

Noise and Vibration Assessment

Rooty Hill Station Easy Access Upgrade and
Multi Storey Car Park, Rooty Hill, NSW.

Document Information

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Rooty Hill Station Easy Access Upgrade and Multi Storey Car Park, Rooty Hill, NSW.

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Document ID	Status	Date	Prepared By	Signed	Reviewed By	Signed
MAC170542RP1V1	Draft	22 November 2017	Rod Linnett		Oliver Muller	

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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) for the proposed Rooty Hill Station Easy Access Upgrade and Multi Storey Car Park at Rooty Hill, NSW (the 'project'). This report presents the methodology, findings of a Noise and Vibration Impact Assessment for the construction and operation of the project.

1.1 Purpose and Objectives

A Noise and Vibration Impact Assessment (NVIA) report is required as part of the requirements of TfNSW. The purpose of the study is to assess and report noise and vibration impacts of the project and to identify mitigation measures where required.

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

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

1.2 Scope of the Assessment

The NVIA scope of works includes:

- reviewing construction activities to identify noise and vibration generating plant, equipment, machinery or activities proposed to be undertaken as part of the project;
- identifying the closest and/or potentially most affected receptors situated within the area of influence to the project;
- quantifying the existing noise environment by conducting unattended noise monitoring and operator attended noise measurements at locations representative of the closest and/or potentially most affected receptors;
- 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 project at the closest and/or potentially most affected receptors;

- 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 project; 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.

2 Description of the Project

2.1 Background

The proposed upgrade forms part of the Transport Access Program (TAP) – an initiative to provide a better experience for public transport customers by delivering accessible, modern, secure and integrated transport infrastructure where it is needed most.

The program aims to provide:

- station precincts that are accessible to the disabled, ageing and parents with prams;
- modern buildings and facilities for all modes that meet the needs of a growing population;
- modern interchanges that support an integrated network and allow seamless transfers between all modes for all customers;
- safety improvements including extra lighting, help points, fences and security measures for car parks and interchanges, including stations, bus stops and wharves;
- signage improvements so customers can more easily use public transport and transfer between modes at interchanges; and
- other improvements and maintenance such as painting, new fencing and roof replacements.

2.2 Site Understanding

The suburb of Rooty Hill is located 40km west of the Sydney CBD and falls within the local government area of Blacktown, NSW. A number of strategic transport links traverse Rooty Hill including the T1 Western Line and Westlink M7. Rooty Hill is a predominantly residential suburb, served by the T1 Western Line providing connections to the suburban Sydney Trains Network.

Key existing land use within Rooty Hill includes:

- residential areas make up the majority of development within the suburb consisting of low density separated residences and some terraced duplex buildings;
- a small town centre comprised of mixed commercial/retail uses located directly adjacent to Rooty Hill Station on both the northern and the southern sides of the railway line; and

- Rooty Hill Public School and Rooty Hill High School - located approximately 500m walking distance from Rooty Hill Station.

The Rooty Hill Station Precinct includes the railway station, associated interchange facilities and passenger access between those facilities including buildings, gates, pedestrian and cycle access paths and linkages to the adjacent streets and commuter car parking, bus stops and shelters, taxi stands, kiss and ride locations and cycle facilities.

2.3 Description of Proposed Construction Works

Three concept options were developed for Rooty Hill Station Precinct. Option C has been chosen as the preferred design for the development and will involve a new footbridge and overhead station concourse (new location), requiring the demolition of the existing footbridge, ramps and stairs. The upgrade also includes the provision of four new lifts with accessible paths, a multi-storey commuter car park (MSCP) and improvements to interchange facilities. To complete this, the following works will be undertaken:

2.3.1 Station Upgrade

The key features of the station upgrade include:

- demolition of existing footbridge, ramps and stairs;
- new footbridge and station concourse with ticketing and passenger information facilities;
- four new set of stairs and lifts at both station entrances and platforms;
- removal of existing seating and shelter on Platform 1/2;
- new canopy coverage from stairs to station building on Platform 1/2;
- accessible paths to station entrance lifts;
- new customer service window on Platform 3/4; and
- family accessible toilets on both platforms.

2.3.2 Interchange Upgrade

The key features of the interchange upgrade include:

Northern Interchange:

- provision of zebra crossing and remove refuge islands on North Parade;
- provision of shelters for kiss & ride zones on both sides of North Parade and taxi zone;
- removal of garden beds at northern interchange to create wider footpaths;
- conversion of on-street parking to provide additional kiss & ride spaces on North Parade;
- provision of 10 undercover bicycle racks near station entrance;
- extension of shared path from M7 (by Roads and Maritime) to station entrance;
- construction of multi-storey car park (between the rail corridor and the Council Depot) with the required number of accessible parking spaces;
- removal of sections of existing garden bed on the eastern side of Rooty Hill Road North to allow set-down of bus passengers; and
- conversion of bus stop on western side of Rooty Hill Road North to a taxi zone.

Southern Interchange:

- provision of 10 undercover bicycle racks near station entrance; and
- reconfiguration of southern commuter car park to locate accessible parking closer to new lift.

The Project site, general area of works and compound/laydown areas are presented in Figure 1.

FIGURE 1
LOCALITY PLAN
 REF: MAC170542



KEY

-  **R1** RECEIVER LOCATION
-  **L1** LOGGER LOCATION
-  SITE LOCATION
-  MSCP LOCATION

3 Assessment Methodology

The methodology and assumptions utilised in the noise and vibration assessment are outlined below.

3.1 Guidelines and Standards

This Noise and Vibration Impact Assessment has been conducted with due regard to and in accordance with the following key policy and guidelines:

- NSW Department of Environment and Climate Change – NSW Interim Construction Noise Guideline (ICNG), July 2009;
- NSW Department of Environment and Conservation – NSW Environmental Noise Management – Assessing Vibration: A Technical Guideline (the NSW Vibration Guideline), February 2006;
- NSW Government – Transport for NSW (TfNSW) Construction Noise Strategy (CNS), Version 3 dated July 2016;
- NSW Department of Environment, Climate Change and Water – NSW Road Noise Policy (RNP), March 2011; and
- NSW Environment Protection Authority – NSW Environmental Noise Management – Industrial Noise Policy (INP), January 2000 and relevant application notes.

The assessment has also considered and applied the following additional policy, guidelines and standards where relevant:

- Standards Australia AS 2436–2010™ (AS2436) – Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites;
- Standards Australia AS1055–1997™ (AS1055) – Description and Measurement of Environmental Noise;
- Standards Australia AS IEC 61672.1–2004™ (AS61672) – Electro Acoustics - Sound Level Meters Specifications Monitoring or Standards Australia AS1259.2-1990™ (AS1259) – Acoustics – Sound Level Meters – Integrating/Averaging as appropriate to the device;
- Standards Australia AS/IEC 60942:2004/IEC 60942:2003 (IEC60942) – Australian Standard™ – Electroacoustics – Sound Calibrators;

- 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 Construction Noise

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 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;
- 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 nearest relevant receptors. The qualitative assessment methodology is a more simplified approach that relies more on noise management strategies. This study has adopted a quantitative assessment approach.

The quantitative approach includes identification of potentially affected receptors, description of activities involved in the project, derivation of the construction noise management levels, quantification of potential noise impact at receptors and, provides management and mitigation recommendations. Table 1 summarises the ICNG recommended standard hours for construction.

Table 1 Recommended Standard Hours for Construction

Period	Preferred Construction Hours
Day (Standard construction hours)	Monday to Friday - 7am to 6pm
	Saturdays - 8am to 1pm
	Sundays or Public Holidays - No construction

The recommended hours do not apply in the event of direction from police, or other relevant authorities, for safety reasons or where required in an emergency to avoid the loss of lives, property and/or to prevent environmental harm. Work conducted outside of standard hours are considered out of hours work (OOH). OOH periods are divided into two categories representing evening and night periods and cover the hours listed below:

Period 1 (evening/low risk period): Monday to Friday – 6pm to 10pm, Saturdays – 1pm to 6pm, Sundays 8am to 6pm.

Period 2 (night/medium to high risk period): Monday to Friday – 10pm to 7am, Saturdays/Sundays – 6pm to 7am (8am on Sunday mornings).

3.3 Noise Management Levels

The ICNG provides guidance on the assessment and management of construction noise. Section 4 of the ICNG details the quantitative assessment method involving predicting noise levels and comparing them with the Noise Management Level (NML), and are important indicators of the potential level of construction noise impact. Table 2 provides the ICNG recommended $LA_{eq}(15min)$ NMLs and how they are to be applied.

Table 2 Noise Management Levels

Time of Day	Management Level LAeq (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 + 10 dB.	<p>The noise affected level represents the point above which there may be some community reaction to noise.</p> <p>Where the predicted or measured LAeq(15min) is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level.</p> <p>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.</p>
	Highly noise affected 75 dBA.	<p>The highly noise affected level represents the point above which there may be strong community reaction to noise.</p> <p>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.</p>
Outside recommended standard hours.	Noise affected RBL + 5 dB.	<p>A strong justification would typically be required for work outside the recommended standard hours.</p> <p>The proponent should apply all feasible and reasonable work practices to meet the noise affected level.</p> <p>Where all feasible and reasonable practices have been applied and noise is more than 5 dBA above the noise affected level, the proponent should negotiate with the community.</p> <p>For guidance on negotiating agreements see section 7.2.2.</p>

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.

3.4 Sleep disturbance

Section 4.3 of the ICNG (DECC, 2009) states that a sleep disturbance assessment is required where construction activities are planned to occur for more than two consecutive nights.

Draft scheduling of work for the project is yet to be established (See Appendix B), with proposed construction anticipated to occur for more than several months in duration. Therefore, an assessment of sleep disturbance has been completed.

The EPA's screening criteria for sleep disturbance assessments states that the $LA_{1,1min}$ (or LA_{max}) noise level from an intrusive source should not exceed the background noise level by more than 15dB.

Where noise levels have been calculated above the screening criteria, additional analysis should be undertaken, referencing guidance on maximum noise levels and sleep disturbance listed in the Road Noise Policy (RNP) (EPA, 2011). This guidance states:

- Maximum internal noise levels below 50 - 55dBA are unlikely to wake sleeping occupants
- One or two noise events per night, with maximum internal noise levels of 65 - 70dBA, are not likely to affect the health and wellbeing of occupants significantly.

If noise levels over the screening criteria were identified, then additional analysis would consider factors such as:

- How often the events would occur
- The time the events would occur (between 10pm and 7am)
- Whether there are times of day when there is a clear change in the noise environment (such as during early morning shoulder periods).

3.5 Construction Road Traffic Noise

Construction road traffic (noise and vibration) impacts from the project are not anticipated (ie from additional vehicles on the public road network). The proposed ingress and egress routes will use existing public roads as part of the overall road network. It is assumed that the generated heavy vehicles due to the size of the construction works and type of works will be approximately one to two per hour and will have minimal impact to receptors along their routes. The project is not expected to generate a significant increase in vehicles when compared to that of the existing vehicle flows and mixes on the surrounding road network.

3.6 Carpark Operational Noise Assessment

A review of the operational noise emissions associated with the carpark has been completed to quantify its potential impact on surrounding noise sensitive receptors. The assessment calculated the noise emissions associated with car movements within the carpark, including maximum noise events such as door slams engine starting.

4 Existing Acoustic Environment

A key element in assessing environmental noise impacts is an understanding of the existing ambient and background noise levels at the closest and/or potentially most affected receptors to the project.

4.1 Potentially Sensitive Receptors

From observations on site, review of aerial photos and other project information, MAC has identified the following potentially sensitive receptors relevant to the project and are presented in Table 3 summarising the receptors ID, type, address and catchment area; and Figure 1.

These locations do not represent all receptors located near the project although are selected as they are representative of locations that may experience the highest noise level impacts associated with the project. From observations whilst on site, an aged care facility is currently being built adjacent to the railway to the south. The construction period of this facility is not known, but has been included in the assessment for completeness.

Table 3 Noise Sensitive Receptors			
ID	Type	Description Address	Catchment Area
N01	Residential	Rooty Hill Lodge (Motel)	Rooty Hill North
N01-1	Residential	Rooty Hill Lodge (Motel) 1 st Floor	
N02	Residential	138 Hartington Street	
N03	Residential	20 Station Street	
N04	Residential	22 Station Street	
N05	Residential	24 Station Street	
N06	Residential	26 Station Street	
N07	Residential	28 Station Street	
NC01	Commercial	Rooty Hill Road North - Retail	
NC02	Commercial	Imperial Hotel	
NC03	Commercial	Rooty Hill Road North - Retail	
NC04	Commercial	Rooty Hill Road North - Retail	
NC05	Commercial	Rooty Hill Road North - Retail	
NC06	Commercial	Rooty Hill Road North - Retail	
N-IND1	Industrial	Council Workshop Offices	
N-IND2	Industrial	Council Workshop/Depot	
NW01	Commercial	92-96 North Parade	
NW01-1	Residential (1 st Floor)	92-96 North Parade	
NW02	Residential	90 North Parade	
NW03	Residential	88 North Parade	
NW04	Residential	86 North Parade	

Table 3 Noise Sensitive Receptors

ID	Type	Description Address	Catchment Area
NW05	Residential	84 North Parade	
NW06	Residential	3a Perkins Street	
NW07	Residential	3b Perkins Street	
NW08	Residential	3c Perkins Street	
NW09	Residential	3d Perkins Street	
S01A	Future Residential	Aged Care Facility	
S01B	Future Residential	Aged Care Facility	
S02	Residential	30 Artornish Lane	Rooty Hill South
S03	Residential	28 Artornish Lane	
S04	Residential	26 Artornish Lane	
S05	Residential	24 Artornish Lane	
S06	Residential	22 Artornish Lane	
S07	Residential	9 Beames Avenue	
S08	Residential	11 Beames Avenue	
S09	Residential	35 Catherine Street	
S10	Residential	33 Catherine Street	
S11	Residential	31 Catherine Street	
S12	Residential	29 Catherine Street	
S13	Residential	27 Catherine Street	
S14	Residential	25 Catherine Street	
S15	Residential	23 Catherine Street	
S16	Residential	21 Catherine Street	
S17	Residential	2 Mavis Street	
S18	Residential	6 Mavis Street	
S19	Residential	8 Mavis Street	
S20	Residential	10 Mavis Street	
S21	Residential	12 Mavis Street	
S22	Residential	14 Mavis Street	
S23	Residential	16 Mavis Street	
S24 Arts	School	Rooty Hill School of Arts	
S-AR1	Active Recreation	Angus Park Sports Field Rooty Hill South	
SC01	Commercial	Rooty Hill Road South - Retail	
SC02	Commercial	Rooty Hill Road South - Retail	
SC03	Commercial	Rooty Hill Road South - Retail	
SC04	Commercial	Lone Pine Tavern	

4.2 Noise Monitoring Methodology

In accordance with NSW noise guidelines, background noise levels are measured in the absence of the site under assessment and are used to develop NMLs for residential receptors.

To quantify existing noise levels, long-term unattended noise monitoring and short-term operator attended noise measurements were performed at representative receptors located near the project. The locations at which the existing noise levels were monitored are presented in Table 4.

The unattended noise monitoring survey was conducted in general accordance with the procedures described in Australian Standard AS 1055-1997, "Acoustics - Description and Measurement of Environmental Noise" and the EPL. Noise measurements were carried out using two Svantek Type 1, 977 noise analysers from Tuesday 10 October 2017 to Wednesday 18 October 2017. The acoustic instrumentation used carries current NATA calibration and complies with AS IEC 61672.1-2004- Electroacoustics - Sound level meters - Specifications. Calibration of all instrumentation was checked prior to and following measurements. Drift in calibration did not exceed ± 0.5 dBA.

Table 4 Noise Monitoring Locations

ID	Unattended Noise Monitoring	Site Description	Co-ordinates	
	Location		MGA56	
L1	138 Hartington Street	Rooty Hill North	300392	6261362
L2	21 Catherine Crescent	Rooty Hill South	300307	6260860

4.3 Noise Monitoring Results

From observations whilst on site, the noise environment at existing residential and commercial receptors is best described as 'urban' in accordance with the INP, being an area with an acoustical environment that:

- is dominated by 'urban hum' or industrial source noise;
- has through traffic with characteristically heavy and continuous traffic flows during peak periods;
- is near commercial districts or industrial districts; and
- has any combination of the above, where 'urban hum' means the aggregate sound of many unidentifiable, mostly traffic-related sound sources.

The results of the unattended noise measurements for both background monitoring locations, including derived RBLs are summarised in Table 5. Appendix C 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), RBL, dBA	Measured LA _{eq} , dBA
L1 Rooty Hill North	Day	45	55
	Evening	45	55
	Night	38	50
L2 Rooty Hill South	Day	42	57
	Evening	42	56
	Night	37	54

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.

As the largest potential for increase in road traffic as described in the Road Traffic Impact Assessment (RTIA - AECOM Report Rooty Hill Station Precinct - Accessibility and Commuter Car Park Upgrade – Traffic, Transport and Access Impact Assessment - February 2015) is expected to occur along Hartington Street and Station Street, from the ingress of additional vehicles to the proposed MSCP, road traffic noise was assessed at noise monitoring location L1 – 138 Hartington Street. Existing road traffic noise levels along Hartington Street and Station Street are summarised in Table 6.

Table 6 Existing Road Traffic Noise Levels			
Noise Monitoring Location	Period ¹	Existing Road Traffic Noise	RNP Assessment Criteria
L1	Day LA _{eq} ,15hr dBA	53.9	55
Rooty Hill North	Night LA _{eq} ,9hr dBA	49.6	50

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

5 Assessment Criteria

5.1 Construction Noise

Noise Management Levels (NMLs) for construction noise have been developed for nearby receptors for standard construction hours and out of hours periods and are summarised in Table 7.

Table 7 Noise Management Levels			
Location	Assessment Period	RBL, dBA	NML LAeq(15min) dBA
Residential Receptors Rooty Hill North	Day (Standard Hours)	45	55 (RBL+10dBA)
	Evening (OOH Period 1)	45	50 (RBL+5dBA)
	Night (OOH Period 2)	38	43 (RBL+5dBA)
Residential Receptors Rooty Hill South	Day (Standard Hours)	42	52 (RBL+10dBA)
	Evening (OOH Period 1)	42	47 (RBL+5dBA)
	Night (OOH Period 2)	37	42 (RBL+5dBA)
Industrial Premises Council Workshop/ Depot	When in use	N/A	75 (external)
Commercial - offices, retail Council Workshop Offices Rooty Hill North and South retail premises	When in use	N/A	70 (external)
School classrooms School of the Arts	When in use	N/A	45 (internal)
Active recreation areas Angus Park Sports Field Rooty Hill South	When in use	N/A	65 (external)

5.2 Sleep Disturbance Criteria

The ICNG criteria are appropriate for assessing noise from continuous construction sources. However, maximum noise events are also required to be quantified. Transient events have the possibility of disturbing the sleep of nearby residents. On this basis, the maximum noise level from any construction activity should not exceed the screening criterion of 53dBA, LA_{max} at residential receptors in Rooty Hill North catchment area and 52dBA, LA_{max} at residential receptors in Rooty Hill South catchment area.

5.3 Road Traffic Noise Criteria

The road traffic noise criteria are provided in the RNP. The 'local road' category, as specified in the RNP, has been adopted for Hartington Street and Station Street for this assessment. 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 for Residential Land Uses			
Road category	Type of project/development	Assessment Criteria - dBA	
		Day (7am to 10pm)	Night (10pm to 7am)
Local roads	Existing residences affected by additional traffic on local roads generated by land use developments	55dBA, LAeq(1hr)	50dBA, LAeq(1hr)

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.

5.4 Operational Noise

Operational noise criteria were set in accordance with the EPA's INP. The area surrounding the project is classed as an urban environment. Table 9 Project Specific Noise Criteria presents the operational noise criteria derived in accordance with the INP.

Table 9 Project Specific Noise Criteria				
Period	RBL	Intrusive Criteria	Amenity Level	Project Specific Noise Level
Rooty Hill North				
Day	45	50	60	50
Evening	45	50	50	50
Night	38	43	45	43
Rooty Hill South				
Day	42	47	60	47
Evening	42	47	50	47
Night	37	42	45	42

5.5 Construction Vibration

5.5.1 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.

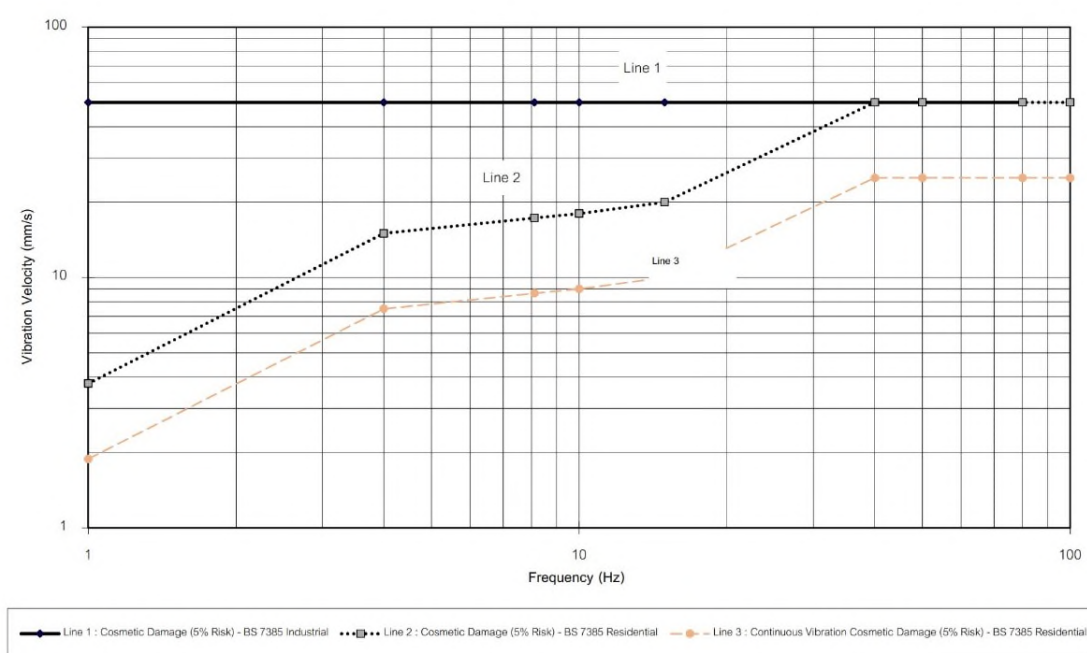
Guide values are set for building vibration based on the lowest vibration levels above which damage has been credibly demonstrated. These levels are considered to result in a minimum risk of vibration-induced damage, where minimal risk for a named effect is usually taken as a 95% probability of no effect.

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 10, with a visual representation presented in Figure 2. Where sources of continuous vibration may give rise to dynamic magnification due to resonance, the values provided in Table 10 should be reduced by 50%. This is especially the case with respect to Peak Particle Velocity (PPV) at lower frequencies.

Table 10 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	15 mm/s at 4 Hz	20 mm/s at 15 Hz
	Residential or light commercial type buildings	increasing to 20 mm/s at 15 Hz	increasing to 50 mm/s at 40 Hz and above

Figure 2 – 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 2.

5.5.2 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 11.

Table 11 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.

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 12 reproduces the preferred and maximum criteria relating to measured peak velocity.

Table 12 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.

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/s^2 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 13.

Table 13 Acceptable Vibration Dose Values (VDV) for Intermittent Vibration				
Location	Daytime		Night-time	
	Preferred	Maximum	Preferred	Maximum
	Value, m/s ^{1.75}	Value, m/s ^{1.75}	Value, m/s ^{1.75}	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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6 Noise and Vibration Assessment

6.1 Methodology

A computer model was developed to determine the noise impact from activities on the project site during standard construction hours and Out of Hours (OOH) periods at nearby receptors to the project. The modelling incorporated existing topographical data for the subject site. Brüel and Kjær Predictor Type 7810 (Version 11.10) noise modelling software was used to assess the potential noise impact associated with the project. 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'.

6.1.1 Modelled Construction Activities

It is evident from the list of activities summarised above that the project will include some construction aspects that will not generate audible noise levels (or any impacts) at nearby receptors. Some construction aspects do have the potential to generate audible noise (and potential impacts) at nearby receptors. Hence, this construction noise assessment will focus on the significant noise generating works.

Best practice for construction noise modelling and impact assessment is to develop a range of representative worst-case assessment scenarios for each key aspect being considered, rather than modelling every plausible scenario that may occur. This avoids the requirement for modelling an exhaustive set of potential circumstances and scenarios that may occur during the construction period. The assessment has not considered potential cumulative construction or operation impacts from the station upgrade and MSCP due to the temporary occurrence of impacts and insufficient scheduling information available at this stage of the project.

The activities, approximate duration (excluding weather delays) and location of works provided by TfNSW are attached in Appendix B, presenting the general area of works and compound/laydown areas. The construction activities and scenarios considered to potentially have the greatest noise impacts on nearby receptors, forming the basis of this assessment are summarised in Table 13. Each scenario has the potential to occur during standard hours, OOH Period 1 and OOH Period 2 and have been assessed against the NMLs for each period. They are intended to provide a means by which representative worst-case emissions can be assessed and the recommendations provided can be applied via the project Noise Management Plan.

Table 14 Construction Works and Activities – Assessment Scenarios

Scenario	Description	Summary of works and Activities
1 - Station Upgrade	1A Enabling Works	Site establishment and services relocation
	1B Demolition	Demolition of existing stairs and station canopies Excavation for new overbridge and lift footings
	1C Main works	Services installation and construct suspended slab
2 - MSCP Upgrade	Main works	Site clearing and general construction of the car park
3 - Interchange Upgrade	Main works	Construction of external roadworks, car park, lifts and footpaths.

6.1.2 Modelled Operational Carpark Activities

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

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

6.1.3 Sound Power Levels

The construction methodology at this stage of the project is still being determined, hence this assessment has adopted generic activities to replicate similar emissions for each task. Assumed plant and equipment consistent with those to be used on the project are listed in Table 15 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 15 Acoustically Significant Sources - Sound Power Levels

Item	Sound Power Level, LAeq(15min) dBA	Scenario				
		1A	1B	1C	2	3
Excavator (20 tonne)	105	✓	✓		✓	✓
Franna Mobile crane	110	✓			✓	
Truck (10 tonne)	107	✓	✓		✓	✓
Wacker Rammer	113	✓			✓	
Hand Tools	102	✓		✓	✓	✓
Bobcat	110		✓			
Jackhammer	113		✓	✓		
Dozer	118		✓			
Excavator (Breaker)	122		✓			
Grader	110		✓			✓
Concrete Saw	118		✓			
Generator	104			✓		
CFA Rig	111			✓		
Truck (HIAB)	107			✓		
Concrete Pump	109			✓	✓	✓
Concrete Truck / Agitator	112			✓	✓	✓
Mobile Crane (100tonne)	105				✓	✓
Paving Machine	108					✓
Grinder 4"	102					✓
Pilling Rig 30 tonne	125					✓
300 tonne Crane – to lift concourse planks/ footbridge	105					✓
Line marking	99					✓
Total Fleet Sound Power Level dBA, ref 10 ⁻¹² W		116	125	118	118	126

For the assessment of operational noise, a sound power for general car usage (i.e. car movement and engine noise) of 73dBA was adopted. To assess the impact transient noise events such as door or boot slams a sound power of 85dBA was adopted.

6.1.4 Construction Noise Predictions

Predictions have quantified levels from each nominated construction activity for the project. Noise emission results for each activity are presented in Table 16. Results reflect the maximum predicted exposure levels to receptors as construction activities occur at close proximity. The levels are presented for activities that occur during either standard or OOH periods. For completeness, predicted noise levels at the aged care facility have been provided assuming the facility is completed prior to construction or there is delay to the project schedule.

