Noise and Vibration Assessment

Edmondson Park South Commuter Car Park
Edmondson Park, NSW.

Prepared for: Pitt&Sherry Operations Pty Ltd
May 2020
MAC191000-01RP2

MAC
Muller Acoustic Consulting

Document Information

Noise and Vibration Assessment

Edmondson Park South Commuter Car Park, Edmondson Park, NSW

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1 Introduction

Muller Acoustic Consulting Pty Ltd (MAC) has been engaged by Pitt&Sherry Operations Pty Ltd on behalf of Transport for NSW (TfNSW) to complete a Noise and Vibration Impact Assessment (NVIA) for the proposed Commuter Car Park (CCP) at Edmondson Park Station, NSW (the 'proposal'). This report presents the methodology, findings of the NVIA for the construction and operation of the proposal.

1.1 Purpose and Objectives

The purpose of this NVIA is to assess noise and vibration emissions from the proposal and to identify mitigation measures where required.

The outcomes of this assessment include recommendations for potential noise and vibration mitigation and management measures designed to achieve an acceptable noise amenity for residential (dwelling) occupants and other sensitive receivers surrounding the proposal site.

1.2 Scope of the Assessment

The NVIA scope of work included:

- reviewing construction activities to identify noise and vibration generating plant, equipment, machinery or activities proposed to be undertaken as part of the proposal;
- identifying the closest and/or potentially most affected receivers situated within the area of influence to the proposal;
- quantifying the existing noise environment by conducting unattended noise monitoring at locations representative of the closest and/or potentially most affected receivers;
- establishing existing noise levels to determine project-specific construction noise management levels (NMLs), and establishing construction vibration objectives;
- undertaking 3D noise modelling to predict noise levels that may occur as a result of the construction of the proposal at the closest and/or potentially most affected receivers;
- providing a comparison of predicted noise levels (and likely vibration events) to the construction NMLs and construction vibration objectives;
- assessment of potential impacts associated with construction noise and vibration; operational noise and sleep disturbance aspects of the proposal; and

- providing recommendations (to be implemented by TfNSW to manage impacts) for feasible and reasonable noise and vibration mitigation and management measures, and monitoring options, where NMLs or vibration objectives may be exceeded.

A glossary of terms, definitions and abbreviations used in this report is provided in **Appendix A**.

2 Proposal Description

2.1 Description of Proposed Construction Works

The proposal involves the construction and operation of a multi-storey car park with integration into the existing road and pedestrian network as part of the Commuter Car Park Program. The proposal is located on the southern side of Edmondson Park Station off Soldiers Parade.

The Proposal would include the following key elements:

- removal of the existing at-grade car park including demolition of the staff facilities and accessible toilet block;
- provision of a ground level plus five levels (including rooftop) commuter car park including:
  - approximately 1,200 commuter car parking spaces;
  - approximately 26 accessible parking spaces;
  - two lifts and six sets of stairs;
  - internal circulation ramps connecting the levels;
  - provision for electric vehicle charging stations; and
  - Transport Park&Ride infrastructure.
- vehicular access and egress from Henderson road directly north of the site;
- separation of vehicle access points and pedestrian access paths;
- installation of renewable energy options such as solar panels and battery storage; and
- ancillary works including services diversion and/or relocation, drainage works, landscaping, installation of lighting, installation of handrails and balustrades, with new infrastructure (including CCTV cameras).

Offset parking during construction would be provided and will be considered under a separate planning approval.

2.2 Potentially Sensitive Receivers

From observations on site, review of aerial photos and other proposal information, MAC has identified the potentially noise sensitive receivers relevant to the proposal presented in **Table 1** summarising the receiver ID, type, address and Noise Catchment Area (NCA). Due to the development of the area, there are numerous residential and commercial construction sites that may be potential noise sensitive receivers depending on when the buildings are completed and when the MSCP is constructed. Therefore, receivers have been identified as existing and future receivers.

Table 1 Noise Sensitive Receivers

ID	Type	Description Address	Noise Catchment Area
AR01	Active Recreation	Clermont Park	Edmondson Park (North West)
AR02	Active Recreation	Bardia Park	Bardia (Centre)
AR03	Active Recreation	Edmondson Regional Park	Denham Court
AR04	Active Recreation	Mon St Quentin Oval	Bardia (Centre)
C01A	Commercial	Commercial/Shops	Edmondson Park Town Centre
C01B	Commercial	Commercial/Shops	
C01C	Commercial	Commercial/Shops	
C01D	Commercial	Commercial/Shops	
C02A	Commercial	Commercial/Shops	
C02B	Commercial	Commercial/Shops	
C02C	Commercial	Commercial/Shops	
C02D	Commercial	Commercial/Shops	
C02E	Commercial	Commercial/Shops	
C03	Commercial	Commercial	
CCC01	Child Care Centre	Bambi Kindergarten	Bardia (Centre)
CH01	Place of Worship	Jehovah's Witness Kingdom Hall	Denham Court
FR01	Future Residential	Soldiers Parade	Edmondson Park Town Centre
FR02	Future Residential	Soldiers Parade	
FR03	Future Residential	Soldiers Parade	
FR04	Future Residential	Soldiers Parade	
FR05	Future Residential	Campbelltown Road	
FR06	Future Residential	Campbelltown Road	Bardia (Centre)
FR07	Future Residential	Campbelltown Road	
FR08	Future Residential	Campbelltown Road	
FR09	Future Residential	Campbelltown Road	
FR10	Future Residential	Campbelltown Road	
FR11	Future Residential	Campbelltown Road	

Table 1 Noise Sensitive Receivers			
ID	Type	Description Address	Noise Catchment Area
FR12	Future Residential	Ray Simpson Avenue	
FR13	Future Residential	Arthur Allen Drive	
FR14	Future Residential	Arthur Allen Drive	
R01	Residential	Digger Lane	
R02	Residential	Digger Lane	
R03	Residential	Ordinance Street	
R04	Residential	Vevi Street	
R05	Residential	Soldiers Parade	Edmondson Park Town Centre
R06	Residential	Soldiers Parade	
R07	Residential	Vevi Street	
R08	Residential	Vevi Street	
R09	Residential	Vevi Street	
R10	Residential	Arthur Allen Drive	
R11	Residential	Arthur Allen Drive	
R12	Residential	Arthur Allen Drive	
R13	Residential	Arthur Allen Drive	Bardia (Centre)
R14	Residential	Arthur Allen Drive	
R15	Residential	Arthur Allen Drive	
R16	Residential	Arthur Allen Drive	
R17	Residential	Arthur Allen Drive	
R18	Residential	Bardia Avenue	
R19	Residential	Bardia Avenue	
R20	Residential	Lowe Avenue	
R21	Residential	Lowe Avenue	
R22	Residential	Webber Circuit	
R23	Residential	Nash Street	
R24	Residential	Noble Street	
R25	Residential	Bursill Place	
R26	Residential	Webber Circuit	Bardia (East)
R27	Residential	Callinan Crescent	
R28	Residential	Donohoe Street	
R29	Residential	Callinan Crescent	
R30	Residential	Ingleburn Gardens Drive	
R31	Residential	Ingleburn Gardens Drive	
R32	Residential	Ingleburn Gardens Drive	

Table 1 Noise Sensitive Receivers			
ID	Type	Description Address	Noise Catchment Area
R33	Residential	Hollyoake Circuit	
R34	Residential	Burton Avenue	
R35	Residential	Ingleburn Gardens Drive	
R36	Residential	Croatia Avenue	Edmondson Park (North East)
R37	Residential	Croatia Avenue	
R38	Residential	Croatia Avenue	
R39	Residential	Croatia Avenue	
R40	Residential	Croatia Avenue	
R41	Residential	Arnhem Road	
R42	Residential	Changsha Road	Edmondson Park (North West)
R43	Residential	Wonson Road	
R44	Residential	Learoyd Road	
R45	Residential	Mcfarlane Road	
R46	Residential	Faulkner Way	
R47	Residential	Faulkner Way	
R48	Residential	Faulkner Way	
R49	Residential	Holiday Avenue	
R50	Residential	Buchan Avenue	
R51	Residential	Buchan Avenue	
R52	Residential	Gallipoli Drive	
R53	Residential	Isonzo Road	
R54	Residential	Culverston Avenue	Denham Court
R55	Residential	Culverston Avenue	
R56	Residential	Culverston Avenue	
R57	Residential	Culverston Avenue	
R58	Residential	Culverston Avenue	
R59	Residential	Culverston Avenue	
R60	Residential	Culverston Avenue	
R61	Residential	Culverston Avenue	
R62	Residential	Culverston Avenue	
R63	Residential	Culverston Avenue	
R64	Residential	Culverston Avenue	
R65	Residential	Culverston Avenue	
SCH01A	Educational	Bardia Public School	Bardia
SCH01B	Educational	Bardia Public School	Bardia

Table 1 Noise Sensitive Receivers			
ID	Type	Description Address	Noise Catchment Area
SCH02	Educational	St Francis College	Edmondson Park (North West)

The proposal site, receivers, general area of works and compounds are presented in **Figure 1** and **Figure 2**. Additional detail including general layouts and proposal design are presented in **Appendix B**.

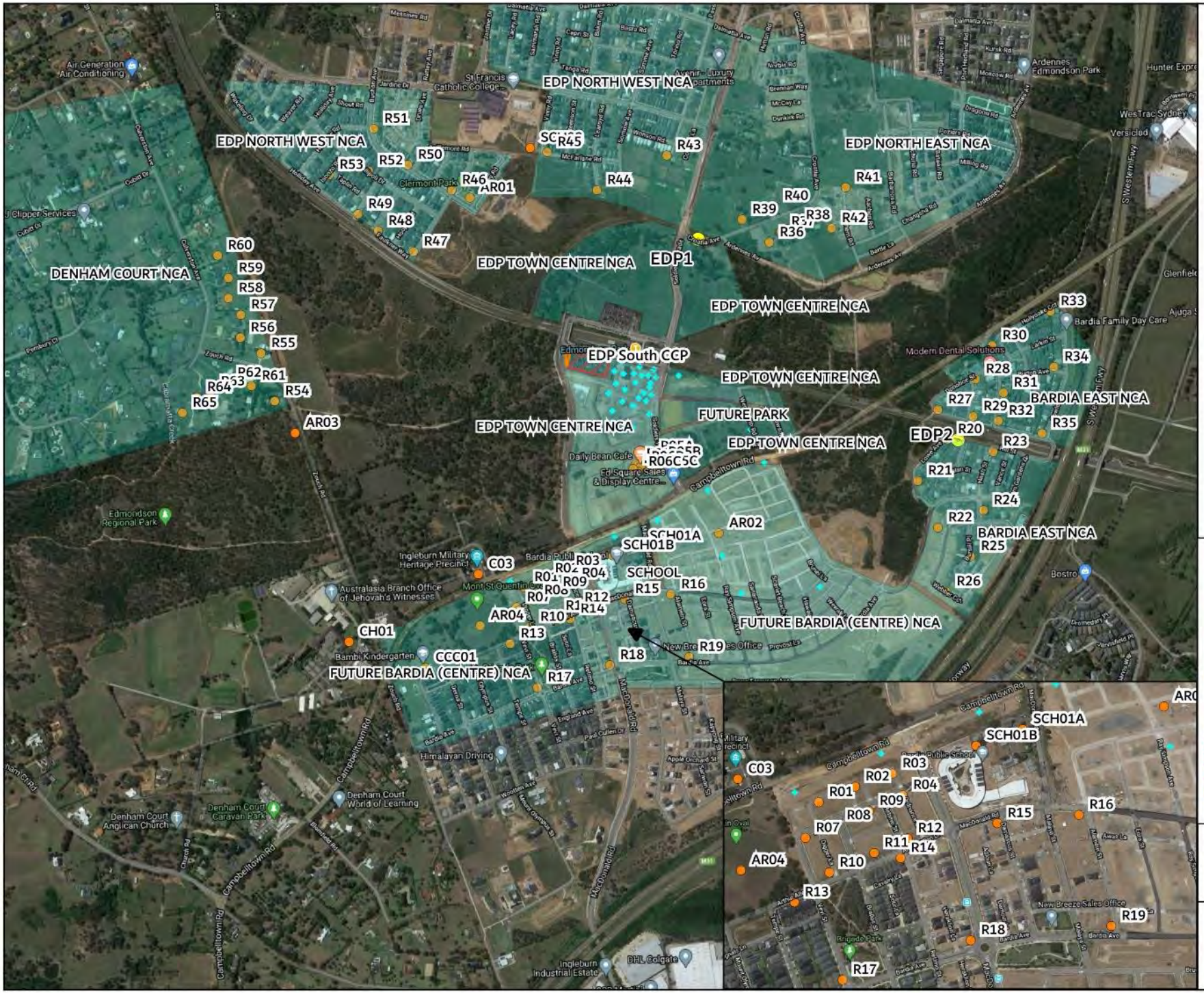

FIGURE 1

PROJECT LAYOUT

MAC191000-01

Edmondson Park Station

South Commuter Car Park

FIGURE 2

Receiver Locations

Edmondson Park Town Centre

MAC191000-01

Edmondson Park Station

South Commuter Car Park

KEY

- EDP Existing Receivers
- EDP Future Receivers
- EDP Noise Monitoring Location
- EDP South CCP
- EDP Construction Compound

0 30 60 90 120 150 m

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3 Noise Policy and Guidelines

3.1 Guidelines and Standards

This NVIA has been completed in general accordance with the following key policy and guidelines:

- NSW Government – Transport for NSW (TfNSW) Construction Noise and Vibration Strategy (CNVS), Version 4.1 dated May 2019;
- NSW Department of Environment and Conservation – NSW Environmental Noise Management – Assessing Vibration: A Technical Guideline (the NSW Vibration Guideline), February 2006;
- NSW Department of Environment and Climate Change – NSW Interim Construction Noise Guideline (ICNG), July 2009;
- NSW Department of Environment, Climate Change and Water – NSW Road Noise Policy (RNP), March 2011; and
- NSW Environment Protection Authority (EPA), Noise Policy for Industry (NPI), 2017;

The assessment has also considered and applied the following standards where relevant:

- Australian Standard AS 2436–2010 (R2016) (AS 2436) – Guide to Noise and Vibration Control on Construction, Demolition and Maintenance sites;
- Australian Standard AS 1055:2018 (AS 1055) – Description and Measurement of Environmental Noise;
- Australian Standard AS IEC 60942-2004 (AS 60942) – Electroacoustics – Sound Calibrators.
- Australian Standard AS/NZS IEC 61672:2019 (AS 61672) – Electro Acoustics - Sound Level Meters Specifications Monitoring;
- German Institute for Standardisation – DIN 4150 (1999-02) Part 3 (DIN4150-3) – Structural Vibration - Effects of Vibration on Structures;
- British Standard BS7385: Part 2-1993 (BS 7385) - Evaluation and Measurement for Vibration in Buildings — Part 2 – Guide to Damage Levels from Ground-borne Vibration, dated 1993; and
- British Standard BS 6472 (1992) Guide to Evaluation of Human Exposure to Vibration in Buildings (1 Hz to 80 Hz).

3.2 Interim Construction Noise Guideline

The assessment and management of noise from construction work is completed with reference to the Interim Construction Noise Guideline (ICNG). The ICNG is specifically aimed at managing noise from construction work regulated by the EPA and is used to assist in setting statutory conditions in licences or other regulatory instruments. The types of construction regulated by the EPA under the POEO (Protection of Environmental Operations) Act 1997, include construction, maintenance and renewal activities carried out by a public authority, such as road upgrades as described in Schedule 1 of the POEO Act.

The ICNG sets out procedures to identify and address the impact of construction noise on residences and other sensitive land uses. This section provides a summary of noise objectives that are applicable to the assessment.

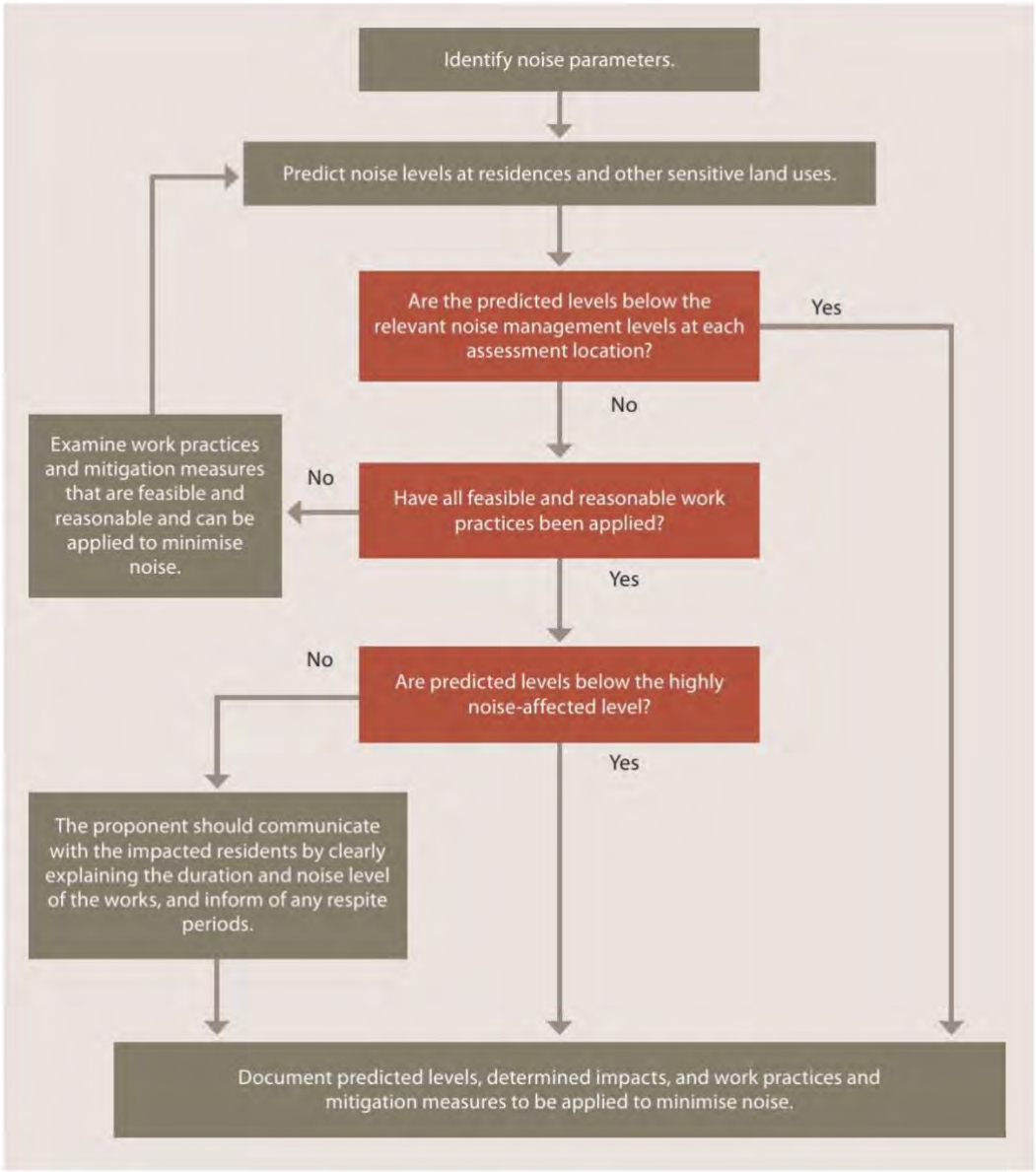
The ICNG provides two methodologies for the assessment of construction noise emissions:

- Quantitative, which is suited to major construction projects with typical durations of more than three weeks; or
- Qualitative, which is suited to short term infrastructure maintenance (for projects with a typical duration of less than three weeks).

The methodology for a quantitative assessment requires a more complex approach, involving noise emission predictions from construction activities to the relevant assessment locations, whilst the qualitative assessment methodology is a more simplified approach that relies more on noise management strategies.

This report has adopted a quantitative assessment approach. The assessment includes identification of potentially affected assessment locations, description of activities involved in the proposal, derivation of the construction noise criteria for standard and out of hours (OOH) periods, quantification of potential noise impacts at receivers and, provides management and mitigation recommendations. Steps of the quantitative approach are summarised in **Figure 3**.

Figure 3 Quantitative Assessment Processes for Assessing and Managing Construction Noise



Source: Department of Environment and Climate Change, 2009.

3.2.1 Construction Hours

Table 2 summaries the ICNG recommended standard and out of hours periods for construction. Note, although not mandatory, strong justification is required to work outside of normal construction hours.

Table 2 Standard Construction Hours and Out of Hours Periods

Period	Preferred Construction Hours
Standard construction hours	Monday to Friday - 7am to 6pm Saturdays - 8am to 1pm Sundays or Public Holidays - No construction
Out of Hours Period 1	Monday to Friday - 6pm to 10pm Saturdays - 7am to 8am and 1pm to 10pm Sundays or Public Holidays - 8am to 6pm
Out of Hours Period 2	Monday to Friday - 10pm to 7am Saturdays - 10pm to 8am Sundays or Public Holidays - 6pm to 7am

3.2.2 Out of Hours Construction

The ICNG suggests that any request to vary the hours of standard construction activities shall be:

- considered on a case by case basis or activity-specific basis;
- accompanied by details of the nature and need for activities to be undertaken during the varied construction hours; and
- accompanied by written evidence that activities undertaken during the varied construction hours are strongly justified; appropriate consultation with potentially affected receivers and notification of the relevant regulatory authorities has occurred; and all practicable and reasonable mitigation measures will be put in place.

Out of Hours (OOH) periods are divided into two categories generally representing evening and night periods and cover the hours listed below:

- **OOH Period 1 (evening/low risk period):** Monday to Friday – 6pm to 10pm, Saturdays – 1pm to 6pm, Sundays/Public Holidays – 8am to 6pm.
- **OOH Period 2 (night/medium to high risk period):** Monday to Friday – 10pm to 7am, Saturdays/Sundays/Public Holidays – 6pm to 7am (8am on Sunday mornings and Public Holidays).

3.2.3 Construction Noise Management Levels

Table 3 reproduces the ICNG management levels for residential receivers. The construction Noise Management Level (NML) is the sum of the management level and relevant Rating Background Level (RBL) for each specific assessment period.

Table 3 Noise Management Levels

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

Note 1: The Rating Background Level (RBL) is an overall single figure background level representing each assessment period over the whole monitoring period. The RBL is used to determine the construction noise management levels for noise assessment purposes and is the median of the ABL's.

3.2.4 Construction Sleep Disturbance

Section 4.3 of the ICNG states that a sleep disturbance assessment is required where construction activities are planned to occur for more than two consecutive nights. An assessment of sleep disturbance is provided in **Section 7.3**.

3.3 Construction Vibration

Department of Environment and Conservation (DEC) 2006, Assessing Vibration: A Technical Guideline (the 'Guideline') provides guidance on determining effects of vibration on buildings occupants. The guideline does not address vibration induced damage to structures, blast induced vibration effects or structure borne noise effects.

The CNVS sets out safe working distances to achieve the human response criteria for vibration. For a large vibratory roller, the CNVS sets a safe working distance of 100m to achieve the residential human response criteria for continuous vibration. The nearest existing residential receivers to the construction area are approximately 150m from the proposal and human exposure to vibration is anticipated to be minimal. Furthermore, where the human response criteria are satisfied, the structural or cosmetic criteria for sensitive receivers will be achieved. Hence, vibration impacts are not considered to be a significant issue to existing residential receivers, therefore have not considered further in this assessment.

However, vibration has the potential to exceed maximum vibration trigger levels at the nearest potential future receiver FR01 immediately adjacent to the proposal. Therefore, the proposal will be required to actively manage vibration generating equipment through testing or substitution if the residential building is occupied during the construction period. With respect to potential future receivers, detailed vibration criteria are provided in **Appendix C**.

3.4 Construction Road Traffic Noise

Construction road traffic (noise and vibration) impacts from the proposal are not anticipated (ie from additional vehicles on the public road network). The proposed route via Soldiers Parade to Camden Valley Way or Campbelltown Road would generate approximately five to six (proposal related) heavy vehicle movements per hour at the peak of construction. This is considered negligible and is not expected to increase existing road traffic noise levels at receivers along the route. Furthermore, the proposal is not expected to generate a significant increase in vehicles on the surrounding road network compared to the existing vehicle flows of approximately 7,000 vehicles per day.

3.5 Car Park Operational Noise Assessment

A review of the operational noise emissions associated with the car park has been completed to quantify the potential impact on surrounding noise sensitive receivers. The assessment calculated the noise emissions associated with car movements within the carpark, including maximum noise events such as door slams engine starting. Results of the assessment are presented in **Section 8**.

3.6 Road Noise Policy

The road traffic noise criteria are provided in the Department of Environment, Climate Change and Water NSW (DECCW), Road Noise Policy (RNP), 2011. The policy sets out noise criteria applicable to different road classifications for the purpose of quantifying traffic noise impacts. Road noise criteria relevant to this assessment are presented in detail in **Section 5.3**.

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4 Existing Environment

4.1 Unattended Noise Monitoring Methodology

In accordance with NSW noise guidelines, background noise levels are measured in the absence of the proposal site and are used to develop Noise Management Levels (NMLs) for residential receivers.

To quantify existing noise levels, long-term unattended noise monitoring was performed at the nearest receiver locations to the proposal on both sides of the railway and are presented in **Table 4**. Location EDP1 represents receivers to the north of the railway station and receivers exposed to road traffic noise. Due to intensive construction works adjacent to the railway station, Location EDP2, Lowe Avenue was chosen to represent receivers south of the railway station, being a similar offset distance to the railway.

The unattended noise monitoring survey was conducted in general accordance with the procedures described in Australian Standard AS 1055-2018, "Acoustics - Description and Measurement of Environmental Noise". Noise measurements were carried out using two Svantek Type 1, 977 noise analysers from Wednesday 29 January 2020 to Thursday 6 February 2020. The acoustic instrumentation used carries current NATA calibration and complies with AS IEC 61672.1-2019- Electroacoustics - Sound level meters - Specifications. Calibration of all instrumentation was checked prior to and following measurements. Drift in calibration did not exceed ±0.5dBA.

Table 4 Noise Monitoring Locations

ID	Unattended Noise Monitoring Location	Co-ordinates MGA56	
		Easting	Northing
EDP1	Croatia Avenue, Edmondson Park	302357	6239519
EDP2	Lowe Avenue, Bardia	303150	6238898

4.2 Unattended Noise Monitoring Results

The results of the unattended noise measurements for both monitoring locations, including derived Rating Background Levels (RBLs) are summarised in **Table 5**. **Appendix D** presents the noise monitoring charts for the assessment period.

Table 5 Unattended Noise Monitoring Results

Unattended Noise Monitoring Location	Period[1]	Measured Background Noise Level (LA_{90}), dB RBL	Measured dB $LA_{eq(period)}$
EDP1 Croatia Avenue Edmondson Park	Day	41	57
	Evening	45	56
	Night	36	48
EDP2 Lowe Avenue, Bardia	Day	39	52
	Evening	43	58
	Night	37	52

Note: Excludes periods of wind or rain affected data. Meteorological data obtained from the Bureau of Meteorology weather station Badgerys Creek AWS 33.89°S 150.72°E 81m AMSL.

Note 1: Monday to Saturday: Day 7am to 6pm; Evening 6pm to 10pm; Night 10pm to 7am. On Sundays and Public Holidays, Day 8am to 6pm; Evening 6pm to 10pm; Night 10pm to 8am.

5 Noise Assessment Criteria

5.1 Construction Noise

Noise Management Levels (NMLs) for construction noise have been developed for nearby existing residential receivers for standard construction hours and out of hours periods and are summarised in **Table 6**.

Table 6 Noise Management Levels

Location	Assessment Period	RBL, dBA	NML dB $LA_{eq(15min)}$
Residential receivers (EDP1)	Day (Standard Hours)	41	51 (RBL+10dBA)
	Evening (OOH Period 1)	45	46[1] (RBL+5dBA)
	Night (OOH Period 2)	36	41 (RBL+5dBA)
Residential receivers (EDP2)	Day (Standard Hours)	39	49 (RBL+10dBA)
	Evening (OOH Period 1)	43	44[1] (RBL+5dBA)
	Night (OOH Period 2)	37	42 (RBL+5dBA)
Industrial Premises	When in use	N/A	75 (external)
Commercial - offices, retail	When in use	N/A	70 (external)
School classrooms	When in use	N/A	45 (internal)
Places of Worship	When in use	N/A	40 (internal)
Active recreation areas	When in use	N/A	65 (external)

Note: Standard and out of hours construction periods as defined in Section 3.2.1.

Note 1: Daytime RBL adopted as the Evening cannot be higher than the Day as per the NPI.

5.2 Maximum Noise Level Assessment Criteria

The potential for sleep disturbance from maximum noise level events from a project during the night-time period needs to be considered. The NPI considers sleep disturbance to be both awakenings and disturbance to sleep stages.

Where night-time noise levels from a development/premises at a residential location exceed the following criteria, a detailed maximum noise level event assessment should be undertaken:

- $LA_{eq(15min)}$ 40dB or the prevailing RBL plus 5dBA, whichever is the greater, and/or
- LA_{max} 52dB or the prevailing RBL plus 15dBA, whichever is the greater.

A detailed assessment should cover the maximum noise level, the extent to which the maximum noise level exceeds the rating background noise level, and the number of times this happens during the night-time period.

Other factors that may be important in assessing the impacts on sleep disturbance include:

- how often the events would occur;
- the distribution of likely events across the night-time period and the existing ambient maximum events in the absence of the development;
- whether there are times of day when there is a clear change in the noise environment (such as during early morning shoulder periods); and
- current understanding of effects of maximum noise level events at night.

The maximum noise level screening criteria shown in **Table 7** are based on night-time RBLs and trigger values as per Section 2.5 of the NPI.

Table 7 Maximum Noise Level Assessment Trigger Levels

Residential Receivers - Soldiers Parade North (EDP1)			
$L_{Aeq(15min)}$		L_{Amax}	
40dB $L_{Aeq(15min)}$ or RBL + 5dB		52dB L_{Amax} or RBL + 15dB	
Trigger	40	Trigger	52
RBL +5dB	41	RBL +15dB	51
Highest	**41**	**Highest**	**52**
Residential Receivers - Soldiers Parade South (EDP2)			
$L_{Aeq(15min)}$		L_{Amax}	
40dB $L_{Aeq(15min)}$ or RBL + 5dB		52dB L_{Amax} or RBL + 15dB	
Trigger	40	Trigger	52
RBL +5dB	42	RBL +15dB	52
Highest	**42**	**Highest**	**52**

Note 1: As per Section 2.5 of the NPI, the highest of each metric are adopted as the screening criteria.

5.3 Road Traffic Noise Criteria

Table 8 presents the road traffic noise assessment criteria reproduced from the RNP relevant for this road category.

Table 8 Road Traffic Noise Assessment Criteria

Road category	Type of project/development	Assessment Criteria - dBA	
		Day (7am to 10pm)	Night (10pm to 7am)
Freeways/arterial/ sub-arterial Roads	Existing residences affected by additional traffic on freeways/arterial/sub-arterial roads generated by land use developments	60dB $LA_{eq(15hr)}$	55dB $LA_{eq(9hr)}$
Local roads	Existing residences affected by additional traffic on local roads generated by land use developments	55dB $LA_{eq(1hr)}$	50dB $LA_{eq(1hr)}$
School Classrooms	Proposed road projects and traffic generating developments	40dB $LA_{eq(1hr)}$ (internal)	N/A
Places of Worship		40dB $LA_{eq(1hr)}$ (internal)	
Child Care Facilities		Sleeping rooms 35dB $LA_{eq(1hr)}$ (internal)	
		Indoor play areas 35dB $LA_{eq(1hr)}$ (internal)	
		Outdoor play areas 35dB $LA_{eq(1hr)}$ (internal)	
Open Space (active use)	Proposed road projects and traffic generating developments	60dB $LA_{eq(1hr)}$	N/A
Open Space (passive use)		55dB $LA_{eq(1hr)}$	N/A

Additionally, the RNP states where existing road traffic noise criteria are already exceeded, any additional increase in total traffic noise level should be limited to 2dBA, which is generally accepted as the threshold of perceptibility to a change in noise level.

