



Review of Environmental Factors The Cooks to Cove GreenWay (In-Corridor Works)

Appendix J: Noise and Vibration Impact Assessment (Marshall Day Acoustics, 2021)

June 2021



GREENWAY CORRIDOR
CONSTRUCTION NOISE AND VIBRATION
ASSESSMENT

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Project: GREENWAY CORRIDOR

Prepared for: Eco Logical Australia
Suites 28 & 29, Level 7
19 Bolton Street
Newcastle NSW 2300

Attention: Rebecca Ben-Haim

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SUMMARY

Marshall Day Acoustics (MDA) have been commissioned by Eco Logical Australia to conduct an assessment of noise and vibration relating to the redevelopment and operation of portions of the existing urban environmental corridor known as the GreenWay. The GreenWay corridor will feature bike paths and foreshore walks along the active transport corridor. The project is to be constructed over approximately 16 months.

Background noise surveys along the proposed project have been carried out to determine the existing noise environment. Based on the measured ambient noise levels, applicable site-specific Construction Noise Management Levels (NMLs) for various receiver types have been determined.

Due to the nature of operation of the GreenWay (walking and cycling), it is expected that operational noise impacts will be negligible and therefore the primary noise and vibration impacts are expected during the construction works.

Noise from construction activities have been assessed based on assumed plant equipment likely to be used during the proposed construction works and sites. Noise predictions from construction works indicate the potential to exceed the site specific “Highly Noise Affected” and “Noise Affected” management goals at the nearest residential receivers. A summary of noise impact on the Residential and Other Land Uses during various stages of work is provided in the table below. Note that this assessment does not include a land use study of individual allotments in the proximity of the works. Site visits, plans and satellite photos have been reviewed to identify general receiver types.

Table 1: Summary of potential construction noise impact at receivers near proposed construction sites based on land uses

Work ID	Work/ Site	Works Period			
		Standard hours		Evening	Night
		“Noise Affected”	“Highly Noise Affected”	“Noise Affected”	
CS-01	A compound site at Weston Street	R, OLU	R	-	-
CS-02	A compound site at Davis Street	R, OLU	R	-	-
CS-03	A compound site at Constitution Road	R, OLU	R	-	R
CS-04	A compound site at Canterbury Road	R, OLU	R	-	-
CS-05	A compound site at the east of Hercules Street	R	R	-	-
CS-06	A compound site at Lewisham West	R	Not expected	-	-
CS-07	A compound site at Gadigal Reserve	R, OLU	R	-	-
WF	Fencing	R	R	-	-
W-01	Gadigal Reserve Preliminary Works	R, OLU	R	-	-
W-02	Parramatta Road under Bridge and Approaches	R, OLU	R	R	-
W-03	Longport Street Northern Approach	R, OLU	R	-	-

Work ID	Work/ Site	Works Period			
		Standard hours		Evening	Night
		“Noise Affected”	“Highly Noise Affected”	“Noise Affected”	
W-04	Gadigal Reserve Path	R, OLU	R	-	-
W-05	Longport Street Jacked Box Culvert Tunnel	R, OLU	R	R	-
W-06	Lewisham West Corridor Construction	R, OLU	R	-	-
W-07	Davis Street & Constitution Road Cut and Cover Tunnel	R, OLU	R	-	-
W-08	Davis Street to Johnson Park	R, OLU	R	-	-
W-09	Constitution Road to New Canterbury Road	R, OLU	R	-	R
W-10	Hercules Street Parklands	R	R	-	-

Note: ‘-’ indicates that no works are proposed during this period, ‘R’ indicates Residential receivers and ‘OLU’ indicates Other Land Uses.

Note that the above does not indicate that the noise management goals will be exceeded during construction, as these predictions are based on assumed construction methodologies and some noise control measures without the incorporation of all feasible and reasonable noise controls. It does however indicate that there is potential for noise impacts along most of the corridor that will need to be managed during construction.

As construction noise levels are predicted to potentially exceed the “Noise Affected” and/or “Highly Noise Affected” NMLs at some receivers, a detailed Construction Noise and Vibration Management Plan (CNVMP) will need to be prepared in the detailed design phase once detailed construction methodology is available.

Based on the high-level construction traffic noise impact assessment presented in this report, it is unlikely that the project will generate significant traffic noise impacts during Daytime works. However, some construction works would be required during the Night-time period at some work areas where potential sleep awakening is probable. Therefore, a detailed traffic noise impact assessment as part of the CNVMP will be required once a detailed construction traffic assessment is available.

Vibration impacts due to construction works have been reviewed and “Safe Working Distance” from vibration intensive plant indicating the minimum safe distance for the purpose of structural damage are provided. It is recommended that once a detailed construction methodology is known and specific equipment items are selected, a detailed review of proposed plant locations, close working zones, equipment selections and work activities are conducted. Baseline vibration measurements for vibration generating works to develop site-specific exclusion zones should be considered. Detailed vibration impact assessment for works near sensitive receivers are also required to be prepared as part of the CNVMP.

Based on the assumed plant and equipment summarised in this report, the use of some vibration intensive activities may potentially exceed the applicable human comfort guidelines. Where vibration intensive activities are proposed close to sensitive receivers, a detailed vibration impact assessment as part of the CNVMP will be required.

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1.0 INTRODUCTION

1.1 Assessment context and scope

Marshall Day Acoustics (MDA) have been commissioned by Eco Logical Australia to conduct an assessment of noise and vibration relating to the redevelopment and operation of portions of the existing urban environmental corridor known as the GreenWay. The GreenWay corridor will feature bike paths and foreshore walks along the active transport corridor. The project is to be constructed over approximately 16 months.

The purpose of this assessment is to provide a technical assessment to form part of the Review of Environmental Factors (REF) for the GreenWay project. This includes quantifying the existing acoustic environment at and around the site, setting Noise Management Levels for each receiver area and identifying areas where noise impacts are likely and mitigation will be required.

This assessment is based on assumed construction methodologies, noting that a construction team has not been appointed at this time. Future work will need to be undertaken once the detailed design has been carried out and a builder appointed in order to prepare a plan to manage noise and vibration impacts from the works. This would include preparation of a Construction and Vibration Noise Management Plan (CNVMP) for the site.

The current assessment does not include a land use study of individual allotments in the proximity of the works. Site visits, plans and satellite photos have been reviewed to identify general receiver types but future works (at CNVMP stage) may need access to a land use study, particularly to identify non-residential sensitive land uses.

Technical terms used throughout this report are described in Appendix A.

1.2 Document Registry

Acoustic advice provided in this report is based on the following documentation:

- ‘GreenWay In-corridor Project Overview’ prepared by Inner West Council, dated June 2020;
- ‘GreenWay Concept Design Part 2 (Parramatta Rd to Old Canterbury Rd)’ PDF, dated July 2020;
- ‘GreenWay Concept Design Part 3 (Old Canterbury Rd to New Canterbury Road)’ PDF, dated July 2020;
- ‘GreenWay Concept Design Part 4 (New Canterbury Road to Cooks River)’ PDF, dated July 2020.
- ‘Sydney Light Rail Extension Stage 1 Lilyfield to Dulwich Hill Noise and Vibration Assessment’ prepared by Heggies, 2010.

The drawings listed in Table 2 has been considered as part of this assessment.

Table 2: Drawings review schedule

Title	Document No.	Author	Date	Revision
Gadigal Reserve	LD-CD-107	McGregor Coxall	08/07/2020	E
Lewisham West	LD-CD-108	McGregor Coxall	08/07/2020	D
Dulwich Hill Parks	LD-CD-110	McGregor Coxall	02/05/2019	H
Const. Rd – Hercules St	LD-CD-111	McGregor Coxall	29/05/2020	I
Hercules St open space	LD-CD-112	McGregor Coxall	29/05/2020	I

1.3 Relevant Guidelines and Standards

The construction noise impact is assessed in accordance with the following relevant Policies and Guidelines:

- *Interim Construction Noise Guideline, Department of Environment and Climate Change (ICNG),*
- *Assessing Vibration: A Technical Guideline 2006 (Department of Environment and Conservation, 2006)*
- *NSW Road Noise Policy, Department of Environment and Climate Change (RNP).*
- *NSW Noise Policy for Industry 2017, NSW Environment Protection Authority (NPfI)*

2.0 SITE AND PROJECT DESCRIPTION

2.1 Project Overview

The GreenWay project follows the route of the Inner West Light Rail and Hawthorne Canal and features bike paths and foreshore walks. This project travels through the suburbs of Dulwich Hill, Lewisham, Summer Hill, Haberfield and Leichhardt.

The in-corridor works generally include the construction of a shared path, lighting, landscaping and ecological restoration within the Inner West Light Rail Corridor and adjacent land. The in-corridor works consist of two discrete areas known as the central links and the southern links. The central link extends from north of Parramatta Road to south of Old Canterbury Road while the southern link extends from Weston Street to Hercules Street.

The concept design reviewed in this assessment has been provided by McGregor Coxall. However, it is expected that the concept design will be revised based on outcomes of the REF and technical review by TfNSW to develop the reference design. The reference design will form the basis for a Design and Construct contract. As such the assumptions, controls and assessment outcomes in this report must be reviewed in the detailed design phase.

The operation of the GreenWay was originally assessed as part of the 2010 proposal to construct the Inner West Light Rail Extension, however, the GreenWay (bike paths etc.) were not ultimately constructed at that time. The acoustic technical report prepared for the submission (Heggies/Parsons Brinkerhoff report ref 10-8859-R1 Rev 0 dated 7/10/2010) provided as the assessment of construction noise impacts for the project but noted that *“There is no requirement to assess operational noise impacts from users of the GreenWay and operational noise impacts of the GreenWay are not expected to be significant.”*

Due to the nature of operation of the GreenWay (walking and cycling), it is expected that operational noise impacts will be negligible and therefore not assessed further in this report.

2.2 Construction Hours

It is anticipated that most works will be completed during Standard daytime construction hours. At some locations work outside of standard hours would also be required. The works during the following periods are anticipated:

Standard hours: Monday to Friday from 7 am to 6 pm, Saturday 8 am to 1 pm. No work on Sundays or public holidays.

Outside Standard hours-1 (OSH-1): Monday to Friday 6 pm – 10 pm.

Outside Standard hours-2 (OSH-2): It is anticipated that some works during Monday to Friday 10 pm – 7 am would be required at one construction site (see Section 2.3).

2.3 Construction Works

Construction works will be undertaken along the GreenWay shared path alignment as shown in Appendix B. It is anticipated that a number of construction compound areas of varying size would be required for the construction of the project. These construction compounds would be located close to relevant construction activities.

Table 3 lists the nominated construction and compound sites and shows the proposed construction periods assessed in this report.

Table 3: Probable construction sites and works periods

Work ID	Work/ Site	Works Period		
		Standard hours	OSH-1	OSH-2
CS-01	A compound site at Weston Street	✓	-	-
CS-02	A compound site at Davis Street	✓	-	-
CS-03	A compound site at Constitution Road	✓	-	✓
CS-04	A compound site at New Canterbury Road	✓	-	-
CS-05	A compound site at the east of Hercules Street	✓	-	-
CS-06	A compound site at Lewisham West	✓	-	-
CS-07	A compound site at Gadigal Reserve	✓	-	-
WF	Fencing	✓	-	-
W-01	Gadigal Reserve Preliminary Works	✓	-	-
W-02	Parramatta Road under Bridge and Approaches	✓	✓	-
W-03	Longport Street Northern Approach	✓	-	-
W-04	Gadigal Reserve Path	✓	-	-
W-05	Longport Street Jacked Box Culvert Tunnel	✓	✓	-
W-06	Lewisham West Corridor Construction	✓	-	-
W-07	Davis Street & Constitution Road Cut and Cover Tunnel	✓	-	-
W-08	Davis Street to Johnson Park	✓	-	-
W-09	Constitution Road to New Canterbury Road	✓	-	✓
W-10	Hercules Street Parklands	✓	-	-

3.0 EXISTING NOISE ENVIRONMENT

3.1 Noise Monitoring Locations

The existing noise environment in the vicinity of the project varies along the project. A survey of background noise levels was conducted at various locations along the project site and close to the site boundary to determine the existing noise environment during the Daytime, Evening and Night-time periods. These are required to determine the appropriate noise design goals known as Noise Management Levels (NMLs) in accordance with the ICNG.

In this report, NMLs for various areas are determined as a basis for assessing the potential noise impacts during construction works. Unattended environmental noise monitoring was conducted from 21 October 2020 to 5 November 2020 to establish present ambient noise levels. Noise

monitoring requires a minimum of seven days of data however the loggers were left deployed for just over two weeks in order to maximise the data available and as some sites could not be accessed sooner. The final monitoring duration varies by location as some batteries were depleted prior to retrieval and as such the monitoring period varies between eleven and fifteen days.

The nominated locations were selected based on a review of the potentially affected areas and provide a fair representation of noise levels in the local environment and nearby noise sensitive receivers. Table 4 shows the monitoring locations and the equipment used. Monitoring locations are also shown in the figures in Appendix C.

Table 4: Measurement sites, monitoring IDs and equipment serial numbers

Monitoring ID	Address	Equipment
BG-01	8 Haig Avenue, Summer Hill	01 dB noise logger (S/N: CUBE 11877)
BG-02	101 Malthouse Way, Summer Hill	01 dB noise logger (S/N: CUBE 11887)
BG-03	Bush care site at Fred Street, Lewisham	01 dB noise logger (S/N: DUO 10194)
BG-04	3 Williams Parade, Dulwich Hill	01 dB noise logger (S/N: DUO 10349)
BG-05	49A Hercules Street, Dulwich Hill	01 dB noise logger (S/N: DUO 10769)

The measurement equipment was calibrated before and after the survey with no significant drift observed.

3.2 Unattended Noise Monitoring Results

Average L_{A90} and L_{Aeq} noise levels measured during the long-term noise survey are shown in Table 5 and have been derived in accordance with the data exclusion rules described in the NPfI.

It is noted that most construction works will be completed during standard Daytime construction hours (7 am – 6 pm). However, at some locations, Evening (6 pm – 10 pm) and Night-time (1 am – 4 am) works would also be required. The Day Evening and Night periods as defined in the NPfI have been used for derivation of the RBLs in Table 5.

All the measurements were generally conducted at a height of 1.5 m above the ground level and in a free-field condition (more than 1 m from any vertical surface). Graphs of the measured noise levels during the measurement period are provided in Appendix D.

Table 5: Measured average background and ambient noise levels

Monitoring ID	Period	RBL L_{A90} dB	L_{Aeq} dB
	Standard hours – Day	44	54
BG-01	Outside Standard hours-1 (OSH-1) - Evening	42	54
	Outside Standard hours-2 (OSH-2) - Night	34	50
	Standard hours – Day	46	55
BG-02	Outside Standard hours-1 (OSH-1) - Evening	42	53
	Outside Standard hours-2 (OSH-2) - Night	37	50
	Standard hours – Day	43	55
BG-03	Outside Standard hours-1 (OSH-1) - Evening	37	60
	Outside Standard hours-2 (OSH-2) - Night	30 (29)	50
BG-04	Standard hours – Day	40	56

Monitoring ID	Period	RBL L _{A90} dB	L _{Aeq} dB
	Outside Standard hours-1 (OSH-1) - Evening	39	54
	Outside Standard hours-2 (OSH-2) - Night	31	49
	Standard hours – Day	37	51
BG-05	Outside Standard hours-1 (OSH-1) - Evening	33	53
	Outside Standard hours-2 (OSH-2) - Night	30 (27)	48

Note: Standard hours: Monday to Friday from 7 am to 6 pm, Saturday 8 am to 1 pm. No work on Sundays or public holidays.

Outside Standard hours-1 (OSH-1): Monday to Friday 6 pm – 10 pm.

Outside Standard hours-2 (OSH-2): Monday to Friday 10 pm – 7 am.

* In accordance with NPfl, where RBL is below the ‘Minimum Assumed RBL’ for the relevant period, the ‘Minimum Assumed RBL’ is selected. Noise level within brackets shows the measured RBL.

4.0 CONSTRUCTION NOISE AND VIBRATION OBJECTIVES

4.1 Airborne Noise Management Levels

In this section, construction noise targets have been determined based on the relevant guidelines and standards mentioned in Section 1.3 as well as measured ambient noise levels presented in Section 3.2. Noise criteria applicable to the project site with respect to construction activities have been derived considering the ‘*Interim Construction Noise Guideline*’ (ICNG) The full derivation of criteria is provided in Appendix E.

The majority of the receivers in the vicinity of the proposed works are residential receivers consisting of a mix of single and multiple dwellings. Other existing land uses in the study area include industrial areas, educational establishments, active and passive recreation areas, and retail areas.

4.1.1 Residential receivers – NMLs during Day and Evening periods (7 am to 10 pm)

ICNG sets airborne Noise Management Levels (NMLs) for residential receivers based on the measured Rating Background Level. The existing noise environment in the vicinity of the project varies along the project. Noise criteria applicable to the residential receivers in the vicinity of the noise monitoring location described in Section 3.1, are summarised in Appendix E.

4.1.2 Residential receivers – sleep disturbance during Night-time period (10 pm to 7 am)

In addition to the NMLs, where construction would be required during the Night-time period the potential sleep disturbance impact should be assessed.

The ICNG refers to the *NSW Environmental Criteria for Road Traffic Noise*, EPA 1999, in assessing the extent of the impact on sleep. This policy, however, is superseded by the *NSW Road Noise Policy*, EPA 2011.

The *NSW Environmental Criteria for Road Traffic Noise*, EPA 1999, discussed a guideline aimed at limiting the level of sleep disturbance due to environmental noise – that the L_{AF1, 1 minute} level of any noise should not exceed the ambient L_{AF90} noise level by more than 15 dB. This guideline takes into account the emergence of noise events, but does not directly limit the number of such events or their highest level, which are also found to affect sleep disturbance. However, *NSW Road Noise Policy*, EPA 2011 concluded that:

- Maximum internal noise levels below 50–55 dB(A) are unlikely to awaken people from sleep
- One or two noise events per night, with maximum internal noise levels of 65–70 dB(A), are not likely to affect health and wellbeing significantly.

On this basis, the approach of assessing potential sleep disturbance in this report is to apply an initial screening criterion of background plus 15 dBA and to undertake further detailed analysis if the screening criterion is exceeded.

Based on the assumption that an open window provides 10 dB attenuation (which would be typical of a facade with partially open windows), noise levels below 60-65 dB L_{Amax} outside an open bedroom window would be unlikely to cause awakening reactions. Furthermore, one or two events with a noise level of 75-80 dB L_{Amax} outside an open bedroom window would be unlikely to affect health and well-being significantly.

4.1.3 Other Sensitive Land Uses – NMLs

In accordance with the ICNG, other sensitive land uses (non-residential), typically consider noise from construction to be disruptive when the properties are being used. Appendix E provides NMLs for other sensitive receivers for various land uses.

4.2 Construction Traffic Noise Criteria

In accordance with ICNG, potential road traffic noise impact from construction traffic on public roads to and from the subject site should be assessed under the *Environmental Criteria for Road Traffic Noise* (EPA 1999). This policy, however, has been superseded by the *NSW Road Noise Policy* (EPA 2011).

The *NSW Road Noise Policy* (RNP) provides noise level criteria for increased traffic flow as a result of land-use Development with the potential to create additional traffic. Table 6 presents the traffic noise criteria applicable to this project.

Table 6: Road Traffic Noise Criteria

Type of Development	Criteria	
	Day 0700-2200hrs	Night 2200-0700hrs
Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	$L_{eq(15hr)}$ 60 dBA (external)	$L_{eq(9hr)}$ 55 dBA (external)
Existing residences affected by additional traffic on existing local roads generated by land use developments	$L_{eq(1hr)}$ 55 dBA (external)	$L_{eq(1hr)}$ 50 dBA (external)

Source: Table3 EPA – RNP

Additionally, the RNP states that ‘for existing residences and other sensitive land uses affected by additional traffic on existing roads generated by land use developments, any increase in the total traffic noise level as a result of the Development should be limited to 2 dB above that of the noise level without the Development. This limit applies wherever the noise level without the Development is within 2 dB of, or exceeds, the relevant day or night noise assessment criterion.’