Table 16 Noise Emission Predictions, LAeq(15min) dBA

Receptor	NML			Scenario				
	Standard Hours	OOH Period 1	OOH Period 2	1A	1B	1C	2	3
N01	55	50	43	50	64	56	63	68
N01-1	55	50	43	50	64	57	63	68
N02	55	50	43	41	54	47	49	55
N03	55	50	43	48	63	55	61	66
N04	55	50	43	48	62	54	60	65
N05	55	50	43	47	62	54	59	65
N06	55	50	43	47	61	53	59	64
N07	55	50	43	46	61	53	58	64
NC01	70	70	70	55	69	62	67	81
NC02	70	70	70	57	68	62	63	76
NC03	70	70	70	54	65	58	53	71
NC04	70	70	70	53	65	58	55	71
NC05	70	70	70	51	62	55	53	65
NC06	70	70	70	51	61	54	53	64
N-IND1	75	75	75	54	69	61	72	74
N-IND2	75	75	75	53	69	62	72	69
NW01	70	70	70	55	67	61	55	69
NW01-1	55	50	43	55	68	61	56	69
NW02	55	50	43	54	65	59	50	63
NW03	55	50	43	53	62	56	48	54
NW04	55	50	43	52	61	55	48	53
NW05	55	50	43	52	61	54	49	54
NW06	55	50	43	45	57	50	49	56
NW07	55	50	43	46	57	50	49	56
NW08	55	50	43	47	57	50	49	57
NW09	55	50	43	47	57	50	48	58

Table 16 Noise Emission Predictions, LAeq(15min) dBA

Receptor	NML			Scenario				
	Standard Hours	OOH Period 1	OOH Period 2	1A	1B	1C	2	3
S01A	52	47	42	64	72	65	59	67
S01B	52	47	42	59	70	63	65	65
S02	52	47	42	49	57	51	49	59
S03	52	47	42	49	58	51	49	57
S04	52	47	42	49	56	49	49	55
S05	52	47	42	48	55	48	49	54
S06	52	47	42	47	55	48	48	54
S07	52	47	42	60	64	58	54	64
S08	52	47	42	58	64	58	54	62
S09	52	47	42	54	64	57	53	62
S10	52	47	42	49	61	55	52	61
S11	52	47	42	44	58	52	50	59
S12	52	47	42	46	58	50	51	55
S13	52	47	42	45	56	50	51	56
S14	52	47	42	46	55	49	49	56
S15	52	47	42	46	56	49	49	56
S16	52	47	42	45	56	49	49	55
S17	52	47	42	49	61	54	58	59
S18	52	47	42	48	61	55	58	59
S19	52	47	42	49	61	54	58	59
S20	52	47	42	51	61	54	58	59
S21	52	47	42	50	61	54	58	59
S22	52	47	42	52	61	54	58	59
S23	52	47	42	52	60	54	58	58
S24 Arts	52	47	42	52	60	53	52	58
S-AR1	52	47	42	56	61	55	52	59
SC01	70	70	70	69	66	59	55	64
SC02	70	70	70	63	62	55	51	62
SC03	70	70	70	56	61	54	52	60
SC04	70	70	70	55	65	57	57	62

6.1.5 Operational Noise Emissions

Predicted noise levels from the operational activities associated with the MSCP are below 40dBA for all non-residential receptors; and below 35dBA at all residential receptors.

Furthermore, predicted noise levels from maximum noise emissions associated with transient noise events within the MSCP are below 35dBA at all residential receptors during the night period.

Due to the existing high background levels associated with urban hum including local traffic the noise emissions associated with the operation of the car park is deemed not to increase overall noise levels and would be masked by ambient sources.

6.1.6 Maximum Noise Emissions / Sleep Disturbance Results

Proposed night time out of hours activities have the potential to generate noise emissions that may cause sleep disturbance at receptors directly adjacent to the construction work.

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

Modelling identified that maximum emissions have the potential to be above the sleep disturbance screening criterion at several receptors. Furthermore, it is envisaged that the project would proactively manage 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.

7 Discussion

A discussion of the results for each scenario is set out below. Predicted noise levels, compliance and determination of additional mitigation measures (AMM) in accordance with the CNS for each assessment scenario are detailed in Appendix D. Additionally, Table 16 provides a summary of the number of compliances and non-compliances with the relevant NMLs for each assessment scenario for standard and out of hours periods.

7.1 Scenario 1A Station Upgrade - Enabling Works

The activities required for Scenario 1A are most likely to be conducted during standard hours. Predicted noise levels generally comply with the relevant NMLs and additional mitigation measures are not required for standard hours (unless the proposed aged care facility is completed prior to the project).

Where tasks are required to be conducted during OOH Period 1 or 2, the application of AMM, reasonable and feasible work practices (Section 8) should be considered and applied to reduce noise impacts to the community.

7.2 Scenario 1B Station Upgrade - Demolition

The activities required for Scenario 1B are most likely to be conducted during standard hours and OOH. Predicted noise levels exceed the NMLs at most receptors (approx. 75%) and are less than 10dB above the daytime RBL. Additional mitigation measures (LB, M) will be required during standard hours for six receptor locations without the application of reasonable and feasible work practices (Section 8).

Where tasks are required to be conducted during OOH Period 1 or 2, the application of AMM, reasonable and feasible work practices (Section 8) should be considered and applied to reduce noise impacts to the community.

7.3 Scenario 1C Station Upgrade – Main Works

The activities required for Scenario 1C are most likely to be conducted during standard hours and OOH. Predicted noise levels exceed the NMLs at most receptors (approx. 40%) but are generally less than 10dB above the RBL. Additional mitigation measures are not required during standard hours (unless the proposed aged care facility is completed prior to the project) without the application of reasonable and feasible work practices (Section 8).

Where tasks are required to be conducted during OOH Period 1 or 2, the application of AMM, reasonable and feasible work practices (Section 8) should be considered and applied to reduce noise impacts to the community.

7.4 Scenario 2 MSCP Upgrade – Main Works

The activities required for Scenario 2 are most likely to be conducted during standard hours and OOH. Predicted noise levels exceed the NMLs at most receptors (approx. 40%) but are generally less than 10dB above the RBL. Additional mitigation measures are not required during standard hours (unless the proposed aged care facility is completed prior to the project) without the application of reasonable and feasible work practices (Section 8) which should be considered and applied to reduce noise impacts to the community for all proposed OOH periods.

7.5 Scenario 3 Interchange Upgrade – Main Works

The activities required for Scenario 3 are most likely to be conducted during standard hours and OOH. Predicted noise levels exceed the NMLs at most receptors (approx. 75%) and are less than 10dB above the daytime RBL. Additional mitigation measures (LB, M) will be required during standard hours for seven receptor locations and 38 receptor locations during OOH Period 1 without the application of reasonable and feasible work practices (Section 8).

Predicted noise levels indicate that two commercial receptor locations (NC01 and NC02) will be highly noise affected.

Predicted noise levels exceed the NMLs at most receptors (approx. 80%) for OOH Period 2. Additional mitigation measures are likely to be required with the application of reasonable and feasible work practices (Section 8), to reduce the number of affected receptor locations.

Table 17 NML Compliance Summary

No of Receptors	Scenario 1A Unmitigated			Scenario 1B Unmitigated			Scenario 1C Unmitigated			Scenario 2 Unmitigated			Scenario 3 Unmitigated		
	Std	P1	P2	Std	P1	P2	Std	P1	P2	Std	P1	P2	Std	P1	P2
Comply with NML	29	14	56	13	13	56	14	13	56	21	13	56	9	9	54
Do not comply with NML	27	42	0	43	43	0	42	43	0	35	43	0	45	45	0
Highly Noise Affected	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2
No of Receptors	Scenario 1A Mitigated			Scenario 1B Mitigated			Scenario 1C Mitigated			Scenario 2 Mitigated			Scenario 3 Mitigated		
	Std	P1	P2	Std	P1	P2	Std	P1	P2	Std	P1	P2	Std	P1	P2
Comply with NML	55	52	44	49	25	13	54	50	28	55	43	33	44	28	12
Do not comply with NML	1	4	12	7	31	43	2	6	28	1	13	23	12	28	44
Highly Noise Affected	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

7.6 Road Traffic Noise Assessment

The potential for (operational) road traffic noise impacts are most likely to result from the proposed MSCP, creating a worst case additional 429 trips, of which 75% of these are assumed to be generated from the northern intersection at Hartington Street and Station Street. There is insufficient breakdown of vehicle trips at the intersection of Hartington Street and Station Street, so it is assumed that there would be a 50% split of movements between each of these roads.

Road traffic noise calculations are based on the worst case situation described in the AECOM RTIA which results in a predicted increase in road traffic noise along Hartington Street and Station Street of 1.5dB.

Therefore, road traffic noise impacts from the project are expected to be negligible as the expected increase in noise level is less than the 2dB threshold as per the RNP.

7.7 Vibration Assessment

The major potential sources of construction vibration include piling and compaction by vibratory rollers/plates. Equipment and plant have the potential to operate at a minimum offset distance of 18m from the nearest residential receptors when work occurs at the project site.

Generally, use of compactors would be for creating any hard standings or storage areas such as offices, compounds and stockpiles. Piling is required to install the foundations of the new footbridge. Peak levels of vibration from rolling typically occurs as the roller stops to change direction and a resonance is created as the roller (and vibrator) is stationary. Vibrating rollers typically generate vibration emissions between 10 - 50Hz. Therefore, the relevant vibration criteria for rolling is between 5mm/s and 15mm/s for standard type building structures.

Table 18 provides the minimum working distances for the use of various vibration intensive sources to nearby receptors.

Table 18 Minimum Working Distances or Vibratory Plant (m)

Plant item	Rating / Description	Minimum working distance	
		Cosmetic damage (BS 7385)	Human response (OH&E Vibration guideline)
Vibratory Roller	< 50 kN (Typically 1-2 tonnes)	5 m	15 m to 20 m
	< 100 kN (Typically 2-4 tonnes)	6 m	20 m
	< 200 kN (Typically 4-6 tonnes)	12 m	40 m
	< 300 kN (Typically 7-13 tonnes)	15 m	100 m
	> 300 kN (Typically 13-18 tonnes)	20 m	100 m
	> 300 kN (> 18 tonnes)	25 m	100 m
Small Hydraulic Hammer	(300 kg - 5 to 12t excavator)	2 m	7 m
Medium Hydraulic Hammer	(900 kg – 12 to 18t excavator)	7 m	23 m
Large Hydraulic Hammer	(1600 kg – 18 to 34t excavator)	22 m	73 m
Vibratory Pile Driver	Sheet piles	2 m to 20 m	20 m
Pile Boring	≤ 800 mm	2 m (nominal)	4 m
Jackhammer	Hand held	1 m (nominal)	2 m

Note: Source, CNVG (Roads and Maritime, 2015)

7.8 Feasible and Reasonable Mitigation Measures - Vibration

To minimise vibration impact during rolling activities and piling, it is recommended that large vibratory rollers be substituted with smaller units or replaced with alternative compaction techniques (ie wacker packers), where feasible. Additionally, bored piling (if feasible) is the recommended approach for piling activities on the project as this will effectively minimise vibration emissions associated with the activity.

It is recommended that when using vibration generating equipment, the minimum offset distance to receptors is, or greater than the minimum offset criteria specified in the CNS to satisfy BS7385.

Where substitution of equipment is not feasible or practical, vibration monitoring should be considered throughout the project to quantify and manage vibration emissions. The monitoring instrumentation can be setup with specific vibration limits that, when triggers, text or email the site manager that there have been elevated emissions. This allows the site manger to pro-actively manage or implement changes to construction activities where necessary.

Ground-borne construction noise impacts from the project are not anticipated as significant vibration generating source/s, with the potential to generate perceptible ground-borne noise, does not form part of the project design.

7.8.1 Structural Damage

Currently, there is no Australian Standard that sets the criteria for the assessment of building damage caused by vibration. Cosmetic damage criteria are provided in British Standard BS 7385.2 – 1993 Evaluation and measurement for vibration in buildings (Table 4-6) and German Standard DIN 4150-3: 1999-02 Structural Vibration – Part 3: Effects of vibration on structures (Table 4-7). This assessment has applied the DIN 4150-3: 1999 criteria as they are more stringent.

Significant vibration levels are not anticipated due to the nature of the construction works required and the distance offset to the closest buildings.

8 Feasible and Reasonable Mitigation Measures - Noise

Noise modelling identifies that relevant NMLs for the project could be exceeded when each construction activity occurs. The ICNG outlines noise management and mitigation initiatives to minimise the impact and improve the acoustic amenity of receivers potentially affected by road construction projects. The guideline suggests there are no prescribed noise controls for construction work, instead:

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

8.1 Universal Work Practices

Universal work practices that can be applied to the project (and all subsequent activities) include:

- conduct toolbox talks pre-shift to communicate awareness regarding the importance of noise emission management;
- ensure site managers periodically check noise emissions at receivers adjacent to noisy activities so that potential problems can be rectified;
- radios will not be used and no yelling allowed;
- no slamming of doors is allowed;
- plant will be parked in accessible and where possible shielded locations prior to being used for out of hours work;
- minimise the use of reverse alarms;
- site access will be gained via entry points most remote to receivers;
- minimise clustering of plant items;
- management are to communicate to staff and contractors the importance of minimising noise emissions to the community when arriving and leaving site; and
- a noise monitoring program is to be implemented to quantify noise emissions from construction activities and guide practical reasonable and feasible noise control measures.

8.2 Consultation and Notification

General

- Inform affected residents and other sensitive land use occupants the levels of impacts, the associated duration of each activity and what is being adopted at the project to minimize noise impacts to the community. This information should be provided to the community seven days before commencement.

- Provide information to neighbours before and during construction through media such as letterbox drops, meetings or individual contact. In some areas, the proponent will need to provide notification in languages other than English. A website could also be established for the project to provide information.
- Implement a site information board at the front of the site with the name of the organisation responsible for the site and their contact details, hours of operation and regular information updates. This signage should be clearly visible from the outside and include standard and after hours emergency contact details.
- Maintain good communication between the community and project staff.
- Appoint a community liaison officer where required to maintain good communications between community and staff.

Complaints handling

- Provide a readily accessible contact point, for example, through a 24-hour toll-free information and complaints line and give complaints a fair hearing;
- Have a documented complaints process, including an escalation procedure so that if a complainant is not satisfied there is a clear path to follow;
- Records of all community complaints will be maintained on an up-to-date complaints register. The records will include:
 - date and time of the complaint;
 - how the complaint was made (telephone, mail or email);
 - any personal details of the complainant that were provided, or if no details are provided, a note to that effect;
 - the nature of the complaint;
 - any actions taken by the site supervisor/construction contractor in relation to the complaint, including any follow up contact with the complainant and the timing for implementing action; and

- if no action was taken by site supervisor/construction contractor in relation to the complaint, the reason why no action was taken.
- Community complaints will be allocated to a responsible contractor's representative immediately to facilitate the implementation of corrective actions. The details of the complaint will also be circulated to the applicable construction personnel for action, where required.

8.3 Plant and Equipment On Site

- As far as practical, locate lighting plant away from sensitive receivers;
- For vegetation removal, where possible mulching should be conducted during standard construction or as a minimum, during OOH Period 1 (ie evening shifts);
- No reversing of vehicles (reverse alarms) during out of hours work (ie the vehicles will do a complete U turn if they are required to change direction or have spotters);
- Use of air brakes is not permitted;
- All plant will be driven in a conservative manner (no over-revving);
- Machinery will not be permitted to 'warm-up' before the nominated working hours or adjacent to receivers;
- Where possible, machinery will be located/orientated to direct noise away from the closest sensitive receivers;
- Undertake regular maintenance of machinery to minimise noise emissions. Maintenance will be confined to standard daytime construction hours and where possible, away from noise sensitive receivers;
- The quietest suitable machinery reasonably available will be selected for each work activity;
- All machinery will have efficient low noise muffler design and be well-maintained;
- The offset distance between noisy items of plant/machinery and nearby sensitive receivers will be maximised;
- Queuing of vehicles is not to occur adjacent to any residential receiver/catchment;

- Where queuing is required, for example due to safety reasons, a site entry position will be selected that is well removed from receivers/catchments. Where this is not feasible, engines are to be switched off to reduce their overall noise impacts on receivers;
- Where practicable, ensure the coincidence of noisy plant/machinery working simultaneously in close proximity to sensitive receivers is avoided; and
- Keep truck drivers informed of designated vehicle routes, parking locations, acceptable delivery hours or other relevant practices (for example, minimising the use of engine brakes, and no extended periods of engine idling).

8.4 Work Scheduling

- Schedule work when neighbours are not present (for example, commercial neighbours, colleges and schools may not be present outside business hours or on weekends);
- Schedule noisy activities around times of high background noise (local road traffic or when other local noise sources are active) where possible to provide masking or to reduce the amount that the construction noise intrudes above the background;
- Care should be taken to minimise noise from any refuelling at night and ensure plant is as far as practical from receivers when refuelling;
- 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;
- Designate access routes to the site, through consultation with potentially noise-affected residences and other sensitive land uses, and make drivers aware of nominated vehicle routes;
- Provide designated on-site truck waiting areas away from residences and other sensitive land uses. Truck waiting areas may require bunding or walls to minimise noise;
- Provision of the dedicated staff/contractor car parking area away from residences is considered a practical and effective noise control measure to minimise impacts of staff entering and leaving the project; and
- Schedule delivery of materials to occur during the day or early evening periods to avoid noise emission associated with deliveries.

8.4.1 Transmission Path

- Where possible eliminate or reduce the line-of-sight from noise emission sources to residences or other sensitive land uses using temporary barriers or mobile screens;
- Temporary noise barriers can be constructed from hoardings or pvc curtains attached to temporary fences. Stockpiles and, shipping containers are also effective barriers;
- Consider mobile screens for work that is static or plant that will be stationary for the duration of the work (ie drainage work, or around compressors and generators);
- Erect temporary noise barriers at shift start up to ensure that noise during the entire shift is minimised; and
- Consider the height of mobile screens when adjacent to multistorey dwellings to ensure adequate height to remove line of sight from the source to the elevated receiver.

8.5 At residence (treatments) or other sensitive Land Uses (last resort)

- 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.

8.6 Additional Mitigation Measures

The CNS outlines a range of standard additional mitigation measures which are recommended to manage the potential impact and would be implemented for the project where practicable. The additional measures are reproduced in Table 19 will be considered following incorporation of feasible and reasonable mitigation measures for the project outlined in Section 8.

Table 19 Triggers for Additional Mitigation Measures - Airborne Noise

Time period		Mitigation measures			
		LAeq(15min) noise level above background (RBL)			
		Qualitative assessment of noise levels			
		0 to 10 dBA Noticeable	10 to 20 dBA Clearly audible	20 to 30 dBA Moderately intrusive	> 30 dBA Highly intrusive
Standard	Mon-Fri (7am - 6pm)				
	Sat (8am - 1pm)	-	-	LB, M	LB, M
	Sun/Pub Hol (Nil)				
OOH Period 1	Mon-Fri (6pm - 10pm)				
	Sat (7am-8am) & (1pm- 10pm)	-	LB	M, LB,	M, IB, LB, RO, PC, SN, RO ²
	Sun/Pub Hol (8am - 6pm)				
OOH Period 2	Mon-Fri (10pm - 7am)				
	Sat (10pm - 8am)	LB	M, LB, RO ²	M, IB, LB, PC, SN, RO ²	AA, M, IB, LB, PC, SN, RO
	Sun/Pub Hol (6pm - 7am)				

RO²: Respite Offers identified in OOH Period 2 for clearly audible (10 to 20dBA) and moderately intrusive (20 to 30dBA) work shall only apply if works are expected to continue for more than three consecutive evenings for OOH Period 1 or more than two consecutive nights for OOH Period 2.

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9 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 construction of the Rooty Hill Station Easy Access Upgrade and Multi Storey Car Park (the 'project') at Rooty Hill, NSW.

MAC quantified existing background noise levels in the area and established noise management levels (NMLs) in accordance with relevant NSW standards and guidelines applicable to the project and developed representative assessment scenarios.

The assessment has identified receptors situated in the vicinity of significant noise and vibration generating plant, equipment and/or activities associated with the project and quantified the potential for noise impacts during the construction phases of the project via modelling for representative assessment scenarios. Construction noise levels from the project were calculated for commercial, industrial and residential receptors surrounding the project and compared against the relevant NMLs. The assessment also identifies noise mitigation measures, practices to be considered for the project and their effects.

Predicted noise levels are typical of construction works and activities undertaken in this type of setting. Although a number of exceedances are identified, these are predominantly associated with predicted 15 minute noise levels calculated via modelling for the purposes of the assessment, in accordance with the ICNG and the CNS. These values do not represent a constant noise emission that would be experienced by the community on a daily basis throughout the construction period.

These results and noted exceedances identify that good-practice construction noise management and control techniques will be required to reduce noise levels as far as practicable to minimise noise impacts to the community. It is recommended that a Construction Noise and Vibration Management Plan (CNVMP) be prepared for the project to address the additional noise control, mitigation and management measures required, focussing on out of hours work periods, where significant noise impacts are expected. The CNVMP would be implemented in conjunction with community and stakeholder consultation and notification processes.

An assessment of future road traffic noise impacts was completed. Results indicate that road traffic noise emissions from the project will be negligible and would not increase existing road traffic noise levels by more than 2dB.

Operational noise levels from the MSCP are predicted to comply with the relevant INP intrusive and sleep disturbance noise criteria.

Based on the equipment and activities identified for the project, potential sources of vibration are limited. With normal construction design development and general vibration management practices in place the potential for human comfort impacts, adverse effects on building contents or adverse effects on structures is therefore minimal. Notwithstanding, safe working distances for vibration intensive plant established in this assessment should be adopted for the project.

Appendix A – Glossary of Terms

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

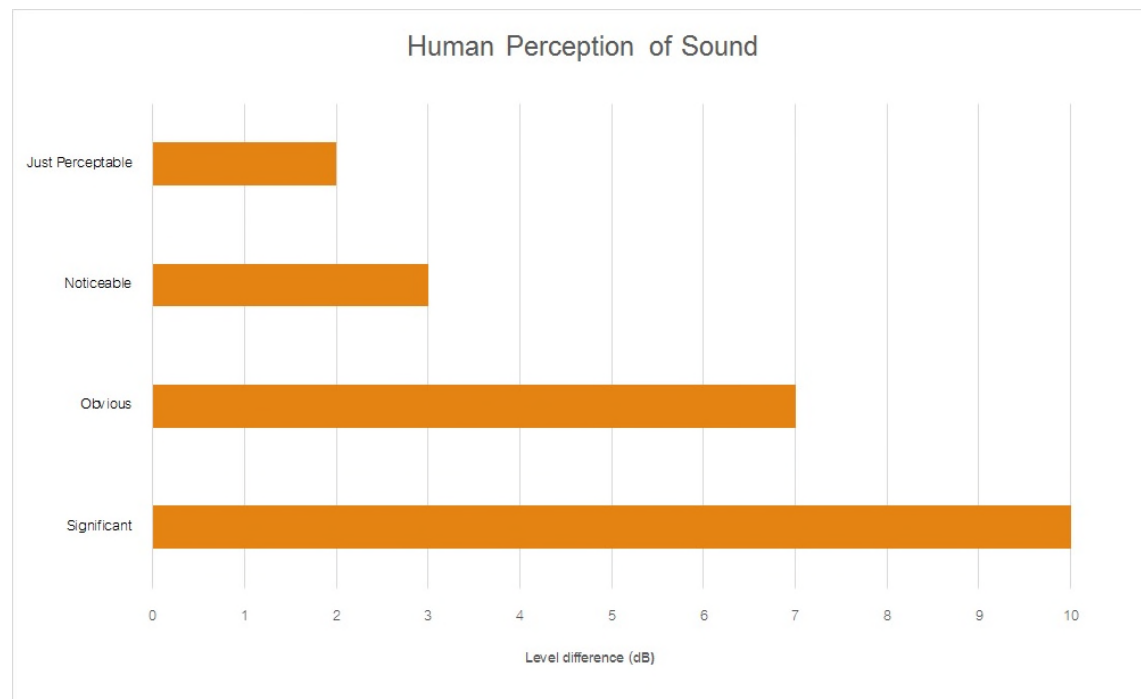
Table A1 Glossary of Terms	
Term	Description
1/3 Octave	Single octave bands divided into three parts
Octave	A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit.
ABL	Assessment Background Level (ABL) is defined in the INP as a single 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 describing 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.
LAm _{ax}	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)	<p>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 :</p> $= 10 \cdot \log_{10} (W/W_0)$ <p>Where : W is the sound power in watts and W₀ is the sound reference power at 10-12 watts.</p>

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 – Construction Scenarios

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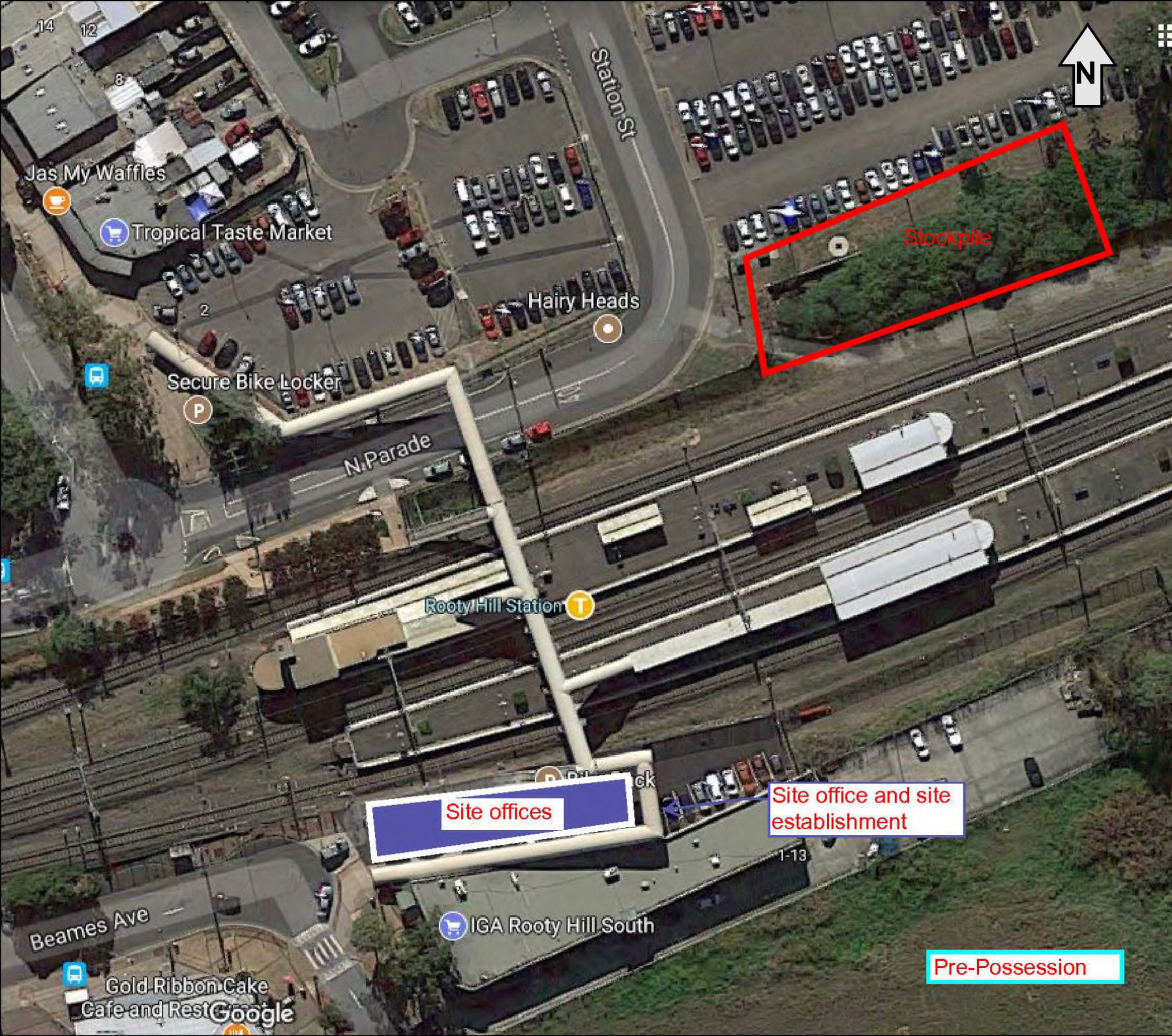


