10 Eastern Creek Drive, Eastern Creek, NSW 2766

Development Application Acoustic Assessment

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Document control record

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Title	Senior Acoustic Engineer	Title	Client Manager

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1 Introduction

A new development is proposed on the brownfield site at 10 Eastern Creek Drive, Eastern Creek. Aurecon have been engaged to undertake an assessment of the potential noise impacts associated with the proposed development, to support the masterplan development application.

The purpose of this assessment is to determine if the potential environmental noise impacts associated with the operational phase of the development, complies with the relevant local authority requirements. To this extent this report will:

- Identify surrounding sensitive receivers.
- Present the results of ambient noise survey conducted by this office.
- Address relevant local council, State and Australian Standard noise requirements and formulate noise emission criteria applicable to the subject proposal.
- Identify potential noise generating sources associated with the subject proposal and detail indicative ameliorative treatments.

1.1 References

- METIER3 2019, Masterplanning Drawing Package, Draft Issue dated 23 September.
- NSW Environment Protection Authority 2017, Noise Policy for Industry.
- NSW Government Legislation 2009, State Environmental Planning Policy (Western Sydney Employment Area).
- NSW Government Legislation 2015, Blacktown Local Environmental Plan.
- Blacktown City Council NSW (2015). Development Control Plan.
- Standards Australia 2018, *AS 1055:2018 Acoustics-Description and measurement of environmental noise*.

2 Project Overview and Site Description

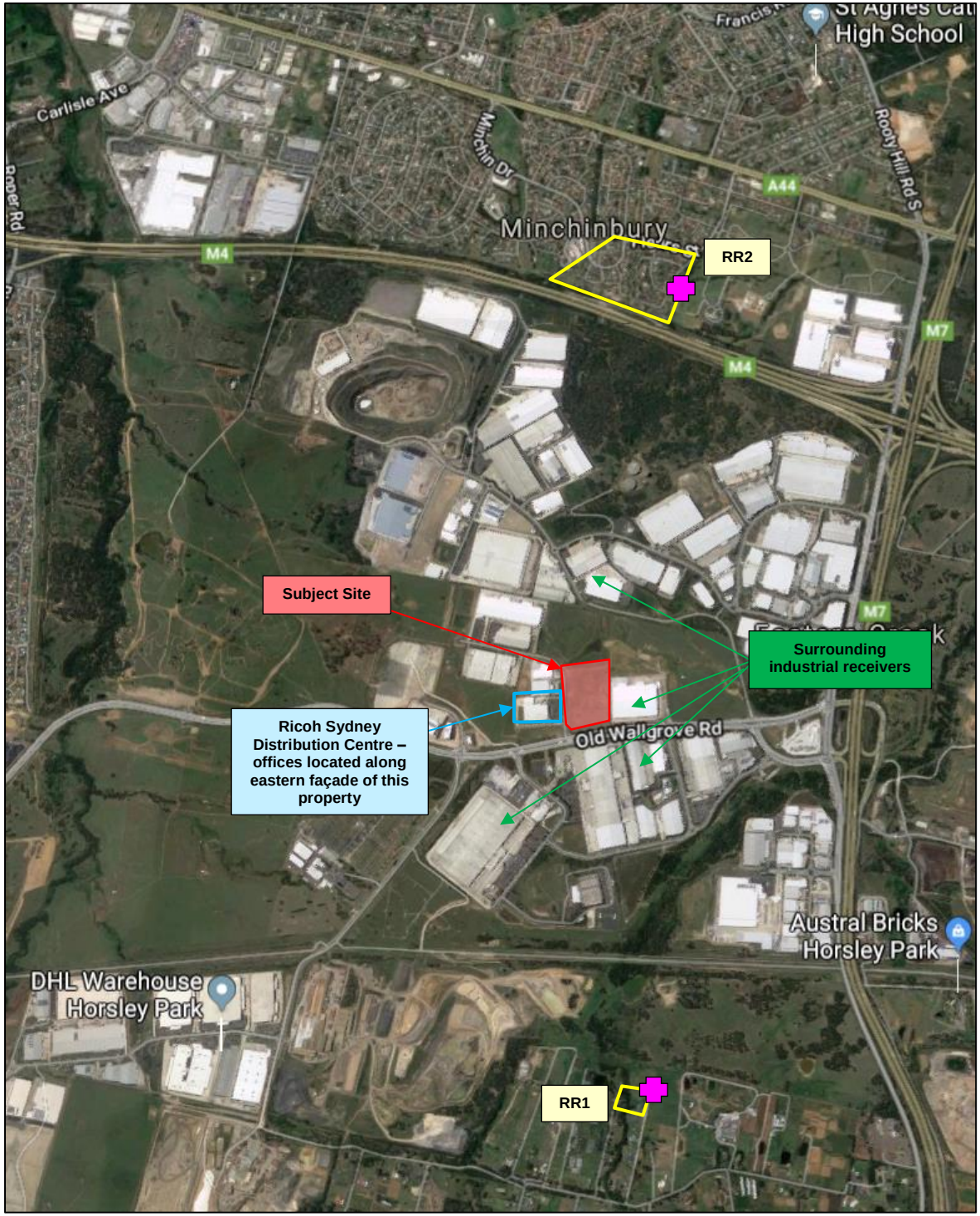
The proposed development site is located on the eastern side of the Eastern Creek Drive and Old Wallgrove Road intersection, in Eastern Creek. It is bounded by Old Wallgrove Road to the south, Eastern Creek Drive to the west, an existing industrial/warehouse property to the east, brownfield land to the north, and slopes from south to north, from approx. 72m to 64m. The subject site is located within the Blacktown City Council local government area (LGA) and is zoned general industrial IN1 as per the State Environmental Planning Policy (Western Sydney Employment Area) 2009.

The site is surrounded by industrial and warehouse developments to the east, north, west and south. The nearest residential areas are located approximately 1.6km and 1.7km to the south and north respectively of the subject site.

The nearest potentially affected noise-sensitive receivers are as follows;

- Residential Receiver 1 (RR1) – Private residential property located at 146 Burley Road, Horsley Park, approx. 1.6km to the south.
- Residential Receiver 2 (RR2) – Residential properties located along Farrington Street, Minchinbury, on the northern side of M4 Western Motorway (west of M7 Interchange), approx. 1.7km to the north.
- Commercial Receiver – Ricoh Sydney Distribution Centre offices, located along the eastern façade of the warehouse development at 1 Eastern Creek Drive, Eastern Creek.

Figure 1 below illustrates locations of the subject site, unattended noise monitors, surrounding properties and nearest affected noise-sensitive receivers.



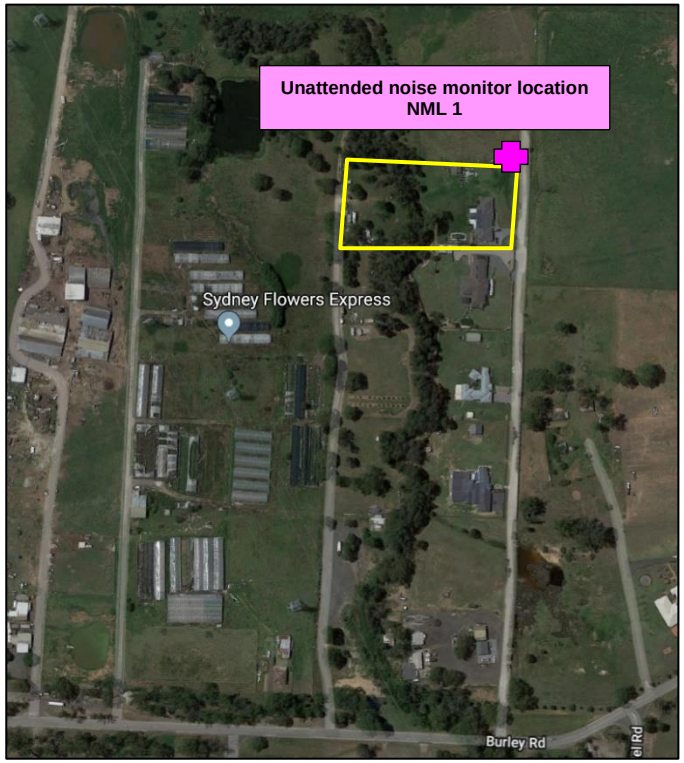


Figure 1 – Overall Site Context Plan

Figure 3 – Rural Residential property at 146 Burley Road

Figure 2 – Ricoh offices located along eastern façade of the distribution centre

It is proposed to construct two 2-storey buildings, each with FOH areas, offices, warehouse areas and plantrooms. A standalone substation building is also proposed as illustrated in the figure below. The facility will typically operate 24 hours a day 7 days a week. A total of approx. 40 staff are envisaged to work across both buildings, during standard business hours.

On-site parking is provided for 50 vehicles to the west of building 1, with the loading dock for the facility also located along the western façade of this building. All vehicular access at this stage is only proposed via the one access point proposed to the west of building 1, towards the north-west corner of the site.

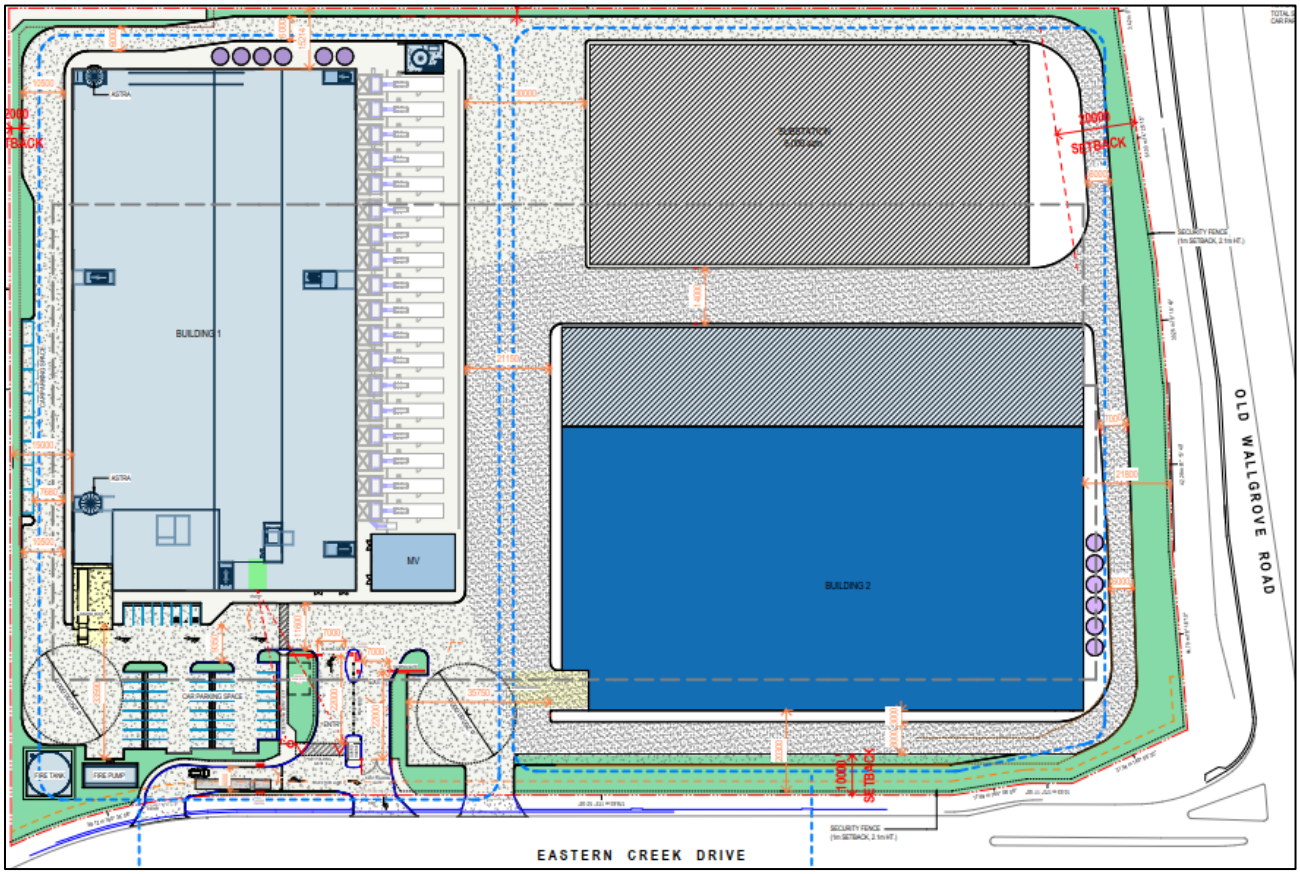


Figure 4 – Proposed Site Plan

3 Ambient Noise Survey

- The ambient environment immediately surrounding the project site is dominated by traffic noise from the high percentage of heavy vehicle movements on the surrounding road network, associated with the surrounding industrial properties.
- Unattended long-term monitoring was conducted at the two residential receiver locations, to quantify the existing acoustic environment.