Additionally, where construction would be required during the Night-time period the potential sleep disturbance impact should be assessed. Based on the discussion presented in Section 4.1.2, the approach of assessing potential sleep disturbance in this report is to apply an initial screening criterion of background plus 15 dBA and to undertake further detailed analysis if the screening criterion is exceeded.

4.3 Vibration Targets

4.3.1 Vibration targets to prevent structural cosmetic damage

Vibration levels which are likely to cause cosmetic damage to surrounding properties of the site are to be assessed using *DIN 4150-3:1999 ‘Structural Vibration – Effects of vibration on structures’*.

Table 7: Vibration limits according to DIN 4150: Peak Particle Velocity, (PPV) mm/s

Line	Type of structure	Vibration at the foundation of building, at a frequency of			Vibration in horizontal plane of highest floor, at all frequencies
		1Hz to 10Hz	10Hz to 50Hz	50Hz to 100Hz and above	
I	Buildings used for commercial purposes, industrial buildings, and buildings of similar design	20	20 to 40	40 to 50	40
II	Dwellings and buildings of similar design and/or occupancy	5	5 to 15	15 to 20	15
III	Structures that, because of their particular sensitivity to vibration, cannot be classified under lines I and II and are of great intrinsic value (e.g. listed buildings under preservation order)	3	3 to 8	8 to 10	8

4.3.2 Specific vibration requirements – Jemena gas mains

Construction of the tunnel at Constitution Road is to take place in the proximity of Jemena gas mains. For the purpose of protecting the gas mains near at this site, the following in-principal protection guidelines are provided by Jemena:

1. *Peak particle velocity being felt by gas main to not exceed 20mm/s;*
2. *Construction methodology should be provided and submitted to Jemena for approval;*
3. *An integrity inspection of Jemena gas main would be required to be performed;*
4. *Depending on the final depth of cover, a protection slab may be required over Jemena gas main;*
5. *Being a secondary main, pipeline patrol would be required;*
6. *In relation to the crane operations, loading assessment would be required.*

These guidelines need to be considered in the detailed design and construction methodology of the project along with relevant vibration requirements in Section 4.3.1.

4.3.3 Human comfort vibration targets

Humans can detect vibration levels which are well below those causing any risk of damage to a building or its contents. Human comfort due to vibration from construction works is assessed under the NSW EPA document *Assessing Vibration – a technical guideline* (DEC 2006).

The vibration characteristics of most construction activities (e.g. excavation, rock breaking and pilling) are considered to be intermittent. Vibration criteria applicable to the site for intermittent vibration sources, are summarised in Table 8.

Table 8: Vibration limits according to Assessing Vibration: A Technical Guideline, (m/s^{1.75})

Location	Daytime (0600-2200hrs) ¹		Night (2200-0600 hrs) ¹	
	Preferred Value, VDV	Maximum Value, VDV	Preferred Value, VDV	Maximum Value, VDV
Critical areas ²	0.1	0.2	0.1	0.2
Residences	0.2	0.4	0.13	0.26
Offices, schools, educational institutions and places of worship	0.4	0.8	0.4	0.8
Workshops	0.8	1.6	0.8	1.6

Note: 1 Daytime is 7.00 am to 10.00 pm and Night-time is 10.00 pm to 7.00 am.

2 Examples include hospital operating theatres and precision laboratories where sensitive operations are occurring. These criteria are only indicative, and there may be a need to assess intermittent values against the continuous or impulsive criteria for critical areas. Source: BS 6472–1992

5.0 CONSTRUCTION NOISE

In this section construction noise impact assessments associated with the proposed works described in Section 2.3, are provided. Construction noise targets have been established in the previous section and the prediction results are based on the assumptions detailed in this report.

Ground-borne noise associated with the expected activities from the transmission of vibration through the ground is expected to be negligible compared to the direct transmission of noise through the air. Therefore, ground-borne construction noise has not been assessed further in this report.

5.1 Construction Airborne Noise Prediction Methodology

5.1.1 Assessment scenarios

Construction works are proposed to be undertaken along the GreenWay shared path alignment as shown in Appendix B. Based on the proposed construction locations and methodology, the following scenarios were developed to represent the works at various construction sites within the project.

Construction works: [CS-01 – CS-07] (Compound Sites)

Two scenarios were developed to represent potential noise impact on the surrounding receivers from proposed works at the compound sites [CS-01 – CS-07] defined in Section 2.3. Noise levels from the proposed compound sites in this assessment have been calculated for the following scenarios:

“Establishment Phase” (E): During this phase, the compound site would be established. It is assumed that all the proposed plant items nominated by the client for this activity will be working concurrently towards the centre of the relevant compound site for between 25 to 100% of the time over a 15-minute period.

“Operation Phase” (O): During this phase, the compound site would support the construction of the GreenWay project. It is assumed that all the proposed plant items nominated by the client for this activity will be working concurrently towards the centre of the relevant construction site for between 25 to 100% of the time over a 15-minute period.

Construction works: [WF] (Fencing)

Fencing works are proposed at various location along the boundary of the site. Since the majority of the works are expected to occur at the site boundary, only one scenario for this activity is assumed. For the assessment of this activity, it is assumed that all the proposed plant items for this activity would operate concurrently at the boundary of the project where required.

Construction works: [W-01 – W-010] (Construction of GreenWay)

For construction works [W-01 – W-010] defined in Section 2.3, two scenarios were developed to represent the works potentially having the greatest noise impact on the surrounding receivers. Noise levels for these works in this assessment have been calculated for the following scenarios:

“Typical Average Case” (TA): it is assumed that all the proposed plant items nominated by the client will be working concurrently towards the centre of the relevant construction site for between 25% to 100% of the time over a 15-minute period.

“Typical Worst Case” (TW): it is assumed that two of the noisiest proposed plant items will be working concurrently simultaneously near the boundary of the relevant construction site for between 25 to 100% of the time over a 15-minute period.

Situations, where noise sources would be located towards the centre of the site, are likely to be representative of the longer-term average noise emissions.

5.1.2 Assumed construction plant items and sound power

At this early planning stage, specific details regarding proposed construction processes are not established, with the types of activities, plant and schedule not yet determined. On this basis, plant and equipment used during each stage of construction works have been assumed based on typical work practices. These assumptions must be reviewed in the detailed design phase when more information is available on the schedule for the works and the equipment to be used.

If the plant items to be used differ from that assumed in this report, further assessment of construction noise and vibration will be required. A summary of equipment assumed to be operating and the assumed operating duty (percentage of time operating per 15-minute period) for each phase of construction work, is provided in Appendix F. The relevant sound power data for these plant items is provided in Appendix G.

5.1.3 Modelling assumptions

Noise levels have been calculated at 1.5m above ground level in accordance with the requirements of the ICNG and at various distances from the boundary of the site. Calculated noise levels include the effects of the noise control recommendations specific to each work area detailed in a relevant work area in Section 5.2.

The calculations in this assessment take into account the direct noise from construction works without the noise attenuation due to obstacles, buildings and barriers as well as the noise reflected from buildings. Therefore, it is expected that predicted noise levels in this report present potential noise levels at sensitive receivers with a direct line of sight to the proposed construction activities.

5.2 Construction Airborne Noise Assessment by Work Area

Noise levels from construction activities during the stages of works described in Section 2.3, have been calculated in this section. These noise levels have been predicted under guidance from ‘AS2436-2010 Guide to noise control on construction, maintenance and demolition sites’ and utilising the information provided in ‘BS 5228-1-2009 Code of practice for noise and vibration control on construction and open sites’.

For each construction site, a range of noise levels is predicted at various distances between the assumed noise sources and receivers for the assessment scenarios defined in Section 5.1.1. It should be noted that some assessment scenarios assume that all the proposed plant items can be working concurrently in a 15-minute construction period. Therefore, the predicted noise levels presented in the following sections are representative of the potential ‘noisiest’ 15-minute construction period. However, generally, predicted noise levels are expected to be lower for a majority of the construction periods when all the plant items are not working concurrently in a 15-minute period.

5.2.1 [CS-01 – CS-07] – Compound sites

Description

Several compound site would be required to support the construction sites along the project. Compound sites would be established prior to the commencement of site works at multiple locations and would be retained in place for parts of or throughout the works period.

The establishment of compound sites would involve vegetation clearing and ground levelling and fencing as required. During the operation of a compound site, loading and unloading of materials and equipment would be expected. It is anticipated that the establishment of all the compound site would be undertaken during the Standard hours only. Moreover, it is anticipated that all the compound sites would only operate during the Standard hours with the exception of the compound site at Canterbury Road [CS-03] where some works during Night period (OSH-2) are also expected during the operation phase of this compound site. Figure 1 to Figure 6 show area photo indicating schematic locations of the proposed compound sites.

Figure 1: Schematic location of compound sites at ‘Weston Street’ and ‘Davis Street’ [CS-01 and CS-02]



Figure 2: Schematic location of construction work area at 'Constitution Road' [CS-03]



Figure 3: Schematic location of construction work area at 'Canterbury Road' [CS-04]



Figure 4: Schematic location of construction work area east of 'Hercules Street' [CS-05]



Figure 5: Schematic location of construction work area at 'Lewisham West' [CS-06]

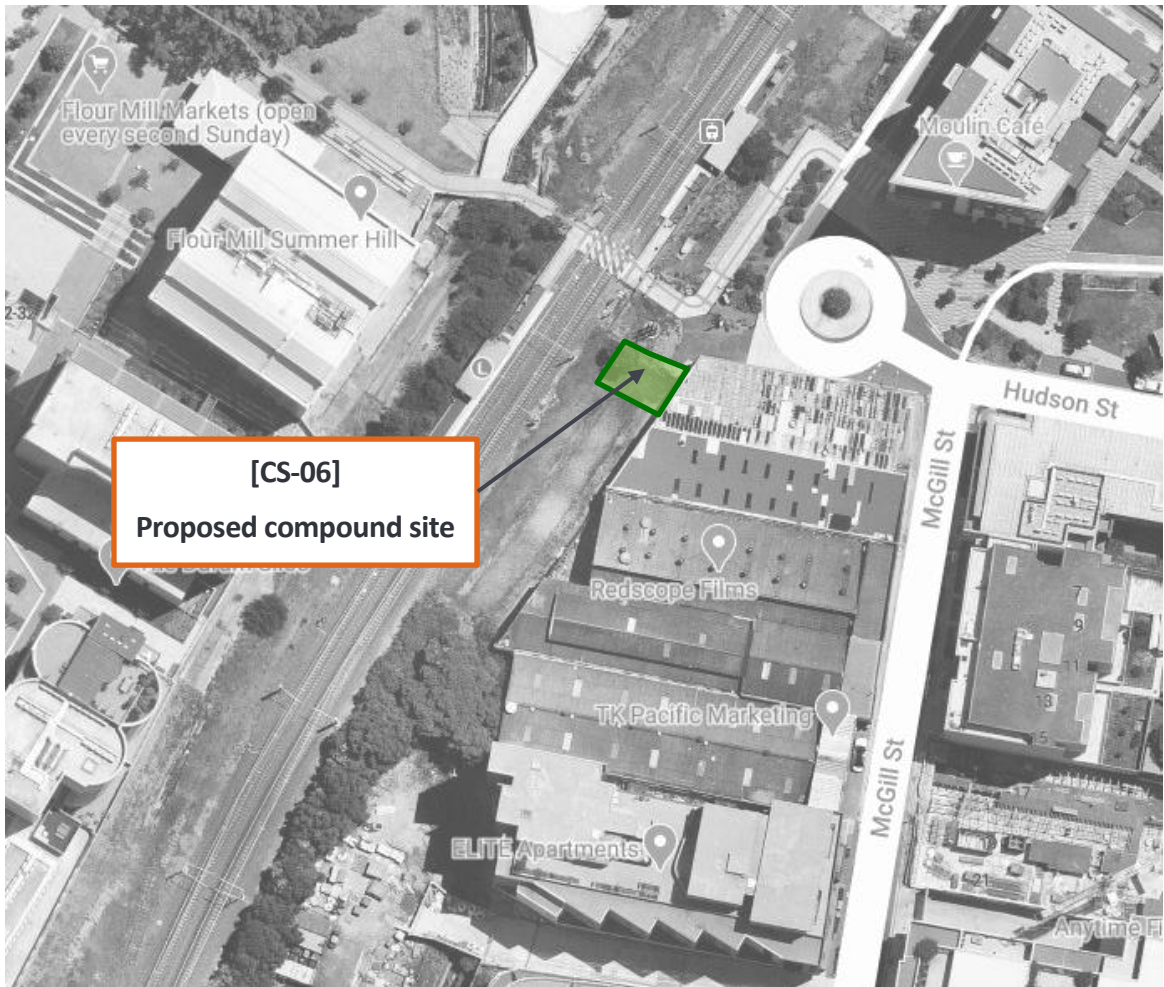


Figure 6: Schematic location of construction work area at ‘Gadigal Reserve’ [CS-07]



Assumed construction plant items and sound power

A summary of equipment and the assumed duty (percentage operation in 15-minute) of equipment to be operating simultaneously in a 15-minute period for each construction work phase, is provided in Appendix F. The relevant sound power data for these plant items is provided in Appendix G.

Site-specific NMLs

For residential receivers located in the proximity of the compound sites, the applicable construction NMLs based on the background noise measurements conducted at the relevant monitoring locations are presented in Table 9.

Table 9: Residential Construction NMLs applicable to receivers near compound Sites [CS-01 - CS-07], L_{Aeq} dB

Compound Site	Monitoring ID	Standard hours		Outside Standard hours	
		“Noise Affected”	“Highly Noise Affected”	OSH-1	OSH-2
[CS-01] Weston Street	BG-04	50	75	N/A	N/A
[CS-02] Davis Street	BG-04	50	75	N/A	N/A
[CS-03] Constitution Road	BG-04	50	75	N/A	N/A
[CS-04] Canterbury Road	BG-04	50	75	N/A	36*

Compound Site	Monitoring ID	Standard hours		Outside Standard hours	
		“Noise Affected”	“Highly Noise Affected”	OSH-1	OSH-2
[CS-05] east of Hercules Street	BG -05	47	75	N/A	N/A
[CS-06] Lewisham West	BG -02	56	75	N/A	N/A
[CS-07] Gadigal Reserve	BG-01	54	75	N/A	N/A

Note: ‘N/A’ indicates that no works are proposed during this period

* works are proposed only during the Operation Phase of the compound site

NMLs for other Sensitive Land Uses in the vicinity of the works in this site are listed in Appendix E.

Noise control recommendations

In the absence of a detailed construction methodology, no specific noise control measures for the proposed plant items can be recommended at this stage. A detailed Construction Noise and Vibration Management Plan (CNVMP) will need to be prepared in the detailed design phase once detailed construction methodology is available.

Prediction results

Table 10 details the predicted noise levels at the receivers during the works proposed at the Compound Sites. Noise level calculated at 1.5 m above ground level and at various distances from the boundary of the site are provided.

Table 10: Predicted noise levels during works at Compound Sites [CS-01 – CS-07], $L_{Aeq, 15min}$ (dB)

Assessment Scenario	Receiver distance from the boundary of the construction site					
	5 m	10 m	20 m	60 m	80 m	100 m
Establishment of the Compound Site (E)	88	82	76	67	64	62
Operation of the Compound Site (O)	83	77	71	61	59	57

Discussion

The establishment of compound sites, which would involve vegetation clearing and ground levelling and fencing as required, is expected to be carried out relatively in a short period of time. Works during the operation of a compound site are likely to be representative of the longer-term noise emissions. Based on a review of the available drawings and satellite photos, and the predicted results in Table 10, the following noise impacts during the operation phase of a compound site are expected:

[CS-01] Weston Street: The nearest residential receivers are located approximately within 5 m of the site and offices/ retail outlet receivers within 60 m of the site. On this basis works during the Operation of the compound site have the potential to exceed both the “Highly Noise Affected” levels and “Noise Affected” NMLs at some residences. “Noise Affected” Noise Management Level for offices/ retail outlet receivers near this site has the potential to be exceeded.

[CS-02] Davis Street: The nearest residential receivers are located approximately within 5 m of the site and offices/ retail outlet receivers within 20 m of the site. On this basis, the works during the Operation of the compound site have the potential to exceed both the “Highly Noise Affected” levels and “Noise Affected” NMLs at some residences. “Noise Affected” Noise Management Level for offices/ retail outlet receivers near this site is not expected to be exceeded.

[CS-03] Constitution Road: The nearest residential receivers are located approximately within 10 m of the site, offices/ retail outlet receivers within 10 m of the site and active recreational receivers (Arlington Oval and Johnson Park) within 60 m of the site. On this basis, the works during the Operation of the compound site have the potential to exceed both the “Highly Noise Affected” levels and “Noise Affected” NMLs at some residences. While “Noise Affected” Noise Management Level for offices/ retail outlet receivers may potentially be exceeded the levels for active recreational receivers near this site are not expected to be exceeded.

[CS-04] Canterbury Road: The nearest residential receivers are located approximately within 5 m of the site, offices/ retail outlet receivers within 10 m of the site and the Dulwich Hill Public School within 130 m of the site. On this basis, the works during the Operation of the compound site have the potential to exceed both the “Highly Noise Affected” levels and “Noise Affected” NMLs at some residences during Standard hours and Outside Standard hours. While “Noise Affected” Noise Management Level for offices/ retail outlet receivers may potentially be exceeded, these levels for the Dulwich Hill Public School near this site are not expected to be exceeded.

[CS-05] east of Hercules Street: The nearest residential receivers are located approximately within 20 m of the site and the Dulwich Hill Public School within 200 m of the site. On this basis, the works during the Operation of the compound site have the potential to exceed both the “Highly Noise Affected” levels and “Noise Affected” NMLs at some residences. “Noise Affected” Noise Management Level for the Dulwich Hill Public School near this site is not expected to be exceeded.

[CS-06] Lewisham West: The nearest residential receivers are located approximately within 40 m of the site, offices/ retail outlet receivers within 15 m of the site and passive recreational receiver (Harvest Park) within 80 m of the site. On this basis, the works during the Operation of the compound site have the potential to exceed “Noise Affected” NMLs at some residences. “Noise Affected” Noise Management Levels for the offices/ retail outlet and passive recreational receivers are not expected to be exceeded.

[CS-07] Gadigal Reserve: The nearest residential receivers are located approximately within 15 m of the site and passive recreational receiver (Gadigal Reserve) within 50 m of the site. On this basis, the works during the Operation of the compound site have the potential to exceed both the “Highly Noise Affected” levels and “Noise Affected” NMLs at some residences. “Noise Affected” Noise Management Levels for the passive recreational receiver has the potential to be exceeded.

As such the operations at all of the compound sites will need to be considered during the preparation of the CNVMP such that all feasible and reasonable noise management practices are adopted, including consultation with the community. Inclusions for construction noise and vibration management plan are proposed in Appendix H.

Sleep disturbance assessment

Since some construction works would be required during the Night-time period at the compound site near Constitution Road [CS-03], potential sleep disturbance during Night-time works should be assessed. Based on the discussion presented in Section 4.1.2, the site-specific sleep disturbance screening level is 46 dB $L_{A1(60sec)}$. Table 11 details the predicted sleep disturbance noise levels at neighbouring receivers as the result of the operation of an ‘Electric Handheld Tool’ with an assumed L_{A1} 110 dB Sound Power during Night-time period.

