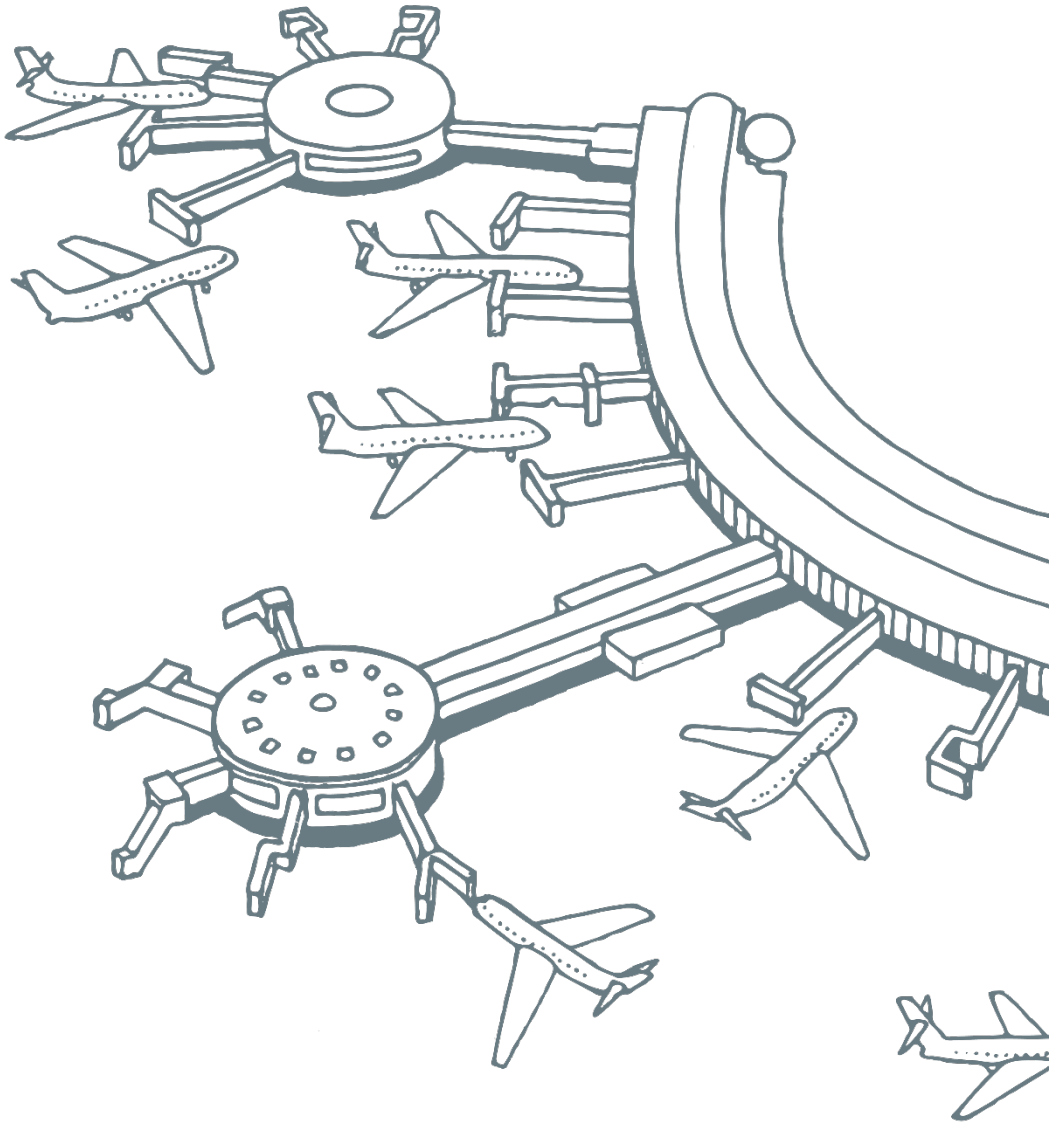
APPENDIX I
ACOUSTICS REPORT



BNE Auto Mall

Acoustic Assessment Report

Brisbane Airport Corporation

Reference: 503043

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1 Introduction

1.1 Project overview

A draft Major Development Plan has been prepared for the construction and operation of the BNE Auto Mall (the Project) on an unused 51.3 ha parcel of land bordered by Moreton Drive, Airport Drive and Nancy Bird Way. The BNE Auto Mall is set to be Australia's benchmark automotive precinct designed for new and used car buyers, motoring enthusiasts and the public. The Project will include a diverse mix of uses such as:

- A performance track which includes a skid pan, kick plate, manoeuvring course, dedicated slalom area, 4WD test circuit, low friction handling circuit and associated driver trainer facilities;
- Flagship automotive dealerships;
- Brand experience centres; and
- Track operations and management centre.

The intention of the BNE Auto Mall is to operate day and night with hours ranging between 9 am to 10 pm, seven days a week, offering a variety of experiences and opportunities for both the visiting public as well as the on-site tenants and workers. The performance track is envisaged to host events such as:

- Corporate driving events;
- Shared test drive days;
- Motorbike days;
- Driver experience days;
- Driver training days;
- 4WD training days; and
- Special and major event days.

The automotive dealerships and brand experience centres are envisaged around the perimeter of the performance track to create a new landmark destination and generate significant economic and social activity for the Brisbane Airport and surrounding area.

1.2 Location of proposed development

The Project site is an unused 51.3 ha parcel of Brisbane Airport land bordered by Moreton Drive (west), Airport Drive (east) and Nancy Bird Way (north). Figure 1 shows the location of the Project site.

The Project site adjoins Kingsford Smith Memorial to the east (corner of Airport Drive and Nancy Bird Way) and is opposite the existing Brisbane Service Centre to the north-east as well as parking for the International Airport to the south-east.

Figure 1 Major Development Plan (MDP) Development Area

1.3 Objectives

This Acoustics Assessment Report provides a high-level assessment of the potential environmental noise impacts from the Project.

For the purpose of this assessment, the operation of the BNE Auto Mall includes the performance track, 4WD test circuit and skid pan. These operational activities have been divided into nine 'typical' scenarios. Each scenario has been assessed against the relevant noise level guidance and criteria to provide an understanding of the potential environmental noise impacts from the Project on nearby sensitive and commercial receptors.

2 Noise regulations

A range of Commonwealth and State regulations and policies related to noise were considered to determine appropriate noise criteria by which to assess potential environmental noise impacts associated with construction and operation of the Project.

2.1 Airport legislation

2.1.1 Airports (Environment Protection) Regulations 1997

Noise sources

Ground-based noise at Brisbane Airport other than noise generated by an aircraft in flight, when landing, taking off or taxiing at an airport, is regulated by the *Airports (Environment Protection) Regulations 1997* (AEPR). The ground-based noise sources surrounding the Project site have been identified in the *2014 Airport Environment Strategy* (AES) as the following:

- Road traffic and rail;
- Construction and development sites;
- Operation of plant or machinery;
- Operation of alarm or warning systems; and
- Aircraft engine ground running.

Commercial and Sensitive receptors

Under Part 2, Division 2, Section 2.04 of the AEPR, offensive noise is defined as:

> *(1) For these Regulations, noise that is offensive occurs when noise is generated at a volume, or in a way, or under a circumstance, that in the opinion of an airport environment officer, offensively intrudes on individual, community or commercial amenity.*
>
> *(2) In forming an opinion, an airport environment officer must have regard to:*
>
> *(a) the volume, tonality and impulsive character (if any) of the noise; and*
>
> *(b) the time of day, and duration, of the noise; and*
>
> *(c) background noise levels at the time the noise is generated; and*
>
> *(d) the location, in relation to the source of the noise, of:*
>
> *(i) sensitive receptors; or*
>
> *(ii) if there is no affected sensitive receptor — commercial receptors; and*
>
> *(e) the excessive noise guidelines in Schedule 4.*
>
> *(3) For subregulation (2):*
>
> ***commercial receptor** means a business operation, whether for profit, or not.*
>
> ***sensitive receptor** means:*
>
> *(a) a dwelling; or*
>
> *(b) an impermanent dwelling in a place designed, or reserved, for impermanent dwellings (for example, a caravan park or residential marina); or*
>
> *(c) a hotel, motel or hostel; or*

(d) a child care institution, kindergarten, school, college, university or other educational institution; or

(e) a hospital, medical centre or nursing home; or

(f) a building that is a church or similar place of worship.

Schedule 4, Part 3 of the AEPR makes reference to commercial receptors, and states that the indicators of noise for sensitive receptors are the same for commercial receptors except for considerations of the following factors:

- The nature of the business conducted at the site
- The time of day when the noise occurs
- The duration of the noise
- The nature and characteristics (if any) of the noise
- The background noise level

Relevance to the Project

The AEPR defines a number of sensitive receptors in close proximity to the Project site:

- The nearest residential receptors are located a significant distance from the Project site (approximately 2 km).
- The nearest existing hotel is the Novotel Hotel, located approximately 1.5km to the south west of the Project site.
- Neighbouring commercial receptors have been included in the assessment, in accordance with Schedule 4, Part 3 of the AEPR.

The impact of the Project on these receptors is discussed in 3.1 of this report.

2.1.2 Australian Standard AS 2021 – Acoustics Aircraft noise intrusion – building siting and construction

Summary

AS 2021-2015 defines the suitability of future development sites for various land uses based on the Australian Noise Exposure Forecast (ANEF) zoning procedure. The values from accompanying notes have been excluded.

Table 1 Building site acceptability based the relevant tables in the Standard are reproduced below. Building types not relevant to the Project, and the tables on ANEF zones - AS2021 Table 2.1

Building type	ANEF zone of site		
	Acceptable	Conditionally acceptable	Unacceptable
Commercial building	Less than 25 ANEF	25 – 35 ANEF	Greater than 35 ANEF

The standard specifies indoor design sound levels from aircraft noise for various types of buildings including commercial uses. It should be noted that under AS2021, a building site (which is assessed) is the location of a proposed or existing building not associated with the aerodrome, therefore the relevant indoor design sound levels are shown in Table 2 and may be used for indicative design criteria.

Table 2 Indoor design sound levels for determination of aircraft noise reduction - AS2021 Table 3.3

Building type and activity		Indoor design sound level*, dB(A)
Commercial buildings, offices and shops	Private offices, conference rooms	55
	Drafting, open offices	65
	Typing, data processing	70
	Shops, supermarkets, showrooms	75

*These indoor design sound levels are not intended to be used for measurement of adequacy of construction. For measurement of the adequacy of construction against aircraft noise intrusion, refer to Appendix D of AS 2021.

Relevance to the Project

- The proposed dealerships and brand experience centres are considered commercial uses.
- The proposed internal spaces of the dealerships and brand experience centres should be designed to the levels specified in Table 2.
- Indoor design sound levels for potential future development on the Project site will need to consider maximum measured noise levels from aircraft noise (flyover).

2.2 Environmental noise level criteria

The following environmental noise level criteria have been considered in this Report:

- Environmental Protection (Noise) Policy 2008, *Environmental Protection Act 1994* (State);
- Noise Impact Assessment Planning Scheme Policy (PSP), *Brisbane City Plan 2014* (Local)
- Australian Standard (AS) 1055.2 – 1997, Acoustics – Description and measurement of environmental noise

2.2.1 Environmental Protection (Noise) Policy 2008

Summary

Due to the rapid growth and increasing density of noise-producing activities in Queensland, the consideration of cumulative noise impacts and background creep is important. For development where background creep is likely, applicants are encouraged to use modelling to demonstrate that the activity will not exceed the standard set in Section 10 of the *Environmental Protection (Noise) Policy 2008* which stipulates:

> "*To the extent that it is reasonable to do so, noise from an activity must not be –*
>
> *a) for noise that is continuous noise measured by $L_{A90,T}$ – more than nil dB(A) greater than the existing acoustic environment measured by $L_{A90,T}$; or*
>
> *b) for noise that varies over time measured by $L_{Aeq,adj,T}$ – more than 5 dB(A) greater than the existing acoustic environment measured by $L_{A90,T}$."*

Relevance to the Project

- Noise emissions from the operation of the performance track including the 4WD test circuit and skid pan as well as associated facilities at the BNE Auto Mall are likely to vary over time. Therefore, a noise level limit of no more than 5 dB(A) greater than the existing acoustic environment measured by $L_{A90,T.}$ is relevant.
- The criteria in Section 2.2.2 is more stringent for the purposes of this assessment.

2.2.2 Noise Impact Assessment Planning Scheme Policy

Summary

Brisbane City Council (BCC) has a published method of noise impact assessment for a proposed scheme (Brisbane Bity Plan 2014 - Schedule 6, v15.00/2019, in effect as of 31 May 2019). The Noise Impact Assessment PSP describes the application of an *intrusive noise criterion*, based on the Rating Background Level (RBL), which is based on the existing noise environment, and an *acoustic amenity*, which is based on a single number value for each time period for amenity. As the *intrusive noise criteria* is lower than the *acoustic amenity criteria* for residential areas surrounding the project during the day, the site will be assessed against the *intrusive acoustic criteria*, which is as follows:

$$dBL_{Aeq,T} = RBL + 3\ dB$$

For locations which exceed the above criterion, a comparison to the applicable acoustic amenity criteria should be made.

Relevance to the Project

- To undertake an assessment of the potential noise impacts associated with the Project, an ambient noise survey is required around the Project site to quantify the existing acoustic environment.
- Background noise measurements have been recorded at various locations around the Project site (refer Section 3.2).
- Additionally, PSK Environmental (2017) has provided noise measurements undertaken at the Kingsford Smith Memorial and the BAC Service Centre (refer Section 3.3)
- The superseded AS1055.2-1997 will be used as a guideline for all other areas potentially impacted by the Project.

2.2.3 AS 1055.2 – 1997, Acoustics – Description and measurement of environmental noise

Summary

Appendix A of AS 1055.2 – 1997 provides estimated background noise levels for different areas containing residences (typically the most sensitive receiver type) in Australia. These are detailed below.

Table 3 Estimated average background sound levels from AS 1055.2 - Appendix A

Noise area category Note1,2	Description of neighbourhood	Average background A-weighted sound pressure level, $L_{A90,T}$					
		Monday to Saturday			Sundays and Public Holidays		
		0700 - 1800	1800 - 2200	2200 - 0700	0900 - 1800	1800 - 2200	2200 - 0900
R1	Areas with negligible transportation	40	35	30	40	35	30
R2	Areas with low density transportation	45	40	35	45	40	35
R3	Areas with medium density transportation or some commerce or industry	50	45	40	50	45	40
R4	Areas with dense transportation or some commerce or industry	55	50	45	55	50	45

Noise area category Note1,2	Description of neighbourhood	Average background A-weighted sound pressure level, $L_{A90,T}$					
		Monday to Saturday			Sundays and Public Holidays		
		0700 - 1800	1800 - 2200	2200 - 0700	0900 - 1800	1800 - 2200	2200 - 0900
R5 Note 3	Areas with very dense transportation or in commercial districts bordering industrial districts	60	55	50	60	55	50
R6 Note 3	Areas with extremely dense transportation or within predominantly industrial districts	65	60	55	65	60	55

Notes:

1) The division into noise area categories is necessary in order to accommodate existing sound levels encountered at residential sites in predominantly commercial or industrial districts, or in areas located close to main land transport routes, i.e. road and rail.

2) The noise area category most appropriate should be selected irrespective of metropolitan or rural zoning and will vary from location to location.

3) Some industrial and commercial sites are not predominant sources of high background sound levels.

This standard has since been superseded (updated as AS1055:2018), with Appendix A and any reference to the table above removed, however these noise level estimates are considered indicative of the ambient environment, in-lieu of noise measurements, particularly for less-noise sensitive receiver types (commercial properties, hotels etc.).

Relevance to the Project

- Based on Table 3 above, the sensitive and commercial receptors identified have had the following noise area category applied;
  - Commercial properties along Qantas Drive – R5
  - Novotel – R3
  - Hertz car rental – R4
  - Airport Prayer Room – R5

2.2.4 Project specific noise criteria

Project specific noise criteria for the various noise-sensitive receptors are outlined in Table 4. These noise criteria are based on measured background noise levels with the Noise Impact Assessment PSP (refer Section 2.2.2) for new noise sources (as this represents the most stringent requirement).

Derivation of the Project specific noise criteria is as follows:

- For residential properties, these criteria are derived from the measurements detailed in Table 7 of this report.
- For the Kingsford Smith Memorial, BAC Service Centre and nearby Prayer Room (within the Central Parking Area (CPA)), noise level measurements presented in Table 9 have been used to establish the proposed noise level criteria.
- All other potentially affected receivers used the estimated background noise levels presented in Table 3.

Table 4 Project Specific Noise Criteria

Noise-sensitive receptor	Criteria, Monday to Saturday dB $L_{Aeq,T}$			Comments
	Daytime 0700 - 1800	Evening 1800 - 2200	Night-time 2200 - 0700	
94 Serpentine Road, Pinkenba	49	46	46	Based on measurements detailed in Table 7.
633 Nudgee Road, Nundah	53	48	44	
789 Nudgee Road, Northgate	53	48	44	
Australian Catholic University	39	36	33	Based on measurements detailed in Table 9.
Kingsford Smith Memorial	55	53	55	
BAC Service Centre/McDonalds	59	58	57	
Prayer Room (Central Parking Area)	59	58	57	Based on BAC Service Centre measurements provided by PSK Environmental.
Nearest existing commercial property (Qantas Drive buildings) – (R5)	63	58	53	Based on estimated background levels in AS1055.2.
Nearest existing hotel – Novotel (floor 3) – (R3)	53	48	43	
Hertz car rental – (R4)	58	53	48	
Prayer Room (Airport) – (R5)	63	58	53	

2.3 Construction noise and vibration criteria

2.3.1 Construction noise criteria

The AEPR summarises the following minimum requirements for construction noise impacts of a building or other structure at the Brisbane Airport:

Table 5 Applicable noise criteria for construction and road traffic noise

Noise source	Noise criteria	Note
Construction (construction, maintenance or demolition of a building or other structure at an airport)	75 $dBL_{A10,15mins}$	Assessed at the site of a sensitive receptor Adjusted for tonal character or impulsiveness

2.3.2 Construction vibration criteria

No vibration related goals are discussed in the AEPR. The Australian Standard AS 2436-2010 *Guide to noise and vibration control on construction, demolition and maintenance sites* also does not provide vibration goals. However, it provides guidance on how vibration control should be undertaken on construction sites.

AS 2436-2010 recommends implementing time restrictions on processes involving exposure to potentially hazardous vibration, low-vibration plant and equipment, and signposting of vibration hazardous areas. Monitoring is identified in AS 2436-2010 as an essential component in the effective control of vibration from construction sites.

The *Guideline: Noise and vibration from blasting* (former Department of Environment and Heritage Protection, 2016) provides vibration criteria for construction blasting with a peak velocity for ground vibration set at 5 mm/s. Whilst no blasting will be conducted as part of Project works, the vibration criteria provides a vibration limit that can be implemented at the nearest sensitive structure (Kingsford Smith Memorial). This criterion is well below levels at which structural damage will occur. Vibrations below this criterion are unlikely to cause cosmetic cracking, including minor non-structural effects such as superficial cracking in cement render or plaster.

During vibration inducing works (e.g. piling) within 200 m of sensitive receptors, including the Kingsford Smith Memorial, and if a validated compliant regarding vibration is received, vibration monitoring shall be undertaken at the Kingsford Smith Memorial to ensure that vibration levels are kept below 5 mm/s in consultation with the BAC Environmental Advisor.

3 Baseline Conditions

3.1 Regional context and sensitive receptors

The Project site is located within an existing high noise environment and is exposed to high levels of daytime, evening and night time ambient noise from a variety of sources, including:

- Vehicular traffic on Moreton Drive, Airport Drive and Nancy Bird Way; and
- Aircraft movements associated with the Brisbane Airport.

Figure 2 below shows ANEF Mapping in relation to the Project site location and other major noise sources in the vicinity such as major roads and Brisbane Airport runways.

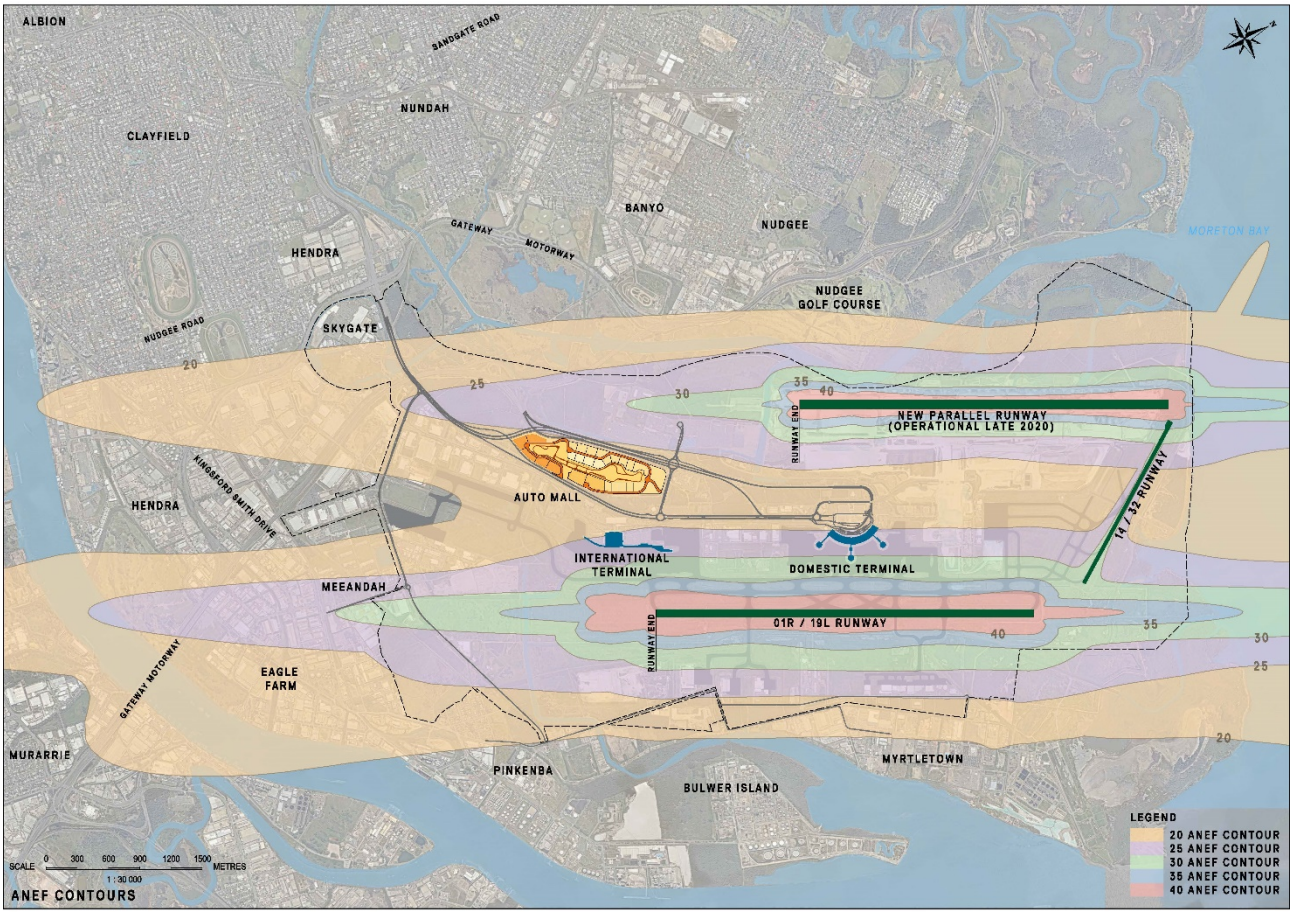


Figure 2 ANEF Mapping showing the Project site

Figure 2 shows the Project site is located within ANEF 20-25 and ANEF 25-30 noise contours for aircraft movements from Brisbane Airport. Based on these noise contours, the Project site is appropriate for commercial and light industrial land use, as per *Table 2.1 of AS 2021-2015.*

Given the existing noise environment from operations at Brisbane Airport, aircraft noise is not considered an obstacle to the proposed land uses. However, a detailed review of aircraft noise ingress into the proposed buildings will be required to achieve the internal background noise criteria.

The nearest residential suburbs to the Project site are Eagle Farm (2 km south-west) and Hendra, with Nundah, Northgate and Banyo located more than 2 km to the west and north.

The closest commercial receptors include:

- The Kingsford Smith Memorial (95 m east).
- Tenancies along Nancy Bird Way, such as:
  - Brisbane Airport Services Centre (approximately 50 m north, directly across Nancy Bird Way), including:
    - Shell Coles Express;
    - McDonalds and other food outlets; and
    - Vehicle servicing precinct – Ultra Tune, Sparkles Car Wash;
- CPA including:
  - Thrifty Car Rental and Hire; and
  - CPA Remote Public Car Park (approximately 120 m north-west, directly across Moreton Drive)
- Tenancies along Bert Hinkler Drive, such as:
  - CPA Staff Car Park Stages 1 and 2;
  - CPA Staff Car Park Stages 3 and 4 (under construction); and
  - Taxi, bus and limousine parking.
- Tenancies along Ivy May Way such as:
  - Europcar Rental;
  - Avis Car Rental;
  - Hertz Car Rental; and
  - Qantas Valet Storage Facility.
- Tenancies within the International Terminal (across Airport Drive), such as:
  - Airtrain services;
  - Secure car parking; and
  - International Terminal lounge, food and shopping outlets.
- Commercial tenancies along Qantas Drive (across Airport Drive).
- Commercial tenancies off Lomandra Drive.
- Flight training centres.

Additionally, other sensitive receptors located around the Project site include:

- Northgate State School (2.6 km west);
- Hendra State School (2.75 km south west);
- Novotel Hotel (1.5 km south west);
- Tadpoles and Joey Club Childcare Centre (2.1 km south west); and
- Pullman and Ibis Hotel (1.5 km north).

Figure 3 below identifies the location of these sensitive receptors as well as nearby commercial and residential areas.

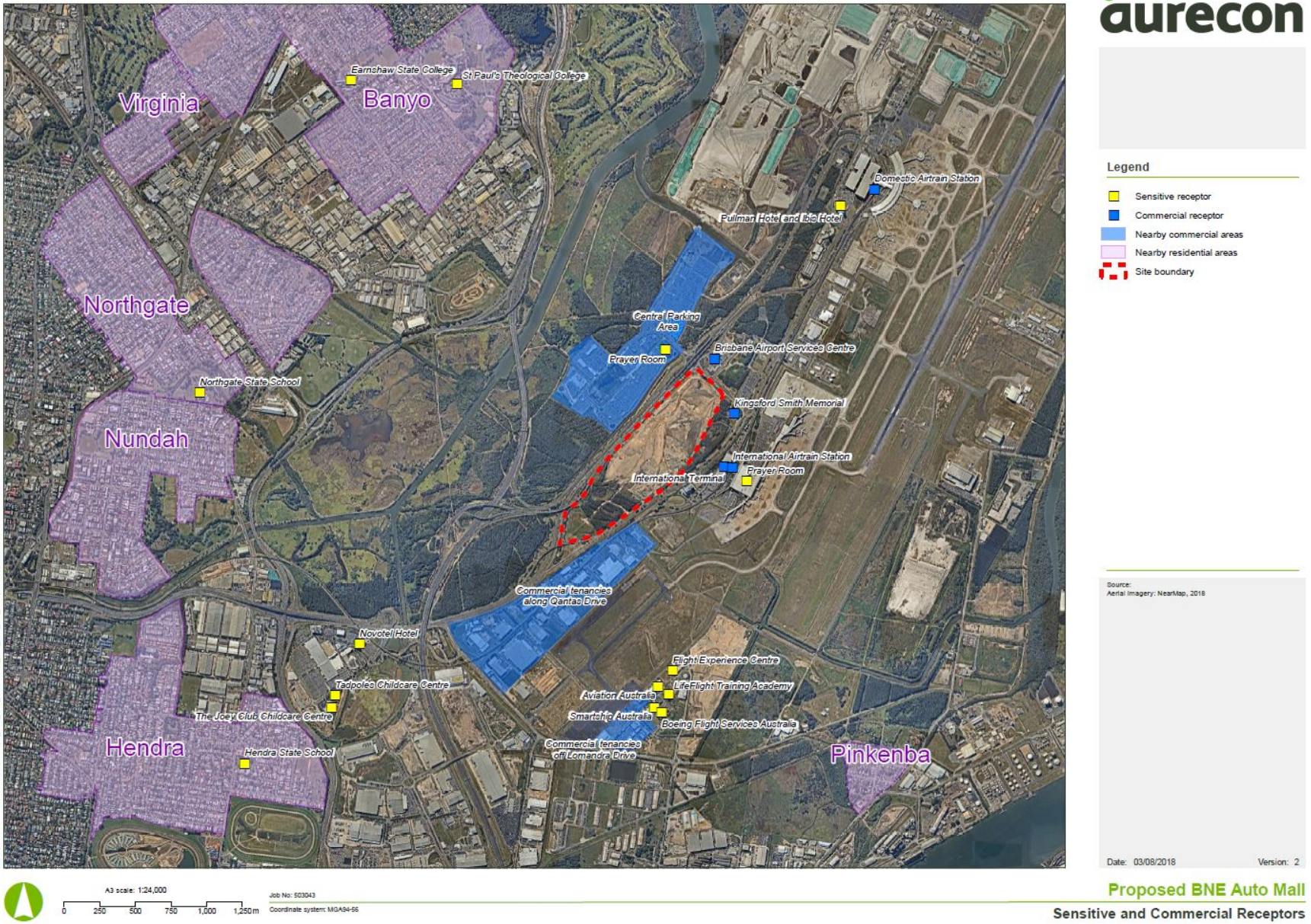


Figure 3 Nearby noise-sensitive receptors

3.2 Noise monitoring

Baseline noise monitoring has been undertaken at three locations around the Project site between the 26 February 2019 and 13 March 2019. The three locations have been selected based on their proximity to the sensitive receptors. The locations are to provide a representation of the existing noise levels at the identified sensitive receptors. The equipment used during the noise monitoring period is presented in Table 6 and locations of monitoring are shown in Figure 4 below.

