Night[5]**
	7am-10pm	**10pm-7am**
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	48.6	52.1
$L_{eq\ 1hr}$ upper 10 percentile	51.1	55.5
$L_{eq\ 1hr}$ lower 10 percentile	46.3	43.9

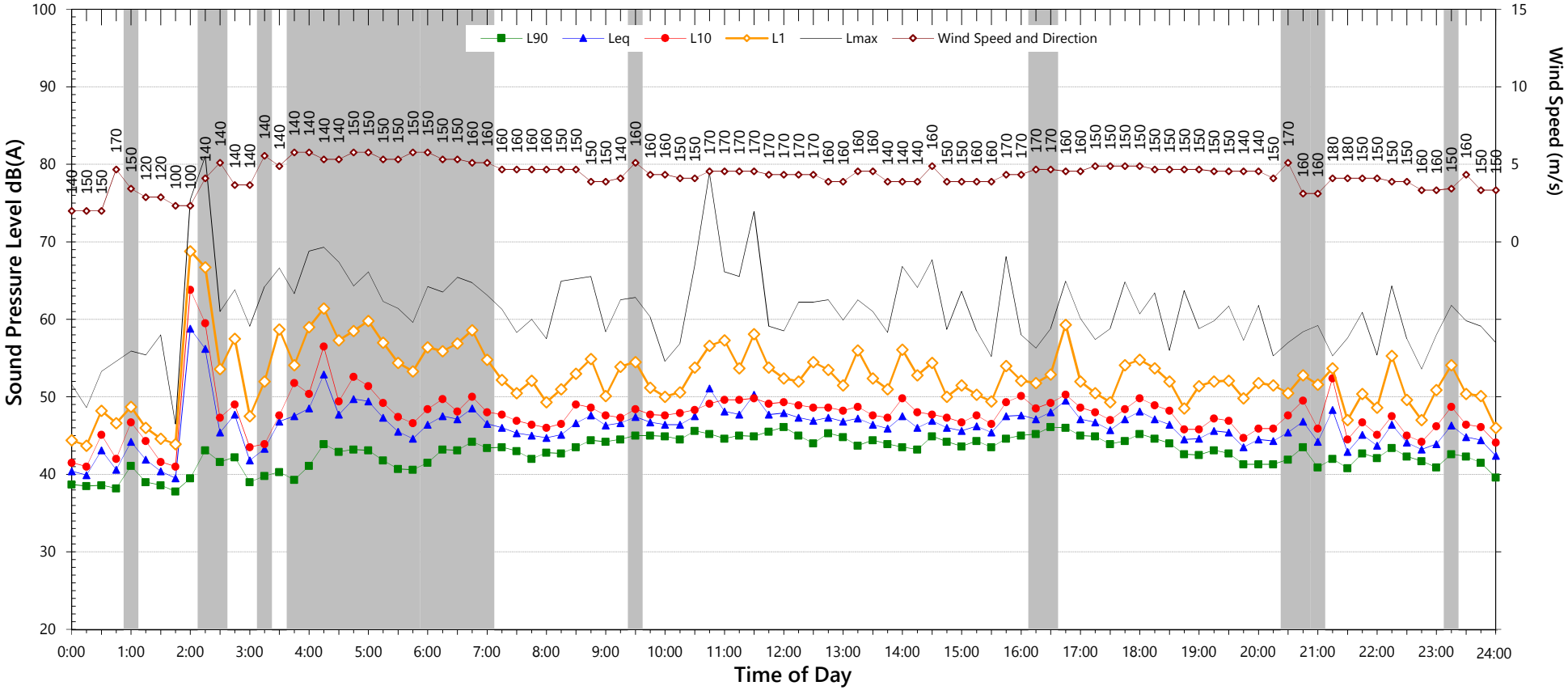
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am til 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. Night time L_{Max} values are shown only where L_{Max} >65dB(A) and where L_{Max}- Leq ≥15dB(A)

Unattended Noise Monitoring Results

Wickham Wool Stores - Caltex Site Boundary

Sunday, 2 April 2017



NSW Industrial Noise Policy (Free Field)			
Descriptor	**Day[2]**	**Evening[3]**	**Night[4 5]**
L_{90}	43.5	-	38.1
LAeq	47.3	-	46.1

Night Time Maximum Noise Levels			(see note 7)
L_{Max} (Range)	68.6	to	82.8
L_{Max} - L_{eq} (Range)	15.8	to	32.1

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	**Day**	**Night[5]**
	7am-10pm	**10pm-7am**
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	49.3	48.6
$L_{eq\ 1hr}$ upper 10 percentile	51.1	53.2
$L_{eq\ 1hr}$ lower 10 percentile	47.1	41.9

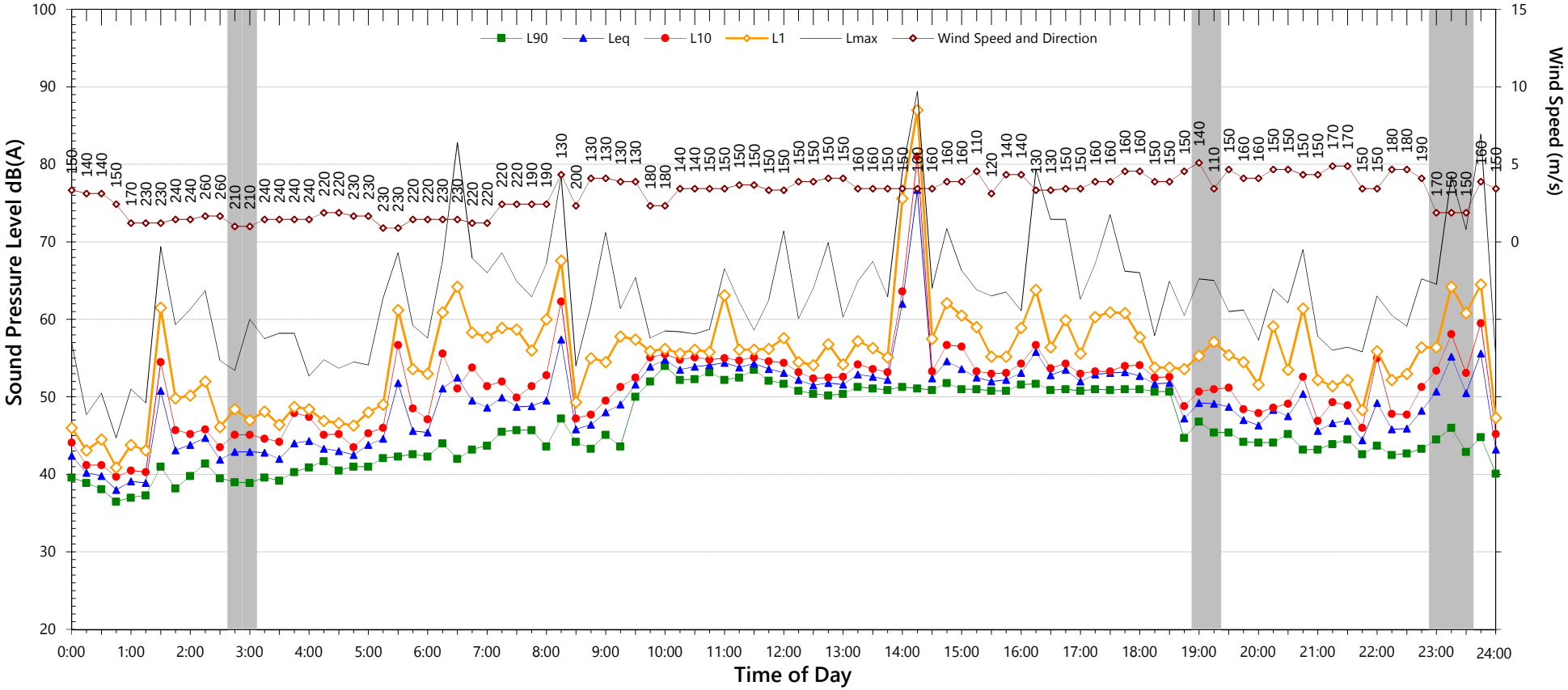
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am til 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. Night time L_{Max} values are shown only where L_{Max} >65dB(A) and where L_{Max}- Leq ≥15dB(A)

Unattended Noise Monitoring Results

Wickham Wool Stores - Caltex Site Boundary

Monday, 3 April 2017



NSW Industrial Noise Policy (Free Field)			
Descriptor	Day[2]	Evening[3]	Night[4 5]
L_{90}	45.1	43.2	-
LAeq	61.1	48.5	-

Night Time Maximum Noise Levels			(see note 7)
L_{Max} (Range)	65.2	to	83.9
L_{Max} - L_{eq} (Range)	15.1	to	31.1

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	62.5	51.6
$L_{eq\ 1hr}$ upper 10 percentile	70.4	57.1
$L_{eq\ 1hr}$ lower 10 percentile	49.8	43.8

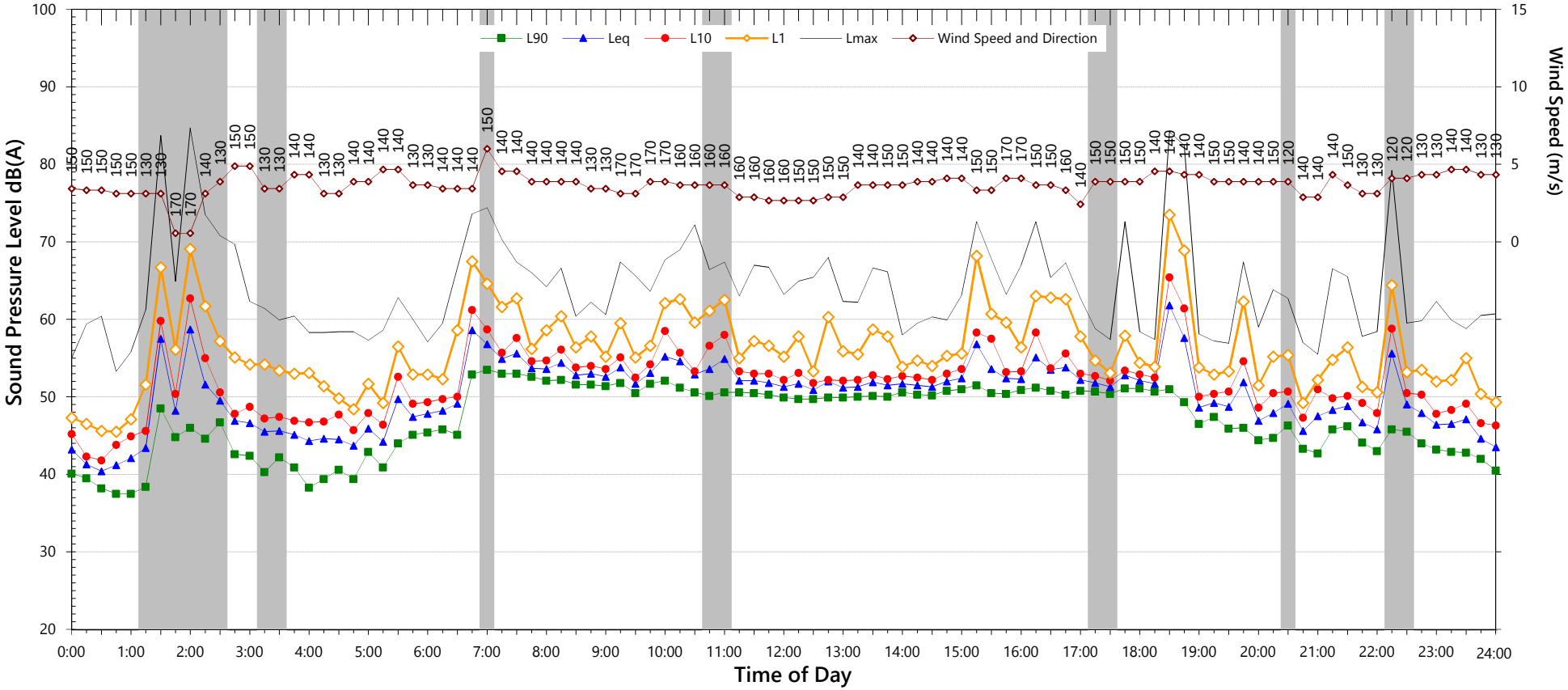
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am til 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. Night time L_{Max} values are shown only where L_{Max} >65dB(A) and where L_{Max}- Leq ≥15dB(A)