Table 11: Predicted sleep disturbance noise levels during ‘Constitution Road Compound Site’ [CS-03], L_{A1} (dB)

Assessment Scenario	Receiver distance from the boundary of the construction site					
	5 m	10 m	20 m	60 m	80 m	100 m
Sleep disturbance	88	82	76	66	64	62

Predicted noise levels for sleep disturbance show that that screening criterion is expected to be exceeded at sensitive receivers with a direct line of sight to plant and equipment at this Compound Site. Where screening criterion is expected to be exceeded further detailed analysis as per Section 4.1.2 are required. Furthermore, detailed analysis is recommended as part of the CNVMP to confirm the number of existing sleep disturbing events that occur as well as the external to internal noise reduction achieved at these locations.

5.2.2 [FW] – ‘Fencing Works’

Description

Prior to the commencement of civil works, permanent fencing of the ‘active’ light rail corridor within the dedicated corridor would be installed between Longport Street and Old Canterbury Road on both sides of the light rail tracks; between Constitution Road and New Canterbury Road on the western side to form a ‘non active’ corridor. The alignment of the fencing would be agreed in consultation with TfNSW. It is anticipated these works could be undertaken during the Standard hours only.

Figure 7 and Figure 8 show area photos indicating a schematic location of the proposed ‘Fencing Works’.

Figure 7: Schematic location of 'Fencing Works' between Longport Street and Old Canterbury Road [FW]

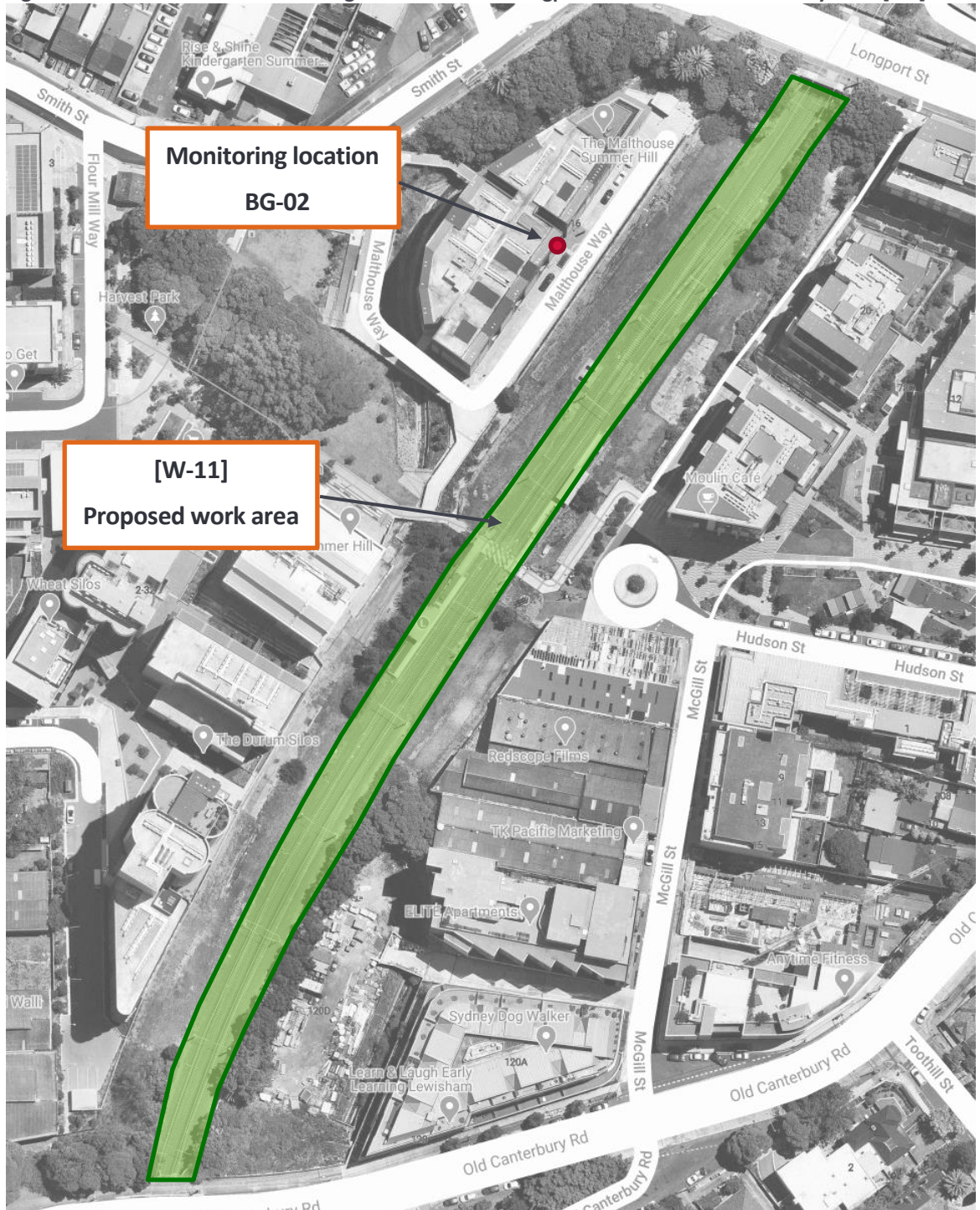
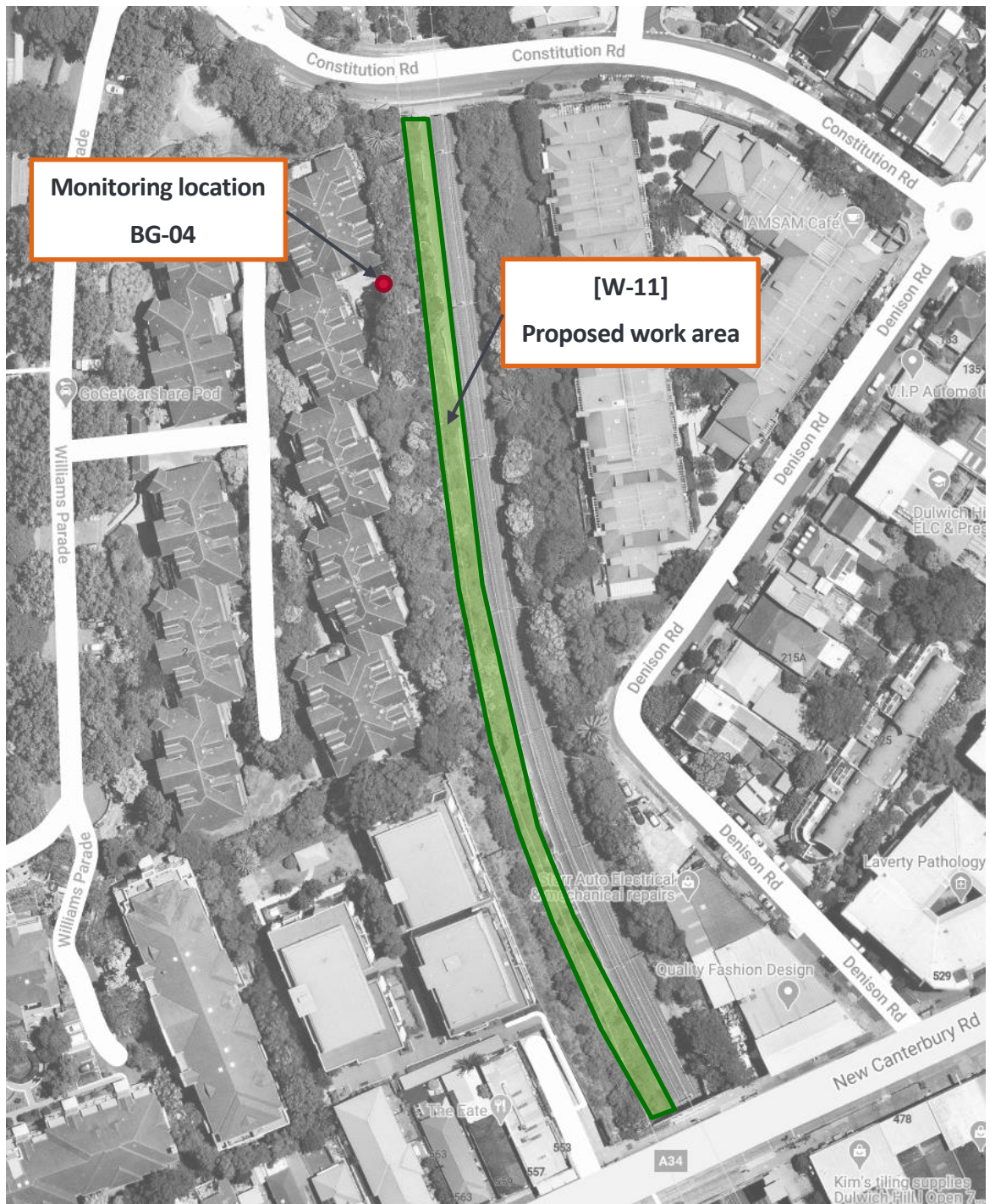


Figure 8: Schematic location of 'Fencing Works' between Constitution Road and New Canterbury Road [FW]



Assumed construction plant items and sound powers

A summary of equipment and the assumed duty (percentage operation in 15-minute) of equipment to be operating simultaneously in a 15-minute period for each construction work phase, is provided in Appendix F. The relevant sound power data for these plant items is provided in Appendix G.

Site-specific NMLs

For residential receivers located in the proximity of the proposed works, the applicable construction NMLs based on the background noise measurements conducted at monitoring location GB-01 and GB-01 are presented in Table 12.

Table 12: Residential Construction NMLs applicable to receivers near ‘Fencing Works’ [FW], L_{Aeq} dB

Residential Receiver Area	Standard hours		Outside Standard hours	
	“Noise Affected”	“Highly Noise Affected”	OSH-1	OSH-2
Between Longport Street and Old Canterbury Road	56	75	N/A	N/A
Between Constitution Road and New Canterbury Road	50	75	N/A	N/A

Note: ‘N/A’ indicates that no works are proposed during this period

NMLs for other Sensitive Land Uses in the vicinity of the works in this site are listed in Appendix E.

Noise control recommendations

In the absence of a detailed construction methodology, no specific noise control measures for the proposed plant items can be recommended at this stage. A detailed Construction Noise and Vibration Management Plan (CNVMP) will need to be prepared in the detailed design phase once detailed construction methodology is available.

Prediction results

Table 13 details the predicted noise levels at the receivers during the Fencing works. Noise level calculated at 1.5m above ground level and at various distances from the boundary of the site. Calculated noise levels include the effects of the noise control recommendations detailed in Table 12.

It is understood that construction activities on-site will not extend outside of the recommended Standard hours.

Table 13: Predicted noise levels during ‘Fencing Works’ [FW], $L_{Aeq, 15min}$ (dB)

Assessment Scenario	Receiver distance from the boundary of the construction site					
	5 m	10 m	20 m	60 m	80 m	100 m
Fencing works	87	81	75	66	63	61

Discussion

Based on a review of the available drawings and satellite photos; and the predicted results in Table 13, the following noise impacts during the Fencing Works are expected:

Between Longport Street and Old Canterbury Road: The nearest residential receivers are located approximately within 10 m of the site, offices/ retail outlet receivers within 20 m of the site and passive recreational receiver (Harvest Park) within 50 m of the site. On this basis the works during the works have at this site has the potential to exceed both the “Highly Noise Affected” levels and “Noise Affected” NMLs at some residences. “Noise Affected” Noise Management Levels for other land uses near this site are not expected to be exceeded.

Between Constitution Road and New Canterbury Road: The nearest residential receivers are located approximately within 10 m of the site, offices/ retail outlet receivers within 30 m of the site, active recreational receivers (Arlington Oval and Johnson Park) within 80 m of the site and the Dulwich Hill Public School within 130 m of the site. On this basis, the works at this site have the potential to exceed both the “Highly Noise Affected” levels and “Noise Affected” NMLs at some residences. “Noise Affected” Noise Management Levels for other land uses near this site are unlikely to be exceeded.

As such the works during 'Fencing Works' will need to be considered during the preparation of the CNVMP such that all feasible and reasonable noise management practices are adopted, including consultation with the community. Inclusions for construction noise and vibration management plan are proposed in Appendix H.

5.2.3 [W-01] – 'Gadigal Reserve Preliminary Works'

Description

Works at this site would be undertaken to facilitate access through Gadigal Reserve for construction of Parramatta Road southern approach [W-02] and Longport Street northern approach [W-03]. The construction would take approximately four months. It is anticipated these works could be undertaken during the Standard hours only.

Figure 9 shows an area photo indicating a schematic location of the proposed construction work area at 'Gadigal Reserve Preliminary Works'.

Figure 9: Schematic location of construction work area at 'Gadigal Reserve Preliminary Works' [W-01]



Assumed construction plant items and sound powers

A summary of equipment and the assumed duty (percentage operation in 15-minute) of equipment to be operating simultaneously in a 15-minute period for each construction work phase, is provided in Appendix F. The relevant sound power data for these plant items are provided in Appendix G.

Site-specific NMLs

For residential receivers located in the proximity of this construction site, the specific construction NMLs based on the background noise measurements conducted at monitoring location GB-01 are applicable and presented in Table 14.

Table 14: Residential Construction NMLs applicable to receivers near ‘Gadigal Reserve Preliminary Works’ [W-01], dBA

Residential Receiver Area	Standard hours		Outside Standard hours	
	“Noise Affected”	“Highly Noise Affected”	OSH-1	OSH-2
Near ‘Gadigal Reserve Preliminary Works’ [W-01]	54	75	N/A	N/A

Note: ‘N/A’ indicates that no works are proposed during this period

NMLs for other Sensitive Land Uses in the vicinity of the works in this site are listed in Appendix E.

Noise control recommendations

Based on the assumed construction methodology MDA recommends that the noise control measures detailed in Table 15 are implemented for the listed plant items when used in this work area. We note that these may be revised as part of the CNVMP. Predicted construction noise levels for this work area in this assessment, include the effect of these recommendations.

Table 15: Noise control recommendations for ‘Gadigal Reserve Preliminary Works’ [W-01], $L_{Aeq, 15min}$ (dB)

Equipment/Location	Recommendation
Generator	- Localised noise barriers should be utilised when this equipment is in use.
Excavator Hammer	- Barriers should be mobile and extend to a height 1 m above noise source.
Concrete Saw	- Barriers should envelop the work location to ensure no direct line of sight to nearby receivers. - Practical and feasible measures should be taken to allow the noise barrier to be located within 4 m of the noise source.

The above noise control recommendations are provided in the absence of a detailed construction methodology. A detailed Construction Noise and Vibration Management Plan (CNVMP) will need to be prepared in the detailed design phase once detailed construction methodology is available.

Prediction results

Table 16 details the predicted noise levels at surrounding receivers during the works proposed at this site. Noise level calculated at 1.5m above ground level and at various distances from the boundary of the site. Calculated noise levels include the effects of the noise control recommendations detailed in Table 15. It is understood that construction activities on-site will not extend outside of the recommended Standard hours.

Table 16: Predicted noise levels during ‘Gadigal Reserve Preliminary Works’ [W-01]

Assessment Scenario	Receiver distance from the boundary of the construction site					
	5 m	10 m	20 m	60 m	80 m	100 m
Typical Worst Case	85	79	73	64	61	59
Typical Average Case	78	77	73*	64*	61*	59*

Note: * It is expected that noise levels from “Typical Average Case” and “Typical Worst Case” will be similar for this site, given the narrow nature of the works area.

Discussion

It is noted that situations, where noise sources would be located towards the centre of the site, are likely to be representative of the longer-term average noise emissions. Therefore, the discussion in this section is based on the predicted results for the “Typical Average Case” scenario presented in Table 16.

Based on a review of the available drawings and satellite photos, the nearest residential receivers are located approximately within 10 m of the site, industrial receivers within 40 m of the site and passive recreational receiver (Gadigal Reserve) within 30 m of the site. On this basis, the works during the works at this site have the potential to exceed both the “Highly Noise Affected” levels and “Noise Affected” NMLs at some residences. While the “Noise Affected” Noise Management Level for industrial receivers is not expected to be exceeded, the NMLs for the passive recreational receiver near this site have the potential for exceedance.

As such the works at this site will need to be considered during preparation of the CNVMP such that all feasible and reasonable noise management practices are adopted, including consultation with the community. Inclusions for construction noise and vibration management plan are proposed in Appendix H.

5.2.4 [W-02] – ‘Parramatta Road under Bridge and Approaches’

Description

At this site, it is likely that the suspended, cantilevered pathway north and south of Parramatta Road will be constructed from bored concrete pile foundations with a steel and/or aluminium and/or fibre composite superstructure. The construction would take approximately eight months. It is anticipated these works could be undertaken primarily during the Standard hours. However, some works during Evening period (OSH-1) are also expected at this site.

Figure 10 shows an area photo indicating a schematic location of the proposed construction work area at ‘Parramatta Road under Bridge and Approaches’.

Figure 10: Schematic location of construction work area at 'Parramatta Road under Bridge and Approaches' [W-02]



Assumed construction plant items and sound power

A summary of equipment and the assumed duty (percentage operation in 15-minute) of equipment to be operating simultaneously in a 15-minute period for each construction work phase, is provided in Appendix F. The relevant sound power data for these plant items is provided in Appendix G.

Site-specific NMLs

For residential receivers located in the proximity of this site, the specific construction NMLs based on the background noise measurements conducted at monitoring location GB-01 are applicable and are presented in Table 17.

Table 17: Residential Construction NMLs applicable to receivers near ‘Parramatta Road under Bridge and Approaches’ [W-02], L_{Aeq} dB

Residential Receiver Area	Standard hours		Outside Standard hours	
	“Noise Affected”	“Highly Noise Affected”	OSH-1	OSH-2
near Parramatta Road under Bridge and Approaches’ [W-02]	54	75	47	N/A

Note: ‘N/A’ indicates that no works are proposed during this period

NMLs for other Sensitive Land Uses in the vicinity of the works at this site are listed in Appendix E.

Noise control recommendations

Based on the assumed construction methodology MDA recommends that the noise control measures detailed in Table 18 are implemented for the listed plant items when used in this work area. We note that these may be revised as part of the CNVMP. Predicted construction noise levels for this work area in this assessment, include the effect of these recommendations.

Table 18: Noise control recommendations for ‘Parramatta Road under Bridge and Approaches’ [W-02]

Equipment/Location	Recommendation
Generator	- Localised noise barriers should be utilised when this equipment is in use.
Excavator Hammer	- Barriers should be mobile and extend to a height 1 m above noise source.
Concrete Saw	- Barrier should envelop the work location to ensure no direct line of sight to nearby receivers. - Practical and feasible measures should be taken to allow the noise barrier to be located within 4 m of the noise source.

The above noise control recommendations are provided in the absence of a detailed construction methodology. A detailed Construction Noise and Vibration Management Plan (CNVMP) will need to be prepared in the detailed design phase once detailed construction methodology is available.

Prediction results

Table 19 details the predicted noise levels at the receivers during the works proposed at this site. Noise level calculated at 1.5m above ground level and at various distances from the boundary of the site. Calculated noise levels include the effects of the noise control recommendations detailed in Table 18.

Table 19: Predicted noise levels during works at ‘Parramatta Road under Bridge and Approaches’ [W-02], $L_{Aeq, 15min}$ (dB)

Assessment Scenario	Receiver distance from the boundary of the construction site					
	5 m	10 m	20 m	60 m	80 m	100 m
Typical Worst Case	89	83	77	68	65	63
Typical Average Case	82	80	77	68*	65*	63*

Note: * It is expected that noise levels from “Typical Average Case” and “Typical Worst Case” will be similar for this site, given the narrow nature of the works area.

Discussion

It is noted that situations, where noise sources would be located towards the centre of the site, are likely to be representative of the longer-term average noise emissions. Therefore, the discussion in this section is based on the predicted results for the “Typical Average Case” scenario presented in Table 19.