Table 6 Noise monitoring equipment

Logger #	Approximate location	Model	Serial number	Date of Calibration
1	94 Lomandra Drive, Brisbane Airport	ARL Ngara	878156	19/11/2018
2	Airport conservation area	ARL Ngara	878155	19/11/2018
3	Virginia Soccer Club	ARL Ngara	878154	19/11/2018
-	-	ARL Calibrator	85217	21/11/2018

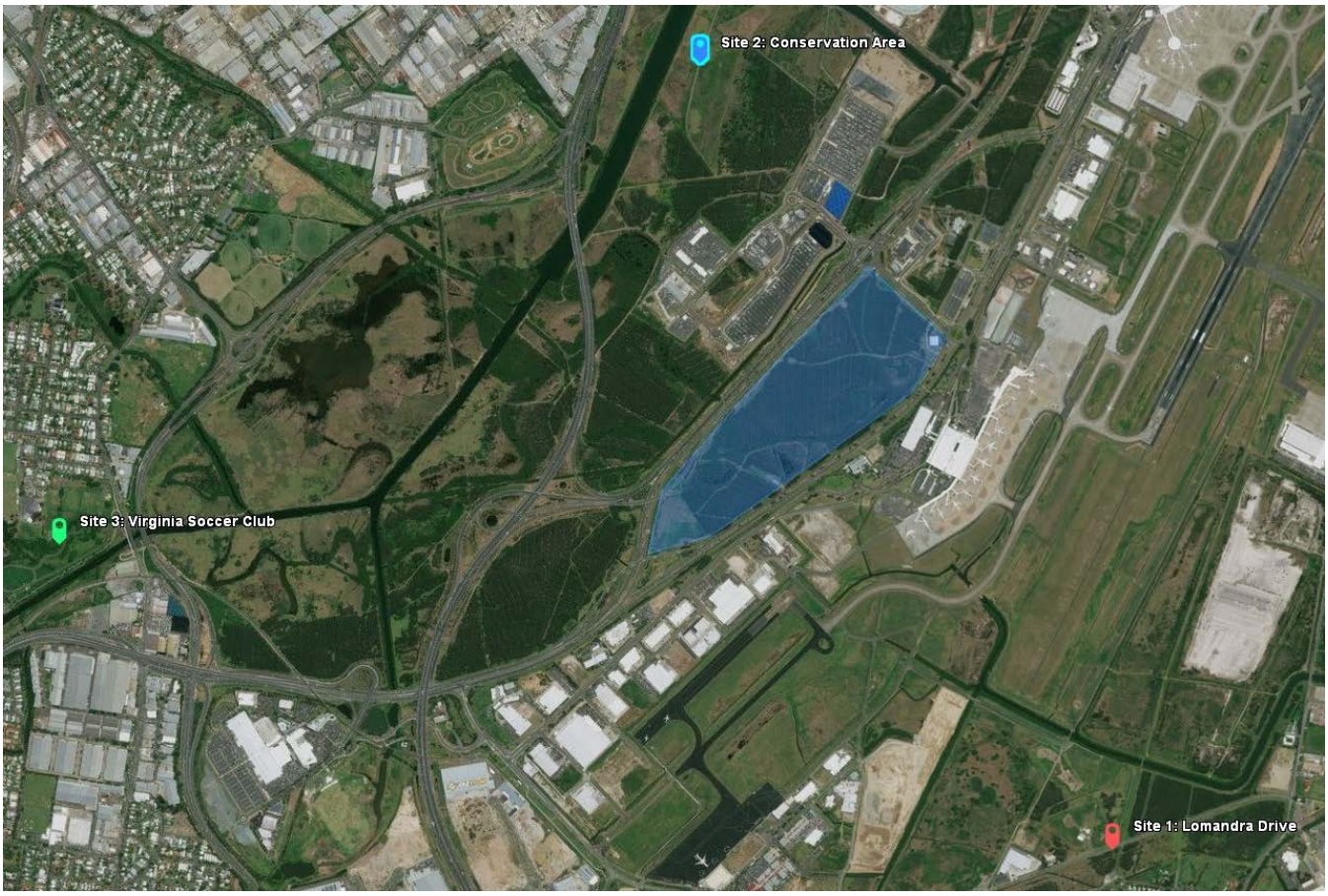


Figure 4 Noise monitoring locations conducted by Aurecon between 26/2/19 – 13/3/19

The noise levels measured during this monitoring period are presented in Table 7.

Table 7 Summary of measured noise levels by Aurecon

Logger #	Date/ Period	Average Noise Level $dBL_{Aeq,T}$			Rating Background Level dBL_{A90}		
		Daytime 0700 - 1800	Evening 1800 - 2200	Night 2200 - 0700	Day 0700 - 1800	Eve. 1800 - 2200	Night 2200 - 0700
1	26/02/19 – 05/03/19	62	60	57	46	43	43
2	26/02/19 – 05/03/19	51	50	52	45	45	41

Logger #	Date/ Period	Average Noise Level $dBL_{Aeq,T}$			Rating Background Level dBL_{A90}		
		Daytime 0700 - 1800	Evening 1800 - 2200	Night 2200 - 0700	Day 0700 - 1800	Eve. 1800 - 2200	Night 2200 - 0700
3	05/03/19 – 13/03/19	58	52	49	50	45	41

Measurement periods during inclement weather (high wind speeds or rain) were removed from the assessment. As a result, the dominant noise sources captured include:

- Aircraft movements
- Road traffic movements (standard, motorbike and heavy vehicle)
- Cricket chirping (distant, late night/early morning)
- Low frequency hum (distant, late night/early morning)
- Bird noise (distant and intermittent at Logger 2 location)

The use of the local sports areas, an idling truck and local nearby bird noises were removed from the assessment at Logger 3, as these noise sources will not be indicative of the existing noise environment at nearby sensitive receptors.

Meteorological data captured by the local Bureau of Meteorology weather station (Brisbane Airport, ID: 040842) was considered representative of the meteorological conditions at the noise logger locations.

The measured Bureau of Meteorology data and noise monitoring data is presented in Appendix A of this Report.

3.3 Review of existing data

Ambient noise level measurements from the following reports were also reviewed to quantify the existing noise environment around the Project site:

- Parallel Runway EIS/Major Development Plan (MDP) (2006)
- PSK Environmental Interim Report (2017)

For the Parallel Runway EIS/MDP, ambient noise levels at several locations surrounding the Project site were recorded in November 2005. The relevant locations to the Project site include:

- St Paul's Theological College (2.5 km north-west) – recorded distant traffic and birds
- 33 Franklin Street, Nundah (2.45 km west) – recorded distant traffic, insects, birds and occasional local traffic
- 17 McBride Road, Pinkenba (2.6 km south-east) – recorded birds, insects, children, animals and aircraft noise

The measured noise levels at these locations are summarised in Table 8 below. It is noted that the Parallel Runway EIS/MDP considered these noise levels to be 'typical' for these areas.

Table 8 Summary of previously measured noise levels - 2006

Site	Min $dBL_{A90,1hr}$			$dBL_{Aeq,Period}$		
	Daytime 0700 - 1800	Evening 1800 - 2200	Night 2200 - 0700	Daytime 0700 - 1800	Evening 1800 - 2200	Night 2200 - 0700
St Paul's Theological College (Educational facility)	36	33	30	56	51	44
33 Franklin Street, Nundah (residential property)	44	42	36	57	50	49

Site	Min $dBL_{A90,1hr}$			$dBL_{Aeq,Period}$		
	Daytime 0700 - 1800	Evening 1800 - 2200	Night 2200 - 0700	Daytime 0700 - 1800	Evening 1800 - 2200	Night 2200 - 0700
17 McBride Road, Pinkenba (residential property)	42	37	34	57	52	51

Source: BAC 2006

A comparison of Table 7 and Table 8 shows that noise levels have generally increased from 2006 to 2019, across all time periods (daytime, evening and night).

Additionally, sound level monitoring was undertaken at the Project site by PSK Environmental in September 2017. A summary of these results is included in Table 9 below. For ease of comparison, values from the PSK Environmental Interim Report (2017) have be rounded to the nearest whole number.

Table 9 Summary of measured noise levels by PSK Environmental (2017)

Location	Date/ Period	dBL_{Aeq}			dBL_{A10}			dBL_{A90}		
		Day 0700 - 1800	Evening 1800 - 2200	Night 2200 - 0700	Day 0700 - 1800	Eve. 1800 - 2200	Night 2200 - 0700	Day 0700 - 1800	Evening 1800 - 2200	Night 2200 - 0700
Kingsford Smith Memorial	05/09/17 – 19/09/17	60	55	58	60	56	59	52	48	50
BAC Service Centre	20/09/17 – 05/10/17	61	60	60	63	62	62	56	53	52

The results in Table 9 show higher measured noise levels at the Kingsford Smith Memorial and BAC Service Centre compared to the locations in Table 7 and Table 8. The noise levels are higher in these locations given their location at the Brisbane Airport. A copy of the 'Site Plan and Sampling Locations' from the PSK Environmental Interim Report (2017), detailing noise monitoring is detailed in Appendix B of this Report.

3.4 Vibration

Baseline vibration monitoring was undertaken at the Kingsford Smith Memorial by PSK Environmental over 14 days between 7 September 2017 and 25 September 2017. A summary of the vibration results is included in Table 10 below.

Table 10 2017 Baseline Vibration monitoring survey results

Monitoring period	Maximum vibration detected (mm/s)	Second highest reading (mm/s)	Average vibration detected (mm/s)
17 – 13 September 2017	1.0	0.97	0.12
14 September 2017	6.44	0.75	0.16
19 – 25 September 2017	3.53	1.58	0.12

During the 14-day baseline monitoring period, the maximum vibration result recorded was 6.44 mm/s which exceeds the set performance criteria of 5.0 mm/s. The exceedance occurred at Kingsford Smith Memorial on 14 September 2017 at approximately 3 pm for a one-minute period and was reported by PSK Environmental to be attributed to tampering of the vibration monitoring equipment. The average vibration detected was 0.12 mm/s which is well below 1 mm/s.

4 Methodology

4.1 Noise modelling

4.1.1 Noise-sensitive receptors

Sound level predictions for nine typical operational scenarios for the BNE Auto Mall have been conducted for a series of noise-sensitive locations near the Project site. The noise-sensitive locations in the noise model have been selected to include the nearest affected receivers (both existing and proposed receptors) and are shown in Figure 5.

Figure 5 Noise prediction locations

4.1.2 Prediction methodology

The level of noise in local environs that arise from activities at the Project site will depend upon a number of factors, the more significant of which are:

- The sound power levels (L_{WA}) of the plant of equipment used on site. In this case, motor vehicles being driven around the performance track.
- The periods of operation of the 'noisy activities' on site. The performance track will operate seven days a week with operating hours ranging between 9 am and 10 pm.
- The distance between the noise source and receiving position.
- The presence or absence of screening effects due to barriers, or ground absorption.
- Any reflection effects due to the facades of buildings, etc.

The parameter that is in general use and is recommended internationally for the description of environmental noise at a receptor position is the equivalent continuous sound pressure level, L_{eq} (expressed in dB). The L_{eq} describes the total amount of acoustic energy measured but does not take any account of the ear's ability to hear certain frequencies more readily than others. Instead, an A-weighting is applied to form the L_{Aeq} (expressed in dBA) as this is found to relate better to the loudness of the sound heard.

In order to assist in the calculation of predicted L_{Aeq} noise levels for the Project, SoundPLAN noise modelling software has been used. The noise prediction software has been configured to undertake the calculations in accordance with ISO 9613-2.

The parameters used in SoundPLAN are listed in Table 11 below.

Table 11 Modelling parameters

Parameter	Setting/Source
Software	SoundPlan v8.0
Algorithm	ISO 9613-2
Parameter	$L_{Aeq,1h}$
Ground Absorption	1.0
Road Absorption	0.5
Receiver Height	1.5 m
Noise Contour Grid	1.5 m height, 5 m resolution
Receiver positions	Free-field
Reflection Order	3

4.1.3 Sound power levels

The following sound power levels have been used in the modelling based on Aurecon's experience of similar projects and our comprehensive library of noise sources. Peak noise levels have been used to ensure a conservative approach is taken in the model to high performance vehicles driving around the performance track. For the purposes of this assessment, 'high performance vehicles' are assumed to mean those with the highest sound power levels, likely to be vehicles with the largest engines and loudest exhaust systems. The peak noise level for a high performance vehicle has been modelled as 109 dBA from a distance of 6 m, while motorbikes have been modelled as 106 dBA from a distance of 6m.

Table 12 Assumed noise levels

Sound source	Sound Power Level, dBA	Sound Pressure Level, dBA at 'm' metres	Reference	Assumptions
Test stand for diesel engines	107 dB L_{WA}	-	SoundPLAN library data	-
Car spectrum for normal road car	98 dB L_{WA}	-	SoundPLAN library data	-
High performance vehicle on performance track	-	109 dBA at 6 m	Library data	Peak noise level measured with vehicle driving around track
High performance vehicle on performance track	-	99 dBA at 6 m	Library data	Minimum noise level measured with vehicle driving around a track
Motorbikes	-	106 dBA at 6 m	Library data	-
Spectator seating areas	83 dB L_{WA} per m^2	-	Library data	Assumed a level of 80 dBA per person, occupying an area of 2 m^2 each.

4.1.4 Assumptions

The following assumptions have been made for this assessment:

- Sound power levels have been derived from SoundPLAN library data.
- The terrain is generally flat between the noise sensitive locations and the Project site.
- No modulation, tonal or impulsiveness characteristics are present in the source noise levels.

5 Assessment

The noise model includes nine 'typical' scenarios for the operation of the BNE Auto Mall including the performance track, 4WD test circuit and skid pan. The operational activities are based on the proposed activities outlined within Section 2.4.1 of the MDP. The modelled scenarios also include a combination of potential operational activities occurring simultaneously to represent day-to-day operations, semi-regular/regular events and special and major events.

5.1 Noise level predictions

5.1.1 Modelling Scenarios

Preliminary noise modelling has been undertaken based on the potential noise sources within the Project site to provide a general understanding of the expected noise impacts, sources and extent of mitigation required. There are nine 'typical' scenarios that have been assessed which are associated with day-to-day operations of the BNE Auto Mall as well as potential operational activities for event days. Each of these scenarios are detailed below:

- **Scenario One:** High performance vehicles using the performance track, with six laps within a one hour period (operating hours from 9 am to 10 pm).
- **Scenario Two**: Normal test driving situations (using normal road cars) assuming a maximum of 12 laps within a one hour period. This Scenario aligns with the potential operational activities for *driver training days* (operating hours from 9 am to 6 pm)
- **Scenario Three:** Scenario One with the addition of six stationary (idling) vehicles at pit-stop locations. This Scenario aligns with the potential operational activities for *driver experience days* (operating hours from 9 am to 10 pm).
- **Scenario Four:** Scenario One with the addition of two vehicles using the skid pan (operating hours from 9 am to 10 pm).
- **Scenario Five:** Scenario Three with the addition of two vehicles using the skid pan (operating from 9 am to 6 pm).
- **Scenario Six:** High performance vehicles using the performance track, with twelve vehicle laps of the track within a one hour period (operating from 9 am to 10 pm).
- **Scenario Seven:** Scenario Four with the addition of six vehicles per hour using the 4WD test circuit, and six motorbikes per hour using the performance track. This Scenario aligns with the potential operational activities that are anticipated for *shared test drive days, 4WD training days* and *motorbike days* (operating from 9 am to 10 pm). It is noted these activities may occur in isolation of other activities, however, the simultaneous use of high performance vehicles, the skid pan, 4WD test circuit and motorbikes has been assessed to represent the worst-case scenario.
- **Scenario Eight:** Six high performance vehicles on the performance track, completing six laps simultaneously in any one hour period. This Scenarios aligns with the potential operational activities that are anticipated for *corporate driving days* (operating from 9 am to 6 pm).
- **Scenario Nine:** Six high performance vehicles using the performance track, completing 12 laps in any one hour period. Also includes up to 5,000 spectators, cars idling in the pit stop locations and operation of a PA system (operating from 9 am to 10 pm). It is noted the estimated maximum number of people for the *special and/or major event days* is 1000 spectators, however, this Scenario has assessed a worst-case scenario with 5,000 spectators.

5.1.2 Results and discussion

The predicted noise impact of the BNE Auto Mall is considered at both existing and future noise-sensitive receptors in the vicinity of the Project site. An assessment of the nine 'typical' scenarios (at different locations)

is presented in Table 13, and should be read in conjunction with the noise contour maps included in Appendix C. Predicted noise levels are preliminary estimates, and it is noted that levels will vary depending on vehicle type and frequency of usage.

Note that cumulative noise impact in the wider acoustic environment from each scenario is not presented in the below table but will need to be considered as part of the final design of any development to ensure that the 'background noise creep' objectives of the Noise Impact Assessment PSP are achieved.

Table 13 Predicted noise levels at noise sensitive receivers for each operational scenario

Noise-sensitive receptor	Predicted noise level, $dBL_{Aeq,1h}$								
	Scenario #								
	One	Two	Three	Four	Five	Six	Seven	Eight	Nine
94 Serpentine Road, Pinkenba	19	10	20	39	39	30	39	35	43
633 Nudgee Road, Nundah	18	8	18	37	37	28	38	33	41
789 Nudgee Road, Northgate	19	9	19	39	39	29	39	34	43
Australian Catholic University	4	15	15	36	36	25	36	30	38
Nearest existing commercial property	46	36	47	59	59	56	59	61	72
Nearest existing hotel – Novotel (floor 3)	<25	<25	<25	43	43	34	43	39	46
Pullman and IBIS Hotel (floor 3)	<25	<25	<25	47	47	33	47	38	45
Hertz car rental	35	26	35	58	58	46	57	51	57
Kingsford Smith Memorial	37	27	37	59	59	47	59	52	60
BAC Service Centre	38	28	38	59	59	48	59	53	59
Prayer Room (Central parking area)	37	28	38	59	59	48	59	53	59
Prayer Room (Airport)	37	28	39	58	58	48	58	53	59

Table 14 below compares the predicted noise levels in Table 13 above against the Project specific daytime criteria outlined in Table 4. Daytime noise levels have been considered most appropriate for comparison, as the most intensive usage of the performance track is likely to occur during this period.

Table 14 Comparison between predicted noise levels and project criteria (day)

Noise-sensitive receptor	Noise Criteria dBL_{Aeq} (Day)	Predicted difference between predicted noise level and project specific criteria, dB (only predicted differences of noise levels above the applicable criteria)								
		Scenario One	Scenario Two	Scenario Three	Scenario Four	Scenario Five	Scenario Six	Scenario Seven	Scenario Eight	Scenario Nine
94 Serpentine Road, Pinkenba	49	-	-	-	-	-	-	-	-	-
633 Nudgee Road, Nundah	53	-	-	-	-	-	-	-	-	-
789 Nudgee Road, Northgate	53	-	-	-	-	-	-	-	-	-
Australian Catholic University	39	-	-	-	-	-	-	-	-	-
Nearest existing commercial property	63	-	-	-	-	-	-	-	-	9
Nearest existing hotel – Novotel (floor 3)	53	-	-	-	-	-	-	-	-	-
Nearest existing Pullman and IBIS hotel (floor 3)	63	-	-	-	-	-	-	-	-	-
Hertz car rental	58	-	-	-	-	-	-	-	-	-
Kingsford Smith Memorial	55	-	-	-	4	4	-	4	-	5
BAC Service Centre	59	-	-	-	-	-	-	-	-	-

Noise-sensitive receptor	Noise Criteria dBL_{Aeq} (Day)	Predicted difference between predicted noise level and project specific criteria, dB (only predicted differences of noise levels above the applicable criteria)								
		Scenario One	Scenario Two	Scenario Three	Scenario Four	Scenario Five	Scenario Six	Scenario Seven	Scenario Eight	Scenario Nine
Prayer Room (Central parking area)	59	-	-	-	-	-	-	-	-	-
Prayer Room (Airport)	63	-	-	-	-	-	-	-	-	-

For operational scenarios which are likely to operate to 10 pm (and thus into the evening period), a comparison to the evening noise criteria was made, and is presented in Table 15.

Table 15 Comparison between predicted noise levels and project criteria (evening)

Noise-sensitive receptor	Noise Criteria dBL_{Aeq} (Evening)	Predicted noise level, $dBL_{Aeq,1h}$					
		Scenario One	Scenario Three	Scenario Four	Scenario Six	Scenario Seven	Scenario Nine
94 Serpentine Road, Pinkenba	46	-	-	-	-	-	-
633 Nudgee Road, Nundah	48	-	-	-	-	-	-
789 Nudgee Road, Northgate	48	-	-	-	-	-	-
Australian Catholic University	36	-	-	-	-	-	2
Nearest existing commercial property	58	-	-	1		1	14
Nearest existing hotel – Novotel (floor 3)	48	-	-	-	-	-	-
Nearest existing Pullman and IBIS hotel (floor 3)	58	-	-	-	-	-	-
Hertz car rental	53	-	-	4	-	4	4
Kingsford Smith Memorial	53	-	-	6	-	6	7
BAC Service Centre	58	-	-	1	-	1	1
Prayer Room (Central parking area)	58	-	-	1	-	1	1
Prayer Room (Airport)	58	-	-	-	-	-	1

Based on these results, the following observations can be made in relation to the predicted noise impact of the BNE Auto Mall:

Daytime Operations (9 am – 6 pm)

All scenarios for the BNE Auto Mall are predicted to be in compliance with the daytime local noise criteria at the following locations:

- 94 Serpentine Road, Pinkenba
- 633 Nudgee Road, Nundah
- 789 Nudgee Road, Northgate
- Australian Catholic University
- Novotel
- Pullman and IBIS hotel
- Hertz car rental
- BAC Service Centre
- Prayer Room (Central parking area)
- Prayer Room (Airport)

Daytime noise criteria exceedances are predicted for the following receptors for the noted operational scenarios:

- Commercial properties along Qantas Drive
  - A 9 dB exceedance for Operational Scenario Nine.
- Kingsford Smith Memorial
  - A 4 dB exceedance for Operational Scenario Four.
  - A 4 dB exceedance for Operational Scenario Five.
  - A 4 dB exceedance for Operational Scenario Seven.
  - A 5 dB exceedance for Operational Scenario Nine.

The exceedances for Scenario Nine relates to operational activities that are associated with special and/or major event days. As such, these exceedances would occur up to a maximum of twice a year (i.e. bi-annual events).

With respect to the Kingsford Smith Memorial predicted exceedances, visitors and/or workers on the site are typically not there for extended periods of time (i.e. self-guided tours only) and therefore are unlikely to be exposed to the hour-long predicted noise levels.

Evening operations (6 pm – 10 pm)

All scenarios for the BNE Auto Mall are predicted to be in compliance with the evening local noise criteria at the following locations;

- 94 Serpentine Road, Pinkenba
- 633 Nudgee Road, Nundah
- 789 Nudgee Road, Northgate
- Novotel
- Pullman and IBIS hotel

Evening noise criteria exceedances are predicted for the following receptors for the noted operational scenarios:

- Australian Catholic University
  - A 2 dB exceedance for Operational Scenario Nine.
- Commercial properties along Qantas Drive
  - A 1 dB exceedance for Operational Scenario Four.
  - A 1 dB exceedance for Operational Scenario Seven.
  - A 14 dB exceedance for Operational Scenario Nine.
- Hertz Car Rental
  - A 4 dB exceedance for Operational Scenario Four.
  - A 4 dB exceedance for Operational Scenario Seven.
  - A 4 dB exceedance for Operational Scenario Nine.
- Kingsford Smith Memorial
  - A 6 dB exceedance for Operational Scenario Four.
  - A 6 dB exceedance for Operational Scenario Seven.
  - A 7 dB exceedance for Operational Scenario Nine.
- BAC Service Centre

  - A 1 dB exceedance for Operational Scenario Four.
  - A 1 dB exceedance for Operational Scenario Seven.
  - A 1 dB exceedance for Operational Scenario Nine.
- Prayer Room (Service Centre)
  - A 1 dB exceedance for Operational Scenario Four.
  - A 1 dB exceedance for Operational Scenario Seven.
  - A 1 dB exceedance for Operational Scenario Nine.
- Prayer Room (Airport)
  - A 1 dB exceedance for Operational Scenario Nine.

As previously stated, the exceedances for Scenario Nine relates to operational activities that are associated with special and/or major event days. As such, these exceedances would occur up to a maximum of twice a year (i.e. bi-annual events) and do not form part of the day-to-day operations of the BNE Auto Mall.

- A 2 dB exceedance for this Scenario is predicted at Australian Catholic University. As noise levels in this area were measured in 2006, it may be productive that noise monitoring re-occur at this receptor for updated background noise levels. As the predicted exceedance is minor, it may be productive to engage this site for operational times, as the min. dBL_{A90} (likely obtained from the 9 pm – 10 pm period) may not be applicable to the concurrent use of both the BNE Auto Mall and University. When comparing the predicted noise levels to the Low density residential zone boundary acoustic amenity criterion ($45dBL_{Aeq,evening}$) (as the Educational zone borders with the Low density residential zone), compliance is met.

With regard to the exceedances predicted for the commercial properties along Qantas Drive, these businesses are typically open during the daytime only, and thus are not likely to have any onsite workers and/or visitors during the evening period. Therefore, exceedances at these locations would likely not impact these commercial properties. Nevertheless, it is recommended to undertake discussions with local in regard to the BNE Auto Mall's operational hours. As the commercial buildings are located on the Airport Land Use Zone, there is no applicable acoustic amenity criterion.

For the predicted 1 dB exceedances, these exceedances are very minor, and it is expected that these exceeding locations be managed via stakeholder engagement.

With respect to the Kingsford Smith Memorial predicted exceedances, as previously noted, visitors and/or workers on the site are typically not there for extended periods of time (i.e. self-guided tours only) and therefore are unlikely to be exposed to the hour-long predicted noise levels.

Hertz Car Rental is predicted to have an approximate external exceedance of 4 dB above the background noise criteria for three operational scenarios (Scenarios Four, Seven and Nine). As this location is open until late (12:30 am), concurrent use of the BNE Auto Mall and Car Rental will occur. Based on preliminary desktop assessment, it appears the Hertz Office is enclosed within the building, which will likely reduce noise levels to AS2107:2016 design noise levels for an office reception (below 45 dBA).

While residential properties are predicted to be in compliance with both the daytime and evening noise criteria, it is recommended that residential properties in nearby neighbourhoods be informed via stakeholder engagement of bi-annual events, as complaints may still occur.

5.1.3 Other noise sources

The proposed BNE Auto Mall is likely to include a performance track that will require the use of a PA system on the Project site, proposed to be used for emergency situations only. The following has been considered in relation to the PA system:

- The design and commissioning of the PA system should be considered as part of the Operational Noise Management Plan for the facility.
- The detailed design of the PA system will need to consider the location and directionality / spill of the speakers, and noise limiters, as appropriate.

- Specification of the PA system is subject to detailed design.

5.1.4 Construction noise and vibration

At the time of writing, the construction methodology for the Project has not been confirmed. It is understood that the construction phase will involve dealerships, brand experience centres and the performance track. These will be constructed simultaneously. It is assumed that construction of any future development on the Project site will involve excavation, structural works and fitout works, subject to development of a final program.

It is estimated that the total construction duration for the BNE Auto Mall will last a number of weeks/months and any noisy construction activities would be conducted during typical weekday hours between 7:00am and 6:00pm. With appropriate selection of plant and typical noise mitigation measures, construction noise from general earth works and typical construction activities are expected to generally comply with the applicable noise and vibration limits at the neighbouring properties.

Appropriate noise management measures can be used to mitigate any noise effects. Given the limited information available at this stage, it is recommended that a Construction Noise and Vibration Management Plan (CNVMP) is developed as a Condition of Consent. The CNVMP will outline appropriate measures to mitigate any potential adverse noise effects, including communication with neighbours.

An assessment of construction noise and vibration impacts associated with the initial earthworks phase of the Project (referred to as site preparatory works) was undertaken for the preparation of the Environmental Assessment Report (EAR) dated August 2017. The findings of this EAR concluded that potential impacts on the nearest receptors from the site preparatory works can be managed with appropriate mitigation measures outlined in Appendix E.

It is considered that nearby residential areas (Eagle Farm, Hendra, Nundah, Northgate and Banyo) are a sufficient distance away from the Project site and will not experience any adverse construction noise impacts.

Noise impacts may also be associated with construction vehicle traffic. Traffic due to workforce movements and delivery of materials will increase the ambient noise levels on the Project site and adjoining access routes. However, it is not expected that any change in noise will be noticeable given access routes are currently major road corridors.

5.1.5 Construction noise and vibration management plan (CNVMP)

It is considered that a CNVMP constitutes the best practicable option to mitigate the construction noise and vibration effects on the adjacent receivers and to minimise disruption to existing airport facilities and operations.

The CNVMP should, as a minimum, identify the following:

- Proposed construction activities and associated noise and vibration levels;
- Days and hours of site operation;
- Identification of affected neighbours;
- Noise mitigation measures;
- Construction noise monitoring requirements;
- Procedures for community liaison (e.g. distribution of site contact information etc.); and
- The CNVMP should adopt mitigation measures outlined in AS2436-2010.

5.2 Mitigation Measures

A comprehensive list of proposed noise mitigation measures is included as Appendix E. It is anticipated that a number of best practice mitigation measures are considered appropriate to mitigate potential noise impacts associated with the construction and operation of the BNE Auto Mall including restricting the use of the PA system to emergency situations only, stakeholder engagement with affected receptors (i.e. Australian Catholic University, BAC Service Centre and Qantas Drive businesses) and engineering design strategies such as perimeter bunds and acoustic screening, where necessary.

6 Summary

- A preliminary high-level assessment of potential noise impacts of the BNE Auto Mall and associated operational activities including the performance track, 4WD test circuit and skid pan has been conducted. Relevant noise level criteria for the operation of the BNE Auto Mall has been determined.
- An assessment of the baseline conditions at the Project site has been completed, with existing and future noise-sensitive receptors identified.
- The proposed commercial buildings (i.e. dealerships and brand experience centres) are appropriate land uses to be located within the existing noise environment of the Brisbane Airport.
- A comprehensive noise model of the Project site including nine 'typical' operational scenarios has been completed, and an assessment has been made in accordance with the appropriate noise impact assessment methodology for new noise sources.
- During periods of intense operational activity, predicted noise levels may exceed the Project specific noise level criteria at the Kingsford Smith Memorial and nearby commercial locations in the vicinity of the Project site.
- Operational and engineering design mitigation measures will be necessary to ensure that noise levels at future commercial receptors (dealerships and brand experience centres) within the BNE Auto Mall do not exceed the relevant criteria during periods of intense operational activities. Appropriate best practice and site-specific noise mitigation measures have been recommended in Appendix E.
- It is considered that the nearby residential areas (Eagle Farm, Hendra, Nundah, Northgate and Banyo) are a sufficient distance away from the Project site and will not experience any noise or vibration impacts as a result of the construction and operation of the BNE Auto Mall.
- With the incorporation of appropriate noise mitigation measures, the BNE Auto Mall is considered likely to operate within the Project specific criteria for existing and future noise sensitive receptors during the daytime operations.
- Stakeholder engagement with affected commercial precincts (Australian Catholic University, BAC Service Centre, Qantas Drive businesses) is recommended to understand their evening operations. This will help assess the number of true affected businesses that may be impacted by the operation of the BNE Auto Mall during the evening. Once confirmed, further mitigation strategies may be required.
- Due to the irregular occurrence of Scenario Nine (bi-annual), it is recommended that stakeholder engagement occur prior to events at exceeding locations, and possibly at nearby residential areas is undertaken.
- Construction noise and vibration has been considered, and the development of a CNVMP in accordance with AS2436-2010 and the mitigation measures outlined in Appendix E is recommended.
- It is recommended that sound power levels and operational activities are reviewed during the commissioning phase as outlined in the *Operational Noise Management Plan* (Appendix D), and the 'typical' scenarios that formed part of this assessment are updated accordingly.