FIGURE B1

CONSTRUCTION STAGING

REF: MAC170542



Site offices

Site office and site establishment

Pre-Possession





FIGURE B2

CONSTRUCTION STAGING

REF: MAC170542



Minor Service
relocation

Site offices

Possession 1 Config 7
- 5/6 May 2018



FIGURE B3

CONSTRUCTION STAGING

REF: MAC170542



Possession 2 - Config 6
7/8 July 2018



FIGURE B4

CONSTRUCTION STAGING

REF: MAC170542



Relocate existing OHWS

Regrade platform surfaces where required around lift entry and stairs

Site offices

Possession 3 Config 7
8/9 September 2018



FIGURE B5

CONSTRUCTION STAGING

REF: MAC170542



Trenching / sawing
(route and location
indicative) to install
electrical power
conduits and
substation including
potential removal of
power poles

Form footings and
place reo for
overbridge, stairs
and lifts

Non-Possession
(including night work)



FIGURE B6

CONSTRUCTION STAGING

REF: MAC170542



Site offices

Pour footings for
overbridge, stairs
and lifts

Possession 4 - Config 6
12/13 January 2019

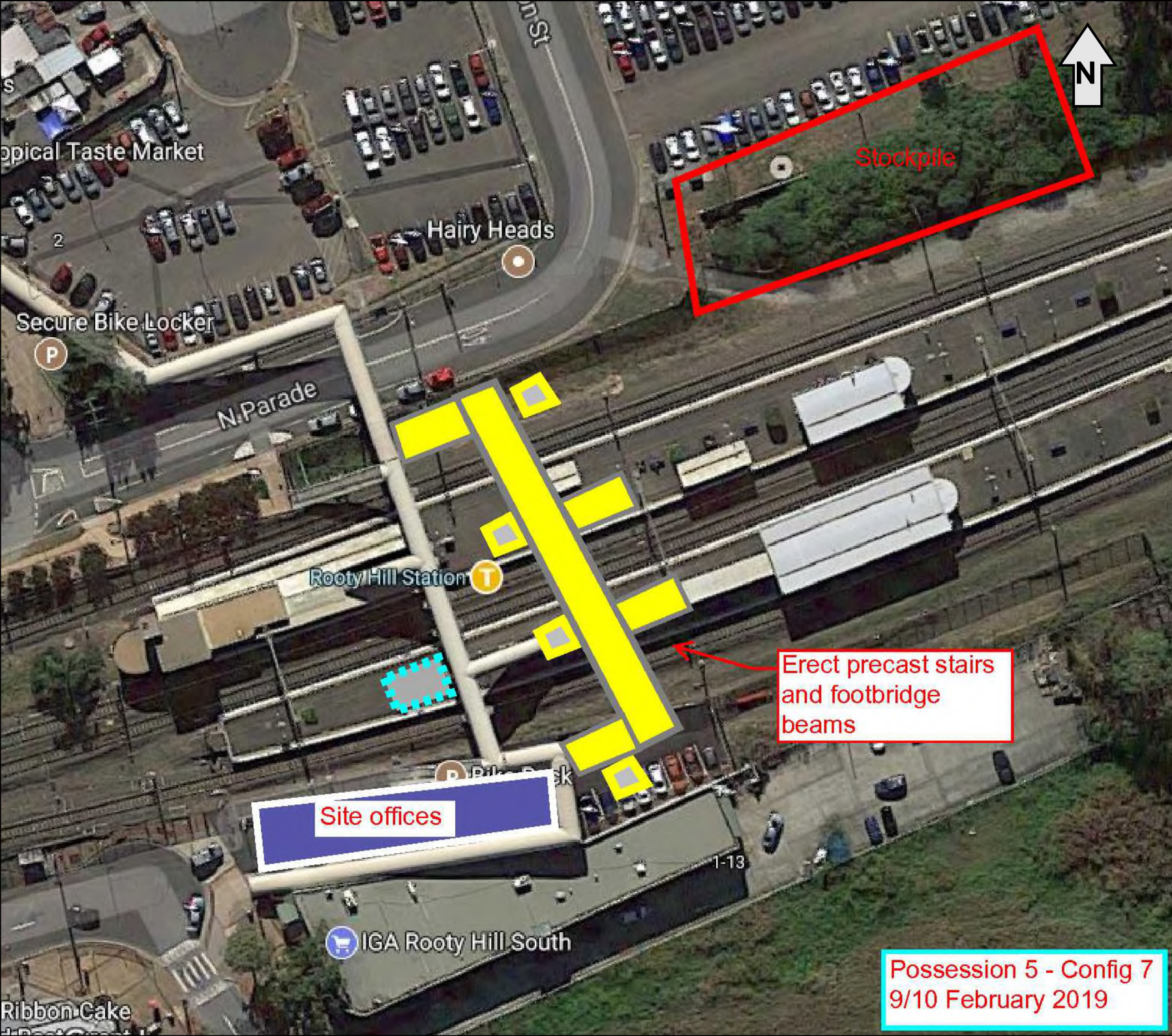


FIGURE B7

CONSTRUCTION STAGING

REF: MAC170542



Erect precast stairs
and footbridge
beams

Site offices

Possession 5 - Config 7
9/10 February 2019



FIGURE B8

CONSTRUCTION STAGING

REF: MAC170542



Possession 6 - Config 6
27/28 April 2019

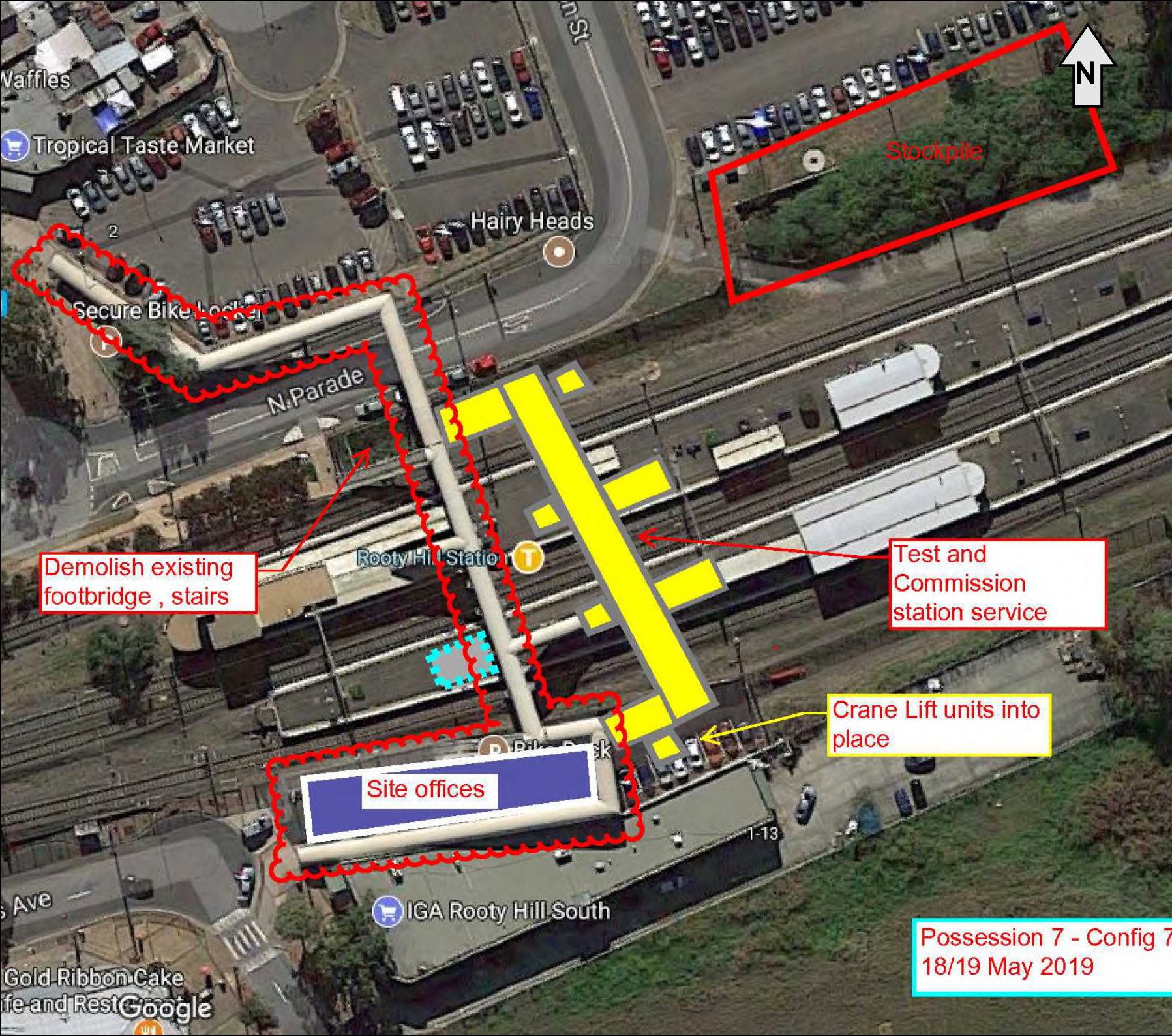


FIGURE B9

CONSTRUCTION STAGING

REF: MAC170542



Possession 7 - Config 7
18/19 May 2019

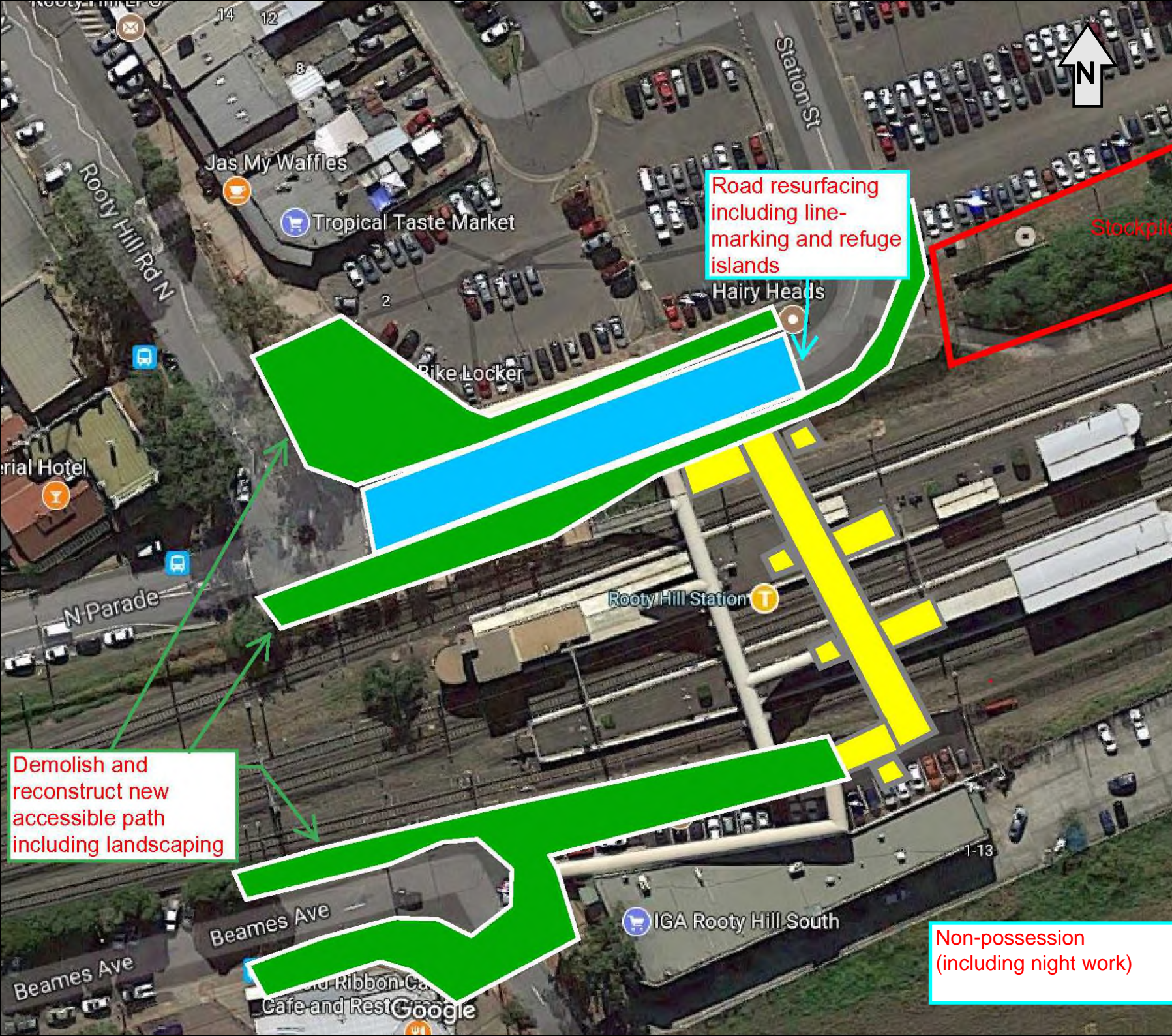


FIGURE B10

CONSTRUCTION STAGING

REF: MAC170542

Road resurfacing
including line-
marking and refuge
islands

Hairy Heads

Rooty Hill Station

IGA Rooty Hill South

Non-possession
(including night work)

Demolish and
reconstruct new
accessible path
including landscaping

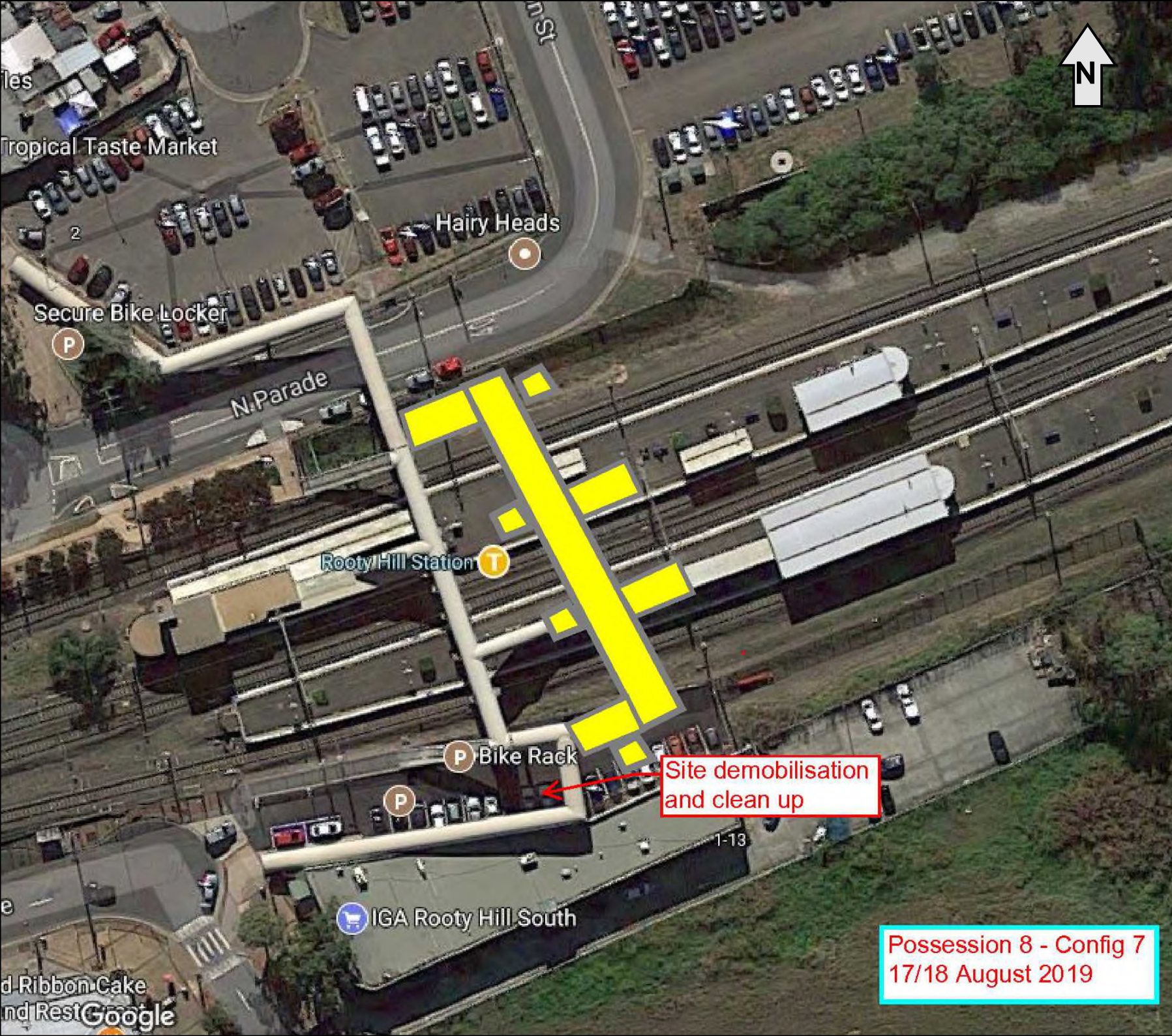


FIGURE B11

CONSTRUCTION STAGING

REF: MAC170542



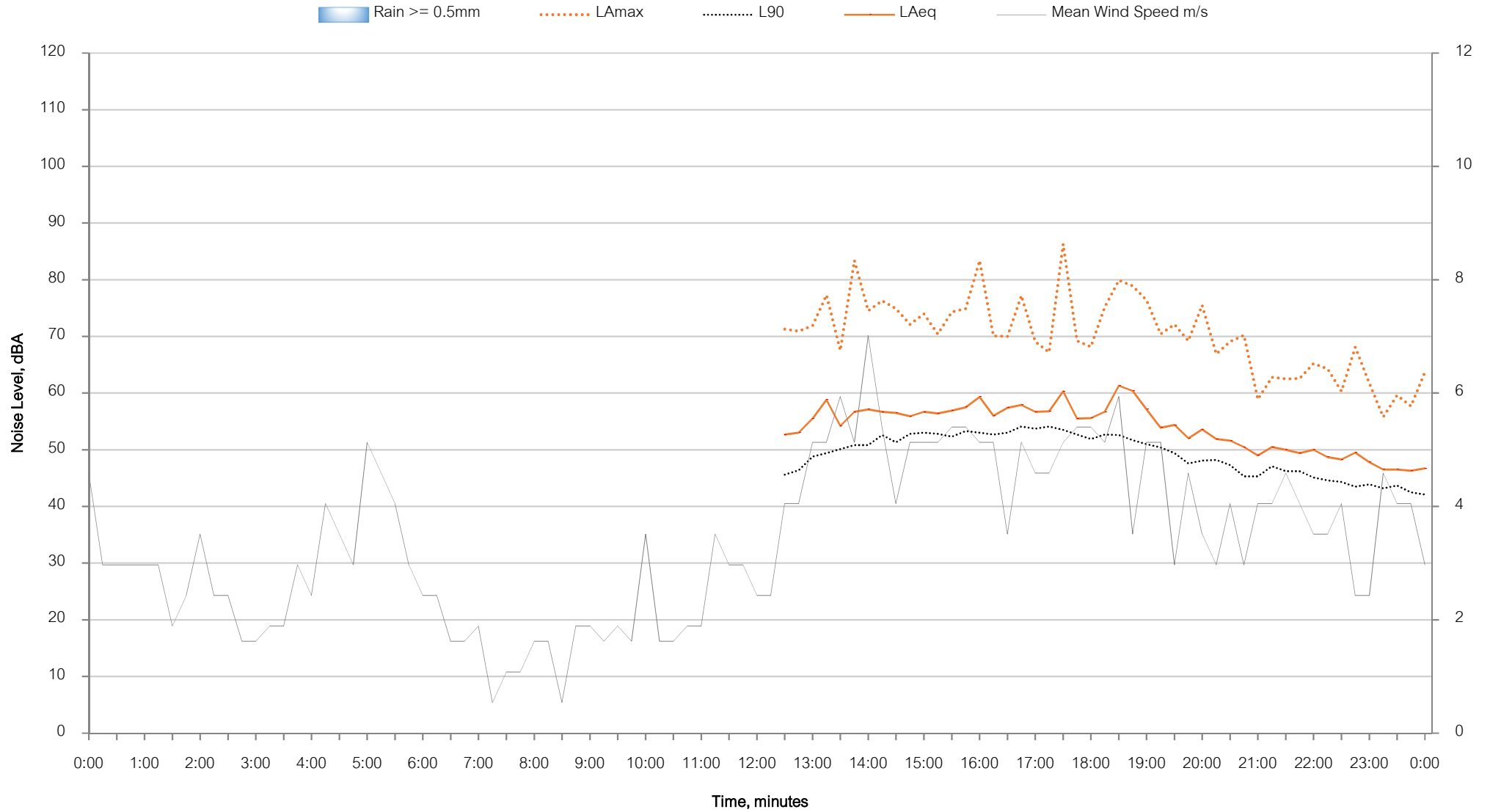
Possession 8 - Config 7
17/18 August 2019