Based on a review of the available drawings and satellite photos, the nearest residential receivers are located approximately within 10 m of the site, offices/ retail outlet receivers within 20 m of the site and passive recreational receiver (Gadigal Reserve) within 30 m of the site. On this basis the works at this site have the potential to exceed both the “Highly Noise Affected” levels and “Noise Affected” NMLs at some residences. “Noise Affected” Noise Management Levels for other land uses near this site also have the potential to be exceeded.

As such the works at this site will need to be considered during the preparation of the CNVMP such that all feasible and reasonable noise management practices are adopted, including consultation with the community. Inclusions for construction noise and vibration management plan are proposed in Appendix H.

5.2.5 [W-03] – ‘Longport Street Northern Approach’

Description

At this construction site, the elevated path north of Longport Street will likely be constructed from bored concrete pile foundations with steel and/or aluminium and/or fibre composite superstructure. The construction would take approximately three months. It is anticipated these works could be undertaken during the Standard hours only.

Figure 11 shows an area photo indicating a schematic location of the proposed construction work area at ‘Longport Street Northern Approach’.

Figure 11: Schematic location of construction work area at ‘Longport Street Northern Approach’ [W-03]



Assumed construction plant items and sound power

A summary of equipment and the assumed duty (percentage operation in 15-minute) of equipment to be operating simultaneously in a 15-minute period for each construction work phase, is provided in Appendix F. The relevant sound power data for these plant items is provided in Appendix G.

Site-specific NMLs

For residential receivers located in the proximity of this site, the applicable construction NMLs based on the background noise measurements conducted at monitoring location GB-01, are presented in Table 20.

Table 20: Residential Construction NMLs applicable to receivers near ‘Longport Street Northern Approach’ [W-03], L_{Aeq} dB

Residential Receiver Area	Standard hours		Outside Standard hours	
	“Noise Affected”	“Highly Noise Affected”	OSH-1	OSH-2
Near ‘Longport Street Northern Approach’ [W-03]	54	75	N/A	N/A

Note: ‘N/A’ indicates that no works are proposed during this period

NMLs for other Sensitive Land Uses in the vicinity of the works in this site are listed in Appendix E.

Noise control recommendations

Based on the assumed construction methodology MDA recommends that the noise control measures detailed in Table 21 are implemented for the listed plant items when used in this work area. We note that these may be revised as part of the CNVMP. Predicted construction noise levels for this work area in this assessment, include the effect of these recommendations.

Table 21: Noise control recommendations for ‘Longport Street Northern Approach’ [W-03]

Equipment/Location	Recommendation
Generator	<ul style="list-style-type: none"> - Localised noise barriers should be utilised when this equipment is in use. - Barriers should be mobile and extend to a height 1 m above noise source. - Barrier should envelop the work location to ensure no direct line of sight to nearby receivers. - Practical and feasible measures should be taken to allow the noise barrier to be located within 4 m of the noise source.

The above noise control recommendations are provided in the absence of a detailed construction methodology. A detailed Construction Noise and Vibration Management Plan (CNVMP) will need to be prepared in the detailed design phase once detailed construction methodology is available.

Prediction results

Table 22 details the predicted noise levels at the receivers during the works proposed at this site. Noise level calculated at 1.5m above ground level and at various distances from the boundary of the site. Calculated noise levels include the effects of the noise control recommendations detailed in Table 21.

It is understood that construction activities on-site will not extend outside of the recommended Standard hours.

Table 22: Predicted noise levels during works at ‘Longport Street Northern Approach’ [W-03], $L_{Aeq, 15min}$ L_{Aeq} dB

Assessment Scenario	Receiver distance from the boundary of the construction site					
	5 m	10 m	20 m	60 m	80 m	100 m
Typical Worst Case	89	83	77	68	65	63
Typical Average Case	80	78	75	68	65*	63*

Note: * It is expected that noise levels from “Typical Average Case” and “Typical Worst Case” will be similar for this site, given the narrow nature of the works area.

Discussion

It is noted that situations, where noise sources would be located towards the centre of the site, are likely to be representative of the longer-term average noise emissions. Therefore, the discussion in this section is based on the predicted results for the “Typical Average Case” scenario presented in Table 22.

Based on a review of the available drawings and satellite photos, the nearest residential receivers are located approximately within 10 m of the site, industrial receivers within 40 m of the site and passive recreational receiver (Gadigal Reserve) within 30 m of the site. On this basis, the works at this site have the potential to exceed both the “Highly Noise Affected” levels and “Noise Affected” NMLs at some residences. While “Noise Affected” Noise Management Level for industrial receivers are not expected to be exceeded, the NMLs for the passive recreational receiver near this site have the potential to be exceeded.

As such the works at this site will need to be considered during preparation of the CNVMP such that all feasible and reasonable noise management practices are adopted, including consultation with the community. Inclusions for construction noise and vibration management plan are proposed in Appendix H.

5.2.6 [W-04] – ‘Gadigal Reserve Path’

Description

At this construction site, path works through Gadigal Reserve would largely be earthworks, on-grade concrete paths, stormwater works and associated hard and soft landscaping and lighting. The construction would take approximately four months. It is anticipated these works will be undertaken during the Standard hours only.

Figure 12 shows an area photo indicating a schematic location of the proposed construction work area at ‘Gadigal Reserve Path’.

Figure 12: Schematic location of construction work area at 'Gadigal Reserve Path' [W-04]



Assumed construction plant items and sound power

A summary of equipment and the assumed duty (percentage operation in 15-minute) of equipment to be operating simultaneously in a 15-minute period for each construction work phase, is provided in Appendix F. The relevant sound power data for these plant items is provided in Appendix G.

Site-specific NMLs

For residential receivers located in the proximity of this site, the applicable construction NMLs based on the background noise measurements conducted at monitoring location GB-01 are presented in Table 23.

Table 23: Residential Construction NMLs applicable to receivers near ‘Gadigal Reserve Path’ [W-04], L_{Aeq} (dB)

Residential Receiver Area	Standard hours		Outside Standard hours	
	“Noise Affected”	“Highly Noise Affected”	OSH-1	OSH-2
Near ‘Gadigal Reserve Path’ [W-04]	54	75	N/A	N/A

Note: ‘N/A’ indicates that no works are proposed during this period

NMLs for other Sensitive Land Uses in the vicinity of the works in this site are listed in Appendix E.

Noise control recommendations

Based on the assumed construction methodology MDA recommends that the noise control measures detailed in Table 24 are implemented for the listed plant items when used in this work area. We note that these may be revised as part of the CNVMP. Predicted construction noise levels for this work area in this assessment, include the effect of these recommendations.

Table 24: Noise control recommendations for ‘Gadigal Reserve Path’ [W-04]

Equipment/Location	Recommendation
Generator	<ul style="list-style-type: none"> - Localised noise barriers should be utilised when this equipment is in use. - Barriers should be mobile and extend to a height 1 m above noise source. - Barrier should envelop the work location to ensure no direct line of sight to nearby receivers. - Practical and feasible measures should be taken to allow the noise barrier to be located within 4 m of the noise source.

The above noise control recommendations are provided in the absence of a detailed construction methodology. A detailed Construction Noise and Vibration Management Plan (CNVMP) will need to be prepared in the detailed design phase once detailed construction methodology is available.

Prediction results

Table 25 details the predicted noise levels at the receivers during the works proposed at this site. Noise level calculated at 1.5m above ground level and at various distances from the boundary of the site. Calculated noise levels include the effects of the noise control recommendations detailed in Table 24.

It is understood that construction activities on-site will not extend outside of the recommended Standard hours.

Table 25: Predicted noise levels during works at ‘Gadigal Reserve Path’ [W-04], $L_{Aeq, 15min}$ (dB)

Assessment Scenario	Receiver distance from the boundary of the construction site					
	5 m	10 m	20 m	60 m	80 m	100 m
Typical Worst Case	90	84	78	68	66	64
Typical Average Case	76	75	72	67	65	64*

Note: * It is expected that noise levels from “Typical Average Case” and “Typical Worst Case” will be similar for this site, given the narrow nature of the works area.

Discussion

It is noted that situations, where noise sources would be located towards the centre of the site, are likely to be representative of the longer-term average noise emissions. Therefore, the discussion in this section is based on the predicted results for the “Typical Average Case” scenario presented in Table 25.

Based on a review of the available drawings and satellite photos, the nearest residential receivers are located approximately within 10 m of the site, industrial receivers within 40 m of the site and passive recreational receiver (Gadigal Reserve) within 30 m of the site. On this basis the works at this site have the potential to exceed both the “Highly Noise Affected” levels and “Noise Affected” NMLs at some residences. While “Noise Affected” Noise Management Level for industrial receivers are not expected to be exceeded, the NMLs for the passive recreational receiver near this site have the potential to be exceeded.

As such the works at this site will need to be considered during the preparation of the CNVMP such that all feasible and reasonable noise management practices are adopted, including consultation with the community. Inclusions for construction noise and vibration management plan are proposed in Appendix H.

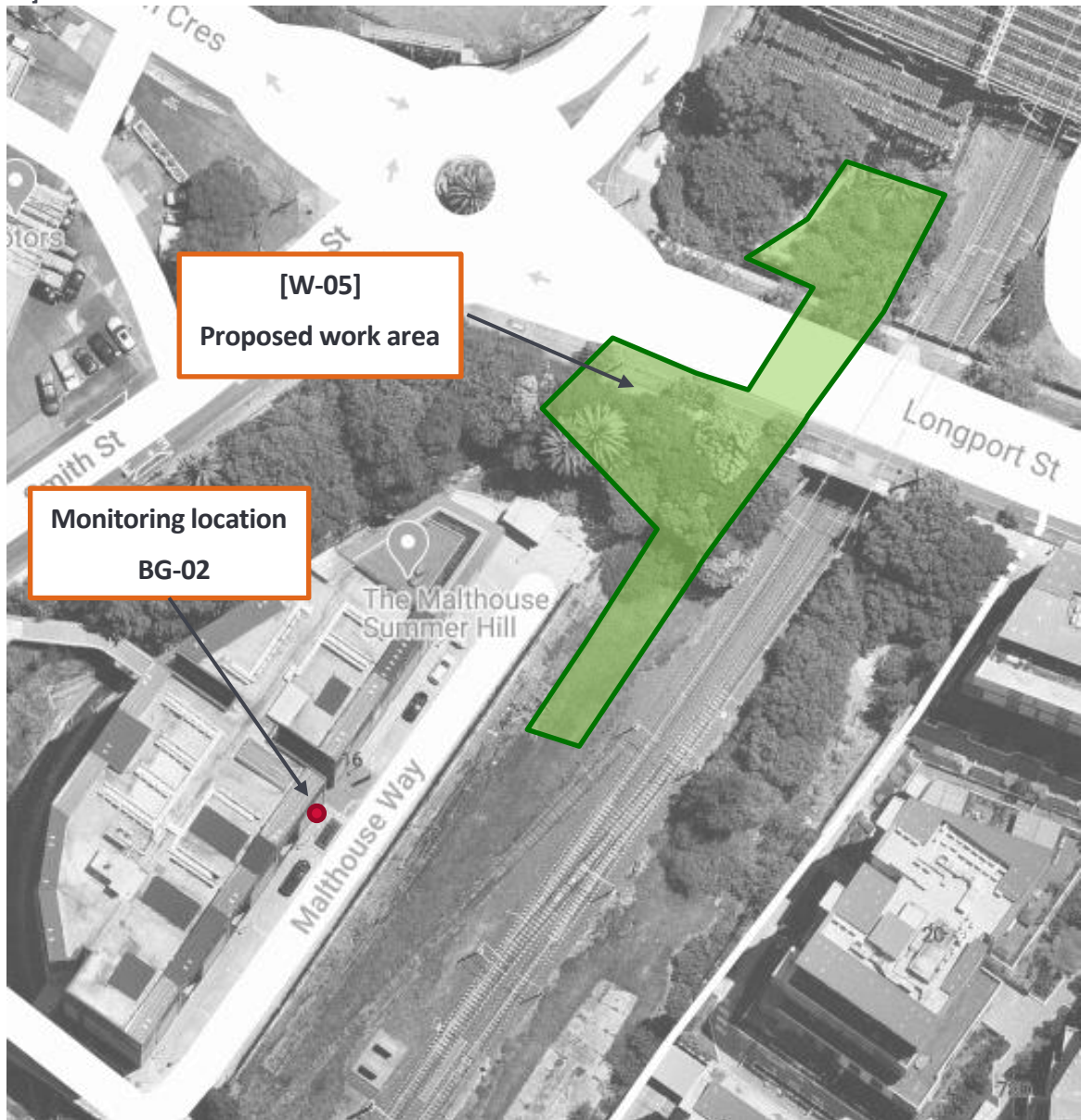
5.2.7 [W-05] – ‘Longport Street Jacked Box Culvert Tunnel’

Description

At this site, a jacked box culvert tunnel method would be used to construct the tunnel below Longport Street, although a canopy tube tunnel may also be considered. The construction would take approximately three months. It is anticipated these works could be undertaken primarily during the Standard hours. However, some works during Evening period (OSH-1) is also expected at this site.

Figure 13 shows an area photo indicating a schematic location of the proposed construction work area at ‘Longport Street Jacked Box Culvert Tunnel’.

Figure 13: Schematic location of construction work area at 'Longport Street Jacked Box Culvert Tunnel' [W-05]



Assumed construction plant items and sound power

A summary of equipment and the assumed duty (percentage operation in 15-minute) of equipment to be operating simultaneously in a 15-minute period for each construction work phase, is provided in Appendix F. The relevant sound power data for these plant items is provided in Appendix G.

Site-specific NMLs

For residential receivers located in the proximity of this site, the applicable construction NMLs based on the background noise measurements conducted at monitoring location GB-02 are presented in Table 26.

Table 26: Residential Construction NMLs applicable to receivers near ‘Longport Street Jacked Box Culvert Tunnel’ [W-05], L_{Aeq} (dB)

Residential Receiver Area	Standard hours		Outside Standard hours	
	“Noise Affected”	“Highly Noise Affected”	OSH-1	OSH-2
Near ‘Longport Street Jacked Box Culvert Tunnel’ [W-05]	56	75	47	N/A

Note: ‘N/A’ indicates that no works are proposed during this period

NMLs for other Sensitive Land Uses in the vicinity of the works in this site are listed in Appendix E.

Noise control recommendations

Based on the assumed construction methodology MDA recommends that the noise control measures detailed in Table 27 are implemented for the listed plant items when used in this work area. We note that these may be revised as part of the CNVMP. Predicted construction noise levels for this work area in this assessment, include the effect of these recommendations.

Table 27: Noise control recommendations for ‘Longport Street Jacked Box Culvert Tunnel’ [W-05]

Equipment/Location	Recommendation
Generator	- Localised noise barriers should be utilised when this equipment is in use.
Excavator Hammer	- Barriers should be mobile and extend to a height 1 m above noise source.
Concrete Saw	- Barrier should envelop the work location to ensure no direct line of sight to nearby receivers. - Practical and feasible measures should be taken to allow the noise barrier to be located within 4 m of the noise source.

The above noise control recommendations are provided in the absence of a detailed construction methodology. A detailed Construction Noise and Vibration Management Plan (CNVMP) will need to be prepared in the detailed design phase once detailed construction methodology is available.

Prediction results

Table 28 details the predicted noise levels at the receivers during the works proposed at this site. Noise level calculated at 1.5m above ground level and at various distances from the boundary of the site. Calculated noise levels include the effects of the noise control recommendations detailed in Table 27.

Table 28: Predicted noise levels during works at ‘Longport Street Jacked Box Culvert Tunnel’ [W-05], $L_{Aeq, 15min}$ (dB)

Assessment Scenario	Receiver distance from the boundary of the construction site					
	5 m	10 m	20 m	60 m	80 m	100 m
Typical Worst Case	86	80	74	64	62	60
Typical Average Case	80	78	74*	64*	62*	60*

Note: * It is expected that noise levels from “Typical Average Case” and “Typical Worst Case” will be similar for this site, given the narrow nature of the works area.

Discussion

It is noted that situations, where noise sources would be located towards the centre of the site, are likely to be representative of the longer-term average noise emissions. Therefore, the discussion in

this section is based on the predicted results for the “Typical Average Case” scenario presented in Table 28.

Based on a review of the available drawings and satellite photos, the nearest residential receivers are located approximately within 10 m of the site, industrial receivers within 90 m of the site and passive recreational receiver (Gadigal Reserve) within 70 m of the site. On this basis, the works at this site have the potential to exceed both the “Highly Noise Affected” levels and “Noise Affected” NMLs at some residences. While “Noise Affected” Noise Management Level for industrial receivers are not expected to be exceeded, the NMLs for the passive recreational receiver near this site do have the potential to be exceeded.

As such the works at this site will need to be considered during the preparation of the CNVMP such that all feasible and reasonable noise management practices are adopted, including consultation with the community. Inclusions for construction noise and vibration management plan are proposed in Appendix H.

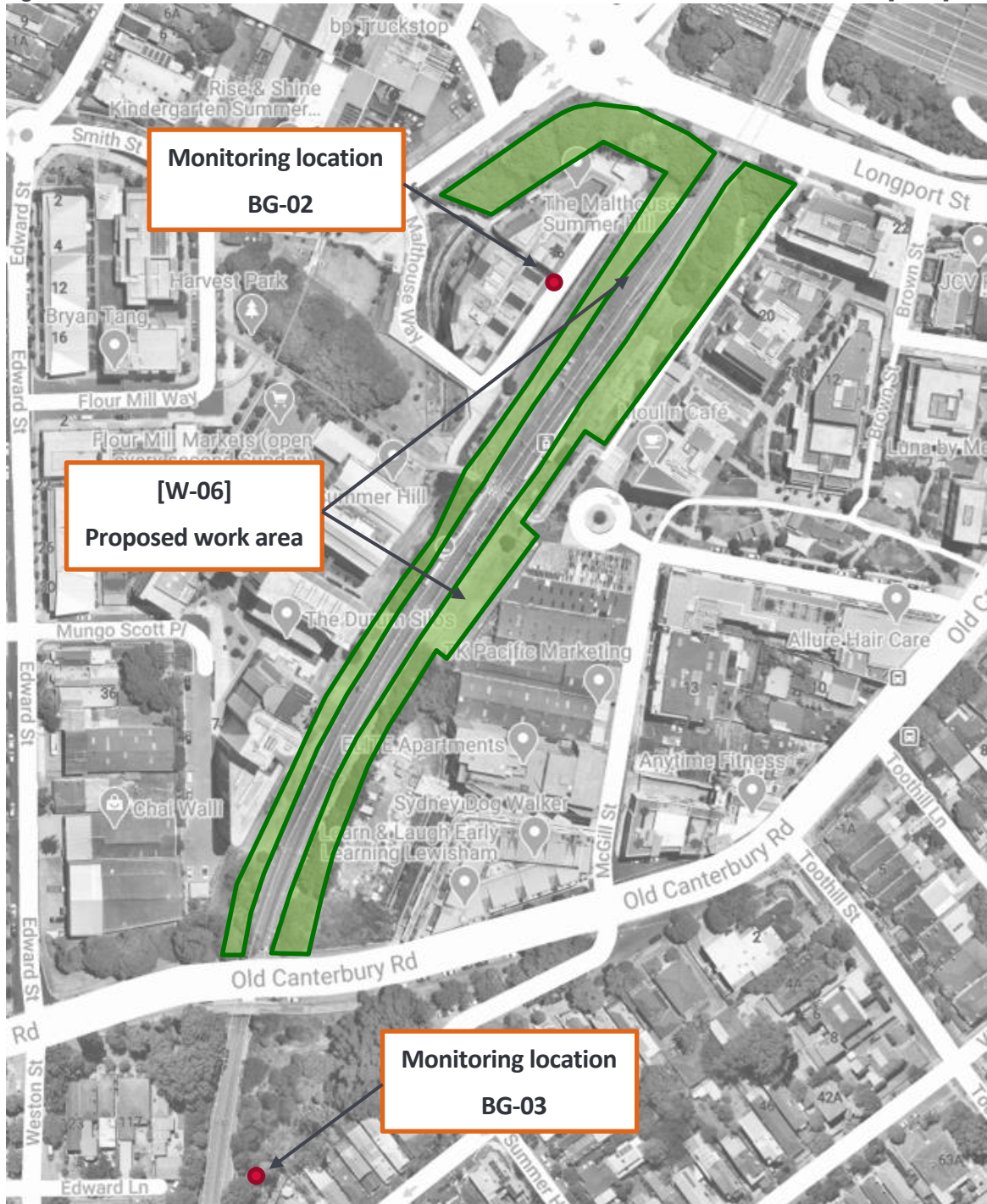
5.2.8 [W-06] – ‘Lewisham West Corridor Construction’

Description

Path works through this site would largely be on-grade concrete paths, associated hard and soft landscaping and lighting. On the eastern side, the wetland and dog off leash area would largely be earthworks and landscaping. The construction would take approximately seven months. It is anticipated these works could be undertaken during the Standard hours only.