Unattended Noise Monitoring Results

Wickham Wool Stores - Caltex Site Boundary

Tuesday, 4 April 2017



NSW Industrial Noise Policy (Free Field)			
Descriptor	Day[2]	Evening[3]	Night[4 5]
L_{90}	49.9	43.0	37.0
LAeq	53.1	53.1	46.4

Night Time Maximum Noise Levels			(see note 7)
L_{Max} (Range)	71.7	to	71.7
L_{Max} - L_{eq} (Range)	15.0	to	19.5

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	55.6	48.9
$L_{eq\ 1hr}$ upper 10 percentile	58.8	54.7
$L_{eq\ 1hr}$ lower 10 percentile	49.8	44.9

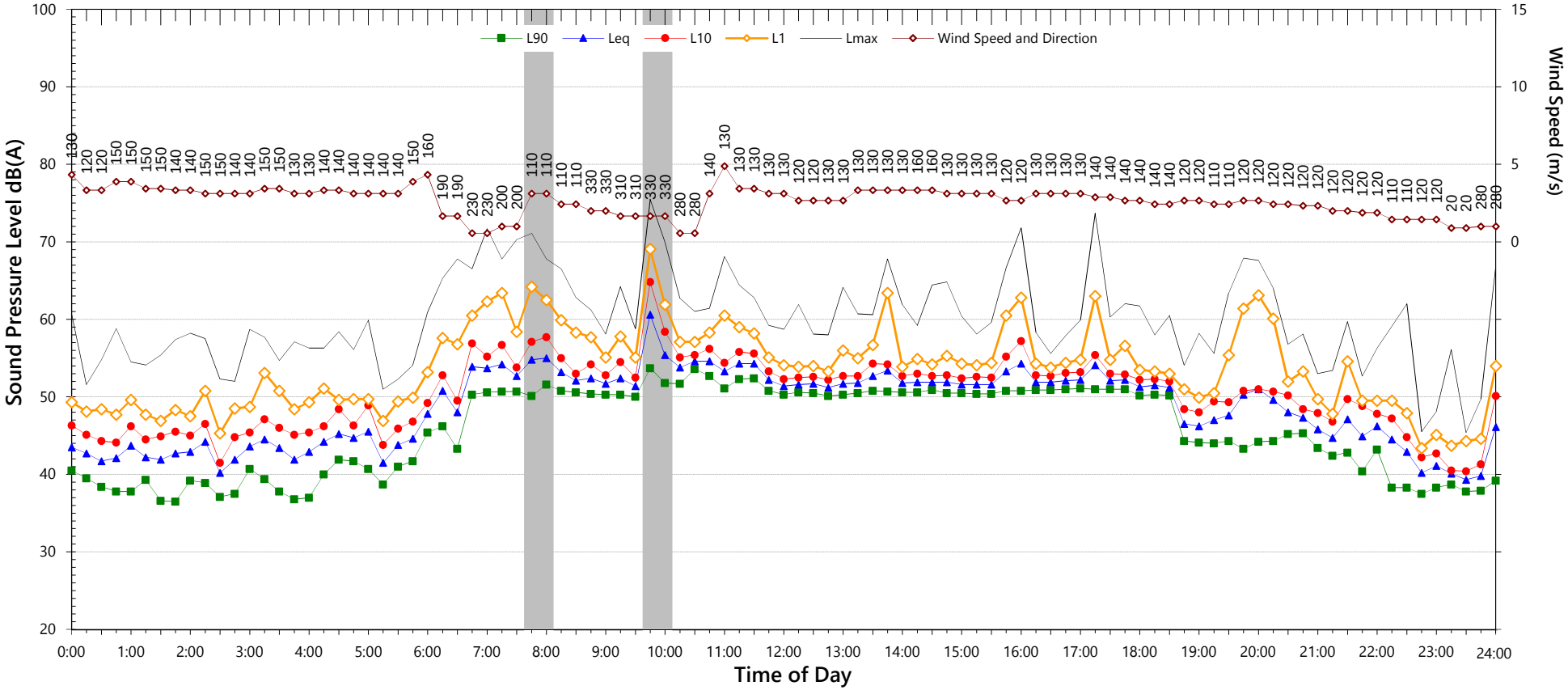
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am til 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. Night time L_{Max} values are shown only where L_{Max} >65dB(A) and where L_{Max}- Leq ≥15dB(A)

Unattended Noise Monitoring Results

Wickham Wool Stores - Caltex Site Boundary

Wednesday, 5 April 2017



NSW Industrial Noise Policy (Free Field)			
Descriptor	Day[2]	Evening[3]	Night[4 5]
L_{90}	50.3	42.4	-
LAeq	52.6	48.4	-

Night Time Maximum Noise Levels			(see note 7)
L_{Max} (Range)	66.9	to	78.4
L_{Max} - L_{eq} (Range)	17.3	to	24.5

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	54.3	51.2
$L_{eq\ 1hr}$ upper 10 percentile	56.3	57.7
$L_{eq\ 1hr}$ lower 10 percentile	49.5	44.9

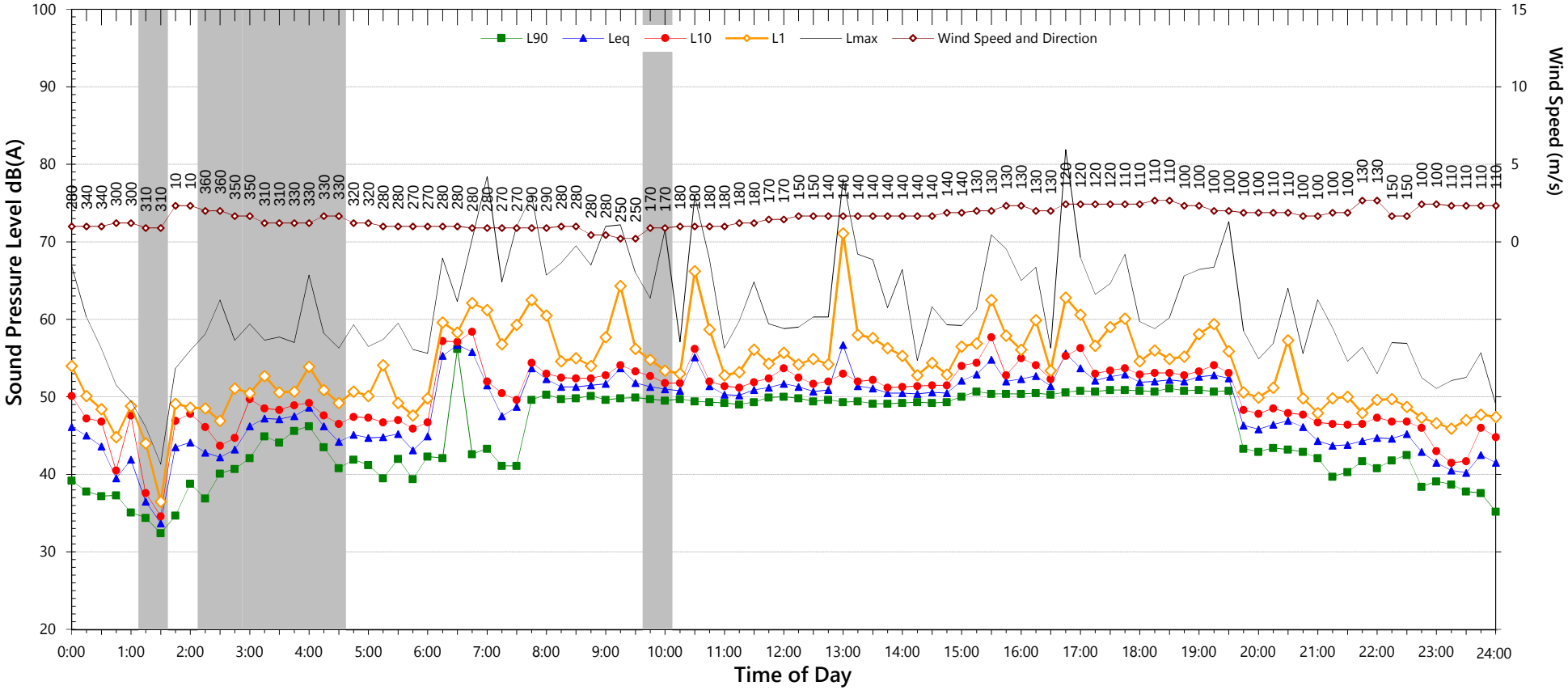
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am til 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. Night time L_{Max} values are shown only where L_{Max} >65dB(A) and where L_{Max}- Leq ≥15dB(A)

Unattended Noise Monitoring Results

Wickham Wool Stores - Caltex Site Boundary

Thursday, 6 April 2017



NSW Industrial Noise Policy (Free Field)			
Descriptor	Day[2]	Evening[3]	Night[4 5]
L_{90}	49.1	40.3	37.6
LAeq	52.2	49.3	46.1

Night Time Maximum Noise Levels			(see note 7)
L_{Max} (Range)	69.7	to	71.0
L_{Max} - L_{eq} (Range)	20.4	to	21.6

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	54.1	48.6
$L_{eq\ 1hr}$ upper 10 percentile	55.9	52.9
$L_{eq\ 1hr}$ lower 10 percentile	47.7	43.8

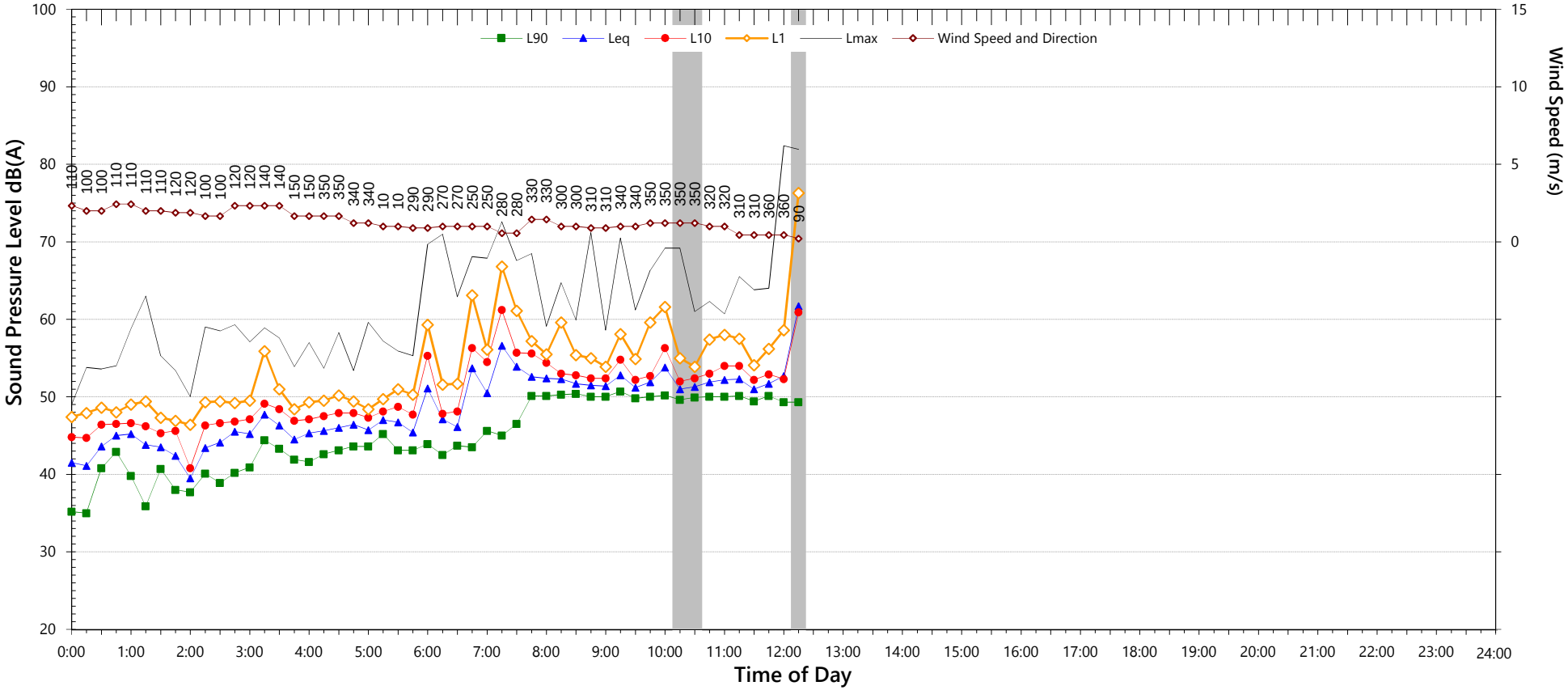
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am til 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. Night time L_{Max} values are shown only where L_{Max} >65dB(A) and where L_{Max}- Leq ≥15dB(A)