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6 Noise Assessment Methodology

6.1 Construction Assessment Methodology

A computer model was developed to quantify proposal noise emissions to existing identified residential receivers for typical construction activities and operations. DGMR (iNoise, Version 2020) noise modelling software was used to quantify noise emissions from typical construction activities and operations. iNoise is a new intuitive and quality assured software for industrial noise calculations in the environment. 3D noise modelling is considered industry best practice for assessing noise emissions from projects.

The model incorporated a three-dimensional digital terrain map giving all relevant topographic information used in the modelling process. Additionally, the model uses relevant noise source data, ground type, attenuation from barrier or buildings and atmospheric information to predict noise levels at the nearest potentially affected receivers.

The model calculation method used to predict noise levels was in accordance with ISO 9613-1 'Acoustics - Attenuation of sound during propagation outdoors. Part 1: Calculation of the absorption of sound by the atmosphere' and ISO 9613-2 'Acoustics - Attenuation of sound during propagation outdoors. Part 2: General method of calculation'.

The construction scenarios included in this assessment are described in **Table 9**.

Table 9 Construction Scenarios	
Scenario	Description
1 - Site establishment and enabling works	Establishment of footpath / pedestrian management and traffic controls Establishment of site compound (erect fencing, site offices, amenities and plant/material storage areas etc Establishment of environmental control measures such as erosion and sediment controls Clearly identify trees and vegetation approved for removal Removal of trees and vegetation
2 - Relocation of services and preparation of substructure	Clearly identify services for protection or relocation Relocation or protection of services
3A - Earthworks	Excavation at ground levels, with minor cut and fill earthworks Substructure preparation (preparation of service drainage and foundations)
3B – Construct floor slabs, columns and walls	Support structures for the columns and stairs Construction of floor slabs, columns and walls Installation of building services including electrical, CCTV and mechanical ventilation
3C - Fit out	Construction of footpaths, ramps, kerbs, islands, fences and surface treatments Installation of lighting, signage, internal car park road surface and line marking
4 - Construction of external cladding/façade	Subject to detailed design
5 - Construction of road works to connect car park to road network	Excavate existing road pavement Lay concrete and asphalt over the external sections of road Installation of new signage where required Kerbing and concrete works Pavement finishing including any surfacing and re-surfacing works Landscaping (subject to detailed design)
6 - Road works on Henderson Street	Establishment of traffic controls Construction of upgraded intersection Installation of new signage and traffic signals

The construction methodology at this stage is still being determined, hence this assessment has adopted generic activities to replicate potential worst case noise emissions for each scenario. Assumed plant and equipment consistent with those to be used are listed in **Table 10** along with each items sound power level. It is noted that sound power levels for plant assessed in this report were sourced from the MAC database. For each activity, all sources were assessed as operating simultaneously.

Table 10 Acoustically Significant Sources - Sound Power Levels (dBA re 10^{-12} Watts).													
Scenario	Description	Octave Band Centre Frequency, Hz									Qty	Util %	Total, dBA
		63	125	250	500	1000	2000	4000	80000	Total			
1 Site Establishment 6 Decommissioning	CAT349D Excavator[6]	89	102	104	103	101	100	93	85	109	1	50%	106
	CATD9 Dozer	86	95	99	107	103	102	100	90	110	1	50%	107
	Tipper Truck	87	90	94	95	97	97	92	82	103	2	80%	105
	Crane[6]	79	92	98	107	108	105	100	96	112	1	80%	111
	Light Service Vehicle[6]	64	70	73	67	64	62	58	44	76	2	50%	76
	Wood Chipper	82	112	110	109	108	105	102	95	116	1	80%	116
	Chainsaw	85	109	108	109	112	111	101	95	117	1	80%	116
	Generator[6]	58	79	89	91	90	87	81	70	96	1	80%	95
	1 Total Fleet Lw	93	114	113	114	115	113	107	101	121			120
	6 Total Fleet Lw	89	102	105	109	109	106	101	96	114			113
2 Services Relocation	CAT349D Excavator	89	102	104	103	101	100	93	85	109	1	80%	108
	Concrete Saw	85	109	108	109	112	111	101	95	117	1	25%	111
	Tipper Truck	87	90	94	95	97	97	92	82	103	2	50%	103
	Crane	79	92	98	107	108	105	100	96	112	1	50%	109
	Light Service Vehicle	64	70	73	67	64	62	58	44	76	2	50%	76
	Hand Tools	82	88	87	98	98	93	82	71	102	3	80%	106
	Total Fleet Lw	93	110	110	112	114	112	104	99	119			115
3A Earthworks	CAT349D Excavator	89	102	104	103	101	100	93	85	109	3	80%	113
	Tipper Truck	87	90	94	95	97	97	92	82	103	3	80%	107
	CATD9 Dozer	86	95	99	107	103	102	100	90	110	1	80%	109
	16G Grader	78	94	101	105	110	107	103	98	113	1	80%	113
	Roller (vibratory)	76	91	101	102	103	101	93	87	108	2	80%	110
	Hand Tools	82	88	87	98	98	93	82	71	102	2	80%	104

Table 10 Acoustically Significant Sources - Sound Power Levels (dBA re 10^{-12} Watts).													
Scenario	Description	Octave Band Centre Frequency, Hz									Qty	Util %	Total, dBA
		63	125	250	500	1000	2000	4000	80000	Total			
	Water Cart	82	85	89	90	92	92	87	77	98	1	80%	97
	Total Fleet Lw	93	104	108	111	112	110	106	99	117	0	0	118
3B Structural	Concrete pump	85	93	94	101	106	102	95	88	109	2	80%	111
	Concrete agitator truck	85	93	94	101	106	102	95	88	109	2	80%	111
	Crane	76	89	95	104	105	102	97	93	109	2	80%	111
	Hand Tools	82	88	87	98	98	93	82	71	102	5	80%	108
	Concrete pencil vibrator	79	87	88	95	100	96	89	82	103	4	80%	108
	Total Fleet Lw	89	97	100	108	111	107	101	96	114			117
3C Fit out	Concrete pump	85	93	94	101	106	102	95	88	109	1	80%	108
	Concrete agitator truck	85	93	94	101	106	102	95	88	103	1	80%	108
	Crane	76	89	95	104	105	102	97	93	110	1	80%	108
	Hand Tools	82	88	87	98	98	93	82	71	102	6	80%	109
	Concrete pencil vibrator	79	87	88	95	100	96	89	82	103	3	80%	107
	Total Fleet Lw	89	97	100	108	111	107	101	96	114			115
4 External Façade	EWP/Scissor Lift	90	94	90	96	94	95	91	82	102	2	80%	104
	Crane	76	89	95	104	105	102	97	93	110	1	80%	108
	Hand Tools	82	88	87	98	98	93	82	71	102	2	80%	104
	Total Fleet Lw	91	96	97	105	106	103	98	93	111			111
5 Road Works	Asphalt miller	96	101	103	104	102	103	103	101	111	1	80%	110
	Asphalt Paver	85	85	87	99	105	104	94	85	108	1	80%	107
	Tipper Truck	87	90	94	95	97	97	92	82	103	2	80%	105
	Total Fleet Lw	96	101	104	105	107	107	104	101	113			113

7 Construction Noise Assessment

7.1 Predicted Noise Levels

Noise levels were calculated at existing identified residential receivers in each assessed NCA for each scenario during standard construction hours and OOH P1 and P2. Noise levels were calculated to 1.5m above ground level. The predicted noise level range for each NCA, the NML and the number of receivers that exceed the NML are presented in **Table 11** to **Table 18** for each assessed scenario. Detailed noise results for each scenario are presented in **Appendix E**.

Table 11 Predicted Noise Levels – Scenario 1 Site Establishment

NCA & No of receivers	Predicted Noise Level dB $LA_{eq(15min)}$	NML dB $LA_{eq(15min)}$			No of receivers > NML_1		
		STD[2]	P1[2]	P2[2]	STD[2]	P1[2]	P2[2]
Edmondson Park Town Centre Existing (24)	23-44	51	46	41	0	0	0
Bardia (Centre) Existing (18)	11-37	51	46	41	0	0	0
Bardia (East) Existing (15)	12-35	51	46	41	0	0	0
Edmondson Park North East (6)	32-42	49	44	42	0	0	0
Edmondson Park North West (12)	27-40	49	44	42	0	0	0
Denham Court (12)	30-41	49	44	42	0	0	0
Bardia (Centre) Future (9)	25-40	51	46	41	0	0	0
Edmondson Park Town Centre Future (99)	19-56	51	46	41	0	5	6
Commercial (10)	40-54	70	70	70	0	0	0
Educational (3)	31-32	55[3]	55[3]	55[3]	0	0	0
Places of Worship (1)	38	50[3]	50[3]	50[3]	0	0	0
Active Recreation Areas (4)	25-42	65	65	65	0	0	0

Note 1: Exceed NML for standard construction hours by more than 10dB and NML for OOH P1 and P2 by more than 5dB requiring additional mitigation measures.

Note 2: Standard and out of hours construction periods as defined in Section 3.2.1.

Note 3: External noise level allowing for 10dB loss through an open window.

Table 12 Predicted Noise Levels – Scenario 2 Service Relocation							
NCA & No of receivers	Predicted Noise Level dB $LA_{eq(15min)}$	NML dB $LA_{eq(15min)}$			No of receivers > NML_1		
		STD	P1	P2	STD	P1	P2
Edmondson Park Town Centre Existing (24)	**30-50**	51	46	41	0	3	4
Bardia (Centre) Existing (18)	18-43	51	46	41	0	0	0
Bardia (East) Existing (15)	19-41	51	46	41	0	0	0
Edmondson Park North East (6)	**38-48**	49	44	42	0	0	1
Edmondson Park North West (12)	34-46	49	44	42	0	0	0
Denham Court (12)	**37-47**	49	44	42	0	0	1
Bardia (Centre) Future (9)	**33-47**	51	46	41	0	3	4
Edmondson Park Town Centre Future (99)	**26-63**	51	46	41	5	28	28
Commercial (10)	46-61	70	70	70	0	0	0
Educational (3)	39-39	55[3]	55[3]	55[3]	0	0	0
Places of Worship (1)	44	50[3]	50[3]	50[3]	0	0	0
Active Recreation Areas (4)	32-49	65	65	65	0	0	0

Note 1: Exceed NML for standard construction hours by more than 10dB and NML for OOH P1 and P2 by more than 5dB requiring additional mitigation measures.

Note 2: Standard and out of hours construction periods as defined in Section 3.2.1.

Note 3: External noise level allowing for 10dB loss through an open window.

Table 13 Predicted Noise Levels – Scenario 3A Earthworks							
NCA & No of receivers	Predicted Noise Level	NML dB $LA_{eq(15min)}$			No of receivers > NML_1		
	dB $LA_{eq(15min)}$	STD	P1	P2	STD	P1	P2
Edmondson Park Town Centre Existing (24)	30-47	51	46	41	0	0	0
Bardia (Centre) Existing (18)	16-44	51	46	41	0	0	0
Bardia (East) Existing (15)	17-41	51	46	41	0	0	0
Edmondson Park North East (6)	38-43	49	44	42	0	0	0
Edmondson Park North West (12)	32-44	49	44	42	0	0	0
Denham Court (12)	36-46	49	44	42	0	0	0
Bardia (Centre) Future (9)	27-47	51	46	41	0	0	0
Edmondson Park Town Centre Future (99)	**25-70**	51	46	41	11	24	25
Commercial (10)	46-58	70	70	70	0	0	0
Educational (3)	38-43	55[3]	55[3]	55[3]	0	0	0
Places of Worship (1)	44	50[3]	50[3]	50[3]	0	0	0
Active Recreation Areas (4)	29-45	65	65	65	0	0	0

Note 1: Exceed NML for standard construction hours by more than 10dB and NML for OOH P1 and P2 by more than 5dB requiring additional mitigation meas ures.

Note 2: Standard and out of hours construction periods as defined in Section 3.2.1.

Note 3: External noise level allowing for 10dB loss through an open window.

Table 14 Predicted Noise Levels – Scenario 3B Sub & Super Structure							
NCA & No of receivers	Predicted Noise Level	NML dB $LA_{eq(15min)}$			No of receivers > NML_1		
	dB $LA_{eq(15min)}$	STD	P1	P2	STD	P1	P2
Edmondson Park Town Centre Existing (24)	28-45	51	46	41	0	0	0
Bardia (Centre) Existing (18)	12-43	51	46	41	0	0	0
Bardia (East) Existing (15)	13-39	51	46	41	0	0	0
Edmondson Park North East (6)	36-41	49	44	42	0	0	0
Edmondson Park North West (12)	28-43	49	44	42	0	0	0
Denham Court (12)	34-45	49	44	42	0	0	0
Bardia (Centre) Future (9)	24-46	51	46	41	0	0	0
Edmondson Park Town Centre Future (99)	**23-70**	51	46	41	11	23	25
Commercial (10)	46-57	70	70	70	0	0	0
Educational (3)	37-43	55[3]	55[3]	55[3]	0	0	0
Places of Worship (1)	43	50[3]	50[3]	50[3]	0	0	0
Active Recreation Areas (4)	26-44	65	65	65	0	0	0

Note 1: Exceed NML for standard construction hours by more than 10dB and NML for OOH P1 and P2 by more than 5dB requiring additional mitigation measures.

Note 2: Standard and out of hours construction periods as defined in Section 3.2.1.

Note 3: External noise level allowing for 10dB loss through an open window.

Table 15 Predicted Noise Levels – Scenario 3C Fitout

NCA & No of receivers	Predicted Noise Level dB $LA_{eq(15min)}$	NML dB $LA_{eq(15min)}$			No of receivers > NML_1		
		STD	P1	P2	STD	P1	P2
Edmondson Park Town Centre Existing (24)	26-43	51	46	41	0	0	0
Bardia (Centre) Existing (18)	10-41	51	46	41	0	0	0
Bardia (East) Existing (15)	12-37	51	46	41	0	0	0
Edmondson Park North East (6)	34-39	49	44	42	0	0	0
Edmondson Park North West (12)	26-41	49	44	42	0	0	0
Denham Court (12)	32-43	49	44	42	0	0	0
Bardia (Centre) Future (9)	22-44	51	46	41	0	0	0
Edmondson Park Town Centre Future (99)	21-68	51	46	41	5	17	23
Commercial (10)	44-55	70	70	70	0	0	0
Educational (3)	35-40	55[3]	55[3]	55[3]	0	0	0
Places of Worship (1)	41	50[3]	50[3]	50[3]	0	0	0
Active Recreation Areas (4)	24-42	65	65	65	0	0	0

Note 1: Exceed NML for standard construction hours by more than 10dB and NML for OOH P1 and P2 by more than 5dB requiring additional mitigation measures.

Note 2: Standard and out of hours construction periods as defined in Section 3.2.1.

Note 3: External noise level allowing for 10dB loss through an open window.

Table 16 Predicted Noise Levels – Scenario 4 External Facade							
NCA & No of receivers	Predicted Noise Level	NML dB $LA_{eq(15min)}$			No of receivers > NML_1		
	dB $LA_{eq(15min)}$	STD	P1	P2	STD	P1	P2
Edmondson Park Town Centre Existing (24)	**33-54**	51	46	41	0	4	5
Bardia (Centre) Existing (18)	**17-47**	51	46	41	0	4	4
Bardia (East) Existing (15)	22-42	51	46	41	0	0	0
Edmondson Park North East (6)	**39-47**	49	44	42	0	0	1
Edmondson Park North West (12)	**32-48**	49	44	42	0	0	2
Denham Court (12)	**40-50**	49	44	42	0	0	2
Bardia (Centre) Future (9)	**32-52**	51	46	41	0	7	8
Edmondson Park Town Centre Future (99)	**29-77**	51	46	41	12	32	41
Commercial (10)	50-62	70	70	70	0	0	0
Educational (3)	42-48	55_3	55_3	55_3	0	0	0
Places of Worship (1)	47	50_3	50_3	50_3	0	0	0
Active Recreation Areas (4)	33-49	65	65	65	0	0	0

Note 1: Exceed NML for standard construction hours by more than 10dB and NML for OOH P1 and P2 by more than 5dB requiring additional mitigation measures.

Note 2: Standard and out of hours construction periods as defined in Section 3.2.1.

Note 3: External noise level allowing for 10dB loss through an open window.

Table 17 Predicted Noise Levels – Scenario 5 Roadworks							
NCA & No of receivers	Predicted Noise Level	NML dB $LA_{eq(15min)}$			No of receivers > NML_1		
	dB $LA_{eq(15min)}$	STD	P1	P2	STD	P1	P2
Edmondson Park Town Centre Existing (24)	24-28	51	46	41	0	0	0
Bardia (Centre) Existing (18)	13-32	51	46	41	0	0	0
Bardia (East) Existing (15)	14-43	51	46	41	0	0	0
Edmondson Park North East (6)	38-45	49	44	42	0	0	0
Edmondson Park North West (12)	26-42	49	44	42	0	0	0
Denham Court (12)	27-44	49	44	42	0	0	0
Bardia (Centre) Future (9)	18-35	51	46	41	0	0	0
Edmondson Park Town Centre Future (99)	20-60	51	46	41	4	21	23
Commercial (10)	30-34	70	70	70	0	0	0
Educational (3)	26-60	55[3]	55[3]	55[3]	0	0	0
Places of Worship (1)	29	50[3]	50[3]	50[3]	0	0	0
Active Recreation Areas (4)	23-44	65	65	65	0	0	0

Note 1: Exceed NML for standard construction hours by more than 10dB and NML for OOH P1 and P2 by more than 5dB requiring additional mitigation measures.

Note 2: Standard and out of hours construction periods as defined in Section 3.2.1.

Note 3: External noise level allowing for 10dB loss through an open window.

Table 18 Predicted Noise Levels – Scenario 6 Decommissioning							
NCA & No of receivers	Predicted Noise Level dB $LA_{eq(15min)}$	NML dB $LA_{eq(15min)}$			No of receivers > NML_1		
		STD	P1	P2	STD	P1	P2
Edmondson Park Town Centre Existing (24)	20-41	51	46	41	0	0	0
Bardia (Centre) Existing (18)	8-34	51	46	41	0	0	0
Bardia (East) Existing (15)	9-32	51	46	41	0	0	0
Edmondson Park North East (6)	29-39	49	44	42	0	0	0
Edmondson Park North West (12)	24-37	49	44	42	0	0	0
Denham Court (12)	27-38	49	44	42	0	0	0
Bardia (Centre) Future (9)	22-37	51	46	41	0	0	0
Edmondson Park Town Centre Future (99)	16-53	51	46	41	0	5	5
Commercial (10)	37-51	70	70	70	0	0	0
Educational (3)	28-29	55[3]	55[3]	55[3]	0	0	0
Places of Worship (1)	35	50[3]	50[3]	50[3]	0	0	0
Active Recreation Areas (4)	22-39	65	65	65	0	0	0

Note 1: Exceed NML for standard construction hours by more than 10dB and NML for OOH P1 and P2 by more than 5dB requiring additional mitigation meas ures.

Note 2: Standard and out of hours construction periods as defined in Section 3.2.1.

Note 3: External noise level allowing for 10dB loss through an open window.

Noise emissions are predicted to be either below the NML or within NML +10dB for standard construction hours at all existing identified residential receivers for all scenarios. Noise emissions are predicted to exceed the OOH NMLs at up to five (5) existing identified residential receivers by more than 5dB for Scenarios 2 and 4. Noise emissions are predicted to be below the highly noise affected management level (75dBA) at all existing identified residential receivers.

Therefore, feasible and reasonable noise controls are recommended to be considered where appropriate.

Noise emissions are predicted to exceed the NMLs by more than 10dB during standard construction hours at up to twelve (12) potential future receivers for Scenarios 2, 3, 3B, 3C, 4 and 5. Noise emissions are predicted to exceed the OOH NMLs at up to 41 potential future receivers by more than 5dB for all scenarios. Noise emissions are predicted to exceed the highly noise affected management level (75dBA) at one (1) potential future receiver FR01.

7.2 Additional Mitigation Measures

The TfNSW CNVS V4.1 outlines a range of standard Additional Mitigation Measures (AMM) which are recommended to manage the potential impact and would be implemented for the proposal where practicable. The additional measures are reproduced in **Table 19** and will be considered following incorporation of feasible and reasonable mitigation measures for the proposal.

Table 19 Triggers for Additional Mitigation Measures - Airborne Noise

Time period	Receiver Perception	dB above RBL	dB above NML	Additional Management Measures
Standard	Noticeable	5 – 10	0	--
	Clearly Audible	>10 – 20	<10	--
	Moderately Intrusive	>20 – 30	>10 – 20	PN, V
	Highly Intrusive	>30	>20	PN, V
	> 75dBA HNA	n/a	n/a	PN, V, SN
OOH Period 1	Noticeable	5 – 10	<5	
	Clearly Audible	>10 – 20	5 - 15	PN
	Moderately Intrusive	>20 – 30	>15 – 25	PN, V, SN, RO
	Highly Intrusive	>30	>25	PN, V, SN, RO, RP#, DR#
OOH Period 2	Noticeable	5 – 10	<5	PN
	Clearly Audible	>10 – 20	5 - 15	PN, V
	Moderately Intrusive	>20 – 30	>15 – 25	PN, V, SN, RO, RP, DR
	Highly Intrusive	>30	>25	PN, V, SN, AA, RP, DR

Notes: PN = Project Notification; SN = Specific Notification, individual briefings, or phone call; V = Verification monitoring; DR = Duration Reduction; RP = Respite Period; RO = Project specific Respite Offer; AA = Alternative Accommodation.

Respite periods and duration reduction are not applicable when works are carried out during OOHW Period 1 Day only (i.e. Saturday 6am-7am & 1pm-6pm, Sundays / Public Holidays 8am-6pm)

Appendix E presents detailed results for existing identified residential receivers and the AMM required to manage noise emissions for all construction periods.

7.3 Maximum Noise Trigger Levels – Construction

Out of hours construction activities occurring during the night time have the potential to generate noise emissions that may cause sleep disturbance at existing identified residential receivers in proximity to the construction work.

Noise modelling quantified the levels from maximum night time events from the near point of each construction activity to existing identified residential receivers. Modelling adopted a sound power level of 115dB L_{Amax} to represent emissions from transient sources such as truck tail gate bangs and metallic impacts from equipment.

Modelling identified that maximum emissions satisfy the maximum noise trigger levels at all existing identified residential receivers.

Maximum emissions have the potential to be exceed to maximum noise trigger levels at the nearest potential future receiver FR01 immediately adjacent to the proposal. Therefore, in the event of the construction of the new residential building being occupied prior to construction, it is recommended that the proposal proactively manages night time noise emissions and implement reasonable and feasible noise control strategies to minimise and where possible, eliminate the occurrence of sleep disturbance within the surrounding locality.

8 Car Park Operational Noise Assessment

To assess the potential noise impacts associated with the operation of the proposed CCP, two key assessment scenarios were developed:

- general operational noise from normal car park usage within the carpark; and
- transient noise events such as car door slams, boot slams or horn emissions.

For the assessment of operational noise, a sound power for general car usage (i.e. car movement and engine noise) of 75dB $LA_{eq(15min)}$ was adopted. Wheel squeal from vehicles manoeuvring in the CCP has not been assessed as the proposal can be designed to minimise or eliminate this type of noise emission. To assess the impact transient noise events such as door or boot slams a sound power level of 85dB LA_{max} was adopted.

Predicted noise levels from the general operation of the car park are less than 35dB $LA_{eq(15min)}$ at all existing identified residential receivers and potential future receivers, satisfying the minimum applicable night time NPI criteria of 35dB $LA_{eq(15min)}$. Predicted maximum noise level events are less than 40dB LA_{max} at all existing identified residential receivers and potential future receivers, which would also satisfy the operational maximum noise trigger levels.

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9 Operational Road Traffic Noise Assessment

9.1 Existing and Future Road Traffic Flows

There is potential for operational road traffic noise impacts as a result of the proposed CCP is most likely to occur from increased traffic on Soldiers Parade. Existing and predicted future traffic flows shown in **Table 20** have been sourced from the proposal Transport Traffic Impact Assessment (TTIA, futurerail Report MTMS0TA-FURL-EDP-TP-RPT-140001 Revision B 31 March 2020) and has been used to calculate the increase in road traffic noise levels from the operation of the CCP.

Table 20 Existing and Future Traffic Flows – Soldiers Parade

Condition	Daytime (7am – 10pm)	Night time (10pm – 7am)
Existing two way traffic flow (Dec 2019) Without CCP	6808	1635
Predicted AM Car Park Demand		
Hour starting 5am	--	110
Hour starting 6am	--	320
Hour starting 7am	420	--
Hour starting 8am	150	--
9am-3pm (estimated 25% CCP capacity)	250	--
Predicted PM Car Park Demand		
Hour starting 3pm	250	--
Hour starting 4pm	250	--
Hour starting 5pm	250	--
Hour starting 6pm	250	--
7am-10pm (estimated 12.5% CCP capacity)	125	--
10pm–5am (estimated 12.5% CCP capacity)	--	125
Total Traffic Flow with CCP	8753	2190
% Increase	29%	34%

Traffic Data Source - Transport Traffic Impact Assessment – Edmondson Park Station CCP (TTIA, futurerail Report MTMS0TA-FURL-EDP-TP-RPT-140001 Revision B 31 March 2020).

9.2 Existing Road Traffic Noise

Unattended noise monitoring data has been analysed to quantify existing road traffic noise levels as there is potential for the proposal to increase existing road traffic noise levels. The Edmondson Park Station CCP Transport Traffic Impact Assessment (TTIA, futurerail Report MTMS0TA-FURL-EDP-TP-RPT-140001 Revision B 31 March 2020) identifies the largest potential for increases in road traffic would occur along Soldiers Parade from additional vehicles generated by the proposed CCP.

Existing road traffic noise levels measured at unattended noise monitoring location EDP1, presented in **Table 21** are below the relevant road traffic noise criteria outlined in **Section 5.3**.

Table 21 Measured Road Traffic Noise Levels

Noise Monitoring Location	Period[1]	Existing Road Traffic Noise Level (free field)
EDP1 Soldiers Parade North (40m from road centreline)	Day	56.4dB $L_{Aeq(15hr)}$
	Night	48.3dB $L_{Aeq(9hr)}$

Note 1: Day 7am to 10pm; Night 10pm to 7am.

The closest existing residential receivers are apartment blocks/townhouses on the southern side of the railway on Soldiers Parade are R05 and R06 and are approximately 15m and 65m respectively from the road centreline. Receiver R06 is also shielded by the receiver R05 structure.

For these receivers, the road traffic noise levels (measured at EDP1) have been adjusted to account for offset distance and façade reflection. Similarly, for residential receivers, on the northern side of Soldiers Parade with direct line of sight to the road, calculated road traffic noise levels (measured at EDP1) have been adjusted to account for offset distance and façade reflection. The existing road traffic noise levels for receivers are presented in **Table 22**.

Table 22 Existing Road Traffic Noise Levels

Receiver	Period[1]	Existing Road Traffic Noise Level
R05 Soldiers Parade South (18m from road centreline)	Day	65.8dB $L_{Aeq(15hr)}$
	Night	57.7dB $L_{Aeq(9hr)}$
R06 Soldiers Parade South (65m from road centreline)	Day	51.2dB $L_{Aeq(15hr)}$
	Night	43.2dB $L_{Aeq(9hr)}$
Receivers facing Soldiers Parade North (25m from road centreline)	Day	56.7dB $L_{Aeq(15hr)}$
	Night	48.7dB $L_{Aeq(9hr)}$

9.3 Modelling Methodology

The operational road traffic assessment has been completed utilising the Calculation of Road Traffic Noise (CoRTN) which was developed by the United Kingdom Department of Environment. The modelling methodology is widely accepted in Australia and the preferred method for assessing operational road traffic emissions by the NSW EPA and TfNSW.

Brüel and Kjær Predictor Type 7810 (Version 11.10) noise modelling software was used to assess operational traffic noise impacts from the proposal. The model incorporated three-dimensional ground contours and relevant features adjacent to Soldiers Parade and Edmondson Park Station. **Table 23** presents the parameters utilised in the modelling process.

Table 23 Road Traffic Noise Assessment Parameters

Parameter	Adopted Value	
	Existing Conditions	Proposal Conditions
Road Surface	Standard dense grade asphalt	
Source Height (cars)	0.5m	
Speed Limit	50km/h	50km/h
Receiver Height	1.5m above ground level	
Receiver Location	1m from building facade	
Receiver Façade Reflection	+2.5dB as per CoRTN	
Receiver Façade Correction	-1.7dB as per ARRB[1]	

Note 1: This adjustment comes from a 1982 Australian Road Research Board study, An Evaluation of the U.K. DoE Traffic Noise Prediction (Report No 122, ARRB – NAASRA Planning Group) which found that the CoRTN calculations were over- predicting road traffic noise by this margin.

9.4 Operational Traffic Noise Results

9.4.1 Model Validation

The noise model was validated using the results of the unattended noise monitoring at EDP1 Soldiers Parade (north). **Table 24** summarises the results of the validation modelling for existing conditions compared to the measured traffic noise levels at location EDP1. Noise predictions demonstrate a consistent correlation (±<2dB tolerance) when compared against measured levels.

Table 24 Road Traffic Noise Model Validation

Location	$LA_{eq(15hr)}$ Daytime Noise Level			$LA_{eq(9hr)}$ Night-time Noise Level		
	Measured Level	Predicted Level	Variance	Measured Level	Predicted Level	Variance
EDP1 Soldiers Parade North	56.4	56.2	0.2	48.3	48.2	0.1

Note: Relevant receiver facade reflection and correction applied as per Table 23.

9.4.2 Comparison of Existing and Future Road Traffic Noise Levels

Table 25 presents a comparison of (calculated) existing and future road traffic noise levels for existing identified residential receivers.