Appendix C – Noise Monitoring Charts

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Background Noise Levels

Logger 1 - 138 Hartington Street, Rooty Hill - Tuesday 10 October 2017



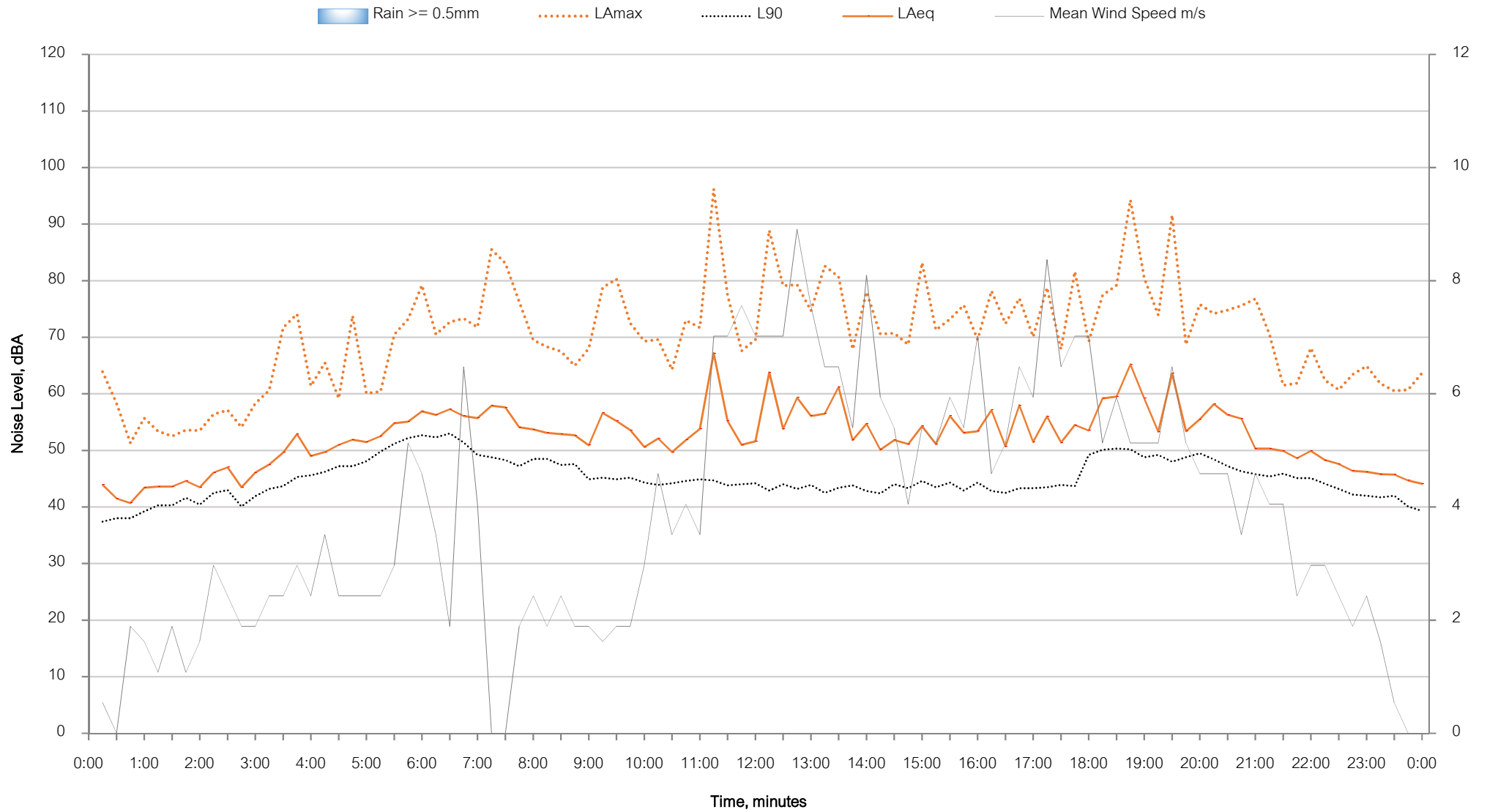
Background Noise Levels

Logger 1 - 138 Hartington Street, Rooty Hill - Wednesday 11 October 2017



Background Noise Levels

Logger 1 - 138 Hartington Street, Rooty Hill - Thursday 12 October 2017



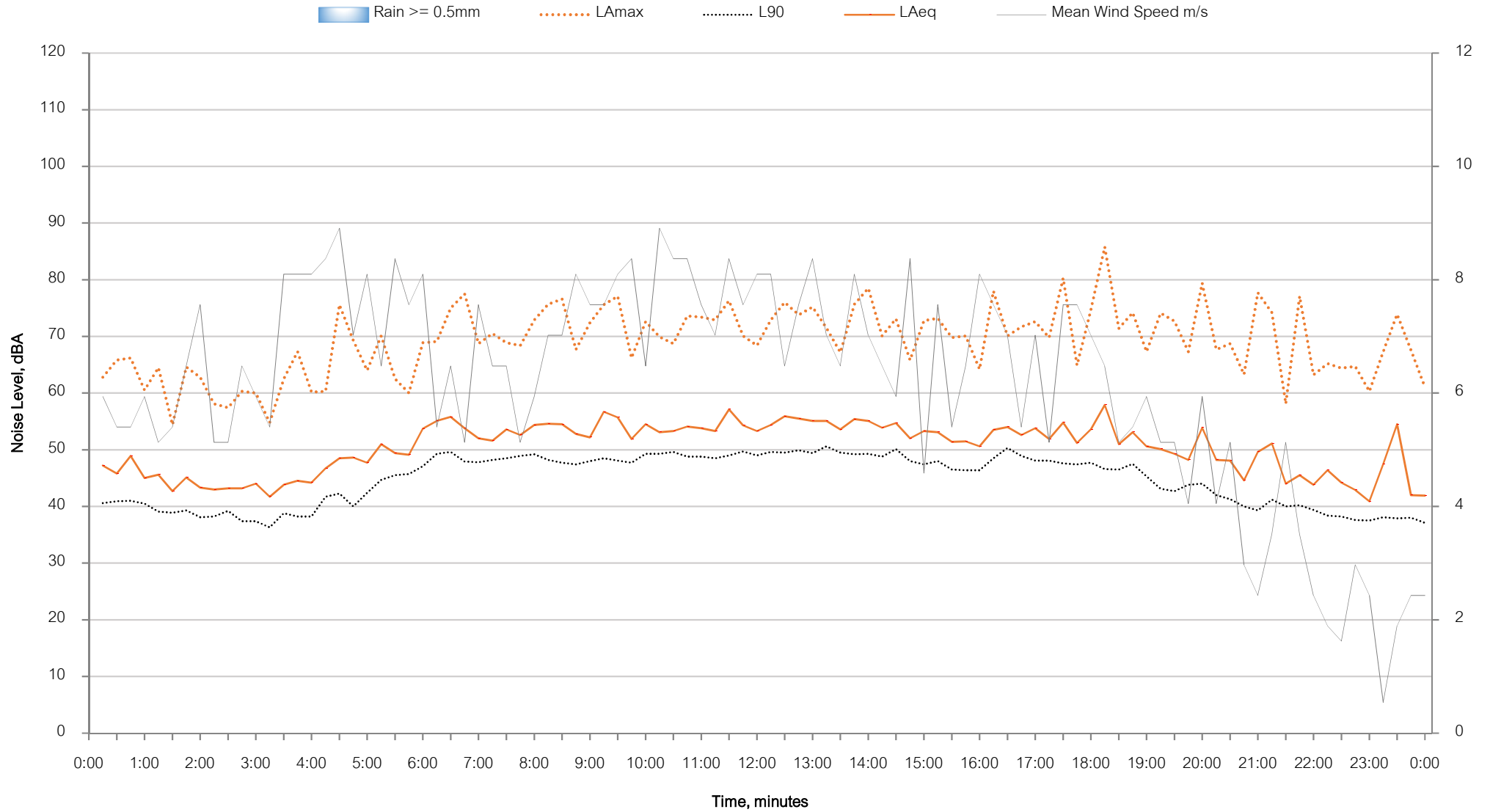
Background Noise Levels

Logger 1 - 138 Hartington Street, Rooty Hill - Friday 13 October 2017



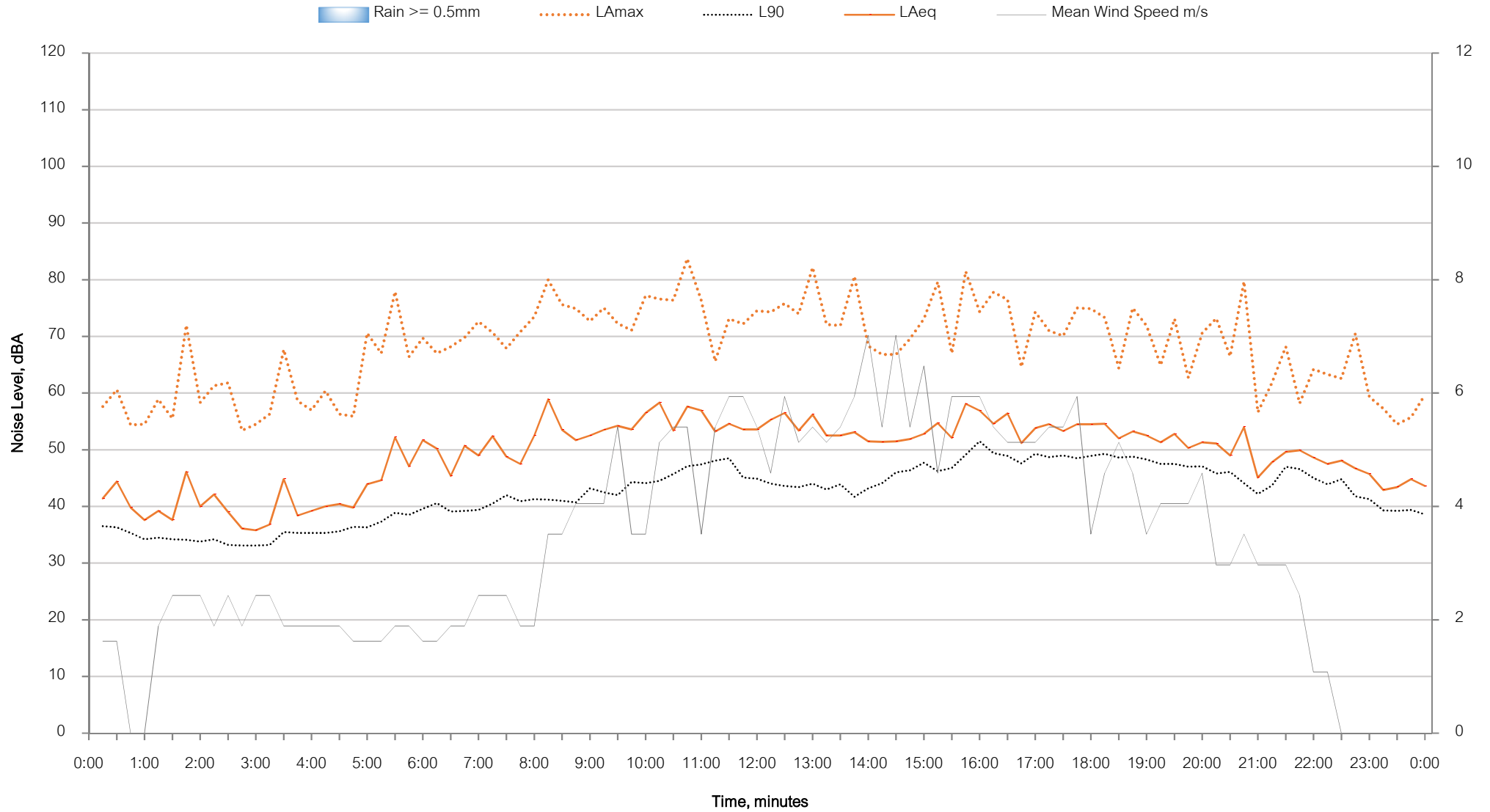
Background Noise Levels

Logger 1 - 138 Hartington Street, Rooty Hill - Saturday 14 October 2017



Background Noise Levels

Logger 1 - 138 Hartington Street, Rooty Hill - Sunday 15 October 2017



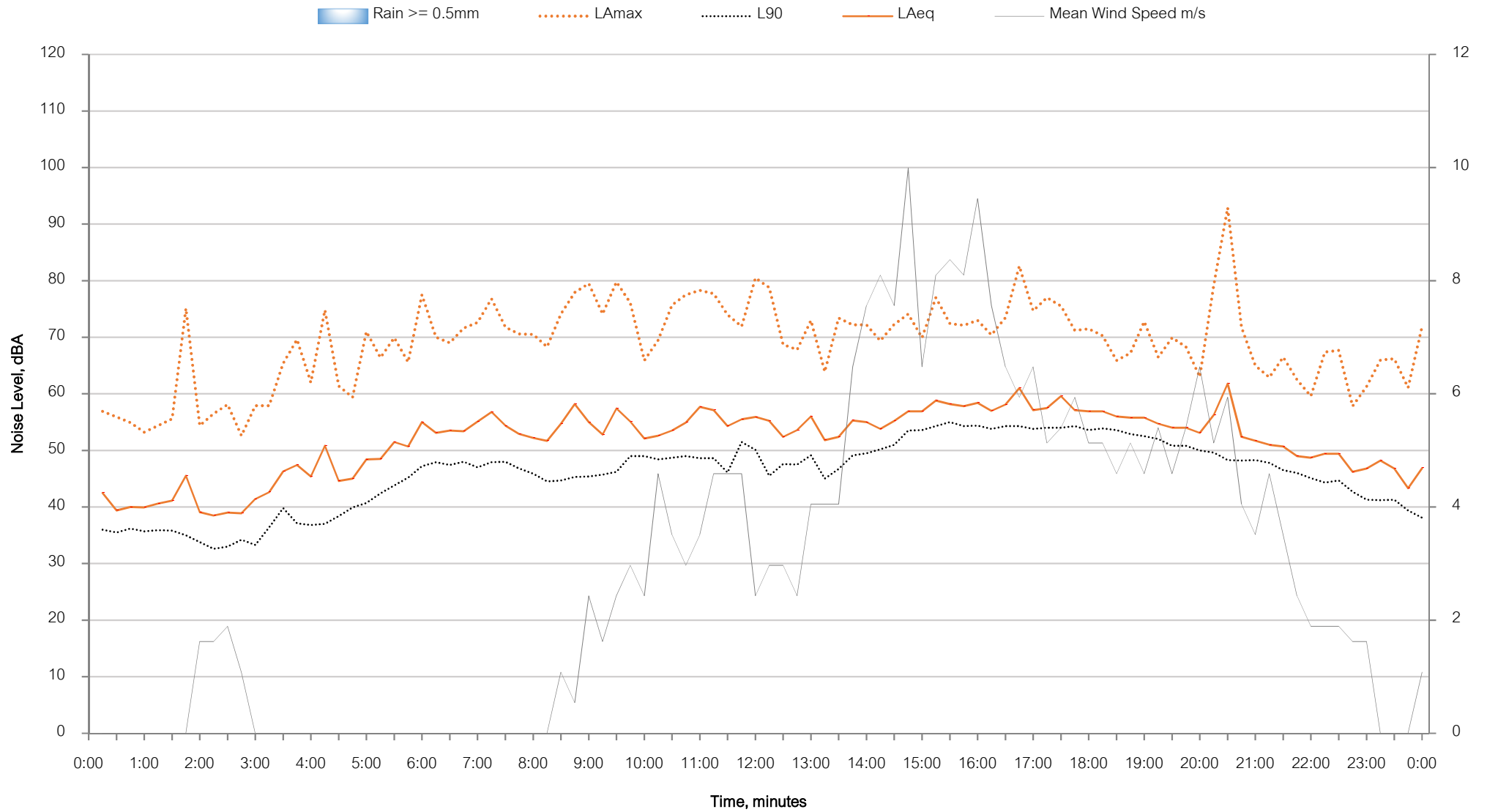
Background Noise Levels

Logger 1 - 138 Hartington Street, Rooty Hill - Monday 16 October 2017



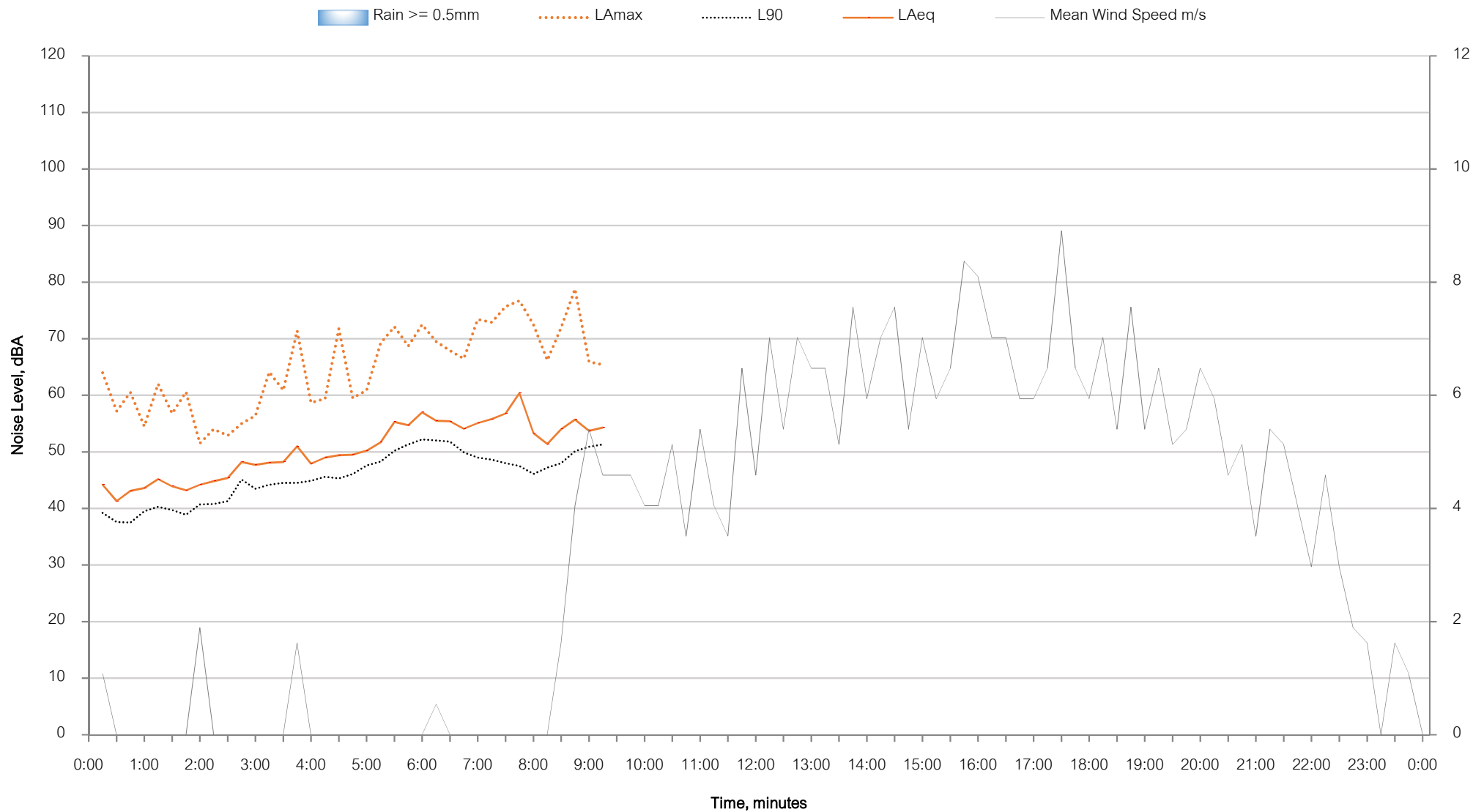
Background Noise Levels

Logger 1 - 138 Hartington Street, Rooty Hill - Tuesday 17 October 2017



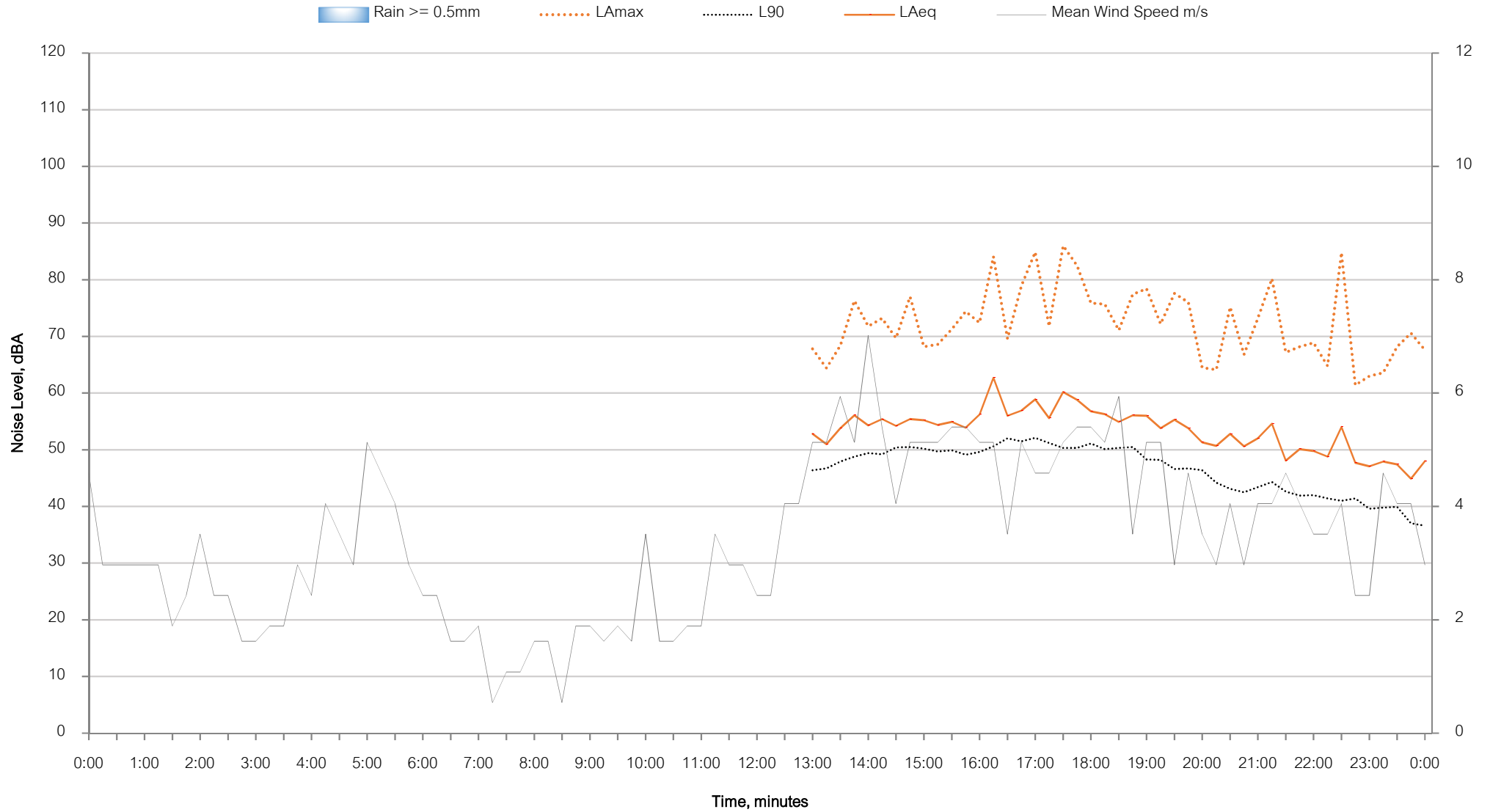
Background Noise Levels

Logger 1 - 138 Hartington Street, Rooty Hill - Wednesday 18 October 2017



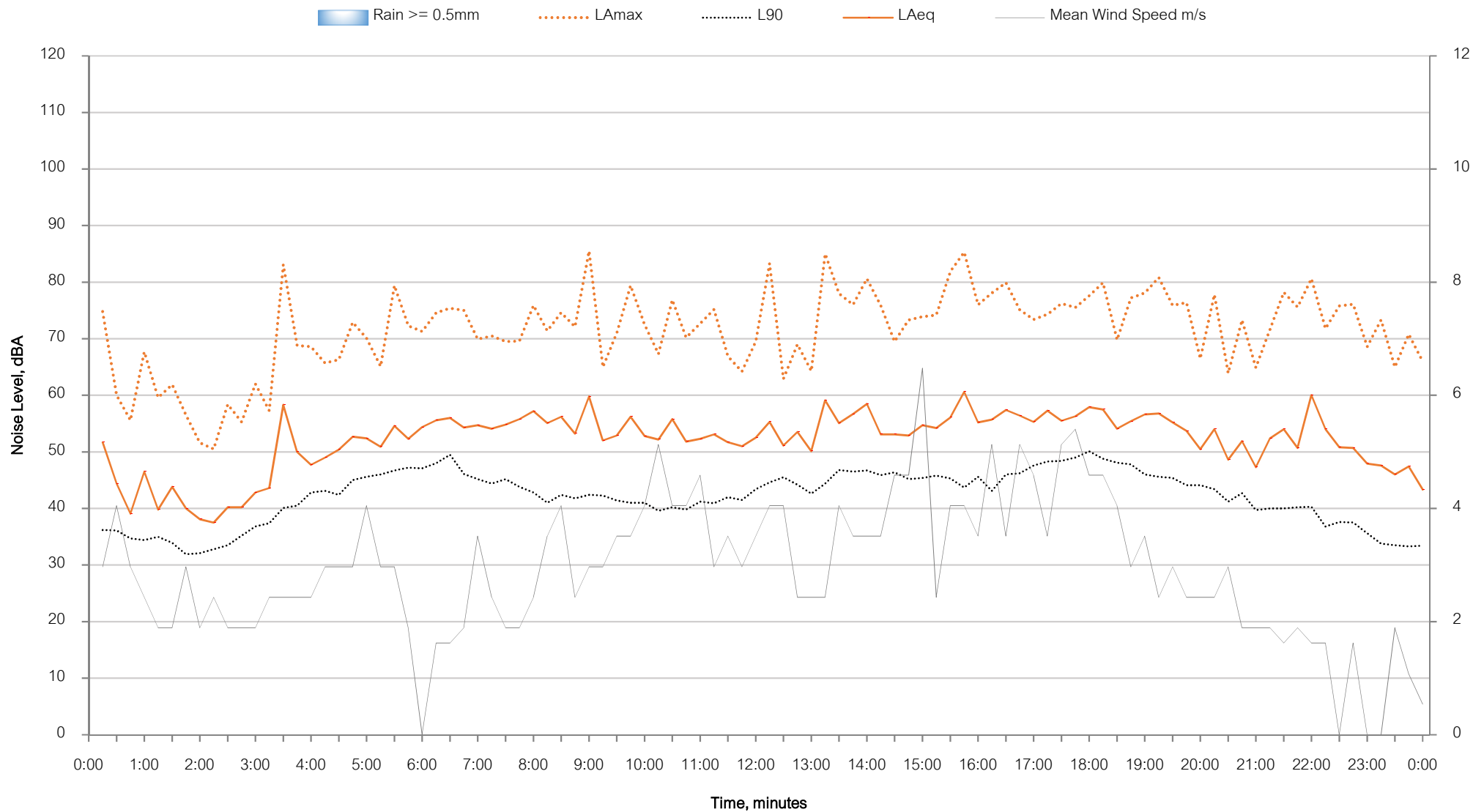
Background Noise Levels

Logger 2 - 21 Catherine Crescent, Rooty Hill - Tuesday 10 October 2017



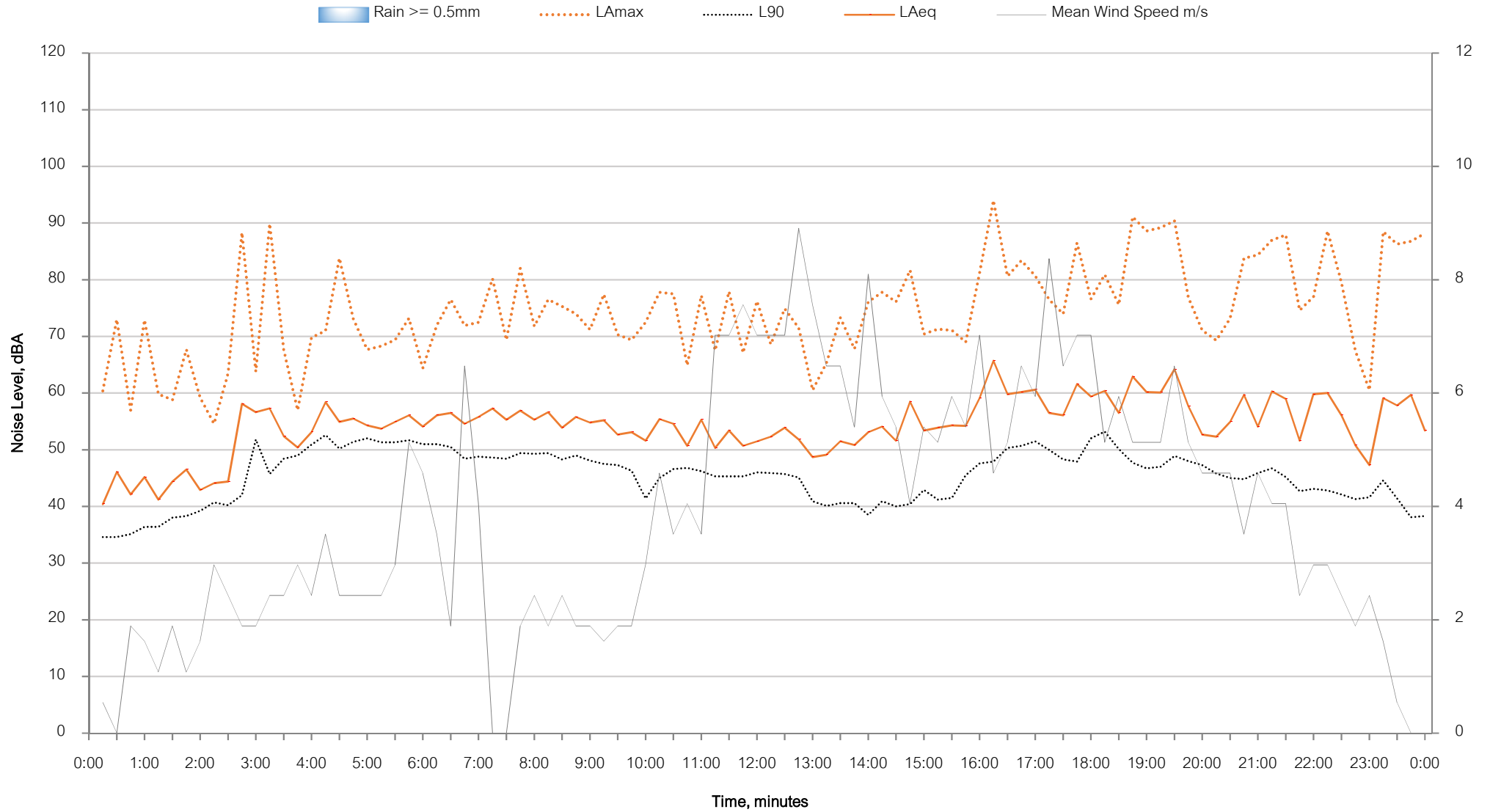
Background Noise Levels

Logger 2 - 21 Catherine Crescent, Rooty Hill - Wednesday 11 October 2017



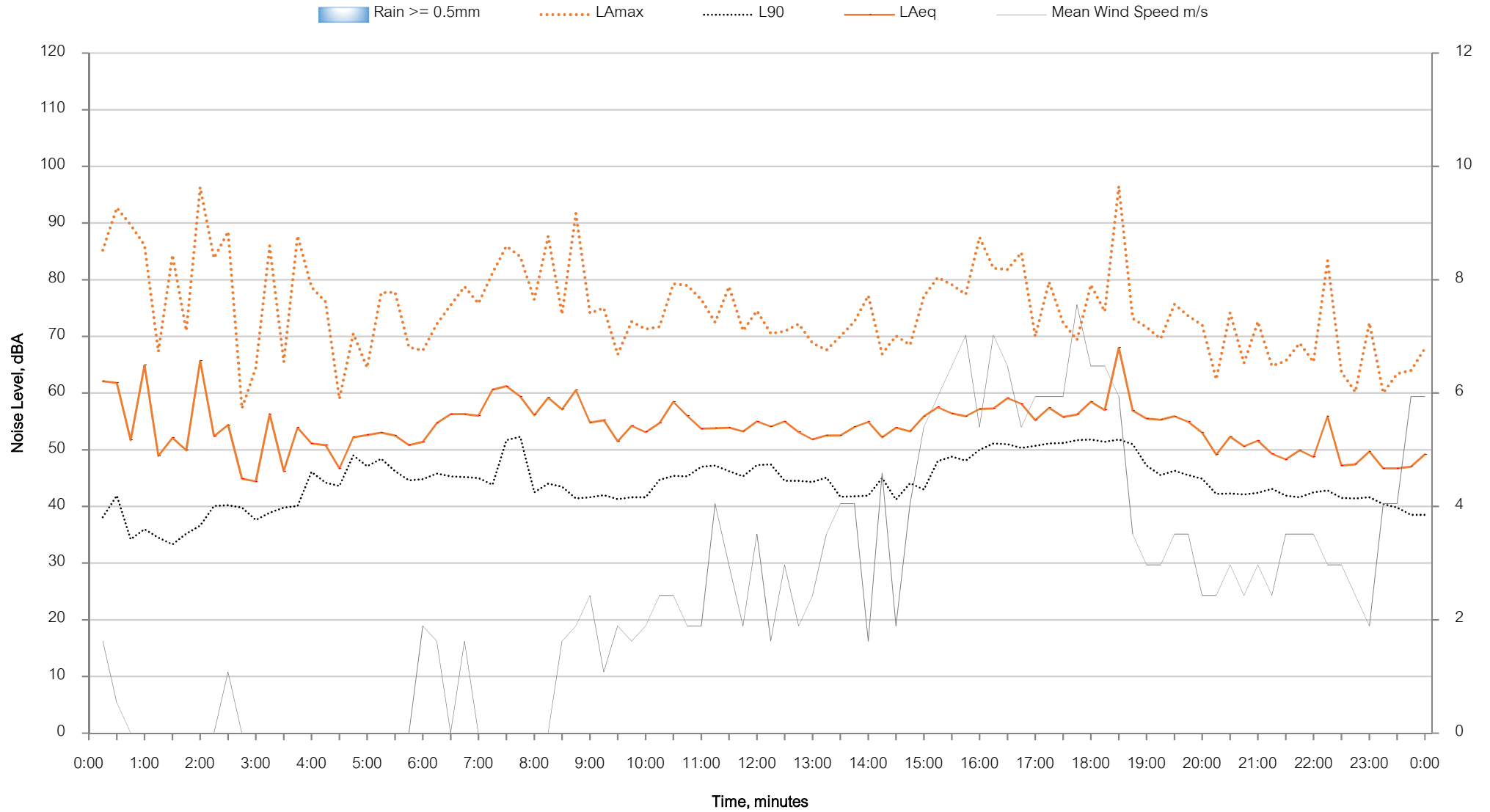
Background Noise Levels

Logger 2 - 21 Catherine Crescent, Rooty Hill - Thursday 12 October 2017



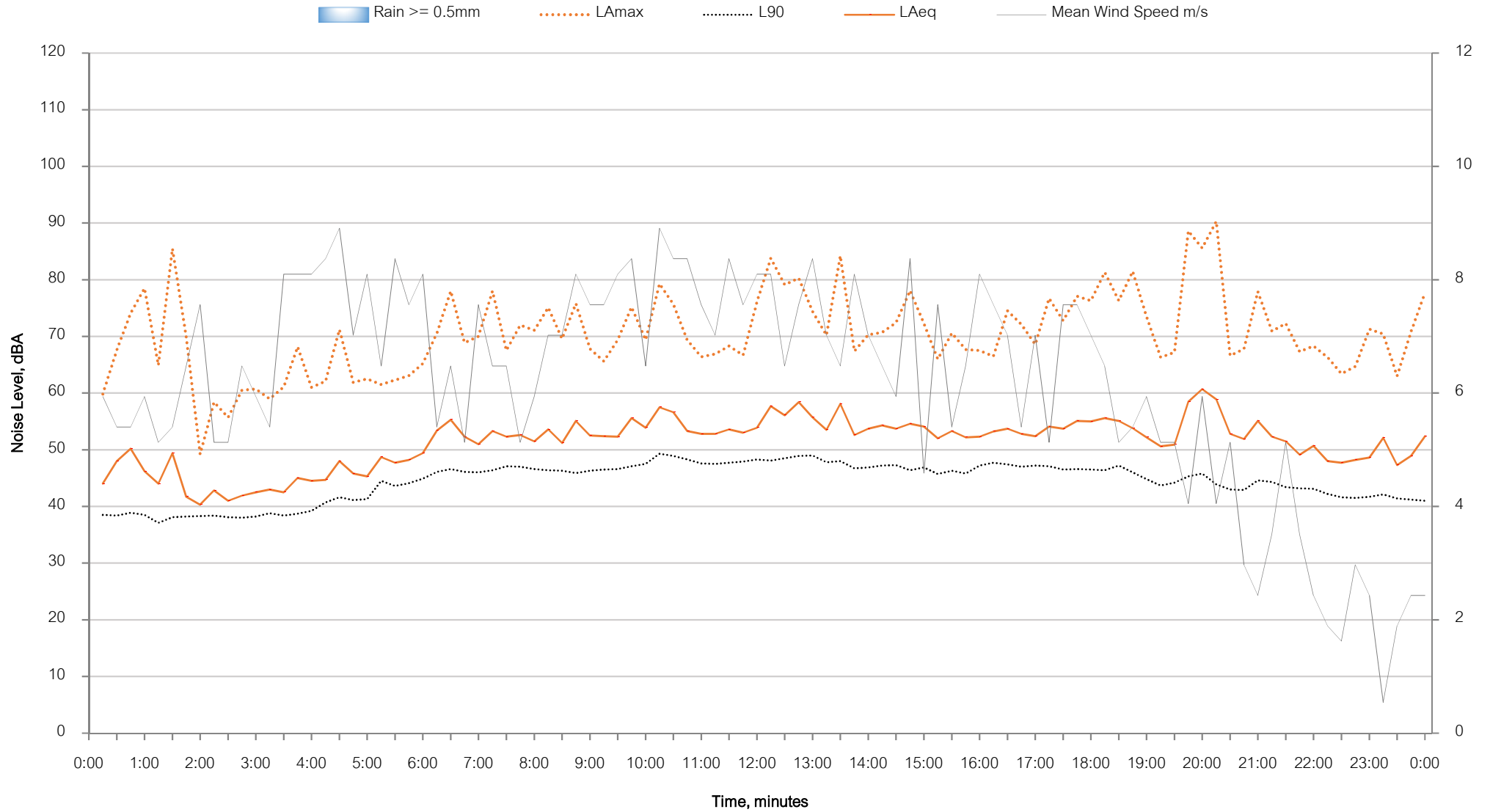
Background Noise Levels

Logger 2 - 21 Catherine Crescent, Rooty Hill - Friday 13 October 2017



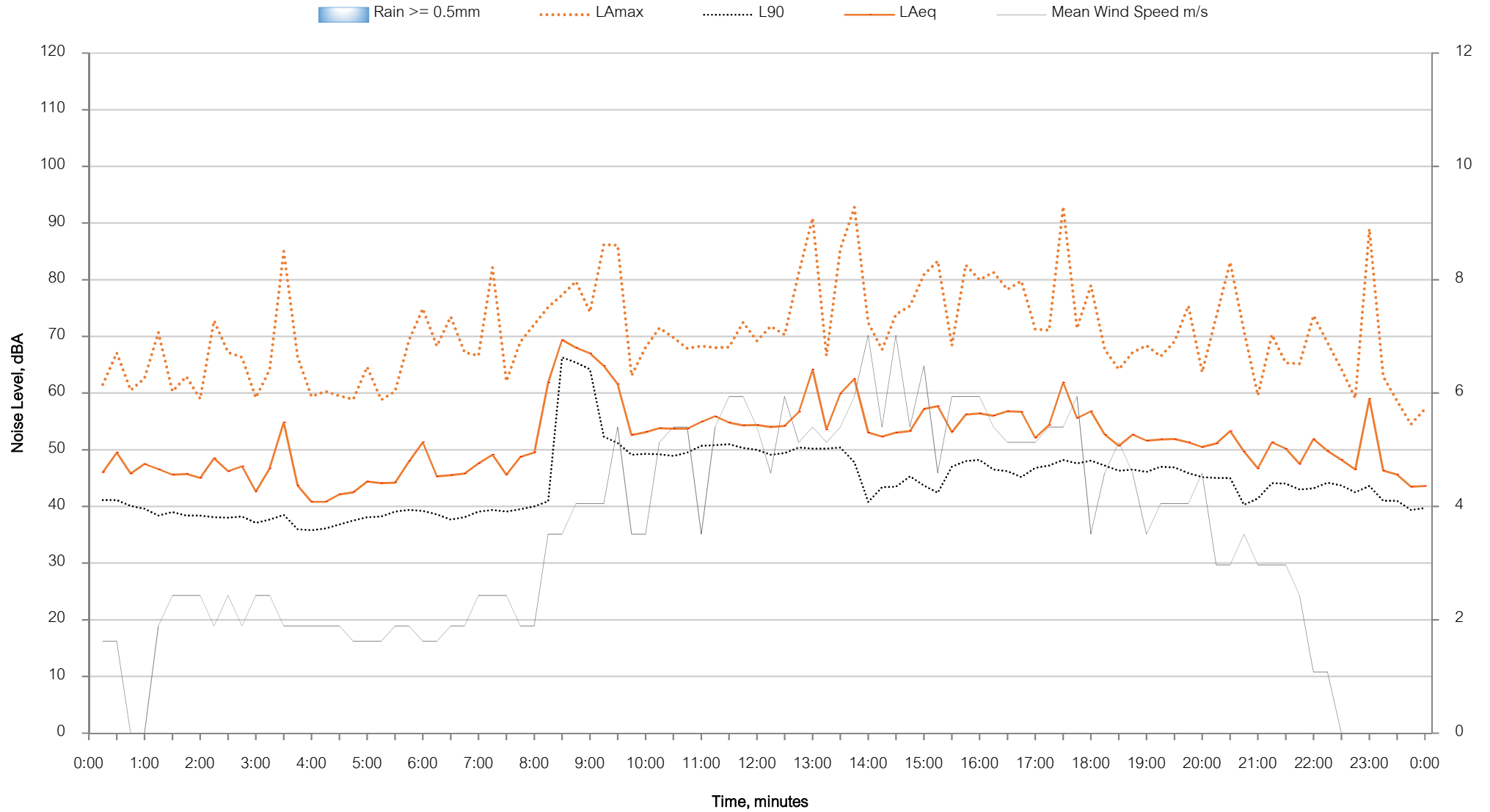
Background Noise Levels

Logger 2 - 21 Catherine Crescent, Rooty Hill - Saturday 14 October 2017



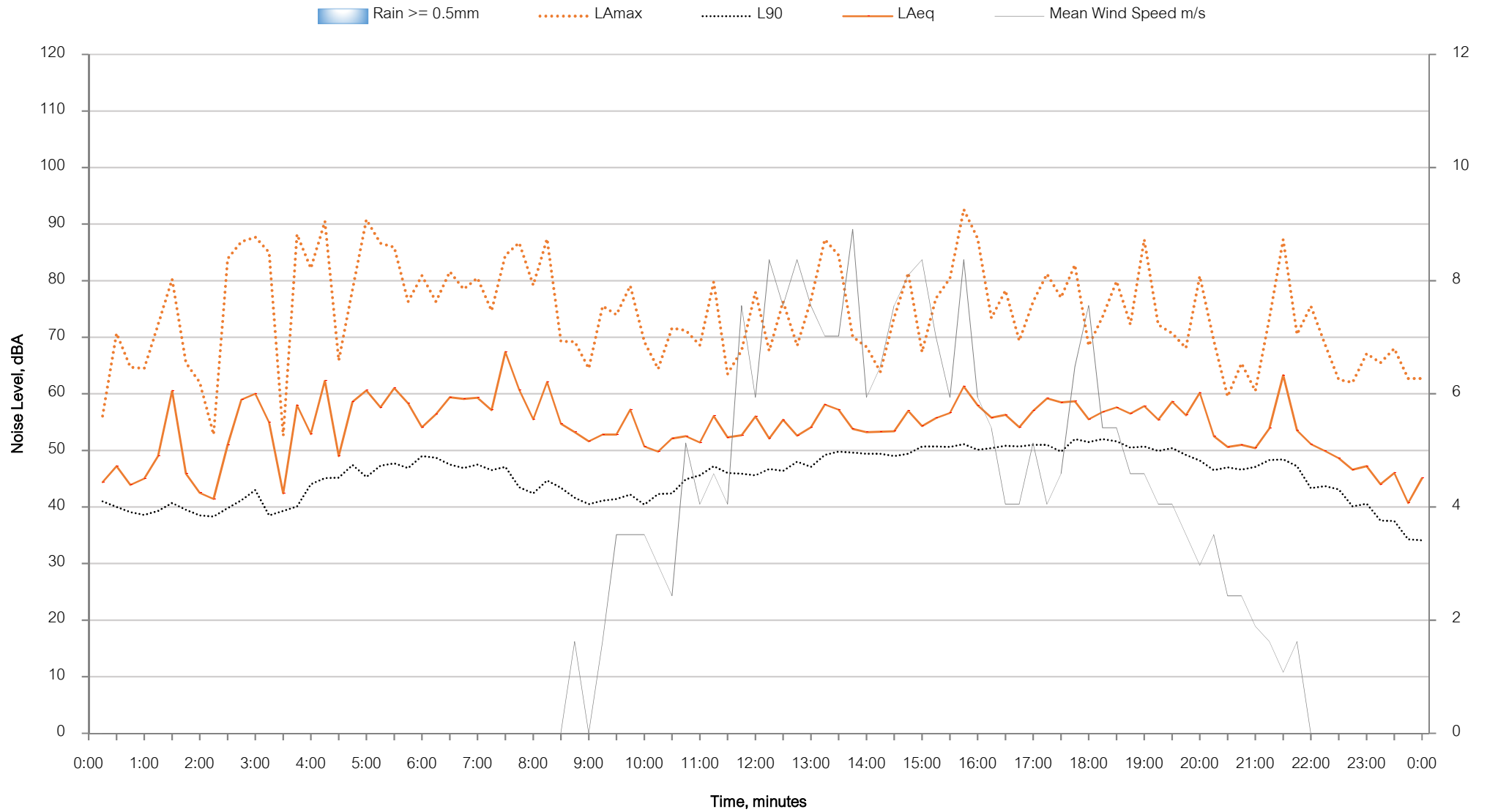
Background Noise Levels

Logger 2 - 21 Catherine Crescent, Rooty Hill - Sunday 15 October 2017



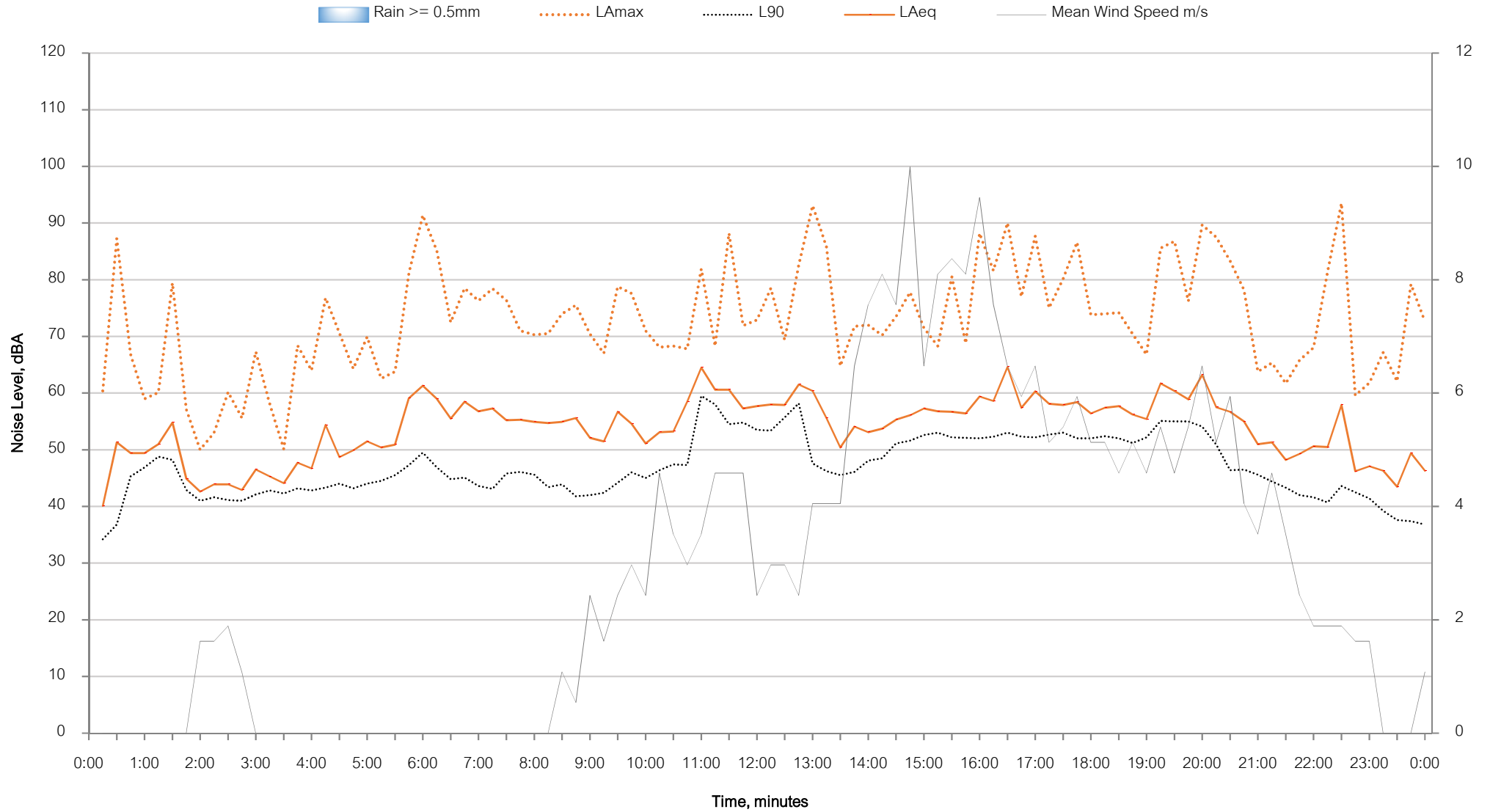
Background Noise Levels

Logger 2 - 21 Catherine Crescent, Rooty Hill - Monday 16 October 2017



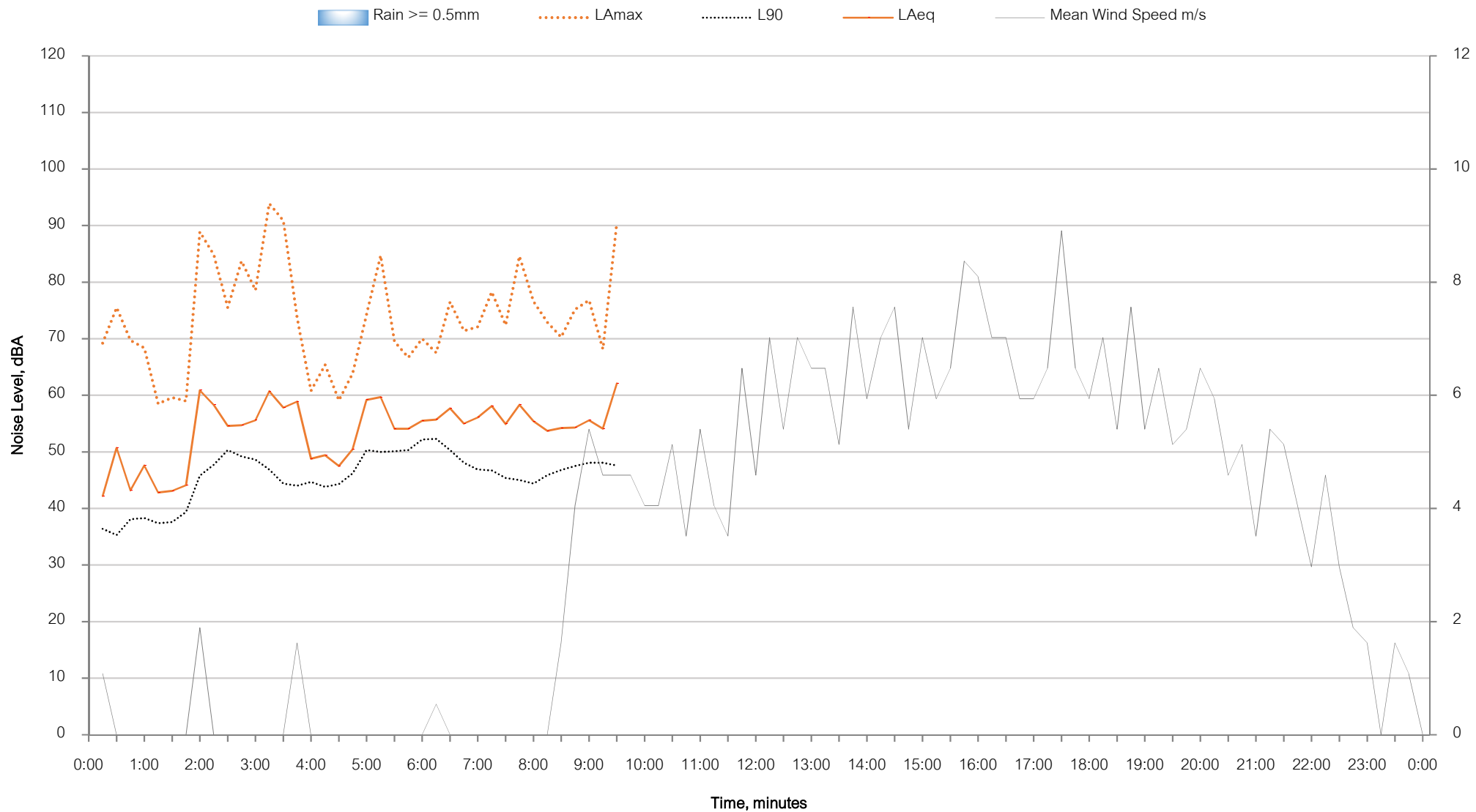
Background Noise Levels

Logger 2 - 21 Catherine Crescent, Rooty Hill - Tuesday 17 October 2017



Background Noise Levels

Logger 2 - 21 Catherine Crescent, Rooty Hill - Wednesday 18 October 2017



Appendix D – Predicted Noise Levels and Mitigation Measures

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Construction Scenario 1A
Station Upgrade - Enabling Works

Name	Type	Description	Height	PNL	RBL			Criteria			Compliance SC1A			PNL - RBL SC1A			Mitigation Measures SC1A		
				SC1A	Std	OOH		Std	OOH Period 1	OOH Period 2	Std	OOH Period 1	OOH Period 2	Std	OOH Period 1	OOH Period 2	Std	OOH Period 1	OOH Period 2
						Period 1	Period 2												
N01	Residential	Rooty Hill Lodge (Motel)	1.5	50	45	45	38	55	50	43	Yes	No	No	5	5	12	-	-	M, LB, RO2
N01-1	Residential	Rooty Hill Lodge (Motel)	4.5	50	45	45	38	55	50	43	Yes	No	No	5	5	12	-	-	M, LB, RO2
N02	Residential	138 Harrington St	1.5	41	45	45	38	55	50	43	Yes	Yes	Yes	-4	-4	3	-	-	LB
N03	Residential	20 Station St	1.5	48	45	45	38	55	50	43	Yes	Yes	No	3	3	10	-	-	LB
N04	Residential	22 Station St	1.5	48	45	45	38	55	50	43	Yes	Yes	No	3	3	10	-	-	LB
N05	Residential	24 Station St	1.5	47	45	45	38	55	50	43	Yes	Yes	No	2	2	9	-	-	LB
N06	Residential	26 Station St	1.5	47	45	45	38	55	50	43	Yes	Yes	No	2	2	9	-	-	LB
N07	Residential	28 Station St	1.5	46	45	45	38	55	50	43	Yes	Yes	No	1	1	8	-	-	LB
NC01	Commercial	Rooty Hill Rd North Commercial	1.5	55	--	--	--	70	70	70	Yes	Yes	Yes	-15	-15	-15	-	-	-
NC02	Commercial	Imperial Hotel	1.5	57	--	--	--	70	70	70	Yes	Yes	Yes	-13	-13	-13	-	-	-
NC03	Commercial	Rooty Hill Rd North Commercial	1.5	54	--	--	--	70	70	70	Yes	Yes	Yes	-16	-16	-16	-	-	-
NC04	Commercial	Rooty Hill Rd North Commercial	1.5	53	--	--	--	70	70	70	Yes	Yes	Yes	-17	-17	-17	-	-	-