Unattended Noise Monitoring Results

Wickham Wool Stores - Caltex Site Boundary

Friday, 7 April 2017



NSW Industrial Noise Policy (Free Field)			
Descriptor	**Day[2]**	**Evening[3]**	**Night[4 5]**
L_{90}	-	-	-
LAeq	-	-	-

Night Time Maximum Noise Levels			(see note 7)
L_{Max} (Range)	-	to	-
L_{Max} - L_{eq} (Range)	-	to	-

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	**Day**	**Night[5]**
	7am-10pm	**10pm-7am**
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	55.2	-
$L_{eq\ 1hr}$ upper 10 percentile	56.7	-
$L_{eq\ 1hr}$ lower 10 percentile	54.2	-

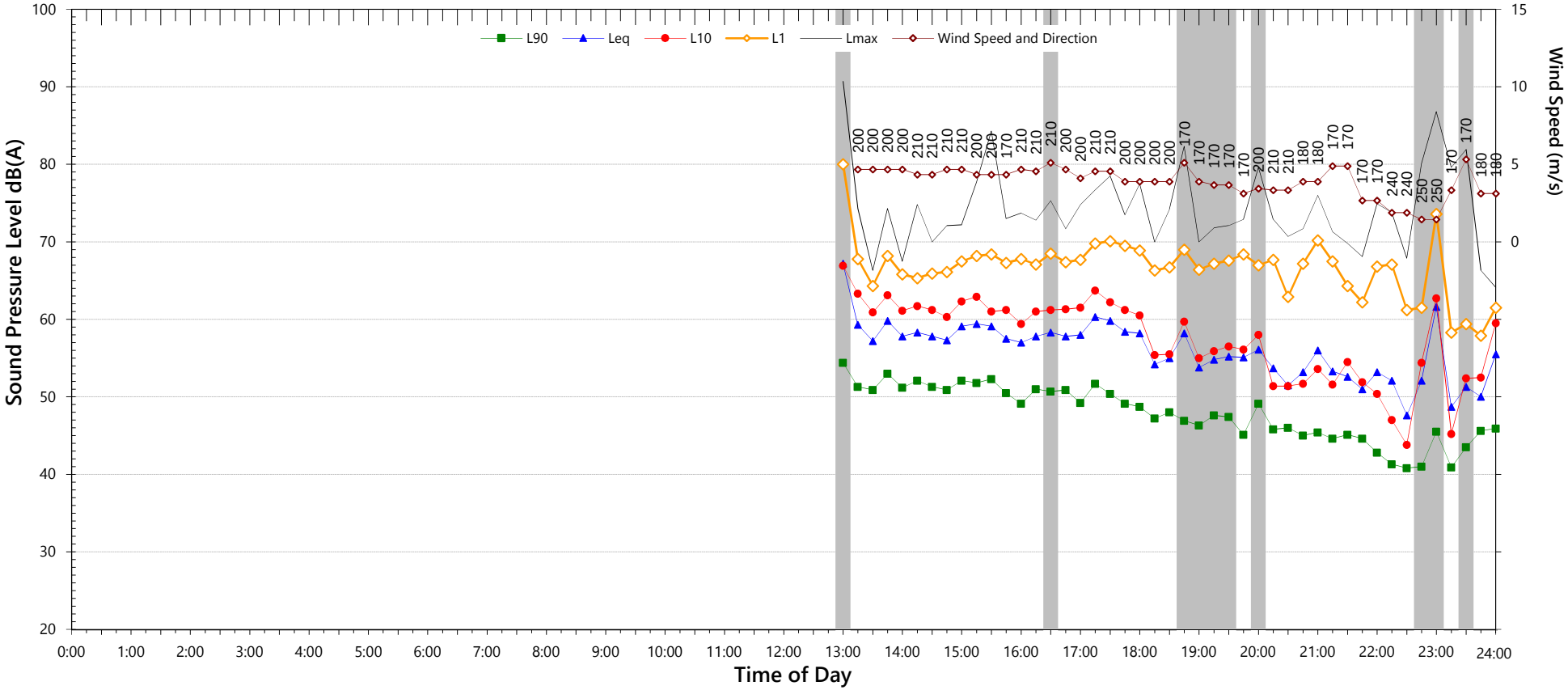
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am til 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. Night time L_{Max} values are shown only where L_{Max} >65dB(A) and where L_{Max}- Leq ≥15dB(A)

Unattended Noise Monitoring Results

Wickham Wool Stores - Annie Street

Friday, 31 March 2017



NSW Industrial Noise Policy (Free Field)			
Descriptor	**Day[2]**	**Evening[3]**	**Night[4 5]**
L_{90}	-	-	-
LAeq	-	-	-

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	**Day**	**Night[5]**
	7am-10pm	**10pm-7am**
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	59.8	55.2
$L_{eq\ 1hr}$ upper 10 percentile	61.8	60.4
$L_{eq\ 1hr}$ lower 10 percentile	55.1	42.0

Night Time Maximum Noise Levels			(see note 7)
L_{Max} (Range)	69.9	to	80.9
L_{Max} - L_{eq} (Range)	17.2	to	28.9

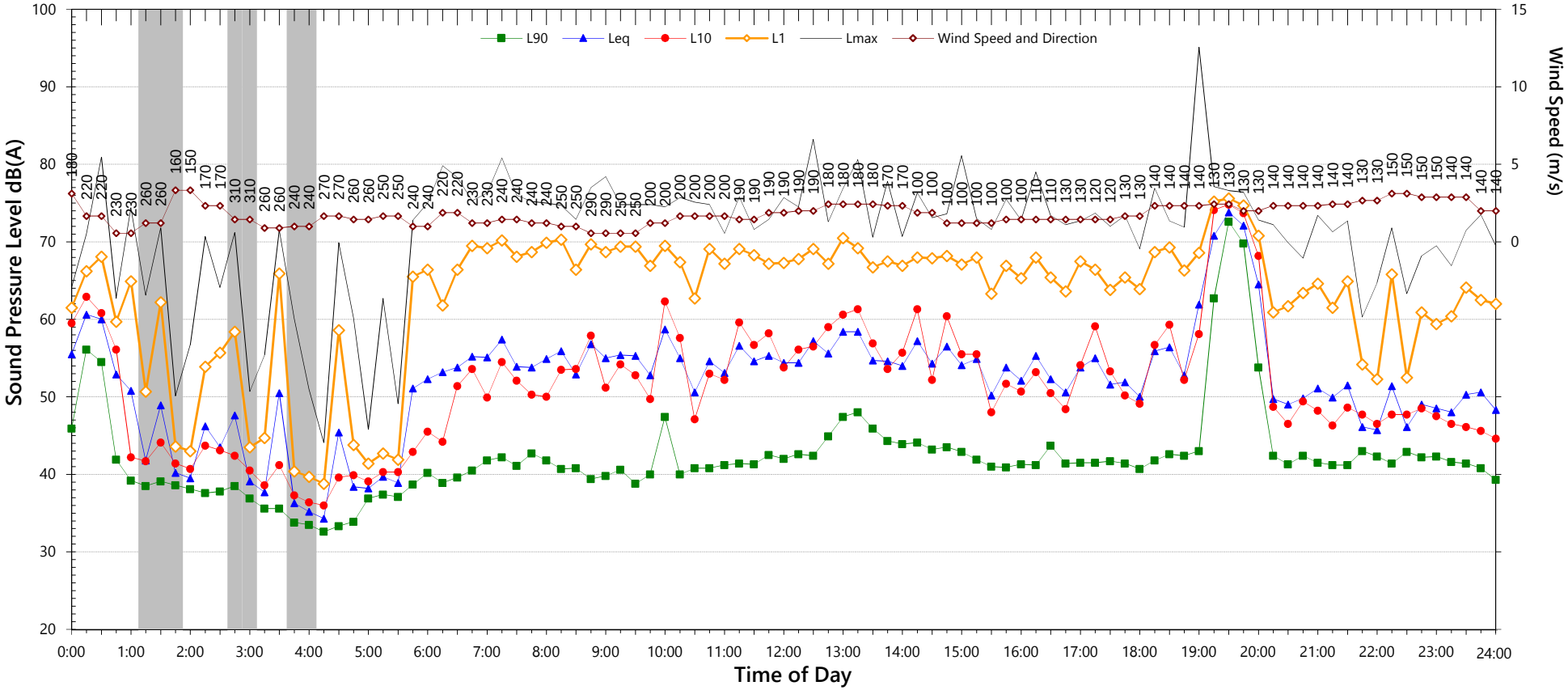
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am til 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. Night time L_{Max} values are shown only where L_{Max} >65dB(A) and where L_{Max}- Leq ≥15dB(A)

Unattended Noise Monitoring Results

Wickham Wool Stores - Annie Street

Saturday, 1 April 2017



NSW Industrial Noise Policy (Free Field)			
Descriptor	**Day[2]**	**Evening[3]**	**Night[4 5]**
L_{90}	40.0	41.2	-
LAeq	55.0	65.6	-

Night Time Maximum Noise Levels			(see note 7)
L_{Max} (Range)	70.9	to	81.7
L_{Max} - L_{eq} (Range)	18.5	to	26.0

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	**Day**	**Night[5]**
	7am-10pm	**10pm-7am**
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	63.3	55.8
$L_{eq\ 1hr}$ upper 10 percentile	71.1	60.3
$L_{eq\ 1hr}$ lower 10 percentile	52.0	50.3