All monitoring procedures and calculated rating background (RBL), project amenity (ANL) and project intrusiveness noise levels, were conducted in accordance with the requirements of the NSW EPA Noise Policy for Industry and Australian Standard 1055:2018 "*Acoustics – Description and measurement of environmental noise".*

3.1 Measurement Period and Locations

Two noise monitors were used to measure the existing ambient environment at the identified sensitive receiver locations (refer section **Error! Reference source not found.**). Monitoring was conducted between 24th – 31st M ay 2019, at the following locations, as illustrated in **Error! Reference source not found.**.

- NML 1 – along the northern property boundary of the rural residential receiver at146 Burley Road, Horsley Park.
- NML 2 – along the eastern property boundary of the residential properties along Farrington Street, north of Nicol Place.

Detailed noise monitoring data is attached in Appendix A.

3.2 Prevailing Noise Conditions

The following noise conditions were noted during monitor setup;

- NML 1 – High volume of bird noise (chirping), pig farm located to the north of the property and light machinery noise (lawn movers, grinders etc.) from surrounding properties.
- NML 2 – Traffic noise from M4 Western Motorway, birds chirping and dogs barking.

3.3 Instrumentation

Unattended noise monitoring was conducted using two Acoustic Research Laboratories type EL-316 noise monitors. The monitors were set to record continuously at 15-minute time intervals, in an A-weighted fast response mode. Both monitors were calibrated at the start and end of the monitoring period using a Brüel & Kjær type 4230 calibrator. No significant drift was noted. Calibration information for the two monitors are detailed in the table below.

Table 1 – Noise Monitor Calibration Information

Equipment	Make	Serial	Last Calibration
NML 1	Acoustic Research Labs	878079	1 May 2019
NML 2		878000	12 October 2019

3.4 Meteorological Conditions

Section A4 of the NSW EPA NPfI outlines the following with regards to meteorological impacts on noise monitoring:

Noise monitoring should not be conducted (or the data should be excluded) when average wind speeds (over 15-minute periods or shorter) at microphone height are greater than 5 m/s, or when rainfall occurs.

However, the same section of this policy also outlines that;

Exceptions to this rule are allowed, provided the proponent is able to show that the wind-induced noise on the microphone, and sound levels due to rain, are at least 10 dB below the noise levels (that is, background and/or ambient) under investigation.

Weather conditions during the monitoring period were obtained from the Horsley Park Equestrian Centre AWS (33.8510°S 150.8567°E) located approx. 7km to the south of the subject site. This data was assessed, and periods of inclement weather are highlighted on the detailed logging data attached in Appendix A.

- Rain was noted most of the day on the 5th October and till approx. 9:20am on the 6th October. This data has been excluded in determining the rating background noise levels.
- Some periods of high wind speeds (> 5m/s) were noted, and these data was excluded in determining the rating background noise levels.

3.5 Measured Background Noise Levels

The rating background noise levels (RBL) at the two monitoring locations are detailed below. The RBL's were calculated based on the methodology detailed in fact sheet A of the NSW EPA NPfI.

Table 2 – Measured Rating Background Noise Levels

Monitor	Measured Rating Background Noise Level dB(A)$L_{90(period)}$		
	Daytime (7am-6pm)	**Evening (6pm-10pm)**	**Night (10pm-7am)**
NML 1	41	42	39
NML 2	44	44	39

4 Environmental Noise Emission Regulations

4.1 Blacktown City Council

Part E of the Blacktown City Council Development Control Plan (DCP) 2015, applies to developments in industrial areas. Section 4.3 of this document outlines the following provisions for developments proposed adjoining residential land;

(d) The likely level of noise to be emitted by the development, particularly its effect on the use of adjoining residential land. In general, noise generated by a development should not exceed the existing background sound pressure level by more than 5dB(A). A statement of compliance with this standard from an acoustic consultant may be required to be submitted with the DA.

The development site is not located adjacent to residential land (nearest residential receiver located approx. 1.6km away) but should be considered.

The NSW Environment Protection Authority's (EPA) Noise Policy for Industry (NPfI) details framework and processes for deriving noise criteria for licences, which can then be used to regulate the operation of premises scheduled under the Protection of the Environment Operations Act 1997. Whilst specifically aimed for the assessment of noise impacts from industrial premises, the policy is also suitable for the assessment tog other major development proposal.

4.2 NSW EPA Noise Policy for Industry

Noise emissions associated with the normal operation of the subject development, will be assessed to comply with the provisions of this policy. This policy nominates two components which will both need to be complied with, namely intrusiveness and amenity.

- **The intrusiveness criterion** is intended to limit the audibility of noise emissions at residential receivers and requires that the $L_{Aeq\ 15minute}$ for the noise source, measured at the most sensitive receiver under worst-case conditions should not exceed the Rating Background Level (RBL) by more than 5dB:

  LAeq, 15-minute ≤ rating background level + 5 dB

- The **amenity criterion** is intended to limit the absolute noise level from all noise sources (e.g. mechanical plant/equipment) to a level that is consistent with the general environment. This criterion only relates to industrial type noise and does not include construction noise, noise from windfarms, patron/amplified music noise from venues and events, noise from sporting activities and noise from transportation sources. It is based on the existing ambient environment at the receivers. Table 2.2 of the policy recommends amenity noise level criteria for various types of receivers at different times of the day. Criteria relevant to the subject assessment are presented below,

Table 3 – NSW EPA NPfI Recommended Amenity Noise Levels

Receiver	Time of Day	L_{Aeq}, dB(A)
Residential - Rural	Day (7am-6pm)	50
	Evening (6pm-10pm)	45
	Night (10pm-7am)	40
Residential - Suburban	Day (7am-6pm)	55
	Evening (6pm-10pm)	45
	Night (10pm-7am)	40
Commercial premises	When in use	65
Industrial premises	When in use	70

The project amenity noise levels are then formulated so that the LAeq noise emissions from the subject development does not increase the total industrial noise levels (new and existing) at the receiver and remains within the recommended amenity noise levels for an area:

Project amenity noise level = recommended amenity noise level – 5dB(A)

The project noise trigger level is a benchmark level above which noise management measures are required to be considered. They are derived by considering both the short-term intrusiveness due to changes in the existing noise environment (applicable to residential receivers only) and maintaining noise level amenity for particular land uses for residents and other sensitive receivers.

4.3 Emergency Plant

There are no provisions in the NPfI or any other NSW legislation for noise impacts associated emergency stand-by plant/equipment. Hence, the VIC EPA State Environment Protection Policy (SEPP) No. N-1 will be used as a point of reference to establish noise emission limits for emergency plant.

Section B4 of the VIC EPA SEPP N-1 outlines the following requirements to control noise impacts associated with standby generators, boilers and fire pumps. This is presented below.

"Where the noise source under consideration is a standby generator, standby boiler or fire pump, the noise limit shall be increased by 10 dB for a day period and by 5 dB for all other periods."

4.4 Project Noise Emission Criteria

Section 2.1 of the NSW EPA NPfI outlines the following conditions in determining the project noise trigger levels,

The project noise trigger level is the lower (that is, the more stringent) value of the project intrusiveness noise level and project amenity noise level.

Intrusive noise levels are only applied to residential receivers (residences). For other receiver types identified in Table 2.2, only the amenity levels apply

The L_{eq} trigger level is determined over a 15-minute period for the project intrusiveness noise level and over an assessment period (day, evening and night) for the project amenity noise level. To standardise the time periods for the intrusiveness and amenity noise levels, section 2.2. of this policy outlines that $L_{Aeq,15min} = L_{Aeq,\ period} + 3$ *decibels (dB).*

The resulting project specific noise emission levels are summarised in the table below.

Table 4 – Project Specific Noise Emission Criteria (Normal Operations)

Receiver	Period	Project Specific Noise Level
RR 1	Day	46 dB(A)$L_{eq(15mins)}$
	Evening	43 dB(A)$L_{eq(15mins)}$
	Night	38 dB(A)$L_{eq(15mins)}$
RR 2	Day	49 dB(A)$L_{eq(15mins)}$
	Evening	43 dB(A)$L_{eq(15mins)}$
	Night	38 dB(A)$L_{eq(15mins)}$
Commercial Receiver	When in use	63 dB(A)$L_{eq(15mins)}$
Industrial properties	When in use	68 dB(A)$L_{eq(15mins)}$

It should be noted that the levels in Table 4 are conditional on no annoying characteristics existing in the noise of concern, such as tonality, amplitude modulation or impulsiveness. If such characteristics exist, then any measured noise levels shall be adjusted in accordance with the requirements of Table C1 of the NpfI, summarised below.

Table 5 – Adjustments to Measured Levels for Noise Characteristics

Where **tonality** is present	Where noise source is **dominant at low frequencies**	Where noise source is **intermittent**
+5 dB	+5 dB	Difference in measured A-weighted levels, upto 5 dB

Note:

- *When a noise source emits tonal and low-frequency noise, only one 5-dB correction should be applied if tone is < 160Hz.*
- *Maximum correction of 10dB(A) where noise contains two or more modifying factors.*

Environmental noise impacts from emergency plant or plant operating under an emergency scenario, will have to comply with the following noise limits;

Table 6 – Project Specific Noise Emission Criteria (Emergency Plant)

Receiver	Period	Project Specific Noise Level
RR 1	Day	56 dB(A)$L_{eq(15mins)}$
	Evening	53 dB(A)$L_{eq(15mins)}$
	Night	43 dB(A)$L_{eq(15mins)}$
RR 2	Day	59 dB(A)$L_{eq(15mins)}$
	Evening	53 dB(A)$L_{eq(15mins)}$
	Night	43 dB(A)$L_{eq(15mins)}$
Commercial Receiver	When in use	73 dB(A)$L_{eq(15mins)}$
Industrial properties	When in use	78 dB(A)$L_{eq(15mins)}$

5 Discussions & Recommendations

Operational noise sources with the potential to impact on the amenity of surrounding sensitive land users include;

- Noise emissions from any external plant and equipment associated with the subject proposal.
- Noise emissions from loading dock operations.

5.1 Noise Emissions from External Plant/Equipment

Information on the proposed services design and the likely plant/equipment associated with this design is not available at this early (DA) stage.

A detailed review of the proposed engineering services design and any associated plant and equipment should be undertaken at detailed design or CC stage, when selections, operating conditions and locations are confirmed. Cumulative noise impacts from the operation of all continuous noise sources, must comply with the project specific noise emission criteria detailed in section 4.4 (normal operating scenario and emergency scenario).

- Typical noisy plant associated with similar facilities include cooling towers, chillers, stand-by generators and rooftop fans. Given the proximity of the nearest affected residential property to the subject site (at least 1.6km away), Aurecon believe all plant can be satisfactorily attenuated to ensure cumulative noise emission comply with the project noise emission goals.
- Typical ameliorative treatments and design principals will include:
  - Strategic location of high noise plant, at maximum distance of sensitive receivers.
  - Installation of acoustic louvres to plant room.
  - Considering appropriate building envelope design options (external wall, façade glazing, roof) for plantrooms and warehouse areas.
  - Building solid noise barriers / partial enclosures on the roof where necessary, around noisy plant.
  - Acoustic attenuators and acoustically lined ductwork.
  - Utilisation of variable speed controls to ramp down plant equipment when full-load is not required (e.g. reduced operation and noise from cooling towers during the night-time).

5.2 Noise Emissions from Loading Dock

A loading dock is proposed along the western façade of building 1. All vehicular access to the site, including loading dock trucks/trailers is proposed via the one access point located to the west of building 1, towards the north-west corner of the site. This is illustrated in the figure below.