NC05	Commercial	Rooty Hill Rd North Commercial	1.5	51	--	--	--	70	70	70	Yes	Yes	Yes	-19	-19	-19	-	-	-
NC06	Commercial	Rooty Hill Rd North Commercial	1.5	51	--	--	--	70	70	70	Yes	Yes	Yes	-19	-19	-19	-	-	-
N-IND1	Industrial	Council Workshop Offices	1.5	54	--	--	--	75	75	75	Yes	Yes	Yes	-21	-21	-21	-	-	-
N-IND2	Industrial	Council Workshop/ Depot	1.5	53	--	--	--	75	75	75	Yes	Yes	Yes	-22	-22	-22	-	-	-
NW01	Commercial	92-96 North Pde Mix Res/Comm	1.5	55	--	--	--	70	70	70	Yes	Yes	Yes	-15	-15	-15	-	-	-
NW01-1	Residential	92-96 North Pde Mix Res/Comm	4.5	55	45	45	38	55	50	43	No	No	No	10	10	17	-	-	M, LB, RO2
NW02	Residential	90 North Pde	1.5	54	45	45	38	55	50	43	Yes	No	No	9	9	16	-	-	M, LB, RO2
NW03	Residential	88North Pde	1.5	53	45	45	38	55	50	43	Yes	No	No	8	8	15	-	-	M, LB, RO2
NW04	Residential	86 North Pde	1.5	52	45	45	38	55	50	43	Yes	No	No	7	7	14	-	-	M, LB, RO2
NW05	Residential	84 North Pde	1.5	52	45	45	38	55	50	43	Yes	No	No	7	7	14	-	-	M, LB, RO2
NW6	Residential	3a Perkins St Residential	1.5	45	45	45	38	55	50	43	Yes	Yes	No	0	0	7	-	-	LB
NW7	Residential	3b Perkins St Residential	1.5	46	45	45	38	55	50	43	Yes	Yes	No	1	1	8	-	-	LB
NW8	Residential	3c Perkins St Residential	1.5	47	45	45	38	55	50	43	Yes	Yes	No	2	2	9	-	-	LB
NW9	Residential	3d Perkins St Residential	1.5	47	45	45	38	55	50	43	Yes	Yes	No	2	2	9	-	-	LB
S02	Residential	30 Artonish Lane	1.5	49	42	42	37	52	47	42	Yes	No	No	7	7	12	-	-	M, LB, RO2
S03	Residential	28 Artonish Lane	1.5	49	42	42	37	52	47	42	Yes	No	No	7	7	12	-	-	M, LB, RO2
S04	Residential	26 Artonish Lane	1.5	49	42	42	37	52	47	42	Yes	No	No	7	7	12	-	-	M, LB, RO2
S05	Residential	24 Artonish Lane	1.5	48	42	42	37	52	47	42	Yes	No	No	6	6	11	-	-	M, LB, RO2
S06	Residential	22 Artonish Lane	1.5	47	42	42	37	52	47	42	Yes	No	No	5	5	10	-	-	LB
S07	Residential	9 Beames Ave	1.5	60	42	42	37	52	47	42	No	No	No	18	18	23	-	LB	M, IB, LB, PC, SN, RO2
S08	Residential	11 Beames Ave	1.5	58	42	42	37	52	47	42	No	No	No	16	16	21	-	LB	M, IB, LB, PC, SN, RO2
S09	Residential	35 Catherine St	1.5	54	42	42	37	52	47	42	No	No	No	12	12	17	-	LB	M, LB, RO2
S10	Residential	33 Catherine St	1.5	49	42	42	37	52	47	42	Yes	No	No	7	7	12	-	-	M, LB, RO2
S11	Residential	31 Catherine St	1.5	44	42	42	37	52	47	42	Yes	Yes	No	2	2	7	-	-	LB
S12	Residential	29 Catherine St	1.5	46	42	42	37	52	47	42	Yes	Yes	No	4	4	9	-	-	LB
S13	Residential	27 Catherine St	1.5	45	42	42	37	52	47	42	Yes	Yes	No	3	3	8	-	-	LB
S14	Residential	25 Catherine St	1.5	46	42	42	37	52	47	42	Yes	Yes	No	4	4	9	-	-	LB
S15	Residential	23 Catherine St	1.5	46	42	42	37	52	47	42	Yes	Yes	No	4	4	9	-	-	LB
S16	Residential	21 Catherine St	1.5	45	42	42	37	52	47	42	Yes	Yes	No	3	3	8	-	-	LB
S17	Residential	2 Mavis St	1.5	49	42	42	37	52	47	42	Yes	No	No	7	7	12	-	-	M, LB, RO2
S18	Residential	6 Mavis St	1.5	48	42	42	37	52	47	42	Yes	No	No	6	6	11	-	-	M, LB, RO2
S19	Residential	8 Mavis St	1.5	49	42	42	37	52	47	42	Yes	No	No	7	7	12	-	-	M, LB, RO2
S20	Residential	10 Mavis St	1.5	51	42	42	37	52	47	42	Yes	No	No	9	9	14	-	-	M, LB, RO2
S21	Residential	12 Mavis St	1.5	50	42	42	37	52	47	42	Yes	No	No	8	8	13	-	-	M, LB, RO2
S22	Residential	14 Mavis St	1.5	52	42	42	37	52	47	42	No	No	No	10	10	15	-	-	M, LB, RO2
S23	Residential	16 Mavis St	1.5	52	42	42	37	52	47	42	No	No	No	10	10	15	-	-	M, LB, RO2
S24_Art	School	Rooty Hill School of Arts	1.5	52	42	42	37	52	47	42	No	No	No	10	10	15	-	-	M, LB, RO2
S-AR1	Active Recreation	Sports Field Rooty Hill South	1.5	56	42	42	37	52	47	42	No	No	No	14	14	19	-	LB	M, LB, RO2
SC01	Commercial	Rooty Hill Rd South Commercial	1.5	69	--	--	--	70	70	70	Yes	Yes	Yes	-1	-1	-1	-	-	-
SC02	Commercial	Rooty Hill Rd South Commercial	1.5	63	--	--	--	70	70	70	Yes	Yes	Yes	-7	-7	-7	-	-	-
SC03	Commercial	Rooty Hill Rd South Commercial	1.5	56	--	--	--	70	70	70	Yes	Yes	Yes	-14	-14	-14	-	-	-
SC04	Residential	Lone Pine Tavern	1.5	55	--	--	--	70	70	70	Yes	Yes	Yes	-15	-15	-15	-	-	-
XS01A	Residential	Future Aged Care	1.5	64	42	42	37	52	47	42	No	No	No	22	22	27	LB, M	M, LB	M, IB, LB, PC, SN, RO2
XS01B	Residential	Future Aged Care East	1.5	59	42	42	37	52	47	42	No	No	No	17	17	22	-	LB	M, IB, LB, PC, SN, RO2