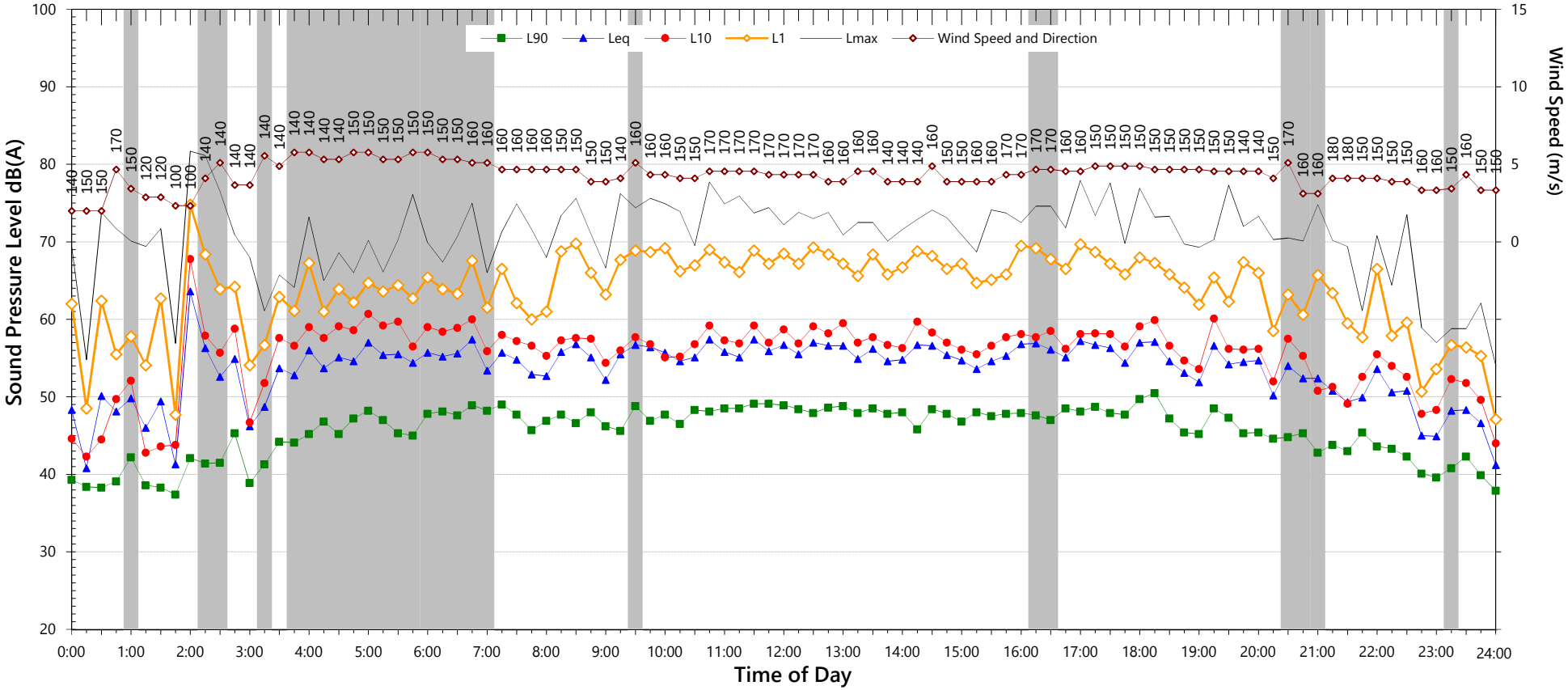
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am til 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. Night time L_{Max} values are shown only where L_{Max} >65dB(A) and where L_{Max}- Leq ≥15dB(A)

Unattended Noise Monitoring Results

Wickham Wool Stores - Annie Street

Sunday, 2 April 2017



NSW Industrial Noise Policy (Free Field)			
Descriptor	Day[2]	Evening[3]	Night[4 5]
L_{90}	46.5	-	37.1
LAeq	55.9	-	50.1

Night Time Maximum Noise Levels			(see note 7)
L_{Max} (Range)	66.4	to	79.7
L_{Max} - L_{eq} (Range)	15.9	to	27.1

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	57.8	52.6
$L_{eq\ 1hr}$ upper 10 percentile	58.9	59.6
$L_{eq\ 1hr}$ lower 10 percentile	53.3	45.5

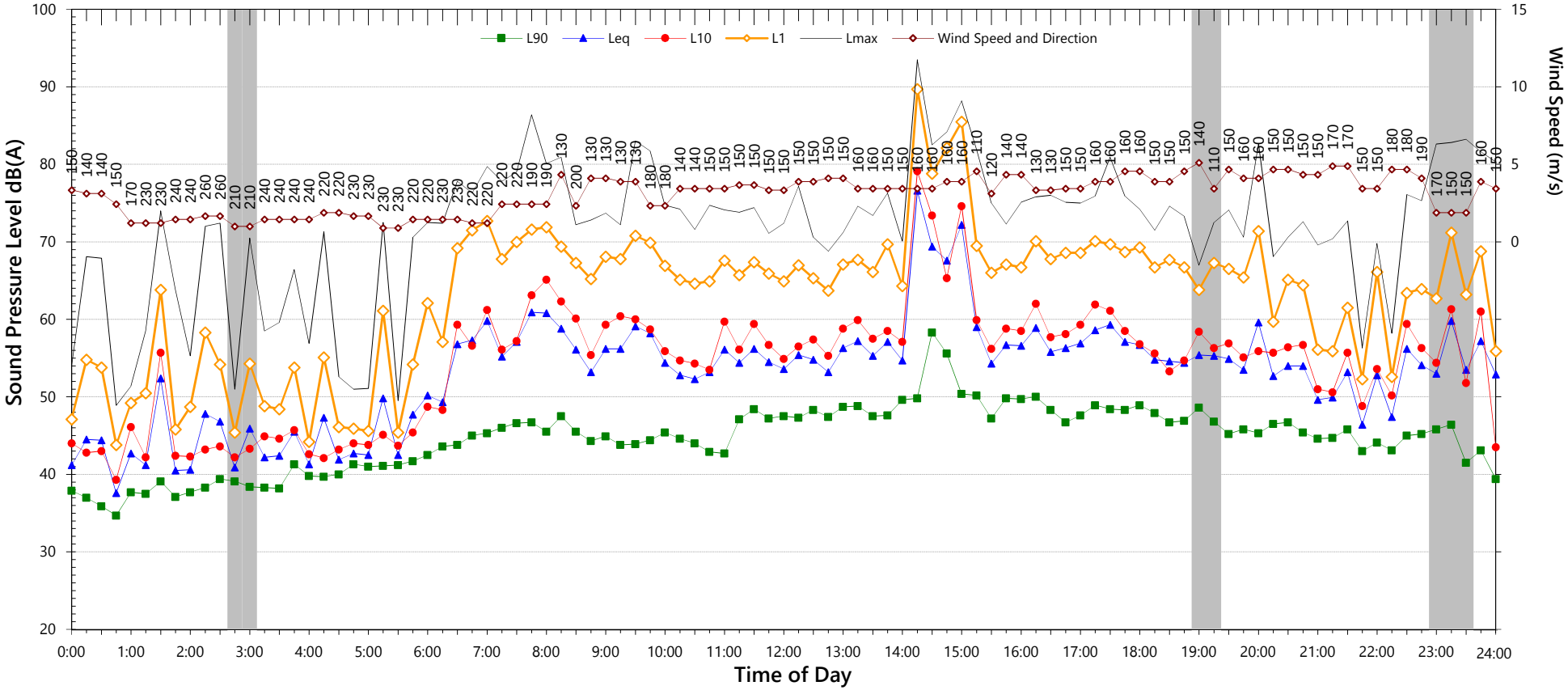
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am til 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. Night time L_{Max} values are shown only where L_{Max} >65dB(A) and where L_{Max}- Leq ≥15dB(A)

Unattended Noise Monitoring Results

Wickham Wool Stores - Annie Street

Monday, 3 April 2017



NSW Industrial Noise Policy (Free Field)			
Descriptor	**Day[2]**	**Evening[3]**	**Night[4 5]**
L_{90}	44.0	44.1	-
LAeq	63.4	54.1	-

Night Time Maximum Noise Levels			(see note 7)
L_{Max} (Range)	66.9	to	81.6
L_{Max} - L_{eq} (Range)	18.4	to	27.3

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	**Day**	**Night[5]**
	7am-10pm	**10pm-7am**
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	64.8	57.5
$L_{eq\ 1hr}$ upper 10 percentile	72.5	64.4
$L_{eq\ 1hr}$ lower 10 percentile	54.7	48.3

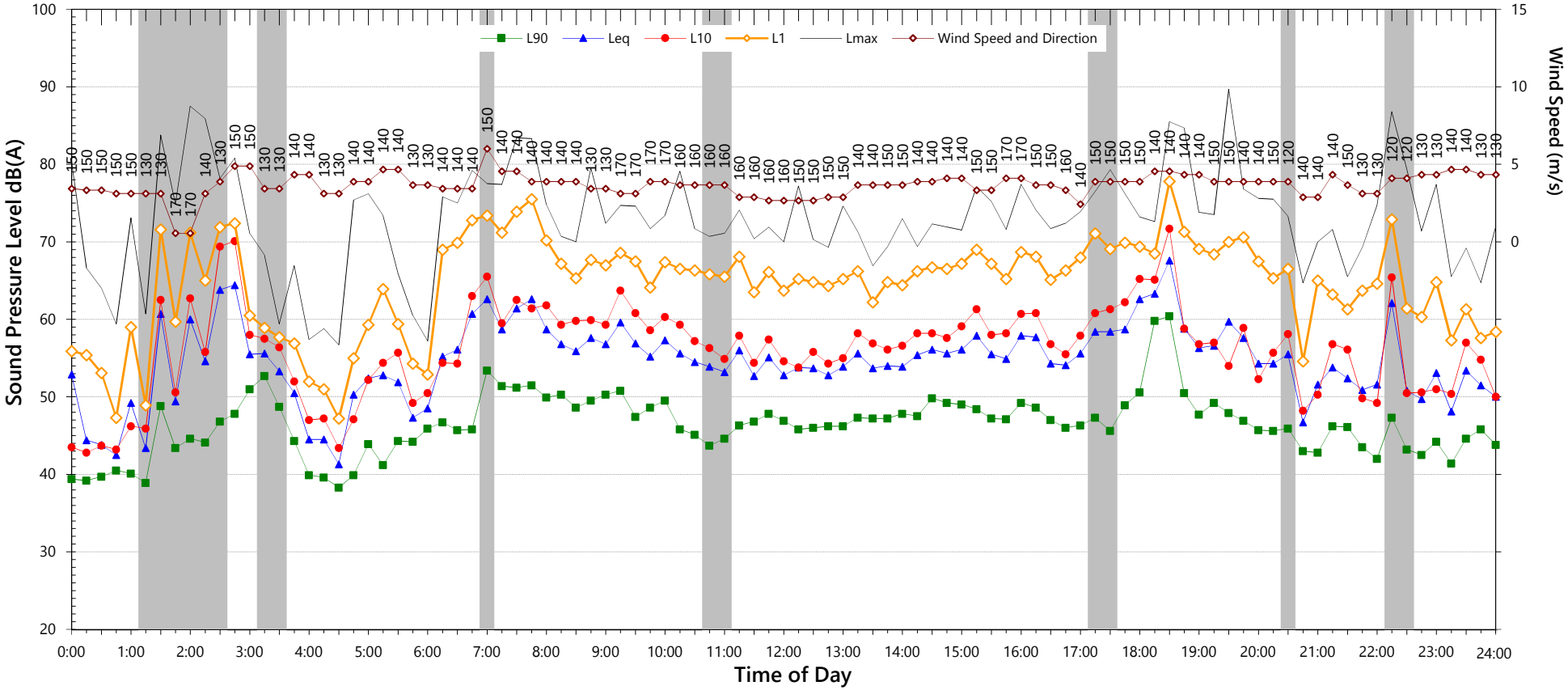
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am til 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. Night time L_{Max} values are shown only where L_{Max} >65dB(A) and where L_{Max}- Leq ≥15dB(A)

Unattended Noise Monitoring Results

Wickham Wool Stores - Annie Street

Tuesday, 4 April 2017



NSW Industrial Noise Policy (Free Field)			
Descriptor	Day[2]	Evening[3]	Night[4 5]
L_{90}	46.0	42.8	35.8
LAeq	57.0	59.2	49.6

Night Time Maximum Noise Levels			(see note 7)
L_{Max} (Range)	65.5	to	79.6
L_{Max} - L_{eq} (Range)	20.8	to	28.5

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	60.2	52.1
$L_{eq\ 1hr}$ upper 10 percentile	65.0	56.5
$L_{eq\ 1hr}$ lower 10 percentile	54.6	43.8