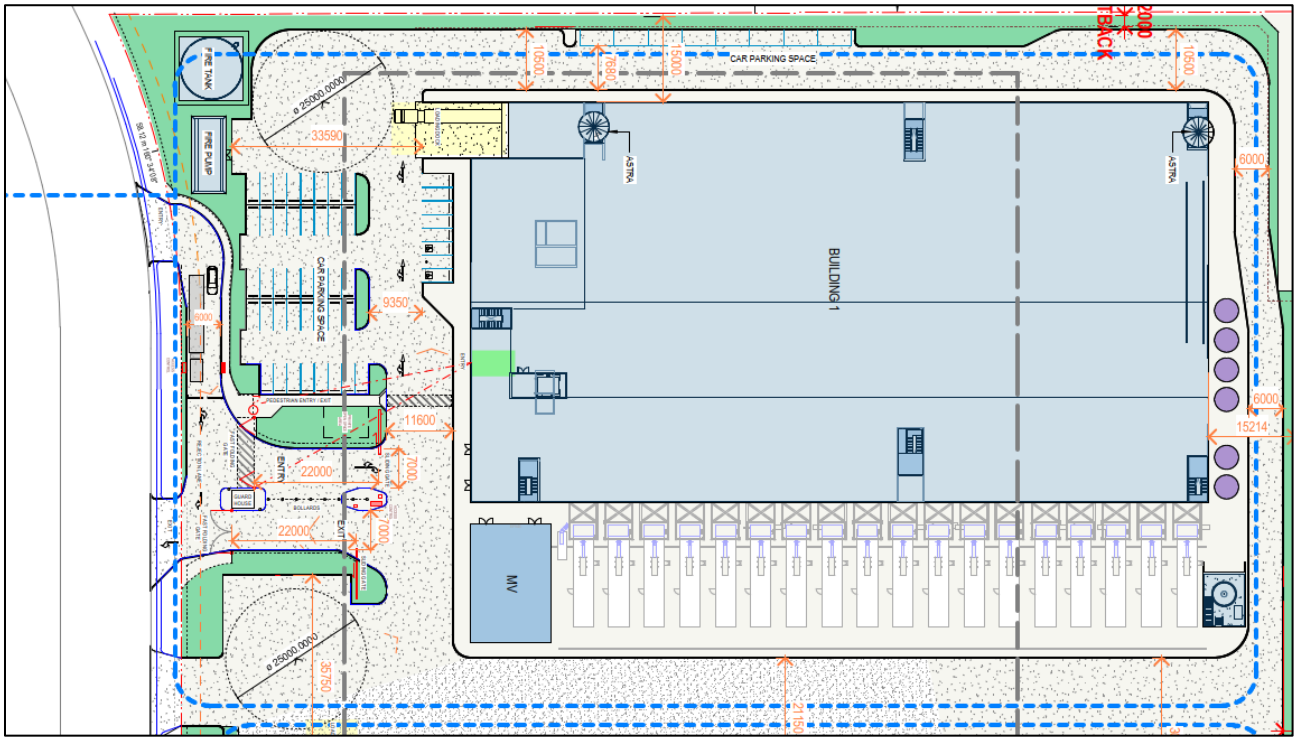


Figure 5 – Proposed Development Loading Dock and Site Access

- The loading dock is mainly used for the delivery of IT equipment, during the daytime period only (7am – 6pm). Loading dock activities will be largely intermittent, with daily use highly unlikely and 2-3 deliveries typically expected in one day.
  - Given the intermittent use of the loading dock, barrier effect resulting from the proposed buildings on site and surrounding industrial facilities and distance (at least 1.6km to nearest residential property), noise impacts from loading dock operations will not be audible at the sensitive receiver locations RR1 and RR2.
  - The Ricoh Sydney Distribution Centre offices are located at least 85 – 90m from the proposed loading dock, with mechanical ventilation and fixed façade, hence noise impacts from the loading dock operations are unlikely to impact on the internal amenity of these receivers. Noise impacts from heavy vehicle (truck/trailer) movements and warehousing operations associated with this receiver is likely to be louder than the subject proposal loading dock operations, based on site survey.
- An acoustic study is recommended during the detailed design or CC stage, when loading dock use and operations are confirmed, to assist in the formulation of a site operational traffic management plan to control any potential noise impacts. This will include:
  - Appropriate location of loading dock and access routes to ensure maximum distance to surrounding sensitive receivers and utilize proposed structures on site as noise barriers.
  - Turning off engines during idling and loading/unloading operations.
  - Replacement of reverse beeping alarms with squawkers.

6 Conclusions

Potential environmental noise impacts associated with the proposed development at 10 Eastern Creek Drive, Eastern Creek, have been assessed.

An overview of the subject proposal and survey of the development site, surrounding properties and nearest sensitive receivers is detailed in section 2.

The existing acoustic environment around the site and a noise survey of the ambient conditions at the nearest affected residential properties is outlined in section 3.

Based on this information and the relevant legislation applicable to the subject proposal (refer section 4), project specific noise emission criteria have been identified (refer section 4.4) along with general principles for acoustic design and noise control (refer section 5).