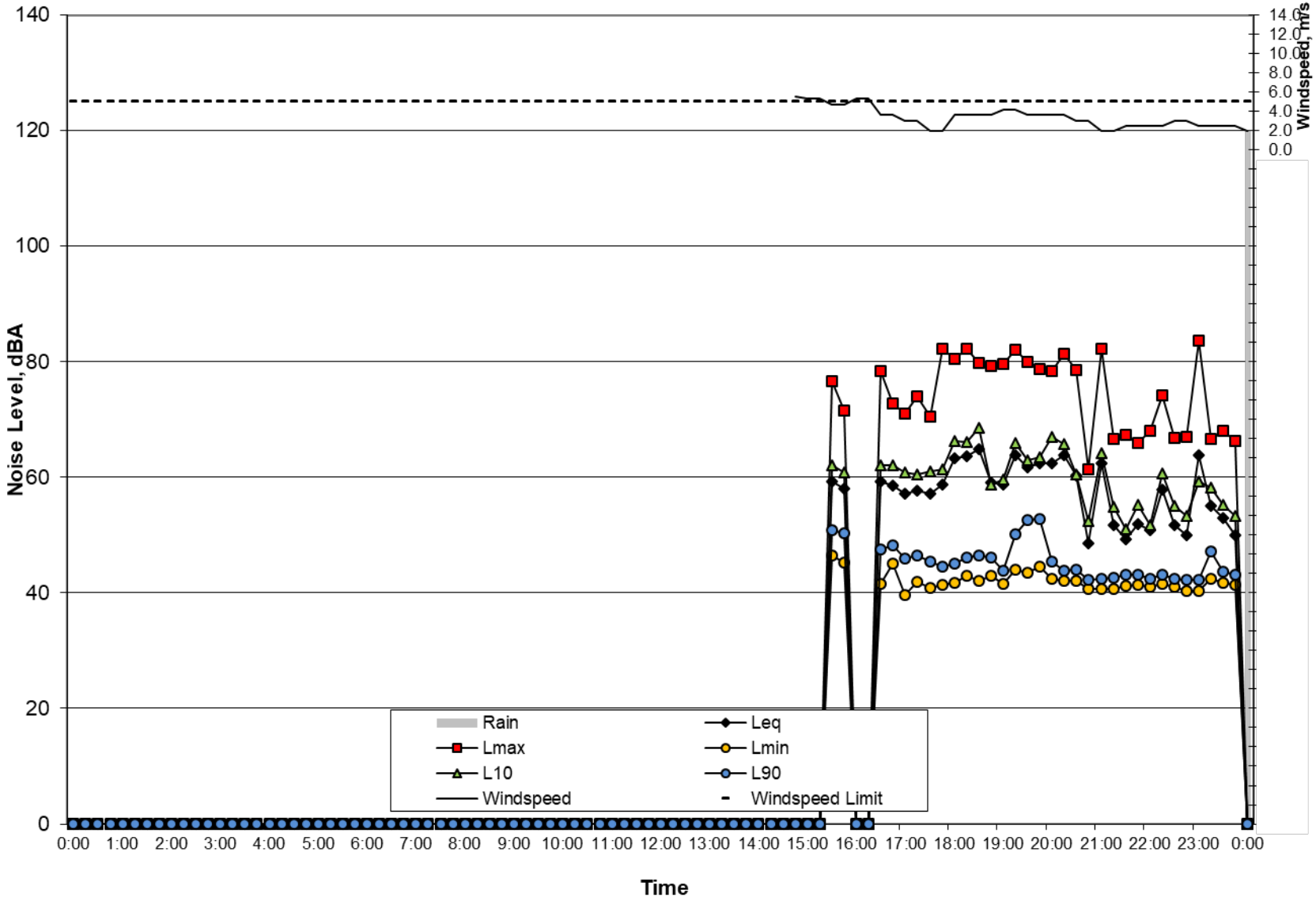
A

Noise monitoring results

Measured Ambient Noise Levels

BNE Airport Auto Mall : Location 1 -

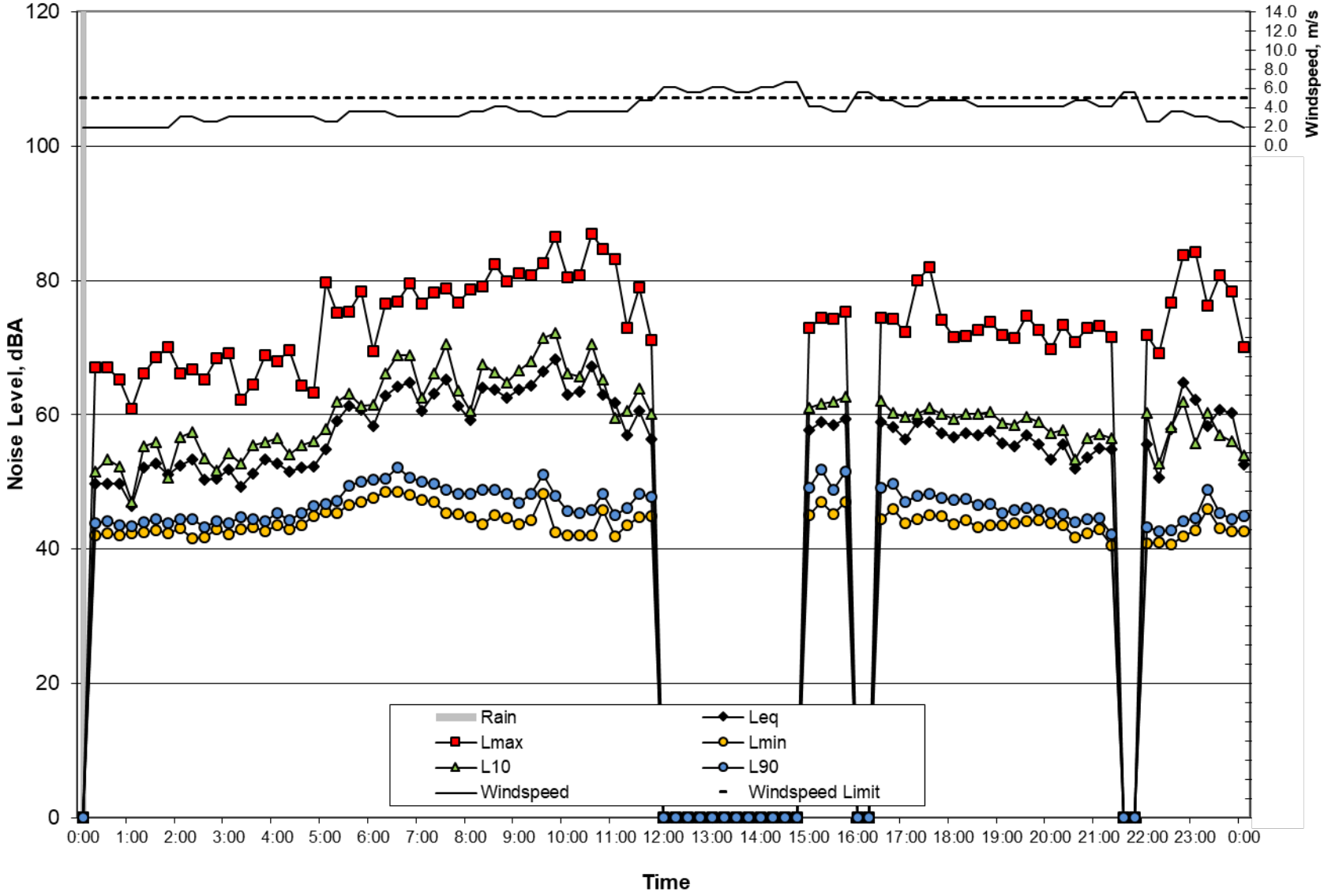
Tuesday, 26 February 2019



Measured Ambient Noise Levels

BNE Airport Auto Mall : Location 1 -

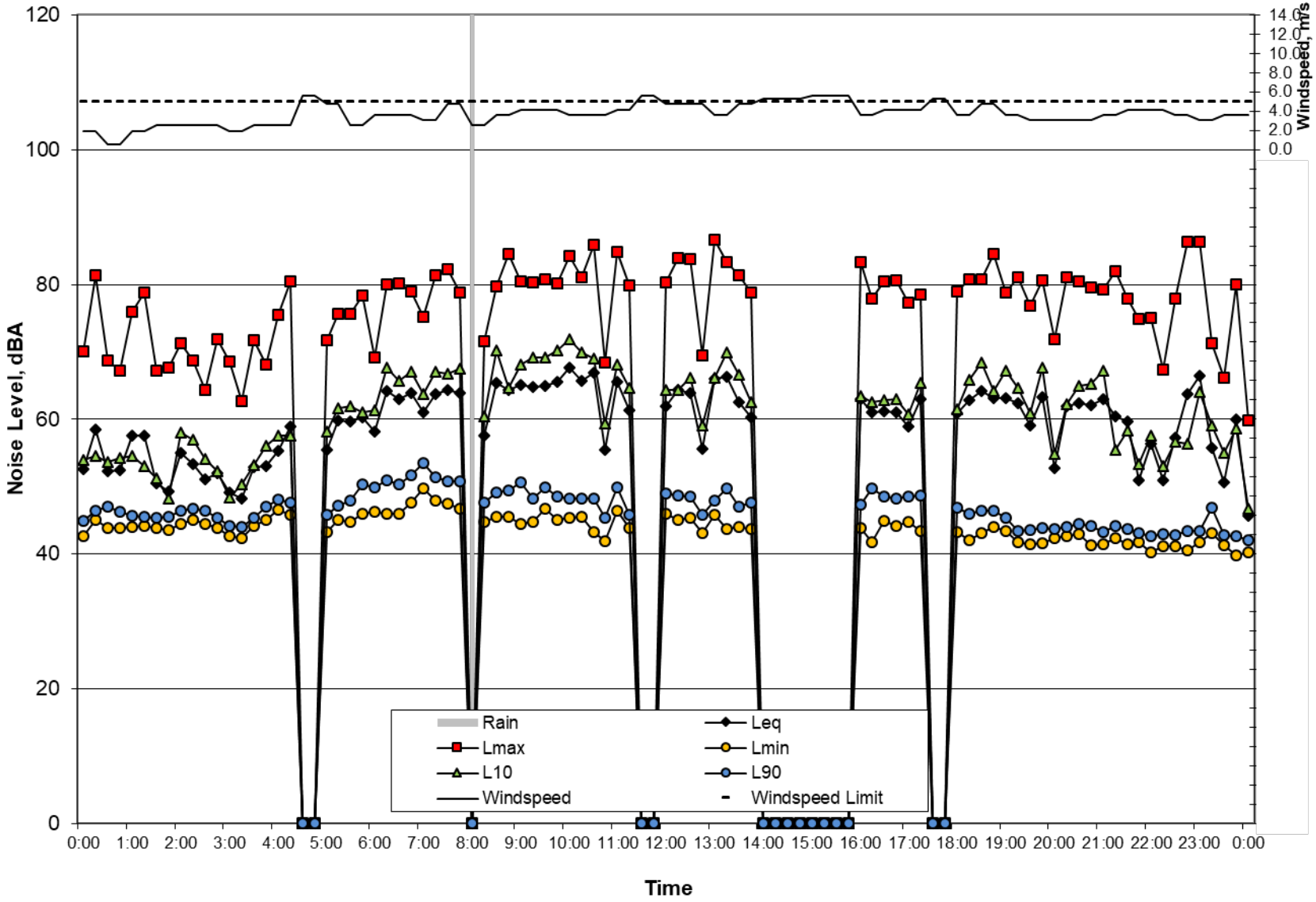
Wednesday, 27 February 2019



Measured Ambient Noise Levels

BNE Airport Auto Mall : Location 1 -

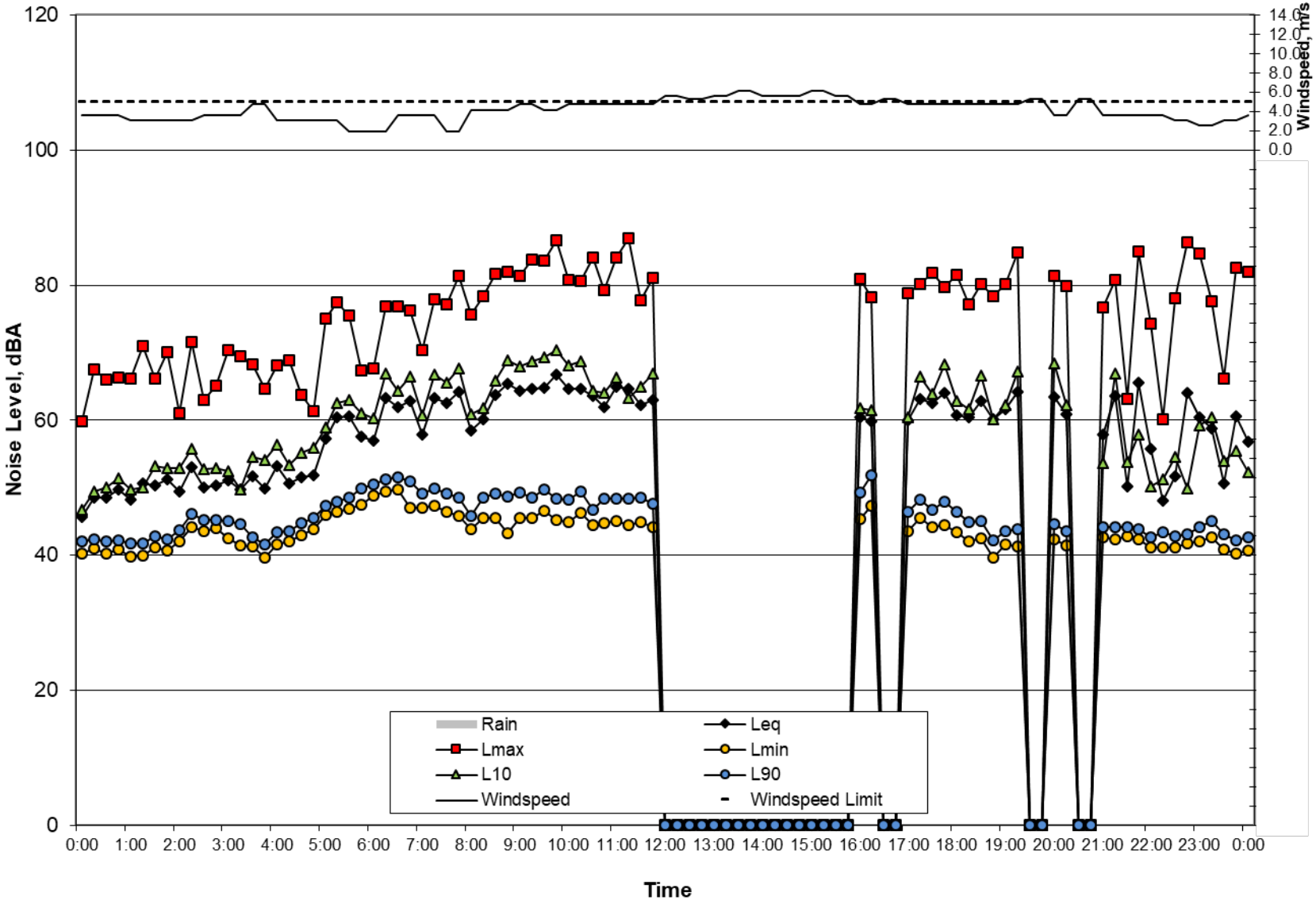
Thursday, 28 February 2019



Measured Ambient Noise Levels

BNE Airport Auto Mall : Location 1 -

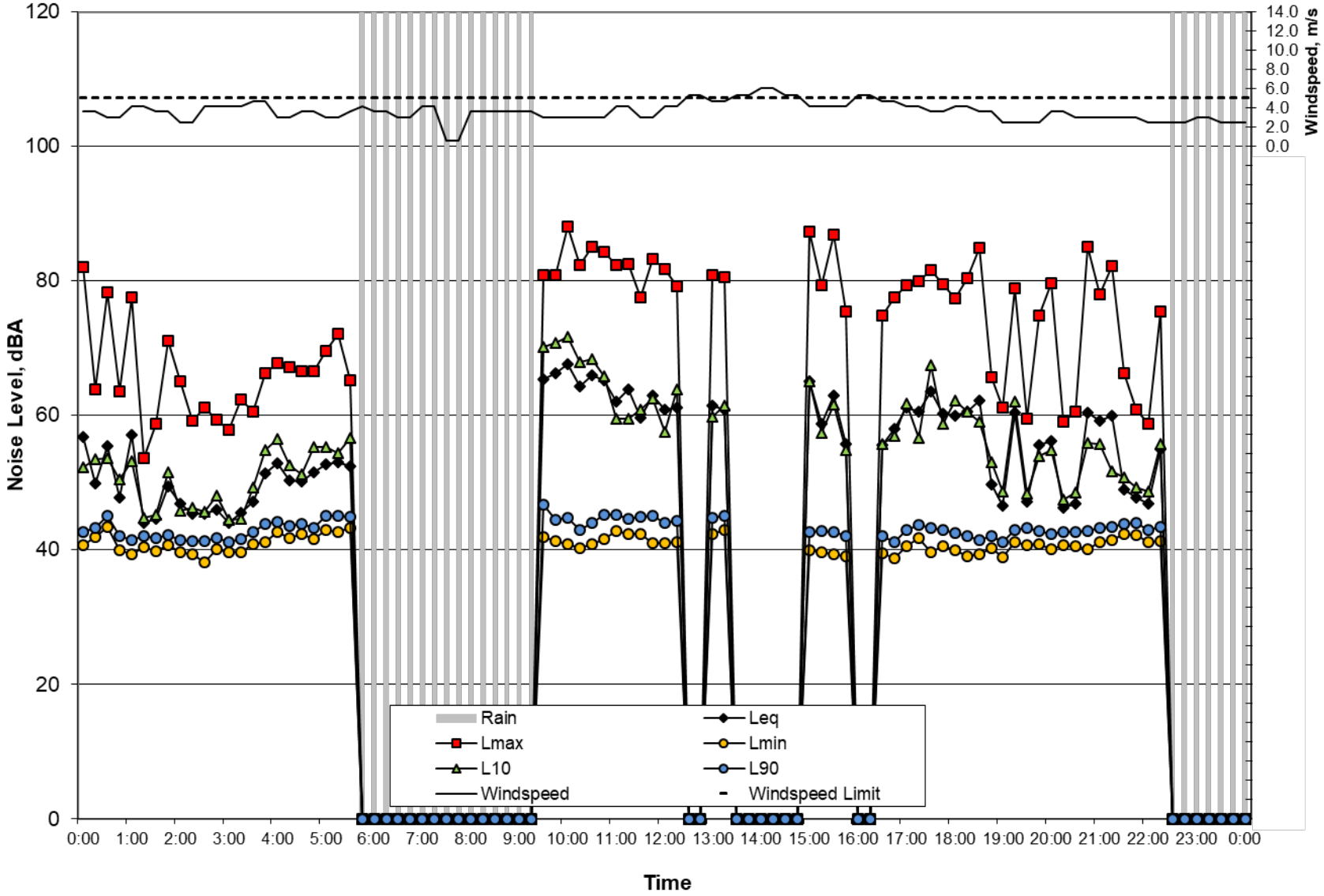
Friday, 1 March 2019



Measured Ambient Noise Levels

BNE Airport Auto Mall : Location 1 -

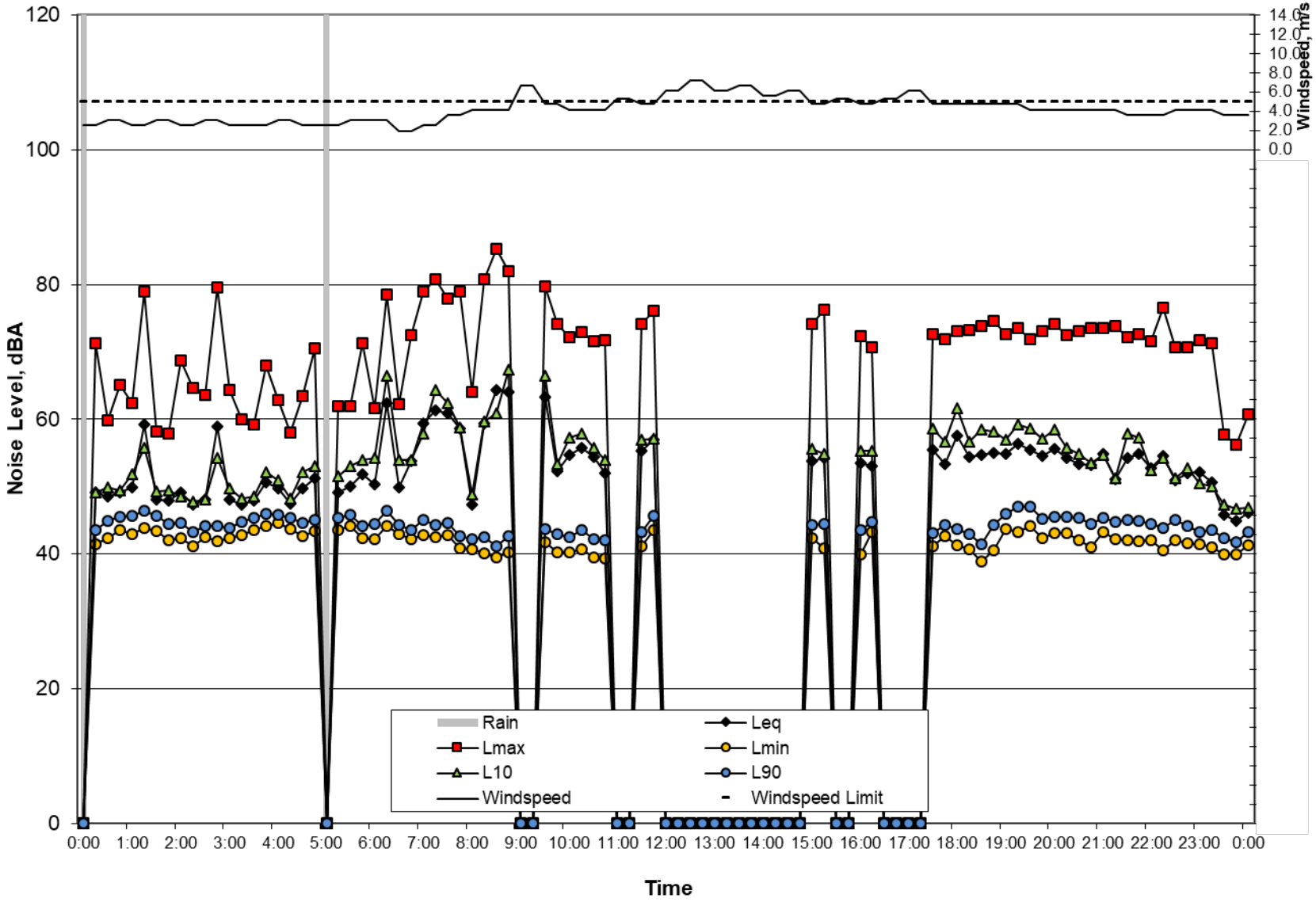
Saturday, 2 March 2019



Measured Ambient Noise Levels

BNE Airport Auto Mall : Location 1 -

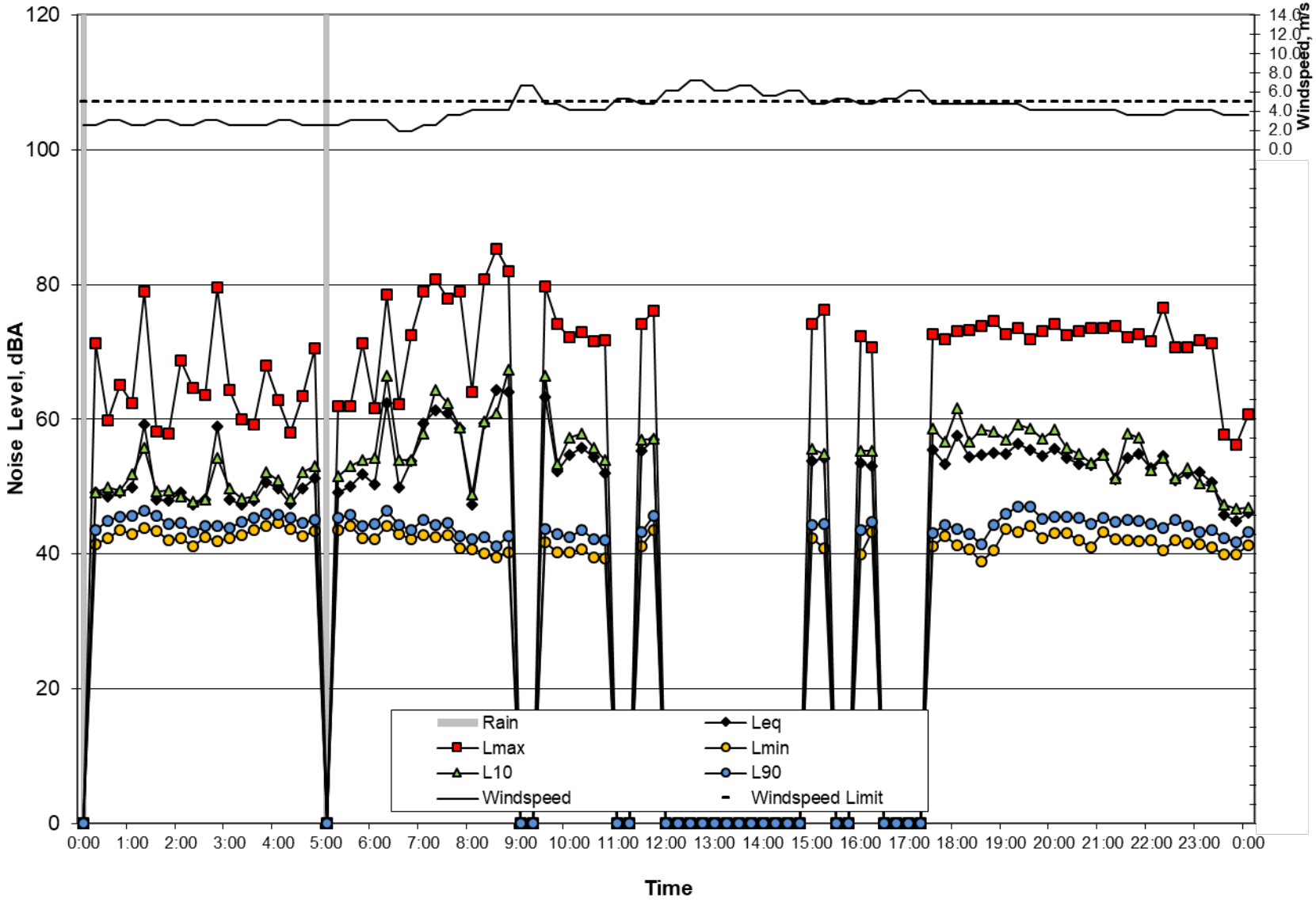
Sunday, 3 March 2019



Measured Ambient Noise Levels

BNE Airport Auto Mall : Location 1 -

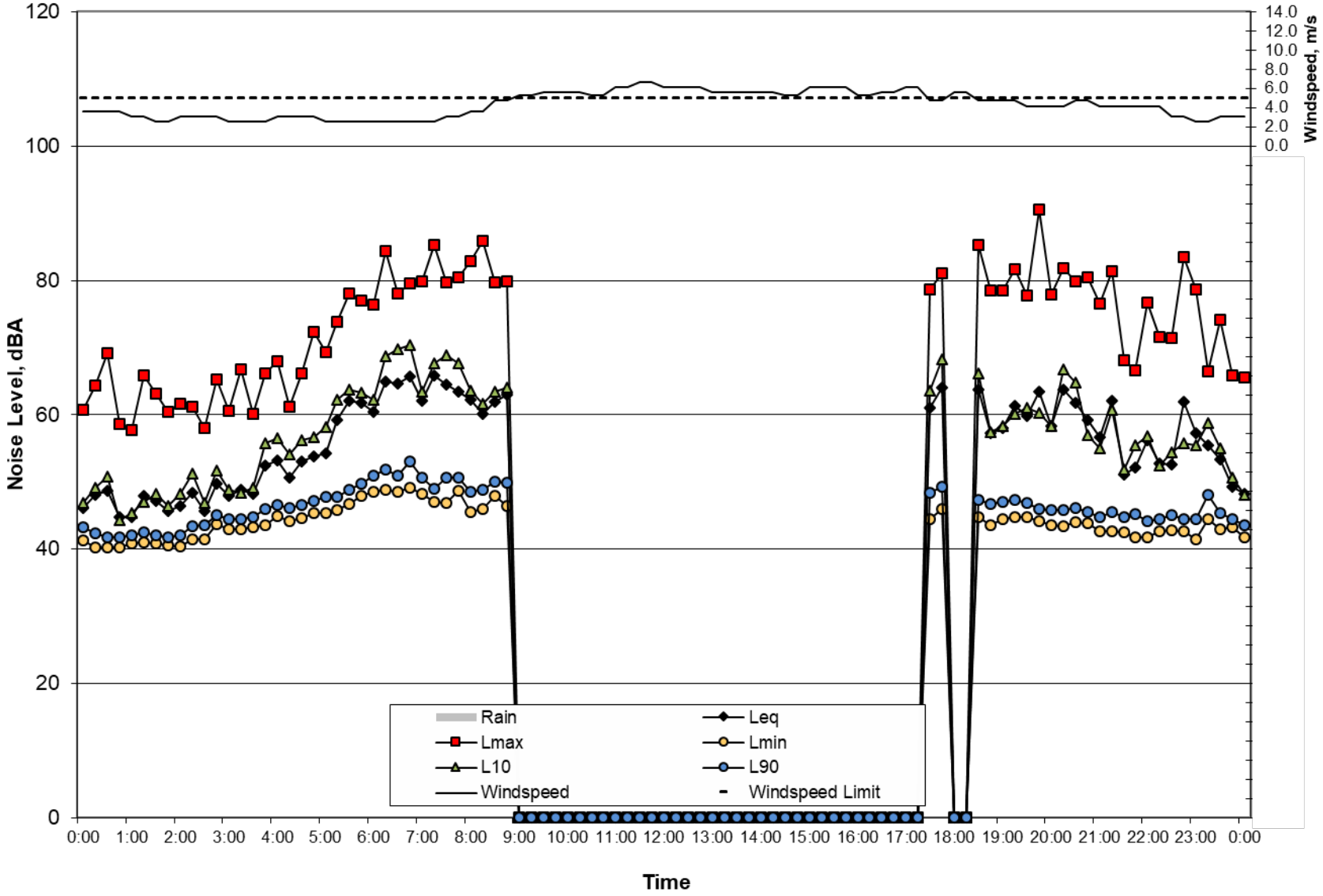
Sunday, 3 March 2019



Measured Ambient Noise Levels

BNE Airport Auto Mall : Location 1 -

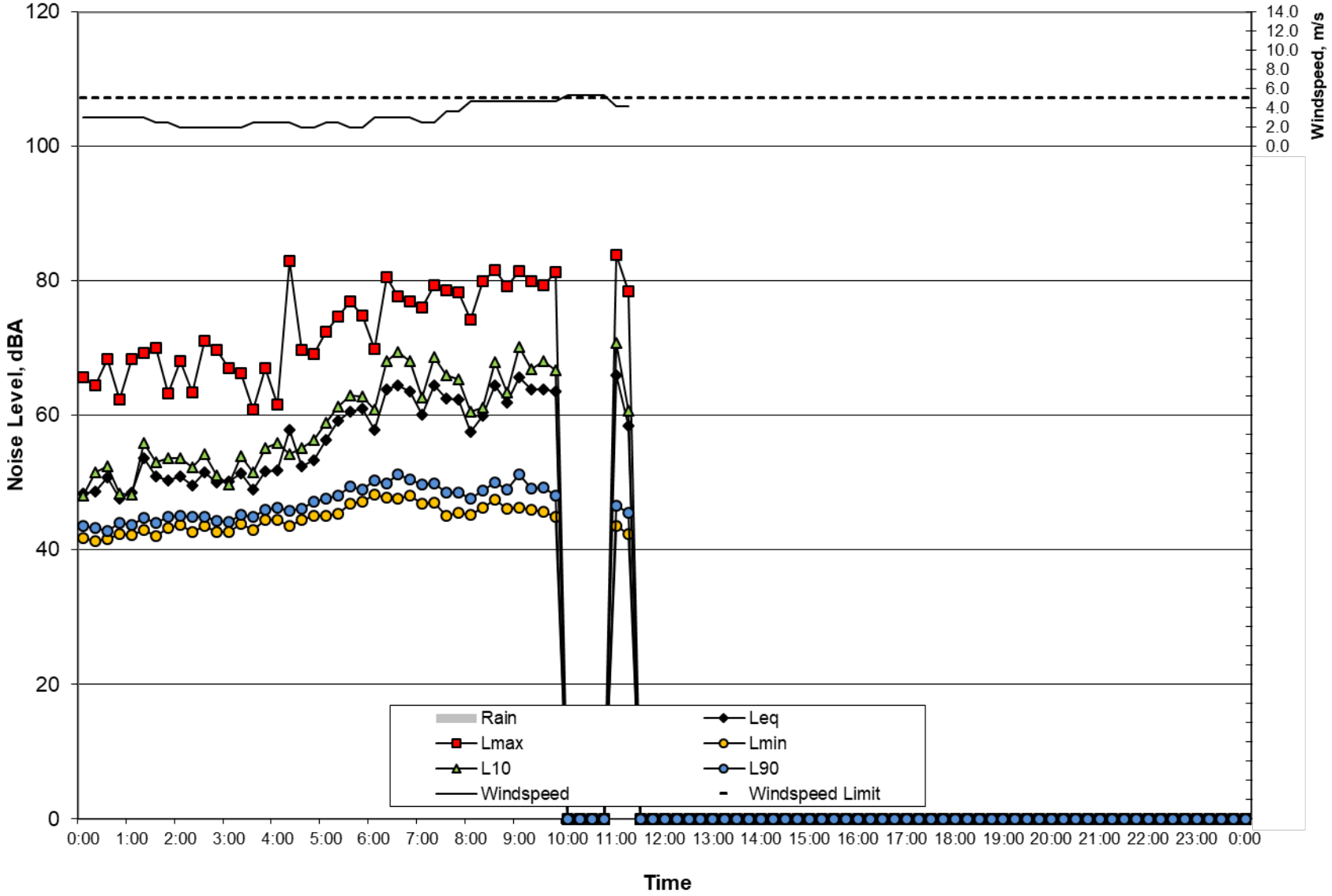