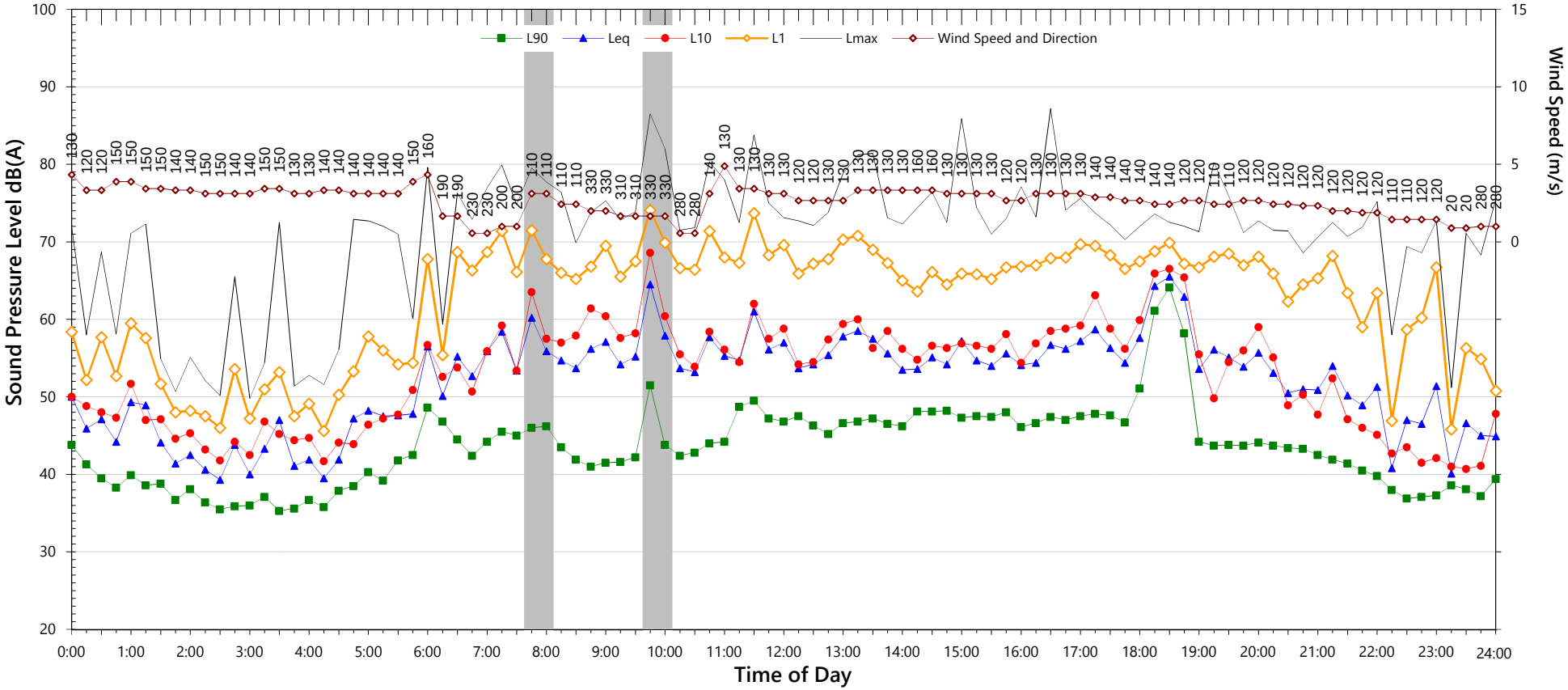
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am til 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. Night time L_{Max} values are shown only where L_{Max} >65dB(A) and where L_{Max}- Leq ≥15dB(A)

Unattended Noise Monitoring Results

Wickham Wool Stores - Annie Street

Wednesday, 5 April 2017



NSW Industrial Noise Policy (Free Field)			
Descriptor	Day[2]	Evening[3]	Night[4 5]
L_{90}	42.1	40.5	-
LAeq	56.1	58.3	-

Night Time Maximum Noise Levels			(see note 7)
L_{Max} (Range)	71.4	to	80.0
L_{Max} - L_{eq} (Range)	19.6	to	30.8

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	59.4	55.2
$L_{eq\ 1hr}$ upper 10 percentile	63.8	60.3
$L_{eq\ 1hr}$ lower 10 percentile	54.0	43.2

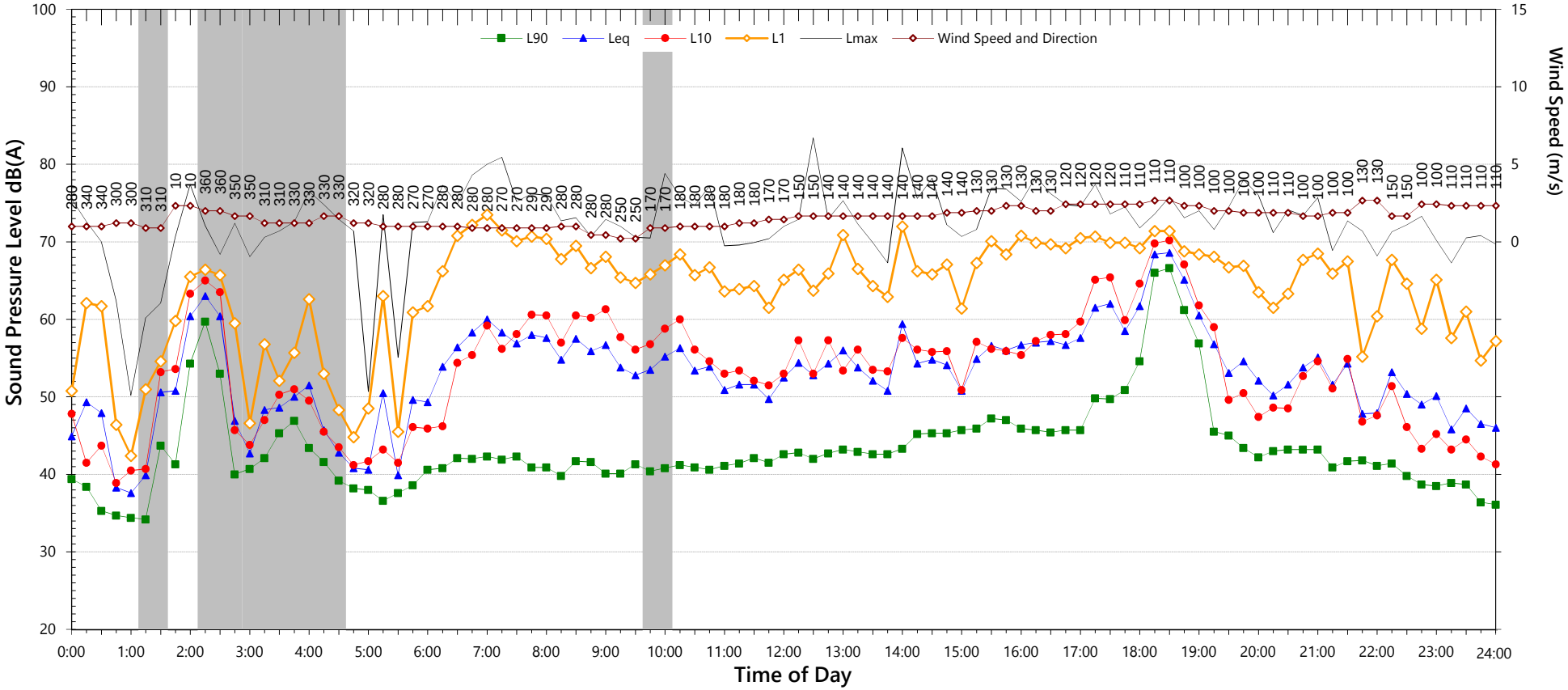
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am til 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. Night time L_{Max} values are shown only where L_{Max} >65dB(A) and where L_{Max}- Leq ≥15dB(A)

Unattended Noise Monitoring Results

Wickham Wool Stores - Annie Street

Thursday, 6 April 2017



NSW Industrial Noise Policy (Free Field)			
Descriptor	**Day[2]**	**Evening[3]**	**Night[4 5]**
L_{90}	40.9	41.1	36.1
LAeq	56.4	61.2	50.1

Night Time Maximum Noise Levels			(see note 7)
L_{Max} (Range)	65.8	to	77.4
L_{Max} - L_{eq} (Range)	20.5	to	28.5

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	**Day**	**Night[5]**
	7am-10pm	**10pm-7am**
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	60.8	52.6
$L_{eq\ 1hr}$ upper 10 percentile	67.2	59.4
$L_{eq\ 1hr}$ lower 10 percentile	53.9	43.6

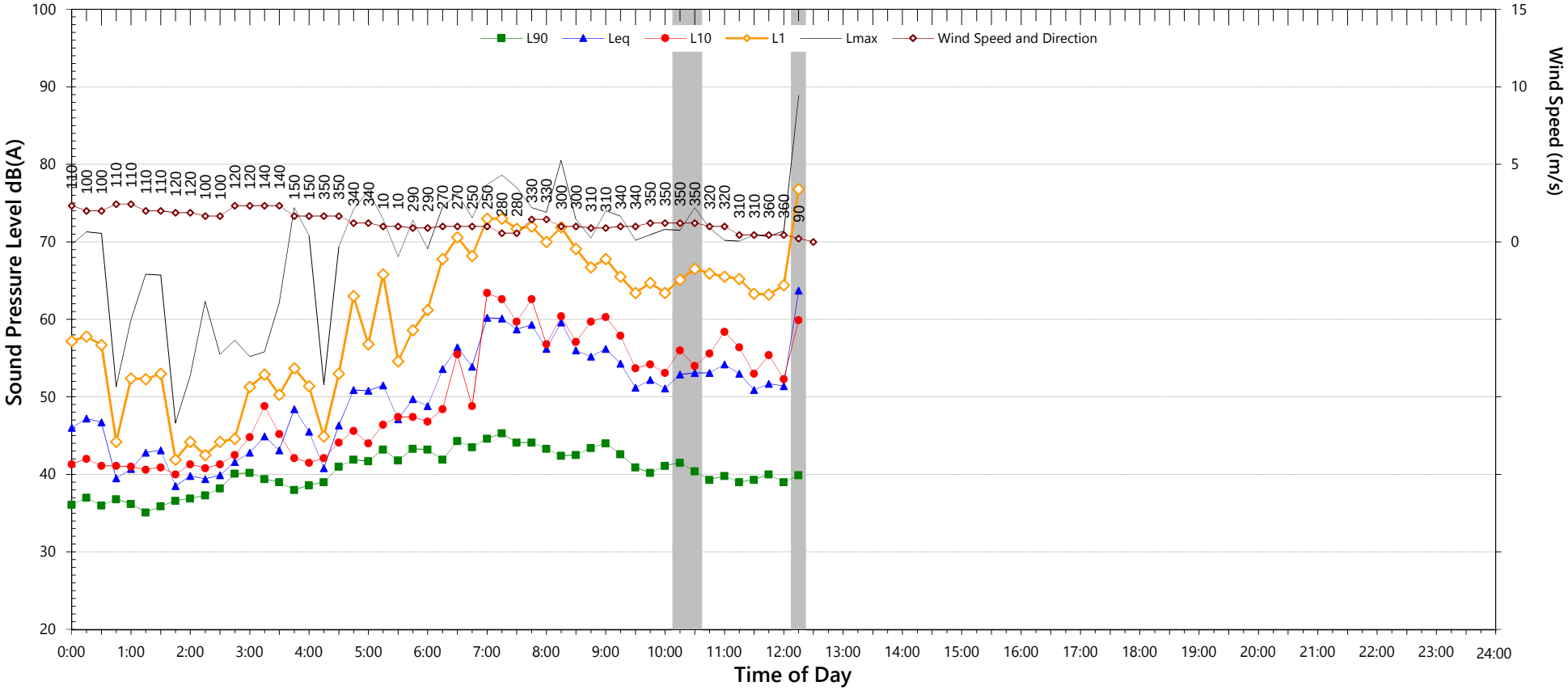
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am til 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. Night time L_{Max} values are shown only where L_{Max} >65dB(A) and where L_{Max}- Leq ≥15dB(A)