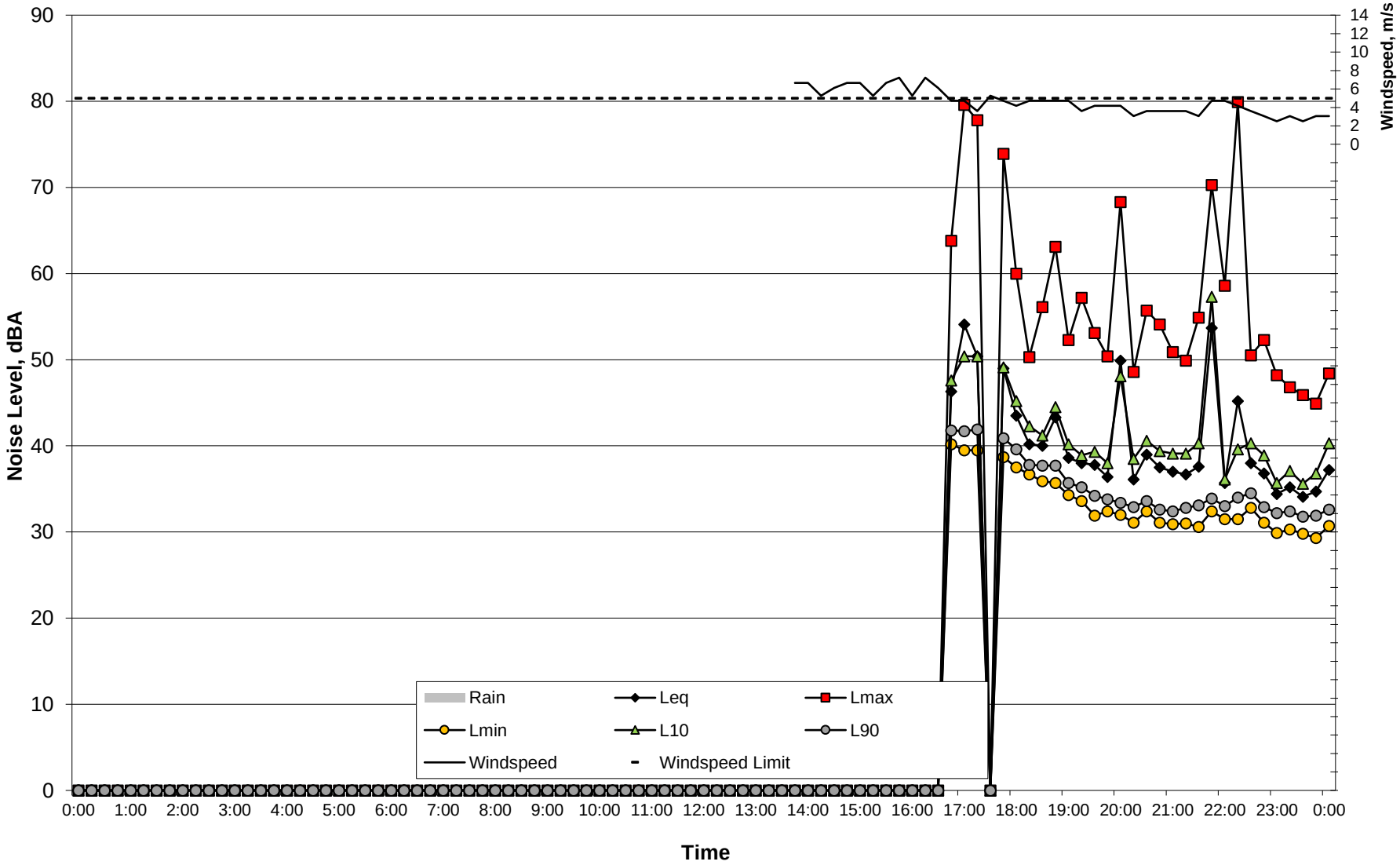
A

Noise Monitoring Data

Measured Ambient Noise Levels

146 Burley Road, Horsely Park

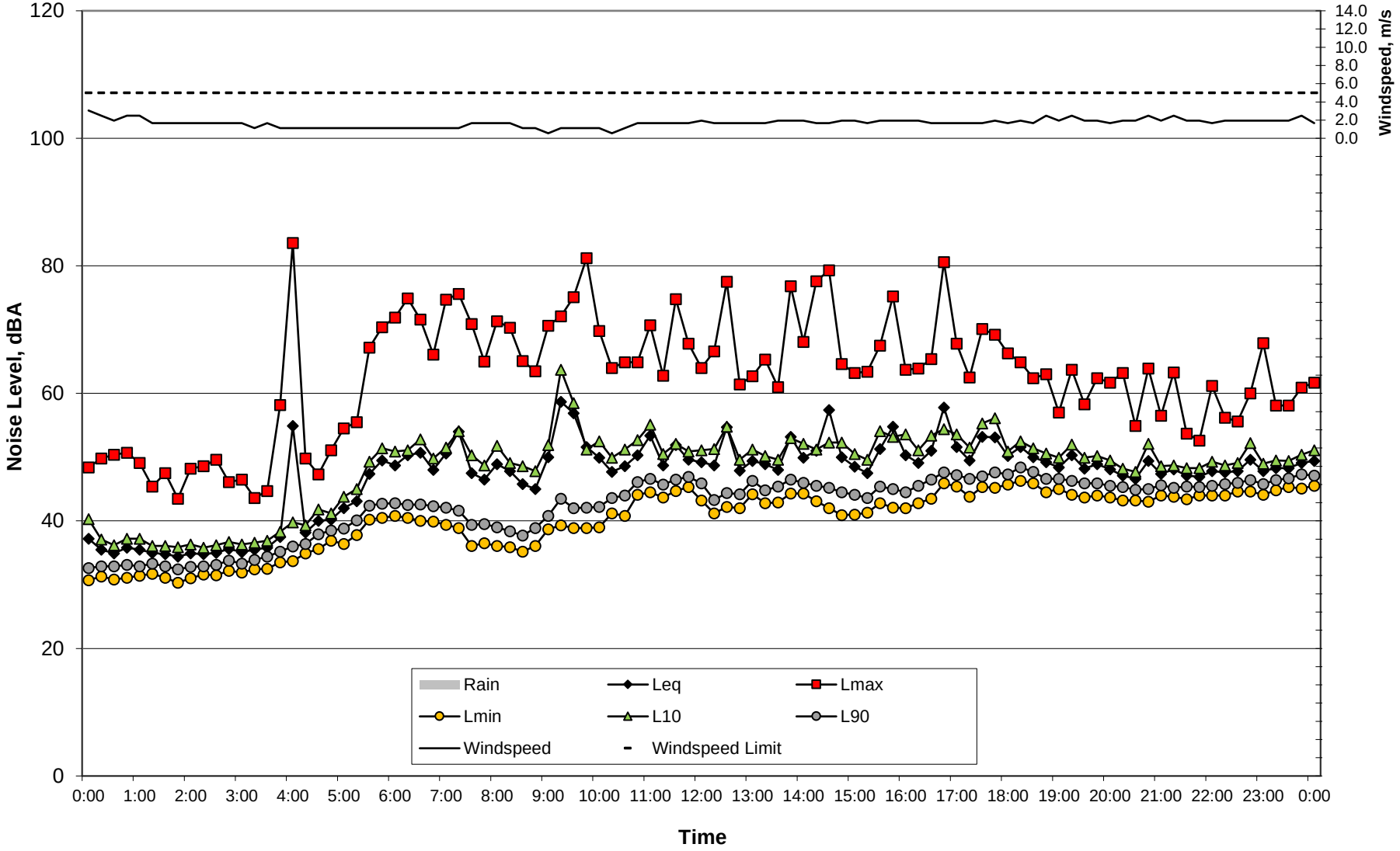
Monday, 30 September 2019



Measured Ambient Noise Levels

146 Burley Road, Horsely Park

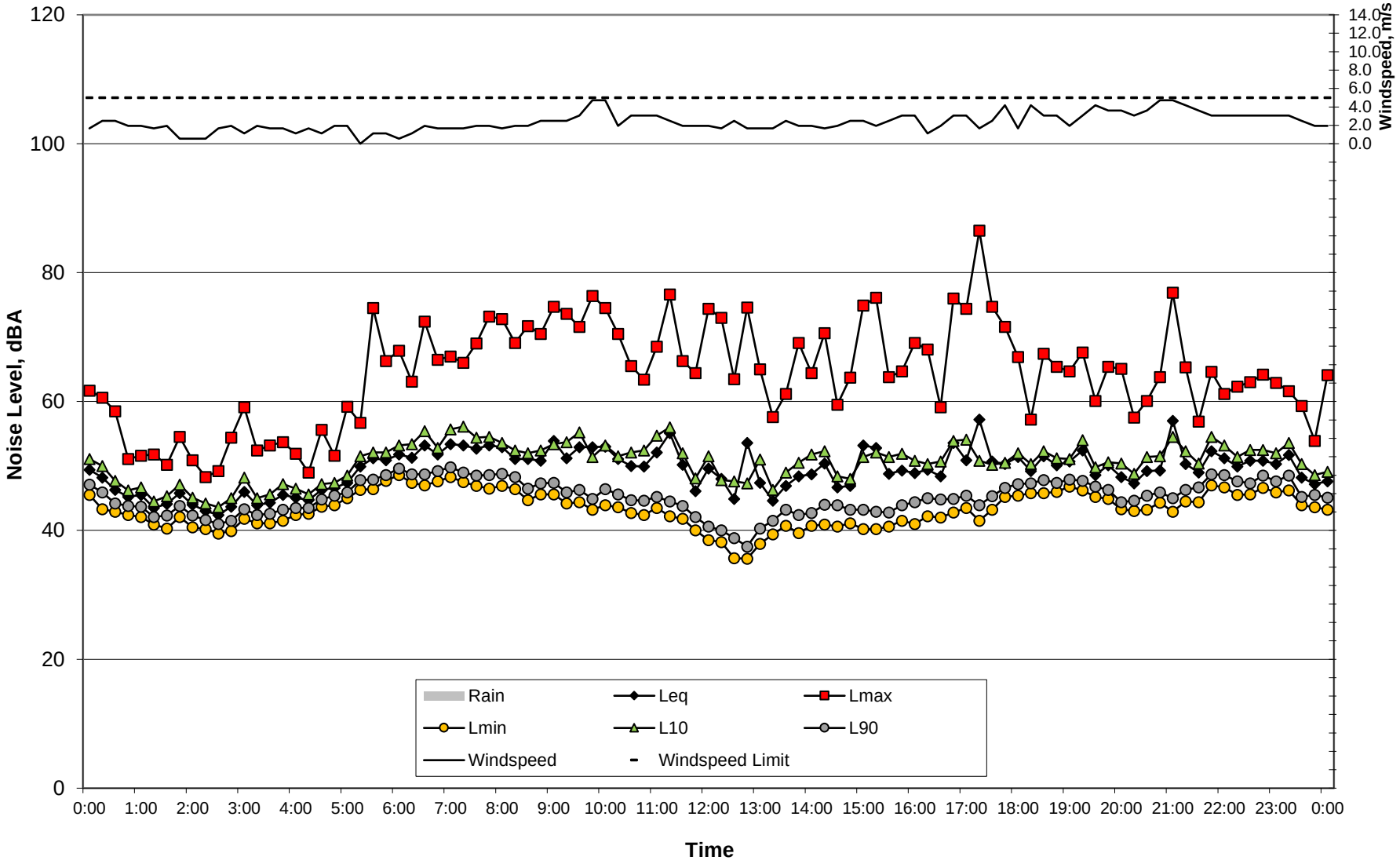
Tuesday, 1 October 2019



Measured Ambient Noise Levels

146 Burley Road, Horsely Park

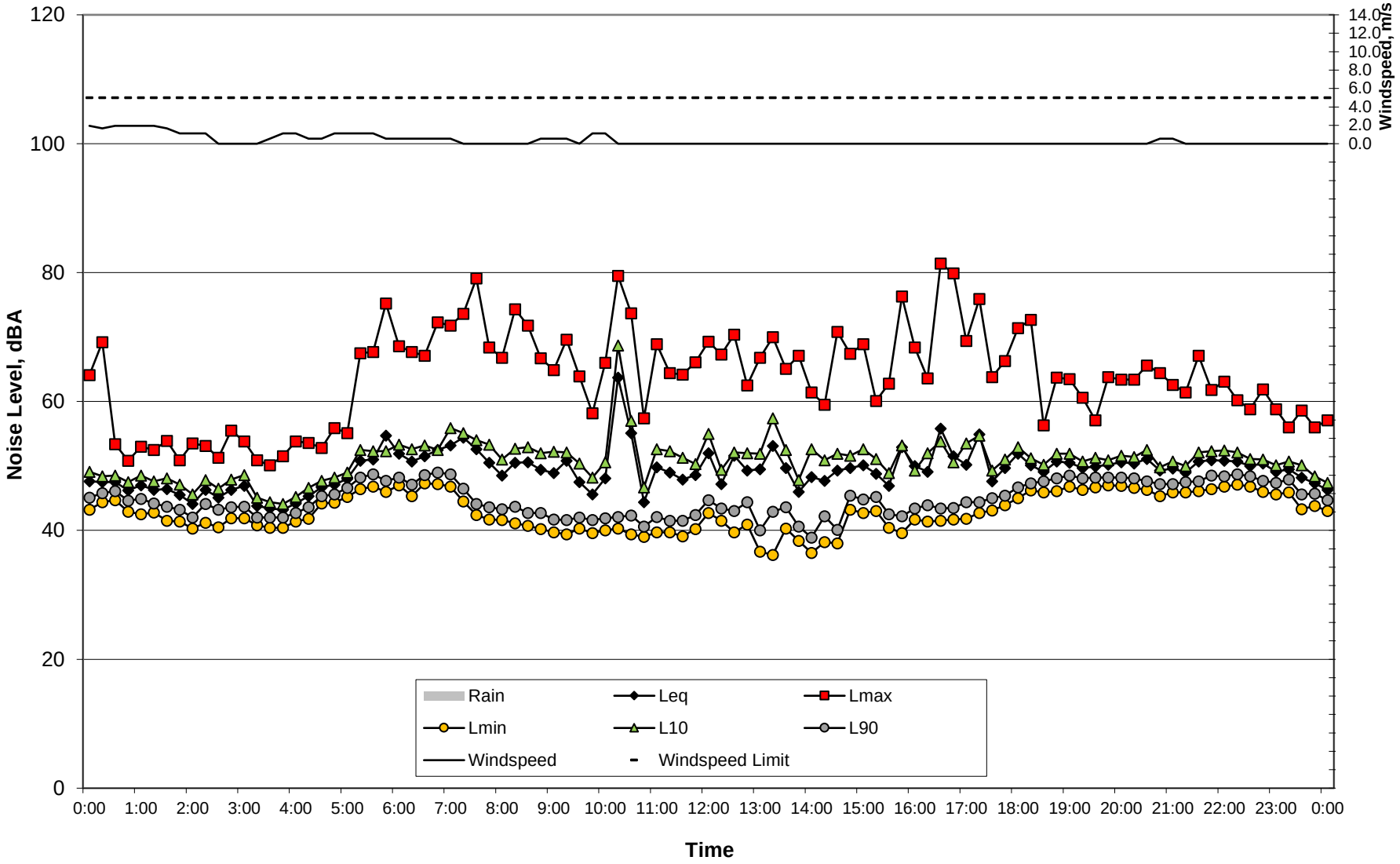
Wednesday, 2 October 2019



Measured Ambient Noise Levels

146 Burley Road, Horsely Park