Table 25 Predicted Road Traffic Noise Levels – Existing Identified Residential Receivers

		Existing Road Traffic Noise		Future Road Traffic Noise		Change, dB	
ID	Description	Daytime dB $LA_{eq(15hr)}$	Night time dB $LA_{eq(9hr)}$	Daytime dB $LA_{eq(15hr)}$	Night time dB $LA_{eq(9hr)}$	Daytime	Night time
R01	Digger Lane	28.7	20.6	32.5	25.0	3.8	4.4
R02	Digger Lane	27.0	18.9	32.3	24.9	5.3	6
R03	Ordinance Street	28.2	20.2	35.0	27.3	6.8	7.1
R04	Vevi Street	27.0	18.9	31.8	24.2	4.8	5.3
R05	Soldiers Parade	**64.1**	**56.0**	**65.2**	**57.4**	1.1	1.4
R06	Soldiers Parade	49.5	41.5	50.7	42.9	1.2	1.4
R07	Vevi Street	26.2	18.2	29.3	21.7	3.1	3.5
R08	Vevi Street	25.7	17.6	29.5	22.0	3.8	4.4
R09	Vevi Street	26.6	18.6	31.3	23.8	4.7	5.2
R10	Arthur Allen Drive	23.5	15.5	26.3	18.8	2.8	3.3
R11	Arthur Allen Drive	23.2	15.2	28.0	20.5	4.8	5.3
R12	Arthur Allen Drive	20.4	12.3	27.6	20.1	7.2	7.8
R13	Arthur Allen Drive	23.0	14.9	25.5	17.8	2.5	2.9
R14	Arthur Allen Drive	20.3	12.2	26.2	18.7	5.9	6.5
R15	Arthur Allen Drive	22.1	14.1	23.4	15.6	1.3	1.5
R16	Arthur Allen Drive	35.0	27.0	36.3	28.5	1.3	1.5
R17	Bardia Avenue	18.6	10.6	21.4	13.9	2.8	3.3
R18	Bardia Avenue	20.3	12.2	22.6	14.7	2.3	2.5
R19	Bardia Avenue	26.3	18.3	27.6	19.8	1.3	1.5
R20	Lowe Avenue	31.1	23.1	32.2	24.5	1.1	1.4
R21	Lowe Avenue	30.6	22.6	31.7	24.0	1.1	1.4
R22	Webber Circuit	31.3	23.3	32.5	24.7	1.2	1.4
R23	Nash Street	31.9	23.7	32.9	25.2	1.0	1.5
R24	Noble Street	32.4	24.4	33.5	25.8	1.1	1.4
R25	Bursill Place	31.4	23.4	32.6	24.8	1.2	1.4
R26	Webber Circuit	31.1	23.1	32.3	24.5	1.2	1.4
R27	Callinan Crescent	31.5	23.5	32.6	24.9	1.1	1.4
R28	Donohoe Street	31.8	23.7	32.9	25.1	1.1	1.4
R29	Callinan Crescent	31.4	23.3	32.5	24.8	1.1	1.5
R30	Ingleburn Gardens	31.9	23.8	33.0	25.2	1.1	1.4

Table 25 Predicted Road Traffic Noise Levels – Existing Identified Residential Receivers							
		Existing Road Traffic Noise		Future Road Traffic Noise		Change, dB	
ID	Description	Daytime dB $L_{Aeq(15hr)}$	Night time dB $L_{Aeq(9hr)}$	Daytime dB $L_{Aeq(15hr)}$	Night time dB $L_{Aeq(9hr)}$	Daytime	Night time
	Drive						
R31	Ingleburn Gardens Drive	32.4	24.3	33.4	25.7	1.0	1.4
R32	Ingleburn Gardens Drive	32.2	24.0	33.3	25.5	1.1	1.5
R33	Hollyoake Circuit	30.9	22.8	32.0	24.2	1.1	1.4
R34	Burton Avenue	31.7	23.7	32.8	25.1	1.1	1.4
R35	Ingleburn Gardens Drive	32.3	24.1	33.4	25.7	1.1	1.6
R36	Croatia Avenue	41.7	33.7	42.8	35.0	1.1	1.3
R37	Croatia Avenue	41.1	33.1	42.2	34.4	1.1	1.3
R38	Croatia Avenue	40.1	32.1	41.2	33.4	1.1	1.3
R39	Croatia Avenue	45.9	37.8	47.0	39.2	1.1	1.4
R40	Croatia Avenue	43.2	35.2	44.3	36.5	1.1	1.3
R41	Arnhem Road	37.7	29.7	38.8	31.1	1.1	1.4
R42	Changsha Road	37.8	29.8	38.9	31.1	1.1	1.3
R43	Wonson Road	49.8	41.8	50.9	43.1	1.1	1.3
R44	Learoyd Road	42.0	33.9	43.1	35.3	1.1	1.4
R45	McFarlane Road	38.9	30.8	40.1	32.4	1.2	1.6
R46	Faulkner Way	34.8	26.6	36.1	28.5	1.3	1.9
R47	Faulkner Way	34.4	26.2	35.6	28.1	1.2	1.9
R48	Faulkner Way	31.0	22.9	32.2	24.5	1.2	1.6
R49	Holiday Avenue	28.4	20.4	29.7	22.0	1.3	1.6
R50	Buchan Avenue	30.3	22.2	31.6	23.9	1.3	1.7
R51	Buchan Avenue	28.1	20.1	29.3	21.6	1.2	1.5
R52	Gallipoli Drive	28.2	20.1	29.4	21.7	1.2	1.6
R53	Isonzo Road	27.1	19.0	28.3	20.6	1.2	1.6
R54	Culverston Avenue	25.1	17.1	26.6	18.9	1.5	1.8
R55	Culverston Avenue	26.1	18.1	27.7	20.0	1.6	1.9
R56	Culverston Avenue	25.1	17.1	26.5	18.8	1.4	1.7
R57	Culverston Avenue	24.9	16.8	26.2	18.5	1.3	1.7
R58	Culverston Avenue	24.5	16.5	25.8	18.0	1.3	1.5
R59	Culverston Avenue	24.6	16.6	25.9	18.1	1.3	1.5
R60	Culverston Avenue	24.3	16.3	25.6	17.8	1.3	1.5
R61	Culverston Avenue	24.3	16.3	25.7	18.0	1.4	1.7
R62	Culverston Avenue	23.5	15.5	24.9	17.2	1.4	1.7

Table 25 Predicted Road Traffic Noise Levels – Existing Identified Residential Receivers

ID	Description	Existing Road Traffic Noise Daytime dB $L_{Aeq(15hr)}$	Existing Road Traffic Noise Night time dB $L_{Aeq(9hr)}$	Future Road Traffic Noise Daytime dB $L_{Aeq(15hr)}$	Future Road Traffic Noise Night time dB $L_{Aeq(9hr)}$	Change, dB Daytime	Change, dB Night time
R63	Culverston Avenue	22.7	14.7	24.1	16.4	1.4	1.7
R64	Culverston Avenue	21.9	13.8	23.3	15.6	1.4	1.8
R65	Culverston Avenue	21.3	13.3	22.8	15.0	1.5	1.7

Note: Levels calculated to the most exposed façade, excludes dwelling structure and includes +2.5dB façade reflection and -1.7dB façade correction.

Note: Bold denotes exceedance of RNP criteria.

Results of the potential future traffic generated by the proposal indicates an increase of 1dB to 7.2dB during the daytime period and 1.3dB to 7.8dB during the night time period across all identified existing residential receivers.

Existing road traffic noise levels at the façade of receiver R05 on Soldiers Parade currently exceed the RNP criteria. Future road traffic noise levels are expected to increase by <2dB therefore satisfying the requirements of the RNP.

Future road traffic noise levels are predicted to satisfy the RNP criteria at all remaining identified existing residential receivers.

Therefore, the objectives of the RNP are satisfied at all identified existing residential receivers.

Table 26 presents a comparison of (calculated) existing and future road traffic noise levels for all non residential receiver types.

Table 26 Predicted Road Traffic Noise Levels – Non Residential Receivers

ID	Description	Existing Road Traffic Noise Daytime dB $L_{Aeq(15hr)}$	Future Road Traffic Noise Daytime dB $L_{Aeq(15hr)}$	Complies with RNP Criteria
AR01	Clermont Park	35.8	37.1	Yes
AR02	Bardia Park	34.6	35.9	Yes
AR03	Edmondson Regional Park	26.6	28.2	Yes
AR04	Mon St Quentin Oval	23.8	26.4	Yes
CCC01	Bambi Kindergarten	22.0	24.8	Yes
CH01	Jehovah's Witness Kingdom Hall	25.8	27.4	Yes
SCH01	Bardia Public School	35.9	37.5	Yes
SCH02	St Francis College	38.4	39.6	Yes

The RNP criteria is satisfied at all non residential receiver types.

10 Discussion

Construction noise levels are predicted to exceed the Triggers for Additional Mitigation Measures (see **Table 19**) for Scenario 2 and Scenario 4 during OOH periods at several existing identified residential receivers, requiring additional mitigation measures to be implemented. Therefore, feasible and reasonable noise controls are recommended to be considered if these activities were to be conducted during OOH periods. It is noted that emissions are predicted to remain below the highly noise affected management levels at existing identified residential receivers (see **Table 3**).

10.1 Construction Noise Management Objectives

The primary objective of noise emission management is to limit noise impacts from construction works on the surrounding community. The following strategies may be adopted to achieve this objective:

- ensure that construction activities meet NMLs within the allowable hours of operation as far as practicable;
- where noise levels are above NMLs, implement reasonable and feasible best practice noise controls to minimise noise emissions and/or exposure duration at affected receivers; and
- where the use of best practice noise controls do not adequately address exceedance of NMLs, adopt alternative measures to minimise impacts on the community.

10.2 Construction Noise Management

Australian Standard AS 2436-2010 "Guide to Noise Control on Construction, Maintenance and Demolition Sites" sets out numerous practical recommendations to assist in mitigating construction noise emissions. Recommendations provided in this standard include operational strategies, source noise control strategies, noise barrier controls, and community consultation.

It is estimated that adopting strategies contained in this standard may result in the following noise attenuation:

- Up to 10dBA where space requirements place limitations on the attenuation options available; and
- Up to 20dBA in situations where noise source noise mitigation measures (silencers, mufflers, etc) can be combined with noise barriers and other management techniques.

Where exceedances of the NML are anticipated, a combination of mitigation, management and consultation with the local communities will be considered.

Therefore, the proposal will consider the following mitigation measures:

- toolbox and induction of personnel prior to shift to inform relevant receivers and mitigation measures;
- all plant should be shutdown when not in use. Plant to be parked/started at farthest point from relevant assessment locations;
- where possible positioning of site shed/containers in locations that would screen potential neighbouring receivers;
- minimisation of UHF radio use;
- avoidance of yelling;
- operating plant in a conservative manner (no over-revving);
- selection of the quietest suitable machinery available for each activity;
- notify residences in advance of works;
- avoidance of metallic impact noise;
- all plant are to utilise the broadband reverse alarm in lieu of the traditional 'tonal' type reverse alarm;
- undertake letter box drops to notify potentially affected receivers of potential works;
- maximise the offset distance between noisy items of plant/machinery and nearby receivers;
- where practicable, ensure those noisy plant/machinery are not working simultaneously in close proximity to sensitive receivers;
- queuing of vehicle is not to occur adjacent to any residential receiver; and
- where queuing is required, for example due to safety reasons, engines are to be switched off to reduce their overall noise impacts on receivers.

10.3 Construction Noise Mitigation Measures

The CNVG and ICNG outline noise management and mitigation initiatives to minimise the impact and improve the acoustic amenity of receivers potentially affected by road construction proposals. The guideline suggests there are no prescribed noise controls for construction work, instead:

> *All feasible and reasonable work practices should be put in place to minimise noise impacts. This approach gives construction site managers and construction workers the greatest flexibility to manage noise.*

Seven key strategies in reducing construction noise emissions are outlined in Section 6 of the ICNG that should be applied on a case-by-case basis and include the following:

Strategy 1: Universal Work Practices;

Strategy 2: Consultation and Notification;

Strategy 3: Plant and Equipment;

Strategy 4: Onsite;

Strategy 5: Work Scheduling;

Strategy 6: Transmission Path;

Strategy 7: At residence (treatments) or other sensitive Land Uses (last resort).

In addition, Australian Standard AS 2436-2010 "Guide to Noise Control on Construction, Maintenance and Demolition Sites" sets out numerous practical recommendations to assist in mitigating construction noise emissions.

Recommendations provided in the ICNG and AS2436 include combinations of operational strategies, source noise control strategies, noise barrier controls, and community consultation.

It is estimated that adopting strategies contained in this standard may result in the following noise attenuation:

- up to 10 dBA where space requirements place limitations on the attenuation options available; and
- up to 20 dBA in situations where noise source noise mitigation measures (silencers, mufflers, etc) can be combined with noise barriers and other management techniques.

The standard mitigation measures are provided in **Table 27**.

Table 27 Standard Mitigation Measures	
Action Required	Management Measures
Universal Work Practices	
Pre-Construction / Site Inductions	All employees, contractors and subcontractors are to receive an environmental induction. The induction must at least include: ▪ relevant noise and vibration mitigation measures ▪ licence and approval conditions ▪ permissible hours of work ▪ limitations on high noise generating activities ▪ location of nearest sensitive receivers ▪ construction employee parking areas ▪ designated loading/unloading areas and procedures ▪ site opening/closing times ▪ environmental incident procedures.
	Implement a noise monitoring program to quantify noise emissions from construction activities and guide practical reasonable and feasible noise control measures.
Plan Worksites	Locate compounds away from sensitive receivers and discourage access from local roads.
	Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site.
Site Practices / Behavioural Practices	Conduct toolbox talks pre-shift to communicate awareness regarding the importance of noise emission management.
	Ensure site managers periodically check the site and nearby residences and other sensitive land uses for noise problems so that solutions can be quickly applied.
	Include in tenders, employment contracts, subcontractor agreements and work method statements clauses that require minimisation of noise and compliance with directions from management to minimise noise
	Avoid shouting and minimise talking loudly. Avoid dropping materials from height, throwing of metal items and slamming of doors.
	Keep truck drivers informed of designated vehicle routes, parking locations, acceptable delivery hours or other relevant practices
	Encourage workers to operate equipment in a conservative manner.

Table 27 Standard Mitigation Measures	
Action Required	Management Measures
Consultation and Notification	
Notification	Provide information to neighbours detailing work activities, dates and hours, impacts and mitigation measures, work schedule over the night period, any operational noise benefits from the works (where applicable) and contact telephone number.
	Notifications should be a minimum of 7 calendar days prior to the start of the works.
	Use site information board at the front of the site with relevant details about site contacts, hours of operation and regular information updates.
Complaints Handling	Have a documented complaints handling procedure with an escalation procedure so that if a complaint is not satisfied, there is a clear path to follow.
	Implement all feasible and reasonable measures to address the source of the complaint.
	Keep a register of any complaints including all relevant details and provide a quick response to all complaints.
Plant and Equipment	
Construction Method	Use quieter and less vibration emitting construction methods where feasible and reasonable (eg bore piles rather than impact driven piles).
Equipment / Maintenance	Select the quietest plant to perform a specific function and consider the noise levels of plant and equipment in rental or purchasing decisions.
	Non-tonal reversing beepers (or an equivalent mechanism) must be fitted and used on all construction vehicles and mobile plant regularly used on site and for any out of hours work. Consider the use of ambient sensitive alarms.
	Regularly inspect and maintain equipment to ensure that it is in good working order.
	Equipment must not be operated until it is maintained or repaired, where maintenance or repair would address an annoying character of noise identified.
	Return any hired equipment that is causing noise that is not typical for the equipment – the increased noise may indicate the need for repair.
Site Practices	The offset distance between noisy plant and adjacent sensitive receivers should be maximised and restrict areas that mobile plant can be operated during sensitive times.
	Maximise shielding between plant and adjacent sensitive receivers by making use of natural landforms, temporary structures and stockpiles, and barriers.
	Operate plant in a quiet and efficient manner. Reduce throttle settings and turn off equipment when not being used.
	Where practicable, avoid the coincidence of noisy plant/machinery working simultaneously in close proximity to sensitive receivers.

Table 27 Standard Mitigation Measures	
Action Required	Management Measures
	Minimise disturbance arising from delivery of goods to construction sites by: ▪ avoid queuing of vehicles where practicable or ensure engines are switched off to reduce their overall noise impacts on receivers ▪ minimise the use of engine brakes ▪ fit delivery vehicles with straps rather than chains ▪ select site access points and roads as far away as possible from sensitive receivers and provide shielding where practicable.
Work Scheduling	
Work Scheduling	Where feasible and reasonable, construction should be carried out during standard construction hours (daytime period). Work generating high noise and/or vibration should be scheduled during less sensitive time periods.
	Where very noisy activities cannot be undertaken during standard construction hours, the works should be completed before 11:00pm.
	Where additional activities or plant may only result in a marginal noise increase and speed up works, consider limiting duration of impacts by concentrating noisy activities at one location and move to another as quickly as possible.
	Works should be scheduled to avoid periods of major student exams such as before or during the Higher School Certificate.
	Schedule delivery of materials to occur during the day or early evening periods only.
	Organise deliveries and access to optimise the number of vehicle trips to and from the site – movements can be organised to amalgamate loads rather than using a number of vehicles with smaller loads.
Transmission Paths	
Physical Methods	Reduce the line-of-sight transmission from noise emissions sources to residences or other sensitive land uses using temporary barriers or mobile screens.
	Erect temporary noise barriers before work commences to ensure noise is minimised during the entire shift.
	Consider the height of mobile screens and barriers to ensure adequate shielding to multistorey dwellings.
At Residence or other Sensitive Land Uses	

Table 27 Standard Mitigation Measures	
Action Required	Management Measures
Structural Surveys	Pre-construction surveys of the structural integrity of vibration sensitive buildings may be required.
Temporary Relocation	Examine and implement, where feasible and reasonable, the option of relocating noise-affected occupants for short periods of time, such as when high noise levels from construction occur at night and there are no feasible and reasonable ways of reducing noise levels. For example, the proponent could offer alternative accommodation or other respite measures (such as movie tickets) where mitigation is sought and there are no feasible and reasonable work methods available.
Architectural Treatments	Examine and implement, where feasible and reasonable, the option of acoustical treatment to residences affected by construction noise, such as to windows at the building façade. Note that the effectiveness of closing existing windows may be limited by the performance of the window seals.

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11 Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has been engaged by Pitt&Sherry Operations Pty. Ltd. on behalf of Transport for NSW (TfNSW) to complete a Noise and Vibration Impact Assessment for the proposed Edmondson Park Commuter Car Park (CCP) Edmondson Park, NSW.

The results of the assessment demonstrate that construction noise levels are predicted to be either below the NML or within NML +10dB for standard construction hours at all existing identified residential receivers for all scenarios. Noise emissions are predicted to exceed the OOH NMLs at up to five (5) existing identified residential receivers for two construction scenarios. Accordingly, the NVIA provides prescriptive reasonable and feasible recommendations that can be implemented to reduce noise impacts to the community. Notwithstanding, noise levels are predicted to satisfy the highly noise affected criteria of 75dB $L_{Aeq(15min)}$, at all existing identified residential receivers.

In summary, it is recommended that during construction, noise control and management measures provided in this report are adopted to minimise impacts to receiver catchments.

Out of hours construction activities occurring during the night time are expected to satisfy the maximum trigger levels at all existing identified residential receivers.

Maximum emissions have the potential to exceed maximum noise trigger levels at the nearest potential future receiver (FR01) immediately adjacent to the proposal. Therefore, the proposal will actively manage and minimise transient noise events during out of hours works if the residential building is occupied during the construction period.

The nearest existing residential receivers to the construction area are greater than 150m from the proposal and human exposure to vibration is anticipated to be minimal. Furthermore, where the human response criteria are satisfied, the structural or cosmetic criteria for sensitive receivers will be achieved.

Construction road traffic (noise and vibration) impacts from the proposal are not anticipated due to the relatively low number of additional vehicles on the public road network, primarily Soldiers Parade. This would be considered a negligible increase in traffic numbers and is not expected to increase road traffic noise levels at receivers along the route.

For existing residential receivers on Soldiers Parade, the additional road traffic from the proposed CCP will result in an increase in road traffic noise levels of up to 1.1dB during the daytime period and up to 1.4dB increase during the night time period. However, as the change in noise levels are is less than 2dB the objectives of the RNP are satisfied at all identified residential receivers. The RNP criteria is satisfied for the remaining identified existing residential receivers.

Predicted noise levels from the operation of the proposal are expected to satisfy the minimum applicable operational criteria at all existing identified residential receivers and potential future receivers. Predicted maximum noise level events from the operation of the proposal are expected to satisfy the maximum noise trigger levels.at all existing identified residential receivers and potential future receivers.

Appendix A – Glossary of Terms

A number of technical terms have been used in this report and are explained in the **Table A1**.

Table A1 Glossary of Terms

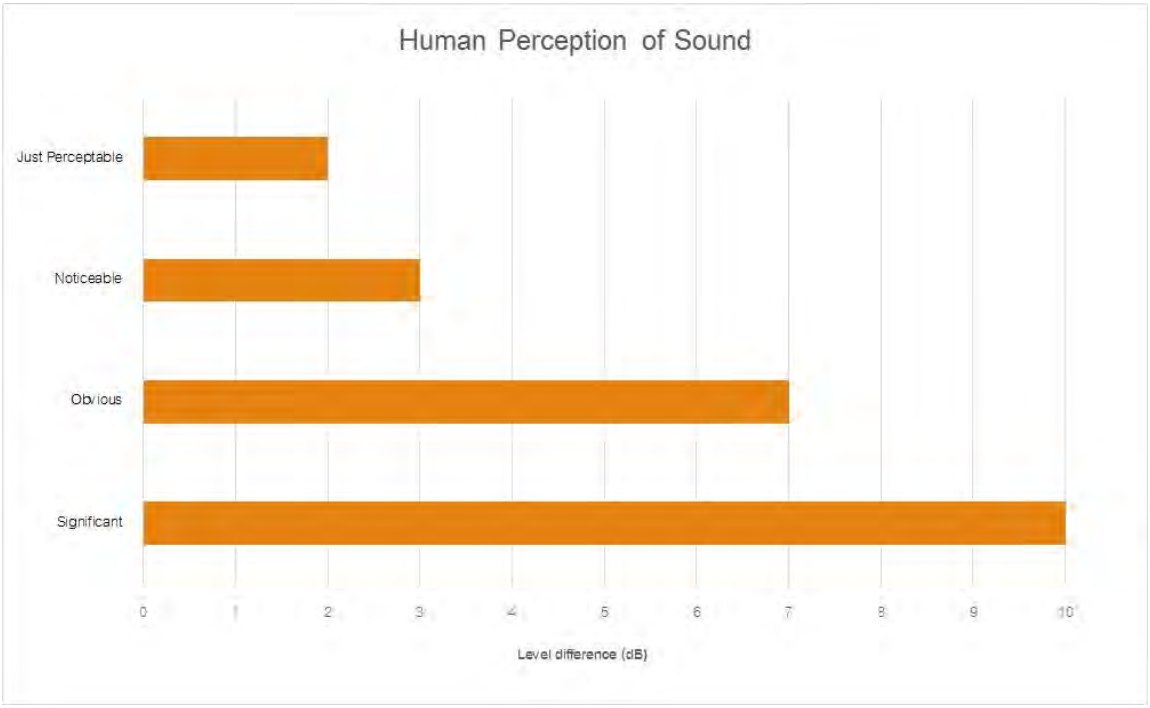
Term	Description
1/3 Octave	Single octave bands divided into three parts
Octave	A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit.
ABL	Assessment Background Level (ABL) is defined in the NPI as a single figure background level for each assessment period (day, evening and night). It is the tenth percentile of the measured L90 statistical noise levels.
Ambient Noise	The noise associated with a given environment. Typically a composite of sounds from many sources located both near and far where no particular sound is dominant.
A Weighting	A standard weighting of the audible frequencies designed to reflect the response of the human ear to noise.
dBA	Noise is measured in units called decibels (dB). There are several scales for Descriptionribing noise, the most common being the 'A-weighted' scale. This attempts to closely approximate the frequency response of the human ear.
dB(Z), dB(L)	Decibels Linear or decibels Z-weighted.
Hertz (Hz)	The measure of frequency of sound wave oscillations per second - 1 oscillation per second equals 1 hertz.
LA10	A noise level which is exceeded 10 % of the time. It is approximately equivalent to the average of maximum noise levels.
LA90	Commonly referred to as the background noise, this is the level exceeded 90 % of the time.
LAeq	The summation of noise over a selected period of time. It is the energy average noise from a source, and is the equivalent continuous sound pressure level over a given period.
LAmax	The maximum root mean squared (rms) sound pressure level received at the microphone during a measuring interval.
RBL	The Rating Background Level (RBL) is an overall single figure background level representing each assessment period over the whole monitoring period. The RBL is used to determine the intrusiveness criteria for noise assessment purposes and is the median of the ABL's.
Sound power level (Lw)	This is a measure of the total power radiated by a source. The sound power of a source is a fundamental location of the source and is independent of the surrounding environment. Or a measure of the energy emitted from a source as sound and is given by : = 10.log10 (W/Wo) Where : W is the sound power in watts and Wo is the sound reference power at 10-12 watts.

Table A2 provides a list of common noise sources and their typical sound level.

Table A2 Common Noise Sources and Their Typical Sound Pressure Levels (SPL), dBA

Source	Typical Sound Level
Threshold of pain	140
Jet engine	130
Hydraulic hammer	120
Chainsaw	110
Industrial workshop	100
Lawn-mower (operator position)	90
Heavy traffic (footpath)	80
Elevated speech	70
Typical conversation	60
Ambient suburban environment	40
Ambient rural environment	30
Bedroom (night with windows closed)	20
Threshold of hearing	0

Figure A1 – Human Perception of Sound



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Appendix B – Proposal Design Plans

SITE PLAN

SCALE 1 : 1000

Max Number of Levels	6
Total Car Bays	1278

0 10 50 100
METRES 1 TO 1000

DRAWING COLOUR CODED - PRINT ALL COPIES IN COLOUR

FOR REVIEW AND COMMENT

REV	DESCRIPTION	DESIGNER INITIAL./DATE	VERIFIED INITIAL./DATE	APPROVED INITIAL./DATE
A	ISSUED FOR REVIEW	EAM 06/03/2020	SM 06/03/2020	AG 06/03/2020

COORDINATE SYSTEM: MGA56 HEIGHT DATUM: AHD SCALE: 1:1000

NSW GOVERNMENT Transport for NSW

futurerail DELIVERING BETTER CONNECTIONS

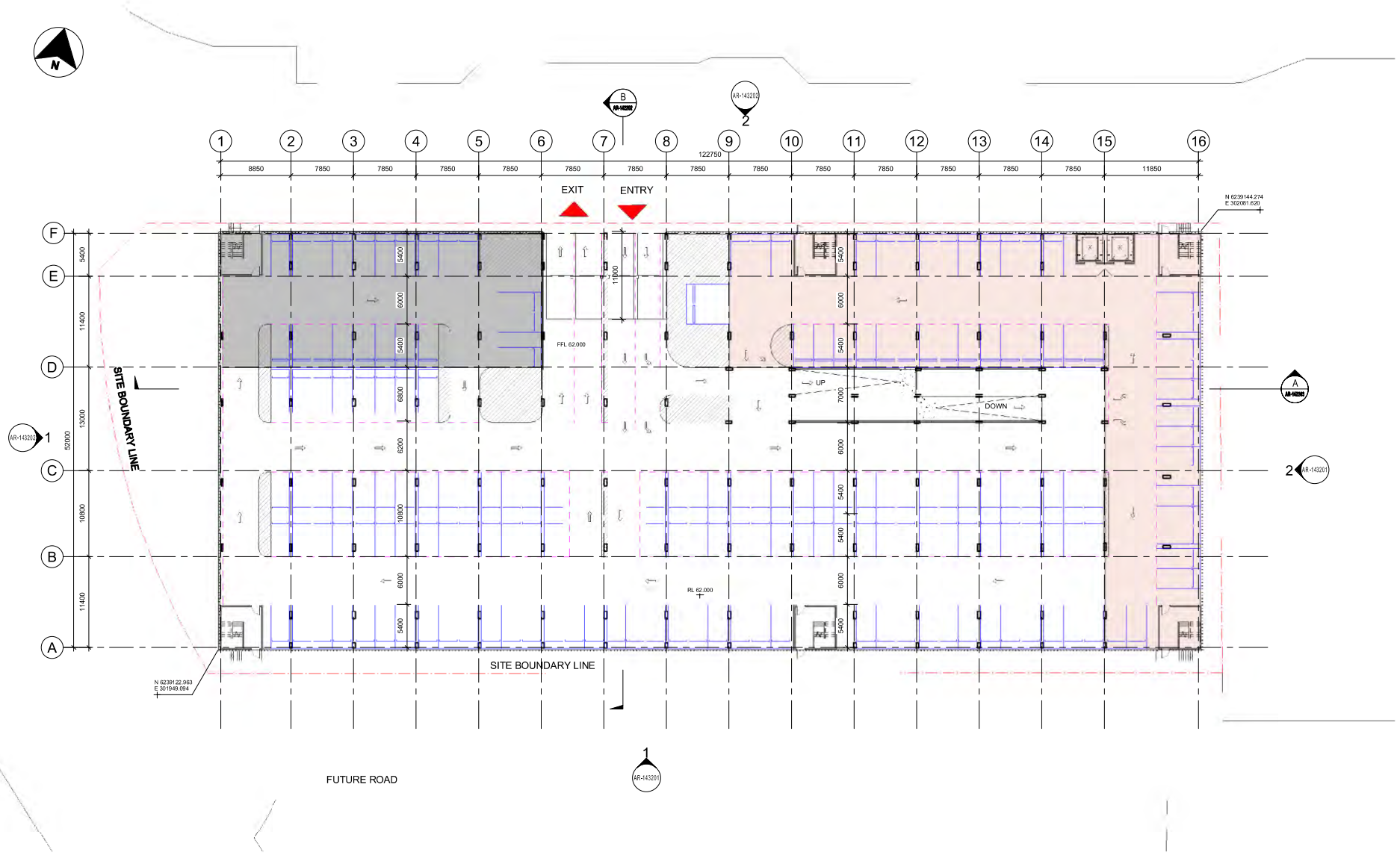
DRAWN	X.PAN	06/03/2020
DESIGNED	E.ANELLI MONTI	06/03/2020
DRG CHECK	S.MCNALLY	06/03/2020
DESIGN CHECK	S.MAND	06/03/2020
APPROVED	A.GARNERO	06/03/2020

SYDNEY
EDMONSON PARK
ARCHITECTURAL
EDP SOUTH MULTI-STOREY CAR PARK
SITE PLAN

FILE No. SHEET: 1 OF 3 A1

STATUS: DEFINITION DESIGN ©

DRG No. NTMSITA-FURL-EDP-AR-DRG-142201 REV A VER EDMS No. AMD No.



GROUND FLOOR PLAN

SCALE 1 : 250

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FOR REVIEW AND COMMENT

Number Of Car Bays for Level	183

0 2.5 12.5 25
METRES 1 TO 250

REV	DESCRIPTION	DESIGNER INITIAL/DATE	VERIFIED INITIAL/DATE	APPROVED INITIAL/DATE
A	ISSUED FOR REVIEW	EAM 06/03/2020	SM 06/03/2020	AG 06/03/2020

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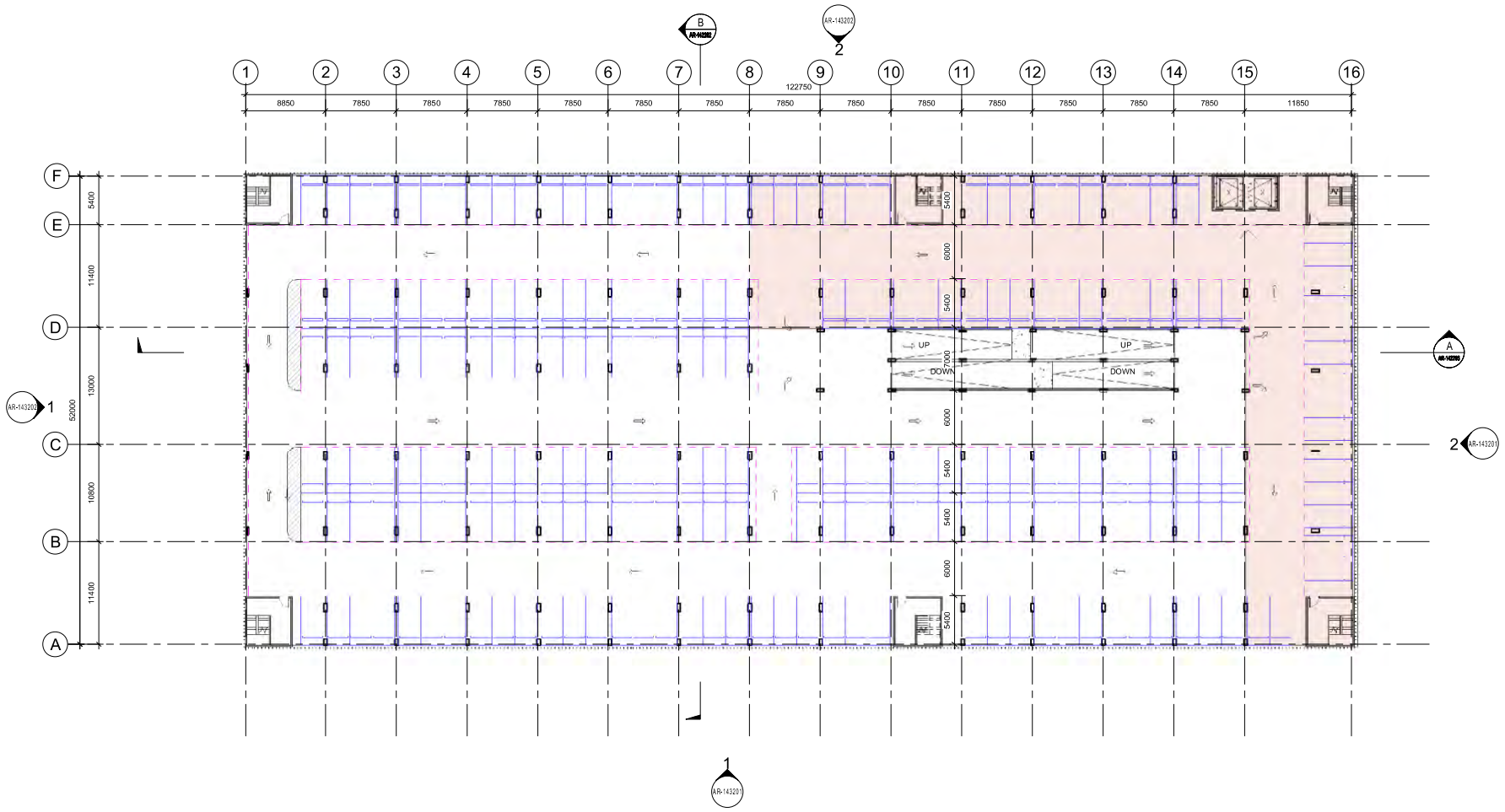
DESIGNED	E.ANELLI MONTI	06/03/2020
DRG CHECK	S.MCNALLY	06/03/2020
DESIGN CHECK	S.MAND	06/03/2020
APPROVED	A.GARNERO	06/03/2020

SYDNEY
EDMONSON PARK
ARCHITECTURAL
EDP SOUTH MULTI-STOREY CAR PARK
GROUND FLOOR PLAN

FILE No. | SHEET: 2 OF 3 | A1
STATUS: DEFINITION DESIGN | ©
DRG No: NTMGSTALEDI_EDP_AR_DRG_142202 | REV | VER | EDMS No: | AMD No.