Construction Scenario 1B
Station Upgrade - Demolition

Name	Type	Description	Height	PNL	RBL			Criteria			Compliance SC1B			PNL - RBL SC1B			Mitigation Measures SC1B		
				SC1B	Std	OOH		Std	OOH Period 1	OOH Period 2	Std	OOH Period 1	OOH Period 2	Std	OOH Period 1	OOH Period 2	Std	OOH Period 1	OOH Period 2
						Period 1	Period 2												
N01	Residential	Rooty Hill Lodge (Motel)	1.5	64	45	45	38	55	50	43	No	No	No	19	19	26	-	LB	M, IB, LB, PC, SN, RO2
N01-1	Residential	Rooty Hill Lodge (Motel)	4.5	64	45	45	38	55	50	43	No	No	No	19	19	26	-	LB	M, IB, LB, PC, SN, RO2
N02	Residential	138 Harrington St	1.5	54	45	45	38	55	50	43	Yes	No	No	9	9	16	-	-	M, LB, RO2
N03	Residential	20 Station St	1.5	63	45	45	38	55	50	43	No	No	No	18	18	25	-	LB	M, IB, LB, PC, SN, RO2
N04	Residential	22 Station St	1.5	62	45	45	38	55	50	43	No	No	No	17	17	24	-	LB	M, IB, LB, PC, SN, RO2
N05	Residential	24 Station St	1.5	62	45	45	38	55	50	43	No	No	No	17	17	24	-	LB	M, IB, LB, PC, SN, RO2
N06	Residential	26 Station St	1.5	61	45	45	38	55	50	43	No	No	No	16	16	23	-	LB	M, IB, LB, PC, SN, RO2
N07	Residential	28 Station St	1.5	61	45	45	38	55	50	43	No	No	No	16	16	23	-	LB	M, IB, LB, PC, SN, RO2
NC01	Commercial	Rooty Hill Rd North Commercial	1.5	69	--	--	--	70	70	70	Yes	Yes	Yes	-1	-1	-1	-	-	-
NC02	Commercial	Imperial Hotel	1.5	68	--	--	--	70	70	70	Yes	Yes	Yes	-2	-2	-2	-	-	-
NC03	Commercial	Rooty Hill Rd North Commercial	1.5	65	--	--	--	70	70	70	Yes	Yes	Yes	-5	-5	-5	-	-	-
NC04	Commercial	Rooty Hill Rd North Commercial	1.5	65	--	--	--	70	70	70	Yes	Yes	Yes	-5	-5	-5	-	-	-
NC05	Commercial	Rooty Hill Rd North Commercial	1.5	62	--	--	--	70	70	70	Yes	Yes	Yes	-8	-8	-8	-	-	-
NC06	Commercial	Rooty Hill Rd North Commercial	1.5	61	--	--	--	70	70	70	Yes	Yes	Yes	-9	-9	-9	-	-	-
N-IND1	Industrial	Council Workshop Offices	1.5	69	--	--	--	75	75	75	Yes	Yes	Yes	-6	-6	-6	-	-	-
N-IND2	Industrial	Council Workshop/ Depot	1.5	69	--	--	--	75	75	75	Yes	Yes	Yes	-6	-6	-6	-	-	-
NW01	Commercial	92-96 North Pde Mix Res/Comm	1.5	67	--	--	--	70	70	70	Yes	Yes	Yes	-3	-3	-3	-	-	-
NW01-1	Residential	92-96 North Pde Mix Res/Comm	4.5	68	45	45	38	55	50	43	No	No	No	23	23	30	LB, M	M, LB	M, IB, LB, PC, SN, RO2
NW02	Residential	90 North Pde	1.5	65	45	45	38	55	50	43	No	No	No	20	20	27	-	LB	M, IB, LB, PC, SN, RO2
NW03	Residential	88North Pde	1.5	62	45	45	38	55	50	43	No	No	No	17	17	24	-	LB	M, IB, LB, PC, SN, RO2
NW04	Residential	86 North Pde	1.5	61	45	45	38	55	50	43	No	No	No	16	16	23	-	LB	M, IB, LB, PC, SN, RO2
NW05	Residential	84 North Pde	1.5	61	45	45	38	55	50	43	No	No	No	16	16	23	-	LB	M, IB, LB, PC, SN, RO2
NW6	Residential	3a Perkins St Residential	1.5	57	45	45	38	55	50	43	No	No	No	12	12	19	-	LB	M, LB, RO2
NW7	Residential	3b Perkins St Residential	1.5	57	45	45	38	55	50	43	No	No	No	12	12	19	-	LB	M, LB, RO2
NW8	Residential	3c Perkins St Residential	1.5	57	45	45	38	55	50	43	No	No	No	12	12	19	-	LB	M, LB, RO2
NW9	Residential	3d Perkins St Residential	1.5	57	45	45	38	55	50	43	No	No	No	12	12	19	-	LB	M, LB, RO2
S02	Residential	30 Artonish Lane	1.5	57	42	42	37	52	47	42	No	No	No	15	15	20	-	LB	M, LB, RO2
S03	Residential	28 Artonish Lane	1.5	58	42	42	37	52	47	42	No	No	No	16	16	21	-	LB	M, IB, LB, PC, SN, RO2
S04	Residential	26 Artonish Lane	1.5	56	42	42	37	52	47	42	No	No	No	14	14	19	-	LB	M, LB, RO2
S05	Residential	24 Artonish Lane	1.5	55	42	42	37	52	47	42	No	No	No	13	13	18	-	LB	M, LB, RO2
S06	Residential	22 Artonish Lane	1.5	55	42	42	37	52	47	42	No	No	No	13	13	18	-	LB	M, LB, RO2
S07	Residential	9 Beames Ave	1.5	64	42	42	37	52	47	42	No	No	No	22	22	27	LB, M	M, LB	M, IB, LB, PC, SN, RO2
S08	Residential	11 Beames Ave	1.5	64	42	42	37	52	47	42	No	No	No	22	22	27	LB, M	M, LB	M, IB, LB, PC, SN, RO2
S09	Residential	35 Catherine St	1.5	64	42	42	37	52	47	42	No	No	No	22	22	27	LB, M	M, LB	M, IB, LB, PC, SN, RO2
S10	Residential	33 Catherine St	1.5	61	42	42	37	52	47	42	No	No	No	19	19	24	-	LB	M, IB, LB, PC, SN, RO2
S11	Residential	31 Catherine St	1.5	58	42	42	37	52	47	42	No	No	No	16	16	21	-	LB	M, IB, LB, PC, SN, RO2
S12	Residential	29 Catherine St	1.5	58	42	42	37	52	47	42	No	No	No	16	16	21	-	LB	M, IB, LB, PC, SN, RO2
S13	Residential	27 Catherine St	1.5	56	42	42	37	52	47	42	No	No	No	14	14	19	-	LB	M, LB, RO2
S14	Residential	25 Catherine St	1.5	55	42	42	37	52	47	42	No	No	No	13	13	18	-	LB	M, LB, RO2
S15	Residential	23 Catherine St	1.5	56	42	42	37	52	47	42	No	No	No	14	14	19	-	LB	M, LB, RO2
S16	Residential	21 Catherine St	1.5	56	42	42	37	52	47	42	No	No	No	14	14	19	-	LB	M, LB, RO2
S17	Residential	2 Mavis St	1.5	61	42	42	37	52	47	42	No	No	No	19	19	24	-	LB	M, IB, LB, PC, SN, RO2
S18	Residential	6 Mavis St	1.5	61	42	42	37	52	47	42	No	No	No	19	19	24	-	LB	M, IB, LB, PC, SN, RO2
S19	Residential	8 Mavis St	1.5	61	42	42	37	52	47	42	No	No	No	19	19	24	-	LB	M, IB, LB, PC, SN, RO2
S20	Residential	10 Mavis St	1.5	61	42	42	37	52	47	42	No	No	No	19	19	24	-	LB	M, IB, LB, PC, SN, RO2
S21	Residential	12 Mavis St	1.5	61	42	42	37	52	47	42	No	No	No	19	19	24	-	LB	M, IB, LB, PC, SN, RO2
S22	Residential	14 Mavis St	1.5	61	42	42	37	52	47	42	No	No	No	19	19	24	-	LB	M, IB, LB, PC, SN, RO2
S23	Residential	16 Mavis St	1.5	60	42	42	37	52	47	42	No	No	No	18	18	23	-	LB	M, IB, LB, PC, SN, RO2
S24_Art	School	Rooty Hill School of Arts	1.5	60	42	42	37	52	47	42	No	No	No	18	18	23	-	LB	M, IB, LB, PC, SN, RO2
S-AR1	Active Recreation	Sports Field Rooty Hill South	1.5	61	42	42	37	52	47	42	No	No	No	19	19	24	-	LB	M, IB, LB, PC, SN, RO2
SC01	Commercial	Rooty Hill Rd South Commercial	1.5	66	--	--	--	70	70	70	Yes	Yes	Yes	-4	-4	-4	-	-	-
SC02	Commercial	Rooty Hill Rd South Commercial	1.5	62	--	--	--	70	70	70	Yes	Yes	Yes	-8	-8	-8	-	-	-
SC03	Commercial	Rooty Hill Rd South Commercial	1.5	61	--	--	--	70	70	70	Yes	Yes	Yes	-9	-9	-9	-	-	-
SC04	Residential	Lone Pine Tavern	1.5	65	--	--	--	70	70	70	Yes	Yes	Yes	-5	-5	-5	-	-	-
XS01A	Residential	Future Aged Care	1.5	72	42	42	37	52	47	42	No	No	No	30	30	35	LB, M	M, LB	AA, M, IB, LB, PC, SN, RO
XS01B	Residential	Future Aged Care East	1.5	70	42	42	37	52	47	42	No	No	No	28	28	33	LB, M	M, LB	AA, M, IB, LB, PC, SN, RO

Construction Scenario 1C
Station Upgrade - Main Works

Name	Type	Description	Height	PNL	RBL			Criteria			Compliance SC1C			PNL - RBL SC1C			Mitigation Measures SC1C		
				SC1C	Std	OOH		Std	OOH Period 1	OOH Period 2	Std	OOH Period 1	OOH Period 2	Std	OOH Period 1	OOH Period 2	Std	OOH Period 1	OOH Period 2
						Period 1	Period 2												
N01	Residential	Rooty Hill Lodge (Motel)	1.5	56	45	45	38	55	50	43	No	No	No	11	11	18	-	LB	M, LB, RO2
N01-1	Residential	Rooty Hill Lodge (Motel)	4.5	57	45	45	38	55	50	43	No	No	No	12	12	19	-	LB	M, LB, RO2
N02	Residential	138 Harrington St	1.5	47	45	45	38	55	50	43	Yes	Yes	No	2	2	9	-	-	LB
N03	Residential	20 Station St	1.5	55	45	45	38	55	50	43	No	No	No	10	10	17	-	-	M, LB, RO2
N04	Residential	22 Station St	1.5	54	45	45	38	55	50	43	Yes	No	No	9	9	16	-	-	M, LB, RO2
N05	Residential	24 Station St	1.5	54	45	45	38	55	50	43	Yes	No	No	9	9	16	-	-	M, LB, RO2
N06	Residential	26 Station St	1.5	53	45	45	38	55	50	43	Yes	No	No	8	8	15	-	-	M, LB, RO2
N07	Residential	28 Station St	1.5	53	45	45	38	55	50	43	Yes	No	No	8	8	15	-	-	M, LB, RO2
NC01	Commercial	Rooty Hill Rd North Commercial	1.5	62	--	--	--	70	70	70	Yes	Yes	Yes	-8	-8	-8	-	-	-
NC02	Commercial	Imperial Hotel	1.5	62	--	--	--	70	70	70	Yes	Yes	Yes	-8	-8	-8	-	-	-
NC03	Commercial	Rooty Hill Rd North Commercial	1.5	58	--	--	--	70	70	70	Yes	Yes	Yes	-12	-12	-12	-	-	-
NC04	Commercial	Rooty Hill Rd North Commercial	1.5	58	--	--	--	70	70	70	Yes	Yes	Yes	-12	-12	-12	-	-	-
NC05	Commercial	Rooty Hill Rd North Commercial	1.5	55	--	--	--	70	70	70	Yes	Yes	Yes	-15	-15	-15	-	-	-
NC06	Commercial	Rooty Hill Rd North Commercial	1.5	54	--	--	--	70	70	70	Yes	Yes	Yes	-16	-16	-16	-	-	-
N-IND1	Industrial	Council Workshop Offices	1.5	61	--	--	--	75	75	75	Yes	Yes	Yes	-14	-14	-14	-	-	-
N-IND2	Industrial	Council Workshop/ Depot	1.5	62	--	--	--	75	75	75	Yes	Yes	Yes	-13	-13	-13	-	-	-
NW01	Commercial	92-96 North Pde Mix Res/Comm	1.5	61	--	--	--	70	70	70	Yes	Yes	Yes	-9	-9	-9	-	-	-
NW01-1	Residential	92-96 North Pde Mix Res/Comm	4.5	61	45	45	38	55	50	43	No	No	No	16	16	23	-	LB	M, IB, LB, PC, SN, RO2
NW02	Residential	90 North Pde	1.5	59	45	45	38	55	50	43	No	No	No	14	14	21	-	LB	M, IB, LB, PC, SN, RO2
NW03	Residential	88North Pde	1.5	56	45	45	38	55	50	43	No	No	No	11	11	18	-	LB	M, LB, RO2
NW04	Residential	86 North Pde	1.5	55	45	45	38	55	50	43	No	No	No	10	10	17	-	-	M, LB, RO2
NW05	Residential	84 North Pde	1.5	54	45	45	38	55	50	43	Yes	No	No	9	9	16	-	-	M, LB, RO2
NW6	Residential	3a Perkins St Residential	1.5	50	45	45	38	55	50	43	Yes	No	No	5	5	12	-	-	M, LB, RO2
NW7	Residential	3b Perkins St Residential	1.5	50	45	45	38	55	50	43	Yes	No	No	5	5	12	-	-	M, LB, RO2
NW8	Residential	3c Perkins St Residential	1.5	50	45	45	38	55	50	43	Yes	No	No	5	5	12	-	-	M, LB, RO2
NW9	Residential	3d Perkins St Residential	1.5	50	45	45	38	55	50	43	Yes	No	No	5	5	12	-	-	M, LB, RO2
S02	Residential	30 Artonish Lane	1.5	51	42	42	37	52	47	42	Yes	No	No	9	9	14	-	-	M, LB, RO2
S03	Residential	28 Artonish Lane	1.5	51	42	42	37	52	47	42	Yes	No	No	9	9	14	-	-	M, LB, RO2
S04	Residential	26 Artonish Lane	1.5	49	42	42	37	52	47	42	Yes	No	No	7	7	12	-	-	M, LB, RO2
S05	Residential	24 Artonish Lane	1.5	48	42	42	37	52	47	42	Yes	No	No	6	6	11	-	-	M, LB, RO2
S06	Residential	22 Artonish Lane	1.5	48	42	42	37	52	47	42	Yes	No	No	6	6	11	-	-	M, LB, RO2
S07	Residential	9 Beames Ave	1.5	58	42	42	37	52	47	42	No	No	No	16	16	21	-	LB	M, IB, LB, PC, SN, RO2
S08	Residential	11 Beames Ave	1.5	58	42	42	37	52	47	42	No	No	No	16	16	21	-	LB	M, IB, LB, PC, SN, RO2
S09	Residential	35 Catherine St	1.5	57	42	42	37	52	47	42	No	No	No	15	15	20	-	LB	M, LB, RO2
S10	Residential	33 Catherine St	1.5	55	42	42	37	52	47	42	No	No	No	13	13	18	-	LB	M, LB, RO2
S11	Residential	31 Catherine St	1.5	52	42	42	37	52	47	42	No	No	No	10	10	15	-	-	M, LB, RO2
S12	Residential	29 Catherine St	1.5	50	42	42	37	52	47	42	Yes	No	No	8	8	13	-	-	M, LB, RO2
S13	Residential	27 Catherine St	1.5	50	42	42	37	52	47	42	Yes	No	No	8	8	13	-	-	M, LB, RO2
S14	Residential	25 Catherine St	1.5	49	42	42	37	52	47	42	Yes	No	No	7	7	12	-	-	M, LB, RO2
S15	Residential	23 Catherine St	1.5	49	42	42	37	52	47	42	Yes	No	No	7	7	12	-	-	M, LB, RO2
S16	Residential	21 Catherine St	1.5	49	42	42	37	52	47	42	Yes	No	No	7	7	12	-	-	M, LB, RO2
S17	Residential	2 Mavis St	1.5	54	42	42	37	52	47	42	No	No	No	12	12	17	-	LB	M, LB, RO2
S18	Residential	6 Mavis St	1.5	55	42	42	37	52	47	42	No	No	No	13	13	18	-	LB	M, LB, RO2
S19	Residential	8 Mavis St	1.5	54	42	42	37	52	47	42	No	No	No	12	12	17	-	LB	M, LB, RO2
S20	Residential	10 Mavis St	1.5	54	42	42	37	52	47	42	No	No	No	12	12	17	-	LB	M, LB, RO2
S21	Residential	12 Mavis St	1.5	54	42	42	37	52	47	42	No	No	No	12	12	17	-	LB	M, LB, RO2
S22	Residential	14 Mavis St	1.5	54	42	42	37	52	47	42	No	No	No	12	12	17	-	LB	M, LB, RO2
S23	Residential	16 Mavis St	1.5	54	42	42	37	52	47	42	No	No	No	12	12	17	-	LB	M, LB, RO2
S24_Art	School	Rooty Hill School of Arts	1.5	53	42	42	37	52	47	42	No	No	No	11	11	16	-	LB	M, LB, RO2
S-AR1	Active Recreation	Sports Field Rooty Hill South	1.5	55	42	42	37	52	47	42	No	No	No	13	13	18	-	LB	M, LB, RO2
SC01	Commercial	Rooty Hill Rd South Commercial	1.5	59	--	--	--	70	70	70	Yes	Yes	Yes	-11	-11	-11	-	-	-
SC02	Commercial	Rooty Hill Rd South Commercial	1.5	55	--	--	--	70	70	70	Yes	Yes	Yes	-15	-15	-15	-	-	-
SC03	Commercial	Rooty Hill Rd South Commercial	1.5	54	--	--	--	70	70	70	Yes	Yes	Yes	-16	-16	-16	-	-	-
SC04	Residential	Lone Pine Tavern	1.5	57	--	--	--	70	70	70	Yes	Yes	Yes	-13	-13	-13	-	-	-
XS01A	Residential	Future Aged Care	1.5	65	42	42	37	52	47	42	No	No	No	23	23	28	LB, M	M, LB	M, IB, LB, PC, SN, RO2
XS01B	Residential	Future Aged Care East	1.5	63	42	42	37	52	47	42	No	No	No	21	21	26	LB, M	M, LB	M, IB, LB, PC, SN, RO2

Construction Scenario 2
MSCP Upgrade - Main Works

Name	Type	Description	Height	PNL	RBL			Criteria			Compliance SC2			PNL - RBL SC2			Mitigation Measures SC2		
				SC2	Std	OOH		Std	OOH Period 1	OOH Period 2	Std	OOH Period 1	OOH Period 2	Std	OOH Period 1	OOH Period 2	Std	OOH Period 1	OOH Period 2
						Period 1	Period 2												
N01	Residential	Rooty Hill Lodge (Motel)	1.5	63	45	45	38	55	50	43	No	No	No	18	18	25	-	LB	M, IB, LB, PC, SN, RO2
N01-1	Residential	Rooty Hill Lodge (Motel)	4.5	63	45	45	38	55	50	43	No	No	No	18	18	25	-	LB	M, IB, LB, PC, SN, RO2
N02	Residential	138 Harrington St	1.5	49	45	45	38	55	50	43	Yes	Yes	No	4	4	11	-	-	M, LB, RO2
N03	Residential	20 Station St	1.5	61	45	45	38	55	50	43	No	No	No	16	16	23	-	LB	M, IB, LB, PC, SN, RO2
N04	Residential	22 Station St	1.5	60	45	45	38	55	50	43	No	No	No	15	15	22	-	LB	M, IB, LB, PC, SN, RO2
N05	Residential	24 Station St	1.5	59	45	45	38	55	50	43	No	No	No	14	14	21	-	LB	M, IB, LB, PC, SN, RO2
N06	Residential	26 Station St	1.5	59	45	45	38	55	50	43	No	No	No	14	14	21	-	LB	M, IB, LB, PC, SN, RO2
N07	Residential	28 Station St	1.5	58	45	45	38	55	50	43	No	No	No	13	13	20	-	LB	M, LB, RO2
NC01	Commercial	Rooty Hill Rd North Commercial	1.5	67	--	--	--	70	70	70	Yes	Yes	Yes	-3	-3	-3	-	-	-
NC02	Commercial	Imperial Hotel	1.5	63	--	--	--	70	70	70	Yes	Yes	Yes	-7	-7	-7	-	-	-
NC03	Commercial	Rooty Hill Rd North Commercial	1.5	53	--	--	--	70	70	70	Yes	Yes	Yes	-17	-17	-17	-	-	-
NC04	Commercial	Rooty Hill Rd North Commercial	1.5	55	--	--	--	70	70	70	Yes	Yes	Yes	-15	-15	-15	-	-	-
NC05	Commercial	Rooty Hill Rd North Commercial	1.5	53	--	--	--	70	70	70	Yes	Yes	Yes	-17	-17	-17	-	-	-
NC06	Commercial	Rooty Hill Rd North Commercial	1.5	53	--	--	--	70	70	70	Yes	Yes	Yes	-17	-17	-17	-	-	-
N-IND1	Industrial	Council Workshop Offices	1.5	72	--	--	--	75	75	75	Yes	Yes	Yes	-3	-3	-3	-	-	-
N-IND2	Industrial	Council Workshop/ Depot	1.5	72	--	--	--	75	75	75	Yes	Yes	Yes	-3	-3	-3	-	-	-
NW01	Commercial	92-96 North Pde Mix Res/Comm	1.5	55	--	--	--	70	70	70	Yes	Yes	Yes	-15	-15	-15	-	-	-
NW01-1	Residential	92-96 North Pde Mix Res/Comm	4.5	56	45	45	38	55	50	43	No	No	No	11	11	18	-	LB	M, LB, RO2
NW02	Residential	90 North Pde	1.5	50	45	45	38	55	50	43	Yes	No	No	5	5	12	-	-	M, LB, RO2
NW03	Residential	88North Pde	1.5	48	45	45	38	55	50	43	Yes	Yes	No	3	3	10	-	-	LB
NW04	Residential	86 North Pde	1.5	48	45	45	38	55	50	43	Yes	Yes	No	3	3	10	-	-	LB
NW05	Residential	84 North Pde	1.5	49	45	45	38	55	50	43	Yes	Yes	No	4	4	11	-	-	M, LB, RO2
NW6	Residential	3a Perkins St Residential	1.5	49	45	45	38	55	50	43	Yes	Yes	No	4	4	11	-	-	M, LB, RO2
NW7	Residential	3b Perkins St Residential	1.5	49	45	45	38	55	50	43	Yes	Yes	No	4	4	11	-	-	M, LB, RO2
NW8	Residential	3c Perkins St Residential	1.5	49	45	45	38	55	50	43	Yes	Yes	No	4	4	11	-	-	M, LB, RO2
NW9	Residential	3d Perkins St Residential	1.5	48	45	45	38	55	50	43	Yes	Yes	No	3	3	10	-	-	LB
S02	Residential	30 Artonish Lane	1.5	49	42	42	37	52	47	42	Yes	No	No	7	7	12	-	-	M, LB, RO2
S03	Residential	28 Artonish Lane	1.5	49	42	42	37	52	47	42	Yes	No	No	7	7	12	-	-	M, LB, RO2
S04	Residential	26 Artonish Lane	1.5	49	42	42	37	52	47	42	Yes	No	No	7	7	12	-	-	M, LB, RO2
S05	Residential	24 Artonish Lane	1.5	49	42	42	37	52	47	42	Yes	No	No	7	7	12	-	-	M, LB, RO2
S06	Residential	22 Artonish Lane	1.5	48	42	42	37	52	47	42	Yes	No	No	6	6	11	-	-	M, LB, RO2
S07	Residential	9 Beames Ave	1.5	54	42	42	37	52	47	42	No	No	No	12	12	17	-	LB	M, LB, RO2
S08	Residential	11 Beames Ave	1.5	54	42	42	37	52	47	42	No	No	No	12	12	17	-	LB	M, LB, RO2
S09	Residential	35 Catherine St	1.5	53	42	42	37	52	47	42	No	No	No	11	11	16	-	LB	M, LB, RO2
S10	Residential	33 Catherine St	1.5	52	42	42	37	52	47	42	No	No	No	10	10	15	-	-	M, LB, RO2
S11	Residential	31 Catherine St	1.5	50	42	42	37	52	47	42	Yes	No	No	8	8	13	-	-	M, LB, RO2
S12	Residential	29 Catherine St	1.5	51	42	42	37	52	47	42	Yes	No	No	9	9	14	-	-	M, LB, RO2
S13	Residential	27 Catherine St	1.5	51	42	42	37	52	47	42	Yes	No	No	9	9	14	-	-	M, LB, RO2
S14	Residential	25 Catherine St	1.5	49	42	42	37	52	47	42	Yes	No	No	7	7	12	-	-	M, LB, RO2
S15	Residential	23 Catherine St	1.5	49	42	42	37	52	47	42	Yes	No	No	7	7	12	-	-	M, LB, RO2
S16	Residential	21 Catherine St	1.5	49	42	42	37	52	47	42	Yes	No	No	7	7	12	-	-	M, LB, RO2
S17	Residential	2 Mavis St	1.5	58	42	42	37	52	47	42	No	No	No	16	16	21	-	LB	M, IB, LB, PC, SN, RO2
S18	Residential	6 Mavis St	1.5	58	42	42	37	52	47	42	No	No	No	16	16	21	-	LB	M, IB, LB, PC, SN, RO2
S19	Residential	8 Mavis St	1.5	58	42	42	37	52	47	42	No	No	No	16	16	21	-	LB	M, IB, LB, PC, SN, RO2
S20	Residential	10 Mavis St	1.5	58	42	42	37	52	47	42	No	No	No	16	16	21	-	LB	M, IB, LB, PC, SN, RO2
S21	Residential	12 Mavis St	1.5	58	42	42	37	52	47	42	No	No	No	16	16	21	-	LB	M, IB, LB, PC, SN, RO2
S22	Residential	14 Mavis St	1.5	58	42	42	37	52	47	42	No	No	No	16	16	21	-	LB	M, IB, LB, PC, SN, RO2
S23	Residential	16 Mavis St	1.5	58	42	42	37	52	47	42	No	No	No	16	16	21	-	LB	M, IB, LB, PC, SN, RO2
S24_Art	School	Rooty Hill School of Arts	1.5	52	42	42	37	52	47	42	No	No	No	10	10	15	-	-	M, LB, RO2
S-AR1	Active Recreation	Sports Field Rooty Hill South	1.5	52	42	42	37	52	47	42	No	No	No	10	10	15	-	-	M, LB, RO2
SC01	Commercial	Rooty Hill Rd South Commercial	1.5	55	--	--	--	70	70	70	Yes	Yes	Yes	-15	-15	-15	-	-	-
SC02	Commercial	Rooty Hill Rd South Commercial	1.5	51	--	--	--	70	70	70	Yes	Yes	Yes	-19	-19	-19	-	-	-
SC03	Commercial	Rooty Hill Rd South Commercial	1.5	52	--	--	--	70	70	70	Yes	Yes	Yes	-18	-18	-18	-	-	-
SC04	Residential	Lone Pine Tavern	1.5	57	--	--	--	70	70	70	Yes	Yes	Yes	-13	-13	-13	-	-	-
XS01A	Residential	Future Aged Care	1.5	59	42	42	37	52	47	42	No	No	No	17	17	22	-	LB	M, IB, LB, PC, SN, RO2
XS01B	Residential	Future Aged Care East	1.5	65	42	42	37	52	47	42	No	No	No	23	23	28	LB, M	M, LB	M, IB, LB, PC, SN, RO2