Monday, 4 March 2019



Measured Ambient Noise Levels

BNE Airport Auto Mall : Location 1 -

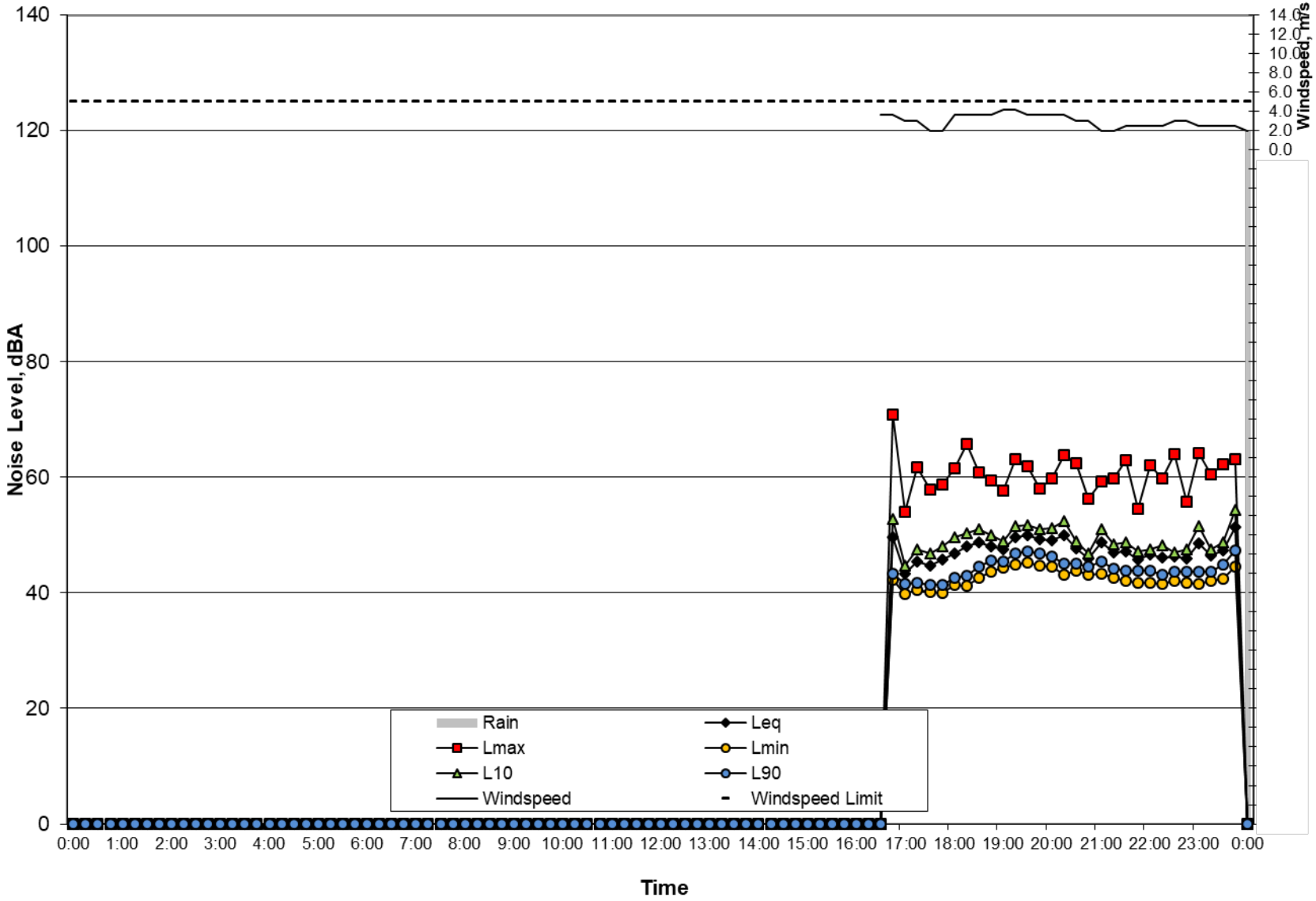
Tuesday, 5 March 2019



Measured Ambient Noise Levels

BNE Airport Auto Mall : Location 2 -

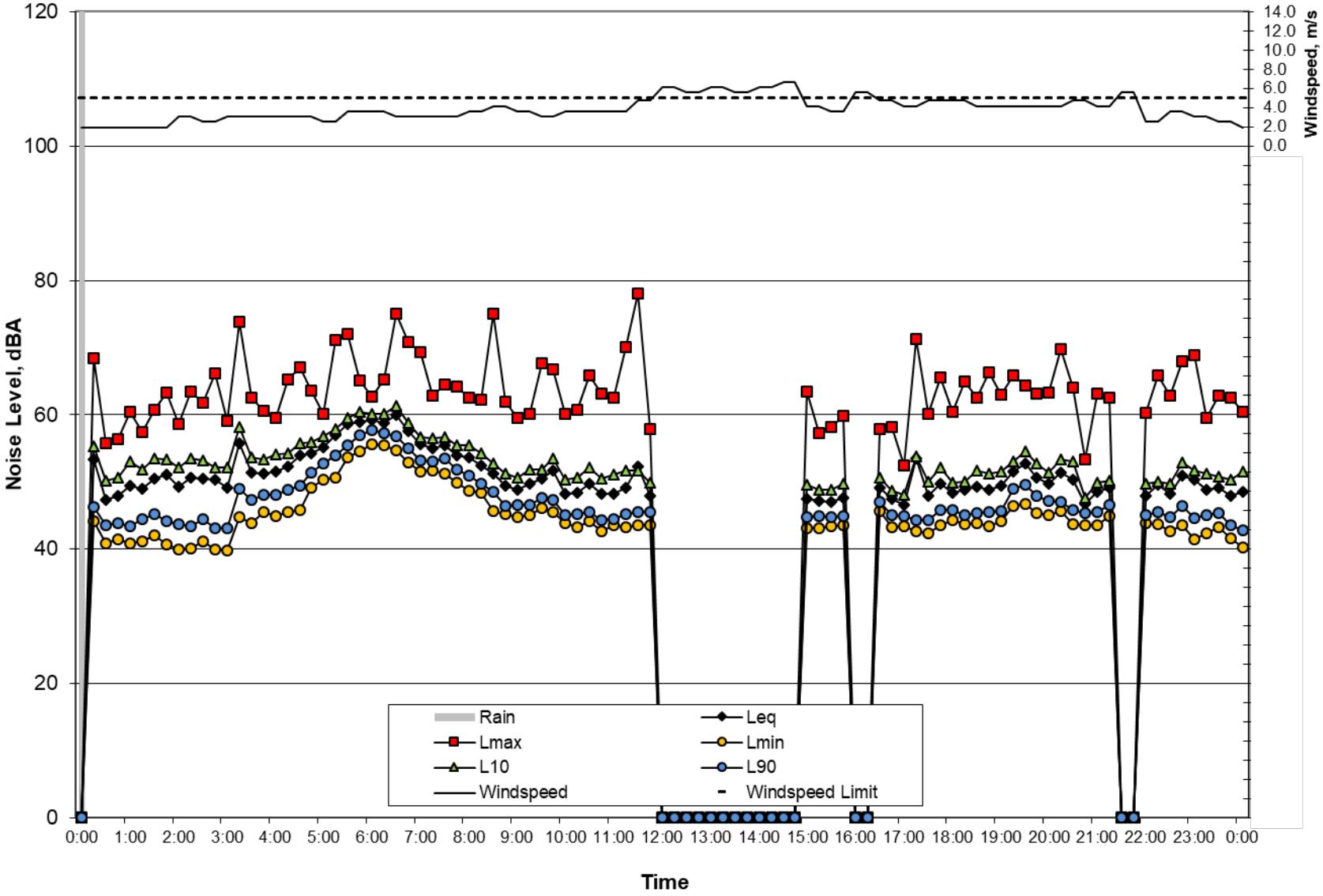
Tuesday, 26 February 2019



Measured Ambient Noise Levels

BNE Airport Auto Mall : Location 2 -

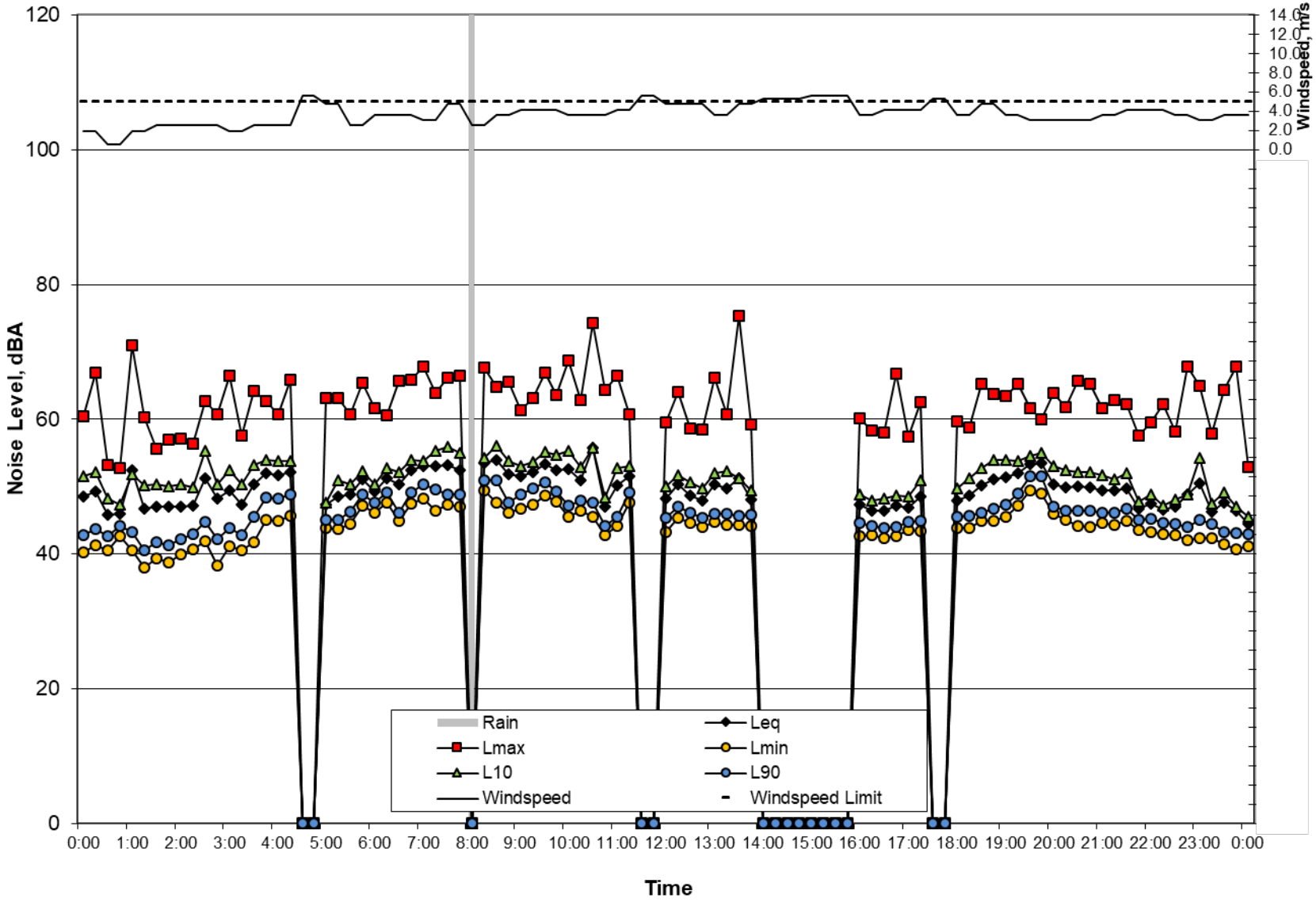
Wednesday, 27 February 2019



Measured Ambient Noise Levels

BNE Airport Auto Mall : Location 2 -

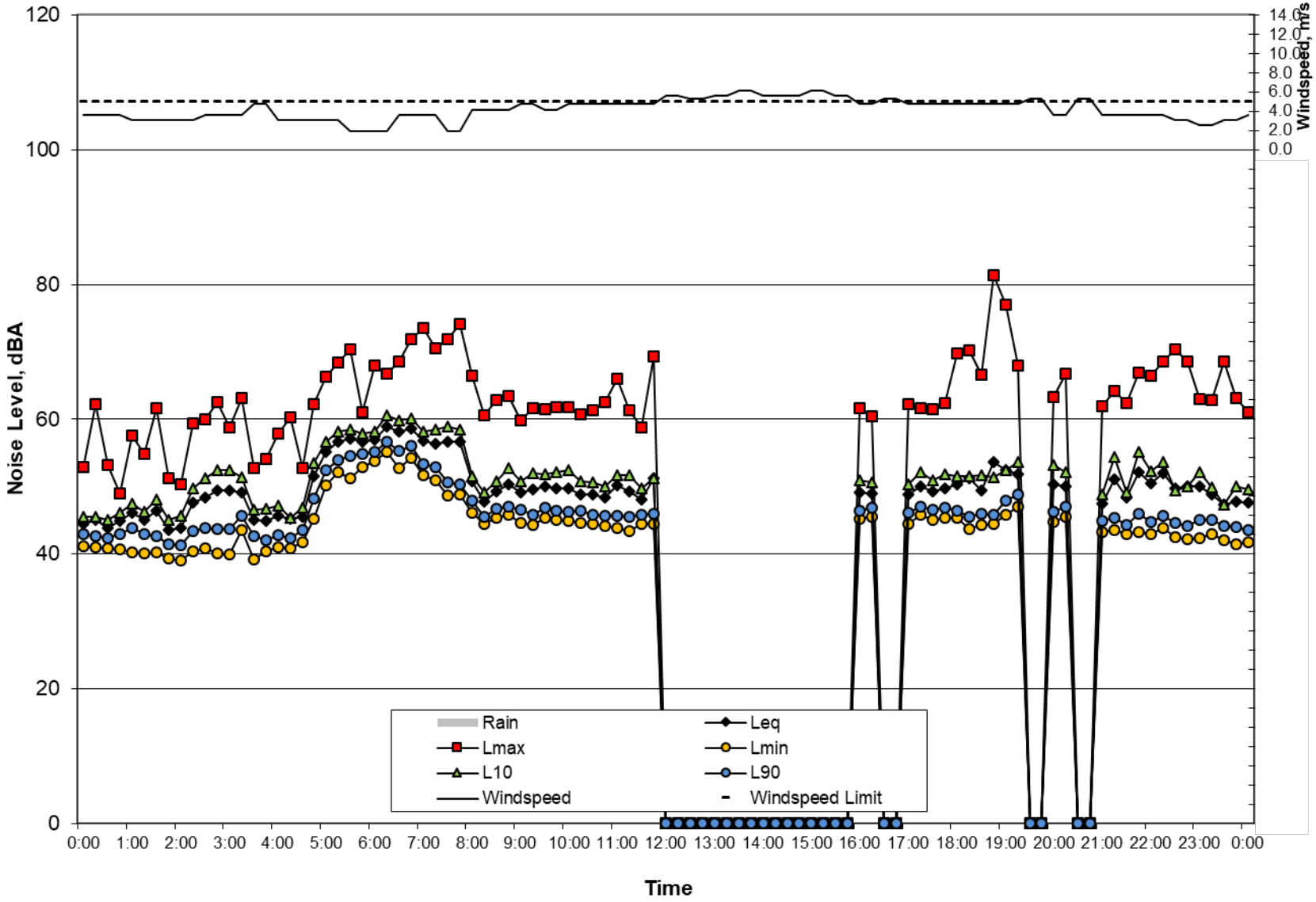
Thursday, 28 February 2019



Measured Ambient Noise Levels

BNE Airport Auto Mall : Location 2 -

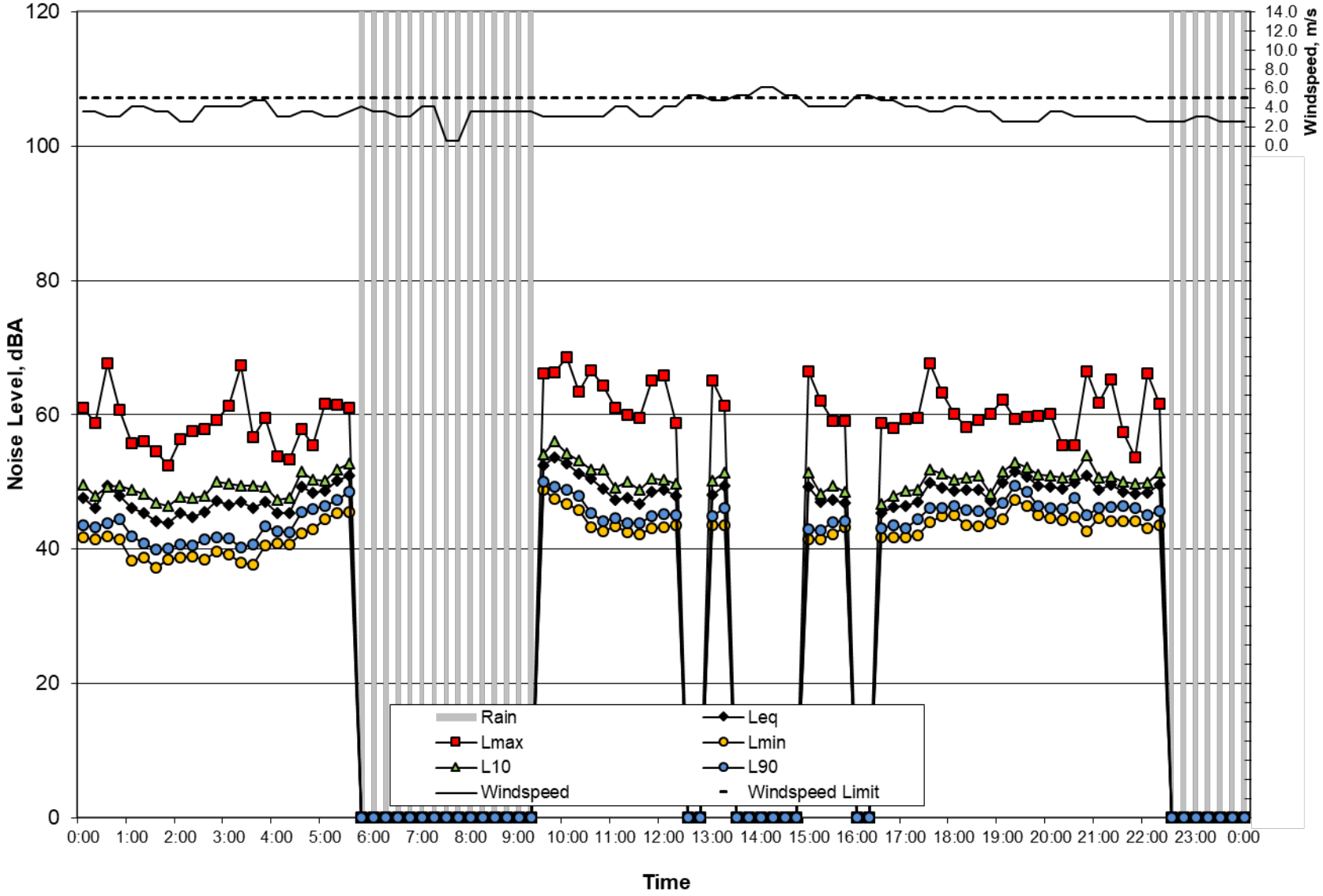
Friday, 1 March 2019



Measured Ambient Noise Levels

BNE Airport Auto Mall : Location 2 -

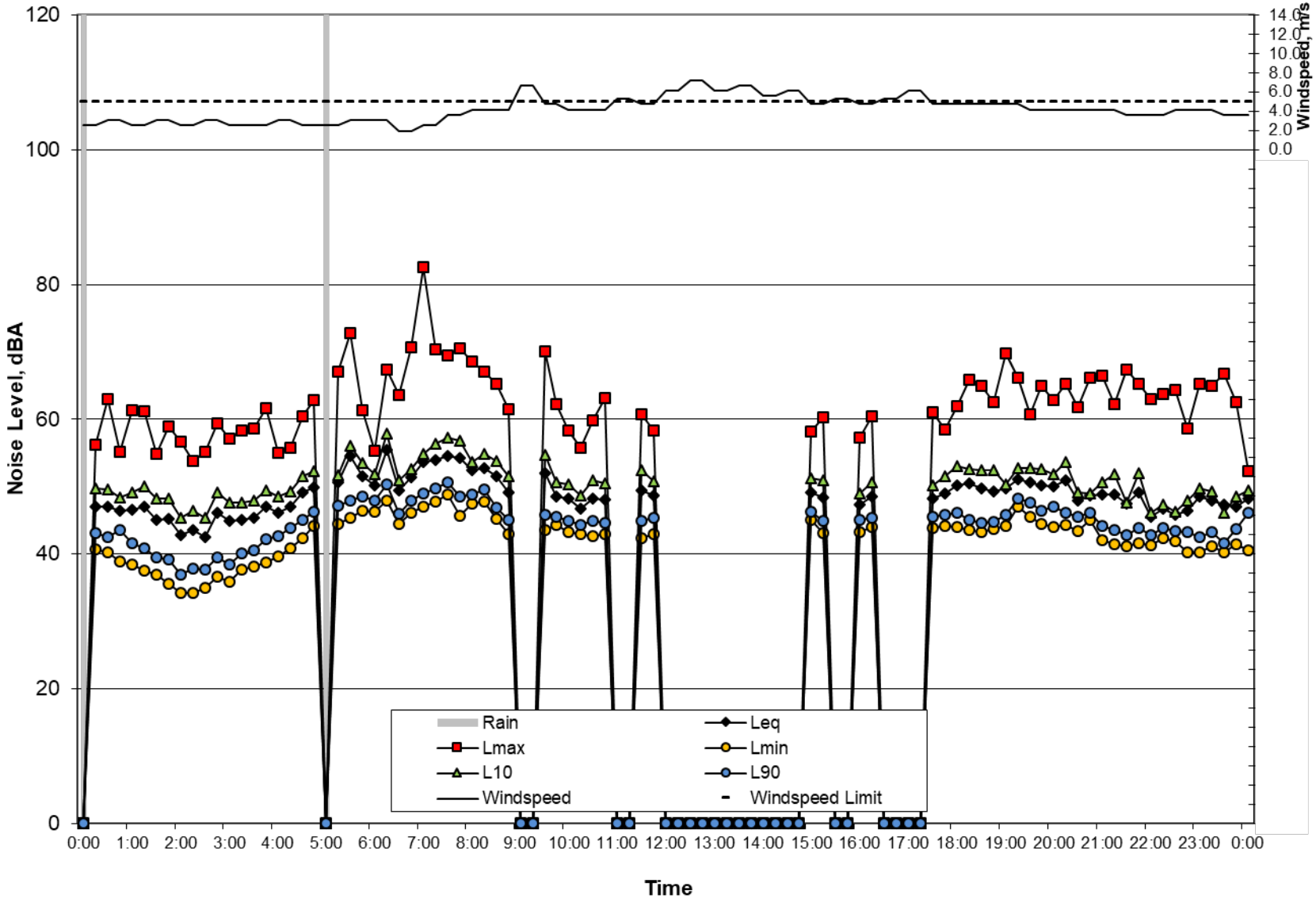
Saturday, 2 March 2019



Measured Ambient Noise Levels

BNE Airport Auto Mall : Location 2 -

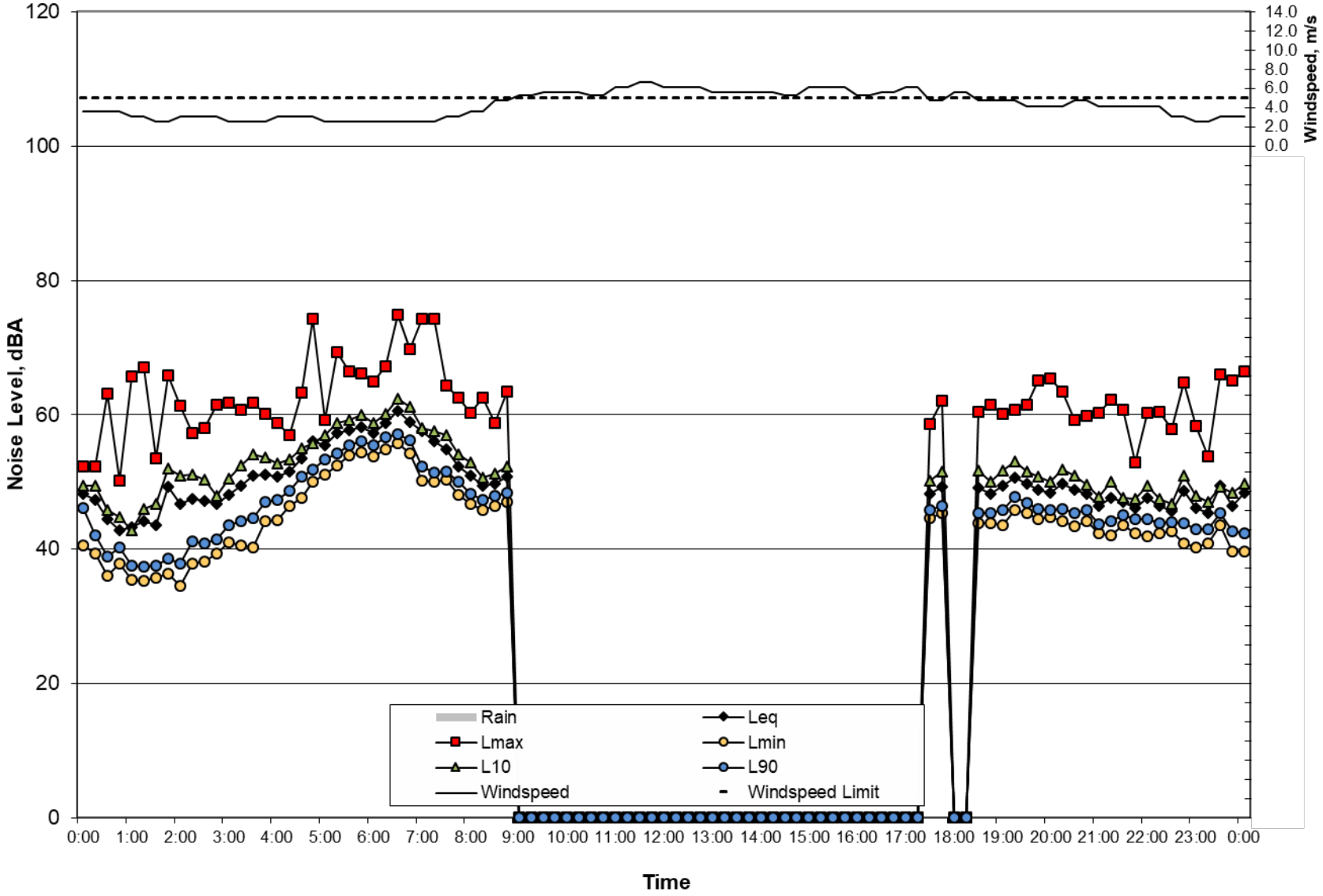
Sunday, 3 March 2019



Measured Ambient Noise Levels

BNE Airport Auto Mall : Location 2 -

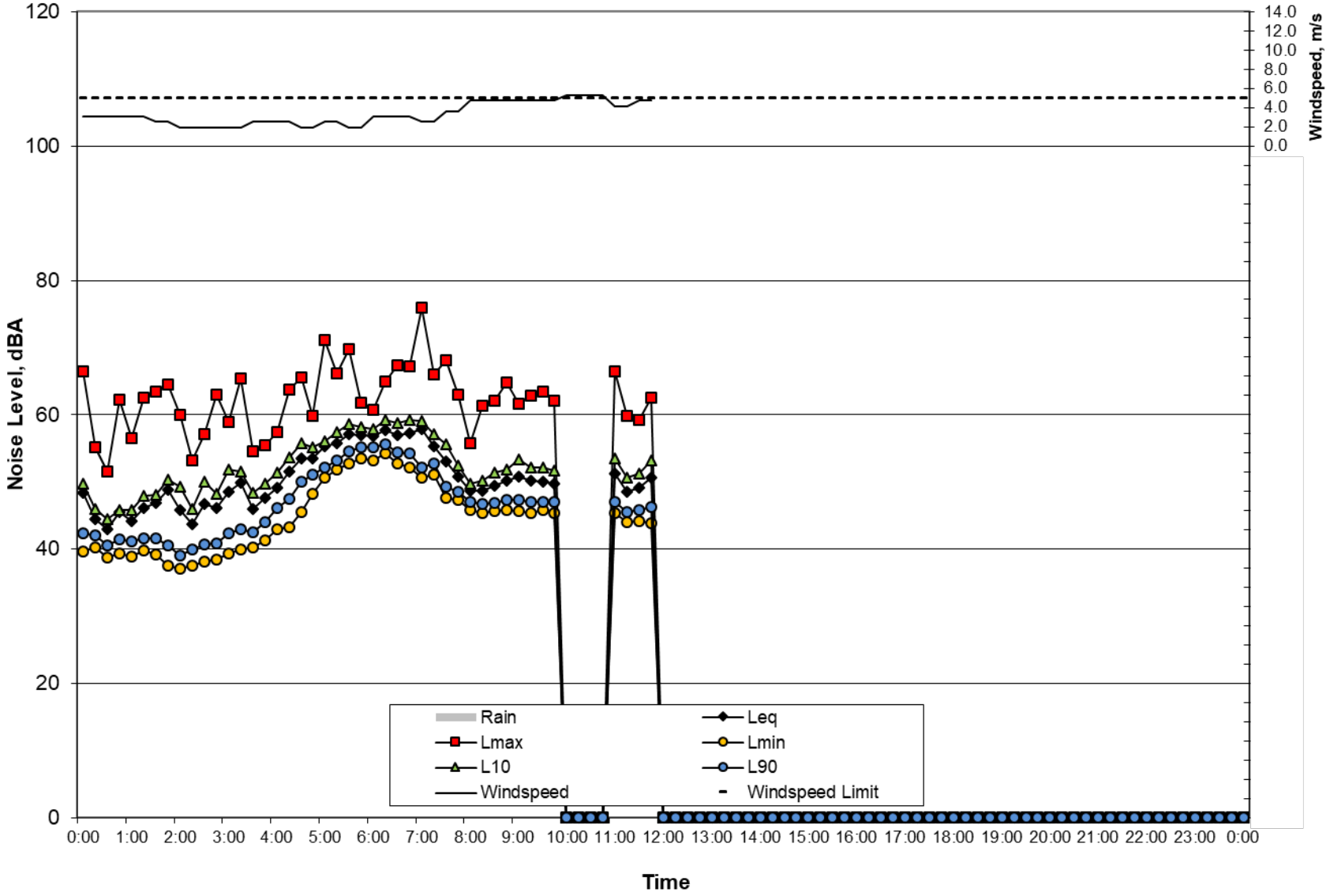