TYPICAL FLOOR PLAN

SCALE 1 : 250

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FOR REVIEW AND COMMENT

Number Of Car Bays for Level	219

0 2.5 12.5 25
METRES
1 TO 250

REV	DESCRIPTION	DESIGNER INITIAL/DATE	VERIFIED INITIAL/DATE	APPROVED INITIAL/DATE
A	ISSUED FOR REVIEW	EAM 06/03/2020	SM 06/03/2020	AG 06/03/2020

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DRG CHECK	S.MCNALLY	06/03/2020
DESIGN CHECK	S.MAND	06/03/2020
APPROVED	A.GANERO	06/03/2020

SYDNEY
EDMONSON PARK
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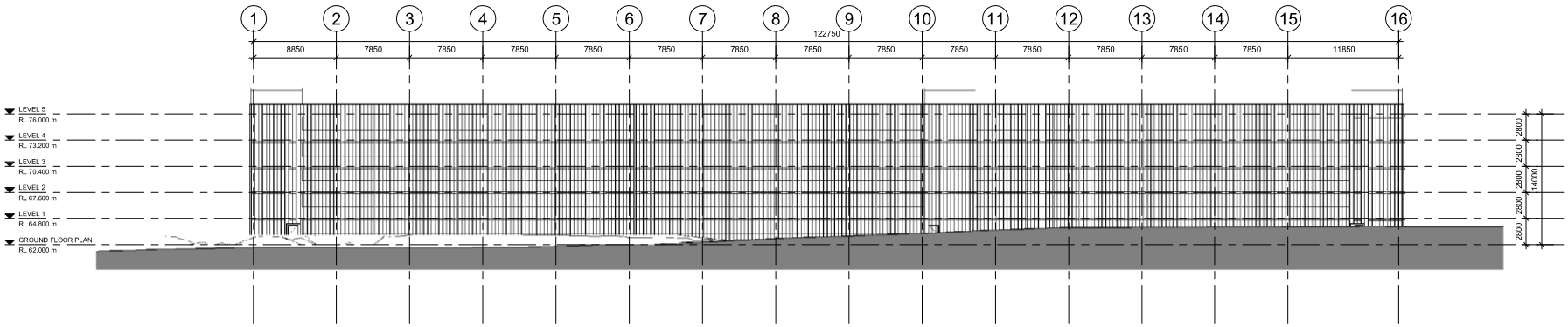
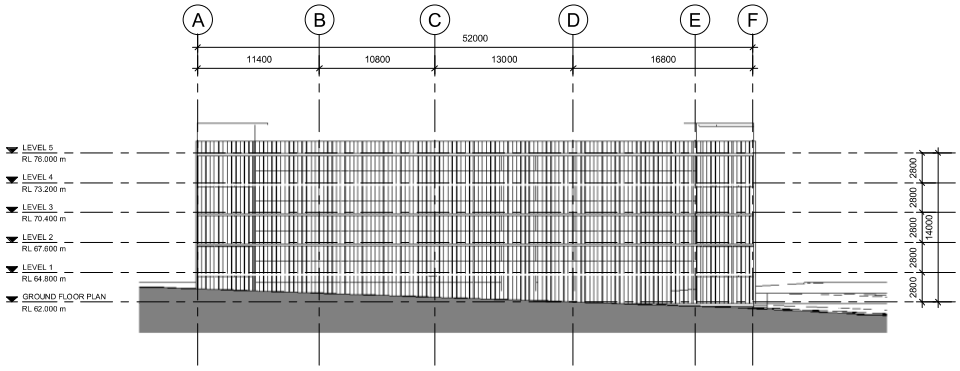
TYPICAL FLOOR PLAN

FILE No.		SHEET: 3 OF 3	A1
STATUS: DEFINITION DESIGN			©
DRG No. MTMSNTA-EURL-EDP-AR-DRG-143203	REV	VER	EDMS No. / AMD No.



ELEVATION 1
SCALE 1 : 250
SOUTH ELEVATION
AR-142202



ELEVATION 2
SCALE 1 : 250
EAST ELEVATION
AR-142202

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0 2.5 12.5 25
METRES
1 TO 250

REV	DESCRIPTION	DESIGNER INITIAL/DATE	VERIFIED INITIAL/DATE	APPROVED INITIAL/DATE
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APPROVED	A.GANERO	06/03/2020

SYDNEY
EDMONSON PARK
ARCHITECTURAL
EDP SOUTH MULTI-STOREY CAR PARK
BUILDING ELEVATIONS

FILE No.
SHEET: 1 OF 2 A1
STATUS: DEFINITION DESIGN
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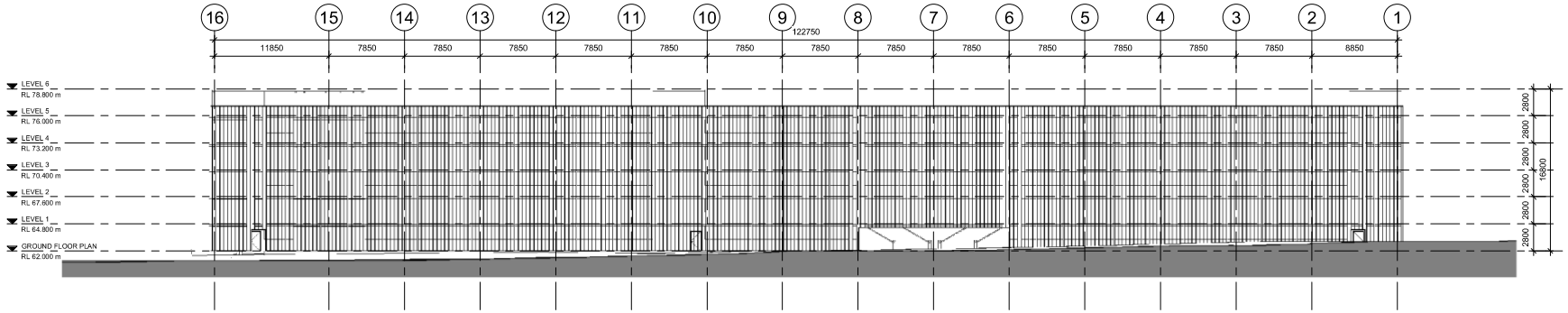
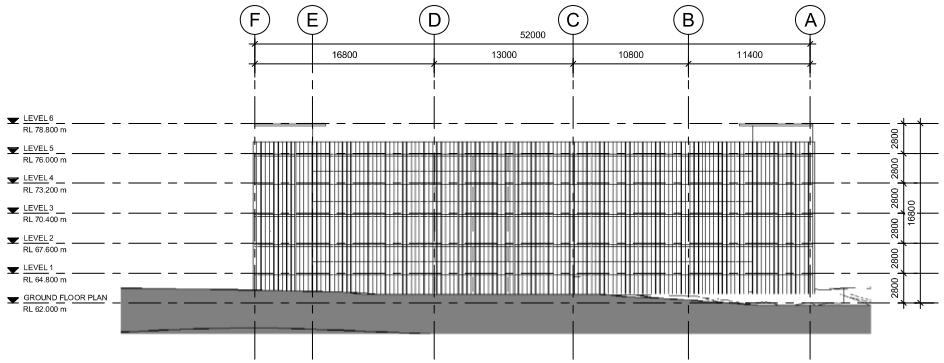
DRG No.	REV	VER	EDMS No.	AMD No.
MTMSCTA-EUN-EDP-AR-DRG-141204				

LEGEND

- SITE BOUNDARY
- CADASTRE LINE
- FUTURE RETAIL
- FUTURE PLANT ROOM
- CAR PARK ENTRY
- ACCESS TO VT



ELEVATION 2
SCALE 1 : 250
NORTH ELEVATION
AR-142202



ELEVATION 1
SCALE 1 : 250
WEST ELEVATION
AR-142202

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FOR REVIEW AND COMMENT

0 2.5 12.5 25
METRES
1 TO 250

REV	DESCRIPTION	DESIGNER INITIAL/DATE	VERIFIED INITIAL/DATE	APPROVED INITIAL/DATE
A	ISSUED FOR REVIEW	EAM 06/03/2020	SM 06/03/2020	AG 06/03/2020

NSW GOVERNMENT Transport for NSW
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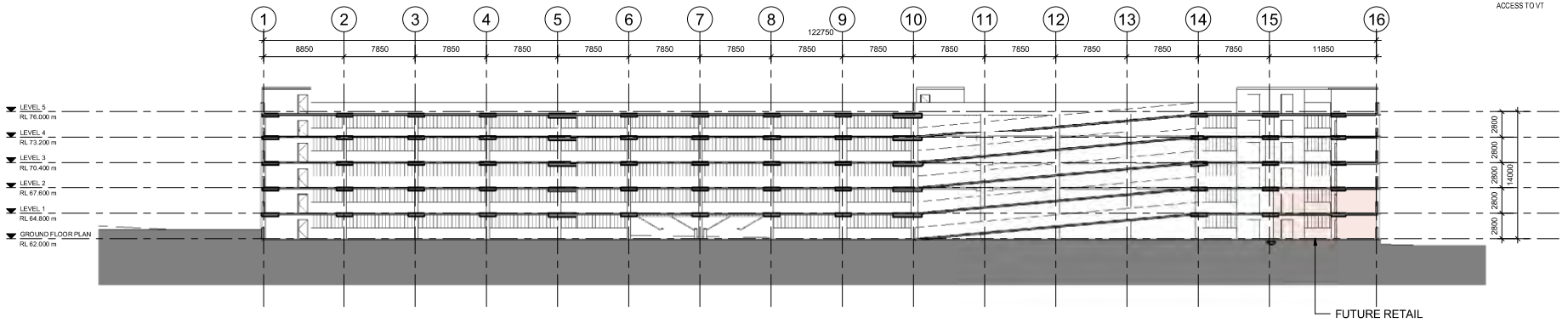
APPROVED	A.GARNERO	06/03/2020

SYDNEY
EDMONSON PARK
ARCHITECTURAL
EDP SOUTH MULTI-STOREY CAR PARK
BUILDING ELEVATIONS

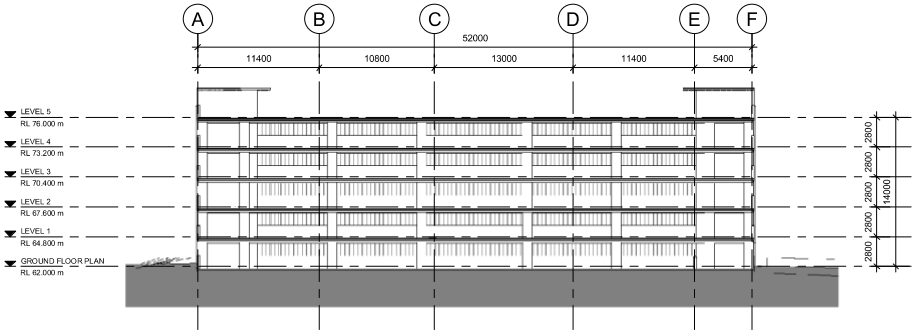
FILE No.		SHEET: 2 OF 2	A1
STATUS: DEFINITION DESIGN			©
DRG No. MTMSTA-ELEV-EDP-AR-DRG-142202	REV	VER	EDMS No. / AMD No.

LEGEND

SITE BOUNDARY
CADASTRE LINE
FUTURE RETAIL
FUTURE PLANT ROOM
CAR PARK ENTRY
ACCESS TO VT



SECTION A
SCALE 1 : 250
LONG SECTION
AR-142203



SECTION B
SCALE 1 : 250
SHORT SECTION
AR-142202

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FOR REVIEW AND COMMENT

0 2.5 12.5 25
METRES 1 TO 250

REV	DESCRIPTION	DESIGNER INITIAL/DATE	VERIFIED INITIAL/DATE	APPROVED INITIAL/DATE
A	ISSUED FOR REVIEW	EAM 06/03/2020	SM 06/03/2020	AG 06/03/2020

COORDINATE SYSTEM: MGA56 HEIGHT DATUM: AHD SCALE: 1:250

NSW GOVERNMENT Transport for NSW
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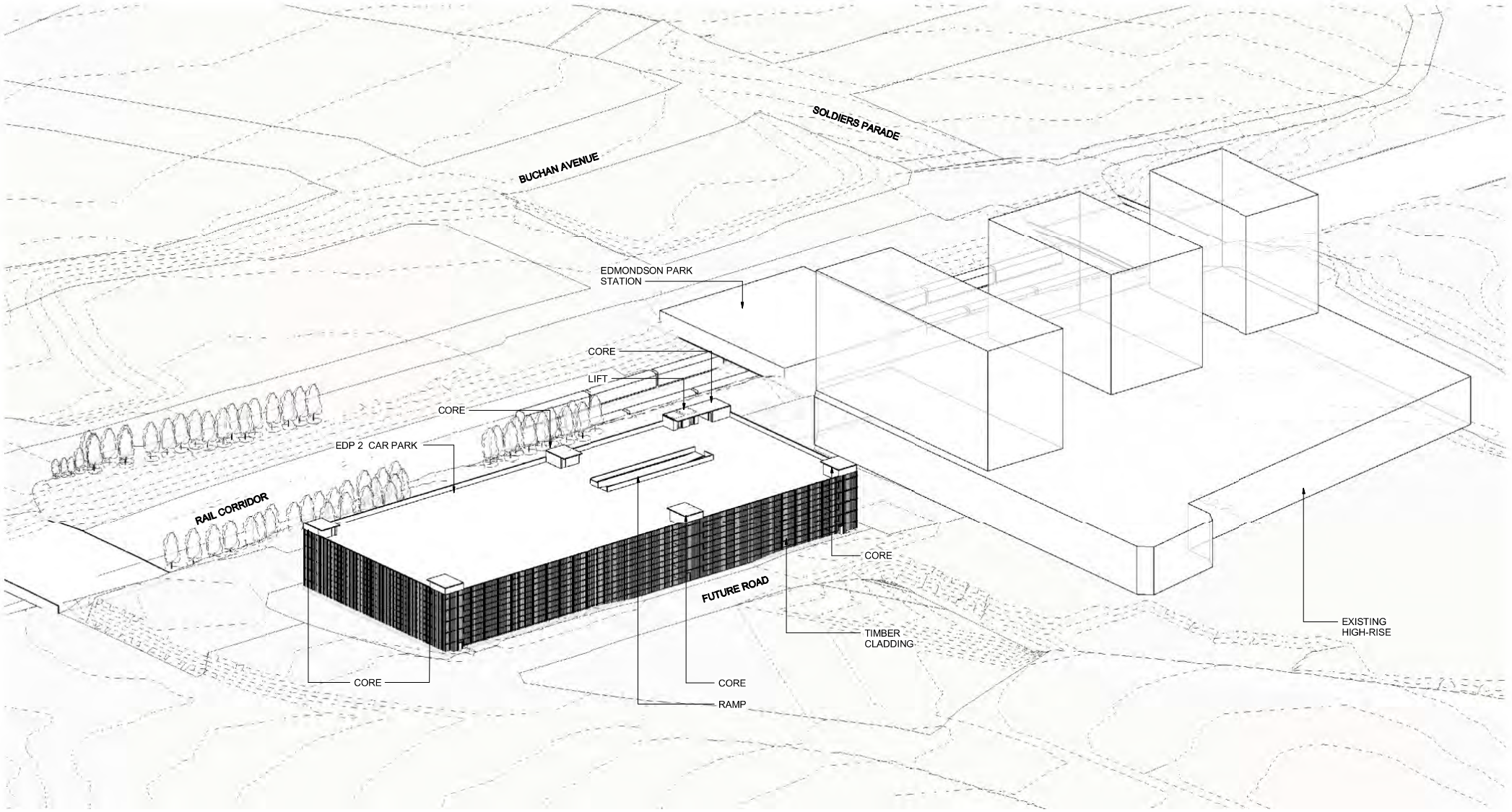
DESIGN CHECK	S.MAND	06/03/2020
APPROVED	A.GARNERO	06/03/2020

SYDNEY
EDMONSON PARK
ARCHITECTURAL
EDP SOUTH MULTI-STOREY CAR PARK
BUILDING SECTIONS

FILE No. SHEET: 1 OF 1 A1
STATUS: DEFINITION DESIGN ©

DRG No.	REV	VER	EDMS No.	AMD No.
MTMSHTA-FURL-EDP-AR-DRG-145201	A			



AXONOMETRIC VIEW

NOT TO SCALE

DRAWING COLOUR CODED - PRINT ALL COPIES IN COLOUR

FOR REVIEW AND COMMENT

REV	DESCRIPTION	DESIGNER INITIAL/DATE	VERIFIED INITIAL/DATE	APPROVED INITIAL/DATE
A	ISSUED FOR REVIEW	EAM 06/03/2020	SM 06/03/2020	AG 06/03/2020

NSW GOVERNMENT Transport for NSW

futurerail DELIVERING BETTER CONNECTIONS

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DRG CHECK	S.MCNALLY	06/03/2020
DESIGN CHECK	S.MAND	06/03/2020
APPROVED	A.GARNERO	06/03/2020

SYDNEY
EDMONSON PARK
ARCHITECTURAL
EDP SOUTH MULTI-STOREY CAR PARK
AXONOMETRIC VIEW

FILE No.
SHEET: 1 OF 1 A1
STATUS: DEFINITION DESIGN

DRG No. MTMSTA-EUH-EDP-AR-DRG-446101 REV VER EDMS No. AMD No.

Appendix C – Vibration Criteria

C Construction Vibration

C1. Cosmetic Damage Criteria

British Standard BS 7385:Part 2-1993 “Evaluation and measurement for vibration in buildings Part 2”, gives guidance on the levels of vibration which building structures could be damaged. BS7385 also takes into consideration the frequency of the vibration which is critical when assessing the likelihood of building damage.

Guide values are set for building vibration based on the lowest vibration levels above which damage has been credibly demonstrated. These levels are considered to result in a minimum risk of vibration-induced damage, where minimal risk for a named effect is usually taken as a 95% probability of no effect.

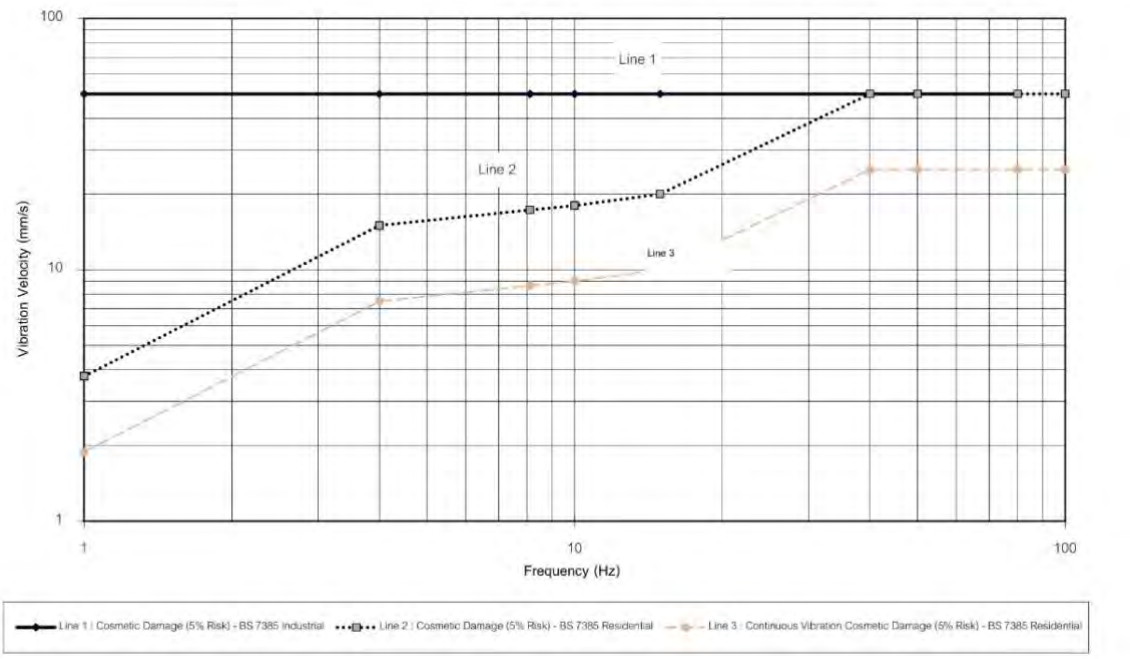
The recommended limits (guide values) for transient vibration to ensure minimal risk of cosmetic damage to residential and heavy commercial/industrial buildings are presented in **Table C1**, with a visual representation presented in **Figure C1**.

Where sources of continuous vibration may give rise to dynamic magnification due to resonance, the values provided in **Table B1** should be reduced by 50%. This is especially the case with respect to Peak Particle Velocity (PPV) at lower frequencies.

Table C1 Transient Vibration Guide Values - Minimal Risk of Cosmetic Damage

Line	Type of Building	Peak Component Particle Velocity in Frequency Range of Predominant Pulse	
		4 Hz to 15 Hz	15 Hz and above
1	Reinforced or framed structures Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	
2	Unreinforced or light framed structures Residential or light commercial type buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

Figure C1– **Transient Vibration Guide Values - Minimal Risk of Cosmetic Damage**



Sources of vibration, which are considered in the standard, include blasting (carried out during mineral extractions or construction excavation), demolition, piling, ground treatments (compaction), construction equipment, tunnelling, road and rail traffic and industrial machinery.

To assess the likelihood of cosmetic damage due to vibration, BS 7385 specifies that vibration levels should be obtained from a monitoring position situated at the base of the building and the maximum level of the orthogonal vibration components (transverse, longitudinal and vertical directions) should be compared with the criteria curves presented in **Figure C1**.

C2. Human Comfort – Assessing Vibration a Technical Guideline

Humans are far more sensitive to vibration than is commonly realised and may detect vibration levels which are well below levels that may cause damage to buildings or structures. Assessing vibration: a technical guideline was published in February of 2006 by the DECC and is based on guidelines contained in BS 6472 – 1992, Evaluation of human exposure to vibration in buildings (1-80 Hz) and provides guidance on assessing vibration against human comfort.

The guideline presents preferred and maximum vibration values for use in assessing human responses to vibration and provides recommendations for measurement and evaluation techniques. At vibration values below the preferred values, there is a low probability of adverse comment or disturbance to building occupants. Where all feasible and reasonable mitigation measures have been applied and vibration values are still beyond the maximum value, it is recommended the operator negotiate directly with the affected community.

The guideline defines three vibration types and provides direction for assessing and evaluating the applicable criteria. Table 2.1 of the guideline provides examples of the three vibration types and has been reproduced in **Table C2**.

Table C2 Examples of types of vibration (from Table 2.1 of the guideline)

Continuous Vibration	Impulsive Vibration	Intermittent Vibration
Machinery, steady road traffic, continuous construction activity (such as tunnel boring machinery)	Infrequent: Activities that create up to three distinct vibration events in an assessment period, e.g. occasional dropping of heavy equipment, occasional loading and unloading. Blasting is assessed using ANZECC (1990)	Trains, intermittent nearby construction activity, passing heavy vehicles, forging machines, impact pile driving, jack hammers. Where the number of vibration events in an assessment period is three or fewer these would be assessed against impulsive vibration criteria.

C2.1 Continuous Vibration

Appendix C of the guideline outlines acceptable criteria for human exposure to continuous vibration (1-80Hz), the criteria are dependent on both the time of activity (usually daytime or night-time) and the occupied place being assessed. **Table C3** reproduces the preferred and maximum criteria relating to measured peak velocity.

Table C3 Criteria for Exposure to Continuous Vibration

Place	Time	Peak Velocity (mm/s)	
		Preferred	Maximum
Critical working Areas (e.g. hospital operating theatres, precision laboratories)	Day or Night	0.14	0.28
Residences	Day	0.28	0.56
	Night	0.20	0.40
Offices	Day or Night	0.56	1.1
Workshops	Day or Night	1.1	2.2

Note: rms velocity (mm/s) and vibration velocity value (dB re 10^{-9} mm/s) values given for most critical frequency >8Hz assuming sinusoidal motion.

C2.2 Intermittent Vibration

Intermittent vibration (as defined in Section 2.1 of the guideline) is assessed using the vibration dose concept which relates to vibration magnitude and exposure time.

Intermittent vibration is representative of activities such as impact hammering, rolling or general excavation work (such as an excavator tracking).

Section 2.4 of the Guideline provides acceptable values for intermittent vibration in terms of vibration dose values (VDV) which requires the measurement of the overall weighted rms (root mean square) acceleration levels over the frequency range 1 Hz to 80 Hz. To calculate VDV the following formula (refer section 2.4.1 of the guideline) was used:

$$VDV = \left[\int_0^T a^4(t)dt \right]^{0.25}$$

Where VDV is the vibration dose value in $m/s_{1.75}$, a (t) is the frequency-weighted rms of acceleration in m/s2 and T is the total period of the day (in seconds) during which vibration may occur.

The Acceptable Vibration Dose Values (VDV) for Intermittent Vibration is reproduced in **Table C4**.

Table C4 Acceptable Vibration Dose Values (VDV) for Intermittent Vibration

Location	Daytime		Night-time	
	Preferred Value, $m/s_{1.75}$	Maximum Value, $m/s_{1.75}$	Preferred Value, $m/s_{1.75}$	Maximum Value, $m/s_{1.75}$
Critical Areas	0.10	0.20	0.10	0.20
Residences	0.20	0.40	0.13	0.26
Offices, schools, educational institutions and places of worship	0.40	0.80	0.40	0.80
Workshops	0.80	1.60	0.80	1.60

Note: Daytime is 7am to 10pm and Night-time is 10pm to 7am
Note: These criteria are indicative only, and there may be a need to assess intermittent values against continuous or impulsive criteria for critical areas.

There is a low probability of adverse comment or disturbance to building occupants at vibration values below the preferred values. Adverse comment or complaints may be expected if vibration values approach the maximum values. The guideline states that activities should be designed to meet the preferred values where an area is not already exposed to vibration.

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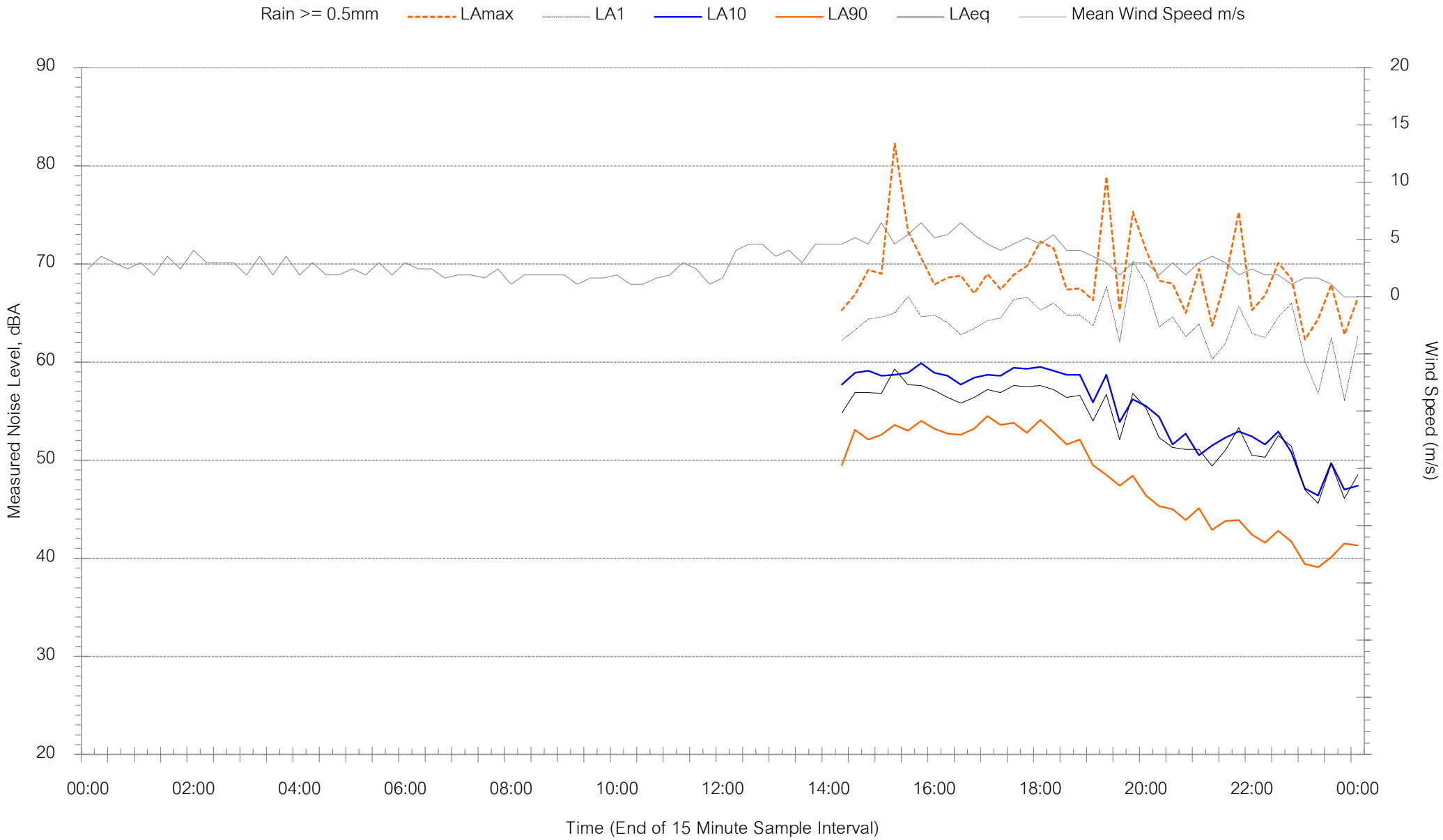
Appendix D – Noise Monitoring Charts