Unattended Noise Monitoring Results

Wickham Wool Stores - Annie Street

Friday, 7 April 2017



NSW Industrial Noise Policy (Free Field)			
Descriptor	**Day[2]**	**Evening[3]**	**Night[4 5]**
L_{90}	-	-	-
LAeq	-	-	-

Night Time Maximum Noise Levels			(see note 7)
L_{Max} (Range)	-	to	-
L_{Max} - L_{eq} (Range)	-	to	-

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	**Day**	**Night[5]**
	7am-10pm	**10pm-7am**
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	58.3	-
$L_{eq\ 1hr}$ upper 10 percentile	61.3	-
$L_{eq\ 1hr}$ lower 10 percentile	54.3	-

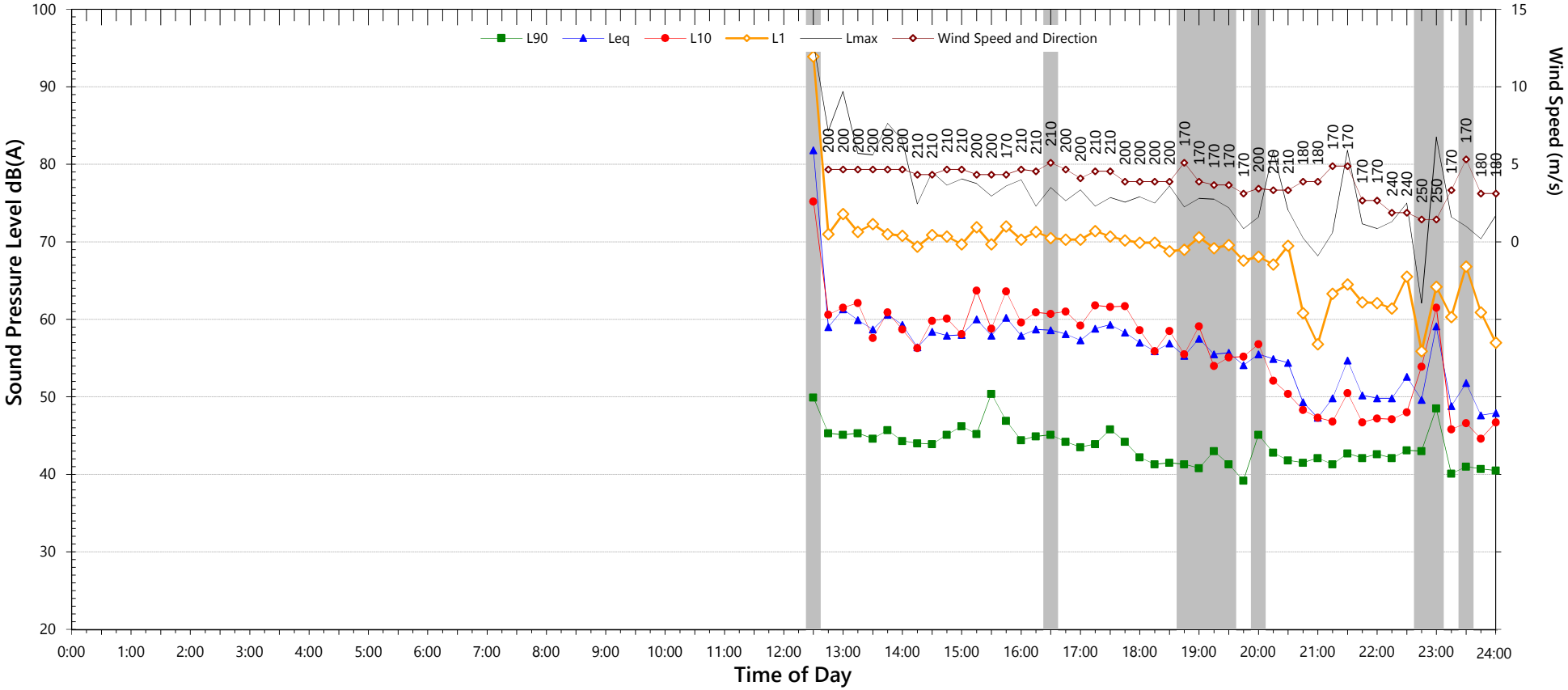
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am til 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. Night time L_{Max} values are shown only where L_{Max} >65dB(A) and where L_{Max}- Leq ≥15dB(A)

Unattended Noise Monitoring Results

Wickham Wool Stores - Milford Street

Friday, 31 March 2017



NSW Industrial Noise Policy (Free Field)			
Descriptor	**Day[2]**	**Evening[3]**	**Night[4 5]**
L_{90}	-	-	-
LAeq	-	-	-

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	**Day**	**Night[5]**
	7am-10pm	**10pm-7am**
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	60.2	50.7
$L_{eq\ 1hr}$ upper 10 percentile	62.8	53.9
$L_{eq\ 1hr}$ lower 10 percentile	54.2	43.8

Night Time Maximum Noise Levels			(see note 7)
L_{Max} (Range)	67.8	to	75.7
L_{Max} - L_{eq} (Range)	23.6	to	27.2

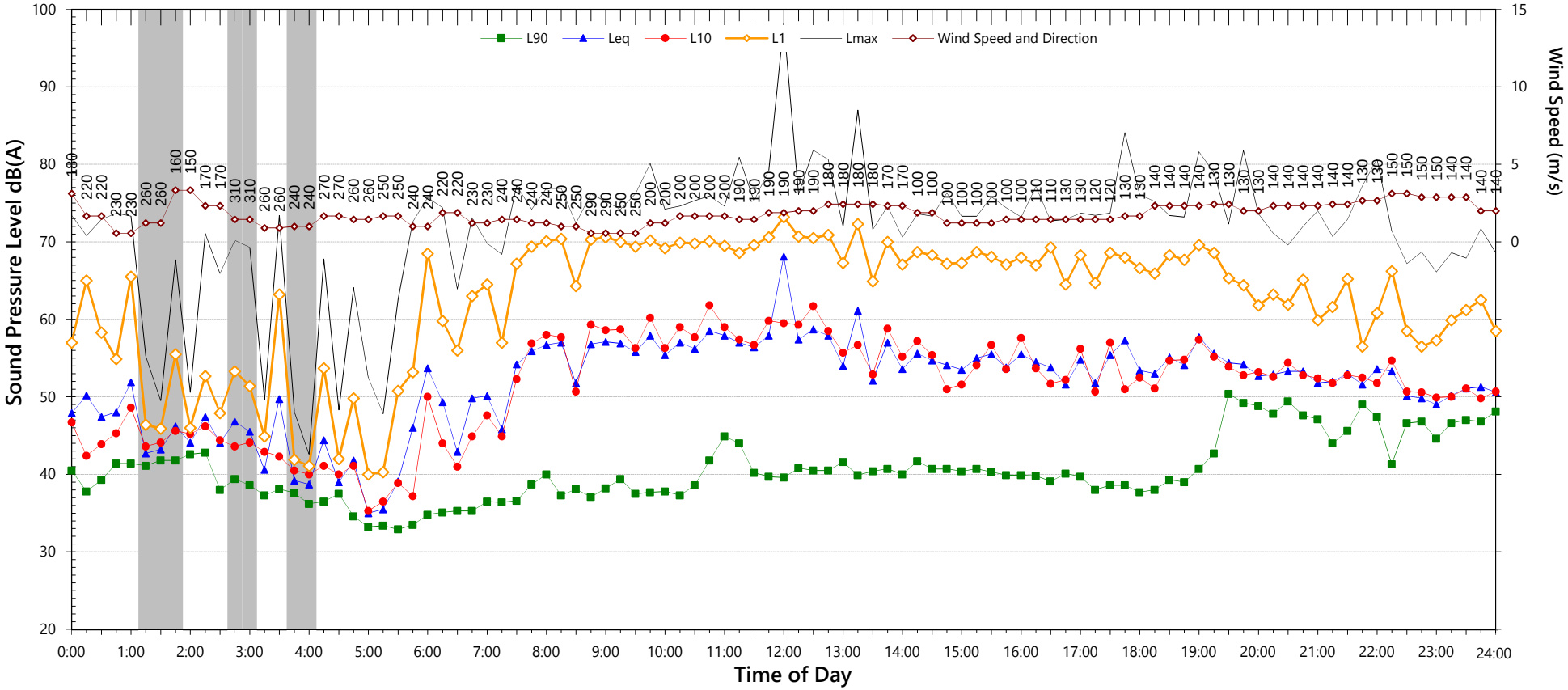
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am til 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. Night time L_{Max} values are shown only where L_{Max} >65dB(A) and where L_{Max}- Leq ≥15dB(A)

Unattended Noise Monitoring Results

Wickham Wool Stores - Milford Street

Saturday, 1 April 2017



NSW Industrial Noise Policy (Free Field)			
Descriptor	**Day[2]**	**Evening[3]**	**Night[4 5]**
L_{90}	37.3	39.0	-
LAeq	57.3	53.9	-

Night Time Maximum Noise Levels			(see note 7)
L_{Max} (Range)	71.1	to	79.5
L_{Max} - L_{eq} (Range)	16.8	to	29.0

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	**Day**	**Night[5]**
	7am-10pm	**10pm-7am**
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	59.2	54.6
$L_{eq\ 1hr}$ upper 10 percentile	63.6	58.1
$L_{eq\ 1hr}$ lower 10 percentile	55.2	49.0

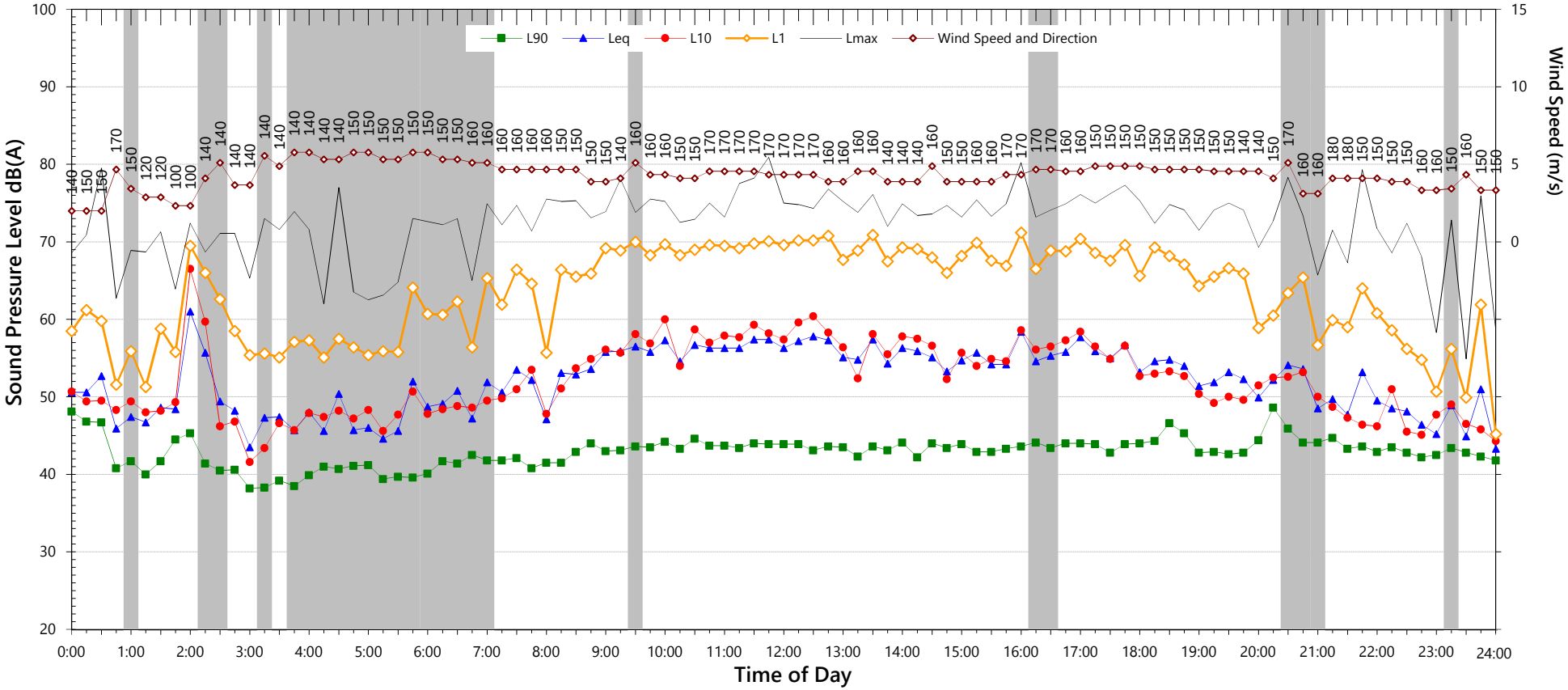
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am til 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. Night time L_{Max} values are shown only where L_{Max} >65dB(A) and where L_{Max}- Leq ≥15dB(A)