Construction Scenario 3
Interchange Upgrade - Main Works

				PNL			RBL			Criteria			Compliance SC3			PNL - RBL SC3			Mitigation Measures SC3		
Name	Type	Description	Height	SC3	OOH Period 1	OOH Period 2	Std	OOH Period 1	OOH Period 2	Std	OOH Period 1	OOH Period 2	Std	OOH Period 1	OOH Period 2	Std	OOH Period 1	OOH Period 2	Std	OOH Period 1	OOH Period 2
N01	Residential	Rooty Hill Lodge (Motel)	1.5	68	68	68	45	45	38	55	50	43	No	No	No	23	23	30	LB, M	M, LB	M, IB, LB, PC, SN, RO2
N01-1	Residential	Rooty Hill Lodge (Motel)	4.5	68	68	68	45	45	38	55	50	43	No	No	No	23	23	30	LB, M	M, LB	M, IB, LB, PC, SN, RO2
N02	Residential	138 Harrington St	1.5	55	55	55	45	45	38	55	50	43	No	No	No	10	10	17	-	-	M, LB, RO2
N03	Residential	20 Station St	1.5	66	66	66	45	45	38	55	50	43	No	No	No	21	21	28	LB, M	M, LB	M, IB, LB, PC, SN, RO2
N04	Residential	22 Station St	1.5	65	65	65	45	45	38	55	50	43	No	No	No	20	20	27	-	LB	M, IB, LB, PC, SN, RO2
N05	Residential	24 Station St	1.5	65	65	65	45	45	38	55	50	43	No	No	No	20	20	27	-	LB	M, IB, LB, PC, SN, RO2
N06	Residential	26 Station St	1.5	64	64	64	45	45	38	55	50	43	No	No	No	19	19	26	-	LB	M, IB, LB, PC, SN, RO2
N07	Residential	28 Station St	1.5	64	64	64	45	45	38	55	50	43	No	No	No	19	19	26	-	LB	M, IB, LB, PC, SN, RO2
NC01	Commercial	Rooty Hill Rd North Commercial	1.5	81	81	81	--	--	--	70	70	70	HNA	HNA	HNA	11	11	11	-	LB	M, LB, RO2
NC02	Commercial	Imperial Hotel	1.5	76	76	76	--	--	--	70	70	70	HNA	HNA	HNA	6	6	6	-	-	LB
NC03	Commercial	Rooty Hill Rd North Commercial	1.5	71	71	71	--	--	--	70	70	70	No	No	No	1	1	1	-	-	LB
NC04	Commercial	Rooty Hill Rd North Commercial	1.5	71	71	71	--	--	--	70	70	70	No	No	No	1	1	1	-	-	LB
NC05	Commercial	Rooty Hill Rd North Commercial	1.5	65	65	65	--	--	--	70	70	70	Yes	Yes	Yes	-5	-5	-5	-	-	-
NC06	Commercial	Rooty Hill Rd North Commercial	1.5	64	64	64	--	--	--	70	70	70	Yes	Yes	Yes	-6	-6	-6	-	-	-
N-IND1	Industrial	Council Workshop Offices	1.5	74	74	74	--	--	--	75	75	75	Yes	Yes	Yes	-1	-1	-1	-	-	-
N-IND2	Industrial	Council Workshop/ Depot	1.5	69	69	69	--	--	--	75	75	75	Yes	Yes	Yes	-6	-6	-6	-	-	-
NW01	Commercial	92-96 North Pde Mix Res/Comm	1.5	69	69	69	--	--	--	70	70	70	Yes	Yes	Yes	-1	-1	-1	-	-	-
NW01-1	Residential	92-96 North Pde Mix Res/Comm	4.5	69	69	69	45	45	38	55	50	43	No	No	No	24	24	31	LB, M	M, LB	AA, M, IB, LB, PC, SN, RO
NW02	Residential	90 North Pde	1.5	63	63	63	45	45	38	55	50	43	No	No	No	18	18	25	-	LB	M, IB, LB, PC, SN, RO2
NW03	Residential	88North Pde	1.5	54	54	54	45	45	38	55	50	43	Yes	No	No	9	9	16	-	-	M, LB, RO2
NW04	Residential	86 North Pde	1.5	53	53	53	45	45	38	55	50	43	Yes	No	No	8	8	15	-	-	M, LB, RO2
NW05	Residential	84 North Pde	1.5	54	54	54	45	45	38	55	50	43	Yes	No	No	9	9	16	-	-	M, LB, RO2
NW6	Residential	3a Perkins St Residential	1.5	56	56	56	45	45	38	55	50	43	No	No	No	11	11	18	-	LB	M, LB, RO2
NW7	Residential	3b Perkins St Residential	1.5	56	56	56	45	45	38	55	50	43	No	No	No	11	11	18	-	LB	M, LB, RO2
NW8	Residential	3c Perkins St Residential	1.5	57	57	57	45	45	38	55	50	43	No	No	No	12	12	19	-	LB	M, LB, RO2
NW9	Residential	3d Perkins St Residential	1.5	58	58	58	45	45	38	55	50	43	No	No	No	13	13	20	-	LB	M, LB, RO2
S02	Residential	30 Artonish Lane	1.5	59	59	59	42	42	37	52	47	42	No	No	No	17	17	22	-	LB	M, IB, LB, PC, SN, RO2
S03	Residential	28 Artonish Lane	1.5	57	57	57	42	42	37	52	47	42	No	No	No	15	15	20	-	LB	M, LB, RO2
S04	Residential	26 Artonish Lane	1.5	55	55	55	42	42	37	52	47	42	No	No	No	13	13	18	-	LB	M, LB, RO2
S05	Residential	24 Artonish Lane	1.5	54	54	54	42	42	37	52	47	42	No	No	No	12	12	17	-	LB	M, LB, RO2
S06	Residential	22 Artonish Lane	1.5	54	54	54	42	42	37	52	47	42	No	No	No	12	12	17	-	LB	M, LB, RO2
S07	Residential	9 Beames Ave	1.5	64	64	64	42	42	37	52	47	42	No	No	No	22	22	27	LB, M	M, LB	M, IB, LB, PC, SN, RO2
S08	Residential	11 Beames Ave	1.5	62	62	62	42	42	37	52	47	42	No	No	No	20	20	25	-	LB	M, IB, LB, PC, SN, RO2
S09	Residential	35 Catherine St	1.5	62	62	62	42	42	37	52	47	42	No	No	No	20	20	25	-	LB	M, IB, LB, PC, SN, RO2
S10	Residential	33 Catherine St	1.5	61	61	61	42	42	37	52	47	42	No	No	No	19	19	24	-	LB	M, IB, LB, PC, SN, RO2
S11	Residential	31 Catherine St	1.5	59	59	59	42	42	37	52	47	42	No	No	No	17	17	22	-	LB	M, IB, LB, PC, SN, RO2
S12	Residential	29 Catherine St	1.5	55	55	55	42	42	37	52	47	42	No	No	No	13	13	18	-	LB	M, LB, RO2
S13	Residential	27 Catherine St	1.5	56	56	56	42	42	37	52	47	42	No	No	No	14	14	19	-	LB	M, LB, RO2
S14	Residential	25 Catherine St	1.5	56	56	56	42	42	37	52	47	42	No	No	No	14	14	19	-	LB	M, LB, RO2
S15	Residential	23 Catherine St	1.5	56	56	56	42	42	37	52	47	42	No	No	No	14	14	19	-	LB	M, LB, RO2
S16	Residential	21 Catherine St	1.5	55	55	55	42	42	37	52	47	42	No	No	No	13	13	18	-	LB	M, LB, RO2
S17	Residential	2 Mavis St	1.5	59	59	59	42	42	37	52	47	42	No	No	No	17	17	22	-	LB	M, IB, LB, PC, SN, RO2
S18	Residential	6 Mavis St	1.5	59	59	59	42	42	37	52	47	42	No	No	No	17	17	22	-	LB	M, IB, LB, PC, SN, RO2
S19	Residential	8 Mavis St	1.5	59	59	59	42	42	37	52	47	42	No	No	No	17	17	22	-	LB	M, IB, LB, PC, SN, RO2
S20	Residential	10 Mavis St	1.5	59	59	59	42	42	37	52	47	42	No	No	No	17	17	22	-	LB	M, IB, LB, PC, SN, RO2
S21	Residential	12 Mavis St	1.5	59	59	59	42	42	37	52	47	42	No	No	No	17	17	22	-	LB	M, IB, LB, PC, SN, RO2
S22	Residential	14 Mavis St	1.5	59	59	59	42	42	37	52	47	42	No	No	No	17	17	22	-	LB	M, IB, LB, PC, SN, RO2
S23	Residential	16 Mavis St	1.5	58	58	58	42	42	37	52	47	42	No	No	No	16	16	21	-	LB	M, IB, LB, PC, SN, RO2
S24_Art	School	Rooty Hill School of Arts	1.5	58	58	58	42	42	37	52	47	42	No	No	No	16	16	21	-	LB	M, IB, LB, PC, SN, RO2
S-AR1	Active Recreation	Sports Field Rooty Hill South	1.5	59	59	59	42	42	37	52	47	42	No	No	No	17	17	22	-	LB	M, IB, LB, PC, SN, RO2
SC01	Commercial	Rooty Hill Rd South Commercial	1.5	64	64	64	--	--	--	70	70	70	Yes	Yes	Yes	-6	-6	-6	-	-	-
SC02	Commercial	Rooty Hill Rd South Commercial	1.5	62	62	62	--	--	--	70	70	70	Yes	Yes	Yes	-8	-8	-8	-	-	-
SC03	Commercial	Rooty Hill Rd South Commercial	1.5	60	60	60	--	--	--	70	70	70	Yes	Yes	Yes	-10	-10	-10	-	-	-
SC04	Residential	Lone Pine Tavern	1.5	62	62	62	--	--	--	70	70	70	Yes	Yes	Yes	-8	-8	-8	-	-	-
XS01A	Residential	Future Aged Care	1.5	67	67	67	42	42	37	52	47	42	No	No	No	25	25	30	LB, M	M, LB	M, IB, LB, PC, SN, RO2
XS01B	Residential	Future Aged Care East	1.5	65	65	65	42	42	37	52	47	42	No	No	No	23	23	28	LB, M	M, LB	M, IB, LB, PC, SN, RO2

Construction Scenario 1A
Station Upgrade - Enabling Works - Mitigated

Name	Type	Description	Height	PNL	RBL			Criteria			Compliance SC1A			PNL - RBL SC1A			Mitigation Measures SC1A		
				SC1A	Std	OOH Period 1	OOH Period 2	Std	OOH Period 1	OOH Period 2	Std	OOH Period 1	OOH Period 2	Std	OOH Period 1	OOH Period 2	Std	OOH Period 1	OOH Period 2
N01	Residential	Rooty Hill Lodge (Motel)	1.5	40	45	45	38	55	50	43	Yes	Yes	Yes	-5	-5	2	-	-	LB
N01-1	Residential	Rooty Hill Lodge (Motel)	4.5	40	45	45	38	55	50	43	Yes	Yes	Yes	-5	-5	2	-	-	LB
N02	Residential	138 Harrington St	1.5	31	45	45	38	55	50	43	Yes	Yes	Yes	-14	-14	-7	-	-	-
N03	Residential	20 Station St	1.5	38	45	45	38	55	50	43	Yes	Yes	Yes	-7	-7	0	-	-	-
N04	Residential	22 Station St	1.5	38	45	45	38	55	50	43	Yes	Yes	Yes	-7	-7	0	-	-	-
N05	Residential	24 Station St	1.5	37	45	45	38	55	50	43	Yes	Yes	Yes	-8	-8	-1	-	-	-
N06	Residential	26 Station St	1.5	37	45	45	38	55	50	43	Yes	Yes	Yes	-8	-8	-1	-	-	-
N07	Residential	28 Station St	1.5	36	45	45	38	55	50	43	Yes	Yes	Yes	-9	-9	-2	-	-	-
NC01	Commercial	Rooty Hill Rd North Commercial	1.5	45	--	--	--	70	70	70	Yes	Yes	Yes	-25	-25	-25	-	-	-
NC02	Commercial	Imperial Hotel	1.5	47	--	--	--	70	70	70	Yes	Yes	Yes	-23	-23	-23	-	-	-
NC03	Commercial	Rooty Hill Rd North Commercial	1.5	44	--	--	--	70	70	70	Yes	Yes	Yes	-26	-26	-26	-	-	-
NC04	Commercial	Rooty Hill Rd North Commercial	1.5	43	--	--	--	70	70	70	Yes	Yes	Yes	-27	-27	-27	-	-	-
NC05	Commercial	Rooty Hill Rd North Commercial	1.5	41	--	--	--	70	70	70	Yes	Yes	Yes	-29	-29	-29	-	-	-
NC06	Commercial	Rooty Hill Rd North Commercial	1.5	41	--	--	--	70	70	70	Yes	Yes	Yes	-29	-29	-29	-	-	-
N-IND1	Industrial	Council Workshop Offices	1.5	44	--	--	--	75	75	75	Yes	Yes	Yes	-31	-31	-31	-	-	-
N-IND2	Industrial	Council Workshop/ Depot	1.5	43	--	--	--	75	75	75	Yes	Yes	Yes	-32	-32	-32	-	-	-
NW01	Commercial	92-96 North Pde Mix Res/Comm	1.5	45	--	--	--	70	70	70	Yes	Yes	Yes	-25	-25	-25	-	-	-
NW01-1	Residential	92-96 North Pde Mix Res/Comm	4.5	45	45	45	38	55	50	43	Yes	Yes	No	0	0	7	-	-	LB
NW02	Residential	90 North Pde	1.5	44	45	45	38	55	50	43	Yes	Yes	No	-1	-1	6	-	-	LB
NW03	Residential	88North Pde	1.5	43	45	45	38	55	50	43	Yes	Yes	No	-2	-2	5	-	-	LB
NW04	Residential	86 North Pde	1.5	42	45	45	38	55	50	43	Yes	Yes	Yes	-3	-3	4	-	-	LB
NW05	Residential	84 North Pde	1.5	42	45	45	38	55	50	43	Yes	Yes	Yes	-3	-3	4	-	-	LB
NW6	Residential	3a Perkins St Residential	1.5	35	45	45	38	55	50	43	Yes	Yes	Yes	-10	-10	-3	-	-	-
NW7	Residential	3b Perkins St Residential	1.5	36	45	45	38	55	50	43	Yes	Yes	Yes	-9	-9	-2	-	-	-
NW8	Residential	3c Perkins St Residential	1.5	37	45	45	38	55	50	43	Yes	Yes	Yes	-8	-8	-1	-	-	-
NW9	Residential	3d Perkins St Residential	1.5	37	45	45	38	55	50	43	Yes	Yes	Yes	-8	-8	-1	-	-	-
S02	Residential	30 Artonish Lane	1.5	39	42	42	37	52	47	42	Yes	Yes	Yes	-3	-3	2	-	-	LB
S03	Residential	28 Artonish Lane	1.5	39	42	42	37	52	47	42	Yes	Yes	Yes	-3	-3	2	-	-	LB
S04	Residential	26 Artonish Lane	1.5	39	42	42	37	52	47	42	Yes	Yes	Yes	-3	-3	2	-	-	LB
S05	Residential	24 Artonish Lane	1.5	38	42	42	37	52	47	42	Yes	Yes	Yes	-4	-4	1	-	-	LB
S06	Residential	22 Artonish Lane	1.5	37	42	42	37	52	47	42	Yes	Yes	Yes	-5	-5	0	-	-	-
S07	Residential	9 Beames Ave	1.5	50	42	42	37	52	47	42	Yes	No	No	8	8	13	-	-	M, LB, RO2
S08	Residential	11 Beames Ave	1.5	48	42	42	37	52	47	42	Yes	No	No	6	6	11	-	-	M, LB, RO2
S09	Residential	35 Catherine St	1.5	44	42	42	37	52	47	42	Yes	Yes	No	2	2	7	-	-	LB
S10	Residential	33 Catherine St	1.5	39	42	42	37	52	47	42	Yes	Yes	Yes	-3	-3	2	-	-	LB
S11	Residential	31 Catherine St	1.5	34	42	42	37	52	47	42	Yes	Yes	Yes	-8	-8	-3	-	-	-
S12	Residential	29 Catherine St	1.5	36	42	42	37	52	47	42	Yes	Yes	Yes	-6	-6	-1	-	-	-
S13	Residential	27 Catherine St	1.5	35	42	42	37	52	47	42	Yes	Yes	Yes	-7	-7	-2	-	-	-
S14	Residential	25 Catherine St	1.5	36	42	42	37	52	47	42	Yes	Yes	Yes	-6	-6	-1	-	-	-
S15	Residential	23 Catherine St	1.5	36	42	42	37	52	47	42	Yes	Yes	Yes	-6	-6	-1	-	-	-
S16	Residential	21 Catherine St	1.5	35	42	42	37	52	47	42	Yes	Yes	Yes	-7	-7	-2	-	-	-
S17	Residential	2 Mavis St	1.5	39	42	42	37	52	47	42	Yes	Yes	Yes	-3	-3	2	-	-	LB
S18	Residential	6 Mavis St	1.5	38	42	42	37	52	47	42	Yes	Yes	Yes	-4	-4	1	-	-	LB
S19	Residential	8 Mavis St	1.5	39	42	42	37	52	47	42	Yes	Yes	Yes	-3	-3	2	-	-	LB
S20	Residential	10 Mavis St	1.5	41	42	42	37	52	47	42	Yes	Yes	Yes	-1	-1	4	-	-	LB
S21	Residential	12 Mavis St	1.5	40	42	42	37	52	47	42	Yes	Yes	Yes	-2	-2	3	-	-	LB
S22	Residential	14 Mavis St	1.5	42	42	42	37	52	47	42	Yes	Yes	No	0	0	5	-	-	LB
S23	Residential	16 Mavis St	1.5	42	42	42	37	52	47	42	Yes	Yes	No	0	0	5	-	-	LB
S24_Art	School	Rooty Hill School of Arts	1.5	42	42	42	37	52	47	42	Yes	Yes	No	0	0	5	-	-	LB
S-AR1	Active Recreation	Sports Field Rooty Hill South	1.5	46	42	42	37	52	47	42	Yes	Yes	No	4	4	9	-	-	LB
SC01	Commercial	Rooty Hill Rd South Commercial	1.5	59	--	--	--	70	70	70	Yes	Yes	Yes	-11	-11	-11	-	-	-
SC02	Commercial	Rooty Hill Rd South Commercial	1.5	53	--	--	--	70	70	70	Yes	Yes	Yes	-17	-17	-17	-	-	-
SC03	Commercial	Rooty Hill Rd South Commercial	1.5	46	--	--	--	70	70	70	Yes	Yes	Yes	-24	-24	-24	-	-	-
SC04	Residential	Lone Pine Tavern	1.5	45	--	--	--	70	70	70	Yes	Yes	Yes	-25	-25	-25	-	-	-
XS01A	Residential	Future Aged Care	1.5	54	42	42	37	52	47	42	No	No	No	12	12	17	-	LB	M, LB, RO2
XS01B	Residential	Future Aged Care East	1.5	49	42	42	37	52	47	42	Yes	No	No	7	7	12	-	-	M, LB, RO2

Construction Scenario 1B
Station Upgrade - Demolition - Mitigated

Name	Type	Description	Height	PNL	RBL			Criteria			Compliance SC1B			PNL - RBL SC1B			Mitigation Measures SC1B		
				SC1B	Std	OOH		Std	OOH Period 1	OOH Period 2	Std	OOH Period 1	OOH Period 2	Std	OOH Period 1	OOH Period 2	Std	OOH Period 1	OOH Period 2
						Period 1	Period 2												
N01	Residential	Rooty Hill Lodge (Motel)	1.5	54	45	45	38	55	50	43	Yes	No	No	9	9	16	-	-	M, LB, RO2
N01-1	Residential	Rooty Hill Lodge (Motel)	4.5	54	45	45	38	55	50	43	Yes	No	No	9	9	16	-	-	M, LB, RO2
N02	Residential	138 Harrington St	1.5	44	45	45	38	55	50	43	Yes	Yes	No	-1	-1	6	-	-	LB
N03	Residential	20 Station St	1.5	53	45	45	38	55	50	43	Yes	No	No	8	8	15	-	-	M, LB, RO2
N04	Residential	22 Station St	1.5	52	45	45	38	55	50	43	Yes	No	No	7	7	14	-	-	M, LB, RO2
N05	Residential	24 Station St	1.5	52	45	45	38	55	50	43	Yes	No	No	7	7	14	-	-	M, LB, RO2
N06	Residential	26 Station St	1.5	51	45	45	38	55	50	43	Yes	No	No	6	6	13	-	-	M, LB, RO2
N07	Residential	28 Station St	1.5	51	45	45	38	55	50	43	Yes	No	No	6	6	13	-	-	M, LB, RO2
NC01	Commercial	Rooty Hill Rd North Commercial	1.5	59	--	--	--	70	70	70	Yes	Yes	Yes	-11	-11	-11	-	-	-
NC02	Commercial	Imperial Hotel	1.5	58	--	--	--	70	70	70	Yes	Yes	Yes	-12	-12	-12	-	-	-
NC03	Commercial	Rooty Hill Rd North Commercial	1.5	55	--	--	--	70	70	70	Yes	Yes	Yes	-15	-15	-15	-	-	-
NC04	Commercial	Rooty Hill Rd North Commercial	1.5	55	--	--	--	70	70	70	Yes	Yes	Yes	-15	-15	-15	-	-	-
NC05	Commercial	Rooty Hill Rd North Commercial	1.5	52	--	--	--	70	70	70	Yes	Yes	Yes	-18	-18	-18	-	-	-
NC06	Commercial	Rooty Hill Rd North Commercial	1.5	51	--	--	--	70	70	70	Yes	Yes	Yes	-19	-19	-19	-	-	-
N-IND1	Industrial	Council Workshop Offices	1.5	59	--	--	--	75	75	75	Yes	Yes	Yes	-16	-16	-16	-	-	-
N-IND2	Industrial	Council Workshop/ Depot	1.5	59	--	--	--	75	75	75	Yes	Yes	Yes	-16	-16	-16	-	-	-
NW01	Commercial	92-96 North Pde Mix Res/Comm	1.5	57	--	--	--	70	70	70	Yes	Yes	Yes	-13	-13	-13	-	-	-
NW01-1	Residential	92-96 North Pde Mix Res/Comm	4.5	58	45	45	38	55	50	43	No	No	No	13	13	20	-	LB	M, LB, RO2
NW02	Residential	90 North Pde	1.5	55	45	45	38	55	50	43	No	No	No	10	10	17	-	-	M, LB, RO2
NW03	Residential	88North Pde	1.5	52	45	45	38	55	50	43	Yes	No	No	7	7	14	-	-	M, LB, RO2
NW04	Residential	86 North Pde	1.5	51	45	45	38	55	50	43	Yes	No	No	6	6	13	-	-	M, LB, RO2
NW05	Residential	84 North Pde	1.5	51	45	45	38	55	50	43	Yes	No	No	6	6	13	-	-	M, LB, RO2
NW6	Residential	3a Perkins St Residential	1.5	47	45	45	38	55	50	43	Yes	Yes	No	2	2	9	-	-	LB
NW7	Residential	3b Perkins St Residential	1.5	47	45	45	38	55	50	43	Yes	Yes	No	2	2	9	-	-	LB
NW8	Residential	3c Perkins St Residential	1.5	47	45	45	38	55	50	43	Yes	Yes	No	2	2	9	-	-	LB
NW9	Residential	3d Perkins St Residential	1.5	47	45	45	38	55	50	43	Yes	Yes	No	2	2	9	-	-	LB
S02	Residential	30 Artonish Lane	1.5	47	42	42	37	52	47	42	Yes	No	No	5	5	10	-	-	LB
S03	Residential	28 Artonish Lane	1.5	48	42	42	37	52	47	42	Yes	No	No	6	6	11	-	-	M, LB, RO2
S04	Residential	26 Artonish Lane	1.5	46	42	42	37	52	47	42	Yes	Yes	No	4	4	9	-	-	LB
S05	Residential	24 Artonish Lane	1.5	45	42	42	37	52	47	42	Yes	Yes	No	3	3	8	-	-	LB
S06	Residential	22 Artonish Lane	1.5	45	42	42	37	52	47	42	Yes	Yes	No	3	3	8	-	-	LB
S07	Residential	9 Beames Ave	1.5	54	42	42	37	52	47	42	No	No	No	12	12	17	-	LB	M, LB, RO2
S08	Residential	11 Beames Ave	1.5	54	42	42	37	52	47	42	No	No	No	12	12	17	-	LB	M, LB, RO2
S09	Residential	35 Catherine St	1.5	54	42	42	37	52	47	42	No	No	No	12	12	17	-	LB	M, LB, RO2
S10	Residential	33 Catherine St	1.5	51	42	42	37	52	47	42	Yes	No	No	9	9	14	-	-	M, LB, RO2
S11	Residential	31 Catherine St	1.5	48	42	42	37	52	47	42	Yes	No	No	6	6	11	-	-	M, LB, RO2
S12	Residential	29 Catherine St	1.5	48	42	42	37	52	47	42	Yes	No	No	6	6	11	-	-	M, LB, RO2
S13	Residential	27 Catherine St	1.5	46	42	42	37	52	47	42	Yes	Yes	No	4	4	9	-	-	LB
S14	Residential	25 Catherine St	1.5	45	42	42	37	52	47	42	Yes	Yes	No	3	3	8	-	-	LB
S15	Residential	23 Catherine St	1.5	46	42	42	37	52	47	42	Yes	Yes	No	4	4	9	-	-	LB
S16	Residential	21 Catherine St	1.5	46	42	42	37	52	47	42	Yes	Yes	No	4	4	9	-	-	LB
S17	Residential	2 Mavis St	1.5	51	42	42	37	52	47	42	Yes	No	No	9	9	14	-	-	M, LB, RO2
S18	Residential	6 Mavis St	1.5	51	42	42	37	52	47	42	Yes	No	No	9	9	14	-	-	M, LB, RO2
S19	Residential	8 Mavis St	1.5	51	42	42	37	52	47	42	Yes	No	No	9	9	14	-	-	M, LB, RO2
S20	Residential	10 Mavis St	1.5	51	42	42	37	52	47	42	Yes	No	No	9	9	14	-	-	M, LB, RO2
S21	Residential	12 Mavis St	1.5	51	42	42	37	52	47	42	Yes	No	No	9	9	14	-	-	M, LB, RO2
S22	Residential	14 Mavis St	1.5	51	42	42	37	52	47	42	Yes	No	No	9	9	14	-	-	M, LB, RO2
S23	Residential	16 Mavis St	1.5	50	42	42	37	52	47	42	Yes	No	No	8	8	13	-	-	M, LB, RO2
S24_Art	School	Rooty Hill School of Arts	1.5	50	42	42	37	52	47	42	Yes	No	No	8	8	13	-	-	M, LB, RO2
S-AR1	Active Recreation	Sports Field Rooty Hill South	1.5	51	42	42	37	52	47	42	Yes	No	No	9	9	14	-	-	M, LB, RO2
SC01	Commercial	Rooty Hill Rd South Commercial	1.5	56	--	--	--	70	70	70	Yes	Yes	Yes	-14	-14	-14	-	-	-
SC02	Commercial	Rooty Hill Rd South Commercial	1.5	52	--	--	--	70	70	70	Yes	Yes	Yes	-18	-18	-18	-	-	-
SC03	Commercial	Rooty Hill Rd South Commercial	1.5	51	--	--	--	70	70	70	Yes	Yes	Yes	-19	-19	-19	-	-	-
SC04	Residential	Lone Pine Tavern	1.5	55	--	--	--	70	70	70	Yes	Yes	Yes	-15	-15	-15	-	-	-
XS01A	Residential	Future Aged Care	1.5	62	42	42	37	52	47	42	No	No	No	20	20	25	-	LB	M, IB, LB, PC, SN, RO2
XS01B	Residential	Future Aged Care East	1.5	60	42	42	37	52	47	42	No	No	No	18	18	23	-	LB	M, IB, LB, PC, SN, RO2