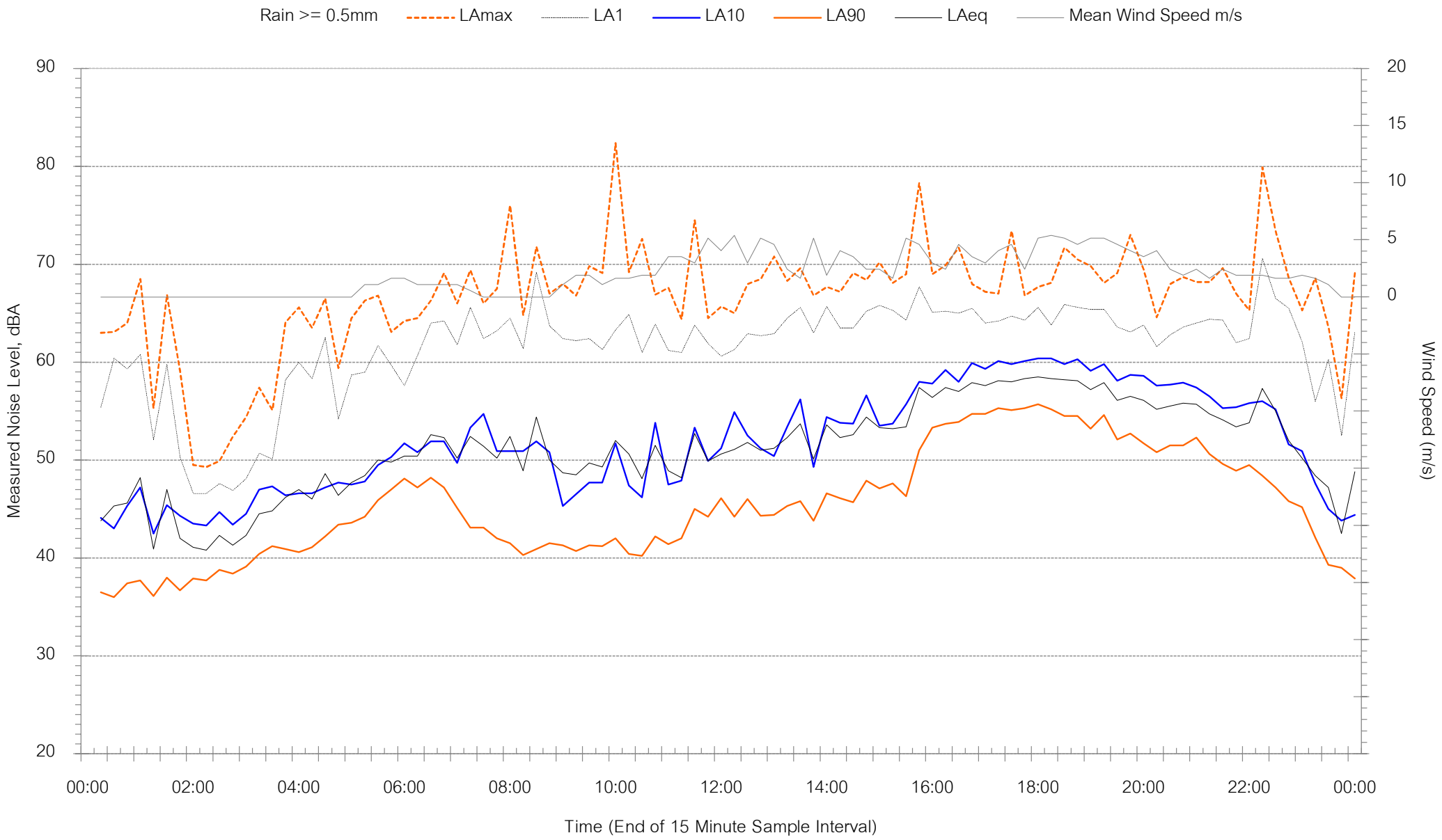
Background Noise Levels

Logger 1 - Croatia Avenue, Edmonson Park - Wednesday 29 January 2020



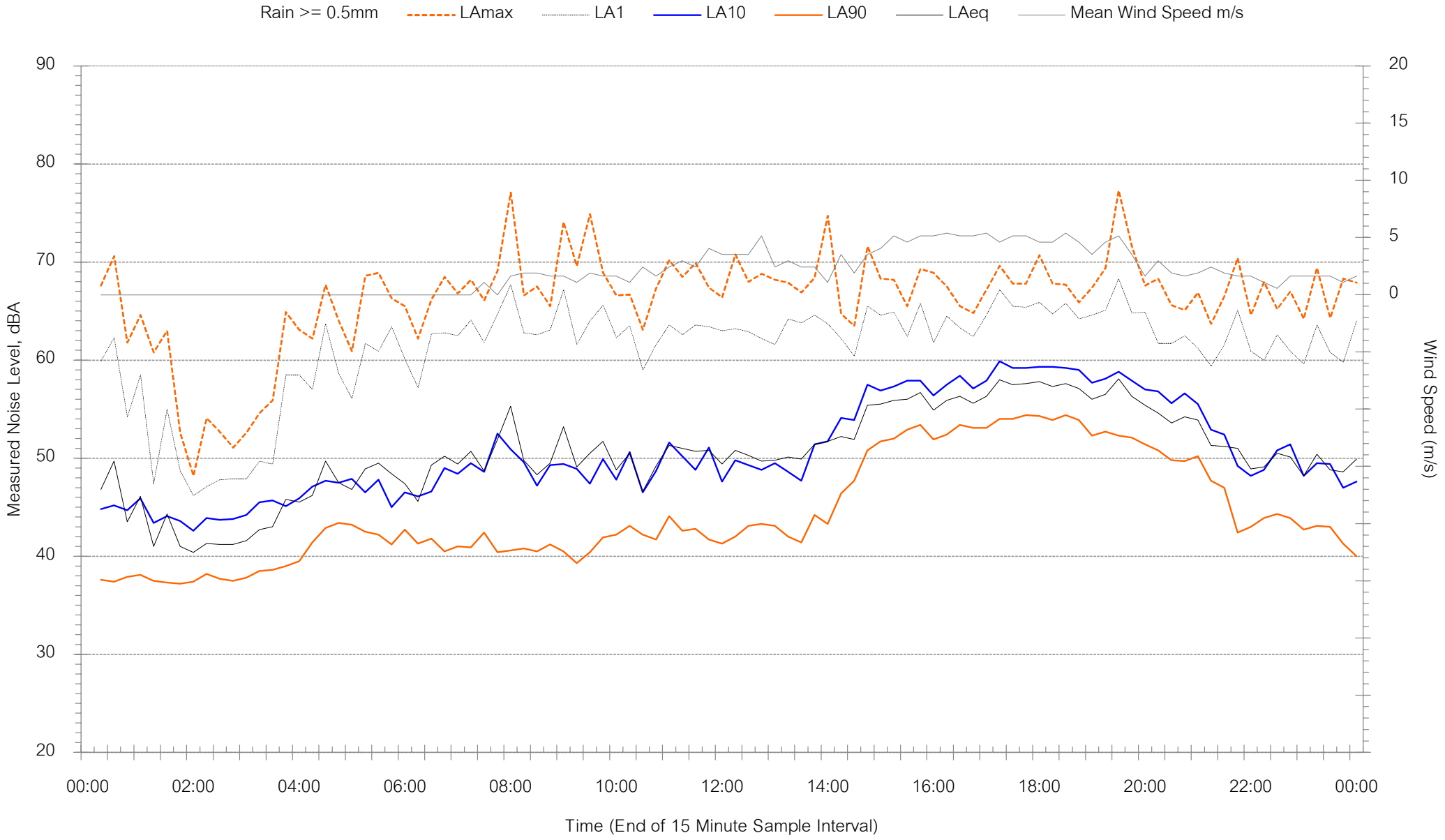
Background Noise Levels

Logger 1 - Croatia Avenue, Edmonson Park - Thursday 30 January 2020



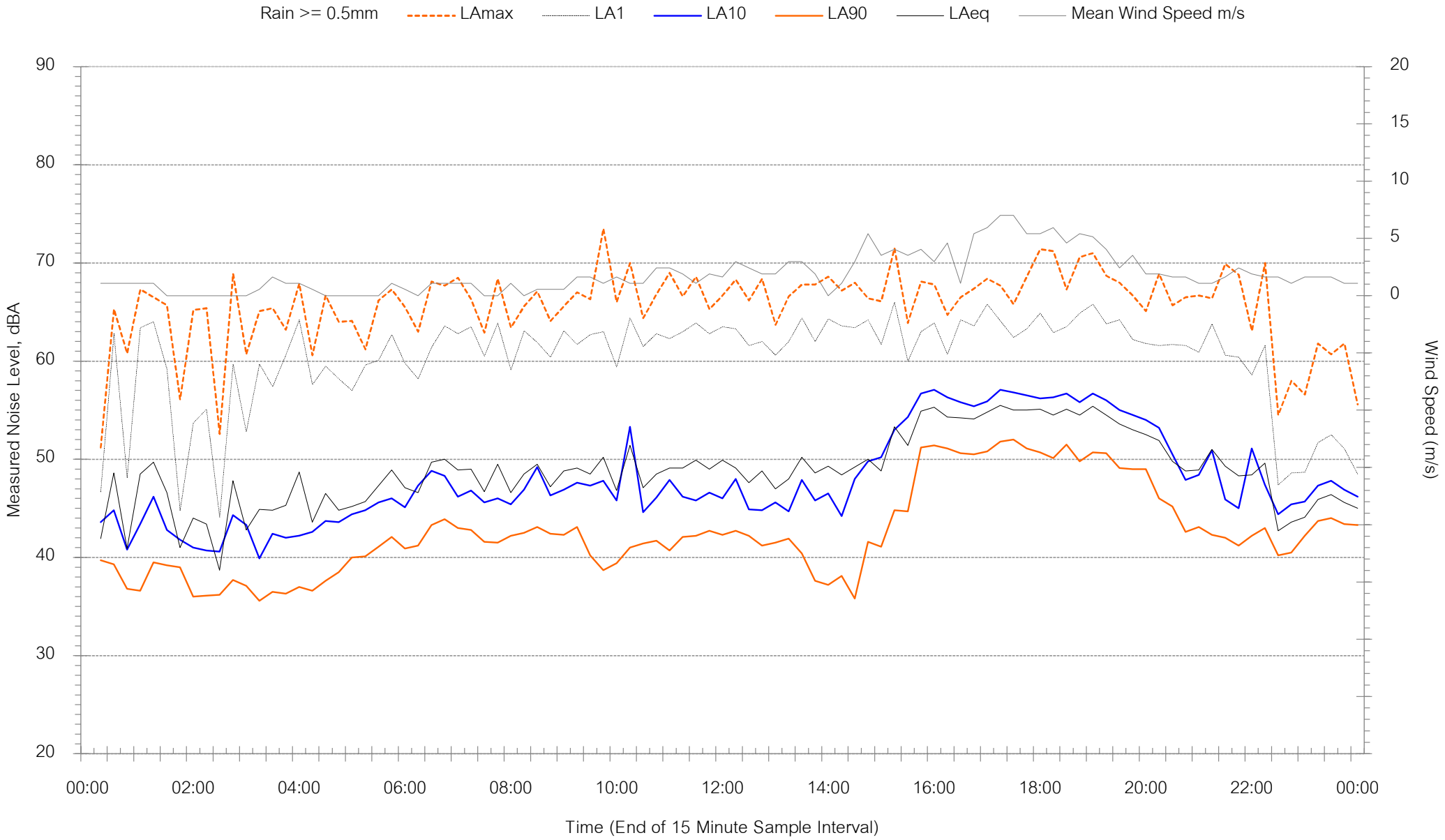
Background Noise Levels

Logger 1 - Croatia Avenue, Edmonson Park - Friday 31 January 2020



Background Noise Levels

Logger 1 - Croatia Avenue, Edmonson Park - Saturday 1 February 2020

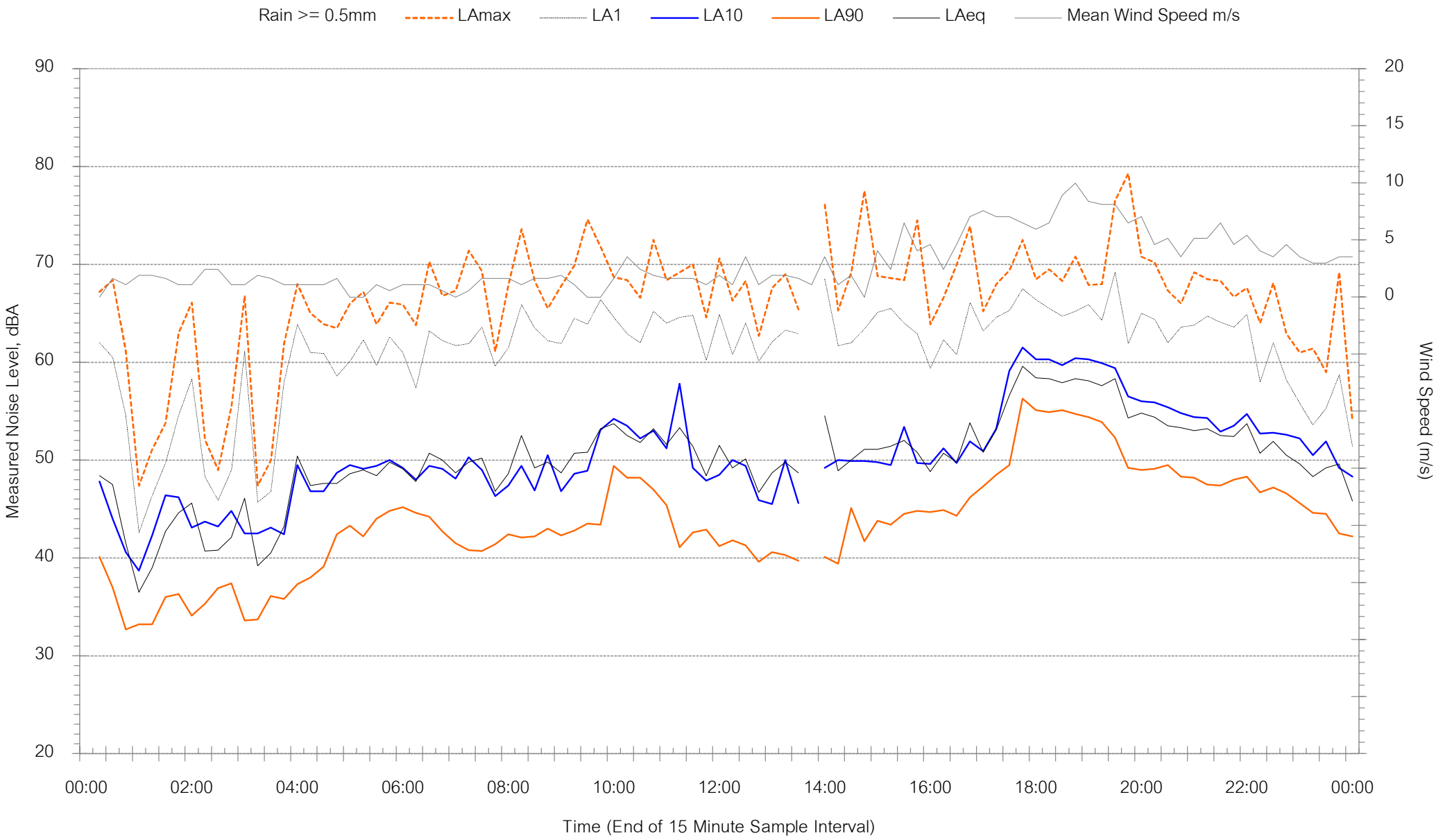


Background Noise Levels

Logger 1 - Croatia Avenue, Edmonson Park - Sunday 2 February 2020

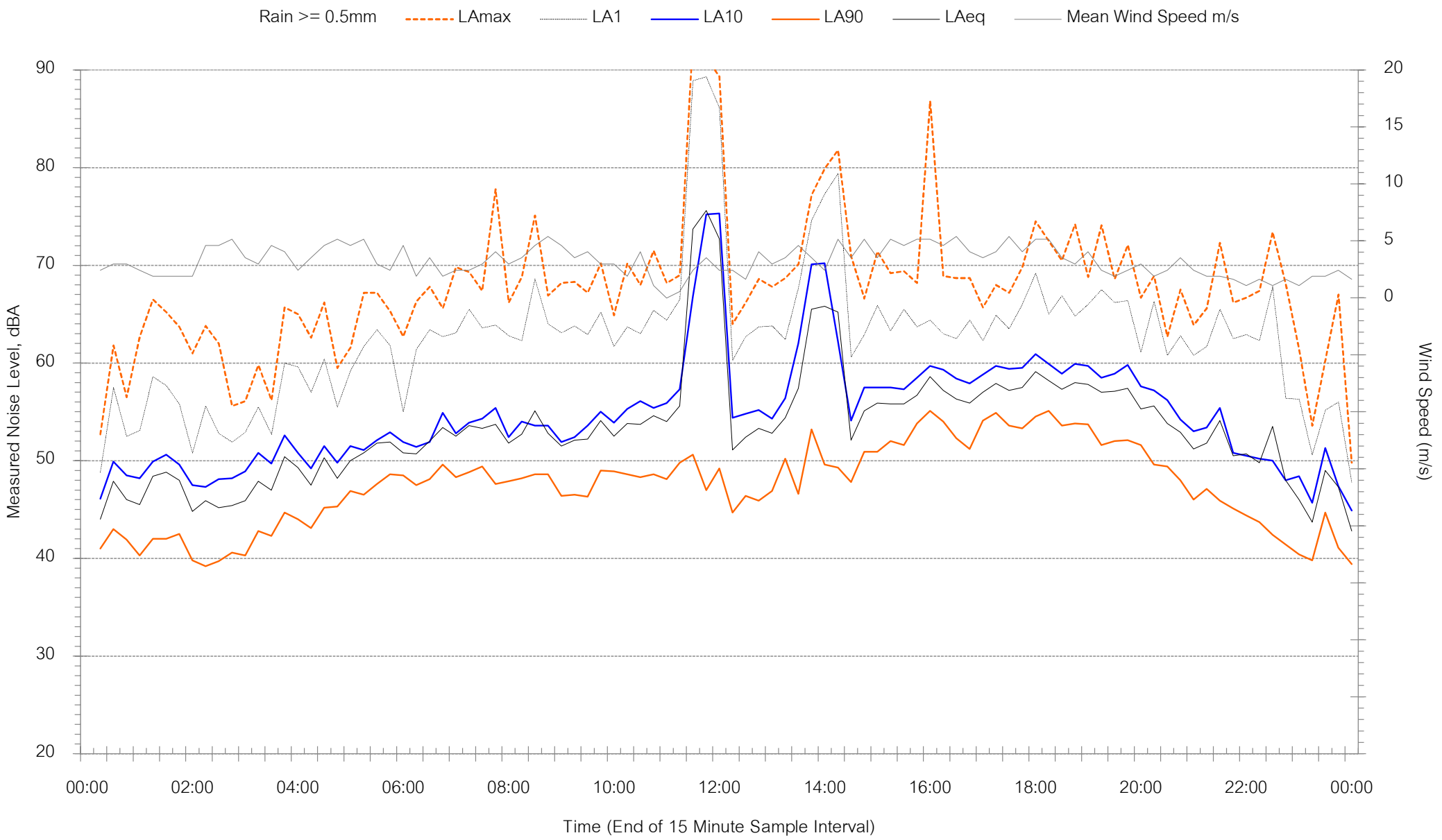
Background Noise Levels

Logger 1 - Croatia Avenue, Edmonson Park - Monday 3 February 2020



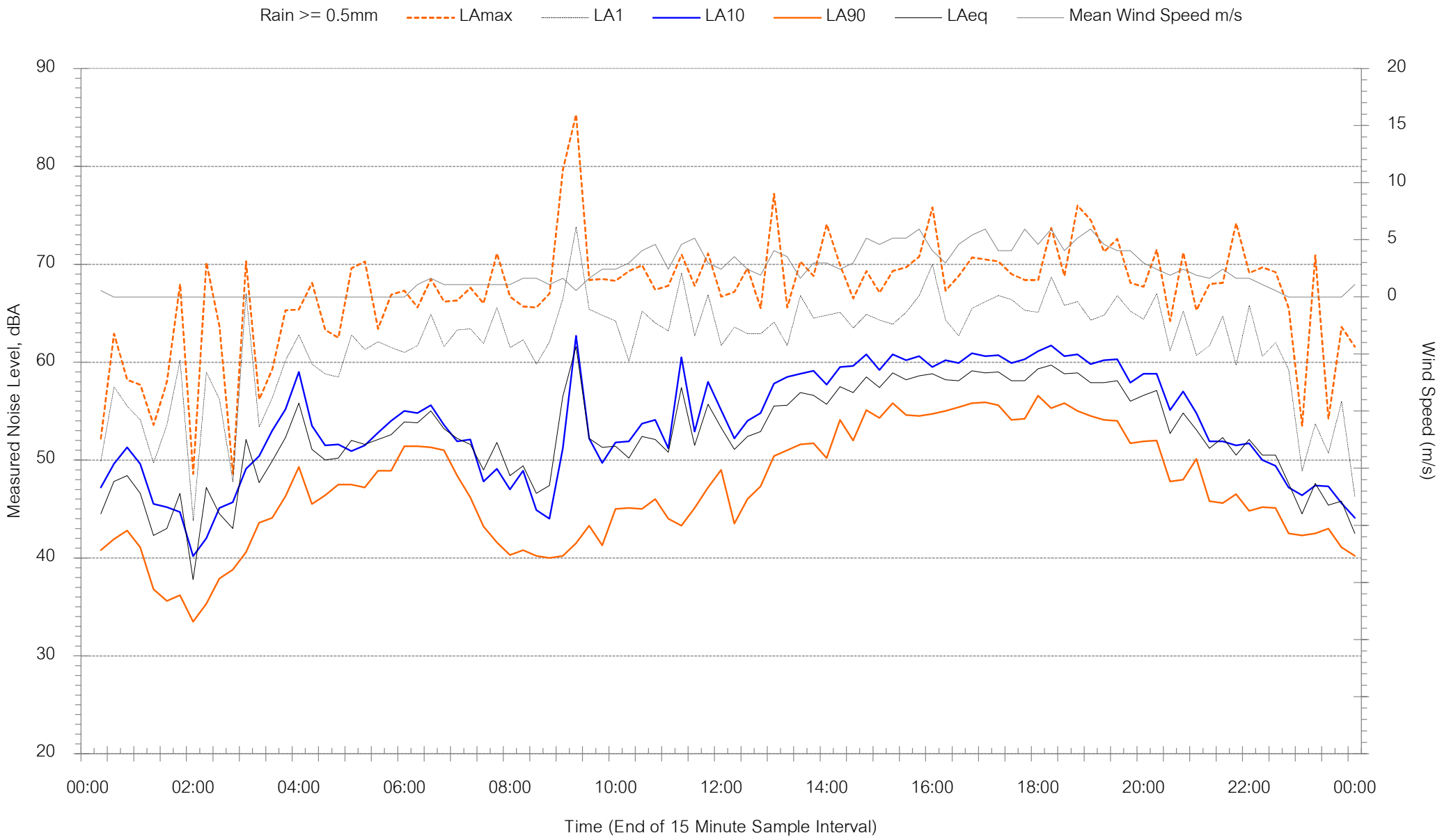
Background Noise Levels

Logger 1 - Croatia Avenue, Edmonson Park - Tuesday 4 February 2020



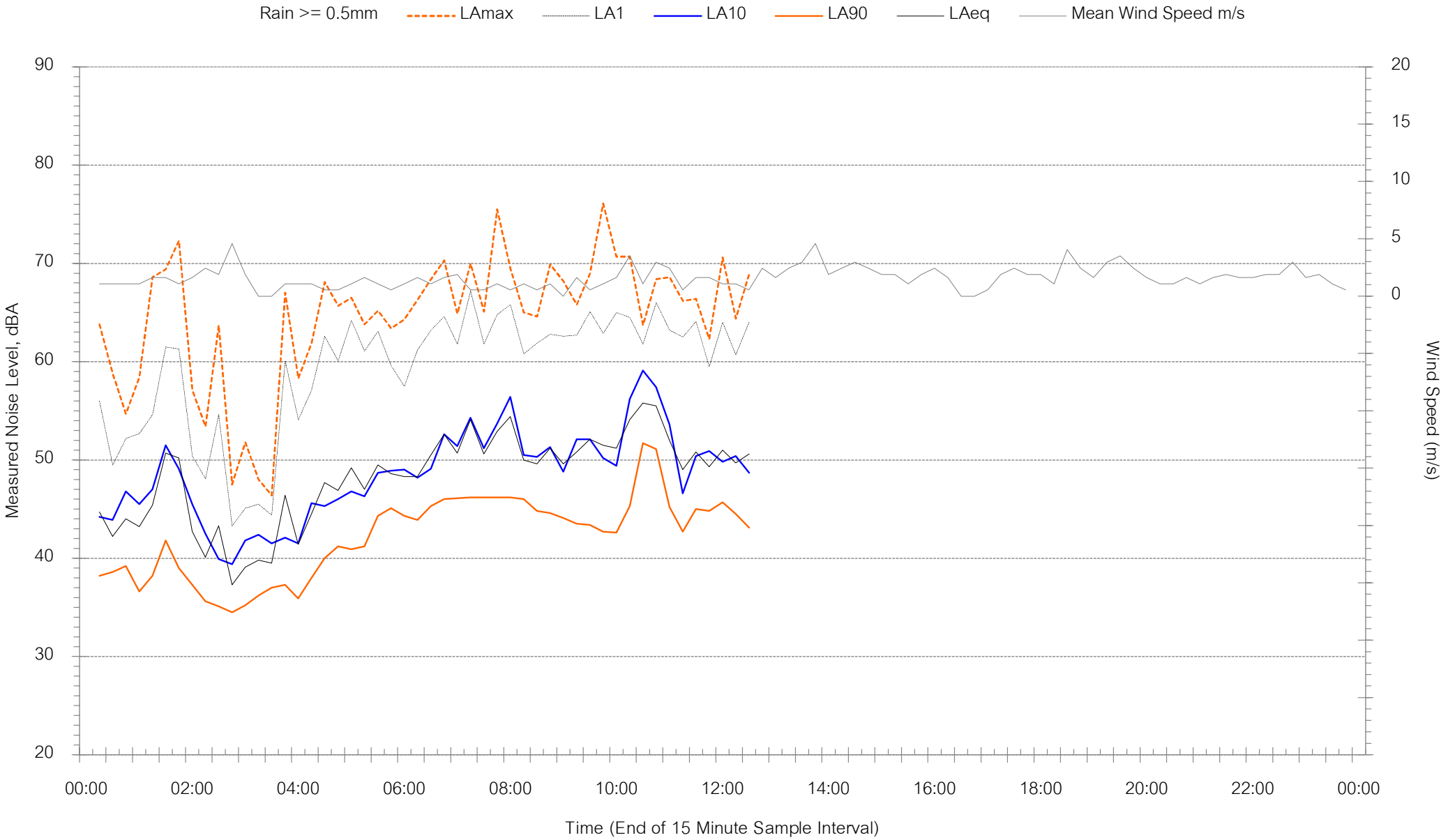
Background Noise Levels

Logger 1 - Croatia Avenue, Edmonson Park - Wednesday 5 February 2020



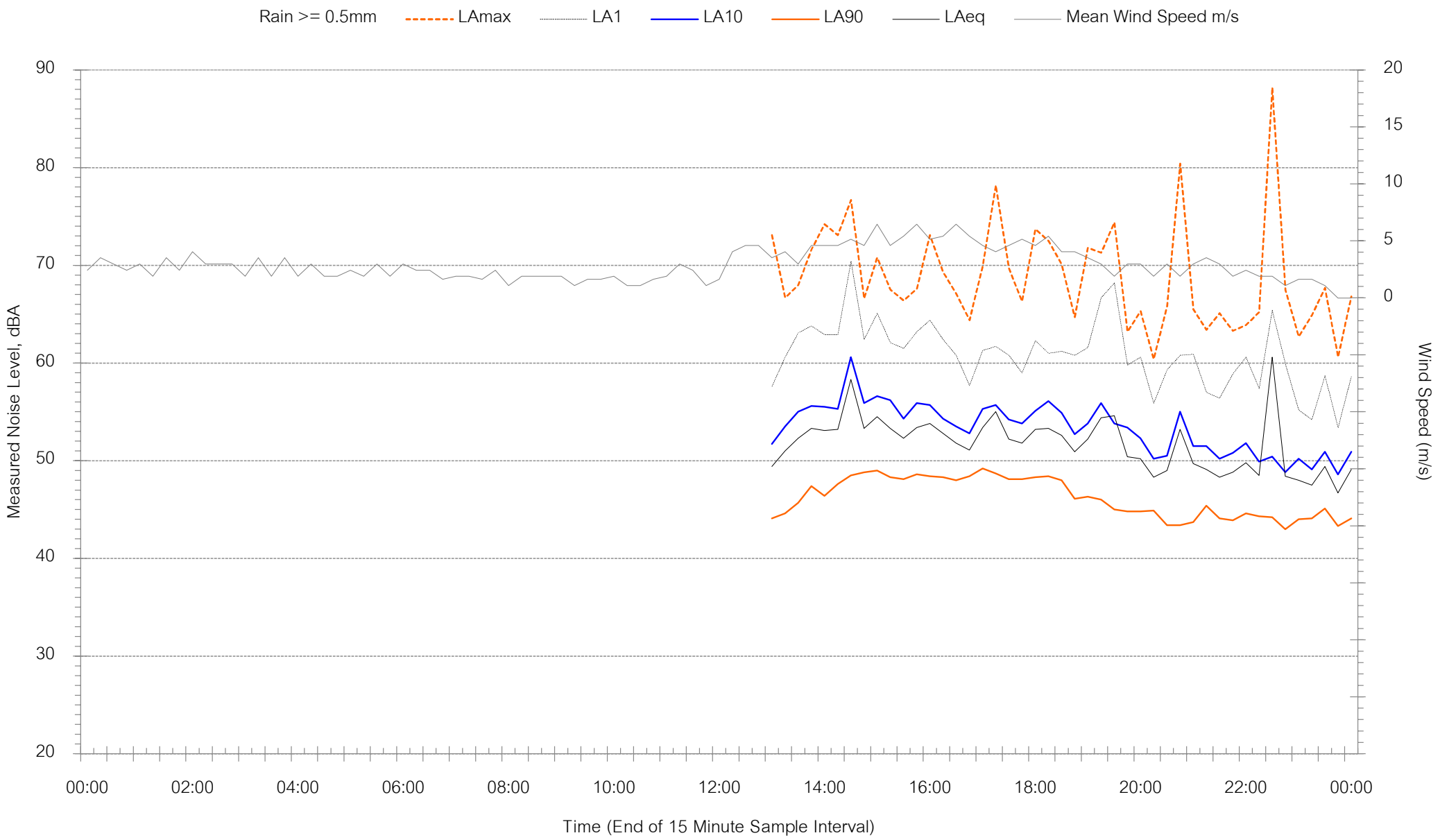
Background Noise Levels

Logger 1 - Croatia Avenue, Edmonson Park - Thursday 6 February 2020



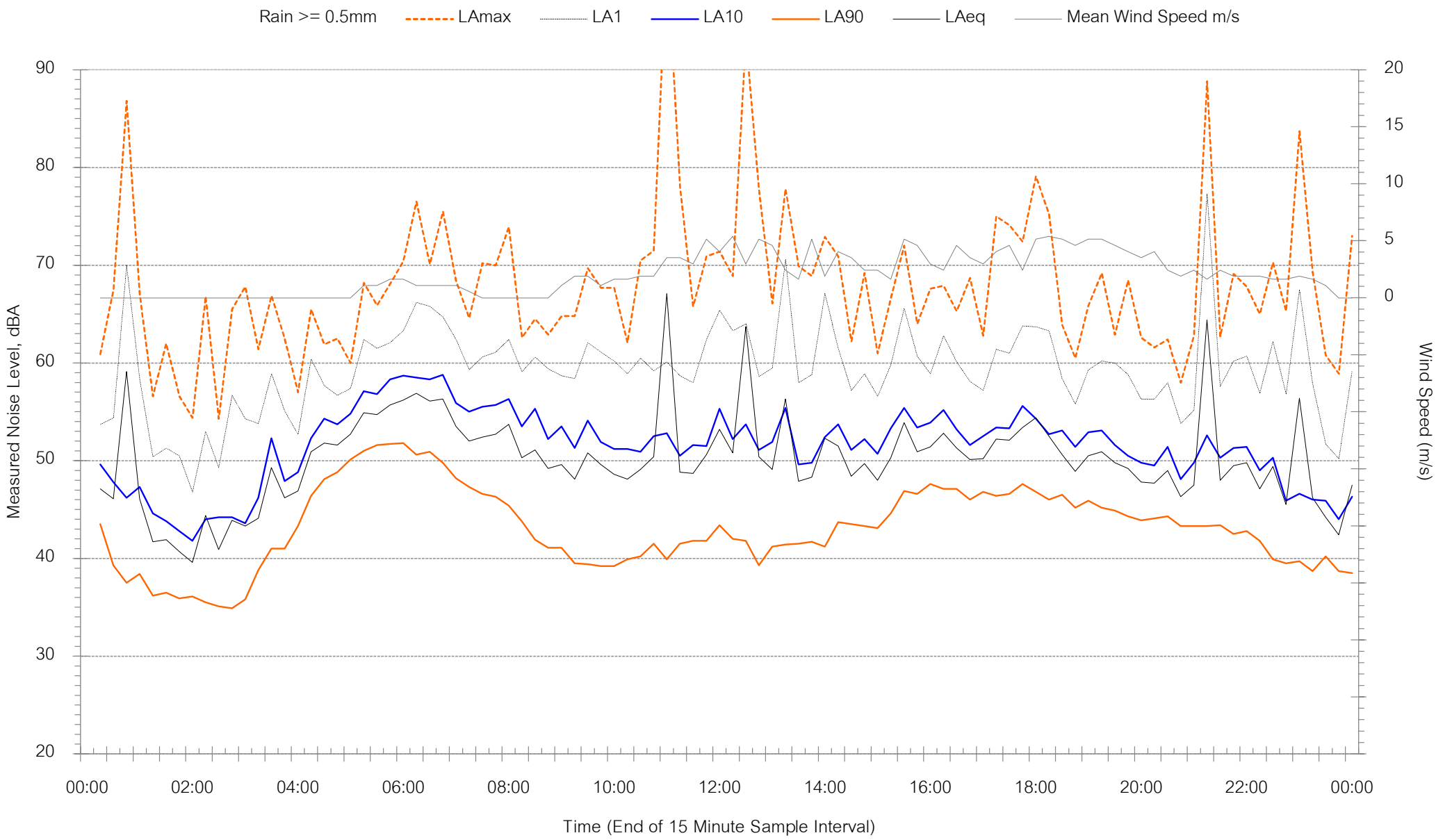