Monday, 4 March 2019



Measured Ambient Noise Levels

BNE Airport Auto Mall : Location 2 -

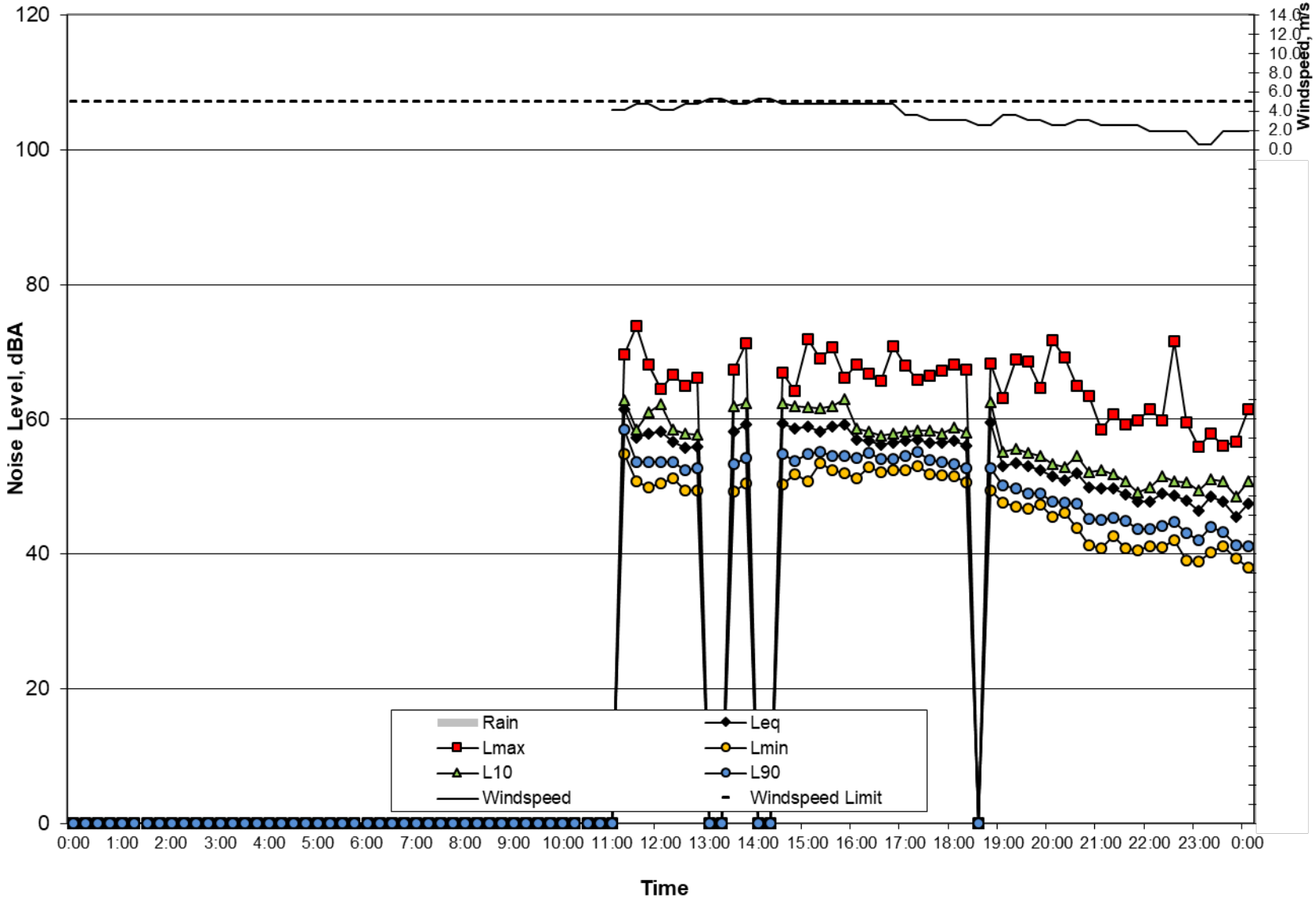
Tuesday, 5 March 2019



Measured Ambient Noise Levels

BNE Airport Auto Mall : Location 3 -

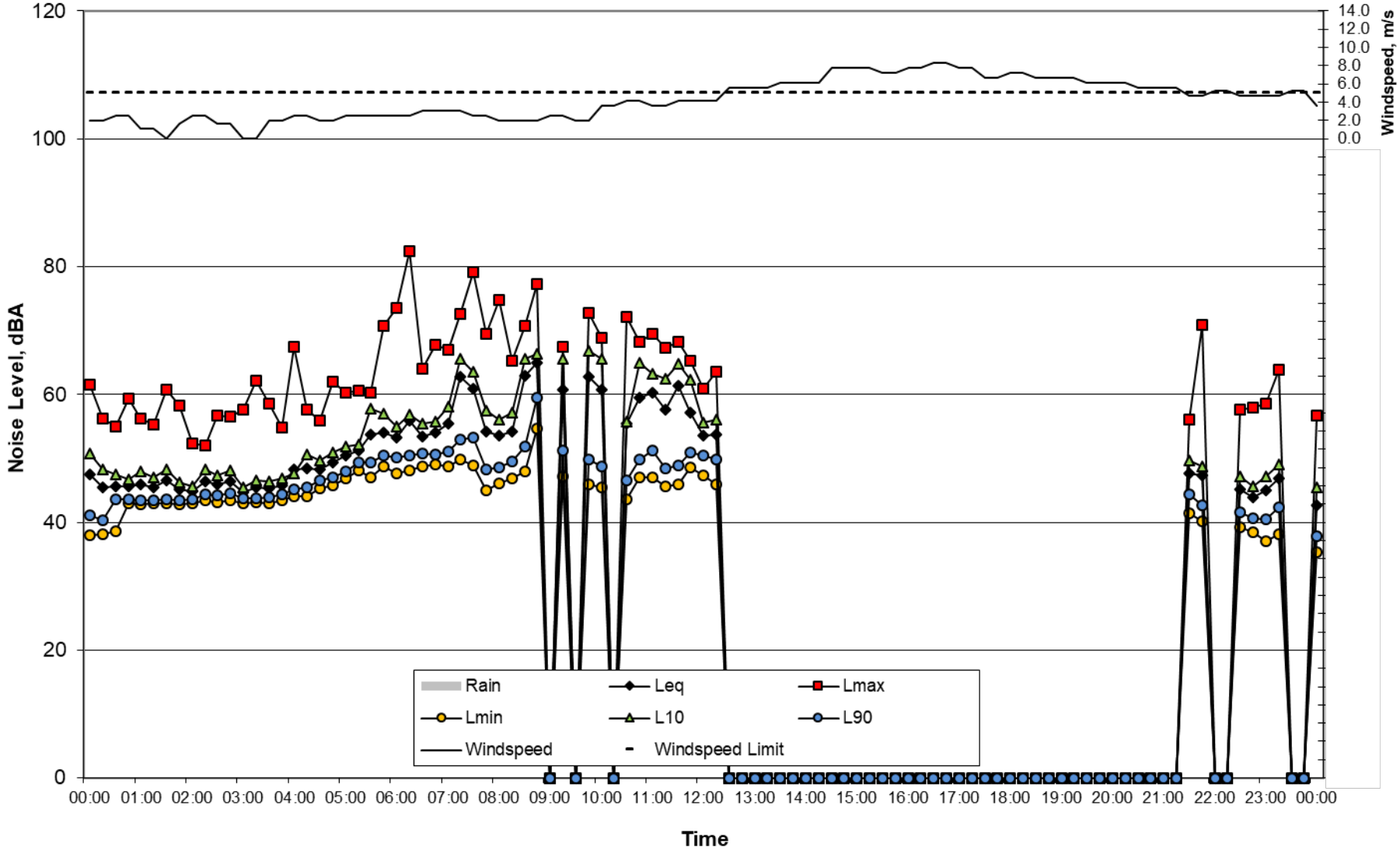
Tuesday, 5 March 2019



Measured Ambient Noise Levels

BNE Airport Auto Mall : Location 3 -

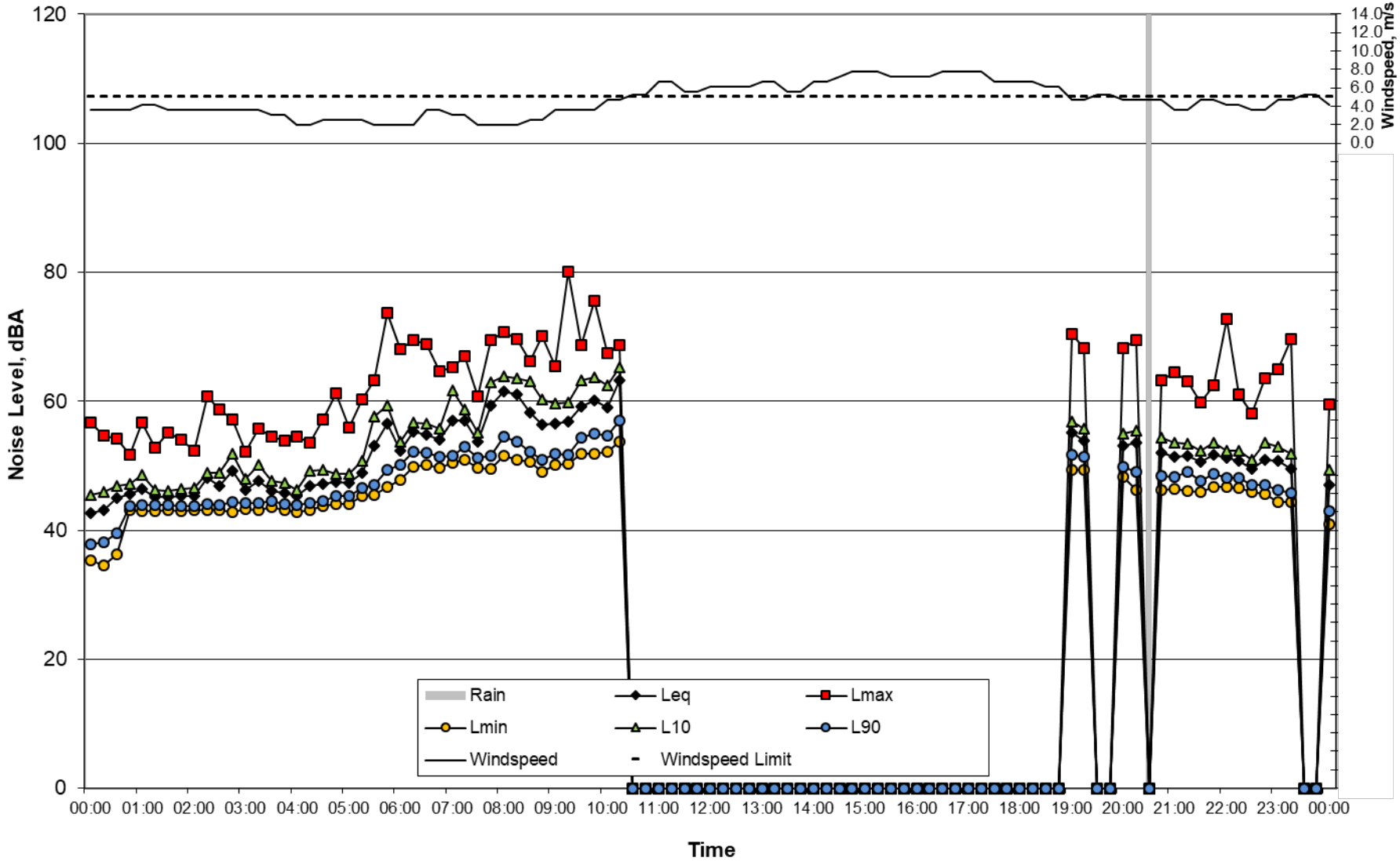
Wednesday, 6 March 2019



Measured Ambient Noise Levels

BNE Airport Auto Mall : Location 3 -

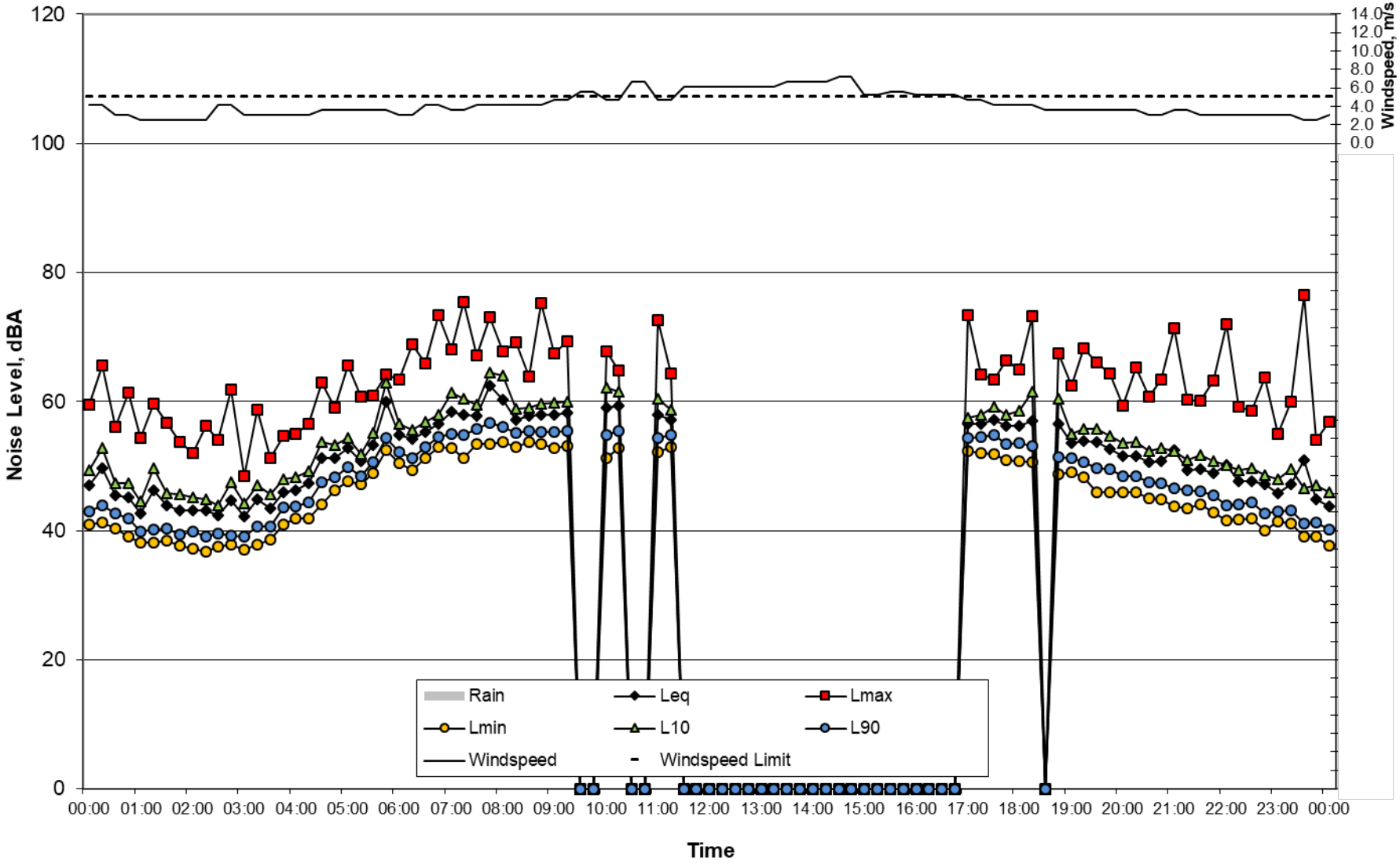
Thursday, 7 March 2019



Measured Ambient Noise Levels

BNE Airport Auto Mall : Location 3 -

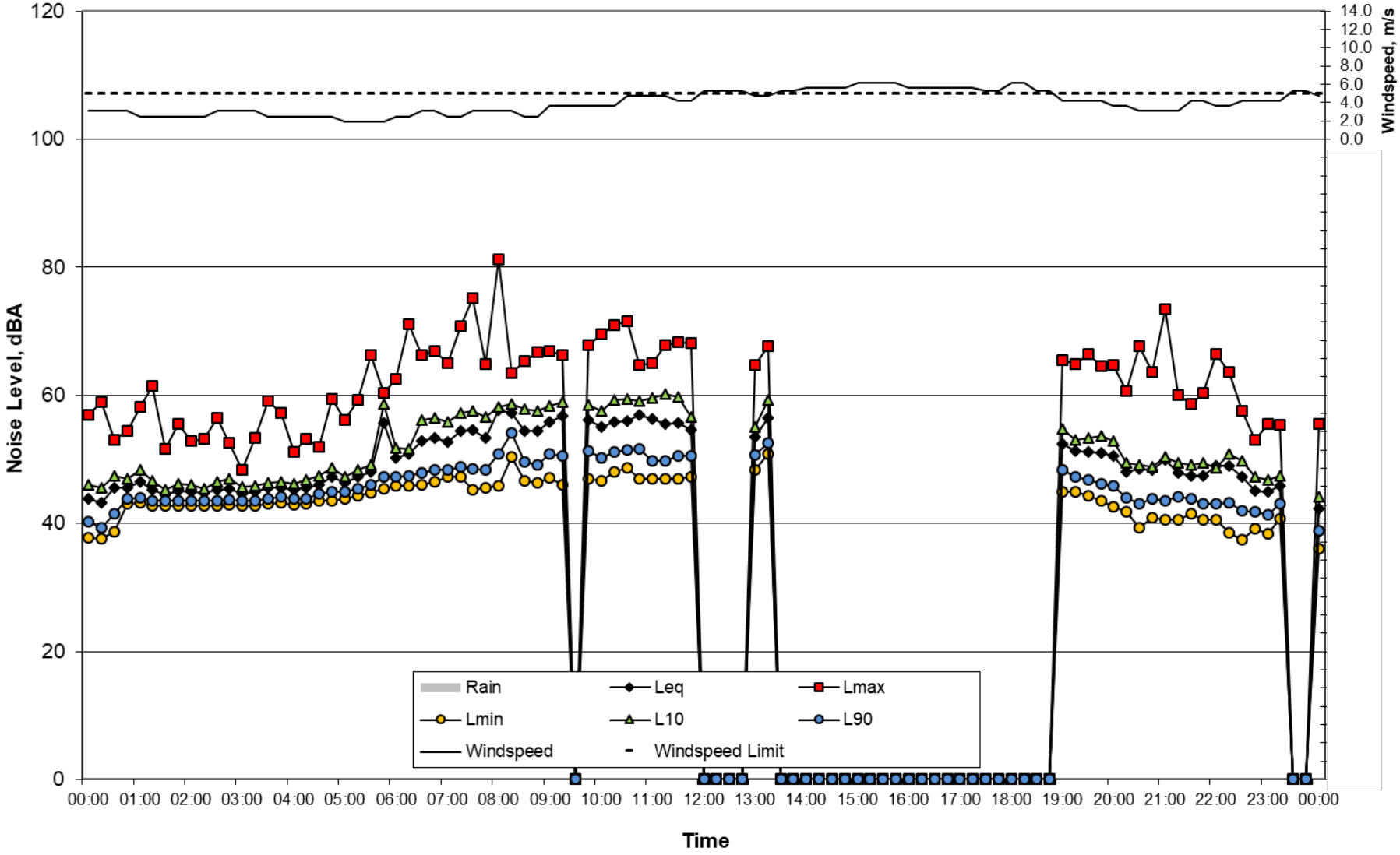
Friday, 8 March 2019



Measured Ambient Noise Levels

BNE Airport Auto Mall : Location 3 -

Saturday, 9 March 2019



Measured Ambient Noise Levels

BNE Airport Auto Mall : Location 3 -

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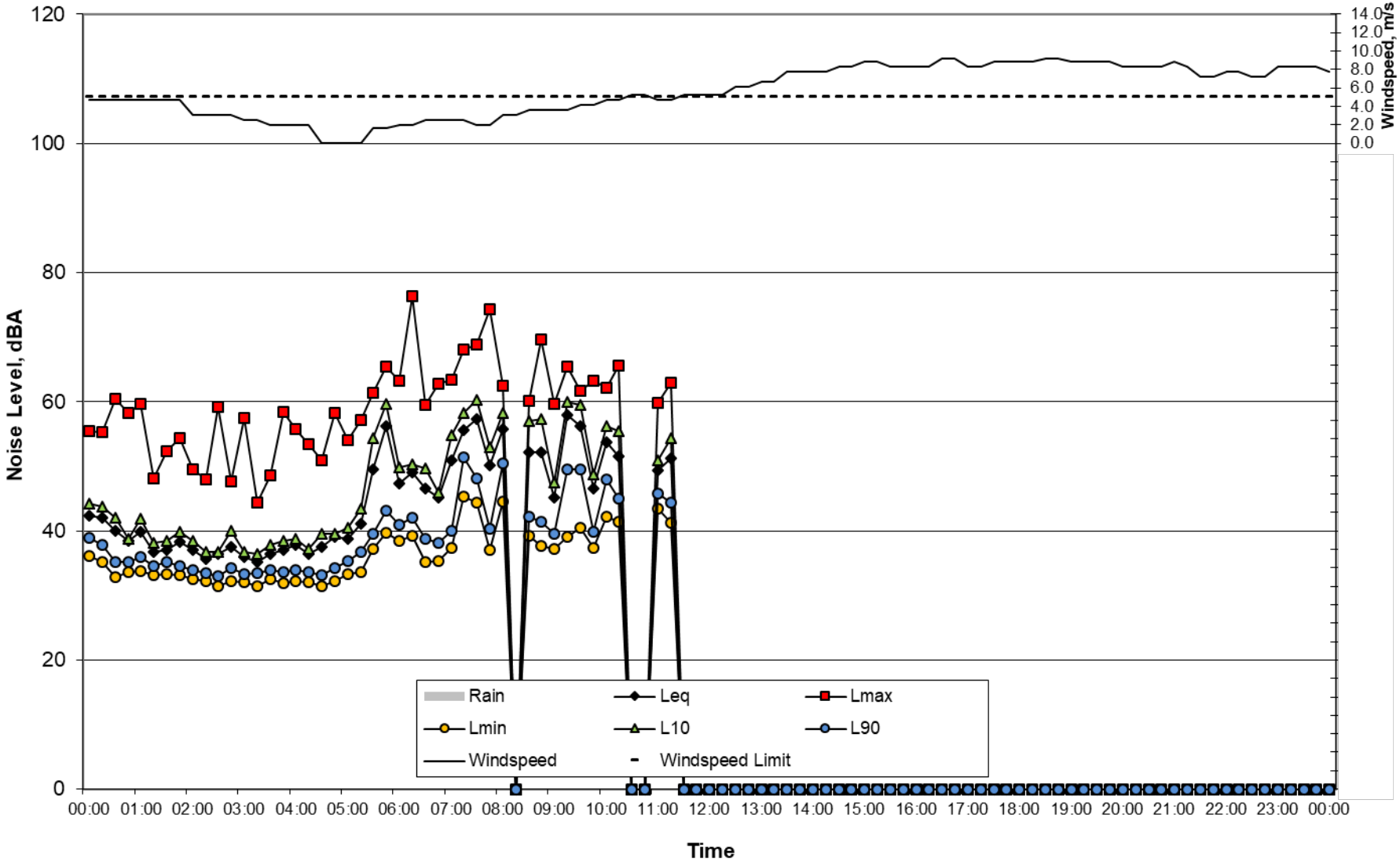

Measured Ambient Noise Levels

BNE Airport Auto Mall : Location 3 -

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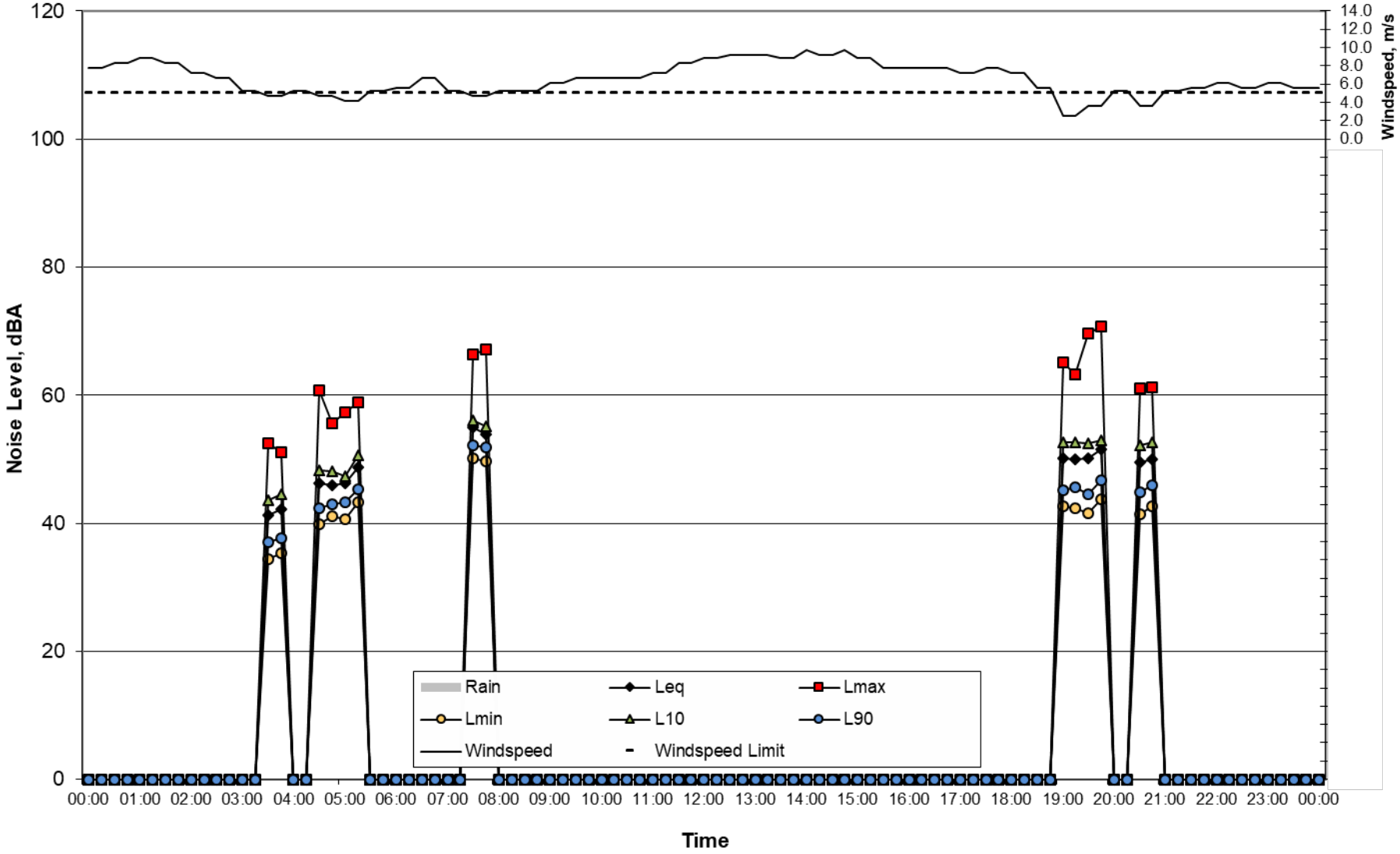