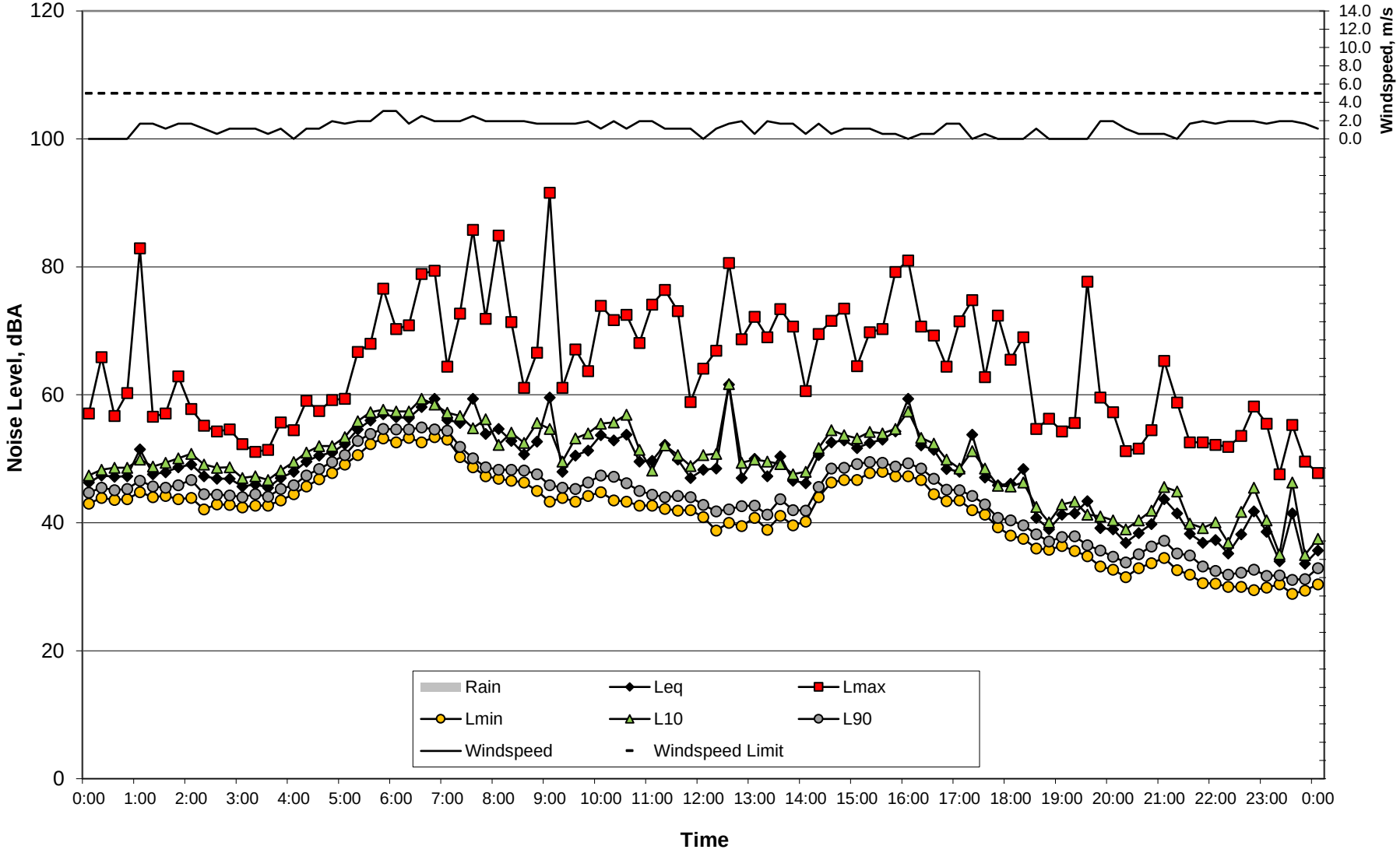
Thursday, 3 October 2019



Measured Ambient Noise Levels

146 Burley Road, Horsely Park

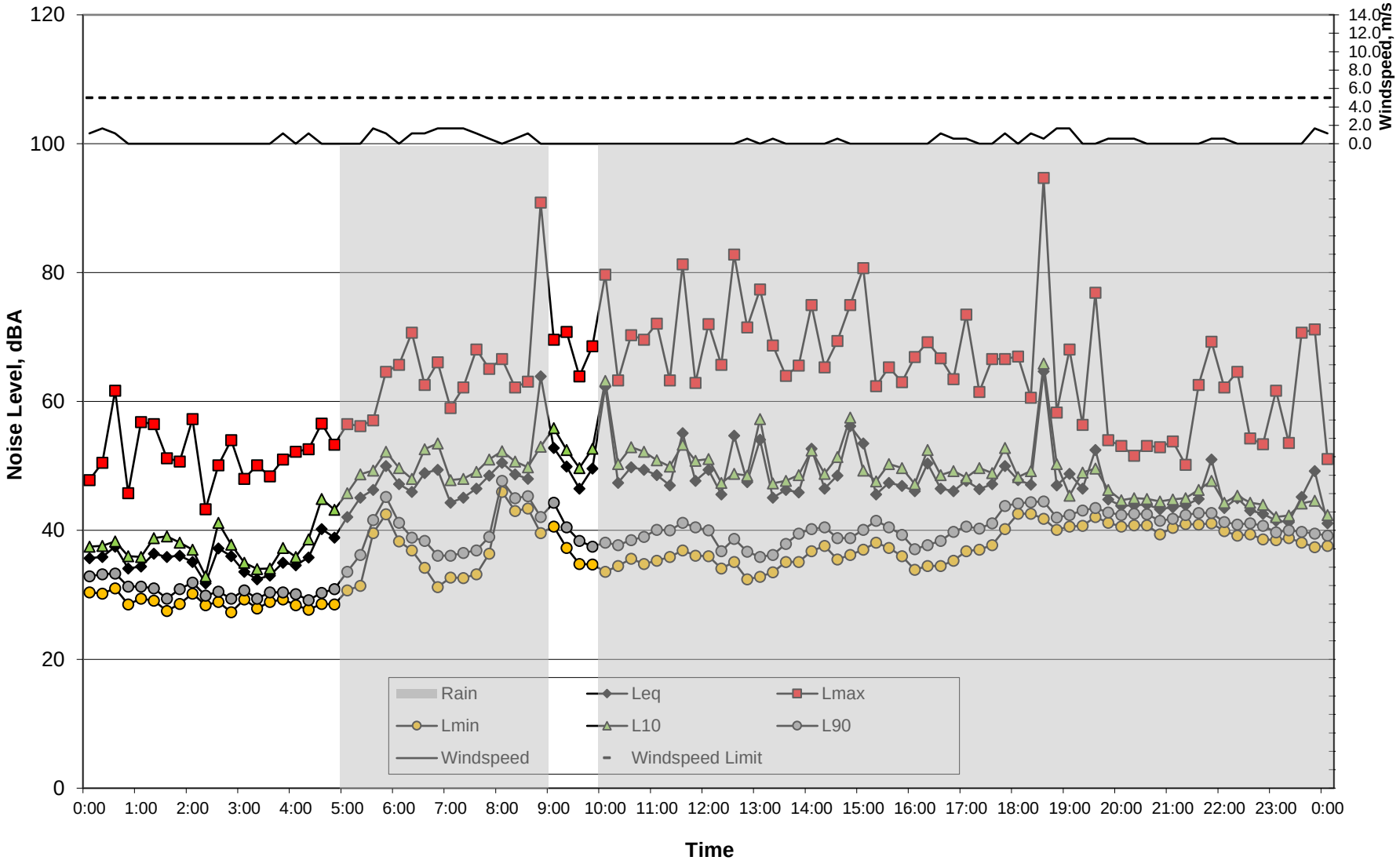
Friday, 4 October 2019



Measured Ambient Noise Levels

146 Burley Road, Horsely Park

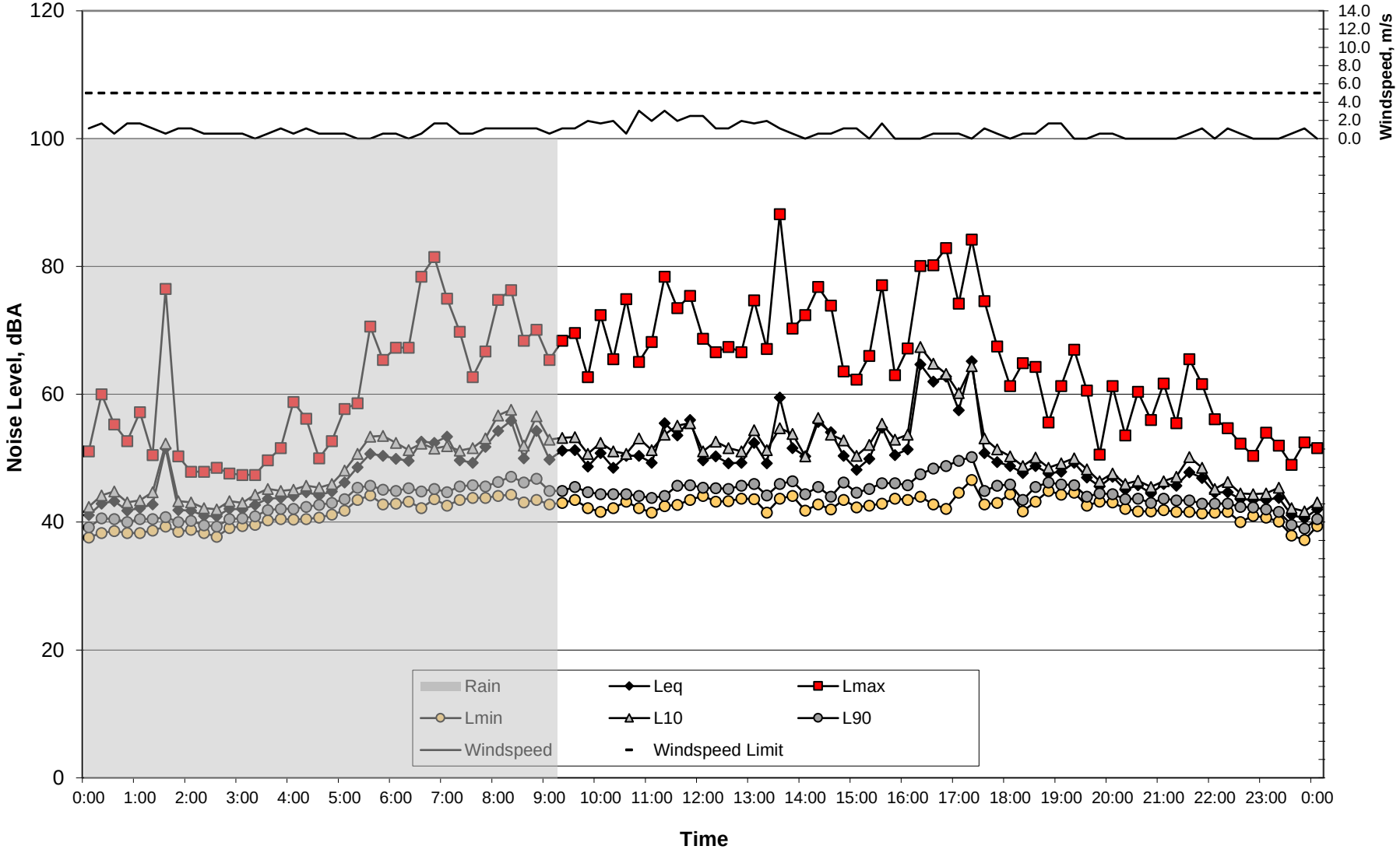
Saturday, 5 October 2019



Measured Ambient Noise Levels

146 Burley Road, Horsely Park

Sunday, 6 October 2019



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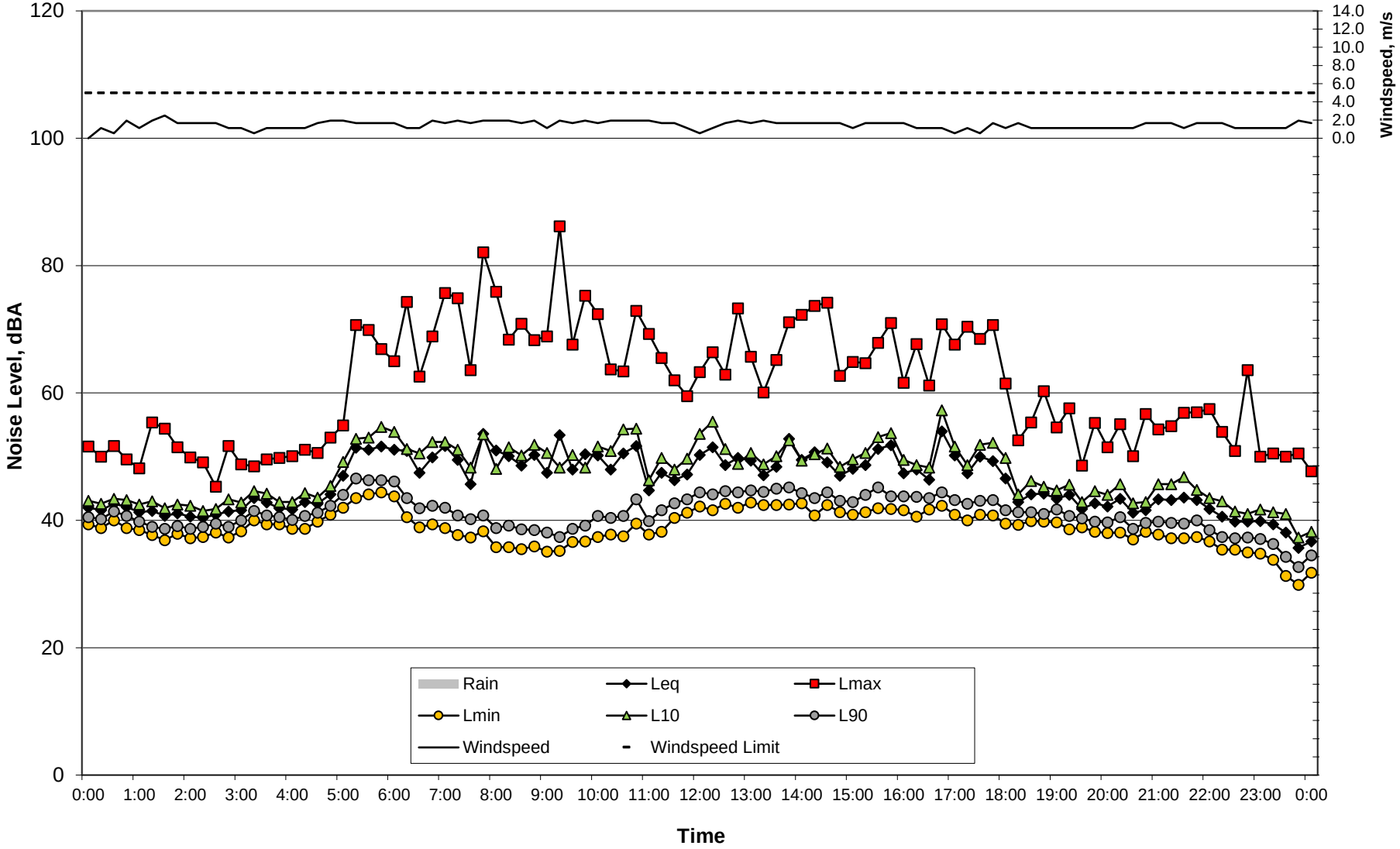
146 Burley Road, Horsely Park