Background Noise Levels

Logger 2 - Lowe Avenue, Edmonson Park - Wednesday 29 January 2020



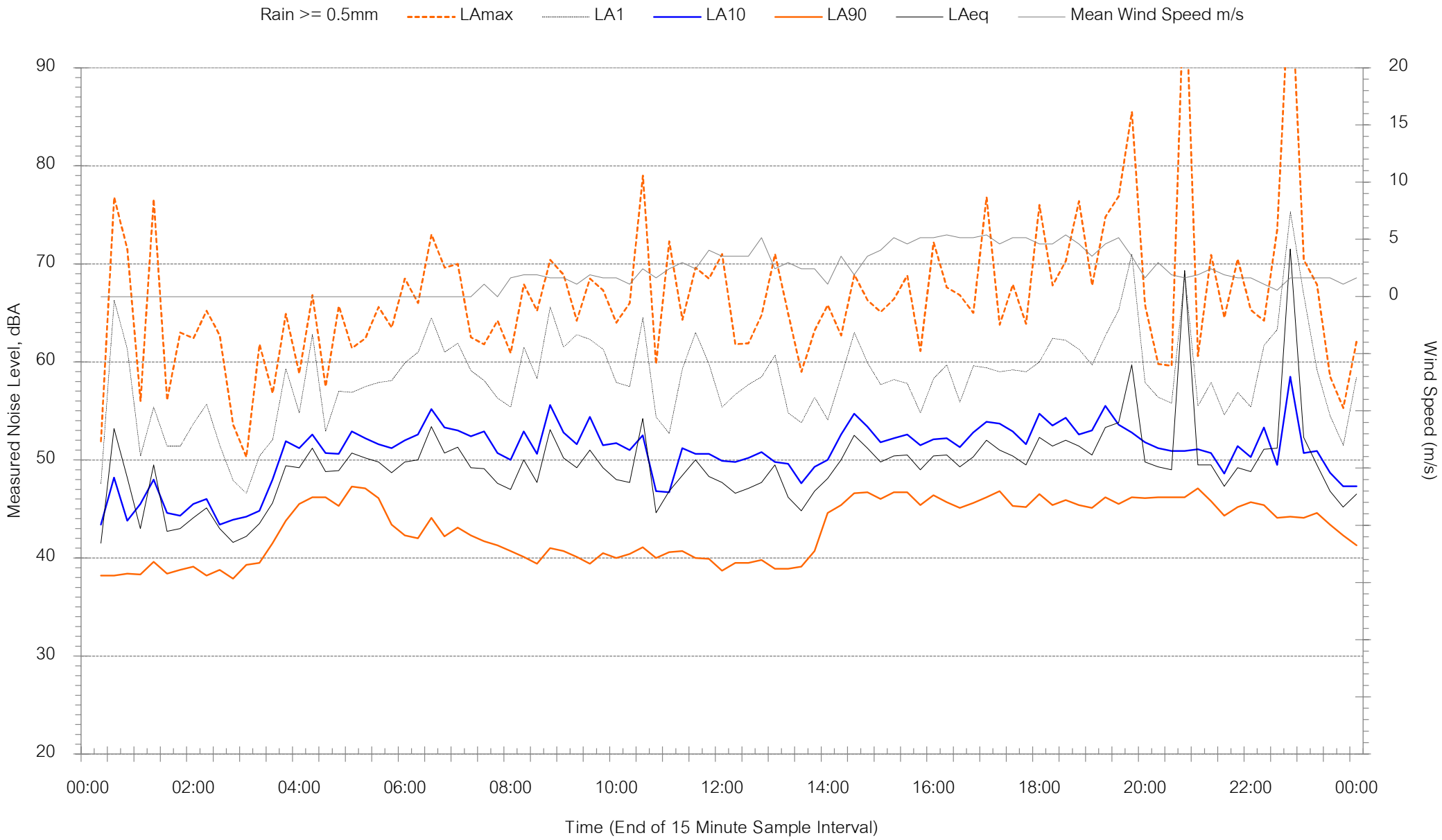
Background Noise Levels

Logger 2 - Lowe Avenue, Edmonson Park - Thursday 30 January 2020



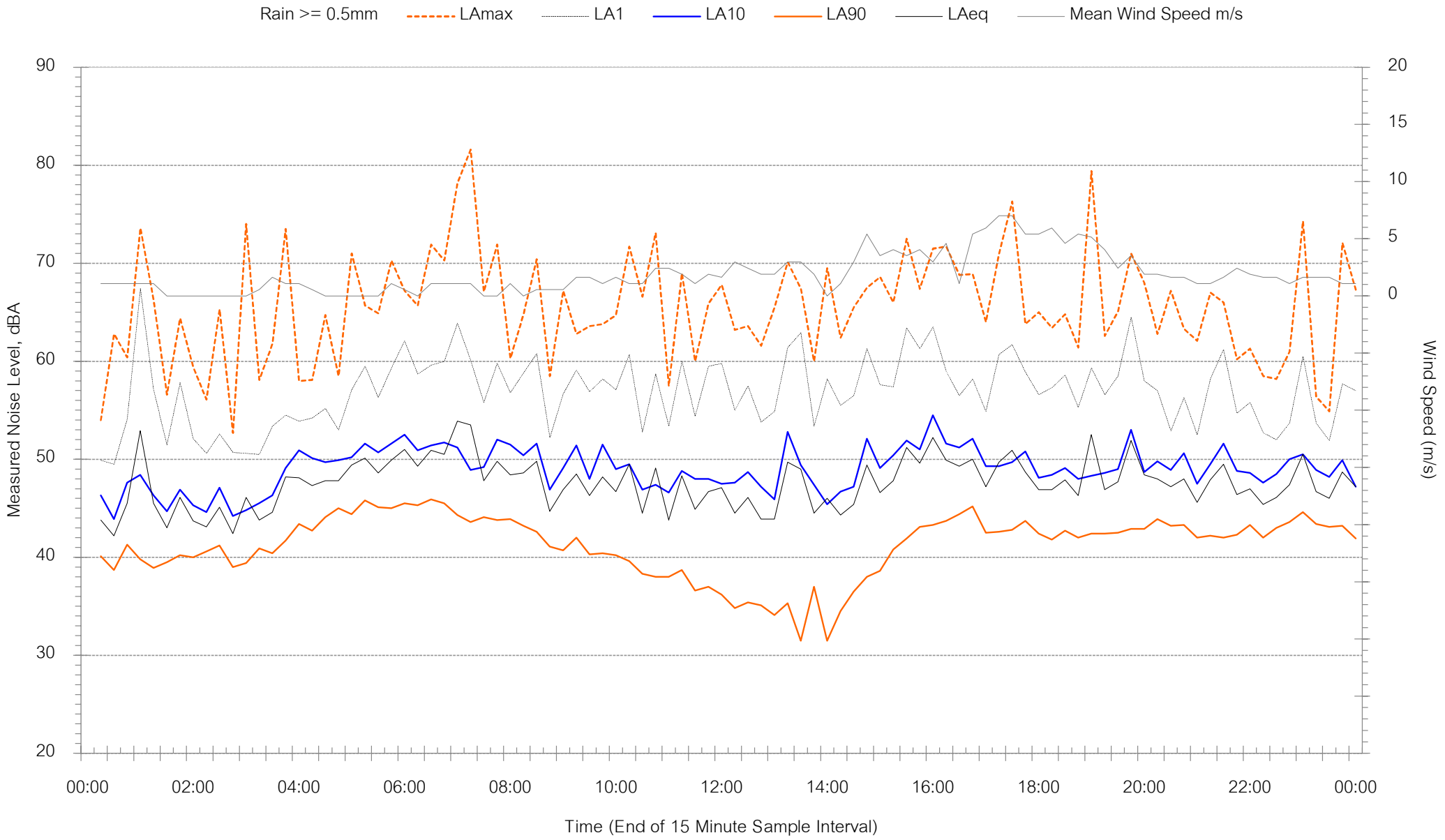
Background Noise Levels

Logger 2 - Lowe Avenue, Edmonson Park - Friday 31 January 2020



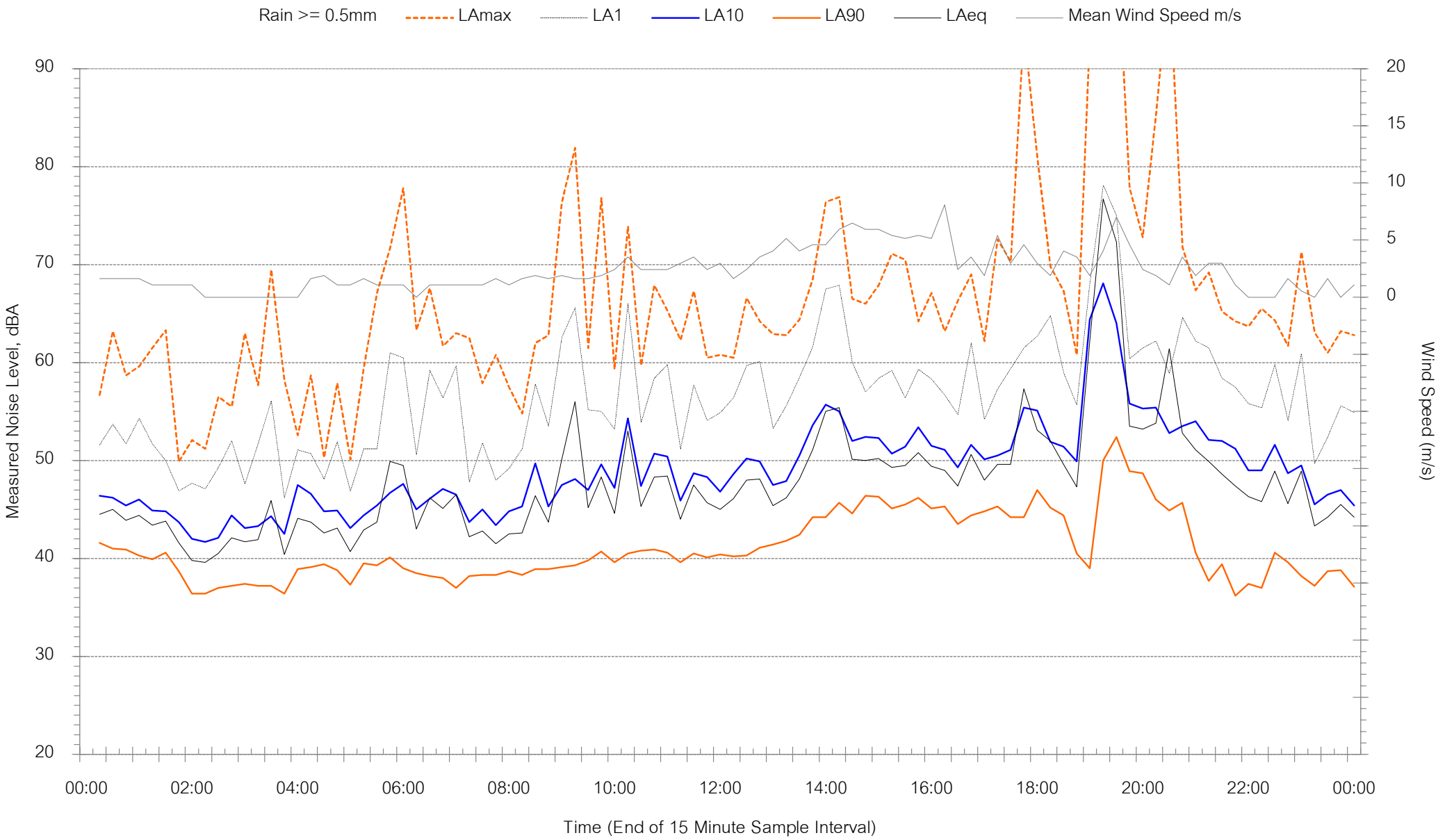
Background Noise Levels

Logger 2 - Lowe Avenue, Edmonson Park - Saturday 1 February 2020



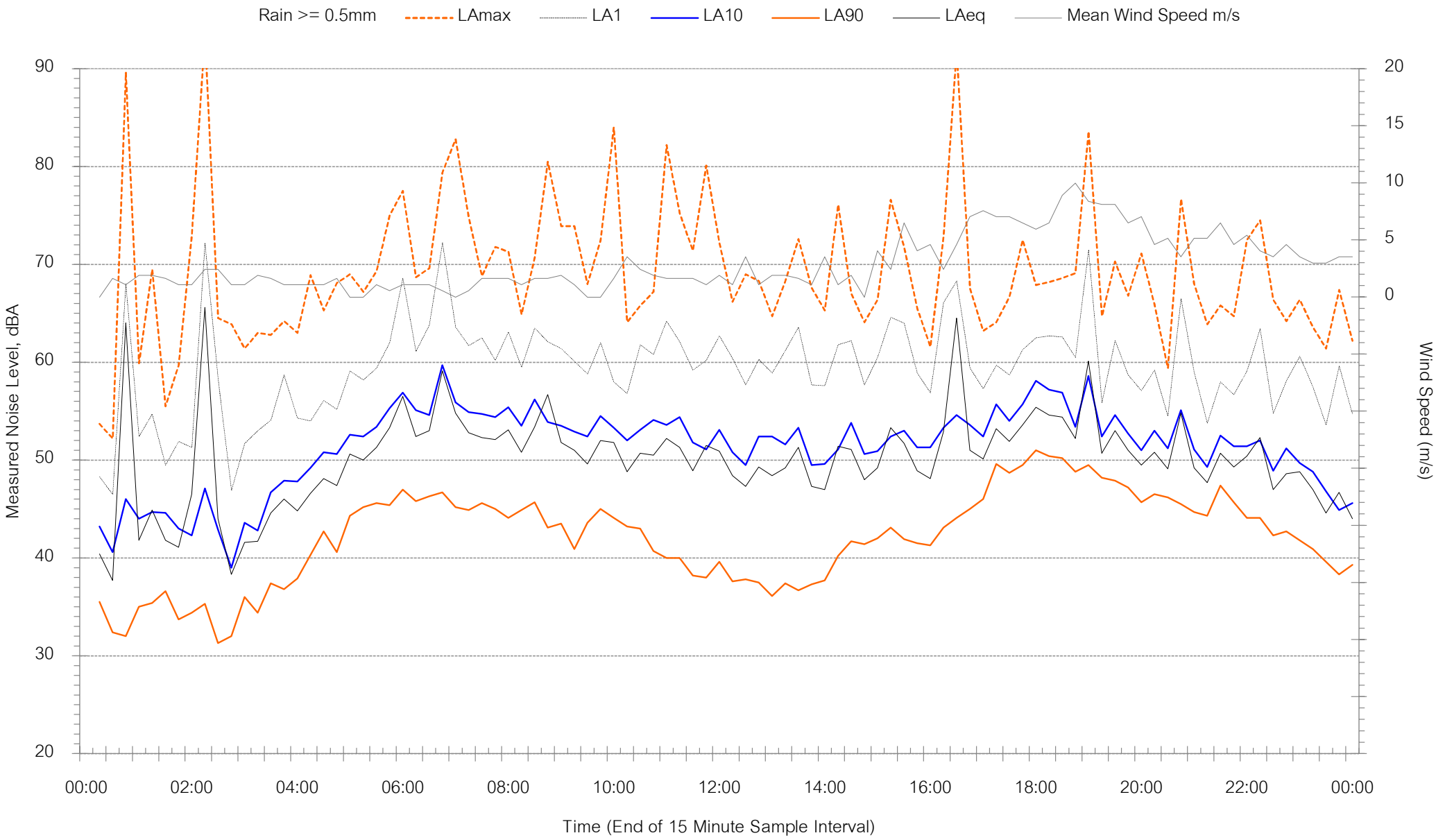
Background Noise Levels

Logger 2 - Lowe Avenue, Edmonson Park - Sunday 2 February 2020



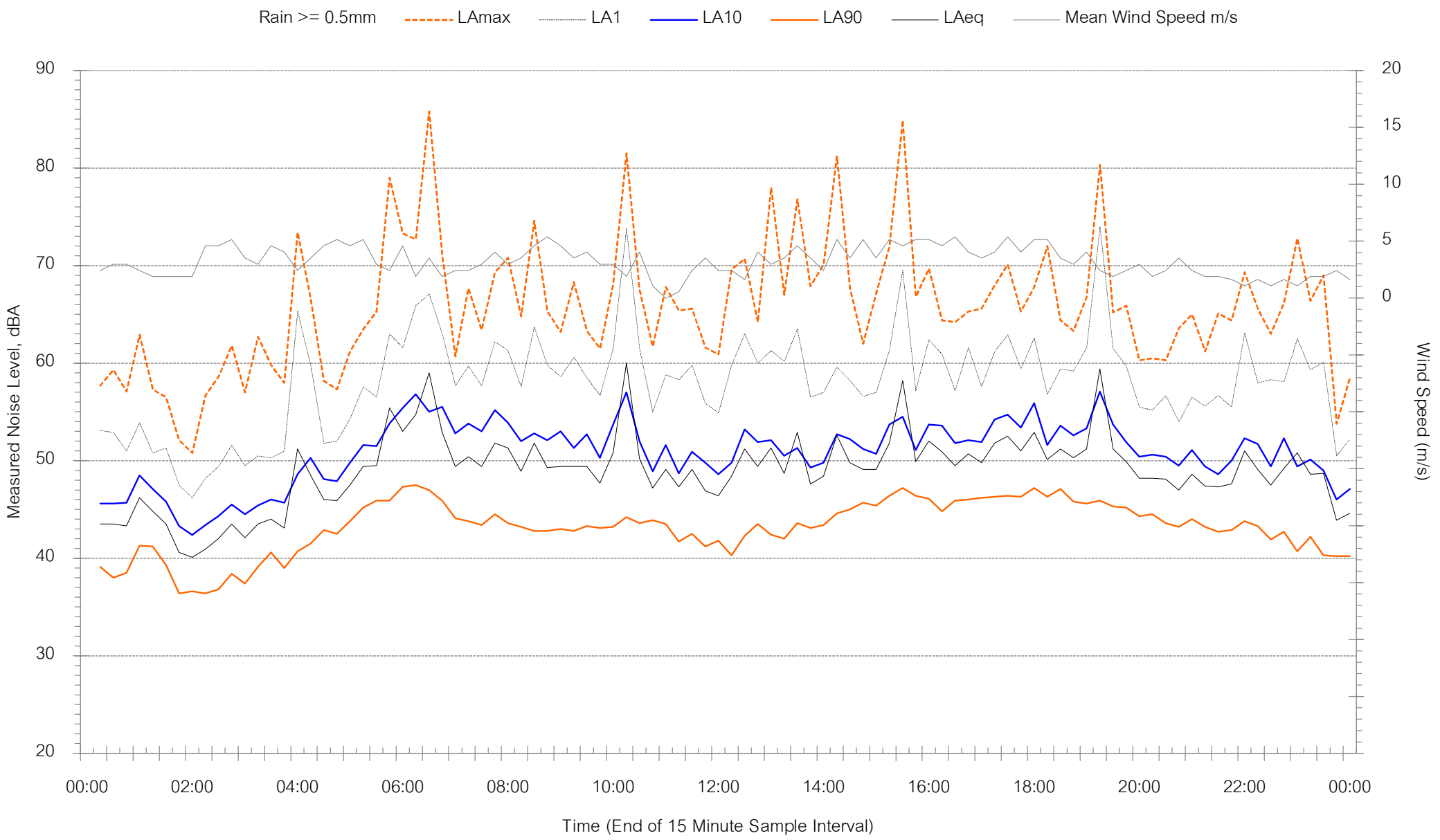
Background Noise Levels

Logger 2 - Lowe Avenue, Edmonson Park - Monday 3 February 2020



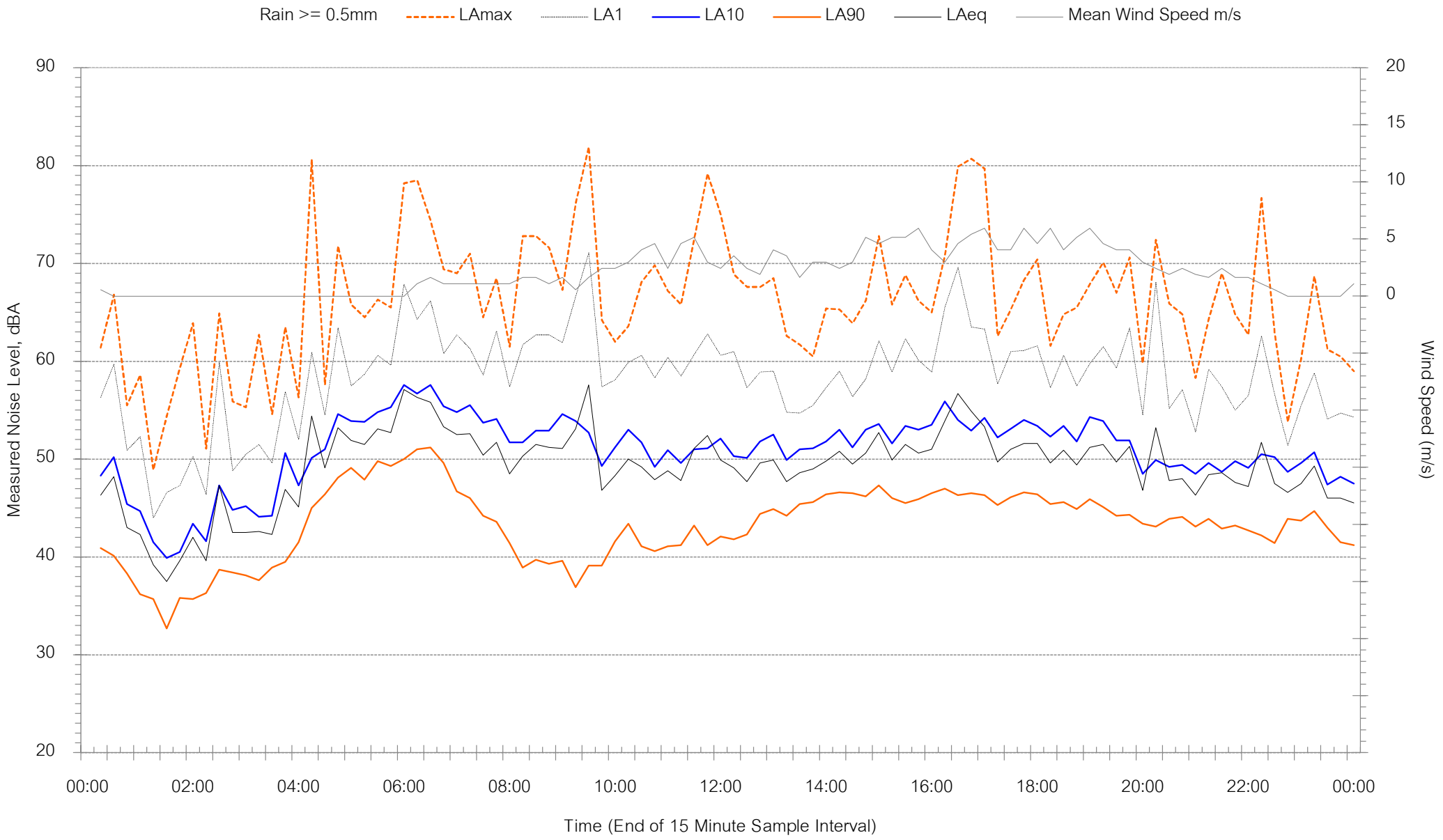
Background Noise Levels

Logger 2 - Lowe Avenue, Edmonson Park - Tuesday 4 February 2020



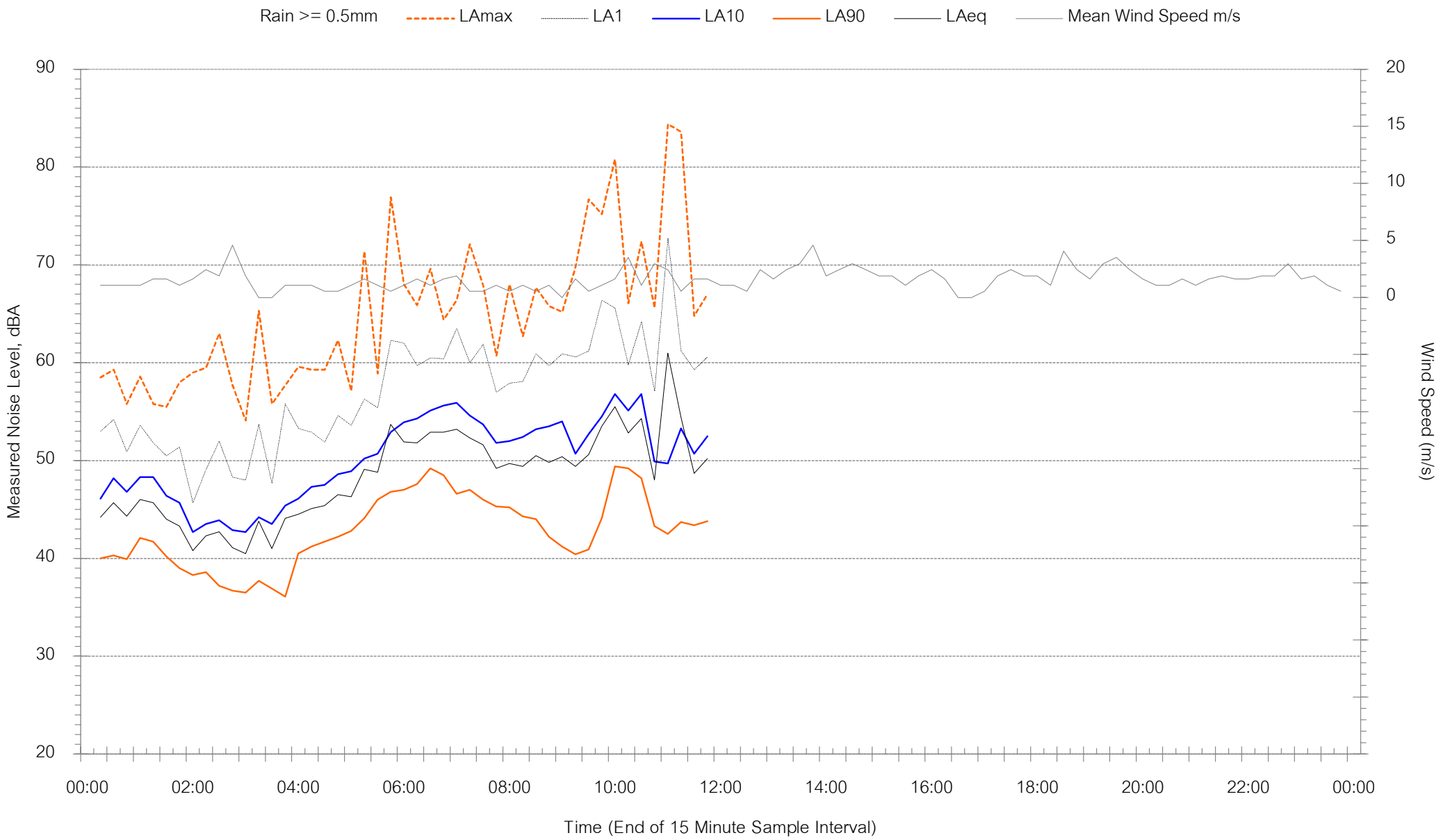
Background Noise Levels

Logger 2 - Lowe Avenue, Edmonson Park - Wednesday 5 February 2020



Background Noise Levels

Logger 2 - Lowe Avenue, Edmonson Park - Thursday 6 February 2020



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Appendix E – Detailed Assessment Results and Additional Mitigation Measures