Unattended Noise Monitoring Results

Wickham Wool Stores - Milford Street

Sunday, 2 April 2017



NSW Industrial Noise Policy (Free Field)			
Descriptor	Day[2]	Evening[3]	Night[4 5]
L_{90}	42.8	-	36.0
LAeq	56.0	-	50.7

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	57.6	53.2
$L_{eq\ 1hr}$ upper 10 percentile	59.4	60.0
$L_{eq\ 1hr}$ lower 10 percentile	53.5	45.5

Night Time Maximum Noise Levels			(see note 7)
L_{Max} (Range)	70.6	to	87.6
L_{Max} - L_{eq} (Range)	22.9	to	31.8

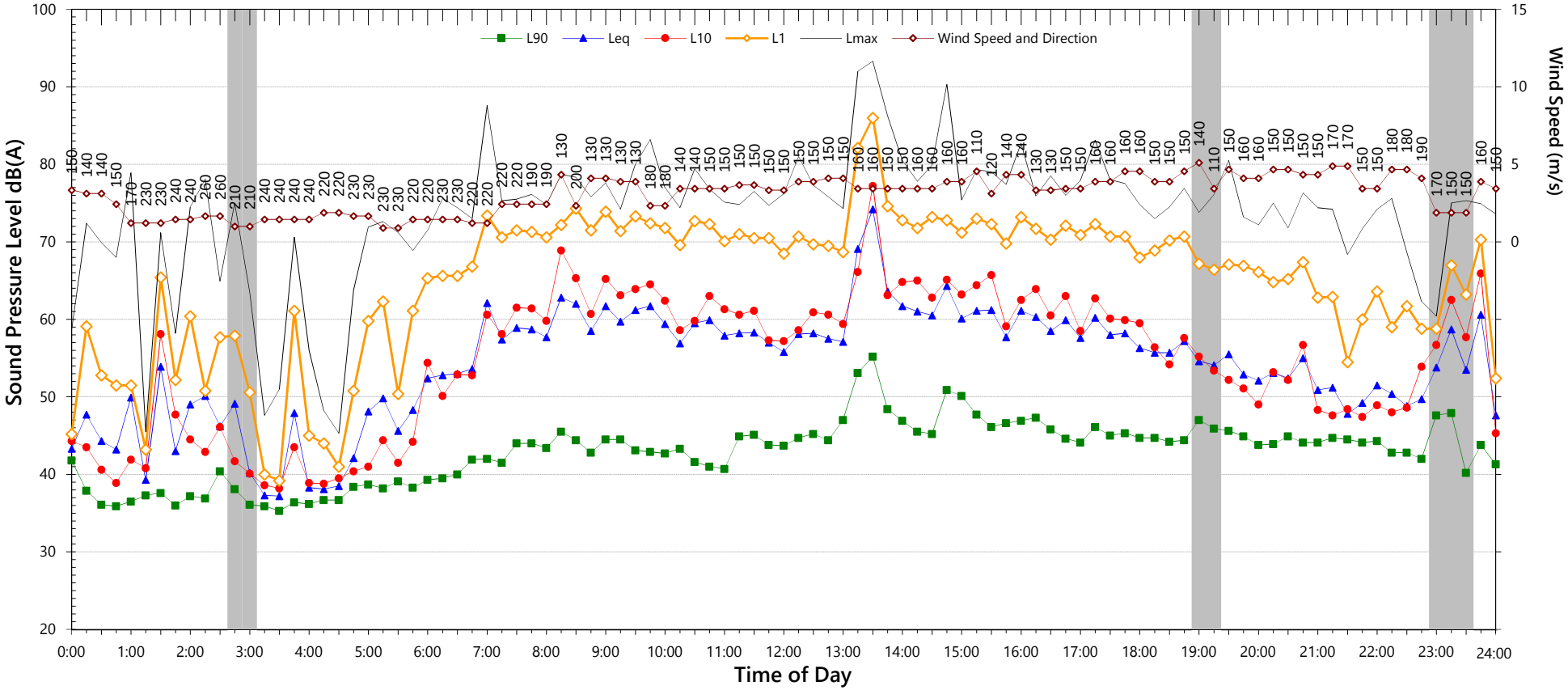
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am til 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. Night time L_{Max} values are shown only where L_{Max} >65dB(A) and where L_{Max}- Leq ≥15dB(A)

Unattended Noise Monitoring Results

Wickham Wool Stores - Milford Street

Monday, 3 April 2017



NSW Industrial Noise Policy (Free Field)			
Descriptor	Day[2]	Evening[3]	Night[4 5]
L_{90}	42.7	43.9	-
LAeq	62.3	53.6	-

Night Time Maximum Noise Levels			(see note 7)
L_{Max} (Range)	65.8	to	79.4
L_{Max} - L_{eq} (Range)	17.1	to	27.4

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	63.8	54.2
$L_{eq\ 1hr}$ upper 10 percentile	69.9	60.3
$L_{eq\ 1hr}$ lower 10 percentile	54.4	45.3

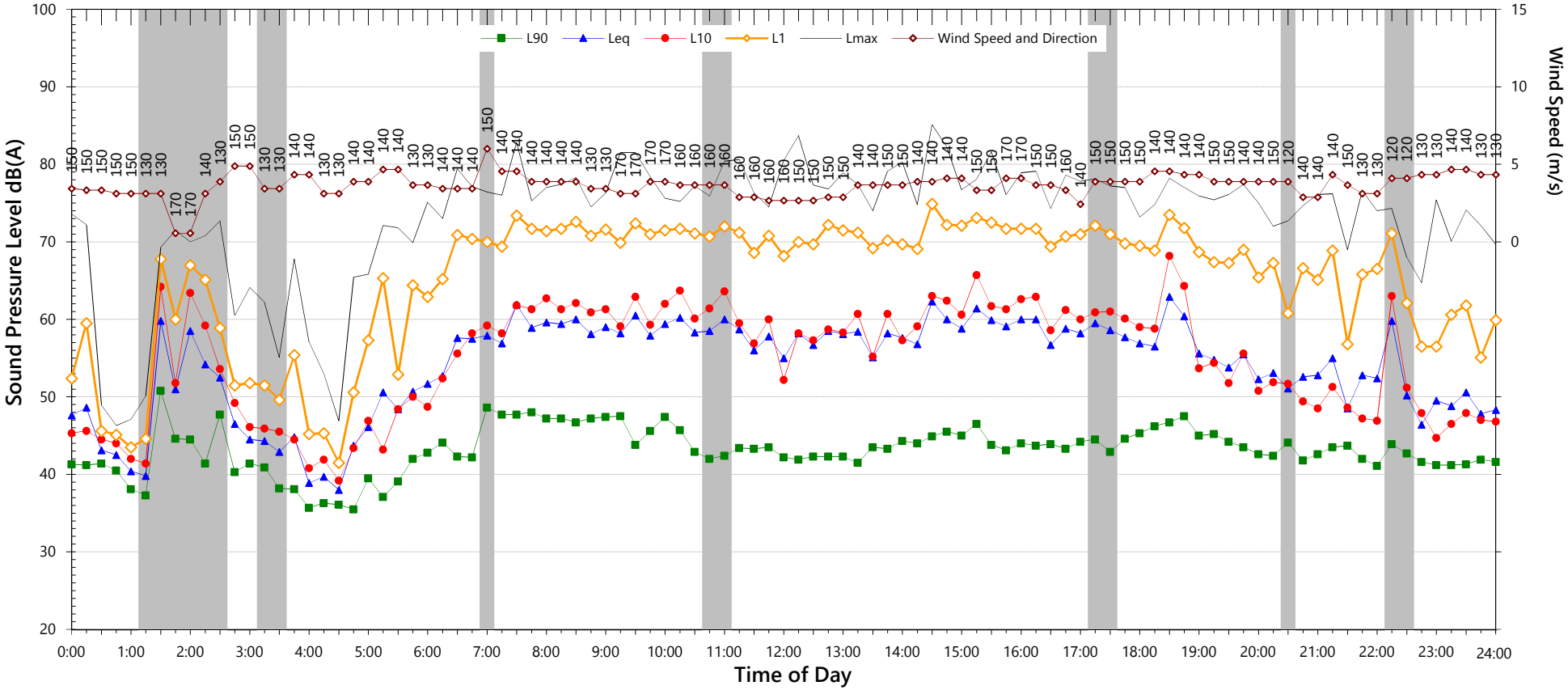
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am til 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. Night time L_{Max} values are shown only where L_{Max} >65dB(A) and where L_{Max}- Leq ≥15dB(A)

Unattended Noise Monitoring Results

Wickham Wool Stores - Milford Street

Tuesday, 4 April 2017



NSW Industrial Noise Policy (Free Field)			
Descriptor	Day[2]	Evening[3]	Night[4 5]
L_{90}	42.3	41.8	35.9
LAeq	58.9	56.2	49.6

Night Time Maximum Noise Levels			(see note 7)
L_{Max} (Range)	66.3	to	80.7
L_{Max} - L_{eq} (Range)	15.4	to	28.1

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	60.8	52.1
$L_{eq\ 1hr}$ upper 10 percentile	62.6	59.3
$L_{eq\ 1hr}$ lower 10 percentile	55.3	41.1