Figure 14 shows an area photo indicating a schematic location of the proposed construction work area at ‘Lewisham West Corridor Construction’.

Figure 14: Schematic location of construction work area at 'Lewisham West Corridor Construction' [W-06]



Assumed construction plant items and sound powers

A summary of equipment and the assumed duty (percentage operation in 15-minute) of equipment to be operating simultaneously in a 15-minute period for each construction work phase, is provided in Appendix F. The relevant sound power data for these plant items is provided in Appendix G.

Site-specific NMLs

For residential receivers located in the proximity of this site, the applicable construction NMLs based on the background noise measurements conducted at monitoring location GB-02 and GB-03, are presented in Table 29.

Table 29: Residential Construction NMLs applicable to receivers near ‘Lewisham West Corridor Construction’ [W-06], $L_{Aeq(15min)}$ (dB)

Residential Receiver Area	Standard hours		Outside Standard hours	
	“Noise Affected”	“Highly Noise Affected”	OSH-1	OSH-2
Receivers north of Old Canterbury Road	56	75	N/A	N/A
Receivers south of Old Canterbury Road	53	75	N/A	N/A
Monitoring ID: GB-03				

Note: ‘N/A’ indicates that no works are proposed during this period

NMLs for other Sensitive Land Uses in the vicinity of the works in this site are listed in Appendix E.

Noise control recommendations

Based on the assumed construction methodology MDA recommends that the noise control measures detailed in Table 30 are implemented for the listed plant items when used in this work area. We note that these may be revised as part of the CNVMP. Predicted construction noise levels for this work area in this assessment, include the effect of these recommendations.

Table 30: Noise control recommendations for ‘Lewisham West Corridor Construction’ [W-06]

Equipment/Location	Recommendation
Generator	- Localised noise barriers should be utilised when this equipment is in use.
Excavator Hammer	- Barriers should be mobile and extend to a height 1 m above noise source.
Concrete Saw	- Barrier should envelop the work location to ensure no direct line of sight to nearby receivers. - Practical and feasible measures should be taken to allow the noise barrier to be located within 4 m of the noise source.

The above noise control recommendations are provided in the absence of a detailed construction methodology. A detailed Construction Noise and Vibration Management Plan (CNVMP) will need to be prepared in the detailed design phase once detailed construction methodology is available.

Prediction results

Table 31 details the predicted noise levels at the receivers during the works proposed at this site. Noise level calculated at 1.5m above ground level and at various distances from the boundary of the site. Calculated noise levels include the effects of the noise control recommendations detailed in Table 30. It is understood that construction activities on-site will not extend outside of the recommended Standard hours.

Table 31: Predicted noise levels during works at ‘Lewisham West Corridor Construction’ [W-06], $L_{Aeq, 15min}$ (dB)

Assessment Scenario	Receiver distance from the boundary of the construction site					
	5 m	10 m	20 m	60 m	80 m	100 m
Typical Worst Case	90	84	78	69	66	64
Typical Average Case	85	82	77	69	66*	64*

Note: * It is expected that noise levels from “Typical Average Case” and “Typical Worst Case” will be similar for this site, given the narrow nature of the works area.

Discussion

It is noted that situations, where noise sources would be located towards the centre of the site, are likely to be representative of the longer-term average noise emissions. Therefore, the discussion in this section is based on the predicted results for the “Typical Average Case” scenario presented in Table 31.

Based on a review of the available drawings and satellite photos, the nearest residential receivers are located approximately within 10 m of the site, offices/ retail outlet receivers within 20 m of the site and passive recreational receiver (Harvest Park) within 50 m of the site. On this basis, the works at this site have the potential to exceed both the “Highly Noise Affected” levels and “Noise Affected” NMLs at some residences. “Noise Affected” Noise Management Level for other land uses near this site also have the potential to be exceeded.

As such the works at this site will need to be considered during the preparation of the CNVMP such that all feasible and reasonable noise management practices are adopted, including consultation with the community. Inclusions for construction noise and vibration management plan are proposed in Appendix H.

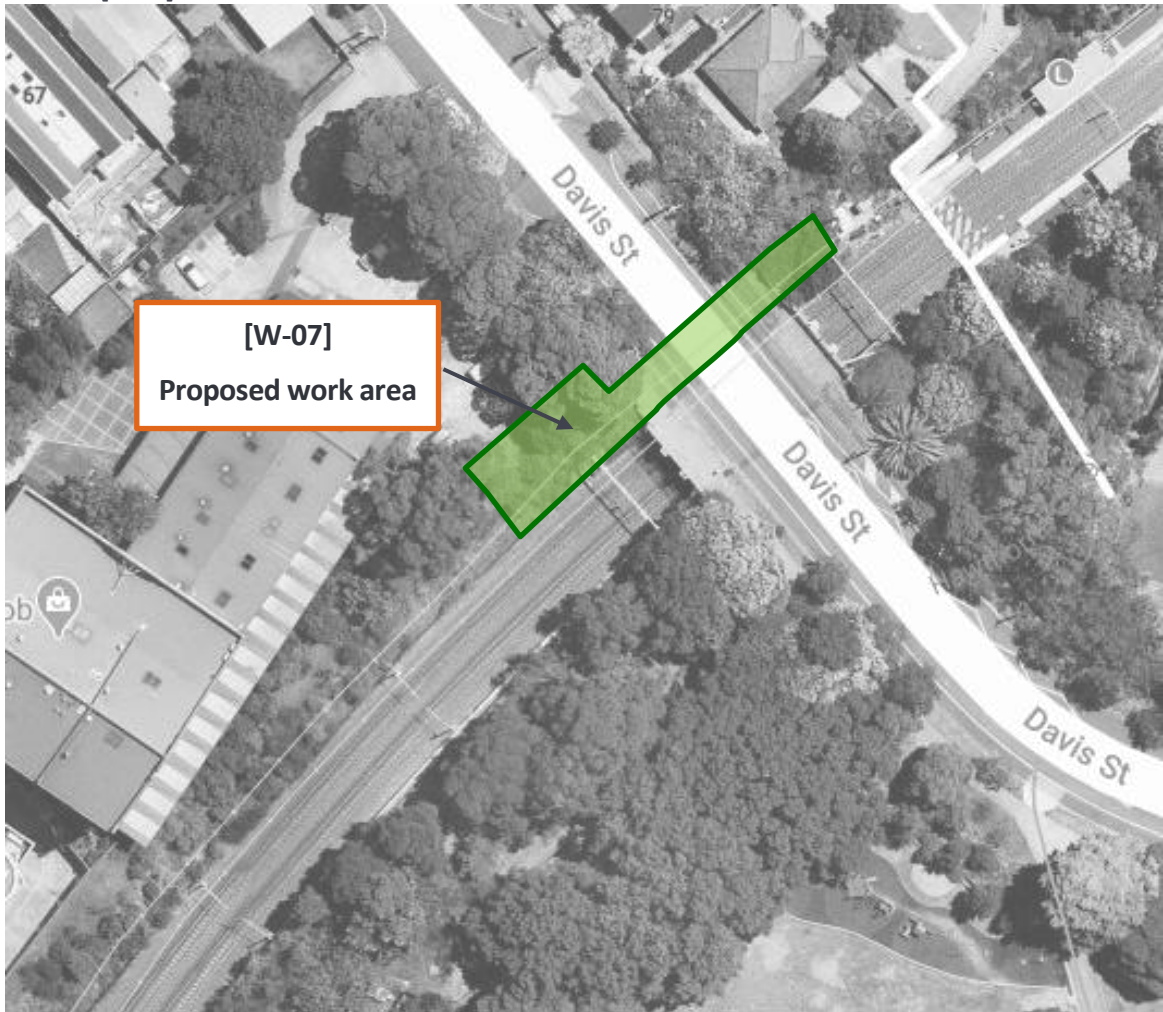
5.2.9 [W-07] – ‘Davis Street and Constitution Road Cut and Cover Tunnels’

Description

At this site, a cut and cover construction method will be used for the Davis Street and Constitution Road tunnels. The construction would take approximately five months. It is anticipated these works could be undertaken during the Standard hours only.

Figure 15 shows an area photo indicating a schematic location of the proposed construction work area at ‘Davis Street and Constitution Road Cut and Cover Tunnels’.

Figure 15: Schematic location of construction work area at ‘Davis Street and Constitution Road Cut and Cover Tunnels’ [W-07]



Assumed construction plant items and sound powers

A summary of equipment and the assumed duty (percentage operation in 15-minute) of equipment to be operating simultaneously in a 15-minute period for each construction work phase, is provided in Appendix F. The relevant sound power data for these plant items is provided in Appendix G.

Site-specific NMLs

For residential receivers located in the proximity of this site, the applicable construction NMLs based on the background noise measurements conducted at monitoring location GB-04 are presented in Table 32.

Table 32: Residential Construction NMLs applicable to receivers near ‘Davis Street and Constitution Road Cut and Cover Tunnels’ [W-07], $L_{Aeq(15min)}$ (dB)

Residential Receiver Area	Standard hours		Outside Standard hours	
	“Noise Affected”	“Highly Noise Affected”	OSH-1	OSH-2
Near ‘Davis Street and Constitution Road Cut and Cover Tunnels’ [W-07]	50	75	N/A	N/A

Note: ‘N/A’ indicates that no works are proposed during this period

NMLs for other Sensitive Land Uses in the vicinity of the works in this site are listed in Appendix E.

Noise control recommendations

Based on the assumed construction methodology MDA recommends that the noise control measures detailed in Table 33 are implemented for the listed plant items when used in this work area. We note that these may be revised as part of the CNVMP. Predicted construction noise levels for this work area in this assessment, include the effect of these recommendations.

Table 33: Noise control recommendations for ‘Davis Street and Constitution Road Cut and Cover Tunnels’ [W-07]

Equipment/Location	Recommendation
Generator	- Localised noise barriers should be utilised when this equipment is in use.
Excavator Hammer	- Barriers should be mobile and extend to a height 1 m above noise source.
Concrete Saw	- Barrier should envelop the work location to ensure no direct line of sight to nearby receivers. - Practical and feasible measures should be taken to allow the noise barrier to be located within 4 m of the noise source.

The above noise control recommendations are provided in the absence of a detailed construction methodology. A detailed Construction Noise and Vibration Management Plan (CNVMP) will need to be prepared in the detailed design phase once detailed construction methodology is available.

Prediction results

Table 34 details the predicted noise levels at the receivers during the works proposed at this site. Noise level calculated at 1.5m above ground level and at various distances from the boundary of the site. Calculated noise levels include the effects of the noise control recommendations detailed in Table 33.

It is understood that construction activities on-site will not extend outside of the recommended Standard hours.

Table 34: Predicted noise levels during works at ‘Davis Street and Constitution Road Cut and Cover Tunnels’ [W-07], L_{Aeq, 15min} (dB)

Assessment Scenario	Receiver distance from the boundary of the construction site					
	5 m	10 m	20 m	60 m	80 m	100 m
Typical Worst Case	92	86	80	70	68	66
Typical Average Case	82	80	76	69	67	65

Note: * It is expected that noise levels from “Typical Average Case” and “Typical Worst Case” will be similar for this site, given the narrow nature of the works area.

Discussion

It is noted that situations, where noise sources would be located towards the centre of the site, are likely to be representative of the longer-term average noise emissions. Therefore, the discussion in this section is based on the predicted results for the “Typical Average Case” scenario presented in Table 34.

Based on a review of the available drawings and satellite photos, the nearest residential receivers are located approximately within 10 m of the site and offices/ retail outlet receivers within 15 m of the site. On this basis the works at this site have the potential to exceed both the “Highly Noise Affected” levels and “Noise Affected” NMLs at some residences. “Noise Affected” Noise Management Level for the offices/ retail outlet receiver near this site also has the potential to be exceeded.

As such the works at this site will need to be considered during the preparation of the CNVMP such that all feasible and reasonable noise management practices are adopted, including consultation with the community. Inclusions for construction noise and vibration management plan are proposed in Appendix H.

5.2.10 [W-08] – ‘Davis Street to Johnson Park’

Description

At this site path works between Davis Street and Johnson Park would largely be low level elevated paths, associated hard and soft landscaping and lighting. The construction would take approximately six months. It is anticipated these works could be undertaken during the Standard hours only.

Figure 16 shows an area photo indicating a schematic location of the proposed construction work area at ‘Davis Street to Johnson Park’.

Figure 16: Schematic location of construction work area at 'Davis Street to Johnson Park' [W-08]



Assumed construction plant items and sound power

A summary of equipment and the assumed duty (percentage operation in 15-minute) of equipment to be operating simultaneously in a 15-minute period for each construction work phase, is provided in Appendix F. The relevant sound power data for these plant items is provided in Appendix G.

Site-specific NMLs

For residential receivers located in the proximity of this site, the applicable construction NMLs based on the background noise measurements conducted at monitoring location GB-04 are presented in Table 35.

Table 35: Residential Construction NMLs applicable to receivers near ‘Davis Street to Johnson Park’ [W-08], L_{Aeq} dB

Residential Receiver Area	Standard hours		Outside Standard hours	
	“Noise Affected”	“Highly Noise Affected”	OSH-1	OSH-2
Near ‘Davis Street to Johnson Park’ [W-08]	50	75	N/A	N/A

Note: ‘N/A’ indicates that no works are proposed during this period

NMLs for other Sensitive Land Uses in the vicinity of the works in this site are listed in Appendix E.

Noise control recommendations

In the absence of a detailed construction methodology, no specific noise control measures for the proposed plant items can be recommended at this stage. A detailed Construction Noise and Vibration Management Plan (CNVMP) will need to be prepared in the detailed design phase once detailed construction methodology is available.

Prediction results

Table 36 details the predicted noise levels at the receivers during the works proposed at this site. Noise level calculated at 1.5m above ground level and at various distances from the boundary of the site. Calculated noise levels include the effects of the noise control recommendations detailed in Table 35.

It is understood that construction activities on-site will not extend outside of the recommended Standard hours.

Table 36: Predicted noise levels during works at ‘Davis Street to Johnson Park’ [W-08], $L_{Aeq, 15min}$ (dB)

Assessment Scenario	Receiver distance from the boundary of the construction site					
	5 m	10 m	20 m	60 m	80 m	100 m
Typical Worst Case	87	81	75	66	63	61
Typical Average Case	83	80	75	66*	63*	61*

Note: * It is expected that noise levels from “Typical Average Case” and “Typical Worst Case” will be similar for this site, given the narrow nature of the works area.

Discussion

It is noted that situations, where noise sources would be located towards the centre of the site, are likely to be representative of the longer-term average noise emissions. Therefore, the discussion in this section is based on the predicted results for the “Typical Average Case” scenario presented in Table 36.

Based on a review of the available drawings and satellite photos, the nearest residential receivers are located approximately within 10 m of the site, offices/ retail outlet receivers within 15 m of the site and active recreational area (Johnson Park) within 20 m of the site. On this basis the works at this site have the potential to exceed both the “Highly Noise Affected” levels and “Noise Affected” NMLs at some residences. “Noise Affected” Noise Management Levels for other land uses near this site also have the potential for exceedance.

As such the works at this site will need to be considered during the preparation of the CNVMP such that all feasible and reasonable noise management practices are adopted, including consultation with the community. Inclusions for construction noise and vibration management plan are proposed in Appendix H.

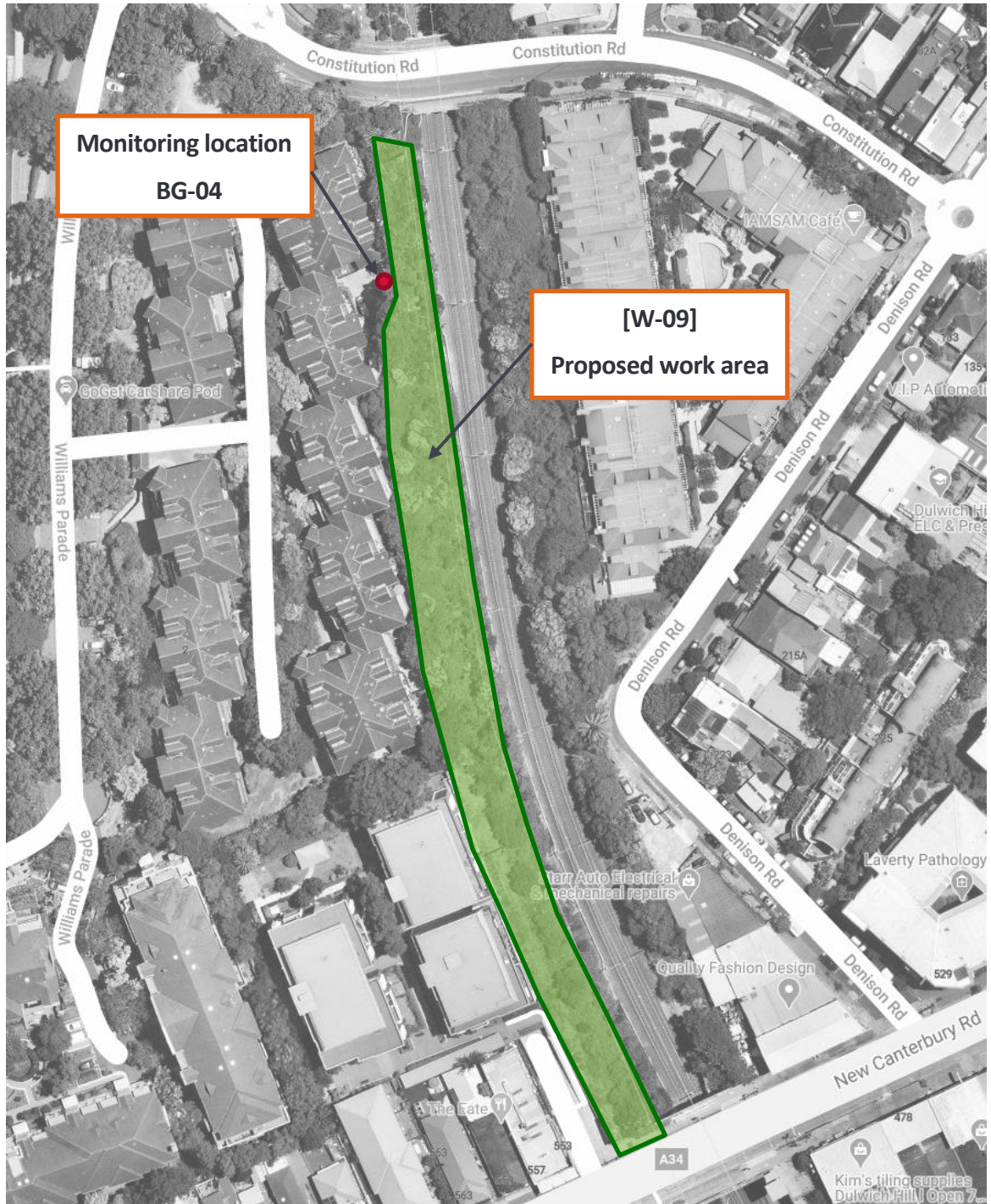
5.2.11 [W-09] – ‘Constitution Road to New Canterbury Road’

Description

At this site, it is likely that the path immediately south of Constitution Road will require a retaining wall to facilitate an on-grade concrete path. From the secant retaining wall south to New Canterbury Road it is likely that the elevated path will be constructed from bored concrete pile foundations with a steel and/or aluminium and/or fibre composite superstructure. The construction would take approximately eleven months. It is anticipated these works could be undertaken primarily during the Standard hours. However, some works during Night period (OSH-2) is also expected at this site.