				1 - Site Establishment			CNS V4 AMMM		
			Predicted Noise Level	Diff to NML			1 - Site Establishment		
Name	Description	NCA	Site Establishment	D	E	N	D	E	N
R05A	Townhouses Soldiers Pde	Edmondson Park Town Centre	23	-26	-21	-19	--	--	--
R05B	Townhouses Soldiers Pde	Edmondson Park Town Centre	23	-26	-21	-19	--	--	--
R05C	Townhouses Soldiers Pde	Edmondson Park Town Centre	26	-23	-18	-16	--	--	--
R05D	Townhouses Soldiers Pde	Edmondson Park Town Centre	42	-7	-2	0	--	--	--
R06A	Townhouses Soldiers Pde	Edmondson Park Town Centre	24	-25	-20	-18	--	--	--
R06B	Townhouses Soldiers Pde	Edmondson Park Town Centre	25	-24	-19	-17	--	--	--
R06C	Townhouses Soldiers Pde	Edmondson Park Town Centre	43	-6	-1	1	--	--	PN
R06D	Townhouses Soldiers Pde	Edmondson Park Town Centre	35	-14	-9	-7	--	--	--
R01	Digger Lane	Bardia (Centre)	37	-12	-7	-5	--	--	--
R02	Digger Lane	Bardia (Centre)	25	-24	-19	-17	--	--	--
R03	Ordinance Street	Bardia (Centre)	25	-24	-19	-17	--	--	--
R04	Vevi Street	Bardia (Centre)	26	-23	-18	-16	--	--	--
R07	Vevi Street	Bardia (Centre)	33	-16	-11	-9	--	--	--
R08	Vevi Street	Bardia (Centre)	35	-14	-9	-7	--	--	--
R09	Vevi Street	Bardia (Centre)	36	-13	-8	-6	--	--	--
R10	Arthur Allen Drive	Bardia (Centre)	34	-15	-10	-8	--	--	--
R11	Arthur Allen Drive	Bardia (Centre)	34	-15	-10	-8	--	--	--
R12	Arthur Allen Drive	Bardia (Centre)	23	-26	-21	-19	--	--	--
R13	Arthur Allen Drive	Bardia (Centre)	35	-14	-9	-7	--	--	--
R14	Arthur Allen Drive	Bardia (Centre)	31	-18	-13	-11	--	--	--
R15	Arthur Allen Drive	Bardia (Centre)	28	-21	-16	-14	--	--	--
R16	Arthur Allen Drive	Bardia (Centre)	33	-16	-11	-9	--	--	--
R17	Bardia Avenue	Bardia (Centre)	13	-36	-31	-29	--	--	--
R18	Bardia Avenue	Bardia (Centre)	12	-37	-32	-30	--	--	--
R19	Bardia Avenue	Bardia (Centre)	15	-34	-29	-27	--	--	--
R20	Lowe Avenue	Bardia (Centre)	11	-38	-33	-31	--	--	--
R21	Lowe Avenue	Bardia (East)	12	-37	-32	-30	--	--	--
R22	Webber Circuit	Bardia (East)	18	-31	-26	-24	--	--	--
R23	Nash Street	Bardia (East)	23	-26	-21	-19	--	--	--
R24	Noble Street	Bardia (East)	23	-26	-21	-19	--	--	--
R25	Bursill Place	Bardia (East)	25	-24	-19	-17	--	--	--
R26	Webber Circuit	Bardia (East)	22	-27	-22	-20	--	--	--
R27	Callinan Crescent	Bardia (East)	27	-22	-17	-15	--	--	--
R28	Donohoe Street	Bardia (East)	25	-24	-19	-17	--	--	--
R29	Callinan Crescent	Bardia (East)	22	-27	-22	-20	--	--	--
R30	Ingleburn Gardens Drive	Bardia (East)	26	-23	-18	-16	--	--	--
R31	Ingleburn Gardens Drive	Bardia (East)	25	-24	-19	-17	--	--	--
R32	Ingleburn Gardens Drive	Bardia (East)	12	-37	-32	-30	--	--	--
R33	Hollyoake Circuit	Bardia (East)	35	-14	-9	-7	--	--	--
R34	Burton Avenue	Bardia (East)	34	-15	-10	-8	--	--	--
R35	Ingleburn Gardens Drive	Bardia (East)	34	-15	-10	-8	--	--	--
R36	Croatia Avenue	Edmondson Park (North East)	35	-16	-11	-6	--	--	--
R37	Croatia Avenue	Edmondson Park (North East)	34	-17	-12	-7	--	--	--
R38	Croatia Avenue	Edmondson Park (North East)	32	-19	-14	-9	--	--	--
R39	Croatia Avenue	Edmondson Park (North East)	32	-19	-14	-9	--	--	--
R40	Croatia Avenue	Edmondson Park (North East)	38	-13	-8	-3	--	--	--
R41	Arnhem Road	Edmondson Park (North East)	42	-9	-4	1	--	--	PN
R42	Chnagsha Road	Edmondson Park (North West)	40	-11	-6	-1	--	--	--
R43	Wonson Road	Edmondson Park (North West)	40	-11	-6	-1	--	--	--
R44	Learoyd Road	Edmondson Park (North West)	39	-12	-7	-2	--	--	--
R45	Mcfarlane Road	Edmondson Park (North West)	32	-19	-14	-9	--	--	--
R46	Faulkner Way	Edmondson Park (North West)	36	-15	-10	-5	--	--	--
R47	Faulkner Way	Edmondson Park (North West)	34	-17	-12	-7	--	--	--
R48	Faulkner Way	Edmondson Park (North West)	27	-24	-19	-14	--	--	--
R49	Holiday Avenue	Edmondson Park (North West)	34	-17	-12	-7	--	--	--
R50	Buchan Avenue	Edmondson Park (North West)	34	-17	-12	-7	--	--	--
R51	Buchan Avenue	Edmondson Park (North West)	34	-17	-12	-7	--	--	--
R52	Gallipoli Drive	Edmondson Park (North West)	34	-17	-12	-7	--	--	--
R53	Isonzo Road	Edmondson Park (North West)	33	-18	-13	-8	--	--	--
R54	Culverston Avenue	Denham Court	32	-19	-14	-9	--	--	--
R55	Culverston Avenue	Denham Court	31	-20	-15	-10	--	--	--
R56	Culverston Avenue	Denham Court	32	-19	-14	-9	--	--	--
R57	Culverston Avenue	Denham Court	31	-20	-15	-10	--	--	--
R58	Culverston Avenue	Denham Court	33	-18	-13	-8	--	--	--
R59	Culverston Avenue	Denham Court	32	-19	-14	-9	--	--	--
R60	Culverston Avenue	Denham Court	32	-19	-14	-9	--	--	--
R61	Culverston Avenue	Denham Court	31	-20	-15	-10	--	--	--
R62	Culverston Avenue	Denham Court	30	-21	-16	-11	--	--	--
R63	Culverston Avenue	Denham Court	39	-12	-7	-2	--	--	--
R64	Culverston Avenue	Denham Court	40	-11	-6	-1	--	--	--
R65	Culverston Avenue	Denham Court	41	-10	-5	0	--	--	--
C01A	Commercial/Shops	Commercial	47	-23	-23	-23	--	--	--
C01B	Commercial/Shops	Commercial	30	-40	-40	-40	--	--	--
C01C	Commercial/Shops	Commercial	32	-38	-38	-38	--	--	--
C01D	Commercial/Shops	Commercial	56	-14	-14	-14	--	--	--
C02A	Commercial/Shops	Commercial	28	-42	-42	-42	--	--	--
C02B	Commercial/Shops	Commercial	26	-44	-44	-44	--	--	--
C02C	Commercial/Shops	Commercial	32	-38	-38	-38	--	--	--
C02D	Commercial/Shops	Commercial	48	-22	-22	-22	--	--	--
C02E	Commercial/Shops	Commercial	52	-18	-18	-18	--	--	--
C03	Military Museum	Commercial	40	-30	-30	-30	--	--	--
CCC01	Bambi Kindergarten	Education	32	-38	-38	-38	--	--	--
SCH01A	Bardia Public School	Education	31	-24	-24	-24	--	--	--
SCH01B	Bardia Public School	Education	32	-23	-23	-23	--	--	--
SCH02	St Francis College	Education	32	-23	-23	-23	--	--	--
CH01	Jehovahs Witness	Place of Worship	38	-12	-12	-12	--	--	--
AR01	Clermont Park	Active Recreation	42	-23	-23	-23	--	--	--
AR02	Bardia Park	Active Recreation	25	-40	-40	-40	--	--	--
AR03	Edmsondson Regional Park	Active Recreation	34	-31	-31	-31	--	--	--
AR04	Mon St Quentin Oval	Active Recreation	34	-31	-31	-31	--	--	--

				2 - Service Relocation					
			Predicted Noise Level	Diff to NML			2 - Service Relocation		
Name	Description	NCA	Service Relocation	D	E	N	D	E	N
R05A	Townhouses Soldiers Pde	Edmondson Park Town Centre	30	-19	-14	-12	--	--	--
R05B	Townhouses Soldiers Pde	Edmondson Park Town Centre	30	-19	-14	-12	--	--	--
R05C	Townhouses Soldiers Pde	Edmondson Park Town Centre	33	-16	-11	-9	--	--	--
R05D	Townhouses Soldiers Pde	Edmondson Park Town Centre	46	-3	2	4	--	--	PN
R06A	Townhouses Soldiers Pde	Edmondson Park Town Centre	32	-17	-12	-10	--	--	--
R06B	Townhouses Soldiers Pde	Edmondson Park Town Centre	32	-17	-12	-10	--	--	--
R06C	Townhouses Soldiers Pde	Edmondson Park Town Centre	50	1	6	8	--	PN	PN, V
R06D	Townhouses Soldiers Pde	Edmondson Park Town Centre	42	-7	-2	0	--	--	--
R01	Digger Lane	Bardia (Centre)	43	-6	-1	1	--	--	PN
R02	Digger Lane	Bardia (Centre)	32	-17	-12	-10	--	--	--
R03	Ordinance Street	Bardia (Centre)	33	-16	-11	-9	--	--	--
R04	Vevi Street	Bardia (Centre)	33	-16	-11	-9	--	--	--
R07	Vevi Street	Bardia (Centre)	40	-9	-4	-2	--	--	--
R08	Vevi Street	Bardia (Centre)	42	-7	-2	0	--	--	--
R09	Vevi Street	Bardia (Centre)	42	-7	-2	0	--	--	--
R10	Arthur Allen Drive	Bardia (Centre)	40	-9	-4	-2	--	--	--
R11	Arthur Allen Drive	Bardia (Centre)	41	-8	-3	-1	--	--	--
R12	Arthur Allen Drive	Bardia (Centre)	31	-18	-13	-11	--	--	--
R13	Arthur Allen Drive	Bardia (Centre)	42	-7	-2	0	--	--	--
R14	Arthur Allen Drive	Bardia (Centre)	38	-11	-6	-4	--	--	--
R15	Arthur Allen Drive	Bardia (Centre)	36	-13	-8	-6	--	--	--
R16	Arthur Allen Drive	Bardia (Centre)	39	-10	-5	-3	--	--	--
R17	Bardia Avenue	Bardia (Centre)	20	-29	-24	-22	--	--	--
R18	Bardia Avenue	Bardia (Centre)	22	-27	-22	-20	--	--	--
R19	Bardia Avenue	Bardia (Centre)	27	-22	-17	-15	--	--	--
R20	Lowe Avenue	Bardia (Centre)	18	-31	-26	-24	--	--	--
R21	Lowe Avenue	Bardia (East)	24	-25	-20	-18	--	--	--
R22	Webber Circuit	Bardia (East)	27	-22	-17	-15	--	--	--
R23	Nash Street	Bardia (East)	28	-21	-16	-14	--	--	--
R24	Noble Street	Bardia (East)	20	-29	-24	-22	--	--	--
R25	Bursill Place	Bardia (East)	32	-17	-12	-10	--	--	--
R26	Webber Circuit	Bardia (East)	19	-30	-25	-23	--	--	--
R27	Callinan Crescent	Bardia (East)	32	-17	-12	-10	--	--	--
R28	Donohoe Street	Bardia (East)	33	-16	-11	-9	--	--	--
R29	Callinan Crescent	Bardia (East)	20	-29	-24	-22	--	--	--
R30	Ingleburn Gardens Drive	Bardia (East)	31	-18	-13	-11	--	--	--
R31	Ingleburn Gardens Drive	Bardia (East)	31	-18	-13	-11	--	--	--
R32	Ingleburn Gardens Drive	Bardia (East)	20	-29	-24	-22	--	--	--
R33	Hollyoake Circuit	Bardia (East)	41	-8	-3	-1	--	--	--
R34	Burton Avenue	Bardia (East)	41	-8	-3	-1	--	--	--
R35	Ingleburn Gardens Drive	Bardia (East)	40	-9	-4	-2	--	--	--
R36	Croatia Avenue	Edmondson Park (North East)	42	-9	-4	1	--	--	PN
R37	Croatia Avenue	Edmondson Park (North East)	41	-10	-5	0	--	--	--
R38	Croatia Avenue	Edmondson Park (North East)	38	-13	-8	-3	--	--	--
R39	Croatia Avenue	Edmondson Park (North East)	39	-12	-7	-2	--	--	--
R40	Croatia Avenue	Edmondson Park (North East)	44	-7	-2	3	--	--	PN
R41	Arnhem Road	Edmondson Park (North East)	48	-3	2	7	--	--	PN, V
R42	Chnagsha Road	Edmondson Park (North West)	46	-5	0	5	--	--	PN
R43	Wonson Road	Edmondson Park (North West)	46	-5	0	5	--	--	PN
R44	Learoyd Road	Edmondson Park (North West)	45	-6	-1	4	--	--	PN
R45	Mcfarlane Road	Edmondson Park (North West)	38	-13	-8	-3	--	--	--
R46	Faulkner Way	Edmondson Park (North West)	42	-9	-4	1	--	--	PN
R47	Faulkner Way	Edmondson Park (North West)	41	-10	-5	0	--	--	--
R48	Faulkner Way	Edmondson Park (North West)	34	-17	-12	-7	--	--	--
R49	Holiday Avenue	Edmondson Park (North West)	41	-10	-5	0	--	--	--
R50	Buchan Avenue	Edmondson Park (North West)	41	-10	-5	0	--	--	--
R51	Buchan Avenue	Edmondson Park (North West)	40	-11	-6	-1	--	--	--
R52	Gallipoli Drive	Edmondson Park (North West)	41	-10	-5	0	--	--	--
R53	Isonzo Road	Edmondson Park (North West)	40	-11	-6	-1	--	--	--
R54	Culverston Avenue	Denham Court	39	-12	-7	-2	--	--	--
R55	Culverston Avenue	Denham Court	37	-14	-9	-4	--	--	--
R56	Culverston Avenue	Denham Court	39	-12	-7	-2	--	--	--
R57	Culverston Avenue	Denham Court	38	-13	-8	-3	--	--	--
R58	Culverston Avenue	Denham Court	40	-11	-6	-1	--	--	--
R59	Culverston Avenue	Denham Court	39	-12	-7	-2	--	--	--
R60	Culverston Avenue	Denham Court	39	-12	-7	-2	--	--	--
R61	Culverston Avenue	Denham Court	38	-13	-8	-3	--	--	--
R62	Culverston Avenue	Denham Court	37	-14	-9	-4	--	--	--
R63	Culverston Avenue	Denham Court	45	-6	-1	4	--	--	PN
R64	Culverston Avenue	Denham Court	46	-5	0	5	--	--	PN
R65	Culverston Avenue	Denham Court	47	-4	1	6	--	--	PN, V
C01A	Commercial/Shops	Commercial	55	-15	-15	-15	--	--	--
C01B	Commercial/Shops	Commercial	36	-34	-34	-34	--	--	--
C01C	Commercial/Shops	Commercial	37	-33	-33	-33	--	--	--
C01D	Commercial/Shops	Commercial	62	-8	-8	-8	--	--	--
C02A	Commercial/Shops	Commercial	34	-36	-36	-36	--	--	--
C02B	Commercial/Shops	Commercial	32	-38	-38	-38	--	--	--
C02C	Commercial/Shops	Commercial	39	-31	-31	-31	--	--	--
C02D	Commercial/Shops	Commercial	55	-15	-15	-15	--	--	--
C02E	Commercial/Shops	Commercial	59	-11	-11	-11	--	--	--
C03	Military Museum	Commercial	46	-24	-24	-24	--	--	--
CCC01	Bambi Kindergarten	Education	39	-31	-31	-31	--	--	--
SCH01A	Bardia Public School	Education	39	-16	-16	-16	--	--	--
SCH01B	Bardia Public School	Education	39	-16	-16	-16	--	--	--
SCH02	St Francis College	Education	39	-16	-16	-16	--	--	--
CH01	Jehovahs Witness	Place of Worship	44	-6	-6	-6	--	--	--
AR01	Clermont Park	Active Recreation	49	-16	-16	-16	--	--	--
AR02	Bardia Park	Active Recreation	32	-33	-33	-33	--	--	--
AR03	Edmsondson Regional Park	Active Recreation	41	-24	-24	-24	--	--	--
AR04	Mon St Quentin Oval	Active Recreation	41	-24	-24	-24	--	--	--

				3A - Earthworks					
			Predicted Noise Level	Diff to NML			3A - Earthworks		
Name	Description	NCA	Earthworks	D	E	N	D	E	N
R05A	Townhouses Soldiers Pde	Edmondson Park Town Centre	30	-19	-14	-12	--	--	--
R05B	Townhouses Soldiers Pde	Edmondson Park Town Centre	30	-19	-14	-12	--	--	--
R05C	Townhouses Soldiers Pde	Edmondson Park Town Centre	32	-17	-12	-10	--	--	--
R05D	Townhouses Soldiers Pde	Edmondson Park Town Centre	40	-9	-4	-2	--	--	--
R06A	Townhouses Soldiers Pde	Edmondson Park Town Centre	31	-18	-13	-11	--	--	--
R06B	Townhouses Soldiers Pde	Edmondson Park Town Centre	31	-18	-13	-11	--	--	--
R06C	Townhouses Soldiers Pde	Edmondson Park Town Centre	46	-3	2	4	--	--	PN
R06D	Townhouses Soldiers Pde	Edmondson Park Town Centre	42	-7	-2	0	--	--	--
R01	Digger Lane	Bardia (Centre)	44	-5	0	2	--	--	PN
R02	Digger Lane	Bardia (Centre)	32	-17	-12	-10	--	--	--
R03	Ordinance Street	Bardia (Centre)	32	-17	-12	-10	--	--	--
R04	Vevi Street	Bardia (Centre)	32	-17	-12	-10	--	--	--
R07	Vevi Street	Bardia (Centre)	41	-8	-3	-1	--	--	--
R08	Vevi Street	Bardia (Centre)	42	-7	-2	0	--	--	--
R09	Vevi Street	Bardia (Centre)	42	-7	-2	0	--	--	--
R10	Arthur Allen Drive	Bardia (Centre)	40	-9	-4	-2	--	--	--
R11	Arthur Allen Drive	Bardia (Centre)	41	-8	-3	-1	--	--	--
R12	Arthur Allen Drive	Bardia (Centre)	32	-17	-12	-10	--	--	--
R13	Arthur Allen Drive	Bardia (Centre)	39	-10	-5	-3	--	--	--
R14	Arthur Allen Drive	Bardia (Centre)	38	-11	-6	-4	--	--	--
R15	Arthur Allen Drive	Bardia (Centre)	35	-14	-9	-7	--	--	--
R16	Arthur Allen Drive	Bardia (Centre)	37	-12	-7	-5	--	--	--
R17	Bardia Avenue	Bardia (Centre)	18	-31	-26	-24	--	--	--
R18	Bardia Avenue	Bardia (Centre)	18	-31	-26	-24	--	--	--
R19	Bardia Avenue	Bardia (Centre)	18	-31	-26	-24	--	--	--
R20	Lowe Avenue	Bardia (Centre)	16	-33	-28	-26	--	--	--
R21	Lowe Avenue	Bardia (East)	17	-32	-27	-25	--	--	--
R22	Webber Circuit	Bardia (East)	20	-29	-24	-22	--	--	--
R23	Nash Street	Bardia (East)	24	-25	-20	-18	--	--	--
R24	Noble Street	Bardia (East)	20	-29	-24	-22	--	--	--
R25	Bursill Place	Bardia (East)	27	-22	-17	-15	--	--	--
R26	Webber Circuit	Bardia (East)	20	-29	-24	-22	--	--	--
R27	Callinan Crescent	Bardia (East)	29	-20	-15	-13	--	--	--
R28	Donohoe Street	Bardia (East)	26	-23	-18	-16	--	--	--
R29	Callinan Crescent	Bardia (East)	20	-29	-24	-22	--	--	--
R30	Ingleburn Gardens Drive	Bardia (East)	30	-19	-14	-12	--	--	--
R31	Ingleburn Gardens Drive	Bardia (East)	28	-21	-16	-14	--	--	--
R32	Ingleburn Gardens Drive	Bardia (East)	17	-32	-27	-25	--	--	--
R33	Hollyoake Circuit	Bardia (East)	41	-8	-3	-1	--	--	--
R34	Burton Avenue	Bardia (East)	41	-8	-3	-1	--	--	--
R35	Ingleburn Gardens Drive	Bardia (East)	40	-9	-4	-2	--	--	--
R36	Croatia Avenue	Edmondson Park (North East)	42	-9	-4	1	--	--	PN
R37	Croatia Avenue	Edmondson Park (North East)	40	-11	-6	-1	--	--	--
R38	Croatia Avenue	Edmondson Park (North East)	38	-13	-8	-3	--	--	--
R39	Croatia Avenue	Edmondson Park (North East)	38	-13	-8	-3	--	--	--
R40	Croatia Avenue	Edmondson Park (North East)	41	-10	-5	0	--	--	--
R41	Arnhem Road	Edmondson Park (North East)	43	-8	-3	2	--	--	PN
R42	Chnagsha Road	Edmondson Park (North West)	42	-9	-4	1	--	--	PN
R43	Wonson Road	Edmondson Park (North West)	43	-8	-3	2	--	--	PN
R44	Learoyd Road	Edmondson Park (North West)	44	-7	-2	3	--	--	PN
R45	Mcfarlane Road	Edmondson Park (North West)	37	-14	-9	-4	--	--	--
R46	Faulkner Way	Edmondson Park (North West)	41	-10	-5	0	--	--	--
R47	Faulkner Way	Edmondson Park (North West)	39	-12	-7	-2	--	--	--
R48	Faulkner Way	Edmondson Park (North West)	32	-19	-14	-9	--	--	--
R49	Holiday Avenue	Edmondson Park (North West)	39	-12	-7	-2	--	--	--
R50	Buchan Avenue	Edmondson Park (North West)	39	-12	-7	-2	--	--	--
R51	Buchan Avenue	Edmondson Park (North West)	39	-12	-7	-2	--	--	--
R52	Gallipoli Drive	Edmondson Park (North West)	40	-11	-6	-1	--	--	--
R53	Isonzo Road	Edmondson Park (North West)	39	-12	-7	-2	--	--	--
R54	Culverston Avenue	Denham Court	38	-13	-8	-3	--	--	--
R55	Culverston Avenue	Denham Court	37	-14	-9	-4	--	--	--
R56	Culverston Avenue	Denham Court	37	-14	-9	-4	--	--	--
R57	Culverston Avenue	Denham Court	37	-14	-9	-4	--	--	--
R58	Culverston Avenue	Denham Court	39	-12	-7	-2	--	--	--
R59	Culverston Avenue	Denham Court	38	-13	-8	-3	--	--	--
R60	Culverston Avenue	Denham Court	37	-14	-9	-4	--	--	--
R61	Culverston Avenue	Denham Court	37	-14	-9	-4	--	--	--
R62	Culverston Avenue	Denham Court	36	-15	-10	-5	--	--	--
R63	Culverston Avenue	Denham Court	44	-7	-2	3	--	--	PN
R64	Culverston Avenue	Denham Court	46	-5	0	5	--	--	PN
R65	Culverston Avenue	Denham Court	42	-9	-4	1	--	--	PN
C01A	Commercial/Shops	Commercial	54	-16	-16	-16	--	--	--
C01B	Commercial/Shops	Commercial	38	-32	-32	-32	--	--	--
C01C	Commercial/Shops	Commercial	42	-28	-28	-28	--	--	--
C01D	Commercial/Shops	Commercial	66	-4	-4	-4	--	--	--
C02A	Commercial/Shops	Commercial	36	-34	-34	-34	--	--	--
C02B	Commercial/Shops	Commercial	34	-36	-36	-36	--	--	--
C02C	Commercial/Shops	Commercial	35	-35	-35	-35	--	--	--
C02D	Commercial/Shops	Commercial	54	-16	-16	-16	--	--	--
C02E	Commercial/Shops	Commercial	57	-13	-13	-13	--	--	--
C03	Military Museum	Commercial	46	-24	-24	-24	--	--	--
CCC01	Bambi Kindergarten	Education	39	-31	-31	-31	--	--	--
SCH01A	Bardia Public School	Education	38	-17	-17	-17	--	--	--
SCH01B	Bardia Public School	Education	43	-12	-12	-12	--	--	--
SCH02	St Francis College	Education	43	-12	-12	-12	--	--	--
CH01	Jehovahs Witness	Place of Worship	44	-6	-6	-6	--	--	--
AR01	Clermont Park	Active Recreation	45	-20	-20	-20	--	--	--
AR02	Bardia Park	Active Recreation	29	-36	-36	-36	--	--	--
AR03	Edmsondson Regional Park	Active Recreation	40	-25	-25	-25	--	--	--
AR04	Mon St Quentin Oval	Active Recreation	41	-24	-24	-24	--	--	--

				3B - Sub-Super Structure					
			Predicted Noise Level	Diff to NML			3B - Sub-Super Structure		
Name	Description	NCA	Sub-Super Structure	D	E	N	D	E	N
R05A	Townhouses Soldiers Pde	Edmondson Park Town Centre	29	-20	-15	-13	--	--	--
R05B	Townhouses Soldiers Pde	Edmondson Park Town Centre	28	-21	-16	-14	--	--	--
R05C	Townhouses Soldiers Pde	Edmondson Park Town Centre	30	-19	-14	-12	--	--	--
R05D	Townhouses Soldiers Pde	Edmondson Park Town Centre	39	-10	-5	-3	--	--	--
R06A	Townhouses Soldiers Pde	Edmondson Park Town Centre	30	-19	-14	-12	--	--	--
R06B	Townhouses Soldiers Pde	Edmondson Park Town Centre	29	-20	-15	-13	--	--	--
R06C	Townhouses Soldiers Pde	Edmondson Park Town Centre	44	-5	0	2	--	--	PN
R06D	Townhouses Soldiers Pde	Edmondson Park Town Centre	41	-8	-3	-1	--	--	--
R01	Digger Lane	Bardia (Centre)	43	-6	-1	1	--	--	PN
R02	Digger Lane	Bardia (Centre)	30	-19	-14	-12	--	--	--
R03	Ordinance Street	Bardia (Centre)	30	-19	-14	-12	--	--	--
R04	Vevi Street	Bardia (Centre)	30	-19	-14	-12	--	--	--
R07	Vevi Street	Bardia (Centre)	39	-10	-5	-3	--	--	--
R08	Vevi Street	Bardia (Centre)	41	-8	-3	-1	--	--	--
R09	Vevi Street	Bardia (Centre)	42	-7	-2	0	--	--	--
R10	Arthur Allen Drive	Bardia (Centre)	39	-10	-5	-3	--	--	--
R11	Arthur Allen Drive	Bardia (Centre)	40	-9	-4	-2	--	--	--
R12	Arthur Allen Drive	Bardia (Centre)	29	-20	-15	-13	--	--	--
R13	Arthur Allen Drive	Bardia (Centre)	37	-12	-7	-5	--	--	--
R14	Arthur Allen Drive	Bardia (Centre)	37	-12	-7	-5	--	--	--
R15	Arthur Allen Drive	Bardia (Centre)	32	-17	-12	-10	--	--	--
R16	Arthur Allen Drive	Bardia (Centre)	35	-14	-9	-7	--	--	--
R17	Bardia Avenue	Bardia (Centre)	16	-33	-28	-26	--	--	--
R18	Bardia Avenue	Bardia (Centre)	15	-34	-29	-27	--	--	--
R19	Bardia Avenue	Bardia (Centre)	16	-33	-28	-26	--	--	--
R20	Lowe Avenue	Bardia (Centre)	12	-37	-32	-30	--	--	--
R21	Lowe Avenue	Bardia (East)	14	-35	-30	-28	--	--	--
R22	Webber Circuit	Bardia (East)	17	-32	-27	-25	--	--	--
R23	Nash Street	Bardia (East)	21	-28	-23	-21	--	--	--
R24	Noble Street	Bardia (East)	15	-34	-29	-27	--	--	--
R25	Bursill Place	Bardia (East)	23	-26	-21	-19	--	--	--
R26	Webber Circuit	Bardia (East)	14	-35	-30	-28	--	--	--
R27	Callinan Crescent	Bardia (East)	26	-23	-18	-16	--	--	--
R28	Donohoe Street	Bardia (East)	23	-26	-21	-19	--	--	--
R29	Callinan Crescent	Bardia (East)	15	-34	-29	-27	--	--	--
R30	Ingleburn Gardens Drive	Bardia (East)	27	-22	-17	-15	--	--	--
R31	Ingleburn Gardens Drive	Bardia (East)	26	-23	-18	-16	--	--	--
R32	Ingleburn Gardens Drive	Bardia (East)	13	-36	-31	-29	--	--	--
R33	Hollyoake Circuit	Bardia (East)	39	-10	-5	-3	--	--	--
R34	Burton Avenue	Bardia (East)	39	-10	-5	-3	--	--	--
R35	Ingleburn Gardens Drive	Bardia (East)	39	-10	-5	-3	--	--	--
R36	Croatia Avenue	Edmondson Park (North East)	40	-11	-6	-1	--	--	--
R37	Croatia Avenue	Edmondson Park (North East)	39	-12	-7	-2	--	--	--
R38	Croatia Avenue	Edmondson Park (North East)	36	-15	-10	-5	--	--	--
R39	Croatia Avenue	Edmondson Park (North East)	36	-15	-10	-5	--	--	--
R40	Croatia Avenue	Edmondson Park (North East)	39	-12	-7	-2	--	--	--
R41	Arnhem Road	Edmondson Park (North East)	41	-10	-5	0	--	--	--
R42	Chnagsha Road	Edmondson Park (North West)	40	-11	-6	-1	--	--	--
R43	Wonson Road	Edmondson Park (North West)	42	-9	-4	1	--	--	PN
R44	Learoyd Road	Edmondson Park (North West)	43	-8	-3	2	--	--	PN
R45	Mcfarlane Road	Edmondson Park (North West)	34	-17	-12	-7	--	--	--
R46	Faulkner Way	Edmondson Park (North West)	39	-12	-7	-2	--	--	--
R47	Faulkner Way	Edmondson Park (North West)	37	-14	-9	-4	--	--	--
R48	Faulkner Way	Edmondson Park (North West)	28	-23	-18	-13	--	--	--
R49	Holiday Avenue	Edmondson Park (North West)	37	-14	-9	-4	--	--	--
R50	Buchan Avenue	Edmondson Park (North West)	38	-13	-8	-3	--	--	--
R51	Buchan Avenue	Edmondson Park (North West)	38	-13	-8	-3	--	--	--
R52	Gallipoli Drive	Edmondson Park (North West)	38	-13	-8	-3	--	--	--
R53	Isonzo Road	Edmondson Park (North West)	37	-14	-9	-4	--	--	--
R54	Culverston Avenue	Denham Court	37	-14	-9	-4	--	--	--
R55	Culverston Avenue	Denham Court	35	-16	-11	-6	--	--	--
R56	Culverston Avenue	Denham Court	36	-15	-10	-5	--	--	--
R57	Culverston Avenue	Denham Court	35	-16	-11	-6	--	--	--
R58	Culverston Avenue	Denham Court	37	-14	-9	-4	--	--	--
R59	Culverston Avenue	Denham Court	36	-15	-10	-5	--	--	--
R60	Culverston Avenue	Denham Court	36	-15	-10	-5	--	--	--
R61	Culverston Avenue	Denham Court	35	-16	-11	-6	--	--	--
R62	Culverston Avenue	Denham Court	34	-17	-12	-7	--	--	--
R63	Culverston Avenue	Denham Court	43	-8	-3	2	--	--	PN
R64	Culverston Avenue	Denham Court	45	-6	-1	4	--	--	PN
R65	Culverston Avenue	Denham Court	41	-10	-5	0	--	--	--
C01A	Commercial/Shops	Commercial	54	-16	-16	-16	--	--	--
C01B	Commercial/Shops	Commercial	37	-33	-33	-33	--	--	--
C01C	Commercial/Shops	Commercial	41	-29	-29	-29	--	--	--
C01D	Commercial/Shops	Commercial	65	-5	-5	-5	--	--	--
C02A	Commercial/Shops	Commercial	36	-34	-34	-34	--	--	--
C02B	Commercial/Shops	Commercial	33	-37	-37	-37	--	--	--
C02C	Commercial/Shops	Commercial	34	-36	-36	-36	--	--	--
C02D	Commercial/Shops	Commercial	53	-17	-17	-17	--	--	--
C02E	Commercial/Shops	Commercial	56	-14	-14	-14	--	--	--
C03	Military Museum	Commercial	46	-24	-24	-24	--	--	--
CCC01	Bambi Kindergarten	Education	37	-33	-33	-33	--	--	--
SCH01A	Bardia Public School	Education	37	-18	-18	-18	--	--	--
SCH01B	Bardia Public School	Education	43	-12	-12	-12	--	--	--
SCH02	St Francis College	Education	43	-12	-12	-12	--	--	--
CH01	Jehovahs Witness	Place of Worship	43	-7	-7	-7	--	--	--
AR01	Clermont Park	Active Recreation	44	-21	-21	-21	--	--	--
AR02	Bardia Park	Active Recreation	26	-39	-39	-39	--	--	--
AR03	Edmsondson Regional Park	Active Recreation	39	-26	-26	-26	--	--	--
AR04	Mon St Quentin Oval	Active Recreation	40	-25	-25	-25	--	--	--