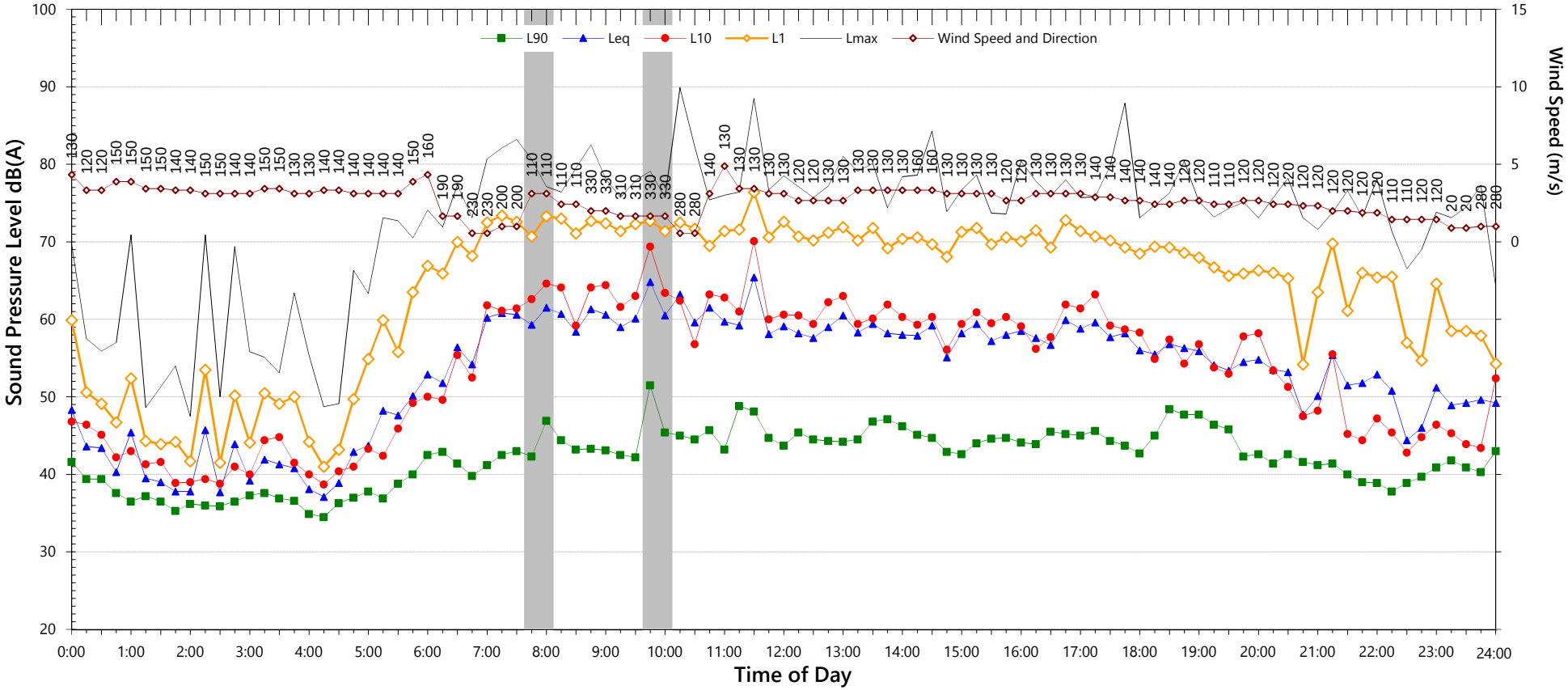
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am til 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. Night time L_{Max} values are shown only where L_{Max} >65dB(A) and where L_{Max}- Leq ≥15dB(A)

Unattended Noise Monitoring Results

Wickham Wool Stores - Milford Street

Wednesday, 5 April 2017



NSW Industrial Noise Policy (Free Field)			
Descriptor	Day[2]	Evening[3]	Night[4 5]
L_{90}	42.7	39.0	-
LAeq	59.6	54.1	-

NSW Road Noise Policy (1m from facade)	(see note 6)	
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	61.1	54.8
$L_{eq\ 1hr}$ upper 10 percentile	63.9	60.5
$L_{eq\ 1hr}$ lower 10 percentile	55.0	49.9

Night Time Maximum Noise Levels			(see note 7)
L_{Max} (Range)	71.5	to	88.0
L_{Max} - L_{eq} (Range)	23.3	to	32.2

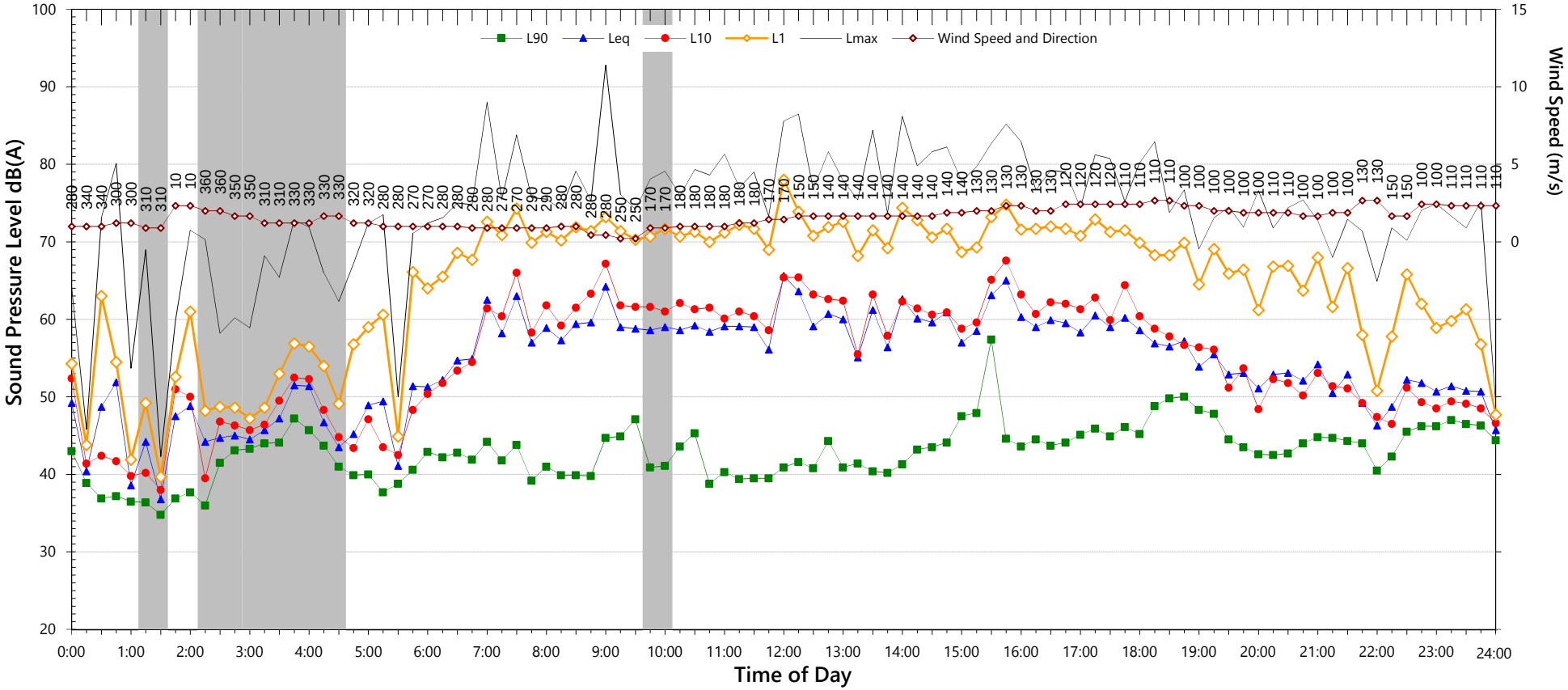
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am til 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. Night time L_{Max} values are shown only where L_{Max} >65dB(A) and where L_{Max}- Leq ≥15dB(A)

Unattended Noise Monitoring Results

Wickham Wool Stores - Milford Street

Thursday, 6 April 2017



NSW Industrial Noise Policy (Free Field)			
Descriptor	**Day[2]**	**Evening[3]**	**Night[4 5]**
L_{90}	39.5	42.5	41.3
LAeq	60.4	53.8	50.1

Night Time Maximum Noise Levels			(see note 7)
L_{Max} (Range)	72.2	to	78.9
L_{Max} - L_{eq} (Range)	21.0	to	29.4

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	**Day**	**Night[5]**
	7am-10pm	**10pm-7am**
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	61.8	52.6
$L_{eq\ 1hr}$ upper 10 percentile	64.5	57.5
$L_{eq\ 1hr}$ lower 10 percentile	54.5	46.0

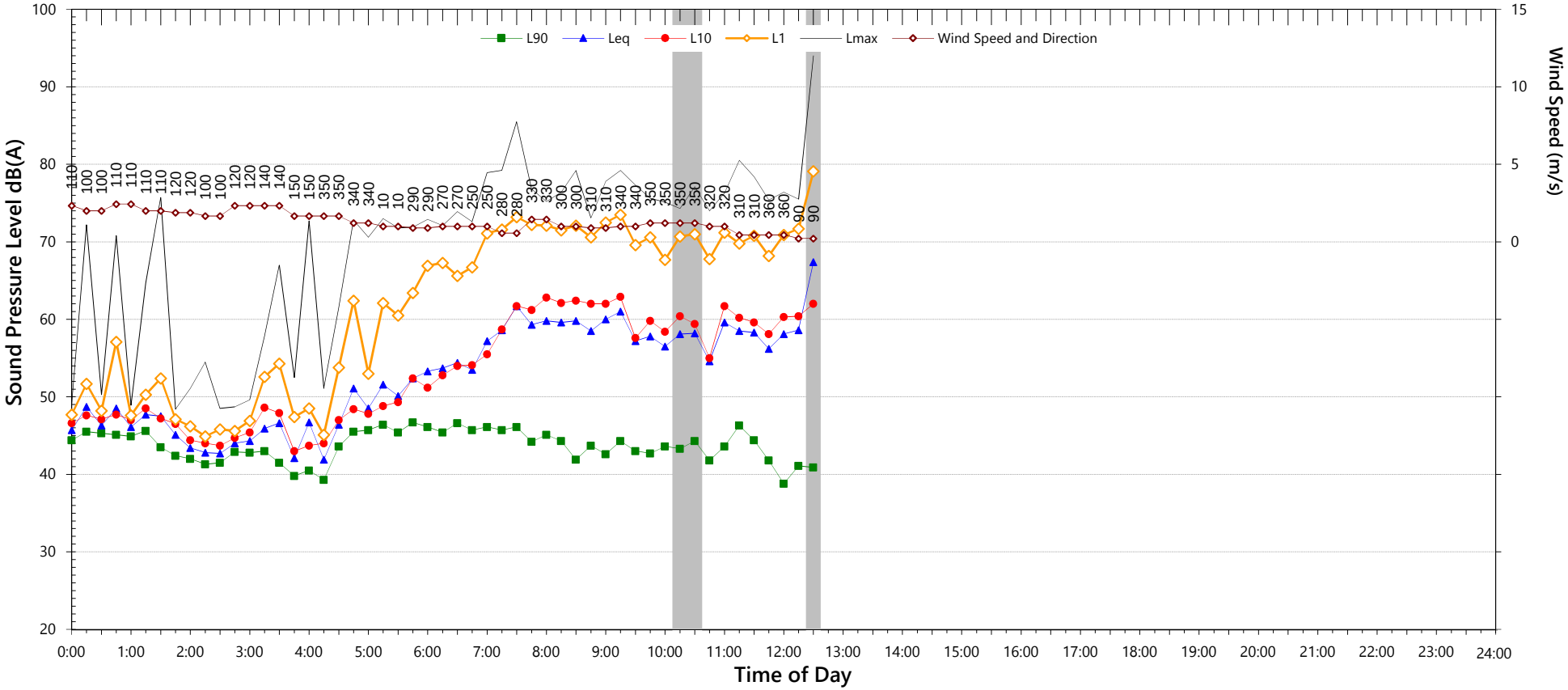
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am til 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. Night time L_{Max} values are shown only where L_{Max} >65dB(A) and where L_{Max}- Leq ≥15dB(A)

Unattended Noise Monitoring Results

Wickham Wool Stores - Milford Street

Friday, 7 April 2017



NSW Industrial Noise Policy (Free Field)			
Descriptor	**Day[2]**	**Evening[3]**	**Night[4 5]**
L_{90}	-	-	-
LAeq	-	-	-

Night Time Maximum Noise Levels			(see note 7)
L_{Max} (Range)	-	to	-
L_{Max} - L_{eq} (Range)	-	to	-

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	**Day**	**Night[5]**
	7am-10pm	**10pm-7am**
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	61.4	-
$L_{eq\ 1hr}$ upper 10 percentile	62.5	-
$L_{eq\ 1hr}$ lower 10 percentile	60.3	-

Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am til 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. Night time L_{Max} values are shown only where L_{Max} >65dB(A) and where L_{Max}- Leq ≥15dB(A)