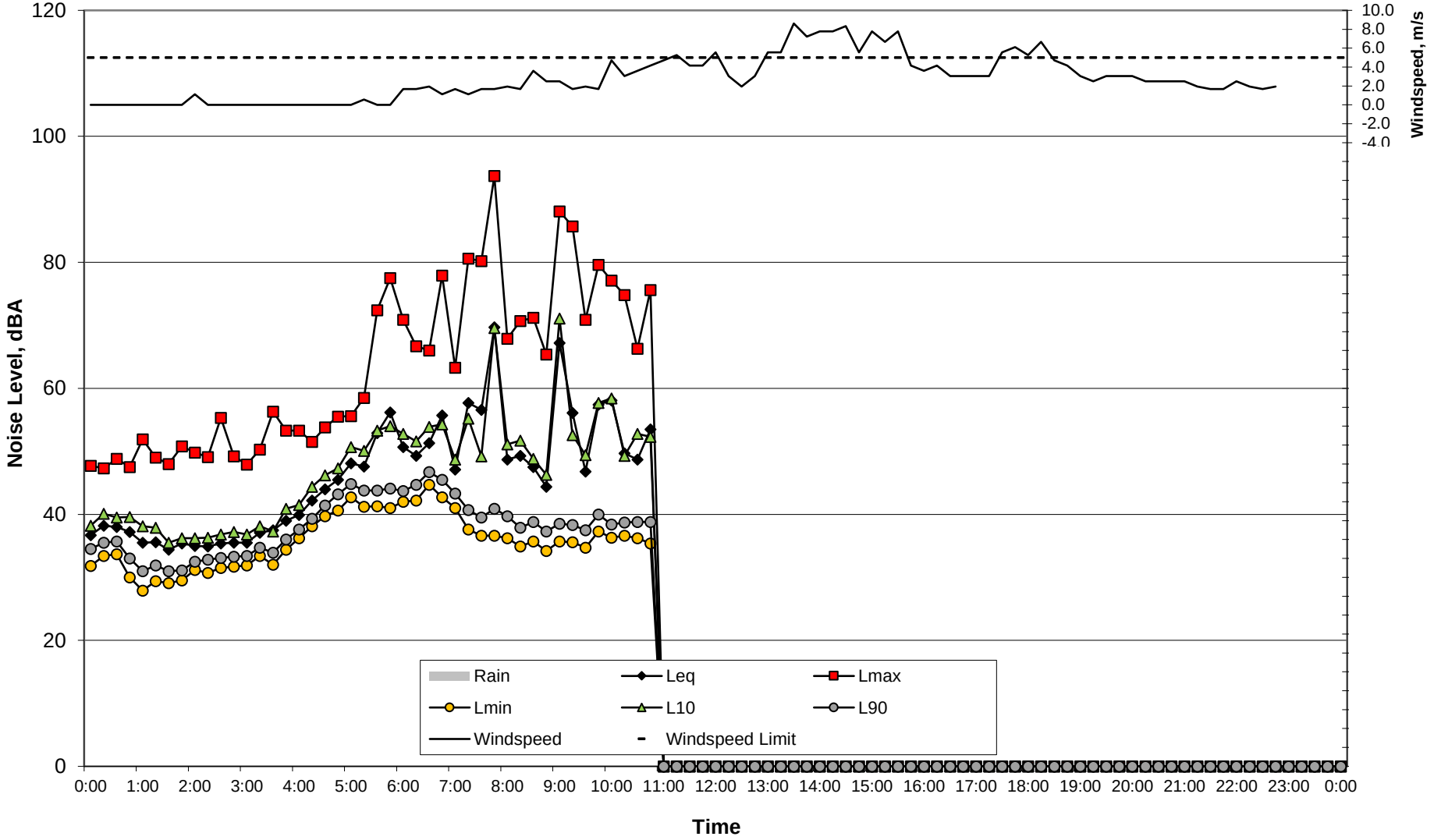
Monday, 7 October 2019



Measured Ambient Noise Levels

146 Burley Road, Horsely Park

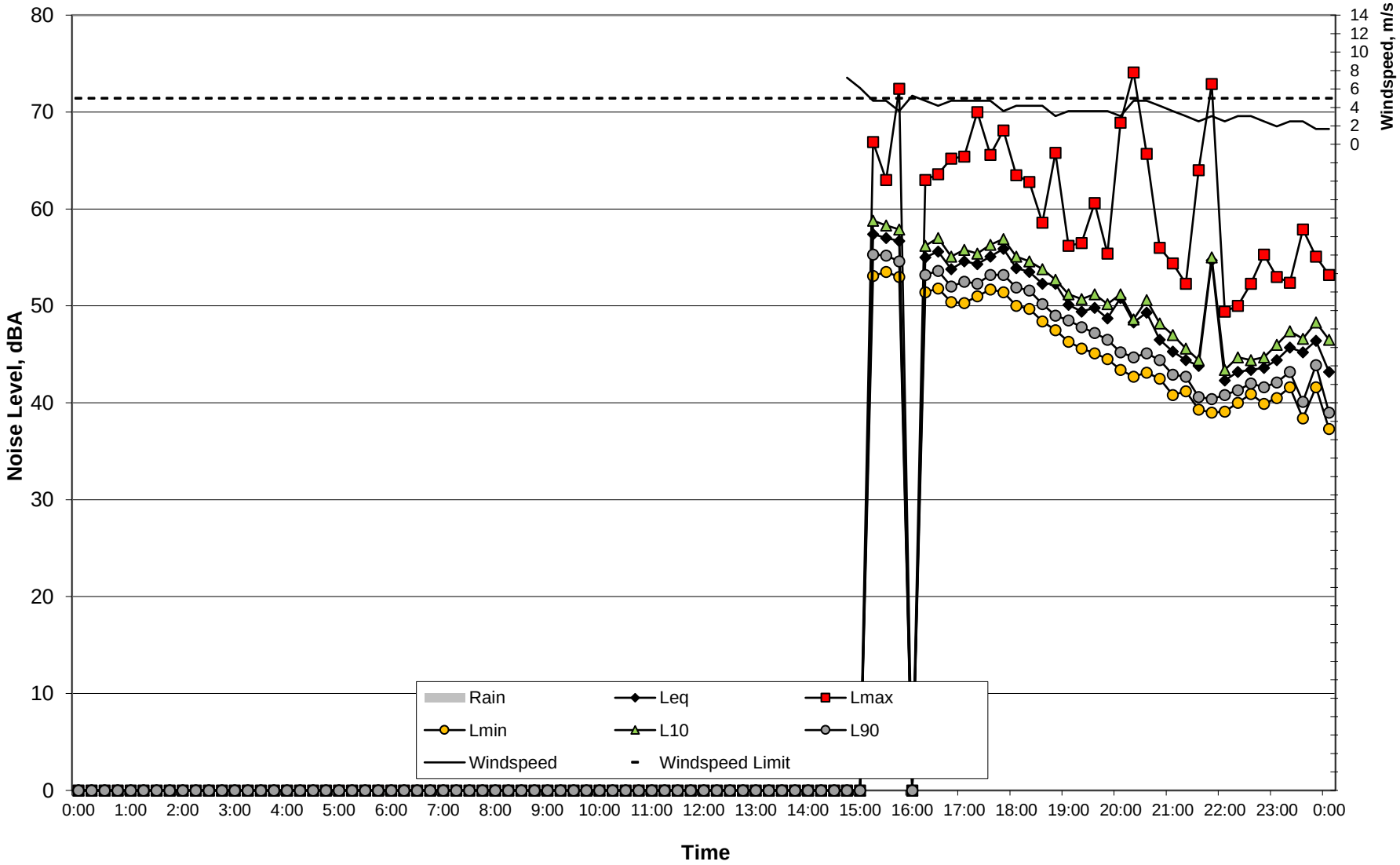
Tuesday, 8 October 2019



Measured Ambient Noise Levels

Frarrington Street, Minchinbury

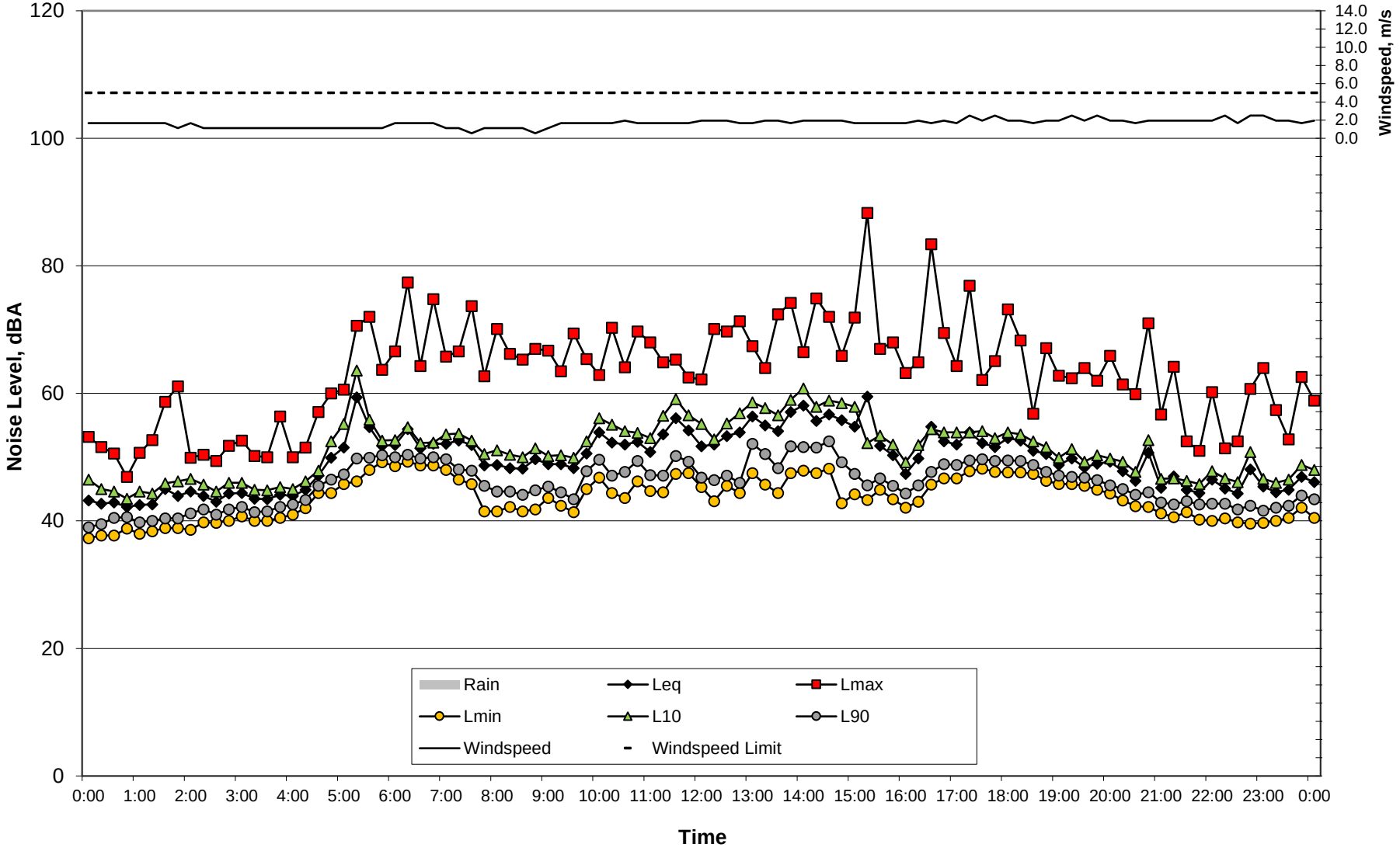
Monday, 30 September 2019



Measured Ambient Noise Levels

Frarrington Street, Minchinbury

Tuesday, 1 October 2019



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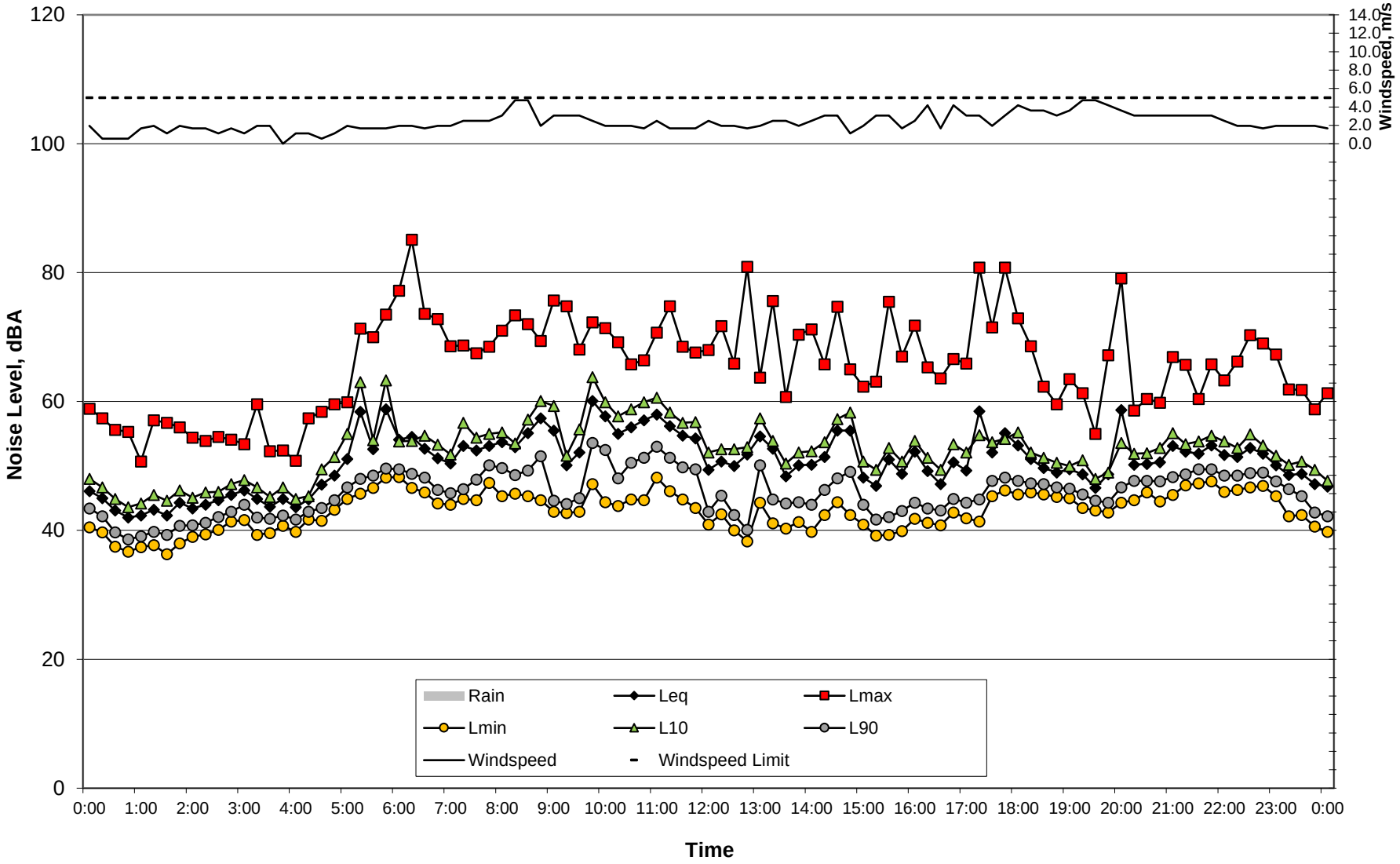
Frarrington Street, Minchinbury