Table 19 shows an area photo indicating a schematic location of the proposed construction work area at ‘Constitution Road to New Canterbury Road’.

Figure 17: Schematic location of construction work area at 'Constitution Road to New Canterbury Road' [W-09]



Assumed construction plant items and sound powers

A summary of equipment and the assumed duty (percentage operation in 15-minute) of equipment to be operating simultaneously in a 15-minute period for each construction work phase, is provided in Appendix F. The relevant sound power data for these plant items is provided in Appendix G.

Site-specific NMLs

For residential receivers located in the proximity of this site, the applicable construction NMLs based on the background noise measurements conducted at monitoring location GB-04 are presented in Table 37.

Table 37: Residential Construction NMLs applicable to receivers near ‘Constitution Road to New Canterbury Road’ [W-09], L_{Aeq} dB

Residential Receiver Area	Standard hours		Outside Standard hours	
	“Noise Affected”	“Highly Noise Affected”	OSH-1	OSH-2
Near Constitution Road to New Canterbury Road’ [W-09]	50	75	N/A	36

Note: ‘N/A’ indicates that no works are proposed during this period

NMLs for other Sensitive Land Uses in the vicinity of the works in this site are listed in Appendix E.

Noise control recommendations

Based on the assumed construction methodology MDA recommends that the noise control measures detailed in Table 38 are implemented for the listed plant items when used in this work area. We note that these may be revised as part of the CNVMP. Predicted construction noise levels for this work area in this assessment, include the effect of these recommendations.

Table 38: Noise control recommendations for ‘Constitution Road to New Canterbury Road’ [W-09]

Equipment/Location	Recommendation
Generator	- Localised noise barriers should be utilised when this equipment is in use.
Excavator Hammer	- Barriers should be mobile and extend to a height 1 m above noise source.
Concrete Saw	- Barrier should envelop the work location to ensure no direct line of sight to nearby receivers. - Practical and feasible measures should be taken to allow the noise barrier to be located within 4 m of the noise source.

The above noise control recommendations are provided in the absence of a detailed construction methodology. A detailed Construction Noise and Vibration Management Plan (CNVMP) will need to be prepared in the detailed design phase once detailed construction methodology is available.

Prediction results

Table 39 details the predicted noise levels at the receivers during the works proposed at this site. Noise level calculated at 1.5m above ground level and at various distances from the boundary of the site. Calculated noise levels include the effects of the noise control recommendations detailed in Table 38.

It is understood that construction activities on-site will not extend outside of the recommended Standard hours.

Table 39: Predicted noise levels during ‘Constitution Road to New Canterbury Road’ [W-09], $L_{Aeq, 15min}$ (dB)

Assessment Scenario	Receiver distance from the boundary of the construction site					
	5 m	10 m	20 m	60 m	80 m	100 m
Typical Worst Case	92	86	80	70	68	66
Typical Average Case	86	83	79	70*	68*	66*

Note: * It is expected that noise levels from “Typical Average Case” and “Typical Worst Case” will be similar for this site, given the narrow nature of the works area.

Discussion

It is noted that situations, where noise sources would be located towards the centre of the site, are likely to be representative of the longer-term average noise emissions. Therefore, the discussion in this section is based on the predicted results for the “Typical Average Case” scenario presented in Table 39.

Based on a review of the available drawings and satellite photos, the nearest residential receivers are located approximately within 10 m of the site, offices/ retail outlet receivers within 30 m of the site, active recreational receivers (Arlington Oval and Johnson Park) within 80 m of the site and the Dulwich Hill Public School within 130 m of the site. On this basis, the works at this site have the potential to exceed both the “Highly Noise Affected” levels and “Noise Affected” NMLs at some residences. “Noise Affected” Noise Management Levels for other land uses near this site also have the potential to be exceeded.

As such the works at this site will need to be considered during the preparation of the CNVMP such that all feasible and reasonable noise management practices are adopted, including consultation with the community. Inclusions for construction noise and vibration management plan are proposed in Appendix H.

Sleep disturbance assessment

Since some construction works would be required during the Night-time period at this site, potential sleep disturbance is required to be assessed. Based on the discussion presented in Section 4.1.2, the site-specific sleep disturbance screening level is 46 dB. Table 40 details the predicted sleep disturbance noise levels at neighbouring receivers as the result of the operation of an ‘Excavator with rock hammer’ with an assumed 125 L_{A1} dB Sound Power during Night-time period.

Table 40: Predicted sleep disturbance noise levels during works at ‘Constitution Road to New Canterbury Road’ [W-09]

Assessment Scenario	Receiver distance from the boundary of the construction site					
	5 m	10 m	20 m	60 m	80 m	100 m
Sleep disturbance	103	97	91	81	79	77

Predicted noise levels for sleep disturbance show that that screening criterion has the potential to be exceeded at sensitive receivers neighbouring this construction site. Where the screening criterion is exceeded, sleep awakening is possible and further detailed analysis as per Section 4.1.2 is required. Furthermore, detailed investigations are recommended to confirm the number of existing sleep disturbing events that occur as well as the external to internal noise reduction achieved at the receivers surrounding this site. This will need to be carried out as part of the Construction Noise and Vibration Management Plan (CNVMP).

5.2.12 [W-10] – ‘Hercules Street Parklands’

Description

Site works through the Hercules Street Parklands would largely be earthworks, on-grade concrete paths, stormwater works and associated hard and soft landscaping and lighting. The construction would take approximately seven months. It is anticipated these works would be undertaken during the Standard hours only.

Figure 18 shows an area photo indicating a schematic location of the proposed construction work area at ‘Hercules Street Parklands’.

Figure 18: Schematic location of construction work area at 'Hercules Street Parklands' [W-10]



Assumed construction plant items and sound powers

A summary of equipment and the assumed duty (percentage operation in 15-minute) of equipment to be operating simultaneously in a 15-minute period for each construction work phase, is provided in Appendix F. The relevant sound power data for these plant items is provided in Appendix G.

Site-specific NMLs

For residential receivers located in the proximity of this site, the applicable construction NMLs based on the background noise measurements conducted at monitoring location GB-05 are presented in Table 41.

Table 41: Residential Construction NMLs applicable to receivers near ‘Hercules Street Parklands’ [W-10], $L_{Aeq(15min)}$ (dB)

Residential Receiver Area	Standard hours		Outside Standard hours	
	“Noise Affected”	“Highly Noise Affected”	OSH-1	OSH-2
Near ‘Hercules Street Parklands’ [W-10]	47	75	N/A	N/A

Note: ‘N/A’ indicates that no works are proposed during this period

NMLs for other Sensitive Land Uses in the vicinity of the works in this site are listed in Appendix E.

Noise control recommendations

Based on the assumed construction methodology MDA recommends that the noise control measures detailed in Table 42 Table 38 are implemented for the listed plant items when used in this work area. We note that these may be revised as part of the CNVMP. Predicted construction noise levels for this work area in this assessment, include the effect of these recommendations.

Table 42: Noise control recommendations for ‘Hercules Street Parklands’ [W-10]

Equipment/Location	Recommendation
Generator	<ul style="list-style-type: none"> - Localised noise barriers should be utilised when this equipment is in use. - Barriers should be mobile and extend to a height 1 m above noise source. - Barrier should envelop the work location to ensure no direct line of sight to nearby receivers. - Practical and feasible measures should be taken to allow the noise barrier to be located within 4 m of the noise source.

The above noise control recommendations are provided in the absence of a detailed construction methodology. A detailed Construction Noise and Vibration Management Plan (CNVMP) will need to be prepared in the detailed design phase once detailed construction methodology is available.

Prediction results

Table 43 details the predicted noise levels at the receivers during the works proposed at this site. Noise level calculated at 1.5m above ground level and at various distances from the boundary of the site. Calculated noise levels include the effects of the noise control recommendations detailed in Table 42.

It is understood that construction activities on-site will not extend outside of the recommended Standard hours.

Table 43: Predicted noise levels during works at ‘Hercules Street Parklands’ [W-10], $L_{Aeq, 15min}$ (dB)

Assessment Scenario	Receiver distance from the boundary of the construction site					
	5 m	10 m	20 m	60 m	80 m	100 m
Typical Worst Case	92	86	80	70	68	66
Typical Average Case	82	80	77	70*	68*	66*

Note: * It is expected that noise levels from “Typical Average Case” and “Typical Worst Case” will be similar for this site, given the narrow nature of the works area.

Discussion

It is noted that situations, where noise sources would be located towards the centre of the site, are likely to be representative of the longer-term average noise emissions. Therefore, the discussion in this section is based on the predicted results for the “Typical Average Case” scenario presented in Table 43.

Based on a review of the available drawings and satellite photos, the nearest residential receivers are located approximately within 10 m of the site and the Dulwich Hill Public School within 45 m of the site. On this basis the works during the Operation works have the potential to exceed both the “Highly Noise Affected” levels and “Noise Affected” NMLs at some residences. “Noise Affected” Noise Management Level for the Dulwich Hill Public School near this site are not expected to be exceeded.

As such the works at this site will need to be considered during the preparation of the CNVMP such that all feasible and reasonable noise management practices are adopted, including consultation with the community. Inclusions for construction noise and vibration management plan are proposed in Appendix H.

6.0 CONSTRUCTION TRAFFIC NOISE IMPACT ASSESSMENT

6.1 Daytime Periods

Detailed existing traffic volumes on the roads surrounding the construction sites; and detailed construction traffic movements and routes associated with various construction sites are not available at this stage. However, a typical maximum of four heavy vehicles per hour are expected at the proposed construction sites.

It is noted that the local roads surrounding the project will be the most sensitive to construction traffic associated with the project compared to other major roads. In the absence of detailed existing traffic volumes on the roads surrounding the construction sites, reference is made to the *‘The Cooks to Cove GreenWay (In-Corridor Works) – Draft Review of Environmental Factors’, 3 May 2021*. Based on this document, Annual Average Daily Traffic (AADT) for most local roads would be over 1,000 vpd. However, for some local roads, AADT of less than 500 vpd is estimated. Based on *‘Sydney Light Rail Extension Stage 1 Lilyfield to Dulwich Hill Noise and Vibration Assessment’* prepared by Heggies, 2010, a local road surrounding the project with relatively low AADT (e.g. Weston Street) has a 5-day AADT of 238 with 10 to 20 vehicles per hour during Daytime with an estimated 5 percent of heavy vehicles.

On this basis, it is unlikely that the project generates traffic noise on local road greater than 2dB above the existing traffic noise during the Daytime period and is not anticipated to generate a significant traffic noise impacts as a result of traffic associated with construction during Daytime period. However, a detailed traffic noise impact assessment as part of the full CNVMP will be required later to be prepared in the detailed design phase once detailed construction traffic assessment is available.

6.2 Night Periods

Since some construction works would be required during the Night-time period at ‘Constitution Road to New Canterbury Road’ site (W-09), potential sleep disturbance is required to be assessed regarding the construction traffic associated with this site. For residential receivers, the screening level of 46 dB $L_{A1(60\text{ sec})}$ is expected to be exceeded in the range of 30 dB $L_{A1(60\text{ sec})}$ to 35 dB $L_{A1(60\text{ sec})}$. Therefore, sleep awakening is probable and further detailed analysis as per Section 4.1.2 are required. Detailed analyses during construction planning are recommended to confirm the number of existing sleep disturbing events.

7.0 CONSTRUCTION VIBRATION IMPACT ASSESSMENT

Vibration propagation through the ground is considered complex and depends on several factors including damping, reflection and impedance in ground conditions. Therefore, detailed vibration propagation assessment is considered to be a site-specific assessment and often require a combination of empirical (site measurements) and analytical methods.

7.1 Safe Working Distances to Prevent Structural Cosmetic Damage

Vibration impacts for specific plant items and site conditions cannot be readily predicted at this stage. However, for the purpose of this assessment, Table 44 shows a “Safe Working Distance” from vibration intensive plant indicating the minimum distance at which vibration levels from intensive vibration activities are not predicted to exceed the cosmetic damage targets. It is noted that these safe working distances are not to be applied to structures sensitive to vibration (e.g. heritage items). Table 44 define safe working distances for the proposed vibration intensive plant.

Table 44: Safe working distance – Cosmetic Damage

Plant Items	Safe working distance, (m)
Hydraulic Impact Hammer – Small (300 kg – 5-12t excavator)	2
Hydraulic Impact Hammer – Medium (900 kg – 12-18t excavator)	7
Hydraulic Impact Hammer – Large (1,600 kg – 18-34t excavator)	22
Pile Boring	2
Jackhammer	1*

* Avoid contact with receiver structure.

It is recommended that once a detailed construction methodology is known and specific equipment items are selected, a detailed review of proposed plant locations, close working zones, equipment selections and work activities for these receivers is conducted. Baseline vibration measurements for vibration generating works to develop site-specific exclusion zones should be considered. Detailed vibration impact assessment for works near sensitive receivers are also required to be prepared as part of the full CNVMP. The vibration criteria detailed in Section 4.3.1 and Section 4.3.2 would govern these work types.

7.2 Comments on Human Discomfort

Based on the assumed plant and equipment summarised in Appendix F, some vibration intensive activities may potentially exceed the applicable human comfort criteria in Section 4.3.3 at distances of up to around 75 meters. Where vibration intensive activities are proposed close to sensitive receivers, these works should be scheduled during the Day where possible. A detailed vibration impacts assessment as part of the full CNVMP will be required later to be prepared in the detailed design phase once detailed construction methodology is available.

APPENDIX A GLOSSARY OF TERMINOLOGY

SPL or L_p	<p><u>Sound Pressure Level</u> A logarithmic ratio of a sound pressure measured at distance, relative to the threshold of hearing (20 μPa RMS) and expressed in decibels.</p>
SWL or L_w	<p><u>Sound Power Level</u> A logarithmic ratio of the acoustic power output of a source relative to 10^{-12} watts and expressed in decibels. Sound power level is calculated from measured sound pressure levels and represents the level of total sound power radiated by a sound source.</p>
dB	<p><u>Decibel</u> The unit of sound level. Expressed as a logarithmic ratio of sound pressure P relative to a reference pressure of $P_r=20 \mu$Pa i.e. $dB = 20 \times \log(P/P_r)$</p>
dBA	<p>The unit of sound level which has its frequency characteristics modified by a filter (A-weighted) so as to more closely approximate the frequency bias of the human ear.</p>
A-weighting	<p>The process by which noise levels are corrected to account for the non-linear frequency response of the human ear.</p>
C-weighting	<p>The process by which noise levels are corrected to account for non-linear frequency response of the human ear at high noise levels (typically greater than 100 decibels).</p>
$L_{Aeq}(t)$	<p>The equivalent continuous (time-averaged) A-weighted sound level. This is commonly referred to as the average noise level. The suffix "t" represents the time period to which the noise level relates, e.g. (8 h) would represent a period of 8 hours, (15 min) would represent a period of 15 minutes and (2200-0700) would represent a measurement time between 10 pm and 7 am.</p>
$L_{A95}(t)$	<p>The A-weighted noise level equalled or exceeded for 95% of the measurement period. This is commonly referred to as the background noise level. The suffix "t" represents the time period to which the noise level relates, e.g. (8 h) would represent a period of 8 hours, (15 min) would represent a period of 15 minutes and (2200-0700) would represent a measurement time between 10 pm and 7 am.</p>
$L_{A90}(t)$	<p>The A-weighted noise level equalled or exceeded for 90% of the measurement period. This is commonly referred to as the background noise level. The suffix "t" represents the time period to which the noise level relates, e.g. (8 h) would represent a period of 8 hours, (15 min) would represent a period of 15 minutes and (2200-0700) would represent a measurement time between 10 pm and 7 am.</p>
$L_{A10}(t)$	<p>The A-weighted noise level equalled or exceeded for 10% of the measurement period. This is commonly referred to as the average maximum noise level. The suffix "t" represents the time period to which the noise level relates, e.g. (8 h) would represent a period of 8 hours, (15 min) would represent a period of 15 minutes and (2200-0700) would represent a measurement time between 10 pm and 7 am.</p>

L_{Amax}	The A-weighted maximum noise level. The highest noise level which occurs during the measurement period.
L_{A01} (t)	<p>The A-weighted noise level which is equalled or exceeded for 1% of the measurement period. This is sometimes referred to as the typical maximum noise level.</p> <p>The suffix "t" represents the time period to which the noise level relates, e.g. (8 h) would represent a period of 8 hours, (15 min) would represent a period of 15 minutes and (2200-0700) would represent a measurement time between 10 pm and 7 am.</p>
L_{peak}	The peak instantaneous pressure level recorded during the measurement period (normally not A-weighted).
L_{Cpk}	The peak instantaneous C-weighted pressure level recorded during the measurement period. Typically measured or estimated at a worker's ear during any noisy event.
L_{dn}	The day night noise level which is calculated from the 24 hour L _{Aeq} with a 10 dB penalty applied to the night-time (2200-0700 hours) L _{Aeq} .
L_{den}	The day evening night noise level which is calculated from the 24 hour L _{Aeq} with a 5 decibel penalty applied to the evening (1800-2200 hours) L _{Aeq} and a 10 decibel penalty applied to the night-time (2200-0700 hours) L _{Aeq} .
SEL or L_{AE}	<p><u>Sound Exposure Level</u></p> <p>The sound level of one second duration which has the same amount of energy as the actual noise event measured.</p> <p>Usually used to measure the sound energy of a particular event, such as a train pass-by or an aircraft flyover</p>
Vibration	<p>When an object vibrates, it moves rapidly up and down or from side to side. The magnitude of the sensation when feeling a vibrating object is related to the vibration velocity.</p> <p>Vibration can occur in any direction. When vibration velocities are described, it can be either the total vibration velocity, which includes all directions, or it can be separated into the vertical direction (up and down vibration), the horizontal transverse direction (side to side) and the horizontal longitudinal direction (front to back).</p>
Amplitude	The measurement of energy or movement in a vibrating object. Amplitude is measured and expressed in three ways: Displacement (commonly in mm); Velocity (commonly in mm/s); and Acceleration (commonly in m/s ²). Amplitude is also the y-axis of the vibration time waveform and spectrum, it helps define vibration severity.
Damping	Energy dissipation in an oscillating structure. For free vibration, that results in a decay in the amplitude of motion over time.
PPV	<p>Peak Particle Velocity</p> <p>For Peak Particle Velocity (PPV) is the measure of the vibration aptitude, zero to maximum. Used for building structural damage assessment.</p>
VDV	<p>Vibration Dose Value</p> <p>Vibration Dose Value is based on British Standard BS 6472:1992 Guide to Evaluation</p>

of Human Exposure to Vibration in Buildings (1Hz to 80Hz) and provides guidelines for the evaluation of whole body exposure to intermittent vibration.