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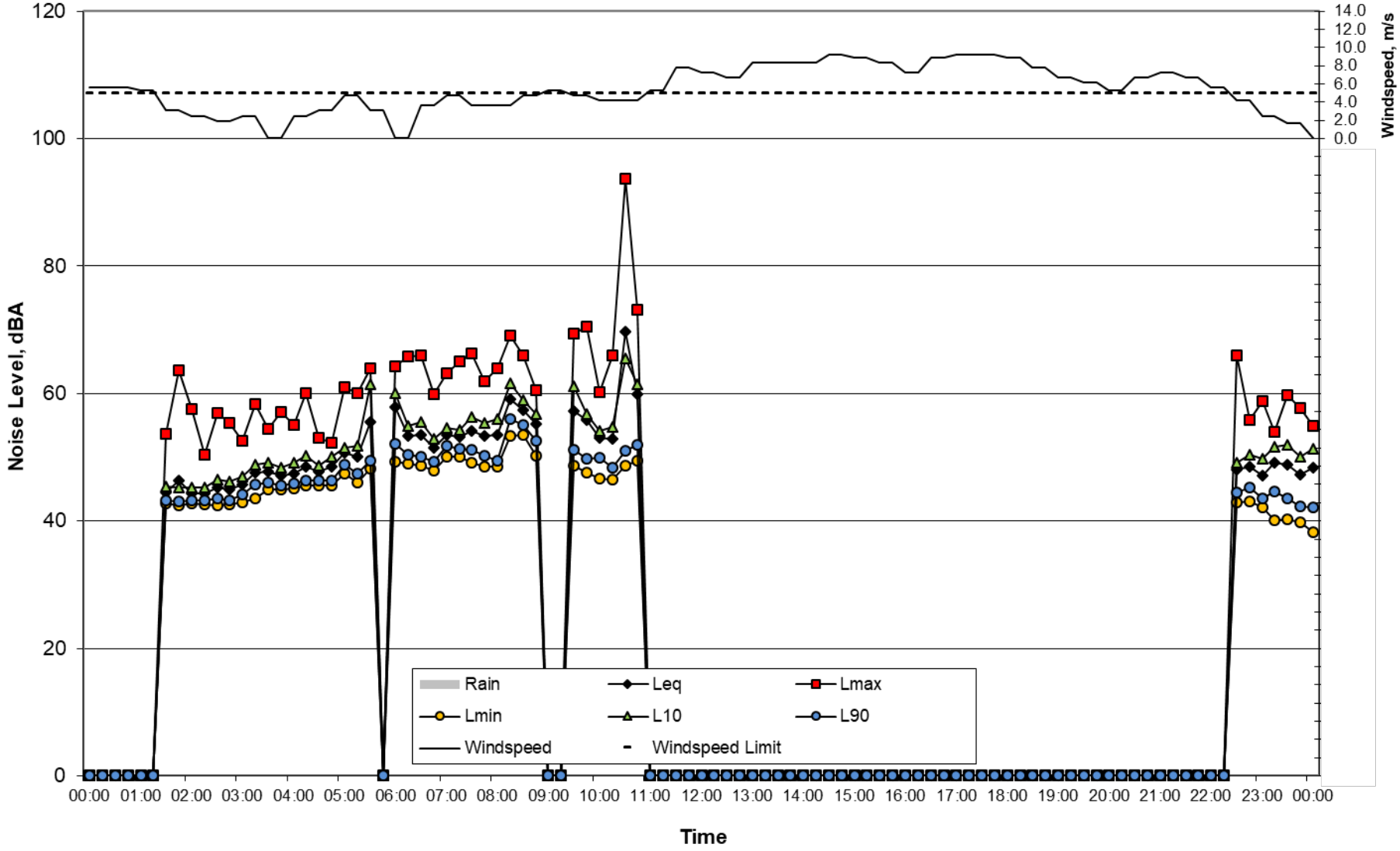

Measured Ambient Noise Levels

BNE Airport Auto Mall : Location 3 -

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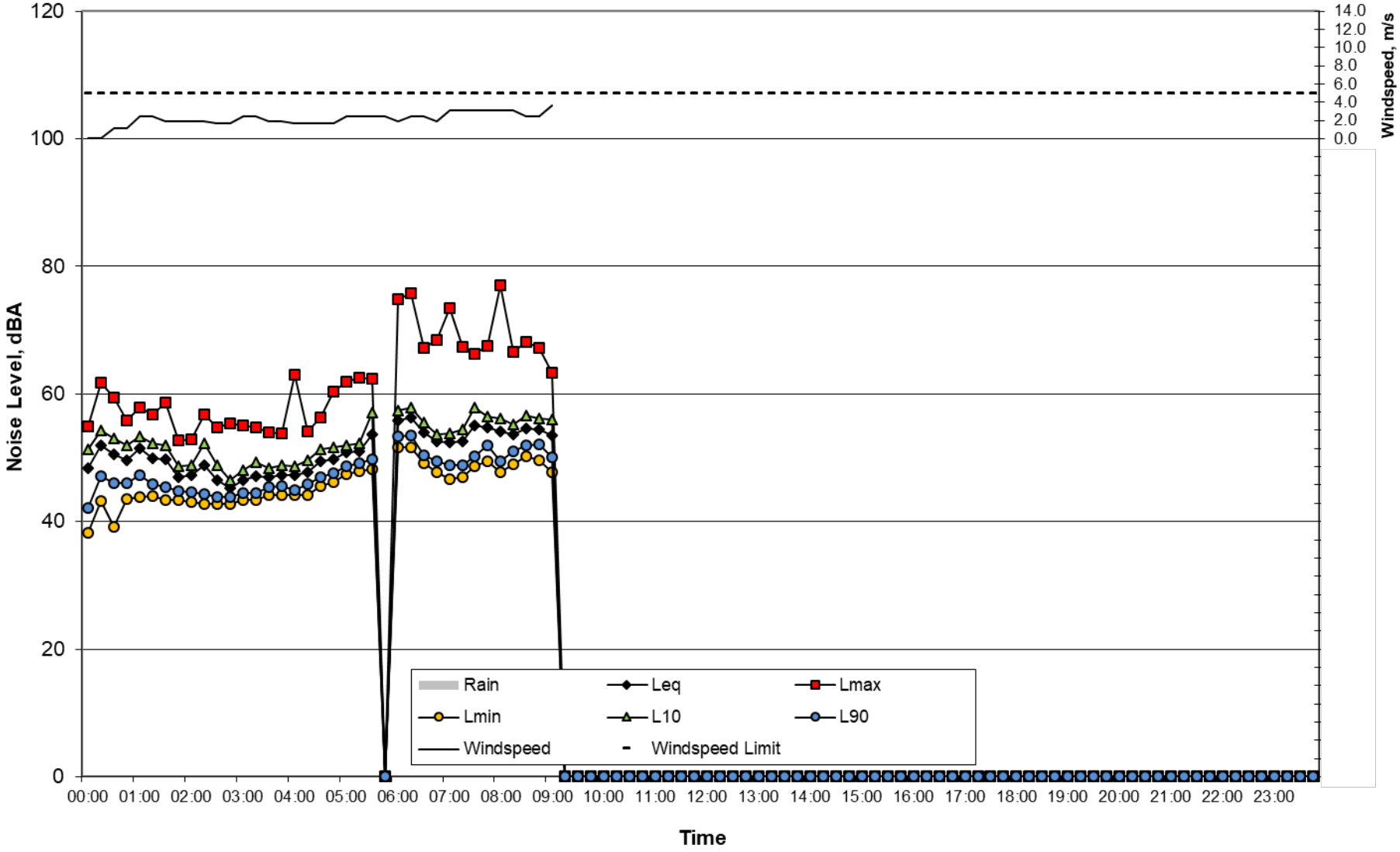
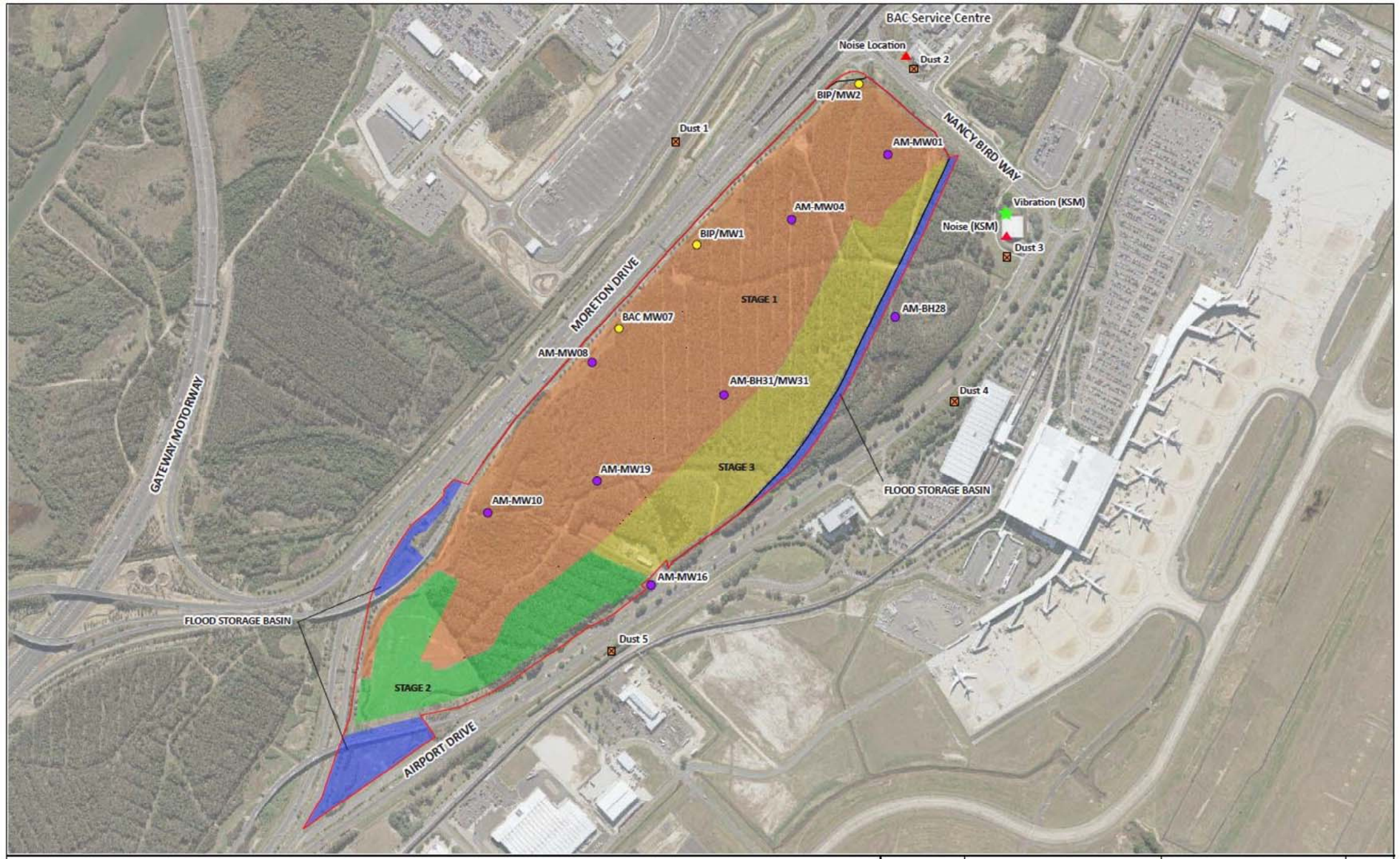


B

PSK Environmental Noise Sampling Location Plan



LEGEND

- Monitoring Wells sampled for the baseline
- Monitoring Wells included for reference
- Baseline Noise Monitoring locations
- Baseline Vibration Monitoring location at Kingsford Smith Memorial
- Baseline Dust Monitoring locations

Notes:
- Baseplan extracted from ImageGlobe 2016. Extracted 06/11/2017
- Stages of development extracted from Brisbane Airport Auto Mall EMP Rev3, Figure 2. Stages of Development, Version 3, Job No: 255492-002

PSK Environmental

Client:	Brisbane Airport Corporation
Project:	Baseline BAC Auto Mall Precinct
Drawn: NK	Date: 08/12/2017
Checked: SLS	Date: 08/12/2017
Title:	SITE PLAN AND SAMPLING LOCATIONS
Scale:	0m 175m
Job No.: J0517-005-003	Fig. No.: 1
Rev: 0	A3

N

C

Predicted Noise Levels – Contour Maps

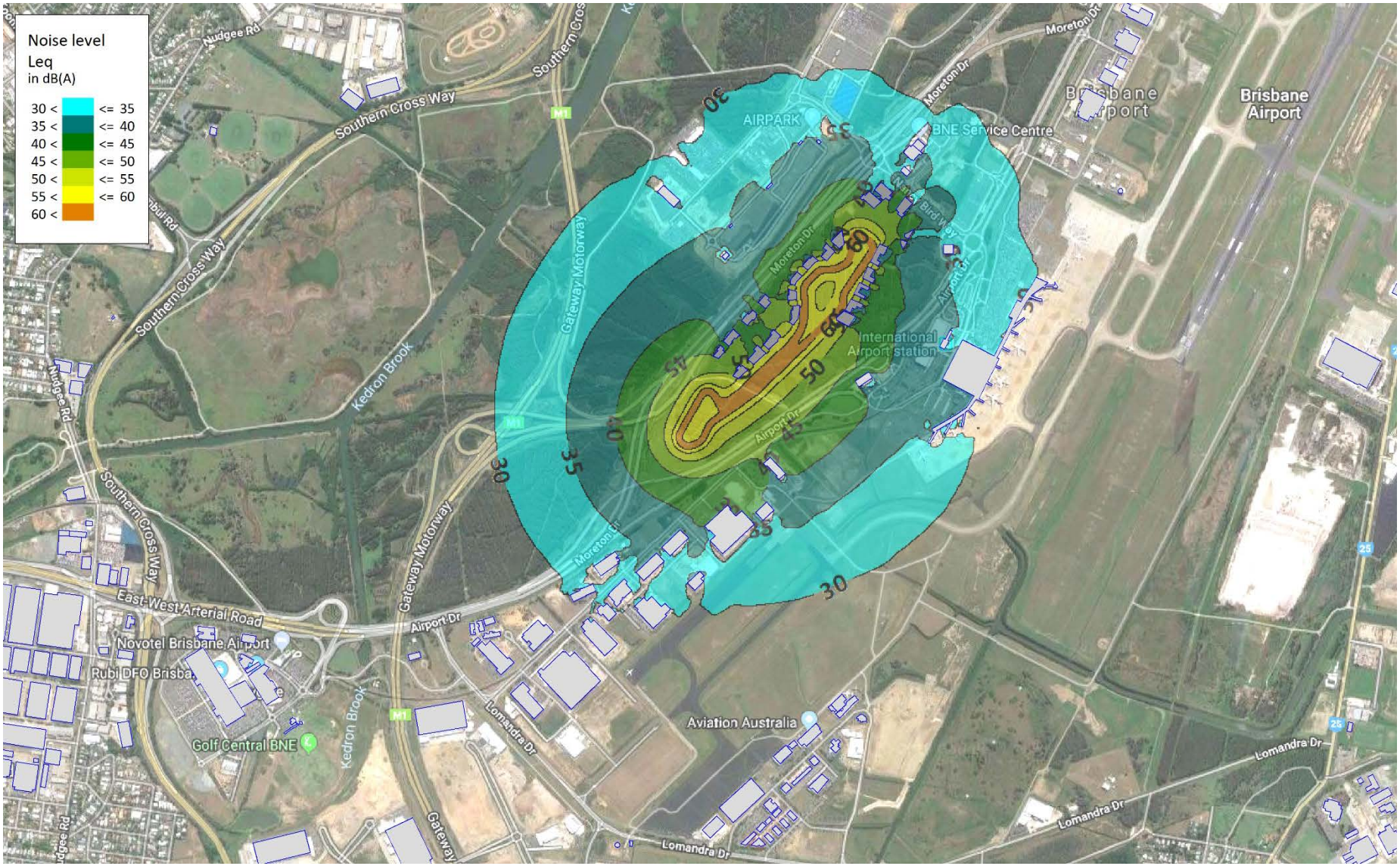


Figure B1 – Operational noise contour of Scenario 1

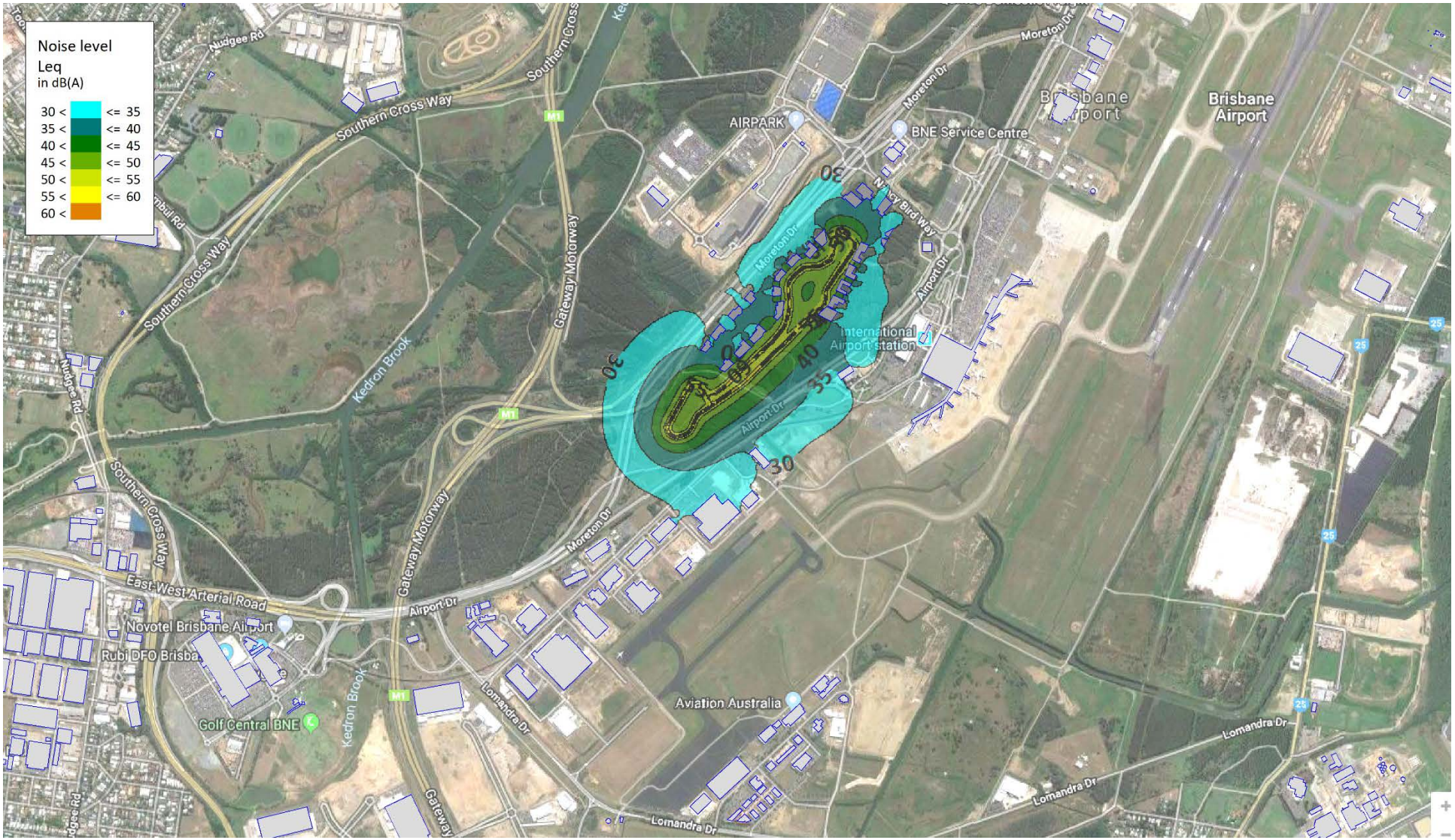


Figure B2 – Operational noise contour of Scenario 2

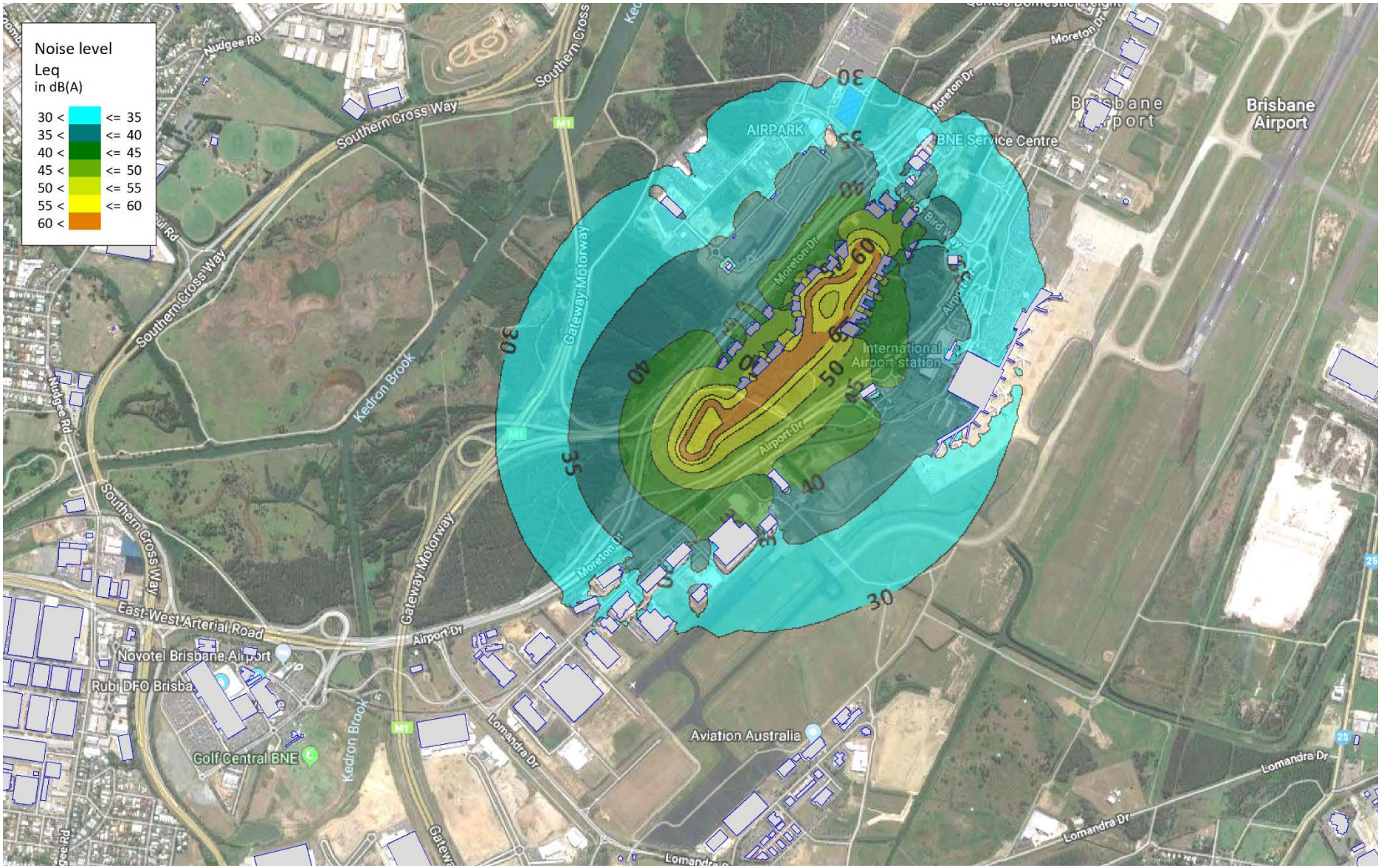


Figure B3 – Operational noise contour of Scenario 3

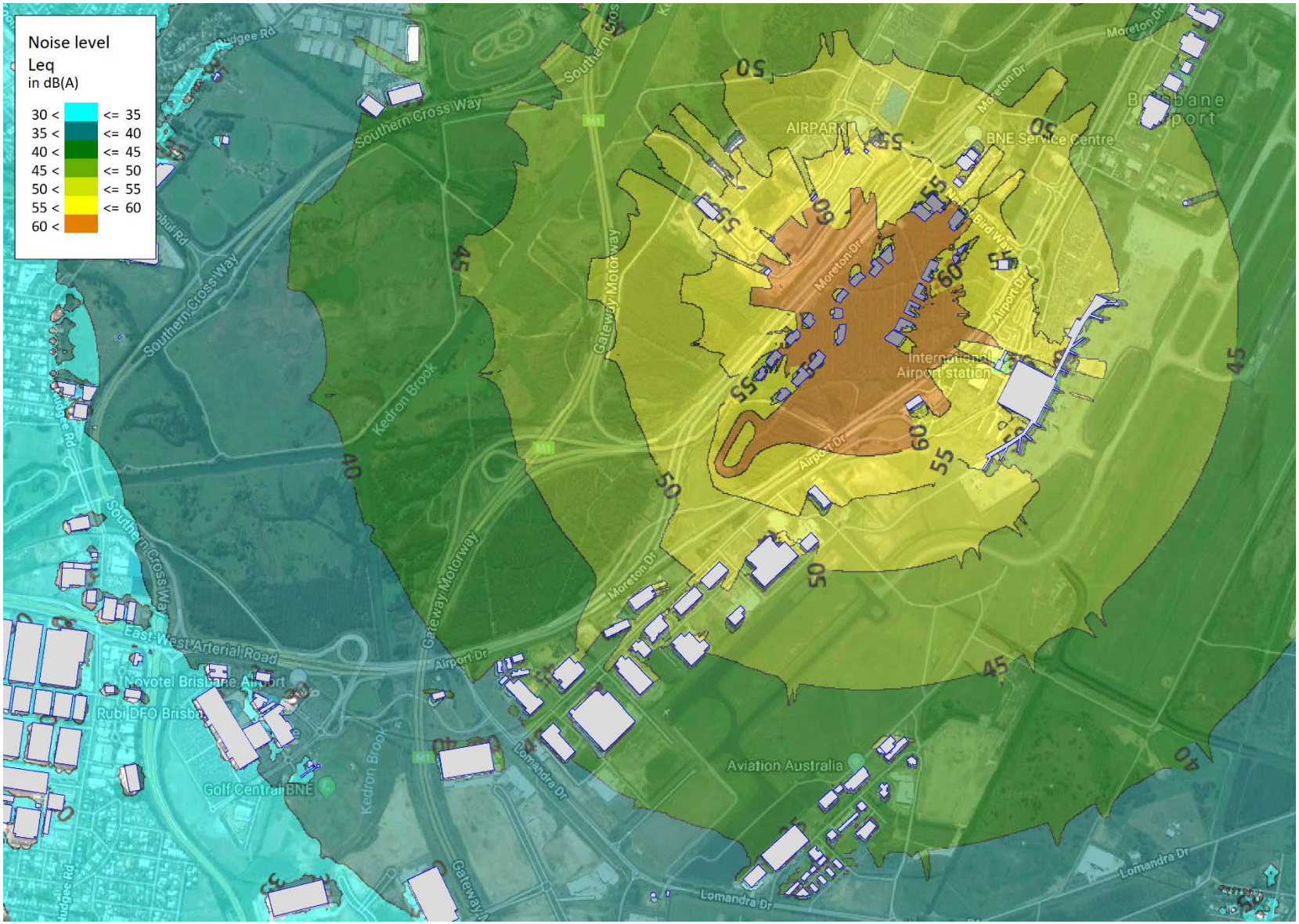


Figure B4 – Operational noise contour of Scenario 4

Figure B5 – Operational noise contour of Scenario 4 (Pinkenba)