Wednesday, 2 October 2019



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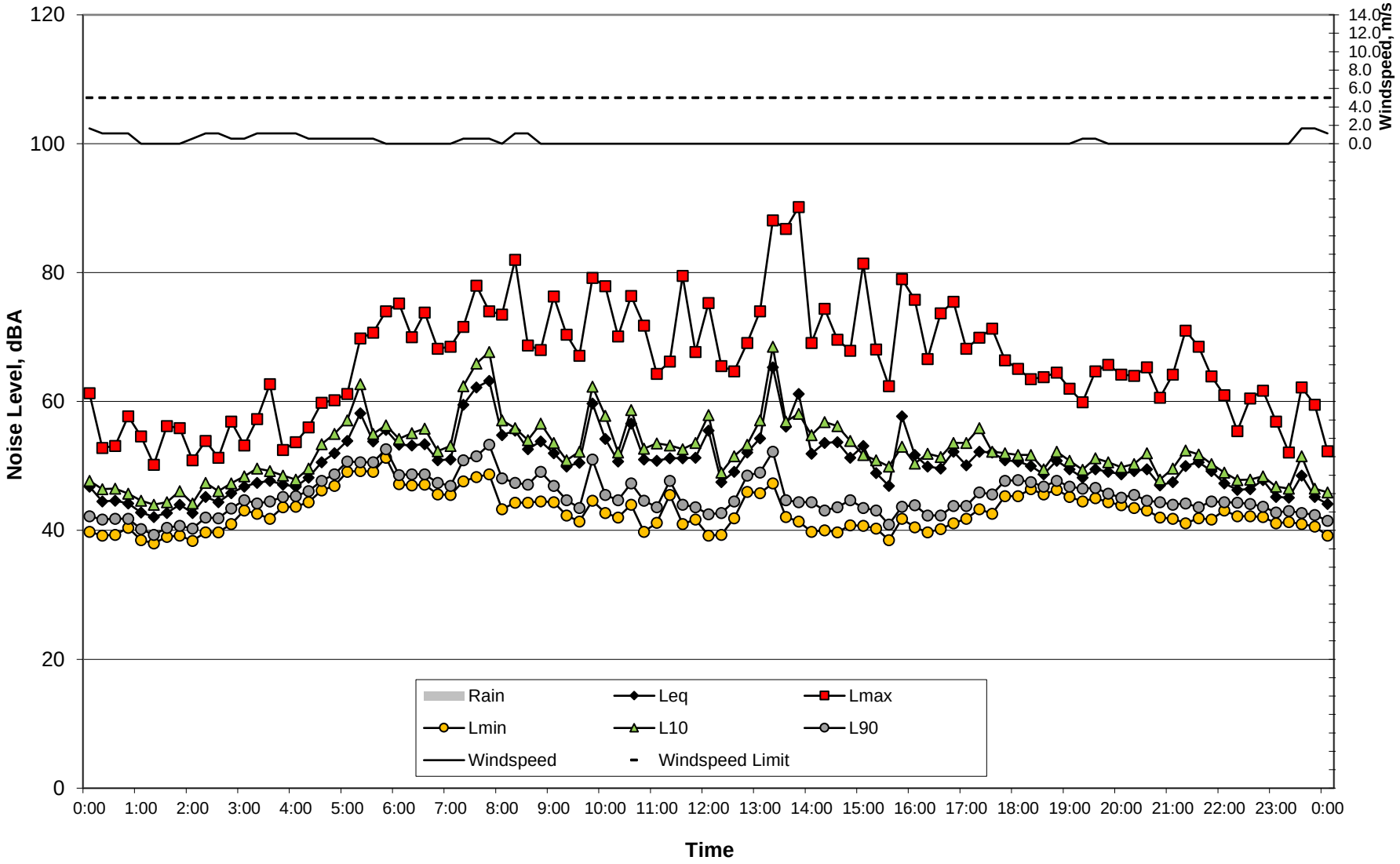

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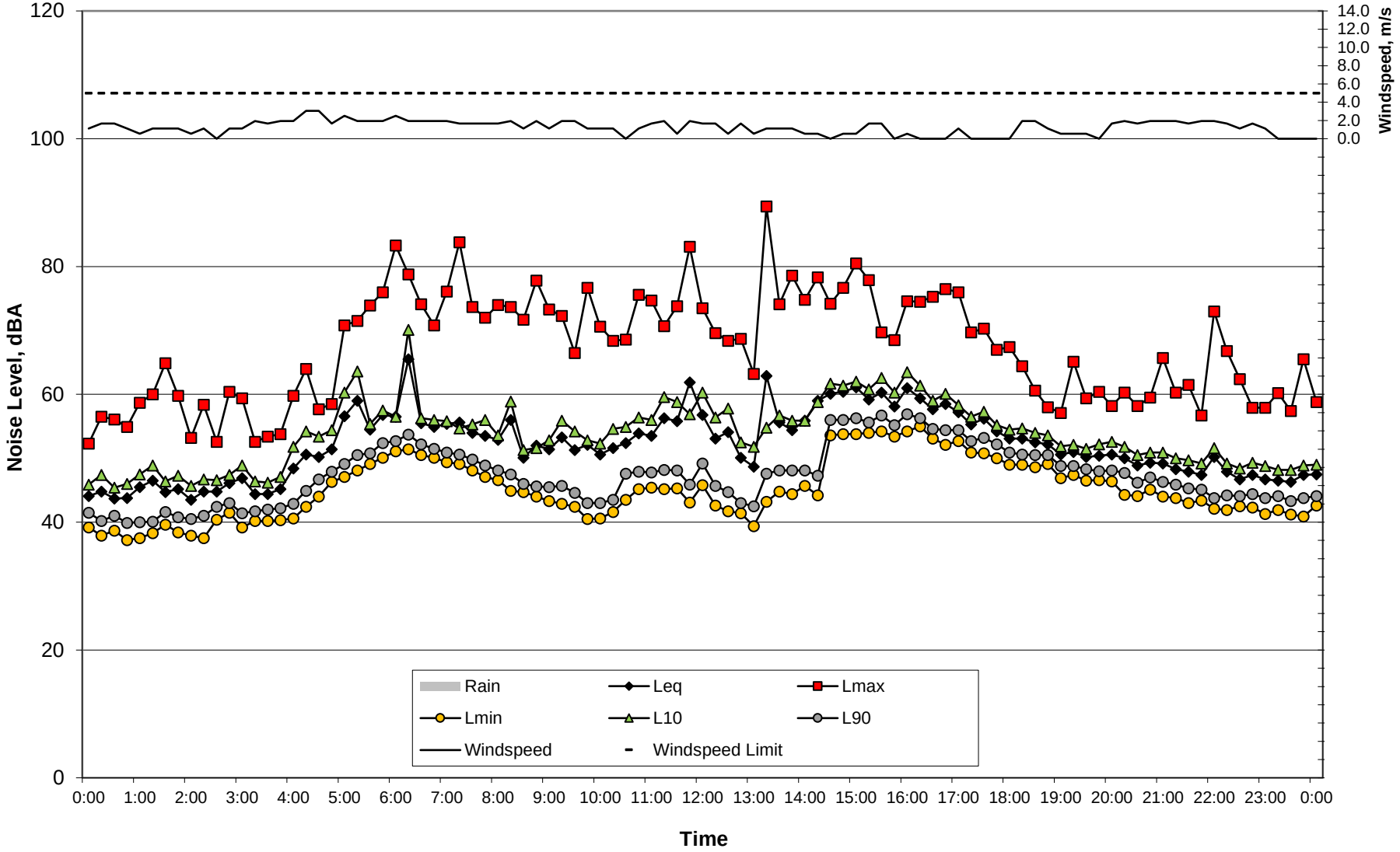

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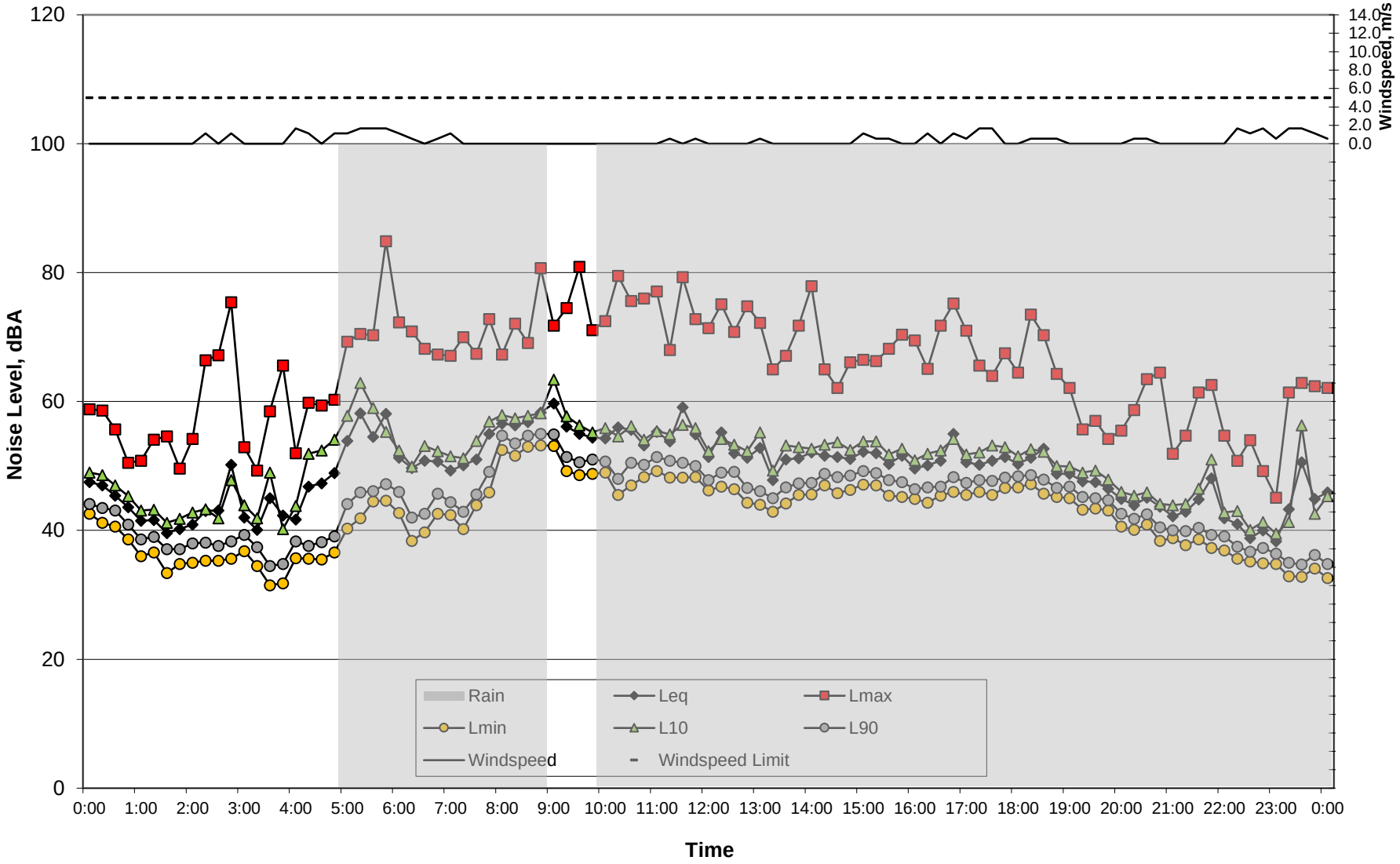