VDV can be used to take into account the weighted measured RMS vibration from many vibration sources including rail vehicles, construction equipment such as jackhammers and industry. VDV takes into account the duration of each event and the number of events per day, either at present or in the foreseeable future and calculates a single value index.

APPENDIX B PROJECT CONCEPT DESIGN



MCGREGOR COXALL
 150 GARDEN STREET
 SYDNEY NSW 2010
 TEL: 02 9212 3333
 WWW.MCGREGORCOXALL.COM

Client
 Inner West Council

Project Name
 GREENWAY
Project No.
 096570
Address
 COOKS TO COVE

Key Plan

Issue Log

Issue No.	Description	By / Checked	Date
1	For Review	JMM	17.3.18
2	For Review	JMM	17.3.18
3	For Review	JMM	17.3.18
4	For Review	JMM	17.3.18
5	For Review	JMM	17.3.18
6	For Review	JMM	17.3.18
7	For Review	JMM	17.3.18
8	For Review	JMM	17.3.18
9	For Review	JMM	17.3.18
10	For Review	JMM	17.3.18
11	For Review	JMM	17.3.18
12	For Review	JMM	17.3.18
13	For Review	JMM	17.3.18
14	For Review	JMM	17.3.18
15	For Review	JMM	17.3.18
16	For Review	JMM	17.3.18
17	For Review	JMM	17.3.18
18	For Review	JMM	17.3.18
19	For Review	JMM	17.3.18
20	For Review	JMM	17.3.18

Scale
 1:500 @ A1
 0 5 10 15 20 25 M
 0 10 20 30 FT

North

Phase
 Concept Design
 Gadigal Reserve
Sheet No.
 LD-CD-107

Rev
 E

- Program**
- Gadigal Reserve natural park
 - Retain existing Just's carrieway path
 - Enclosed path to shield light from Mitchell roost
 - Informal decomposed gravel / crushed sandstone path
 - Nature observation area
 - Informal access to Grovemore St
 - New low fence along channel to meet Gympy Water requirements
 - Fence off Mitchell roost
 - Ecologically friendly feature lighting of Whipple Maus

MCGREGOR
COVALL
60 Cowardin Knickerbocker Court
Lewisville, NC 27033
Phone: 703.838.2820
Fax: 703.838.2820
www.mcgregorcovall.com

Client
Inner West Council


Project Name
Greenway
Project No.
054651D
Address
Cooles to Cove



Issue Log

Issue	For Review	For Action	By / Checked	Date
A	17.9.19	AMM	AMM	17.9.19
B	18.10.19	AMM	AMM	18.10.19
C	18.7.20	AMM	AMM	18.7.20

Scale
1:500 @ A1
AS APPLICABLE FOR THE PURPOSE OF THIS DRAWING ONLY.
1" = 10' 0" (30.48m)
1" = 20' 0" (60.96m)
1" = 30' 0" (91.44m)

North

Phase
Concept Design
Sheet Title
Lewisham West
Sheet No.
LD-CD-108

Rev
D





- Program**
1. Connection past Victorian Mills station to consider pedestrian, bike and vehicle movements
 2. Tunnel under Davis St (refer EN-02-01)

McGREGOR
COXALL

14, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000

Client
Inner West Council

Project Name
Greenway/
Project No.
064570
Address
Cooks to Cove

Key Plan

Issue Log

Issue	Description	By / Checked	Date
A	Draw Issue CD	JMM	27-2-18
B	Draw Issue CD	JMM	6-11-18
C	Draw Issue CD	JMM	16-2-18
D	Draw Issue CD	JMM	22-2-18
E	Draw Issue CD	JMM	22-2-18
F	Draw Issue CD	JMM	22-2-18
G	Draw Issue CD	JMM	22-2-18
H	Draw Issue CD	JMM	22-2-18

Scale
1:500 @ A1

0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100

All dimensions are in millimetres unless otherwise noted.
Do not scale from the drawing.

North

Phase
Concept Design
Sheet Title
Dulwich Hill Parks
Sheet No.
LD-CD-110

Rev
H



McGREGOR COXALL
 20 Cowley Way, Cowley
 Luton, Bedfordshire
 LU1 1JH
 Tel: 01582 561122
 Fax: 01582 561123
 www.mcgregorcoxall.com

Client
 Inner West Council

Project Name
 Greenway
Project No.
 0646570
Address
 Codes to Cave



Issue Log

Rev	Revision Description	By / Checked	Date
R	Revised DNV, CD	AMM	24.4.18
C	Revised DNV, CD	AMM	16.11.18
E	Client Sign, CD	AMM	16.2.19
O	Client Sign, CD	AMM	23.4.19
I	Client Sign, CD	AMM	23.4.19
	Revised 100% CD	AMM	28.9.20



North

Phase
 Concept Design
Sheet Title
 Const. Rd - Hercules St
Sheet No.
 LD-CD-111



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Project Name
Greenway
Project No.
0646570
Address
Cook's to Cove



Rev	Revision Description	By / Checked	Date
0	ISSUED FOR CD	JMM	2018-10
1	REVISED FOR CD	JMM	6-11-18
2	REVISED FOR CD	JMM	7-12-18
3	REVISED FOR CD	JMM	25-4-19
4	REVISED FOR CD	JMM	28-8-20



Phase
Concept Design
Sheet Title
Hercules St open space
Sheet No.
LD-CD-112

Rev
1

APPENDIX C MONITORING LOCATIONS

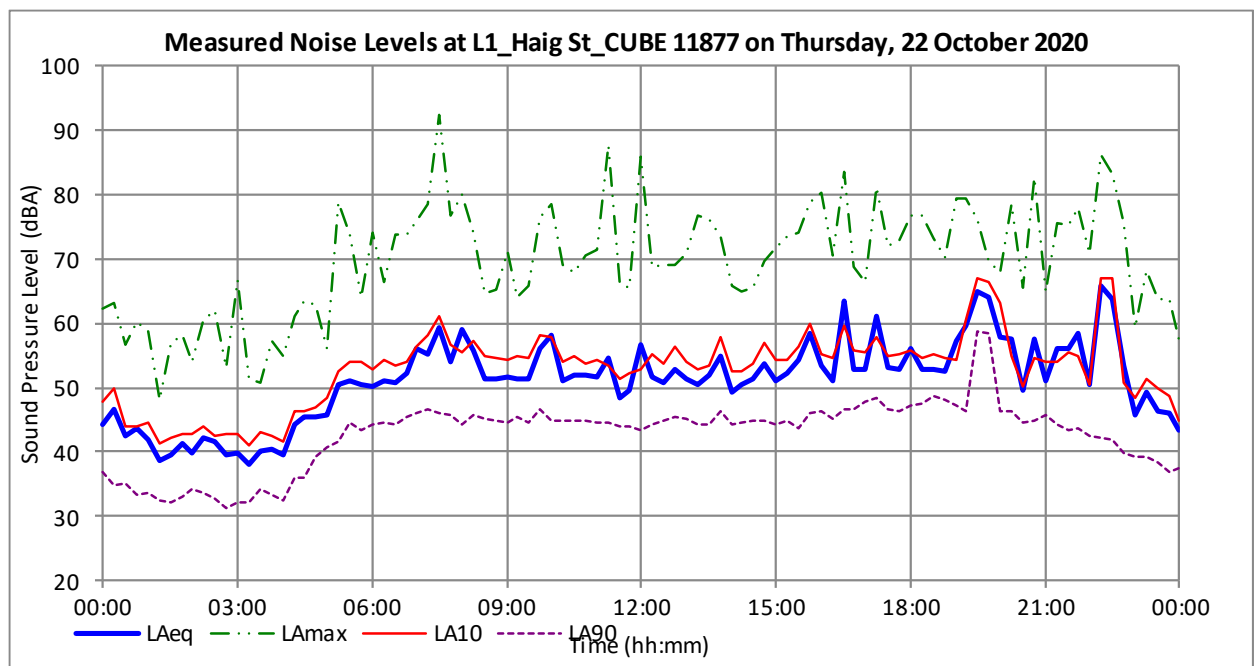
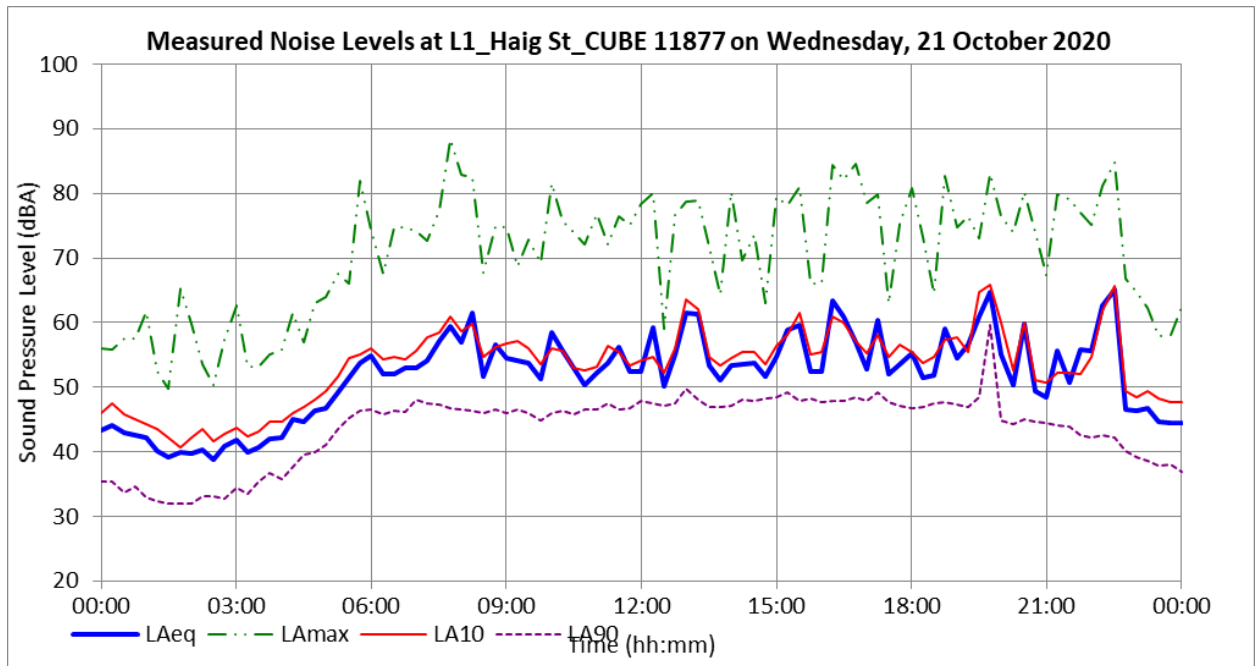


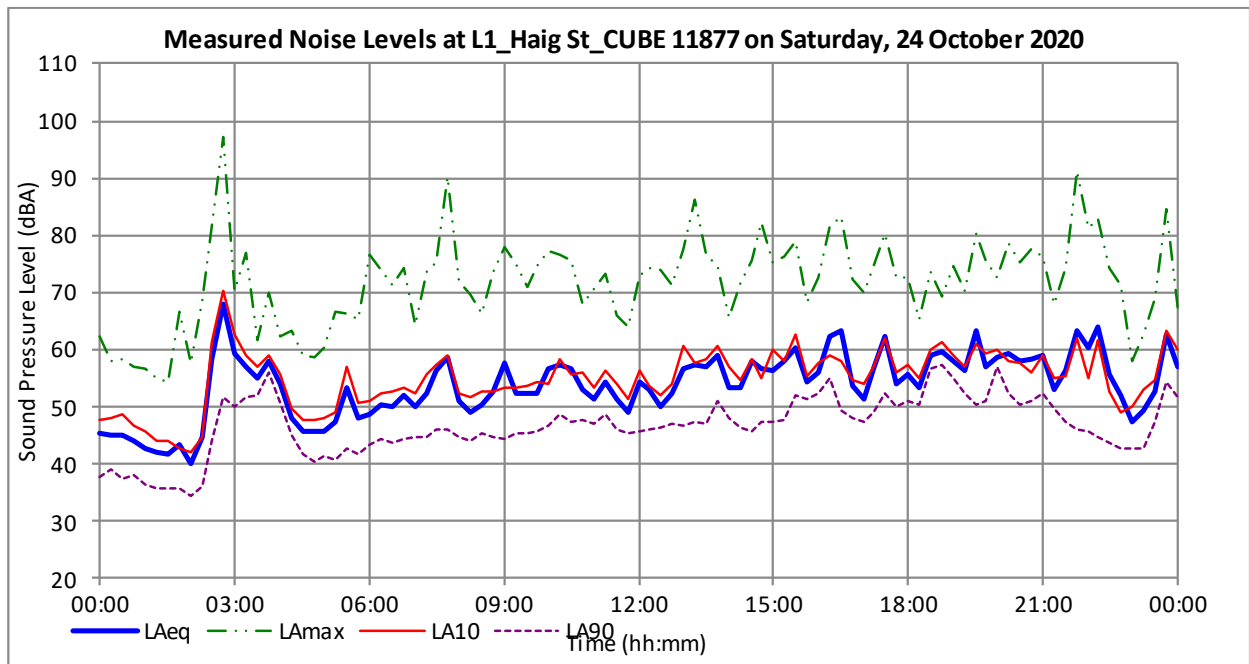
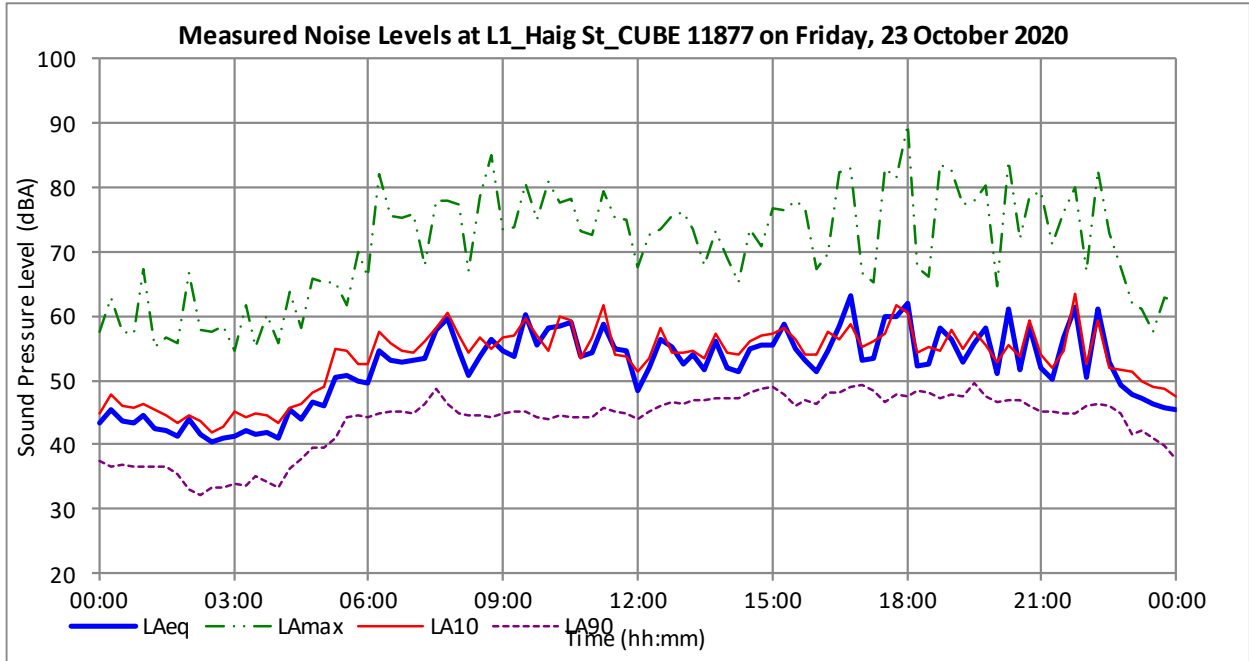


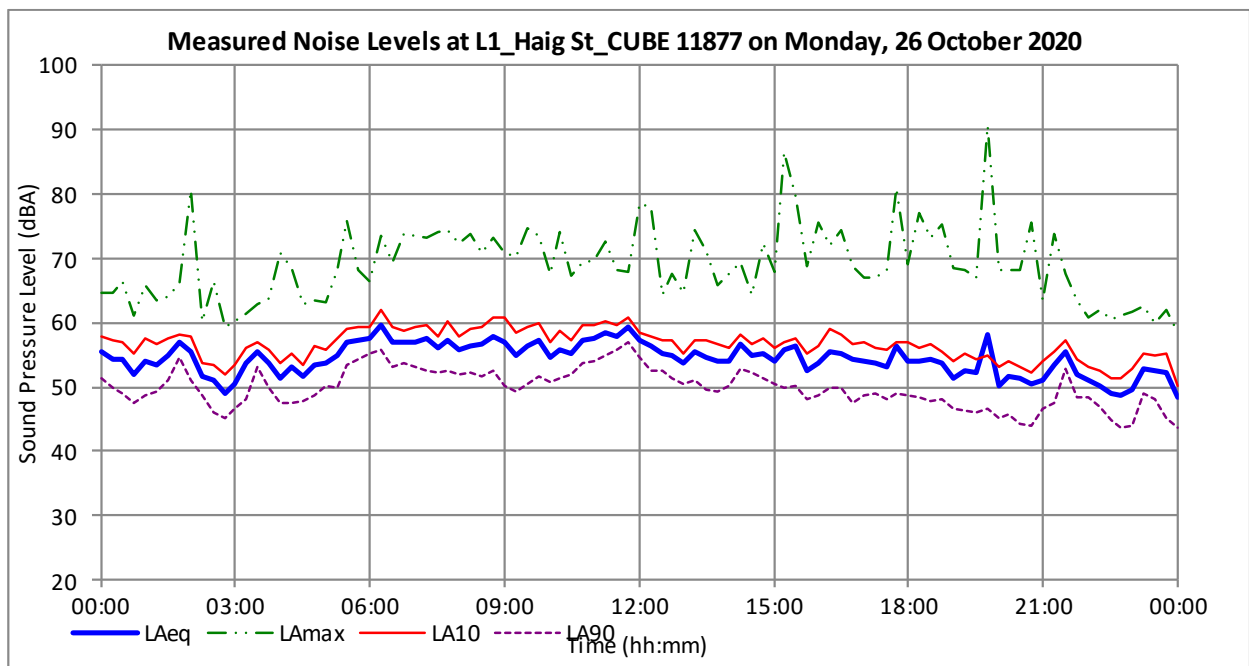
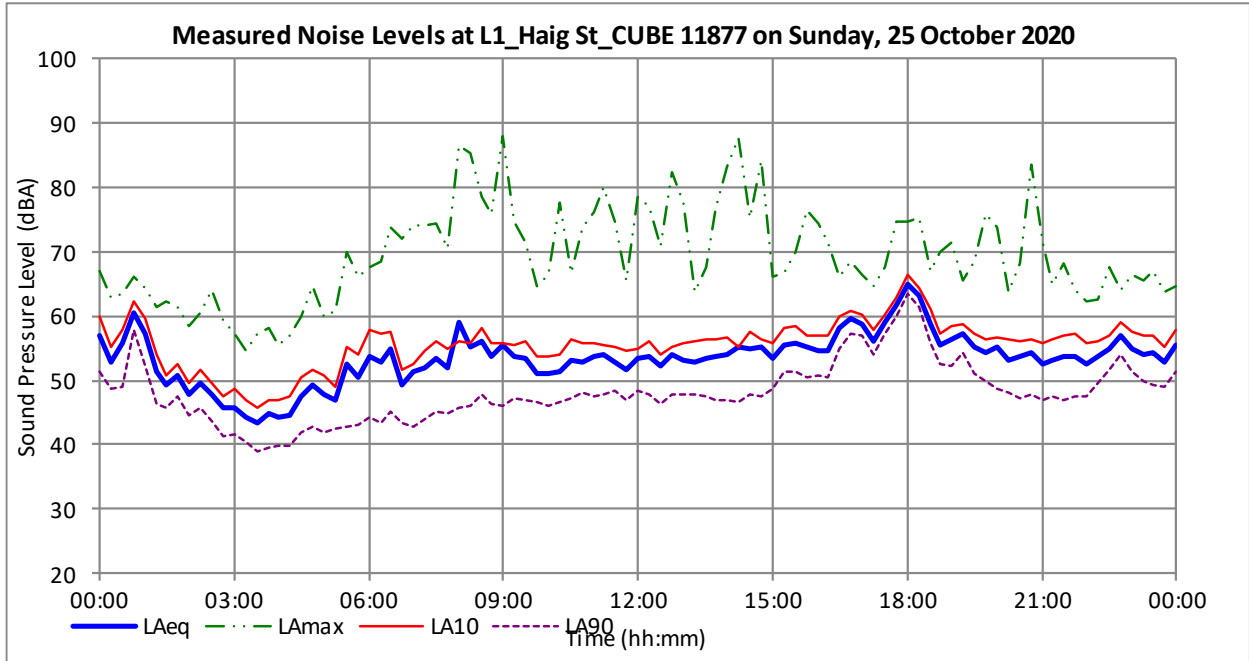