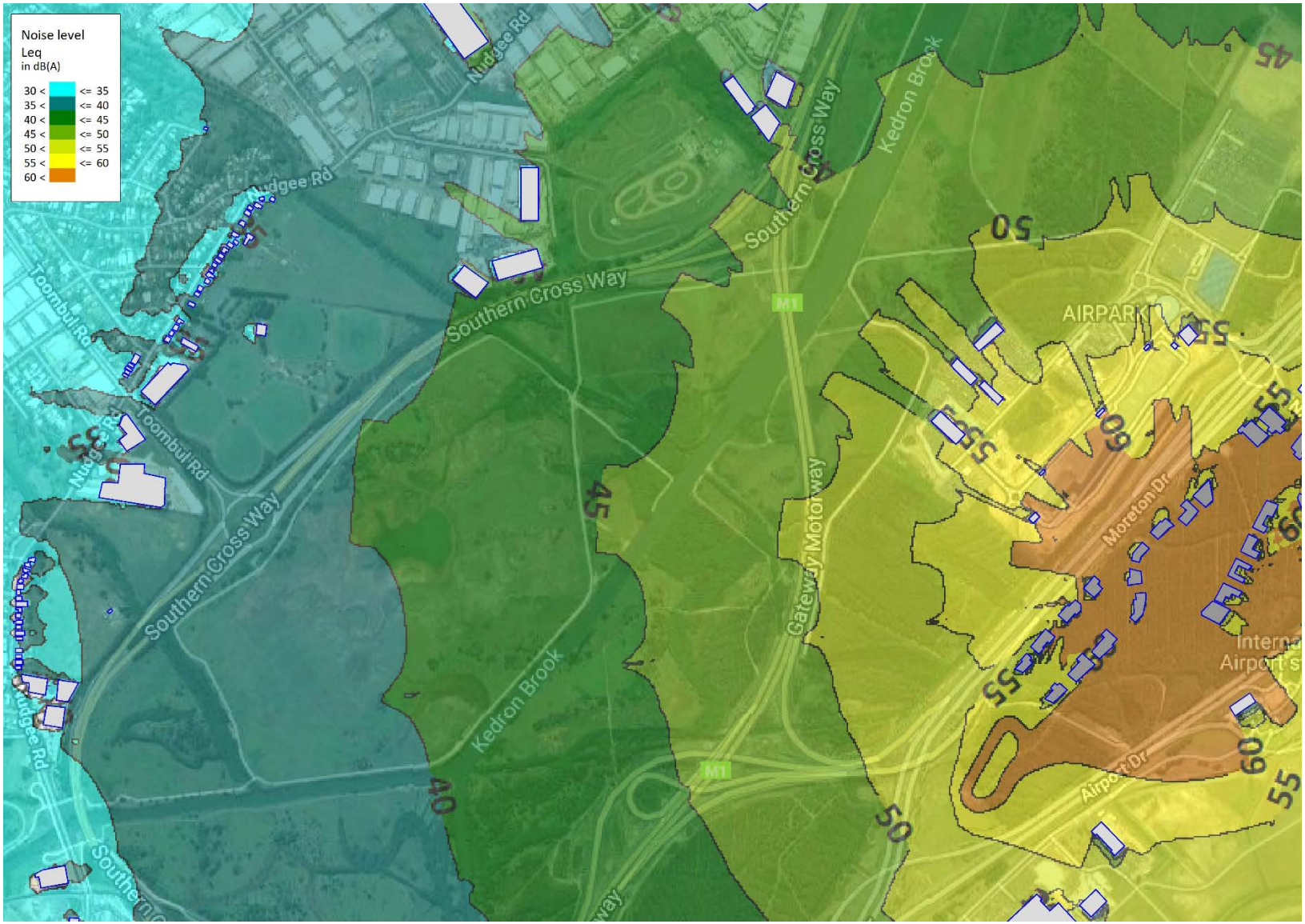


Figure B6 – Operational noise contour of Scenario 4 (Nundah and Northgate)

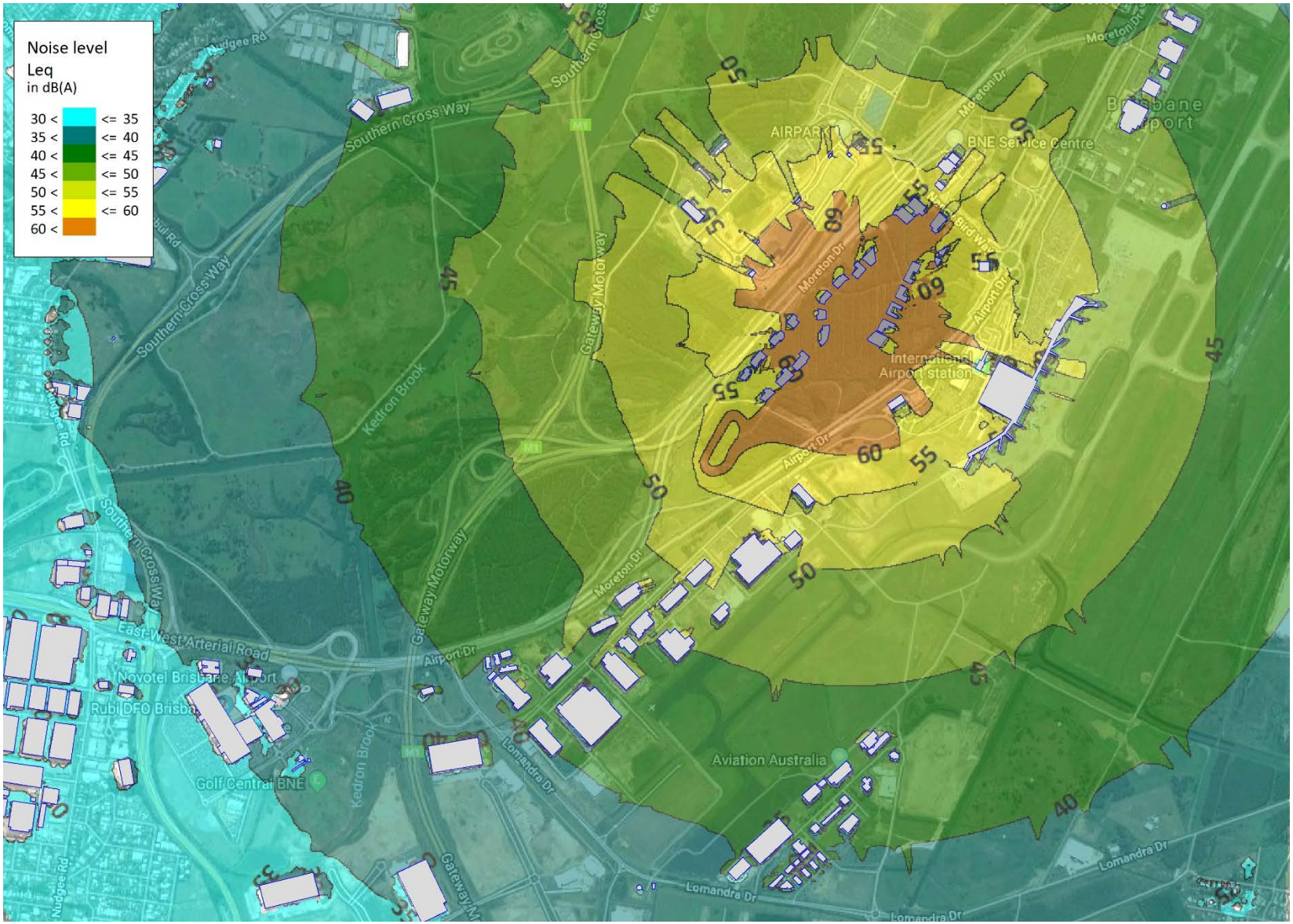


Figure B7 – Operational noise contour of Scenario 5

Figure B8 – Operational noise contour of Scenario 5 (Pinkenba)

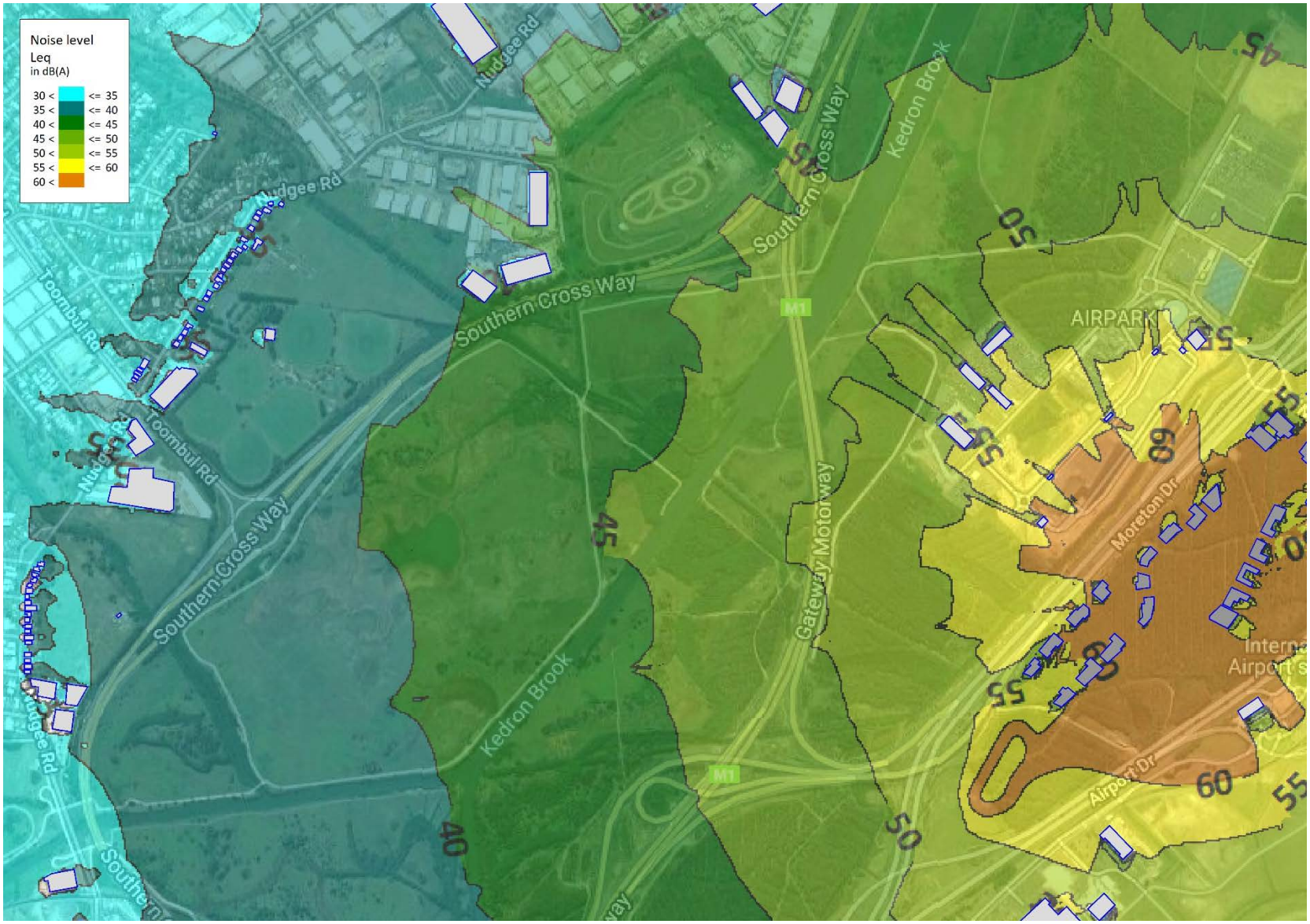


Figure B9 – Operational noise contour of Scenario 5 (Nundah and Northgate)

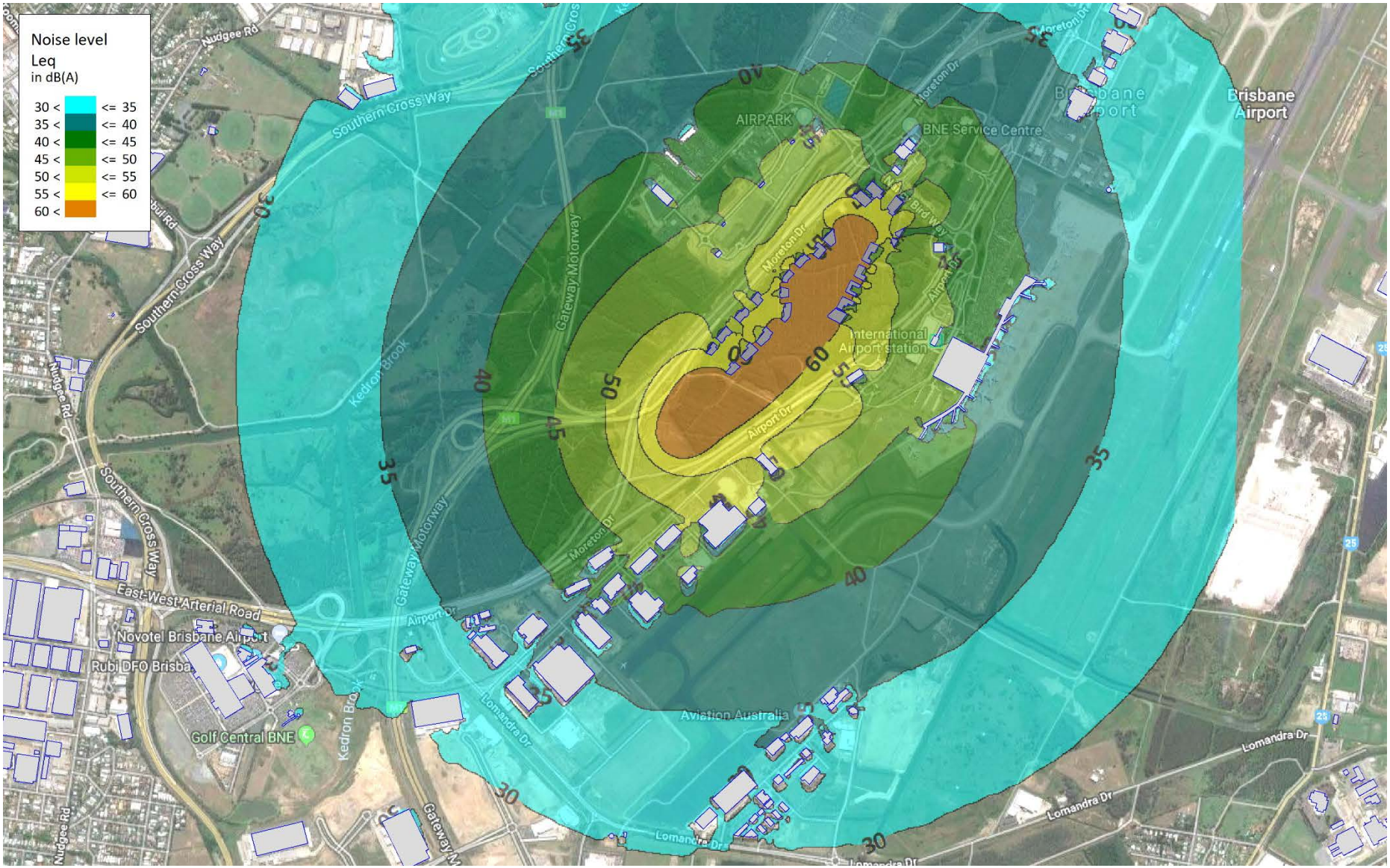


Figure B10 – Operational noise contour of Scenario 6

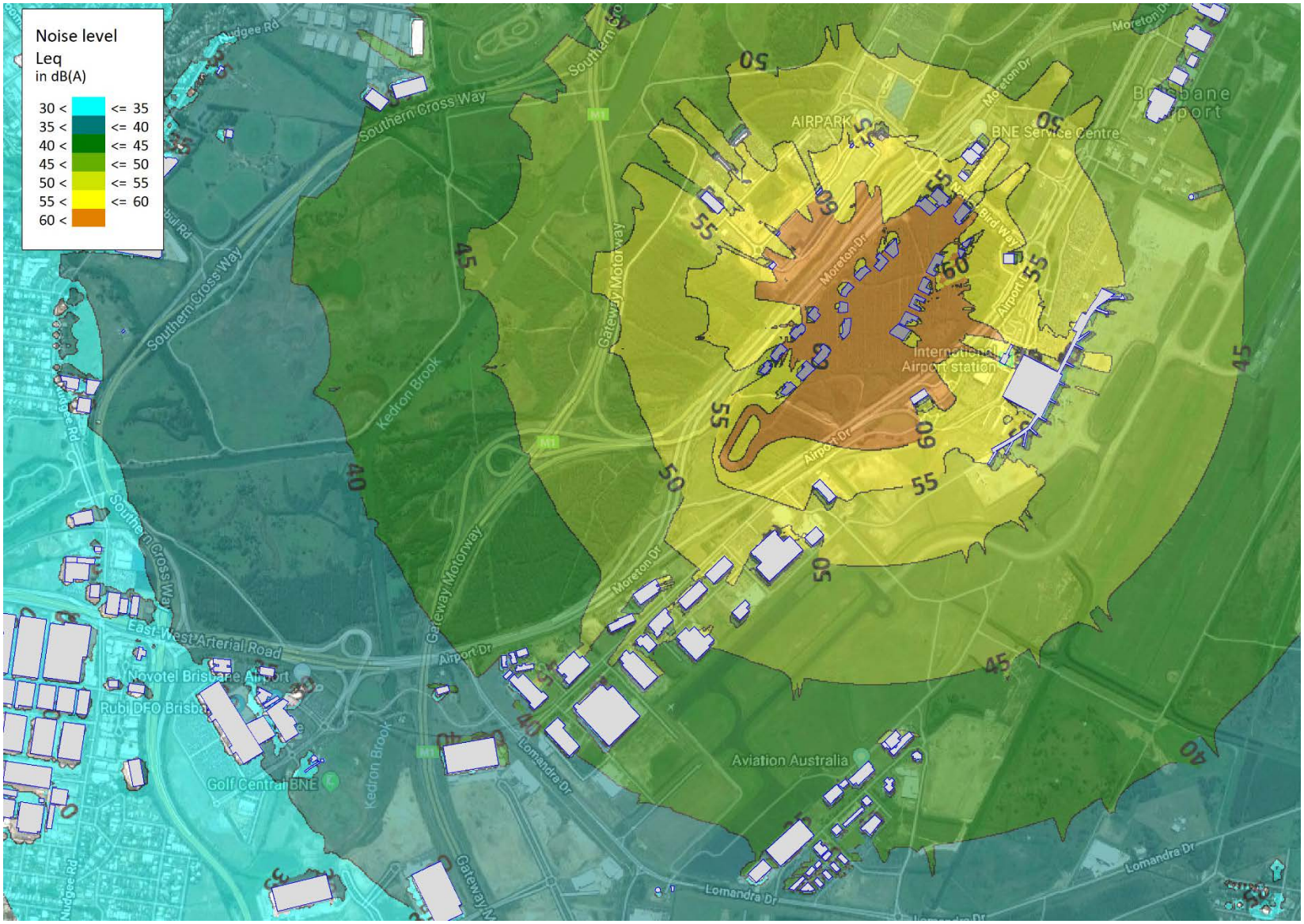


Figure B11 – Operational noise contour of Scenario 7

Figure B12 – Operational noise contour of Scenario 7 (Pinkenba)

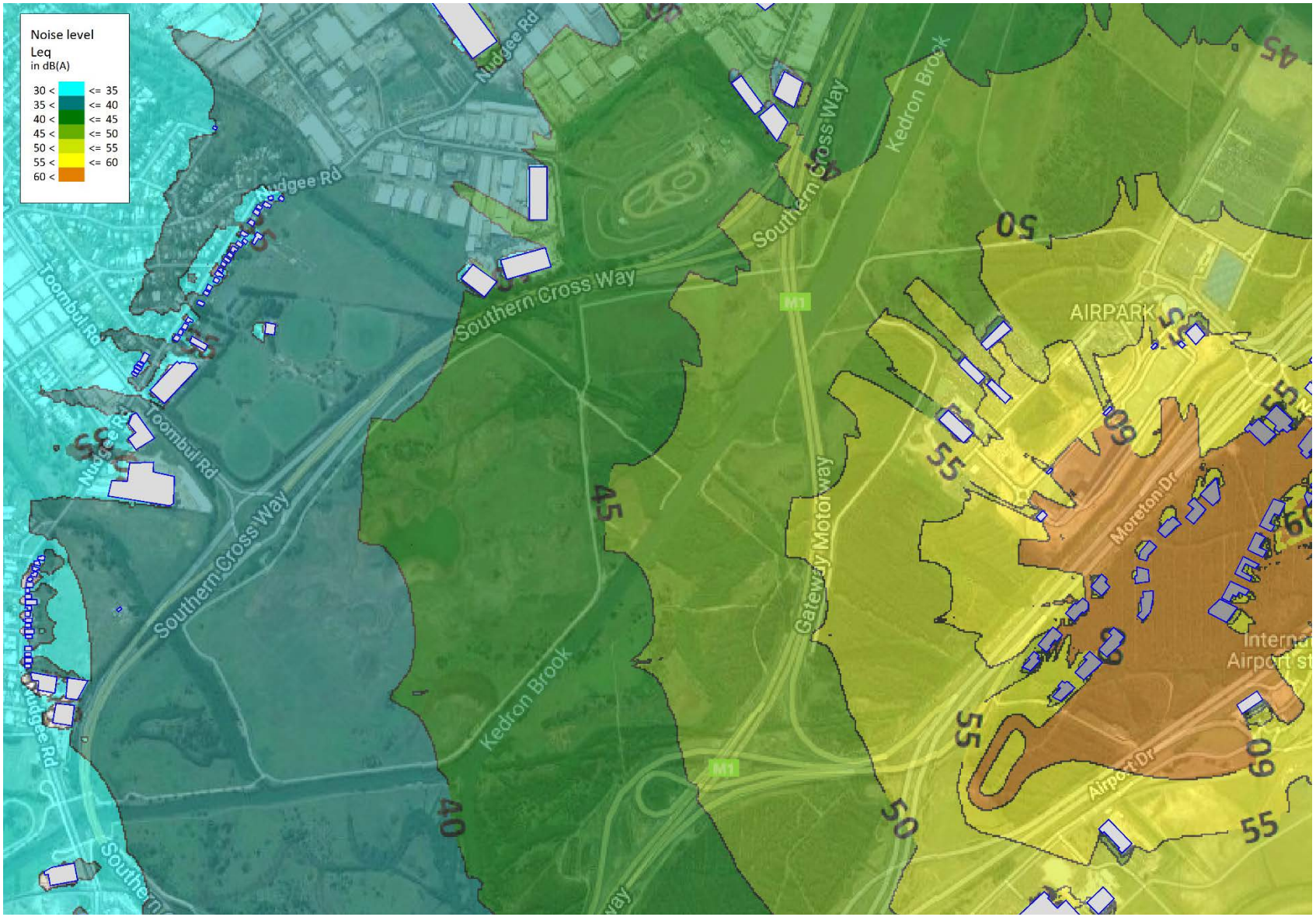


Figure B13 – Operational noise contour of Scenario 7 (Nundah and Northgate)

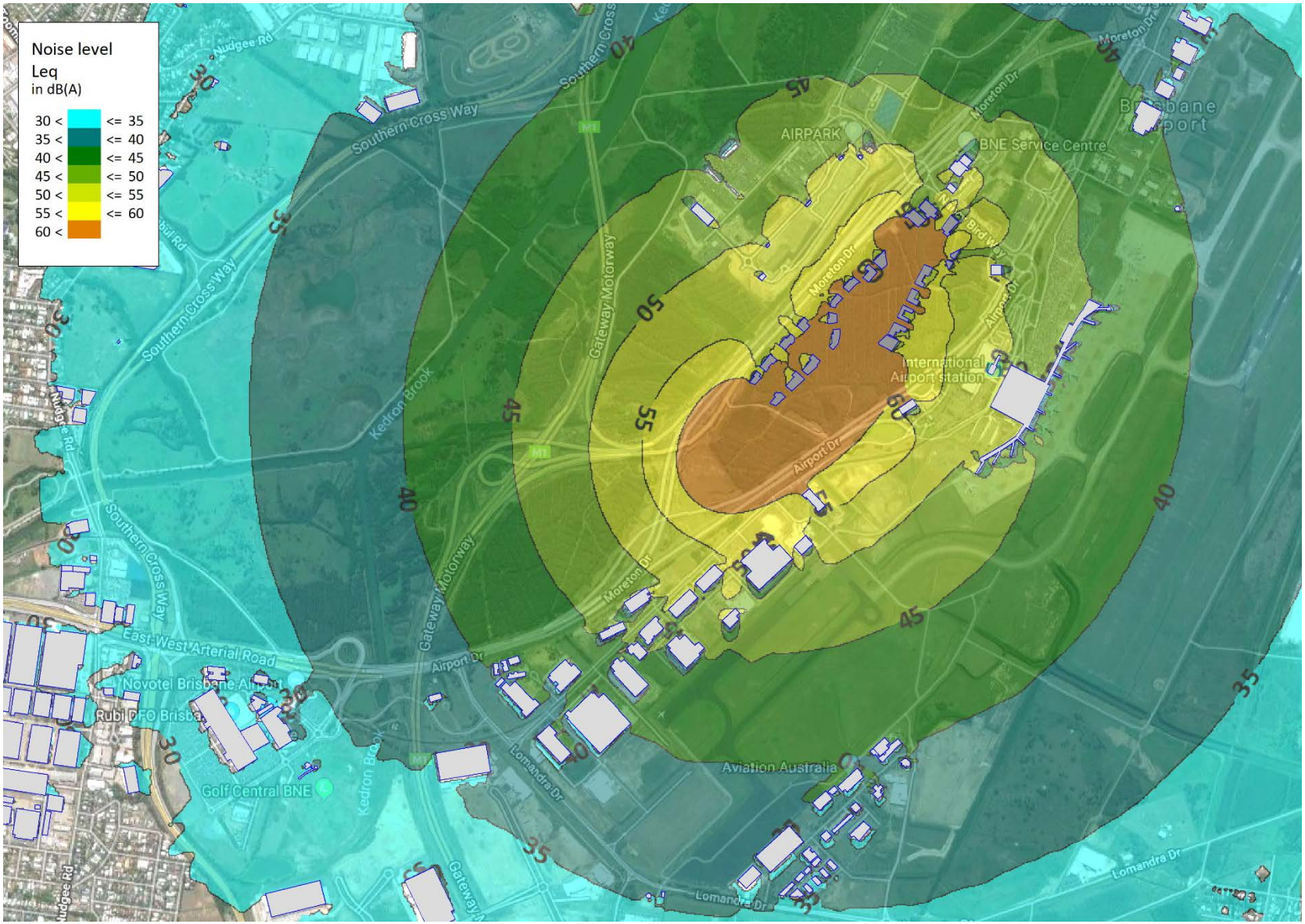


Figure B14 – Operational noise contour of Scenario 8

Figure B15 – Operational noise contour of Scenario 8 (Pinkenba)

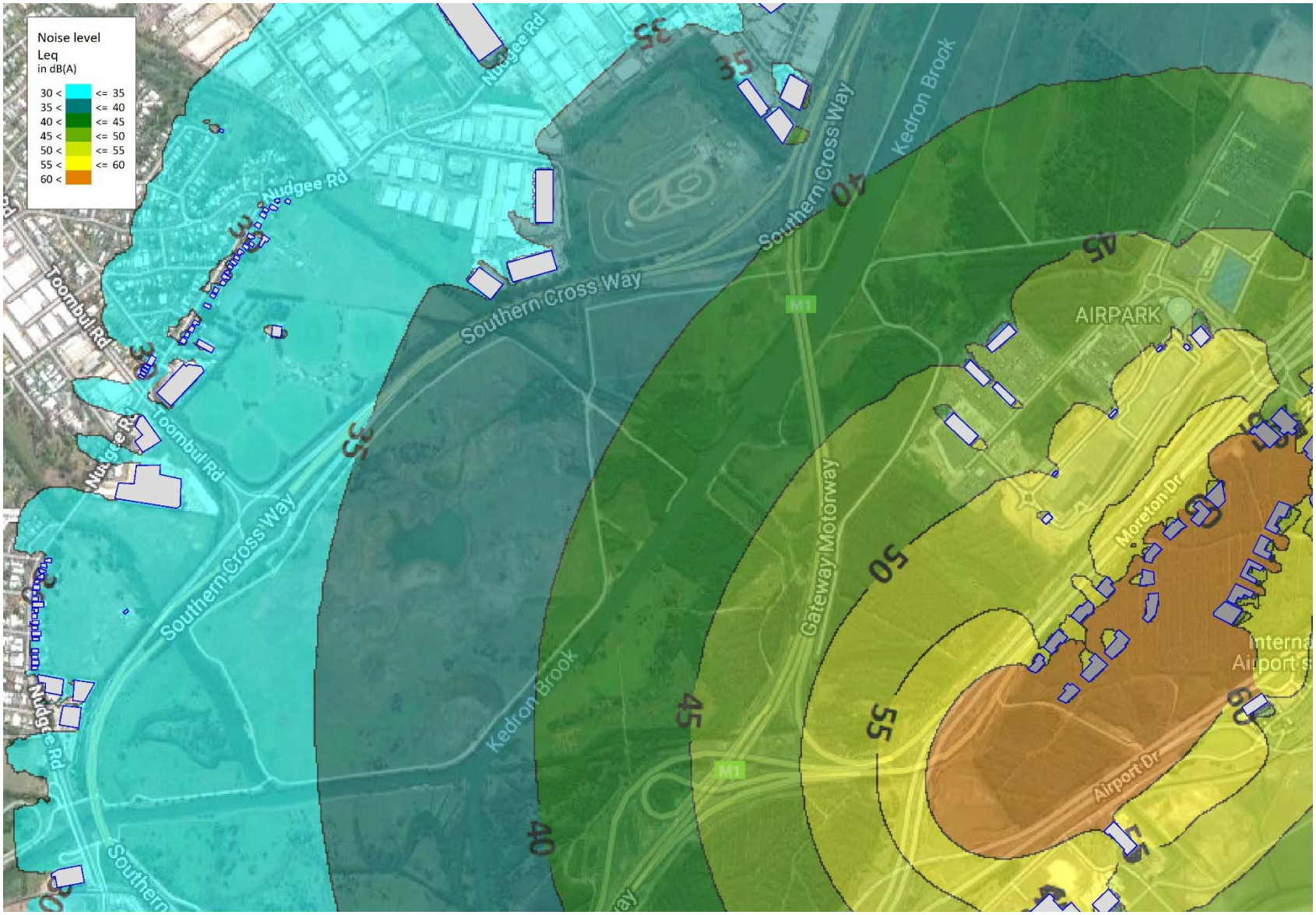


Figure B16 – Operational noise contour of Scenario 8 (Nundah and Northgate)