				3C - Fitout					
			Predicted Noise Level	Diff to NML			3C - Fitout		
Name	Description	NCA	Fitout	D	E	N	D	E	N
R05A	Townhouses Soldiers Pde	Edmondson Park Town Centre	27	-22	-17	-15	--	--	--
R05B	Townhouses Soldiers Pde	Edmondson Park Town Centre	26	-23	-18	-16	--	--	--
R05C	Townhouses Soldiers Pde	Edmondson Park Town Centre	28	-21	-16	-14	--	--	--
R05D	Townhouses Soldiers Pde	Edmondson Park Town Centre	36	-13	-8	-6	--	--	--
R06A	Townhouses Soldiers Pde	Edmondson Park Town Centre	28	-21	-16	-14	--	--	--
R06B	Townhouses Soldiers Pde	Edmondson Park Town Centre	27	-22	-17	-15	--	--	--
R06C	Townhouses Soldiers Pde	Edmondson Park Town Centre	42	-7	-2	0	--	--	--
R06D	Townhouses Soldiers Pde	Edmondson Park Town Centre	39	-10	-5	-3	--	--	--
R01	Digger Lane	Bardia (Centre)	41	-8	-3	-1	--	--	--
R02	Digger Lane	Bardia (Centre)	28	-21	-16	-14	--	--	--
R03	Ordinance Street	Bardia (Centre)	28	-21	-16	-14	--	--	--
R04	Vevi Street	Bardia (Centre)	28	-21	-16	-14	--	--	--
R07	Vevi Street	Bardia (Centre)	37	-12	-7	-5	--	--	--
R08	Vevi Street	Bardia (Centre)	39	-10	-5	-3	--	--	--
R09	Vevi Street	Bardia (Centre)	39	-10	-5	-3	--	--	--
R10	Arthur Allen Drive	Bardia (Centre)	37	-12	-7	-5	--	--	--
R11	Arthur Allen Drive	Bardia (Centre)	38	-11	-6	-4	--	--	--
R12	Arthur Allen Drive	Bardia (Centre)	27	-22	-17	-15	--	--	--
R13	Arthur Allen Drive	Bardia (Centre)	35	-14	-9	-7	--	--	--
R14	Arthur Allen Drive	Bardia (Centre)	35	-14	-9	-7	--	--	--
R15	Arthur Allen Drive	Bardia (Centre)	30	-19	-14	-12	--	--	--
R16	Arthur Allen Drive	Bardia (Centre)	33	-16	-11	-9	--	--	--
R17	Bardia Avenue	Bardia (Centre)	14	-35	-30	-28	--	--	--
R18	Bardia Avenue	Bardia (Centre)	13	-36	-31	-29	--	--	--
R19	Bardia Avenue	Bardia (Centre)	14	-35	-30	-28	--	--	--
R20	Lowe Avenue	Bardia (Centre)	10	-39	-34	-32	--	--	--
R21	Lowe Avenue	Bardia (East)	12	-37	-32	-30	--	--	--
R22	Webber Circuit	Bardia (East)	15	-34	-29	-27	--	--	--
R23	Nash Street	Bardia (East)	19	-30	-25	-23	--	--	--
R24	Noble Street	Bardia (East)	16	-33	-28	-26	--	--	--
R25	Bursill Place	Bardia (East)	22	-27	-22	-20	--	--	--
R26	Webber Circuit	Bardia (East)	15	-34	-29	-27	--	--	--
R27	Callinan Crescent	Bardia (East)	24	-25	-20	-18	--	--	--
R28	Donohoe Street	Bardia (East)	22	-27	-22	-20	--	--	--
R29	Callinan Crescent	Bardia (East)	16	-33	-28	-26	--	--	--
R30	Ingleburn Gardens Drive	Bardia (East)	25	-24	-19	-17	--	--	--
R31	Ingleburn Gardens Drive	Bardia (East)	24	-25	-20	-18	--	--	--
R32	Ingleburn Gardens Drive	Bardia (East)	12	-37	-32	-30	--	--	--
R33	Hollyoake Circuit	Bardia (East)	37	-12	-7	-5	--	--	--
R34	Burton Avenue	Bardia (East)	37	-12	-7	-5	--	--	--
R35	Ingleburn Gardens Drive	Bardia (East)	36	-13	-8	-6	--	--	--
R36	Croatia Avenue	Edmondson Park (North East)	38	-13	-8	-3	--	--	--
R37	Croatia Avenue	Edmondson Park (North East)	37	-14	-9	-4	--	--	--
R38	Croatia Avenue	Edmondson Park (North East)	34	-17	-12	-7	--	--	--
R39	Croatia Avenue	Edmondson Park (North East)	34	-17	-12	-7	--	--	--
R40	Croatia Avenue	Edmondson Park (North East)	37	-14	-9	-4	--	--	--
R41	Arnhem Road	Edmondson Park (North East)	39	-12	-7	-2	--	--	--
R42	Chnagsha Road	Edmondson Park (North West)	38	-13	-8	-3	--	--	--
R43	Wonson Road	Edmondson Park (North West)	40	-11	-6	-1	--	--	--
R44	Learoyd Road	Edmondson Park (North West)	41	-10	-5	0	--	--	--
R45	Mcfarlane Road	Edmondson Park (North West)	32	-19	-14	-9	--	--	--
R46	Faulkner Way	Edmondson Park (North West)	37	-14	-9	-4	--	--	--
R47	Faulkner Way	Edmondson Park (North West)	35	-16	-11	-6	--	--	--
R48	Faulkner Way	Edmondson Park (North West)	26	-25	-20	-15	--	--	--
R49	Holiday Avenue	Edmondson Park (North West)	35	-16	-11	-6	--	--	--
R50	Buchan Avenue	Edmondson Park (North West)	36	-15	-10	-5	--	--	--
R51	Buchan Avenue	Edmondson Park (North West)	36	-15	-10	-5	--	--	--
R52	Gallipoli Drive	Edmondson Park (North West)	36	-15	-10	-5	--	--	--
R53	Isonzo Road	Edmondson Park (North West)	35	-16	-11	-6	--	--	--
R54	Culverston Avenue	Denham Court	35	-16	-11	-6	--	--	--
R55	Culverston Avenue	Denham Court	33	-18	-13	-8	--	--	--
R56	Culverston Avenue	Denham Court	34	-17	-12	-7	--	--	--
R57	Culverston Avenue	Denham Court	33	-18	-13	-8	--	--	--
R58	Culverston Avenue	Denham Court	35	-16	-11	-6	--	--	--
R59	Culverston Avenue	Denham Court	34	-17	-12	-7	--	--	--
R60	Culverston Avenue	Denham Court	34	-17	-12	-7	--	--	--
R61	Culverston Avenue	Denham Court	33	-18	-13	-8	--	--	--
R62	Culverston Avenue	Denham Court	32	-19	-14	-9	--	--	--
R63	Culverston Avenue	Denham Court	41	-10	-5	0	--	--	--
R64	Culverston Avenue	Denham Court	43	-8	-3	2	--	--	PN
R65	Culverston Avenue	Denham Court	39	-12	-7	-2	--	--	--
C01A	Commercial/Shops	Commercial	51	-19	-19	-19	--	--	--
C01B	Commercial/Shops	Commercial	35	-35	-35	-35	--	--	--
C01C	Commercial/Shops	Commercial	38	-32	-32	-32	--	--	--
C01D	Commercial/Shops	Commercial	63	-7	-7	-7	--	--	--
C02A	Commercial/Shops	Commercial	33	-37	-37	-37	--	--	--
C02B	Commercial/Shops	Commercial	31	-39	-39	-39	--	--	--
C02C	Commercial/Shops	Commercial	32	-38	-38	-38	--	--	--
C02D	Commercial/Shops	Commercial	51	-19	-19	-19	--	--	--
C02E	Commercial/Shops	Commercial	54	-16	-16	-16	--	--	--
C03	Military Museum	Commercial	44	-26	-26	-26	--	--	--
CCC01	Bambi Kindergarten	Education	35	-35	-35	-35	--	--	--
SCH01A	Bardia Public School	Education	35	-20	-20	-20	--	--	--
SCH01B	Bardia Public School	Education	40	-15	-15	-15	--	--	--
SCH02	St Francis College	Education	40	-15	-15	-15	--	--	--
CH01	Jehovahs Witness	Place of Worship	41	-9	-9	-9	--	--	--
AR01	Clermont Park	Active Recreation	42	-23	-23	-23	--	--	--
AR02	Bardia Park	Active Recreation	24	-41	-41	-41	--	--	--
AR03	Edmsondson Regional Park	Active Recreation	37	-28	-28	-28	--	--	--
AR04	Mon St Quentin Oval	Active Recreation	38	-27	-27	-27	--	--	--

				4 - Ext Façade					
			Predicted Noise Level	Diff to NML			4 - Ext Façade		
Name	Description	NCA	Ext Façade	D	E	N	D	E	N
R05A	Townhouses Soldiers Pde	Edmondson Park Town Centre	33	-16	-11	-9	--	--	--
R05B	Townhouses Soldiers Pde	Edmondson Park Town Centre	33	-16	-11	-9	--	--	--
R05C	Townhouses Soldiers Pde	Edmondson Park Town Centre	35	-14	-9	-7	--	--	--
R05D	Townhouses Soldiers Pde	Edmondson Park Town Centre	46	-3	2	4	--	--	PN
R06A	Townhouses Soldiers Pde	Edmondson Park Town Centre	34	-15	-10	-8	--	--	--
R06B	Townhouses Soldiers Pde	Edmondson Park Town Centre	34	-15	-10	-8	--	--	--
R06C	Townhouses Soldiers Pde	Edmondson Park Town Centre	50	1	6	8	--	PN	PN, V
R06D	Townhouses Soldiers Pde	Edmondson Park Town Centre	45	-4	1	3	--	--	PN
R01	Digger Lane	Bardia (Centre)	47	-2	3	5	--	--	PN
R02	Digger Lane	Bardia (Centre)	35	-14	-9	-7	--	--	--
R03	Ordinance Street	Bardia (Centre)	35	-14	-9	-7	--	--	--
R04	Vevi Street	Bardia (Centre)	35	-14	-9	-7	--	--	--
R07	Vevi Street	Bardia (Centre)	44	-5	0	2	--	--	PN
R08	Vevi Street	Bardia (Centre)	45	-4	1	3	--	--	PN
R09	Vevi Street	Bardia (Centre)	46	-3	2	4	--	--	PN
R10	Arthur Allen Drive	Bardia (Centre)	44	-5	0	2	--	--	PN
R11	Arthur Allen Drive	Bardia (Centre)	44	-5	0	2	--	--	PN
R12	Arthur Allen Drive	Bardia (Centre)	35	-14	-9	-7	--	--	--
R13	Arthur Allen Drive	Bardia (Centre)	42	-7	-2	0	--	--	--
R14	Arthur Allen Drive	Bardia (Centre)	41	-8	-3	-1	--	--	--
R15	Arthur Allen Drive	Bardia (Centre)	37	-12	-7	-5	--	--	--
R16	Arthur Allen Drive	Bardia (Centre)	40	-9	-4	-2	--	--	--
R17	Bardia Avenue	Bardia (Centre)	21	-28	-23	-21	--	--	--
R18	Bardia Avenue	Bardia (Centre)	21	-28	-23	-21	--	--	--
R19	Bardia Avenue	Bardia (Centre)	26	-23	-18	-16	--	--	--
R20	Lowe Avenue	Bardia (Centre)	17	-32	-27	-25	--	--	--
R21	Lowe Avenue	Bardia (East)	22	-27	-22	-20	--	--	--
R22	Webber Circuit	Bardia (East)	26	-23	-18	-16	--	--	--
R23	Nash Street	Bardia (East)	29	-20	-15	-13	--	--	--
R24	Noble Street	Bardia (East)	33	-16	-11	-9	--	--	--
R25	Bursill Place	Bardia (East)	30	-19	-14	-12	--	--	--
R26	Webber Circuit	Bardia (East)	31	-18	-13	-11	--	--	--
R27	Callinan Crescent	Bardia (East)	33	-16	-11	-9	--	--	--
R28	Donohoe Street	Bardia (East)	32	-17	-12	-10	--	--	--
R29	Callinan Crescent	Bardia (East)	32	-17	-12	-10	--	--	--
R30	Ingleburn Gardens Drive	Bardia (East)	31	-18	-13	-11	--	--	--
R31	Ingleburn Gardens Drive	Bardia (East)	34	-15	-10	-8	--	--	--
R32	Ingleburn Gardens Drive	Bardia (East)	28	-21	-16	-14	--	--	--
R33	Hollyoake Circuit	Bardia (East)	42	-7	-2	0	--	--	--
R34	Burton Avenue	Bardia (East)	42	-7	-2	0	--	--	--
R35	Ingleburn Gardens Drive	Bardia (East)	41	-8	-3	-1	--	--	--
R36	Croatia Avenue	Edmondson Park (North East)	45	-6	-1	4	--	--	PN
R37	Croatia Avenue	Edmondson Park (North East)	42	-9	-4	1	--	--	PN
R38	Croatia Avenue	Edmondson Park (North East)	39	-12	-7	-2	--	--	--
R39	Croatia Avenue	Edmondson Park (North East)	39	-12	-7	-2	--	--	--
R40	Croatia Avenue	Edmondson Park (North East)	43	-8	-3	2	--	--	PN
R41	Arnhem Road	Edmondson Park (North East)	47	-4	1	6	--	--	PN, V
R42	Chnagsha Road	Edmondson Park (North West)	46	-5	0	5	--	--	PN
R43	Wonson Road	Edmondson Park (North West)	47	-4	1	6	--	--	PN, V
R44	Learoyd Road	Edmondson Park (North West)	48	-3	2	7	--	--	PN, V
R45	Mcfarlane Road	Edmondson Park (North West)	37	-14	-9	-4	--	--	--
R46	Faulkner Way	Edmondson Park (North West)	44	-7	-2	3	--	--	PN
R47	Faulkner Way	Edmondson Park (North West)	41	-10	-5	0	--	--	--
R48	Faulkner Way	Edmondson Park (North West)	32	-19	-14	-9	--	--	--
R49	Holiday Avenue	Edmondson Park (North West)	41	-10	-5	0	--	--	--
R50	Buchan Avenue	Edmondson Park (North West)	41	-10	-5	0	--	--	--
R51	Buchan Avenue	Edmondson Park (North West)	43	-8	-3	2	--	--	PN
R52	Gallipoli Drive	Edmondson Park (North West)	43	-8	-3	2	--	--	PN
R53	Isonzo Road	Edmondson Park (North West)	42	-9	-4	1	--	--	PN
R54	Culverston Avenue	Denham Court	42	-9	-4	1	--	--	PN
R55	Culverston Avenue	Denham Court	41	-10	-5	0	--	--	--
R56	Culverston Avenue	Denham Court	41	-10	-5	0	--	--	--
R57	Culverston Avenue	Denham Court	41	-10	-5	0	--	--	--
R58	Culverston Avenue	Denham Court	42	-9	-4	1	--	--	PN
R59	Culverston Avenue	Denham Court	41	-10	-5	0	--	--	--
R60	Culverston Avenue	Denham Court	41	-10	-5	0	--	--	--
R61	Culverston Avenue	Denham Court	40	-11	-6	-1	--	--	--
R62	Culverston Avenue	Denham Court	40	-11	-6	-1	--	--	--
R63	Culverston Avenue	Denham Court	46	-5	0	5	--	--	PN
R64	Culverston Avenue	Denham Court	50	-1	4	9	--	--	PN, V
R65	Culverston Avenue	Denham Court	47	-4	1	6	--	--	PN, V
C01A	Commercial/Shops	Commercial	61	-9	-9	-9	--	--	--
C01B	Commercial/Shops	Commercial	41	-29	-29	-29	--	--	--
C01C	Commercial/Shops	Commercial	44	-26	-26	-26	--	--	--
C01D	Commercial/Shops	Commercial	68	-2	-2	-2	--	--	--
C02A	Commercial/Shops	Commercial	40	-30	-30	-30	--	--	--
C02B	Commercial/Shops	Commercial	37	-33	-33	-33	--	--	--
C02C	Commercial/Shops	Commercial	39	-31	-31	-31	--	--	--
C02D	Commercial/Shops	Commercial	60	-10	-10	-10	--	--	--
C02E	Commercial/Shops	Commercial	60	-10	-10	-10	--	--	--
C03	Military Museum	Commercial	50	-20	-20	-20	--	--	--
CCC01	Bambi Kindergarten	Education	42	-28	-28	-28	--	--	--
SCH01A	Bardia Public School	Education	42	-13	-13	-13	--	--	--
SCH01B	Bardia Public School	Education	47	-8	-8	-8	--	--	--
SCH02	St Francis College	Education	48	-7	-7	-7	--	--	--
CH01	Jehovahs Witness	Place of Worship	47	-3	-3	-3	--	--	--
AR01	Clermont Park	Active Recreation	49	-16	-16	-16	--	--	--
AR02	Bardia Park	Active Recreation	33	-32	-32	-32	--	--	--
AR03	Edmsondson Regional Park	Active Recreation	44	-21	-21	-21	--	--	--
AR04	Mon St Quentin Oval	Active Recreation	44	-21	-21	-21	--	--	--

				5 - Roadworks					
			Predicted Noise Level	Diff to NML			5 - Roadworks		
Name	Description	NCA	Roadworks	D	E	N	D	E	N
R05A	Townhouses Soldiers Pde	Edmondson Park Town Centre	25	-24	-19	-17	--	--	--
R05B	Townhouses Soldiers Pde	Edmondson Park Town Centre	24	-25	-20	-18	--	--	--
R05C	Townhouses Soldiers Pde	Edmondson Park Town Centre	26	-23	-18	-16	--	--	--
R05D	Townhouses Soldiers Pde	Edmondson Park Town Centre	27	-22	-17	-15	--	--	--
R06A	Townhouses Soldiers Pde	Edmondson Park Town Centre	26	-23	-18	-16	--	--	--
R06B	Townhouses Soldiers Pde	Edmondson Park Town Centre	25	-24	-19	-17	--	--	--
R06C	Townhouses Soldiers Pde	Edmondson Park Town Centre	27	-22	-17	-15	--	--	--
R06D	Townhouses Soldiers Pde	Edmondson Park Town Centre	27	-22	-17	-15	--	--	--
R01	Digger Lane	Bardia (Centre)	28	-21	-16	-14	--	--	--
R02	Digger Lane	Bardia (Centre)	26	-23	-18	-16	--	--	--
R03	Ordinance Street	Bardia (Centre)	26	-23	-18	-16	--	--	--
R04	Vevi Street	Bardia (Centre)	27	-22	-17	-15	--	--	--
R07	Vevi Street	Bardia (Centre)	26	-23	-18	-16	--	--	--
R08	Vevi Street	Bardia (Centre)	28	-21	-16	-14	--	--	--
R09	Vevi Street	Bardia (Centre)	28	-21	-16	-14	--	--	--
R10	Arthur Allen Drive	Bardia (Centre)	26	-23	-18	-16	--	--	--
R11	Arthur Allen Drive	Bardia (Centre)	25	-24	-19	-17	--	--	--
R12	Arthur Allen Drive	Bardia (Centre)	21	-28	-23	-21	--	--	--
R13	Arthur Allen Drive	Bardia (Centre)	27	-22	-17	-15	--	--	--
R14	Arthur Allen Drive	Bardia (Centre)	23	-26	-21	-19	--	--	--
R15	Arthur Allen Drive	Bardia (Centre)	21	-28	-23	-21	--	--	--
R16	Arthur Allen Drive	Bardia (Centre)	26	-23	-18	-16	--	--	--
R17	Bardia Avenue	Bardia (Centre)	32	-17	-12	-10	--	--	--
R18	Bardia Avenue	Bardia (Centre)	13	-36	-31	-29	--	--	--
R19	Bardia Avenue	Bardia (Centre)	15	-34	-29	-27	--	--	--
R20	Lowe Avenue	Bardia (Centre)	29	-20	-15	-13	--	--	--
R21	Lowe Avenue	Bardia (East)	14	-35	-30	-28	--	--	--
R22	Webber Circuit	Bardia (East)	15	-34	-29	-27	--	--	--
R23	Nash Street	Bardia (East)	14	-35	-30	-28	--	--	--
R24	Noble Street	Bardia (East)	31	-18	-13	-11	--	--	--
R25	Bursill Place	Bardia (East)	29	-20	-15	-13	--	--	--
R26	Webber Circuit	Bardia (East)	29	-20	-15	-13	--	--	--
R27	Callinan Crescent	Bardia (East)	29	-20	-15	-13	--	--	--
R28	Donohoe Street	Bardia (East)	34	-15	-10	-8	--	--	--
R29	Callinan Crescent	Bardia (East)	34	-15	-10	-8	--	--	--
R30	Ingleburn Gardens Drive	Bardia (East)	28	-21	-16	-14	--	--	--
R31	Ingleburn Gardens Drive	Bardia (East)	29	-20	-15	-13	--	--	--
R32	Ingleburn Gardens Drive	Bardia (East)	33	-16	-11	-9	--	--	--
R33	Hollyoake Circuit	Bardia (East)	43	-6	-1	1	--	--	PN
R34	Burton Avenue	Bardia (East)	42	-7	-2	0	--	--	--
R35	Ingleburn Gardens Drive	Bardia (East)	42	-7	-2	0	--	--	--
R36	Croatia Avenue	Edmondson Park (North East)	44	-7	-2	3	--	--	PN
R37	Croatia Avenue	Edmondson Park (North East)	42	-9	-4	1	--	--	PN
R38	Croatia Avenue	Edmondson Park (North East)	39	-12	-7	-2	--	--	--
R39	Croatia Avenue	Edmondson Park (North East)	38	-13	-8	-3	--	--	--
R40	Croatia Avenue	Edmondson Park (North East)	42	-9	-4	1	--	--	PN
R41	Arnhem Road	Edmondson Park (North East)	45	-6	-1	4	--	--	PN
R42	Chnagsha Road	Edmondson Park (North West)	42	-9	-4	1	--	--	PN
R43	Wonson Road	Edmondson Park (North West)	41	-10	-5	0	--	--	--
R44	Learoyd Road	Edmondson Park (North West)	41	-10	-5	0	--	--	--
R45	Mcfarlane Road	Edmondson Park (North West)	31	-20	-15	-10	--	--	--
R46	Faulkner Way	Edmondson Park (North West)	36	-15	-10	-5	--	--	--
R47	Faulkner Way	Edmondson Park (North West)	34	-17	-12	-7	--	--	--
R48	Faulkner Way	Edmondson Park (North West)	26	-25	-20	-15	--	--	--
R49	Holiday Avenue	Edmondson Park (North West)	34	-17	-12	-7	--	--	--
R50	Buchan Avenue	Edmondson Park (North West)	34	-17	-12	-7	--	--	--
R51	Buchan Avenue	Edmondson Park (North West)	31	-20	-15	-10	--	--	--
R52	Gallipoli Drive	Edmondson Park (North West)	33	-18	-13	-8	--	--	--
R53	Isonzo Road	Edmondson Park (North West)	34	-17	-12	-7	--	--	--
R54	Culverston Avenue	Denham Court	33	-18	-13	-8	--	--	--
R55	Culverston Avenue	Denham Court	32	-19	-14	-9	--	--	--
R56	Culverston Avenue	Denham Court	33	-18	-13	-8	--	--	--
R57	Culverston Avenue	Denham Court	31	-20	-15	-10	--	--	--
R58	Culverston Avenue	Denham Court	31	-20	-15	-10	--	--	--
R59	Culverston Avenue	Denham Court	30	-21	-16	-11	--	--	--
R60	Culverston Avenue	Denham Court	29	-22	-17	-12	--	--	--
R61	Culverston Avenue	Denham Court	28	-23	-18	-13	--	--	--
R62	Culverston Avenue	Denham Court	27	-24	-19	-14	--	--	--
R63	Culverston Avenue	Denham Court	30	-21	-16	-11	--	--	--
R64	Culverston Avenue	Denham Court	34	-17	-12	-7	--	--	--
R65	Culverston Avenue	Denham Court	44	-7	-2	3	--	--	PN
C01A	Commercial/Shops	Commercial	33	-37	-37	-37	--	--	--
C01B	Commercial/Shops	Commercial	32	-38	-38	-38	--	--	--
C01C	Commercial/Shops	Commercial	35	-35	-35	-35	--	--	--
C01D	Commercial/Shops	Commercial	46	-24	-24	-24	--	--	--
C02A	Commercial/Shops	Commercial	29	-41	-41	-41	--	--	--
C02B	Commercial/Shops	Commercial	27	-43	-43	-43	--	--	--
C02C	Commercial/Shops	Commercial	27	-43	-43	-43	--	--	--
C02D	Commercial/Shops	Commercial	30	-40	-40	-40	--	--	--
C02E	Commercial/Shops	Commercial	31	-39	-39	-39	--	--	--
C03	Military Museum	Commercial	33	-37	-37	-37	--	--	--
CCC01	Bambi Kindergarten	Education	26	-44	-44	-44	--	--	--
SCH01A	Bardia Public School	Education	26	-29	-29	-29	--	--	--
SCH01B	Bardia Public School	Education	59	4	4	4	--	--	--
SCH02	St Francis College	Education	60	5	5	5	--	--	--
CH01	Jehovahs Witness	Place of Worship	29	-21	-21	-21	--	--	--
AR01	Clermont Park	Active Recreation	44	-21	-21	-21	--	--	--
AR02	Bardia Park	Active Recreation	23	-42	-42	-42	--	--	--
AR03	Edmsondson Regional Park	Active Recreation	31	-34	-34	-34	--	--	--
AR04	Mon St Quentin Oval	Active Recreation	26	-39	-39	-39	--	--	--

			6 - Decommissioning					
			Predicted Noise Level	Diff to NML			6 - Decommissioning	
Name	Description	NCA	Decommissioning	D	E	N	D	E	N
R05A	Townhouses Soldiers Pde	Edmondson Park Town Centre	20	-29	-24	-22	--	--	--
R05B	Townhouses Soldiers Pde	Edmondson Park Town Centre	20	-29	-24	-22	--	--	--
R05C	Townhouses Soldiers Pde	Edmondson Park Town Centre	23	-26	-21	-19	--	--	--
R05D	Townhouses Soldiers Pde	Edmondson Park Town Centre	39	-10	-5	-3	--	--	--
R06A	Townhouses Soldiers Pde	Edmondson Park Town Centre	21	-28	-23	-21	--	--	--
R06B	Townhouses Soldiers Pde	Edmondson Park Town Centre	22	-27	-22	-20	--	--	--
R06C	Townhouses Soldiers Pde	Edmondson Park Town Centre	40	-9	-4	-2	--	--	--
R06D	Townhouses Soldiers Pde	Edmondson Park Town Centre	32	-17	-12	-10	--	--	--
R01	Digger Lane	Bardia (Centre)	34	-15	-10	-8	--	--	--
R02	Digger Lane	Bardia (Centre)	22	-27	-22	-20	--	--	--
R03	Ordinance Street	Bardia (Centre)	22	-27	-22	-20	--	--	--
R04	Vevi Street	Bardia (Centre)	23	-26	-21	-19	--	--	--
R07	Vevi Street	Bardia (Centre)	30	-19	-14	-12	--	--	--
R08	Vevi Street	Bardia (Centre)	32	-17	-12	-10	--	--	--
R09	Vevi Street	Bardia (Centre)	33	-16	-11	-9	--	--	--
R10	Arthur Allen Drive	Bardia (Centre)	30	-19	-14	-12	--	--	--
R11	Arthur Allen Drive	Bardia (Centre)	31	-18	-13	-11	--	--	--
R12	Arthur Allen Drive	Bardia (Centre)	20	-29	-24	-22	--	--	--
R13	Arthur Allen Drive	Bardia (Centre)	32	-17	-12	-10	--	--	--
R14	Arthur Allen Drive	Bardia (Centre)	28	-21	-16	-14	--	--	--
R15	Arthur Allen Drive	Bardia (Centre)	25	-24	-19	-17	--	--	--
R16	Arthur Allen Drive	Bardia (Centre)	30	-19	-14	-12	--	--	--
R17	Bardia Avenue	Bardia (Centre)	10	-39	-34	-32	--	--	--
R18	Bardia Avenue	Bardia (Centre)	9	-40	-35	-33	--	--	--
R19	Bardia Avenue	Bardia (Centre)	12	-37	-32	-30	--	--	--
R20	Lowe Avenue	Bardia (Centre)	8	-41	-36	-34	--	--	--
R21	Lowe Avenue	Bardia (East)	9	-40	-35	-33	--	--	--
R22	Webber Circuit	Bardia (East)	15	-34	-29	-27	--	--	--
R23	Nash Street	Bardia (East)	20	-29	-24	-22	--	--	--
R24	Noble Street	Bardia (East)	20	-29	-24	-22	--	--	--
R25	Bursill Place	Bardia (East)	22	-27	-22	-20	--	--	--
R26	Webber Circuit	Bardia (East)	19	-30	-25	-23	--	--	--
R27	Callinan Crescent	Bardia (East)	24	-25	-20	-18	--	--	--
R28	Donohoe Street	Bardia (East)	22	-27	-22	-20	--	--	--
R29	Callinan Crescent	Bardia (East)	19	-30	-25	-23	--	--	--
R30	Ingleburn Gardens Drive	Bardia (East)	23	-26	-21	-19	--	--	--
R31	Ingleburn Gardens Drive	Bardia (East)	22	-27	-22	-20	--	--	--
R32	Ingleburn Gardens Drive	Bardia (East)	9	-40	-35	-33	--	--	--
R33	Hollyoake Circuit	Bardia (East)	32	-17	-12	-10	--	--	--
R34	Burton Avenue	Bardia (East)	31	-18	-13	-11	--	--	--
R35	Ingleburn Gardens Drive	Bardia (East)	31	-18	-13	-11	--	--	--
R36	Croatia Avenue	Edmondson Park (North East)	32	-19	-14	-9	--	--	--
R37	Croatia Avenue	Edmondson Park (North East)	31	-20	-15	-10	--	--	--
R38	Croatia Avenue	Edmondson Park (North East)	29	-22	-17	-12	--	--	--
R39	Croatia Avenue	Edmondson Park (North East)	29	-22	-17	-12	--	--	--
R40	Croatia Avenue	Edmondson Park (North East)	35	-16	-11	-6	--	--	--
R41	Arnhem Road	Edmondson Park (North East)	39	-12	-7	-2	--	--	--
R42	Chnagsha Road	Edmondson Park (North West)	37	-14	-9	-4	--	--	--
R43	Wonson Road	Edmondson Park (North West)	37	-14	-9	-4	--	--	--
R44	Learoyd Road	Edmondson Park (North West)	36	-15	-10	-5	--	--	--
R45	Mcfarlane Road	Edmondson Park (North West)	29	-22	-17	-12	--	--	--
R46	Faulkner Way	Edmondson Park (North West)	33	-18	-13	-8	--	--	--
R47	Faulkner Way	Edmondson Park (North West)	31	-20	-15	-10	--	--	--
R48	Faulkner Way	Edmondson Park (North West)	24	-27	-22	-17	--	--	--
R49	Holiday Avenue	Edmondson Park (North West)	31	-20	-15	-10	--	--	--
R50	Buchan Avenue	Edmondson Park (North West)	31	-20	-15	-10	--	--	--
R51	Buchan Avenue	Edmondson Park (North West)	31	-20	-15	-10	--	--	--
R52	Gallipoli Drive	Edmondson Park (North West)	31	-20	-15	-10	--	--	--
R53	Isonzo Road	Edmondson Park (North West)	30	-21	-16	-11	--	--	--
R54	Culverston Avenue	Denham Court	29	-22	-17	-12	--	--	--
R55	Culverston Avenue	Denham Court	28	-23	-18	-13	--	--	--
R56	Culverston Avenue	Denham Court	29	-22	-17	-12	--	--	--
R57	Culverston Avenue	Denham Court	28	-23	-18	-13	--	--	--
R58	Culverston Avenue	Denham Court	30	-21	-16	-11	--	--	--
R59	Culverston Avenue	Denham Court	29	-22	-17	-12	--	--	--
R60	Culverston Avenue	Denham Court	29	-22	-17	-12	--	--	--
R61	Culverston Avenue	Denham Court	28	-23	-18	-13	--	--	--
R62	Culverston Avenue	Denham Court	27	-24	-19	-14	--	--	--
R63	Culverston Avenue	Denham Court	36	-15	-10	-5	--	--	--
R64	Culverston Avenue	Denham Court	37	-14	-9	-4	--	--	--
R65	Culverston Avenue	Denham Court	38	-13	-8	-3	--	--	--
C01A	Commercial/Shops	Commercial	44	-26	-26	-26	--	--	--
C01B	Commercial/Shops	Commercial	26	-44	-44	-44	--	--	--
C01C	Commercial/Shops	Commercial	29	-41	-41	-41	--	--	--
C01D	Commercial/Shops	Commercial	53	-17	-17	-17	--	--	--
C02A	Commercial/Shops	Commercial	25	-45	-45	-45	--	--	--
C02B	Commercial/Shops	Commercial	23	-47	-47	-47	--	--	--
C02C	Commercial/Shops	Commercial	29	-41	-41	-41	--	--	--
C02D	Commercial/Shops	Commercial	45	-25	-25	-25	--	--	--
C02E	Commercial/Shops	Commercial	49	-21	-21	-21	--	--	--
C03	Military Museum	Commercial	37	-33	-33	-33	--	--	--
CCC01	Bambi Kindergarten	Education	29	-41	-41	-41	--	--	--
SCH01A	Bardia Public School	Education	28	-27	-27	-27	--	--	--
SCH01B	Bardia Public School	Education	29	-26	-26	-26	--	--	--
SCH02	St Francis College	Education	29	-26	-26	-26	--	--	--
CH01	Jehovahs Witness	Place of Worship	35	-15	-15	-15	--	--	--
AR01	Clermont Park	Active Recreation	39	-26	-26	-26	--	--	--
AR02	Bardia Park	Active Recreation	22	-43	-43	-43	--	--	--
AR03	Edmsondson Regional Park	Active Recreation	31	-34	-34	-34	--	--	--
AR04	Mon St Quentin Oval	Active Recreation	31	-34	-34	-34	--	--	--

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