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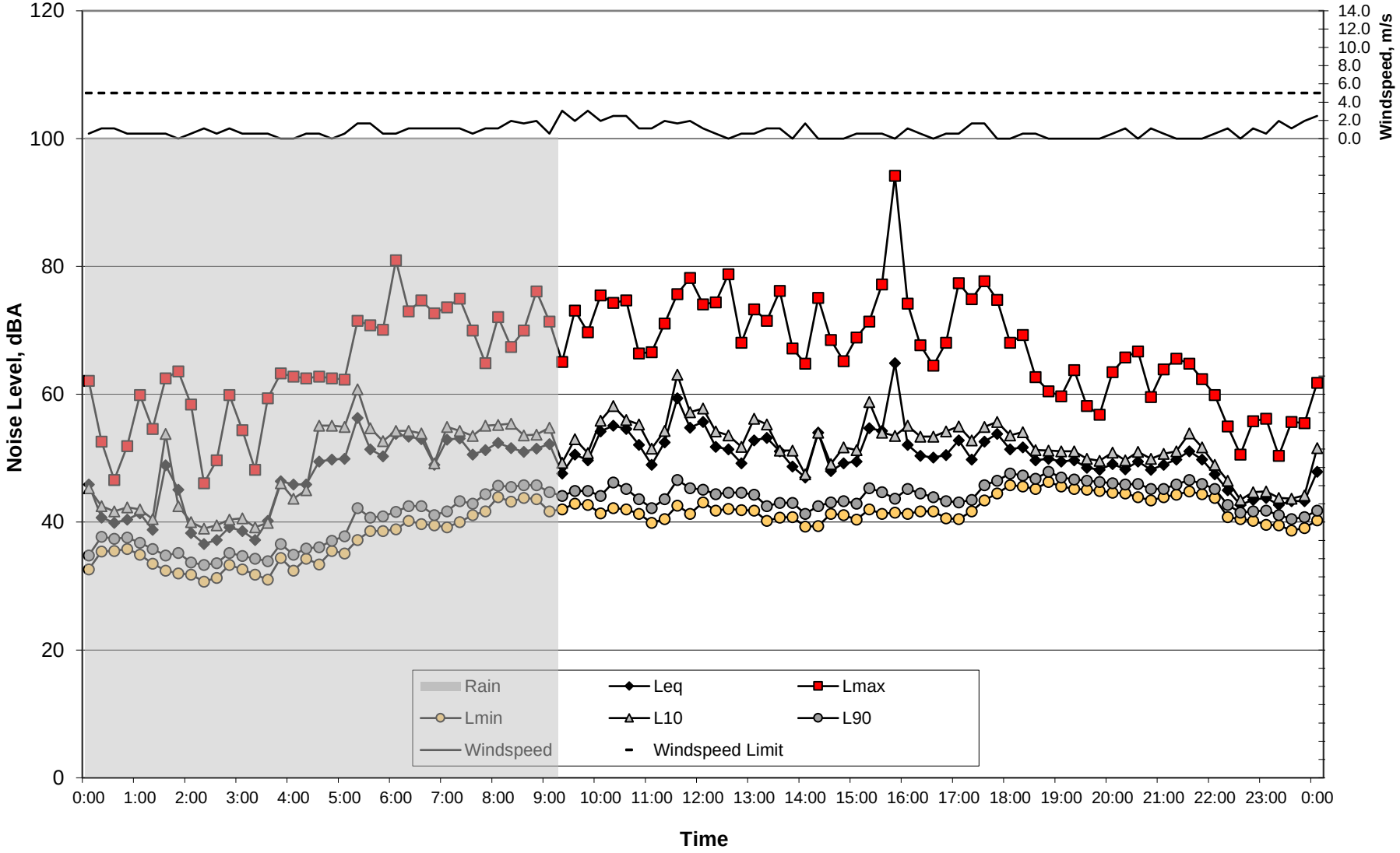

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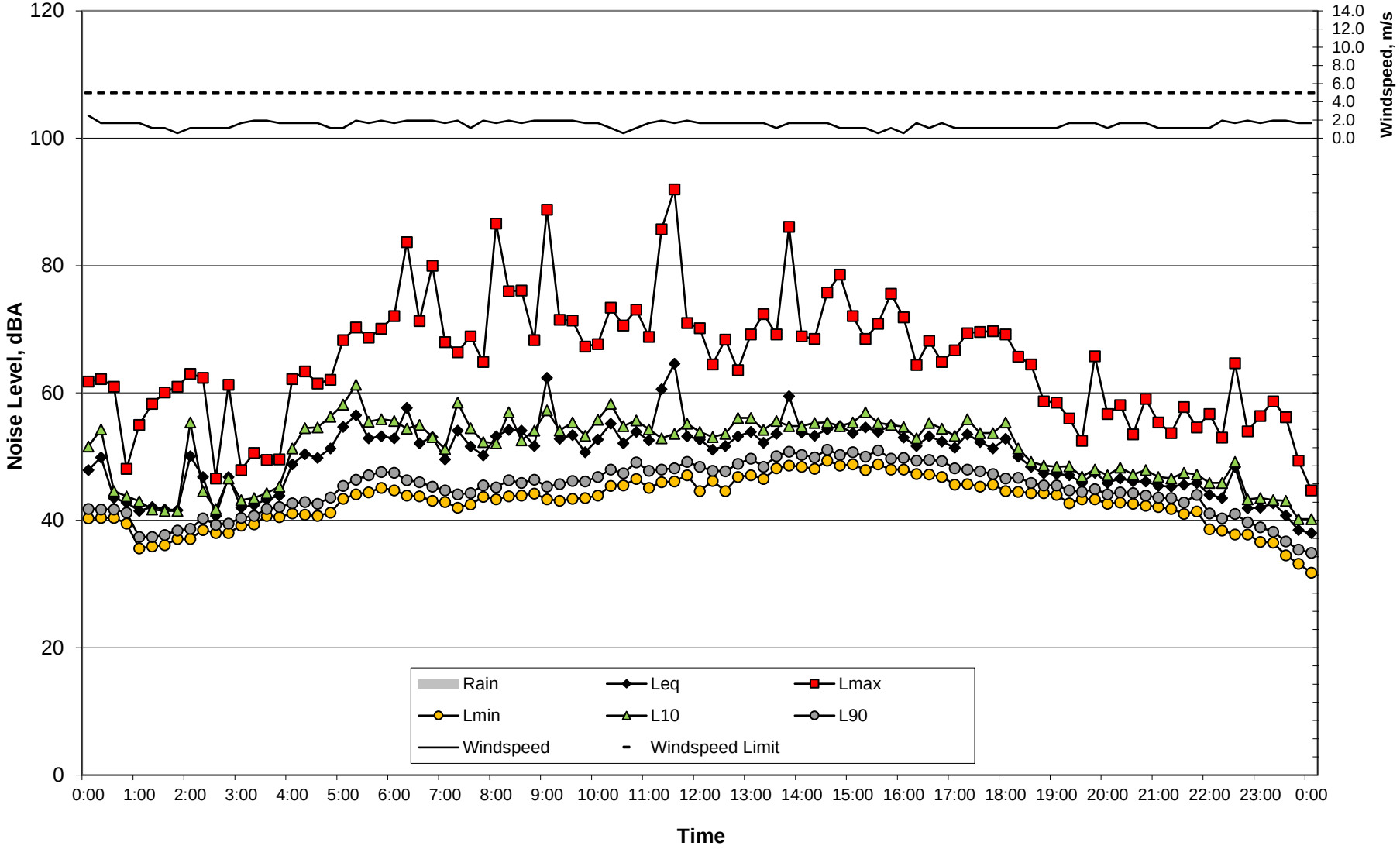
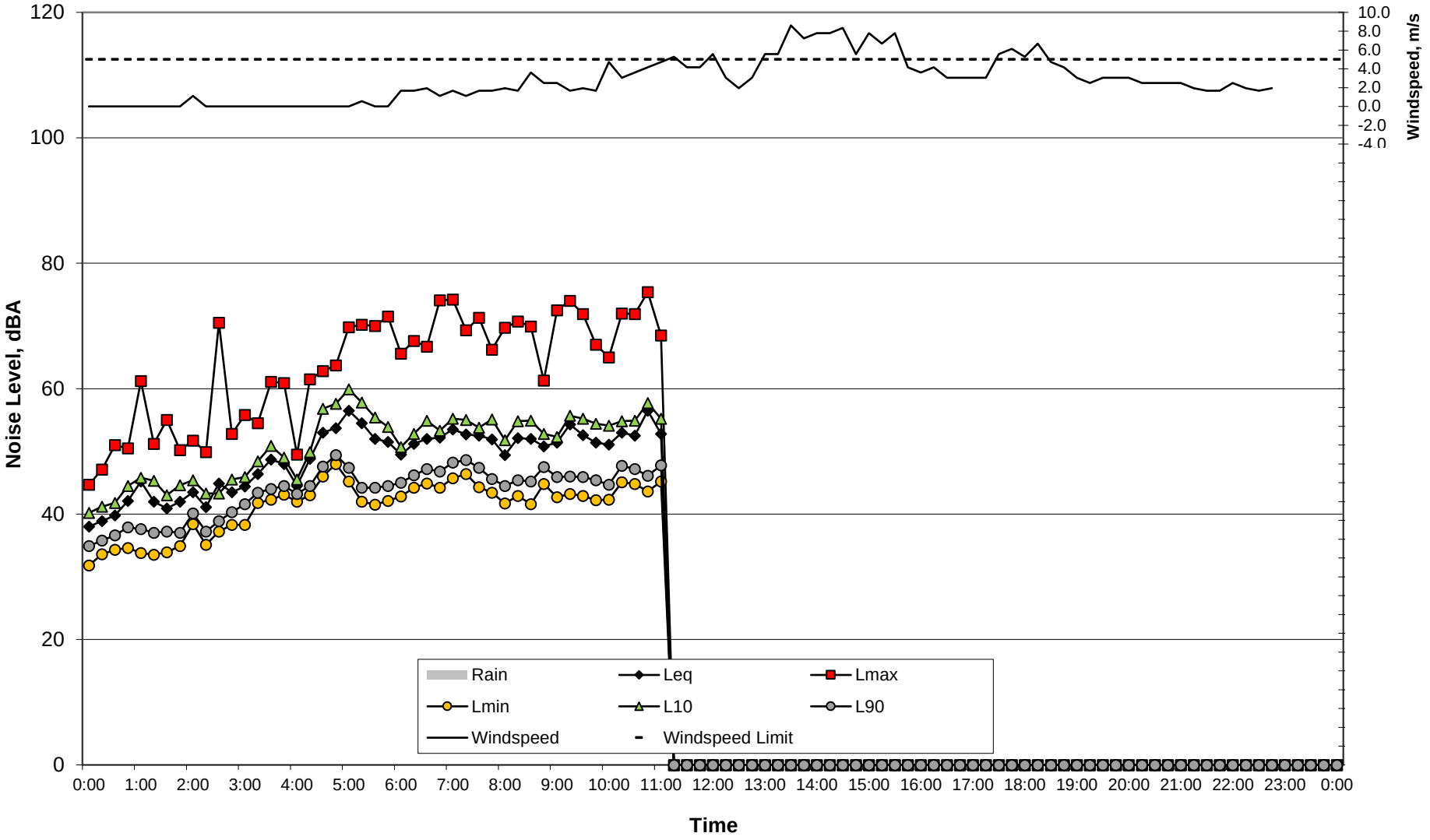


Measured Ambient Noise Levels

Frarrington Street, Minchinbury

Tuesday, 8 October 2019



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Acoustic Terminology

Sound Pressure	Sound or sound pressure is a fluctuation in air pressure over the static ambient pressure.
Sound Pressure Level	The sound pressure relative to a standard reference pressure of 20µPa ($20x10^{-6}$ Pascals) on a decibel (dB) scale.
Sound Power Level	The sound power of a source is the amount of acoustic energy being generated per unit time by the source and does not change with distance. The sound power level is defined as 10 times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power of 1 Pico Watt. Sound power level cannot be directly measured using a microphone. The sound power level of a machine may vary depending on the actual operating load.
dB	The decibel (dB) is the unit used for sound level measurement.
dB(A)	Unit of sound level, in A-weighted decibels. The human ear is not equally sensitive to all frequencies of sound. The A-weighting approximates the sensitivity of the human ear by filtering these frequencies. A dB(A) measurement is considered representative of average human hearing.
$L_{Aeq, T}$	The A-weighted equivalent continuous sound pressure level over T measurement period, used to quantify the average noise level over a time period.
L_{A10}	The A-weighted sound pressure level exceeded for 10% of the measurement period. It is usually used as the descriptor for intrusive noise level and represents ambient road traffic noise in general.
L_{A90}	The A-weighted sound pressure level exceeded for 90% of the measurement period. It is usually used as the descriptor for background noise level.

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