Construction Scenario 1C
Station Upgrade - Mainworks - Mitigated

Name	Type	Description	Height	PNL	RBL			Criteria			Compliance SC1C			PNL - RBL SC1C			Mitigation Measures SC1C		
				SC1C	Std	OOH		Std	OOH Period 1	OOH Period 2	Std	OOH Period 1	OOH Period 2	Std	OOH Period 1	OOH Period 2	Std	OOH Period 1	OOH Period 2
						Period 1	Period 2												
N01	Residential	Rooty Hill Lodge (Motel)	1.5	46	45	45	38	55	50	43	Yes	Yes	No	1	1	8	-	-	LB
N01-1	Residential	Rooty Hill Lodge (Motel)	4.5	47	45	45	38	55	50	43	Yes	Yes	No	2	2	9	-	-	LB
N02	Residential	138 Harrington St	1.5	37	45	45	38	55	50	43	Yes	Yes	Yes	-8	-8	-1	-	-	-
N03	Residential	20 Station St	1.5	45	45	45	38	55	50	43	Yes	Yes	No	0	0	7	-	-	LB
N04	Residential	22 Station St	1.5	44	45	45	38	55	50	43	Yes	Yes	No	-1	-1	6	-	-	LB
N05	Residential	24 Station St	1.5	44	45	45	38	55	50	43	Yes	Yes	No	-1	-1	6	-	-	LB
N06	Residential	26 Station St	1.5	43	45	45	38	55	50	43	Yes	Yes	No	-2	-2	5	-	-	LB
N07	Residential	28 Station St	1.5	43	45	45	38	55	50	43	Yes	Yes	No	-2	-2	5	-	-	LB
NC01	Commercial	Rooty Hill Rd North Commercial	1.5	52	--	--	--	70	70	70	Yes	Yes	Yes	-18	-18	-18	-	-	-
NC02	Commercial	Imperial Hotel	1.5	52	--	--	--	70	70	70	Yes	Yes	Yes	-18	-18	-18	-	-	-
NC03	Commercial	Rooty Hill Rd North Commercial	1.5	48	--	--	--	70	70	70	Yes	Yes	Yes	-22	-22	-22	-	-	-
NC04	Commercial	Rooty Hill Rd North Commercial	1.5	48	--	--	--	70	70	70	Yes	Yes	Yes	-22	-22	-22	-	-	-
NC05	Commercial	Rooty Hill Rd North Commercial	1.5	45	--	--	--	70	70	70	Yes	Yes	Yes	-25	-25	-25	-	-	-
NC06	Commercial	Rooty Hill Rd North Commercial	1.5	44	--	--	--	70	70	70	Yes	Yes	Yes	-26	-26	-26	-	-	-
N-IND1	Industrial	Council Workshop Offices	1.5	51	--	--	--	75	75	75	Yes	Yes	Yes	-24	-24	-24	-	-	-
N-IND2	Industrial	Council Workshop/ Depot	1.5	52	--	--	--	75	75	75	Yes	Yes	Yes	-23	-23	-23	-	-	-
NW01	Commercial	92-96 North Pde Mix Res/Comm	1.5	51	--	--	--	70	70	70	Yes	Yes	Yes	-19	-19	-19	-	-	-
NW01-1	Residential	92-96 North Pde Mix Res/Comm	4.5	51	45	45	38	55	50	43	Yes	No	No	6	6	13	-	-	M, LB, RO2
NW02	Residential	90 North Pde	1.5	49	45	45	38	55	50	43	Yes	Yes	No	4	4	11	-	-	M, LB, RO2
NW03	Residential	88North Pde	1.5	46	45	45	38	55	50	43	Yes	Yes	No	1	1	8	-	-	LB
NW04	Residential	86 North Pde	1.5	45	45	45	38	55	50	43	Yes	Yes	No	0	0	7	-	-	LB
NW05	Residential	84 North Pde	1.5	44	45	45	38	55	50	43	Yes	Yes	No	-1	-1	6	-	-	LB
NW6	Residential	3a Perkins St Residential	1.5	40	45	45	38	55	50	43	Yes	Yes	Yes	-5	-5	2	-	-	LB
NW7	Residential	3b Perkins St Residential	1.5	40	45	45	38	55	50	43	Yes	Yes	Yes	-5	-5	2	-	-	LB
NW8	Residential	3c Perkins St Residential	1.5	40	45	45	38	55	50	43	Yes	Yes	Yes	-5	-5	2	-	-	LB
NW9	Residential	3d Perkins St Residential	1.5	40	45	45	38	55	50	43	Yes	Yes	Yes	-5	-5	2	-	-	LB
S02	Residential	30 Artonish Lane	1.5	41	42	42	37	52	47	42	Yes	Yes	Yes	-1	-1	4	-	-	LB
S03	Residential	28 Artonish Lane	1.5	41	42	42	37	52	47	42	Yes	Yes	Yes	-1	-1	4	-	-	LB
S04	Residential	26 Artonish Lane	1.5	39	42	42	37	52	47	42	Yes	Yes	Yes	-3	-3	2	-	-	LB
S05	Residential	24 Artonish Lane	1.5	38	42	42	37	52	47	42	Yes	Yes	Yes	-4	-4	1	-	-	LB
S06	Residential	22 Artonish Lane	1.5	38	42	42	37	52	47	42	Yes	Yes	Yes	-4	-4	1	-	-	LB
S07	Residential	9 Beames Ave	1.5	48	42	42	37	52	47	42	Yes	No	No	6	6	11	-	-	M, LB, RO2
S08	Residential	11 Beames Ave	1.5	48	42	42	37	52	47	42	Yes	No	No	6	6	11	-	-	M, LB, RO2
S09	Residential	35 Catherine St	1.5	47	42	42	37	52	47	42	Yes	No	No	5	5	10	-	-	LB
S10	Residential	33 Catherine St	1.5	45	42	42	37	52	47	42	Yes	Yes	No	3	3	8	-	-	LB
S11	Residential	31 Catherine St	1.5	42	42	42	37	52	47	42	Yes	Yes	No	0	0	5	-	-	LB
S12	Residential	29 Catherine St	1.5	40	42	42	37	52	47	42	Yes	Yes	Yes	-2	-2	3	-	-	LB
S13	Residential	27 Catherine St	1.5	40	42	42	37	52	47	42	Yes	Yes	Yes	-2	-2	3	-	-	LB
S14	Residential	25 Catherine St	1.5	39	42	42	37	52	47	42	Yes	Yes	Yes	-3	-3	2	-	-	LB
S15	Residential	23 Catherine St	1.5	39	42	42	37	52	47	42	Yes	Yes	Yes	-3	-3	2	-	-	LB
S16	Residential	21 Catherine St	1.5	39	42	42	37	52	47	42	Yes	Yes	Yes	-3	-3	2	-	-	LB
S17	Residential	2 Mavis St	1.5	44	42	42	37	52	47	42	Yes	Yes	No	2	2	7	-	-	LB
S18	Residential	6 Mavis St	1.5	45	42	42	37	52	47	42	Yes	Yes	No	3	3	8	-	-	LB
S19	Residential	8 Mavis St	1.5	44	42	42	37	52	47	42	Yes	Yes	No	2	2	7	-	-	LB
S20	Residential	10 Mavis St	1.5	44	42	42	37	52	47	42	Yes	Yes	No	2	2	7	-	-	LB
S21	Residential	12 Mavis St	1.5	44	42	42	37	52	47	42	Yes	Yes	No	2	2	7	-	-	LB
S22	Residential	14 Mavis St	1.5	44	42	42	37	52	47	42	Yes	Yes	No	2	2	7	-	-	LB
S23	Residential	16 Mavis St	1.5	44	42	42	37	52	47	42	Yes	Yes	No	2	2	7	-	-	LB
S24_Art	School	Rooty Hill School of Arts	1.5	43	42	42	37	52	47	42	Yes	Yes	No	1	1	6	-	-	LB
S-AR1	Active Recreation	Sports Field Rooty Hill South	1.5	45	42	42	37	52	47	42	Yes	Yes	No	3	3	8	-	-	LB
SC01	Commercial	Rooty Hill Rd South Commercial	1.5	49	--	--	--	70	70	70	Yes	Yes	Yes	-21	-21	-21	-	-	-
SC02	Commercial	Rooty Hill Rd South Commercial	1.5	45	--	--	--	70	70	70	Yes	Yes	Yes	-25	-25	-25	-	-	-
SC03	Commercial	Rooty Hill Rd South Commercial	1.5	44	--	--	--	70	70	70	Yes	Yes	Yes	-26	-26	-26	-	-	-
SC04	Residential	Lone Pine Tavern	1.5	47	--	--	--	70	70	70	Yes	Yes	Yes	-23	-23	-23	-	-	-
XS01A	Residential	Future Aged Care	1.5	55	42	42	37	52	47	42	No	No	No	13	13	18	-	LB	M, LB, RO2
XS01B	Residential	Future Aged Care East	1.5	53	42	42	37	52	47	42	No	No	No	11	11	16	-	LB	M, LB, RO2

Construction Scenario 2
MSCP Upgrade - Mainworks - Mitigated

Name	Type	Description	Height	PNL	RBL			Criteria			Compliance SC2			PNL - RBL SC2			Mitigation Measures SC2		
				SC2	Std	OOH		Std	OOH Period 1	OOH Period 2	Std	OOH Period 1	OOH Period 2	Std	OOH Period 1	OOH Period 2	Std	OOH Period 1	OOH Period 2
						Period 1	Period 2												
N01	Residential	Rooty Hill Lodge (Motel)	1.5	53	45	45	38	55	50	43	Yes	No	No	8	8	15	-	-	M, LB, RO2
N01-1	Residential	Rooty Hill Lodge (Motel)	4.5	53	45	45	38	55	50	43	Yes	No	No	8	8	15	-	-	M, LB, RO2
N02	Residential	138 Harrington St	1.5	39	45	45	38	55	50	43	Yes	Yes	Yes	-6	-6	1	-	-	LB
N03	Residential	20 Station St	1.5	51	45	45	38	55	50	43	Yes	No	No	6	6	13	-	-	M, LB, RO2
N04	Residential	22 Station St	1.5	50	45	45	38	55	50	43	Yes	No	No	5	5	12	-	-	M, LB, RO2
N05	Residential	24 Station St	1.5	49	45	45	38	55	50	43	Yes	Yes	No	4	4	11	-	-	M, LB, RO2
N06	Residential	26 Station St	1.5	49	45	45	38	55	50	43	Yes	Yes	No	4	4	11	-	-	M, LB, RO2
N07	Residential	28 Station St	1.5	48	45	45	38	55	50	43	Yes	Yes	No	3	3	10	-	-	LB
NC01	Commercial	Rooty Hill Rd North Commercial	1.5	57	--	--	--	70	70	70	Yes	Yes	Yes	-13	-13	-13	-	-	-
NC02	Commercial	Imperial Hotel	1.5	53	--	--	--	70	70	70	Yes	Yes	Yes	-17	-17	-17	-	-	-
NC03	Commercial	Rooty Hill Rd North Commercial	1.5	43	--	--	--	70	70	70	Yes	Yes	Yes	-27	-27	-27	-	-	-
NC04	Commercial	Rooty Hill Rd North Commercial	1.5	45	--	--	--	70	70	70	Yes	Yes	Yes	-25	-25	-25	-	-	-
NC05	Commercial	Rooty Hill Rd North Commercial	1.5	43	--	--	--	70	70	70	Yes	Yes	Yes	-27	-27	-27	-	-	-
NC06	Commercial	Rooty Hill Rd North Commercial	1.5	43	--	--	--	70	70	70	Yes	Yes	Yes	-27	-27	-27	-	-	-
N-IND1	Industrial	Council Workshop Offices	1.5	62	--	--	--	75	75	75	Yes	Yes	Yes	-13	-13	-13	-	-	-
N-IND2	Industrial	Council Workshop/ Depot	1.5	62	--	--	--	75	75	75	Yes	Yes	Yes	-13	-13	-13	-	-	-
NW01	Commercial	92-96 North Pde Mix Res/Comm	1.5	45	--	--	--	70	70	70	Yes	Yes	Yes	-25	-25	-25	-	-	-
NW01-1	Residential	92-96 North Pde Mix Res/Comm	4.5	46	45	45	38	55	50	43	Yes	Yes	No	1	1	8	-	-	LB
NW02	Residential	90 North Pde	1.5	40	45	45	38	55	50	43	Yes	Yes	Yes	-5	-5	2	-	-	LB
NW03	Residential	88North Pde	1.5	38	45	45	38	55	50	43	Yes	Yes	Yes	-7	-7	0	-	-	-
NW04	Residential	86 North Pde	1.5	38	45	45	38	55	50	43	Yes	Yes	Yes	-7	-7	0	-	-	-
NW05	Residential	84 North Pde	1.5	39	45	45	38	55	50	43	Yes	Yes	Yes	-6	-6	1	-	-	LB
NW6	Residential	3a Perkins St Residential	1.5	39	45	45	38	55	50	43	Yes	Yes	Yes	-6	-6	1	-	-	-
NW7	Residential	3b Perkins St Residential	1.5	39	45	45	38	55	50	43	Yes	Yes	Yes	-6	-6	1	-	-	LB
NW8	Residential	3c Perkins St Residential	1.5	39	45	45	38	55	50	43	Yes	Yes	Yes	-6	-6	1	-	-	LB
NW9	Residential	3d Perkins St Residential	1.5	38	45	45	38	55	50	43	Yes	Yes	Yes	-7	-7	0	-	-	-
S02	Residential	30 Artonish Lane	1.5	39	42	42	37	52	47	42	Yes	Yes	Yes	-3	-3	2	-	-	LB
S03	Residential	28 Artonish Lane	1.5	39	42	42	37	52	47	42	Yes	Yes	Yes	-3	-3	2	-	-	LB
S04	Residential	26 Artonish Lane	1.5	39	42	42	37	52	47	42	Yes	Yes	Yes	-3	-3	2	-	-	LB
S05	Residential	24 Artonish Lane	1.5	39	42	42	37	52	47	42	Yes	Yes	Yes	-3	-3	2	-	-	LB
S06	Residential	22 Artonish Lane	1.5	38	42	42	37	52	47	42	Yes	Yes	Yes	-4	-4	1	-	-	LB
S07	Residential	9 Beames Ave	1.5	44	42	42	37	52	47	42	Yes	Yes	No	2	2	7	-	-	LB
S08	Residential	11 Beames Ave	1.5	44	42	42	37	52	47	42	Yes	Yes	No	2	2	7	-	-	LB
S09	Residential	35 Catherine St	1.5	43	42	42	37	52	47	42	Yes	Yes	No	1	1	6	-	-	LB
S10	Residential	33 Catherine St	1.5	42	42	42	37	52	47	42	Yes	Yes	No	0	0	5	-	-	LB
S11	Residential	31 Catherine St	1.5	40	42	42	37	52	47	42	Yes	Yes	Yes	-2	-2	3	-	-	LB
S12	Residential	29 Catherine St	1.5	41	42	42	37	52	47	42	Yes	Yes	Yes	-1	-1	4	-	-	LB
S13	Residential	27 Catherine St	1.5	41	42	42	37	52	47	42	Yes	Yes	Yes	-1	-1	4	-	-	LB
S14	Residential	25 Catherine St	1.5	39	42	42	37	52	47	42	Yes	Yes	Yes	-3	-3	2	-	-	LB
S15	Residential	23 Catherine St	1.5	39	42	42	37	52	47	42	Yes	Yes	Yes	-3	-3	2	-	-	LB
S16	Residential	21 Catherine St	1.5	39	42	42	37	52	47	42	Yes	Yes	Yes	-3	-3	2	-	-	LB
S17	Residential	2 Mavis St	1.5	48	42	42	37	52	47	42	Yes	No	No	6	6	11	-	-	M, LB, RO2
S18	Residential	6 Mavis St	1.5	48	42	42	37	52	47	42	Yes	No	No	6	6	11	-	-	M, LB, RO2
S19	Residential	8 Mavis St	1.5	48	42	42	37	52	47	42	Yes	No	No	6	6	11	-	-	M, LB, RO2
S20	Residential	10 Mavis St	1.5	48	42	42	37	52	47	42	Yes	No	No	6	6	11	-	-	M, LB, RO2
S21	Residential	12 Mavis St	1.5	48	42	42	37	52	47	42	Yes	No	No	6	6	11	-	-	M, LB, RO2
S22	Residential	14 Mavis St	1.5	48	42	42	37	52	47	42	Yes	No	No	6	6	11	-	-	M, LB, RO2
S23	Residential	16 Mavis St	1.5	48	42	42	37	52	47	42	Yes	No	No	6	6	11	-	-	M, LB, RO2
S24_Art	School	Rooty Hill School of Arts	1.5	42	42	42	37	52	47	42	Yes	Yes	No	0	0	5	-	-	LB
S-AR1	Active Recreation	Sports Field Rooty Hill South	1.5	42	42	42	37	52	47	42	Yes	Yes	No	0	0	5	-	-	LB
SC01	Commercial	Rooty Hill Rd South Commercial	1.5	45	--	--	--	70	70	70	Yes	Yes	Yes	-25	-25	-25	-	-	-
SC02	Commercial	Rooty Hill Rd South Commercial	1.5	41	--	--	--	70	70	70	Yes	Yes	Yes	-29	-29	-29	-	-	-
SC03	Commercial	Rooty Hill Rd South Commercial	1.5	42	--	--	--	70	70	70	Yes	Yes	Yes	-28	-28	-28	-	-	-
SC04	Residential	Lone Pine Tavern	1.5	47	--	--	--	70	70	70	Yes	Yes	Yes	-23	-23	-23	-	-	-
XS01A	Residential	Future Aged Care	1.5	49	42	42	37	52	47	42	Yes	No	No	7	7	12	-	-	M, LB, RO2
XS01B	Residential	Future Aged Care East	1.5	55	42	42	37	52	47	42	No	No	No	13	13	18	-	LB	M, LB, RO2

Construction Scenario 3
Interchange Upgrade - Mainworks - Mitigated

Name	Type	Description	Height	PNL	RBL			Criteria			Compliance SC3			PNL - RBL SC3			Mitigation Measures SC3		
				SC3	Std	OOH		Std	OOH Period 1	OOH Period 2	Std	OOH		Std	OOH		Std	OOH Period 1	OOH Period 2
						Period 1	Period 2					Period 1	Period 2		Period 1	Period 2			
N01	Residential	Rooty Hill Lodge (Motel)	1.5	58	45	45	38	55	50	43	No	No	No	13	13	20	-	LB	M, LB, RO2
N01-1	Residential	Rooty Hill Lodge (Motel)	4.5	58	45	45	38	55	50	43	No	No	No	13	13	20	-	LB	M, LB, RO2
N02	Residential	138 Harrington St	1.5	45	45	45	38	55	50	43	Yes	Yes	No	0	0	7	-	-	LB
N03	Residential	20 Station St	1.5	56	45	45	38	55	50	43	No	No	No	11	11	18	-	LB	M, LB, RO2
N04	Residential	22 Station St	1.5	55	45	45	38	55	50	43	No	No	No	10	10	17	-	-	M, LB, RO2
N05	Residential	24 Station St	1.5	55	45	45	38	55	50	43	No	No	No	10	10	17	-	-	M, LB, RO2
N06	Residential	26 Station St	1.5	54	45	45	38	55	50	43	Yes	No	No	9	9	16	-	-	M, LB, RO2
N07	Residential	28 Station St	1.5	54	45	45	38	55	50	43	Yes	No	No	9	9	16	-	-	M, LB, RO2
NC01	Commercial	Rooty Hill Rd North Commercial	1.5	71	--	--	--	70	70	70	No	No	No	1	1	1	-	-	LB
NC02	Commercial	Imperial Hotel	1.5	66	--	--	--	70	70	70	Yes	Yes	Yes	-4	-4	-4	-	-	-
NC03	Commercial	Rooty Hill Rd North Commercial	1.5	61	--	--	--	70	70	70	Yes	Yes	Yes	-9	-9	-9	-	-	-
NC04	Commercial	Rooty Hill Rd North Commercial	1.5	61	--	--	--	70	70	70	Yes	Yes	Yes	-9	-9	-9	-	-	-
NC05	Commercial	Rooty Hill Rd North Commercial	1.5	55	--	--	--	70	70	70	Yes	Yes	Yes	-15	-15	-15	-	-	-
NC06	Commercial	Rooty Hill Rd North Commercial	1.5	54	--	--	--	70	70	70	Yes	Yes	Yes	-16	-16	-16	-	-	-
N-IND1	Industrial	Council Workshop Offices	1.5	64	--	--	--	75	75	75	Yes	Yes	Yes	-11	-11	-11	-	-	-
N-IND2	Industrial	Council Workshop/ Depot	1.5	59	--	--	--	75	75	75	Yes	Yes	Yes	-16	-16	-16	-	-	-
NW01	Commercial	92-96 North Pde Mix Res/Comm	1.5	59	--	--	--	70	70	70	Yes	Yes	Yes	-11	-11	-11	-	-	-
NW01-1	Residential	92-96 North Pde Mix Res/Comm	4.5	59	45	45	38	55	50	43	No	No	No	14	14	21	-	LB	M, LB, PC, SN, RO2
NW02	Residential	90 North Pde	1.5	53	45	45	38	55	50	43	Yes	No	No	8	8	15	-	-	M, LB, RO2
NW03	Residential	88North Pde	1.5	44	45	45	38	55	50	43	Yes	Yes	No	-1	-1	6	-	-	LB
NW04	Residential	86 North Pde	1.5	43	45	45	38	55	50	43	Yes	Yes	No	-2	-2	5	-	-	LB
NW05	Residential	84 North Pde	1.5	44	45	45	38	55	50	43	Yes	Yes	No	-1	-1	6	-	-	LB
NW6	Residential	3a Perkins St Residential	1.5	46	45	45	38	55	50	43	Yes	Yes	No	1	1	8	-	-	LB
NW7	Residential	3b Perkins St Residential	1.5	46	45	45	38	55	50	43	Yes	Yes	No	1	1	8	-	-	LB
NW8	Residential	3c Perkins St Residential	1.5	47	45	45	38	55	50	43	Yes	Yes	No	2	2	9	-	-	LB
NW9	Residential	3d Perkins St Residential	1.5	48	45	45	38	55	50	43	Yes	Yes	No	3	3	10	-	-	LB
S02	Residential	30 Artonish Lane	1.5	49	42	42	37	52	47	42	Yes	No	No	7	7	12	-	-	M, LB, RO2
S03	Residential	28 Artonish Lane	1.5	47	42	42	37	52	47	42	Yes	No	No	5	5	10	-	-	LB
S04	Residential	26 Artonish Lane	1.5	45	42	42	37	52	47	42	Yes	Yes	No	3	3	8	-	-	LB
S05	Residential	24 Artonish Lane	1.5	44	42	42	37	52	47	42	Yes	Yes	No	2	2	7	-	-	LB
S06	Residential	22 Artonish Lane	1.5	44	42	42	37	52	47	42	Yes	Yes	No	2	2	7	-	-	LB
S07	Residential	9 Beames Ave	1.5	54	42	42	37	52	47	42	No	No	No	12	12	17	-	LB	M, LB, RO2
S08	Residential	11 Beames Ave	1.5	52	42	42	37	52	47	42	No	No	No	10	10	15	-	-	M, LB, RO2
S09	Residential	35 Catherine St	1.5	52	42	42	37	52	47	42	No	No	No	10	10	15	-	-	M, LB, RO2
S10	Residential	33 Catherine St	1.5	51	42	42	37	52	47	42	Yes	No	No	9	9	14	-	-	M, LB, RO2
S11	Residential	31 Catherine St	1.5	49	42	42	37	52	47	42	Yes	No	No	7	7	12	-	-	M, LB, RO2
S12	Residential	29 Catherine St	1.5	45	42	42	37	52	47	42	Yes	Yes	No	3	3	8	-	-	LB
S13	Residential	27 Catherine St	1.5	46	42	42	37	52	47	42	Yes	Yes	No	4	4	9	-	-	LB
S14	Residential	25 Catherine St	1.5	46	42	42	37	52	47	42	Yes	Yes	No	4	4	9	-	-	LB
S15	Residential	23 Catherine St	1.5	46	42	42	37	52	47	42	Yes	Yes	No	4	4	9	-	-	LB
S16	Residential	21 Catherine St	1.5	45	42	42	37	52	47	42	Yes	Yes	No	3	3	8	-	-	LB
S17	Residential	2 Mavis St	1.5	49	42	42	37	52	47	42	Yes	No	No	7	7	12	-	-	M, LB, RO2
S18	Residential	6 Mavis St	1.5	49	42	42	37	52	47	42	Yes	No	No	7	7	12	-	-	M, LB, RO2
S19	Residential	8 Mavis St	1.5	49	42	42	37	52	47	42	Yes	No	No	7	7	12	-	-	M, LB, RO2
S20	Residential	10 Mavis St	1.5	49	42	42	37	52	47	42	Yes	No	No	7	7	12	-	-	M, LB, RO2
S21	Residential	12 Mavis St	1.5	49	42	42	37	52	47	42	Yes	No	No	7	7	12	-	-	M, LB, RO2
S22	Residential	14 Mavis St	1.5	49	42	42	37	52	47	42	Yes	No	No	7	7	12	-	-	M, LB, RO2
S23	Residential	16 Mavis St	1.5	48	42	42	37	52	47	42	Yes	No	No	6	6	11	-	-	M, LB, RO2
S24_Art	School	Rooty Hill School of Arts	1.5	48	42	42	37	52	47	42	Yes	No	No	6	6	11	-	-	M, LB, RO2
S-AR1	Active Recreation	Sports Field Rooty Hill South	1.5	49	42	42	37	52	47	42	Yes	No	No	7	7	12	-	-	M, LB, RO2
SC01	Commercial	Rooty Hill Rd South Commercial	1.5	54	--	--	--	70	70	70	Yes	Yes	Yes	-16	-16	-16	-	-	-
SC02	Commercial	Rooty Hill Rd South Commercial	1.5	52	--	--	--	70	70	70	Yes	Yes	Yes	-18	-18	-18	-	-	-
SC03	Commercial	Rooty Hill Rd South Commercial	1.5	50	--	--	--	70	70	70	Yes	Yes	Yes	-20	-20	-20	-	-	-
SC04	Residential	Lone Pine Tavern	1.5	52	--	--	--	70	70	70	Yes	Yes	Yes	-18	-18	-18	-	-	-
XS01A	Residential	Future Aged Care	1.5	57	42	42	37	52	47	42	No	No	No	15	15	20	-	LB	M, LB, RO2
XS01B	Residential	Future Aged Care East	1.5	55	42	42	37	52	47	42	No	No	No	13	13	18	-	LB	M, LB, RO2

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