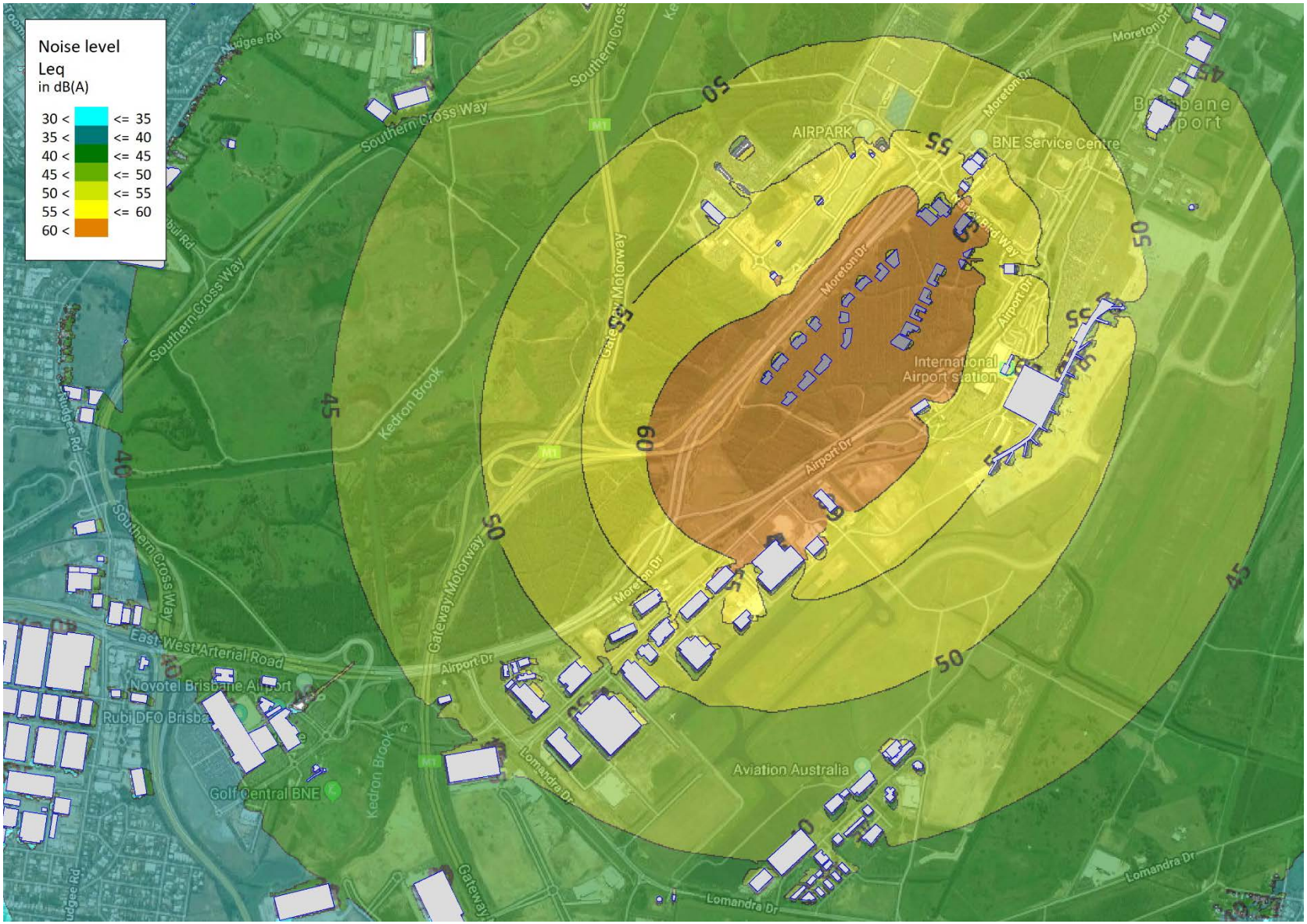


Figure B17 – Operational noise contour of Scenario 9

Figure B18 – Operational noise contour of Scenario 9 (Pinkenba)

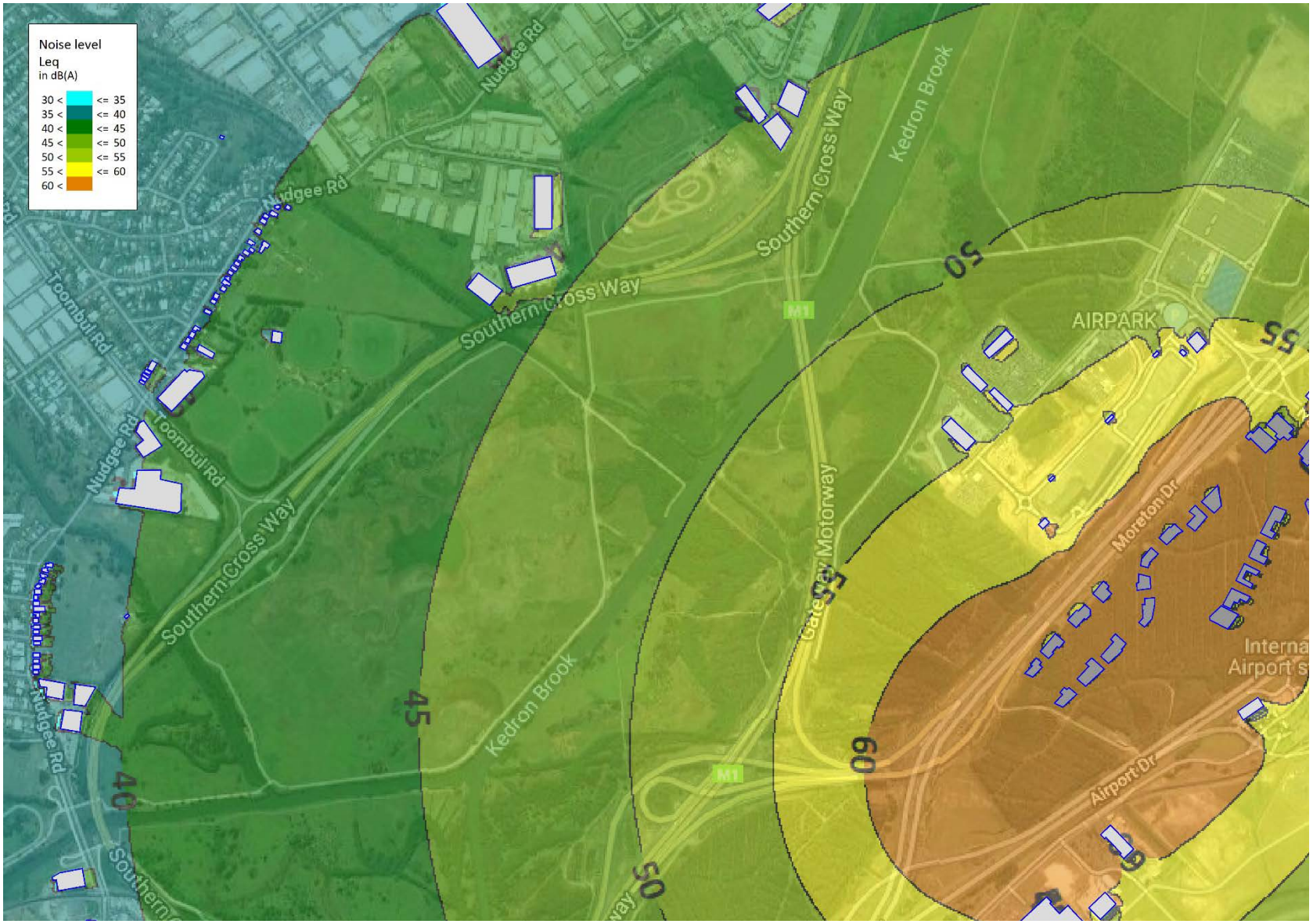


Figure B19 – Operational noise contour of Scenario 9 (Nundah and Northgate)

D

Operational Noise Management Plan

BNE Auto Mall

Operational Noise Management Plan

Brisbane Airport Corporation

Reference: 503043

Revision: 1

2019-03-26

aurecon

Bringing ideas to life

Document control record

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Client		Brisbane Airport Corporation				
Client contact			**Client reference**			
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0	2019-03-18	Draft	D. Larner	Y. Kalkunte		C. Roderick
1	2019-03-26	For issue	D. Larner	Y. Kalkunte		C. Roderick
Current revision		**1**				

Approval			
Author signature		Approver signature	
Name	D. Larner	Name	C. Roderick
Title	Acoustic Consultant	Title	Principal Environment and Planning

Contents

Figures

Tables

1 Introduction

1.1 Project overview

The BNE Auto Mall (the Project) is set to be Australia's benchmark automotive precinct designed for new car buyers, motoring enthusiasts and the public. The Project involves a diverse mix of uses such as:

- A performance track which includes a skid pan, kick plate, manoeuvring course, dedicated slalom area, 4WD demo course, low friction handling circuit and associated driver trainer facilities;
- Flagship automotive dealerships;
- Brand experience centres; and
- Track operations and management centre.

The BNE Auto Mall is to operate seven days a week with hours ranging between 9am and 10pm. The performance track is envisaged to host events such as:

- Corporate driving events;
- Shared test drive days;
- Motorbike days;
- Driver experience days;
- Driver training days;
- 4WD training days; and
- Special and major event days.

The dealerships and brand experience centres will be located around the perimeter of the performance track to create a new landmark destination and generate significant economic and social activity for the Brisbane Airport and surrounding area.

1.2 Purpose of document

This Operational Noise Management Plan should be used as an aid in assessing operational noise emissions for the BNE Auto Mall. Specifically, this document includes:

- The applicable noise criteria to the site
- Noise assessment procedures for the following scenarios:
  - Commissioning of the site
  - On-going noise monitoring to show compliance to the relevant noise criteria
  - Change in operations procedure
  - Special and/or major event days

2 Noise criteria

The noise criteria for the Project site was developed for the BNE Auto Mall Acoustic Assessment Report[1].

2.1 Environmental noise criteria

The following environmental noise level criteria has been considered:

- Environmental Protection (Noise) Policy 2008, *Environmental Protection Act 1994* (State)
- Guideline – Application requirements for activities with noise impacts, Version 3.0, 6 March 2017, former Department of Environment and Heritage Protection (State)
- Guideline – Planning for noise control, Version 1.0, former Department of Environment and Heritage Protection (State)
- Noise Impact Assessment Planning Scheme Policy (PSP), *Brisbane City Plan 2014* (Local)

2.1.1 Noise Impact Assessment Planning Scheme Policy

Brisbane City Council (BCC) has a published method of noise impact assessment for a proposed scheme (Brisbane Bity Plan 2014 - Schedule 6, v15.00/2019, in effect as of 31 May 2019). The Noise Impact Assessment PSP describes the application of an *intrusive noise criterion*, based on the Rating Background Level (RBL), which is based on the existing noise environment, and an *acoustic amenity*, which is based on a single number value for each time period for amenity. As the *intrusive noise criteria* is lower than the *acoustic amenity criteria* for residential areas surrounding the project during the day, the site will be assessed against the *intrusive acoustic criteria*, which is as follows:

The criteria applicable to this Project will be $dBL_{Aeq,T}$ = RBL + 3 dB.

For locations which exceed the above criterion, a comparison to the applicable acoustic amenity criteria should be made.

Baseline measurements were conducted previously by Aurecon[1] and PSK Environmental[2]. A summary of measurements and locations of measurements are shown below in Table 1, Table 2 and Figure 1.

Table 1 Summary of measured noise levels by Aurecon (2019)

Logger #	Location	Date/ Period	Average Noise Level $dBL_{Aeq,T}$			Background Noise Level dBL_{A90}		
			Day 0700 - 1800	Eve. 1800 - 2200	Night 2200 - 0700	Day 0700 - 1800	Eve. 1800 - 2200	Night 2200 - 0700
1	94 Lomandra Drive, Brisbane Airport	26/02/19 – 05/03/19	62	60	57	46 Note 1	43 Note 1	43 Note 1
2	Airport conservation area	26/02/19 – 5/3/19	51	50	52	45 Note 1	45 Note 1	41 Note 1
3	Virginia Soccer Club	05/03/19 – 13/03/19	58	52	49	50 Note 1	45 Note 1	41 Note 1

[1] BNE Auto Mall – Acoustics Assessment Report (2019)
[2] PSK Environmental Interim Report (2017)

Table 2 Summary of measured noise levels by PSK Environmental (2017)

Logger #	Location	Date/ Period	Average Noise Level $dBL_{Aeq,T}$			Background Noise Level dBL_{A90}		
4	Kingsford Smith Memorial	05/09/17 – 19/09/17	60	55	58	52	48	50
5	BAC Service Centre	20/09/17 – 05/10/17	61	60	60	56	53	52

Notes:

1. The reported background noise levels are the Rating Background Levels.

Figure 1 Noise monitoring locations

2.1.2 Australian Standard 1055.2 – 1997, Acoustics – Description and measurement of environmental noise

Appendix A of Australian Standard (AS) 1055.2 – 1997 provides estimated background noise levels for different areas containing residences (typically the most sensitive receiver type) in Australia. These are detailed below.

Table 3 Estimated average background sound levels from AS 1055.2 - Appendix A

Noise area category Note1,2	Description of neighbourhood	Average background A-weighted sound pressure level, $L_{A90,T}$					
		Monday to Saturday			Sundays and Public Holidays		
		0700 - 1800	1800 - 2200	2200 - 0700	0900 - 1800	1800 - 2200	2200 - 0900
R1	Areas with negligible transportation	40	35	30	40	35	30
R2	Areas with low density transportation	45	40	35	45	40	35

Noise area category Note1,2	Description of neighbourhood	Average background A-weighted sound pressure level, $L_{A90,T}$					
		Monday to Saturday			Sundays and Public Holidays		
		0700 - 1800	1800 - 2200	2200 - 0700	0900 - 1800	1800 - 2200	2200 - 0900
R3	Areas with medium density transportation or some commerce or industry	50	45	40	50	45	40
R4	Areas with dense transportation or some commerce or industry	55	50	45	55	50	45
R5 Note 3	Areas with very dense transportation or in commercial districts bordering industrial districts	60	55	50	60	55	50
R6 Note 3	Areas with extremely dense transportation or within predominantly industrial districts	65	60	55	65	60	55

Notes:

1) The division into noise area categories is necessary in order to accommodate existing sound levels encountered at residential sites in predominantly commercial or industrial districts, or in areas located close to main land transport routes, i.e. road and rail.

2) The noise area category most appropriate should be selected irrespective of metropolitan or rural zoning and will vary from location to location.

3) Some industrial and commercial sites are not predominant sources of high background sound levels.

This standard has since been superseded (updated as AS1055:2018), with Appendix A and any reference to the table above removed. However, these noise level estimates are considered indicative of the ambient environment of specific areas, in the absence of noise measurements, particularly for less-noise sensitive receiver types (e.g. commercial properties).

Relevance to the Project

For those sensitive and commercial receptors where noise measurements have not been obtained, the following noise area category has been applied, as per Table 3:

- Commercial properties along Qantas Drive – R5
- Novotel – R3
- Hertz car rental – R4
- Airport Prayer Room – R5

2.2 Project specific noise criteria

Based on the environmental noise criteria outlined in Section 2.1 ($dBL_{Aeq,T}$ = RBL + 3 dB), Table 4 presents the following noise criteria would be considered acceptable for the Project site and the surrounding premises:

Table 4 Proposed noise level criteria for the Project

Noise-sensitive receptor	Criteria, Monday to Saturday dB $L_{Aeq,T}$			Comments
	Daytime 0700 - 1800	Evening 1800 - 2200	Night-time 2200 - 0700	
94 Serpentine Road, Pinkenba	49	46	46	

Noise-sensitive receptor	Criteria, Monday to Saturday dB $L_{Aeq,T}$			Comments
	Daytime 0700 - 1800	Evening 1800 - 2200	Night-time 2200 - 0700	
633 Nudgee Road, Nundah	53	48	44	Based on measurements included in Table 1
789 Nudgee Road, Northgate	53	48	44	
Australian Catholic University	39	36	33	
Kingsford Smith Memorial	55	53	55	
BAC Service Centre/McDonalds	59	58	57	
Prayer Room (Central parking area)	59	58	57	Based on BAC Service Centre measurements provided by PSK Environmental.
Nearest existing commercial property (Qantas Drive buildings) – (R5)	63	58	53	Based on estimated background levels in AS1055.2.
Nearest existing hotel – Novotel (floor 3) – (R3)	53	48	43	
Hertz car rental – (R4)	58	53	48	
Prayer Room (Airport) – (R5)	63	58	53	

3 Acoustic modelling

Preliminary noise modelling was conducted for the BNE Auto Mall to provide a general understanding of the expected noise impacts, sources and extent of mitigation required. Results of this assessment and further details about the modelling procedure is provided in the Acoustics Assessment Report.

The nine 'typical' operational scenarios that were considered for the BNE Auto Mall included:

- **Scenario One:** High performance vehicles using the performance track, with six laps within a one hour period (operating hours from 9 am to 10 pm).
- **Scenario Two**: Normal test driving situations (using normal road cars) assuming a maximum of 12 laps within a one hour period. This Scenario aligns with the potential operational activities for *driver training days* (operating hours from 9 am to 6 pm)
- **Scenario Three:** Scenario One with the addition of six stationary (idling) vehicles at pit-stop locations. This Scenario aligns with the potential operational activities for *driver experience days* (operating hours from 9 am to 10 pm).
- **Scenario Four:** Scenario One with the addition of two vehicles using the skid pan (operating hours from 9 am to 10 pm).
- **Scenario Five:** Scenario Three with the addition of two vehicles using the skid pan (operating from 9 am to 6 pm).
- **Scenario Six:** High performance vehicles using the performance track, with twelve vehicle laps of the track within a one hour period (operating from 9 am to 10 pm).
- **Scenario Seven:** Scenario Four with the addition of six vehicles per hour using the 4WD test circuit, and six motorbikes per hour using the performance track. This Scenario aligns with the potential operational activities that are anticipated for *shared test drive days, 4WD training days* and *motorbike days* (operating from 9 am to 10 pm). It is noted these activities may occur in isolation of other activities, however, the simultaneous use of high performance vehicles, the skid pan, 4WD test circuit and motorbikes has been assessed to represent the worst-case scenario.
- **Scenario Eight:** Six high performance vehicles on the performance track, completing six laps simultaneously in any one hour period. This Scenarios aligns with the potential operational activities that are anticipated for *corporate driving days* (operating from 9 am to 6 pm).
- **Scenario Nine:** Six high performance vehicles using the performance track, completing 12 laps in any one hour period. Also includes up to 5,000 spectators, cars idling in the pit stop locations and operation of a PA system (operating from 9 am to 10 pm) - this scenario has assessed a worst-case scenario with 5,000 spectators.

It is recommended that these scenarios are reviewed by the operators on site following detailed design and once operational activities for the BNE Auto Mall are confirmed.

4 Noise Management

4.1 Commissioning noise monitoring procedure

It is proposed that a commissioning noise strategy is developed to verify the preliminary noise modelling and Acoustics Assessment Report for the BNE Auto Mall. The verification method would involve the following tasks:

- Note any noise mitigation strategies used to date.
- Undertake source noise level measurements of all typical motor vehicle (normal road cars, motorbikes, high performance vehicles, etc.) pass-by on the side of the performance track, in a designated safe area.
- Undertake source noise level measurements of other site-relevant noise sources (e.g. testing rigs/stands, powered equipment, Public Announcement Service), as required.
- Confirm the total number of vehicles used within a defined time period.
- Undertake attended noise monitoring at a minimum of three locations around the performance track, preferably between 200 m – 500 m of the Project site.
- Record weather details at time of measurements, including temperature, wind speed and direction and precipitation amount.
- Remove extraneous noise events from the attended noise measurements (such as aircraft approach/take-off) and inclement weather periods (such as when local wind speeds are > 5 m/s, and rain affects the noise levels).
- Determine source noise levels of noise sources and apply appropriate time-weightings.
- Predict noise levels with respect to attended noise monitoring locations (minimum three), accounting for measured weather statistics.
- Apply a calibration factor to the source noise levels if predicted noise levels differ from the measured noise levels by greater than 1 dB.
- Predict noise levels using a calibrated model with site-specific general weather conditions at noise sensitive locations, for typical and maximum noise scenarios. These scenarios must be clearly defined. Compare the predicted noise levels with the Project noise criteria.
- Investigate noise mitigation measures if exceedances are predicted. Report achievable mitigation measures, including physical mitigation and management controls/operational restrictions.
- Produce noise contour maps of the Project site, preferably in 3 dB increments from 100 m outwards of the site to approximate noise sensitive locations. Sufficient detail needs to be provided as ongoing monitoring will be based on these operational noise contour models.
- Prepare a technical memorandum summarising the results of this verification method, including the new noise contour maps.

The following commissioning procedure is to be conducted by a suitably qualified acoustic consultant.

All noise measurements shall be conducted with a NATA-certified calibrated Type 1 sound level meter, using a “fast” weighting and 1/1 octave band frequency analysis. Measurements should be conducted with the following information documented:

- Pre and post calibration status of the sound level meter.
- Measurement period.
- Notes on attended noise monitoring, including record of extraneous noise events.
- A minimum of 1/1 octave band L_{Amax} and $L_{Aeq,1s}$ parameters recorded for source noise level measurements (1/3 octave band measurements can also be used to check for tonality).
- A minimum of broadband L_{Amax} and $L_{Aeq,1s}$ parameters recorded for attended noise monitoring measurements.

Unattended noise monitoring is not suitable to determine the noise impacts from the Project at surrounding noise sensitive receptors. This is due to the high likelihood of non-Project noise sources (aircraft and road traffic noise) impacting the noise measurement, which are governed by different legislation. Any non-processed measured data would be considered not representative of the BNE Auto Mall noise emissions.

4.2 Post-commissioning noise monitoring procedure

Post-commissioning noise monitoring is also recommended, to ensure ongoing compliance of the BNE Auto Mall. Attended noise monitoring should be conducted in locations within 200 – 500 m of the Project site, to replicate predicted noise levels in the commissioning phase, and should occur for the following scenarios;

- When a noise complaint is made; or
- If no noise complaints occur within a year, conduct annually.

A register of noise complaints should be recorded, including the time and nature of the alleged incident to aid in complaint verification.

4.2.1 Standard noise monitoring

The following procedure should be undertaken when completing a standard noise monitoring assessment;

- Appoint a qualified acoustic consultant.
- Confirm the total number of vehicles and/or motorbikes used within a defined time period.
- Undertake attended noise monitoring at a minimum of three locations, representative of noise sensitive receptors to the Project site, preferably between 200 m – 500 m of the site.
- Record weather details at time of measurements, including temperature, wind speed and direction and precipitation amount.
- Remove extraneous noise events from the attended noise measurements (such as aircraft approach/take-off) and inclement weather periods (such as when local wind speeds are > 5 m/s, and rain affects the noise levels).
- Compare attended measured noise levels to appropriate predicted noise level contours of operational scenarios developed during commissioning phase. Measured noise levels should be within the predicted noise levels contour band (i.e. 30 – 33 $dBL_{Aeq,T}$).
- Provide justification for the selected operational scenario.
- Prepare a technical memorandum with evidence of mutual agreeance in predicted and measured noise levels.
- Peer review technical memorandum with another qualified acoustic consultant.

All technical memorandums should be filed appropriately as evidence of ongoing compliance.

4.2.2 Change in operations procedure

The commissioning noise monitoring procedure (Section 4.1) must be repeated with the new technical memorandum superseding the existing technical memorandum, if the following occurs;

- Operational changes to the BNE Auto Mall (such as change of vehicle fleet, performance track changes, increase in vehicle numbers etc.)
- Major earthworks have occurred between the Project site and noise sensitive locations (including removal of vegetation).
- Construction of new development between the Project site and noise sensitive receptors.
- Any events (including special and/or major events) not previously modelled (to be included as a scenario in the commissioning technical memorandum).

All noise measurements shall be conducted with a Type 1 sound level meter, with “fast” weighting and overall noise level in dB(A). Measurements should be conducted using $L_{Aeq,1s}$ increments, so appropriate data can be processed.

4.2.3 Special and/or major events procedure

If special and/or major events (e.g. car shows etc.) are planned, consultation with the local authority is recommended, to confirm minimum requirements and relevant permits, licences and/or approvals that may be required. In addition to complying with the local authority requirements, the following must also be considered:

- Notify nearby residents of possible noise increases (via letter drop or communications team).
- Limit noisy operational activities (such as the use of the skid pan) to occur during daytime periods (typically between 7 am to 6 pm), where possible so that the less intrusive operational activities are to occur during evening periods.
- Special and/or major events will be limited to occur bi-annually (maximum two times per year).
- Install of temporary noise barriers for the event. The location, extent and height of barriers should be considered.
- Undertake noise monitoring near residential areas during the event, with documentation to include:
  - Approval of event from local authority.
  - Operational noise sources associated with the special event.
  - Noise mitigation strategies adopted for the event (if applicable).
  - Detail of measurement location and topography.
  - Meteorological data at time of measurements.
  - Measured noise levels, detailed commentary on high noise events (including extraneous noise events), time and duration of measurement and source noise type noted at the measurement location.
  - Assessment against relevant noise criteria. Detailed discussion outlining the results of this assessment.
  - Plots of measured noise levels (L_{Amax}, L_{A10}, L_{A90} and $L_{Aeq,T}$), highlighting high noise events. Appropriate time increments showing change in noise levels.
  - Suitable ameliorative measures and management controls in case of non-compliance.

All noise measurements shall be conducted with a NATA-certified calibrated Type 1 sound level meter, using a “fast” weighting and 1/1 octave band frequency analysis. Measurements should be conducted with the following documented:

- Pre and post calibration status of the sound level meter.
- Measurement period.
- Notes on attended noise monitoring, including record of extraneous noise events.
- A minimum of broadband L_{Amax} and $L_{Aeq,1s}$ parameters recorded for attended noise monitoring measurements.

5 Conclusion

An Operational Noise Management Plan has been created for discussion purposes for the BNE Auto Mall. Further discussion is to be undertaken to confirm the preferred process in carrying out the above noise management strategies.

The Operational Noise Management Plan covers the following scenarios:

- Compliance commissioning noise monitoring procedure.
- Standard noise monitoring procedure (post commissioning).
- Change in operations procedure.
- Special events procedure.

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Bringing ideas to life

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E

Mitigation measures

Appendix E

Mitigation measures for noise and vibration

Potential environmental aspect/impact	Management objective	Action	Phase to be implemented	Outcome
Operational Noise				
Operation of the performance track and other vehicular activities	Advise receptors of the potential noise impacts that may occur during operation	■ An Operational Noise Management Plan has been developed for the BNE Auto Mall day-to-day operations and event days. The Operational Noise Management Plan should be reviewed and updated following detailed design and once further details of the operational activities has been confirmed. ■ Where practicable, the number of laps and the simultaneous use of high performance vehicles on the performance track should be limited, particularly outside of daytime hours. ■ Notify nearby sensitive receptors in advance of event days. ■ Undertake stakeholder engagement with affected commercial precincts (Australian Catholic University, BAC Service Centre, Qantas Drive businesses) to understand their evening operations and confirm the 'true affected businesses' that may be impacted by the operation of the BNE Auto Mall during the evening. Once confirmed, further mitigation strategies may be required. ■ Where practicable, avoid the unnecessary revving of vehicle engines and switch of mechanical plant.	Operation	To be updated throughout detailed design and operation phase
Use of the performance track PA system (for emergency only)		■ The design and commissioning of the PA system should be considered as part of the Noise Management Plan for the facility ■ The detailed design of the PA system would need to consider the location and directionality / spill of the speakers, and noise limiters, as appropriate ■ Specification of the PA system is subject to detailed design ■ Announcements, sirens and alarms, particularly those during the evening, should be limited in use and volume where practicable	Prior to and during construction	To be addressed during detailed design phase and construction

Potential environmental aspect/impact	Management objective	Action	Phase to be implemented	Outcome
Internal noise levels at nearby receptors		■ Ensure perimeter bunds and acoustic screening are constructed to the required height without gaps or inconsistencies. Specific location of physical mitigation will be developed in future design stages. In principle, partial screening of a noise source can provide 5dBA attenuation, within the region of 10dBA provided by full screening. ■ Where possible, commercial building layouts on the Project site should be designed to screen workshops and other mechanical activities from sensitive receptors, both on and off the Project site. ■ The internal noise levels in the prayer rooms is likely to meet the internal noise level criteria of AS 2107, assuming closed windows and suitable existing building construction	Prior to and during construction	To be addressed during detailed design phase and construction
Potential community complaints regarding noise during operation of the performance track		■ Keep a register of noise related complaints and record the time and nature of the alleged incident to aid in complaint verification. ■ Investigate the source of substantiated noise complaints. ■ Within seven days of the noise complaint, report the results of the investigation and the actions taken to 'close out' the complaint to the complainant and BAC Environmental Advisor. ■ Where noise complaints persist, undertake noise monitoring 1 m from the façade of affected properties to assess noise levels against BCC's Noise Impact Assessment PSP criteria and to assist with future management of noise complaints. Outside the hours of 7am to 7pm Monday to Saturday (excluding public holidays), if noise at sensitive receptors off Airport land continues to exceed the BCC criteria, the noise generating activity on the Project site will cease operations.		

Potential environmental aspect/impact	Management objective	Action	Phase to be implemented	Outcome
Construction Noise				
	Implement a range of techniques to minimise noise impacts as a result of site construction	■ If required, (e.g. a validated complaint is received, or an exceedance of the limits set are confirmed (refer Section 2.3.1)), an investigation will be undertaken to determine the source of the exceedance/complaint. ■ Where possible and practicable, noise machinery should have appropriate mufflers, silencers and/or enclosures fitted to reduce noise transmission. ■ Avoid noisy plant/machines working simultaneously close together and adjacent to sensitive receivers. ■ Ensure all equipment is limited to an instantaneous sound pressure level at 15 m of L_{max} 85 dBA (under worst case operating mode), either by fitting silencers/shrouds to existing equipment or by using updated equipment. ■ Where possible, locate and operate any constant noise sources (i.e. generators) as far as possible from adjacent or nearby premises and the Kingsford Smith Memorial. ■ Excessively noisy machinery should preferably not operate during sensitive night time hours (i.e. between 10 pm and 7 am) and should be located as far as possible from the noise-sensitive premises. Wherever possible, restrict usage to daytime hours. ■ Equipment used during Project works are to be operated and maintained in a proper and efficient manner to minimise noise levels. ■ Equipment/machinery should be shut down when not in use.		
Potential community complaints regarding construction noise	Manage and monitor noise at sensitive receptors who experience noise related impacts during the construction phase	■ Keep a register of noise related complaints and record the time and nature of the alleged incident to aid in complaint verification. ■ Investigate the source of substantiated noise complaints. ■ Within seven days of the noise complaint, report the results of the investigation and the actions taken to 'close out' the complaint to the complainant and BAC Environmental Advisor. ■ Where noise complaints persist, undertake noise monitoring 1.0 m from the façade of affected properties to assess noise levels against the AEPR noise criteria and to assist with future management of noise complaints. Outside the hours of 7am to 7pm Monday to Saturday (excluding public holidays), if noise at sensitive receptors off Airport land continues to exceed the AEPR noise criteria, the noise generating activity on the Project site will cease operations.	Construction	Requirement to be included in the EMP

Potential environmental aspect/impact	Management objective	Action	Phase to be implemented	Outcome
Vibration				
Vibration from the construction phase leading to cosmetic damage to commercial buildings and sensitive receptors	Minimise the likelihood of damage to commercial buildings and sensitive receptors as a result of vibration from construction activities	■ Condition assessments of existing buildings within close proximity to the Project site, including the Kingsford Smith Memorial, will be undertaken prior to and during construction. ■ Investigate the potential of using static rollers instead of vibratory rollers. ■ Preliminary on-site vibration monitoring at set distances should be conducted for representative works on the site away from vibration sensitive locations. These measurements should then be used to determine potential vibration impacts on nearby vibration sensitive receivers, such as Kingsford Smith Memorial. ■ Advise stakeholders of upcoming works via regular stakeholder communications. Stakeholders will have the opportunity to discuss with BAC if there are any concerns. ■ As far as practical, all operations causing relatively high levels of vibration should be carried out at a time to cause the least annoyance to neighbours (e.g. daytime hours). ■ Where possible, locate and operate any constant vibration sources (e.g. generators), as far as possible from adjacent or nearby premises.	Prior to construction, and during construction	Requirements to be included in the EMP

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