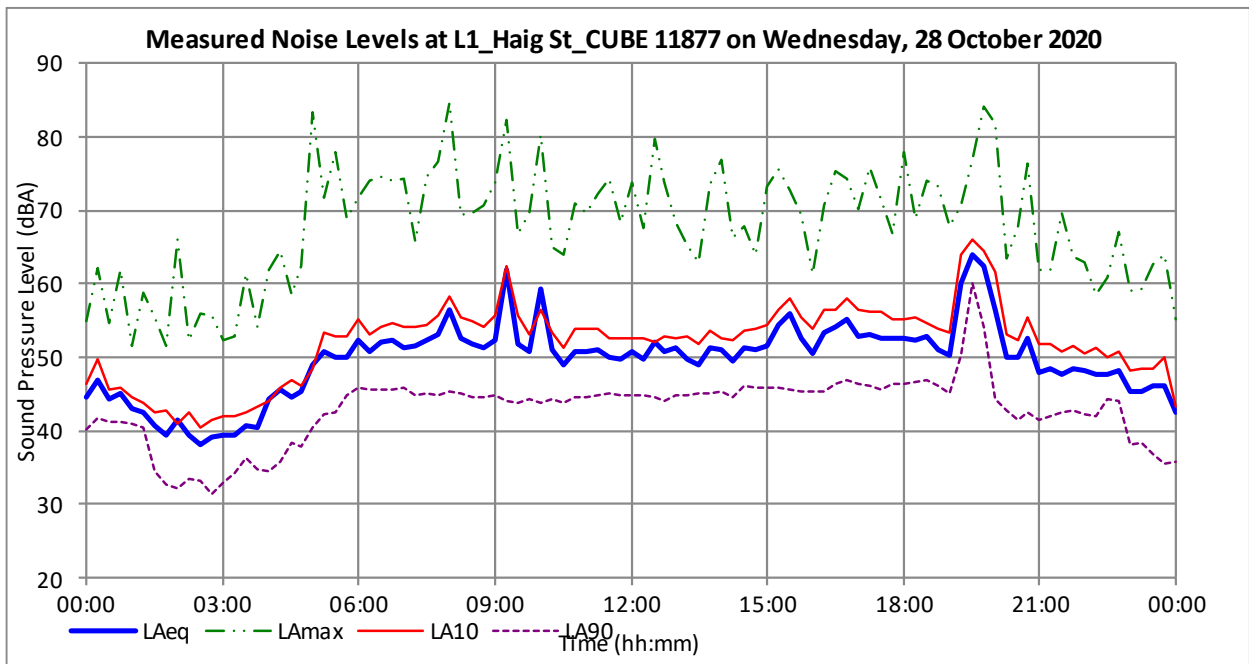
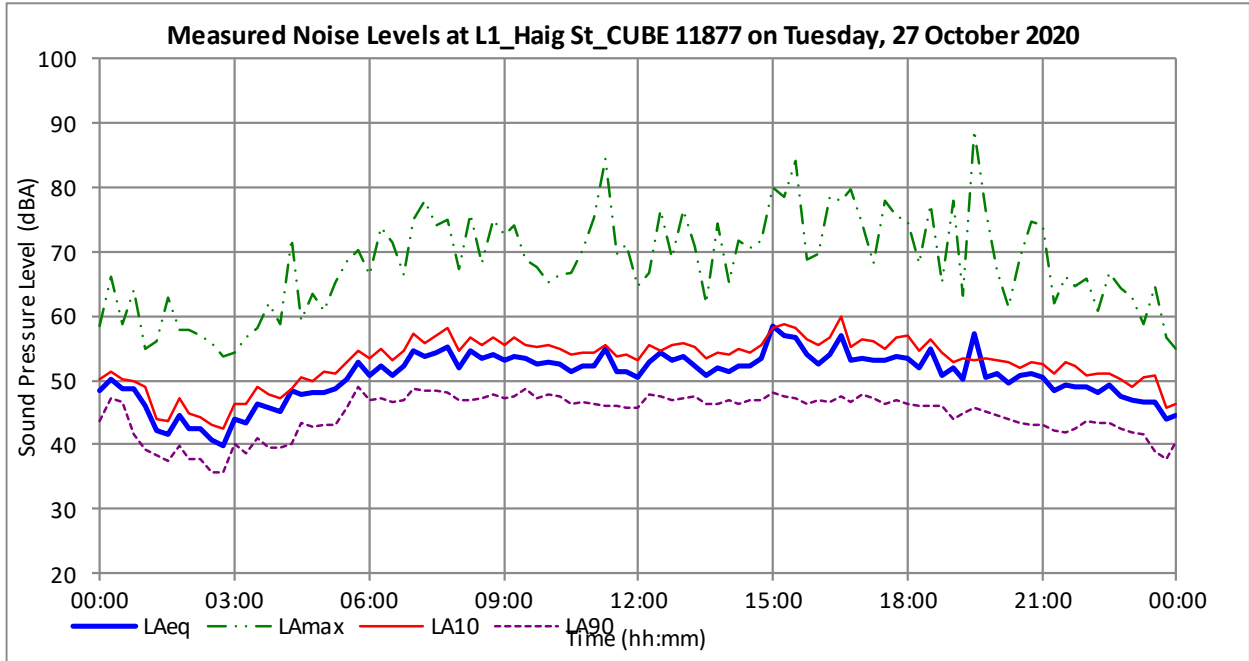
APPENDIX D MONITORING RESULTS

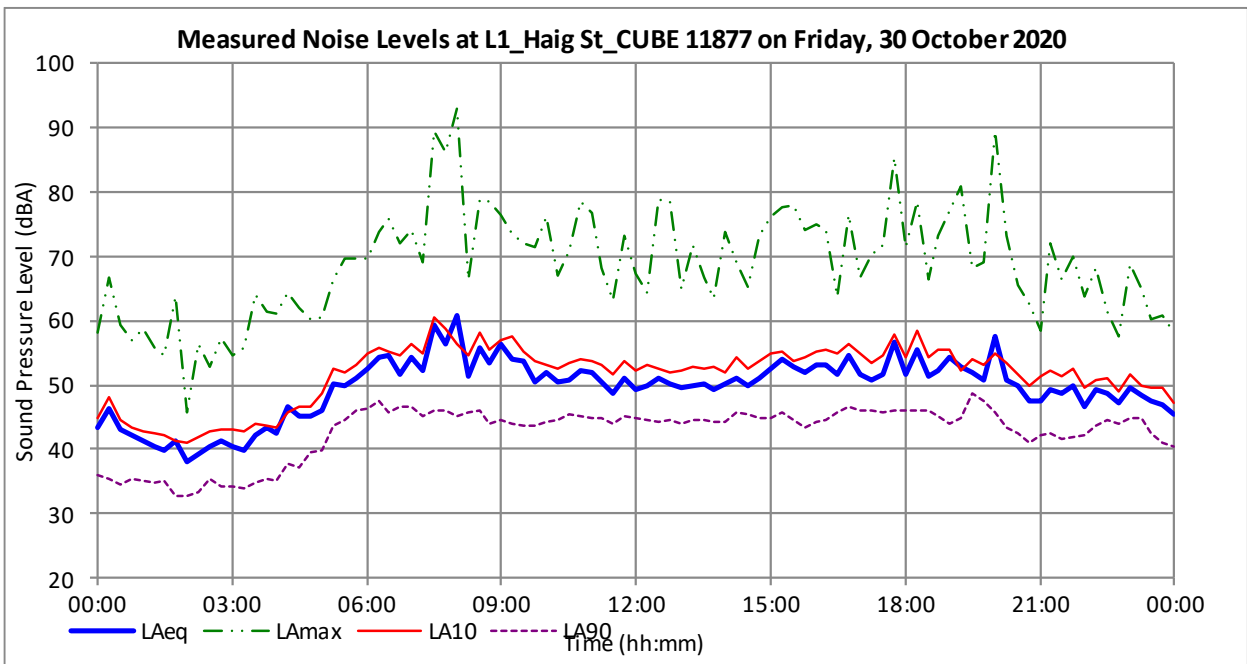
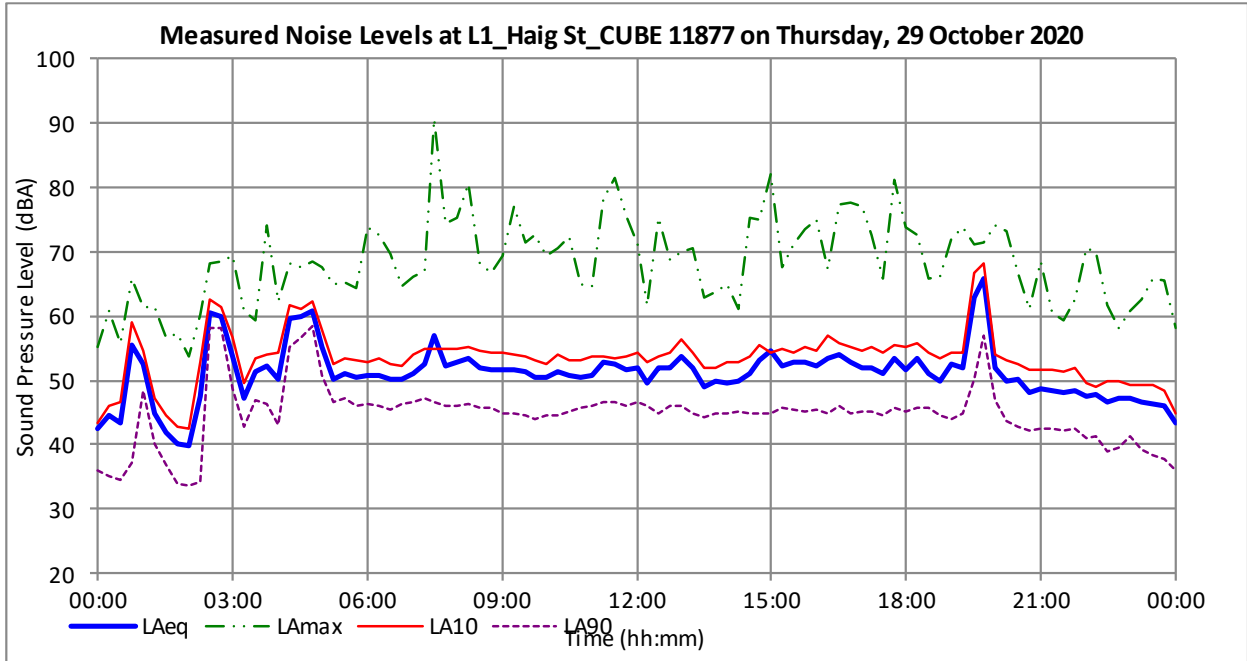
D1 Noise monitoring results at monitoring location BG-01

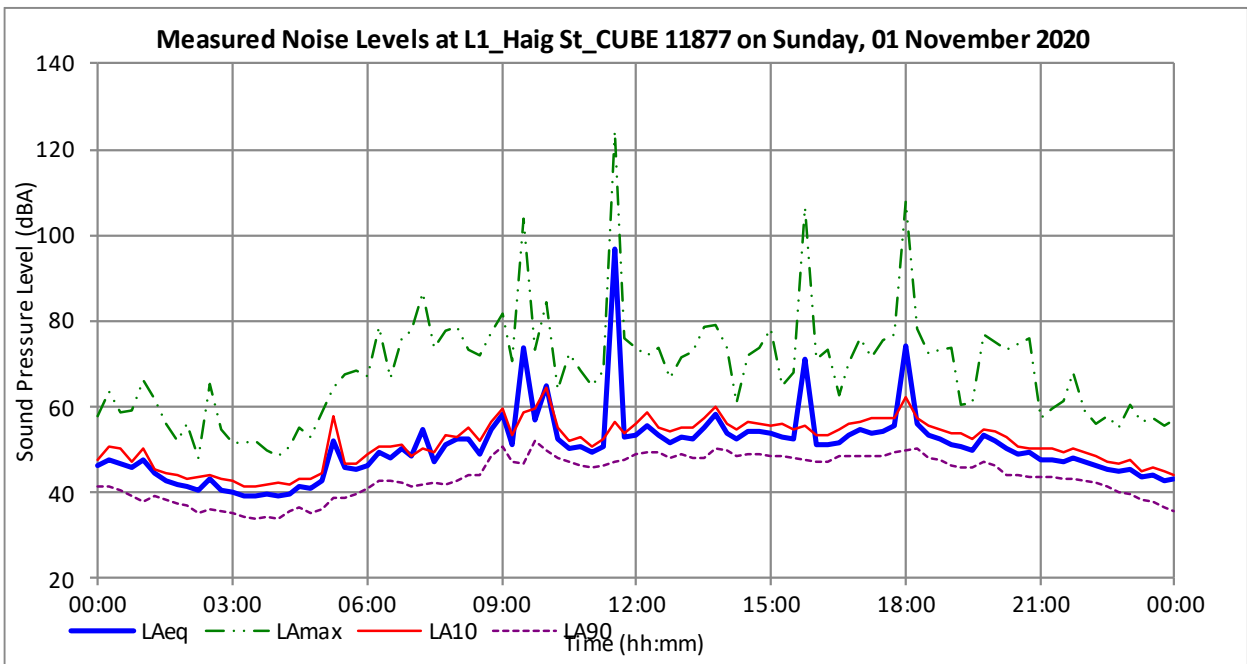
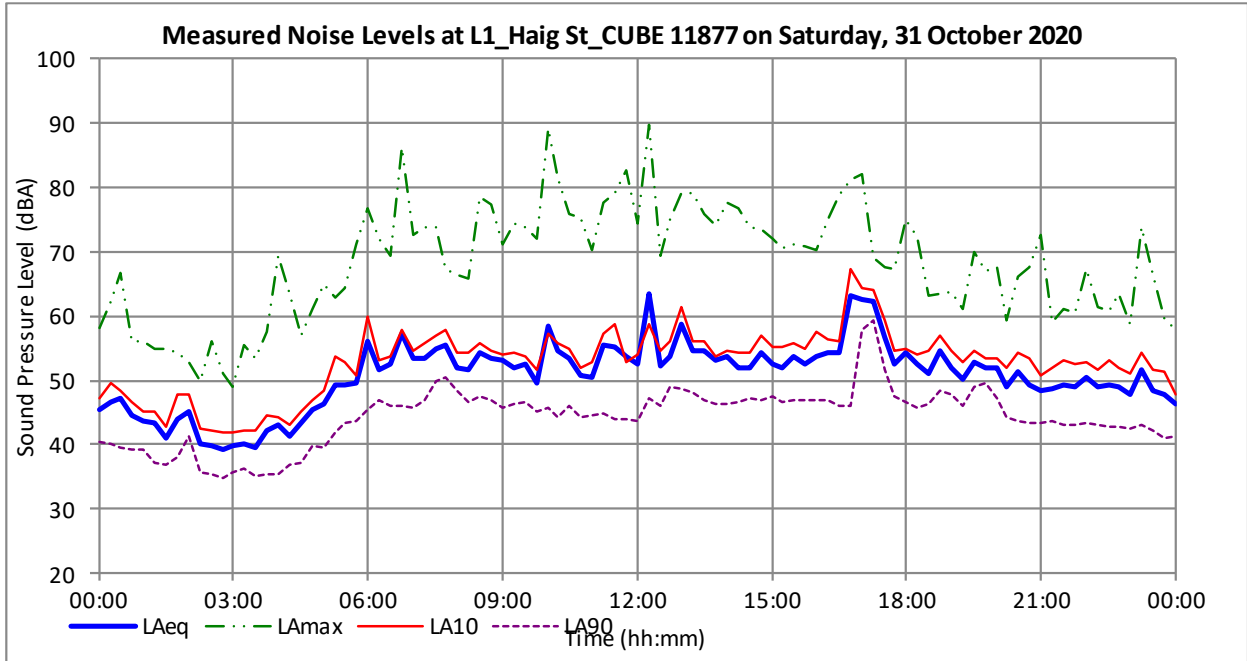


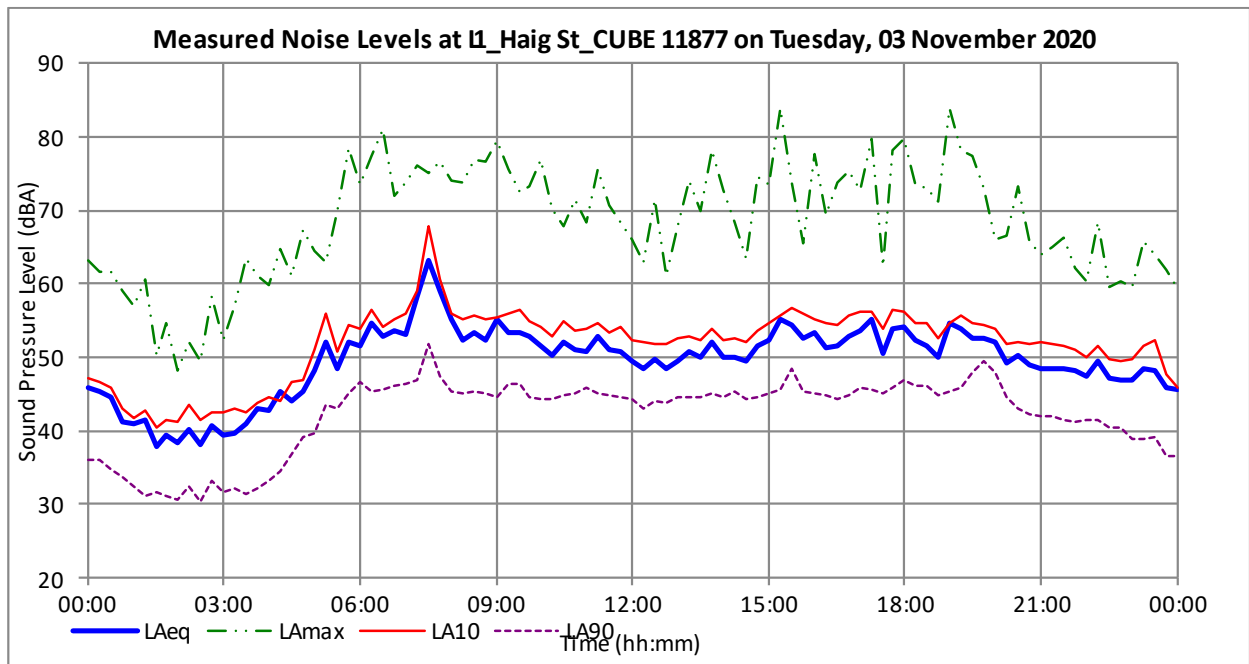
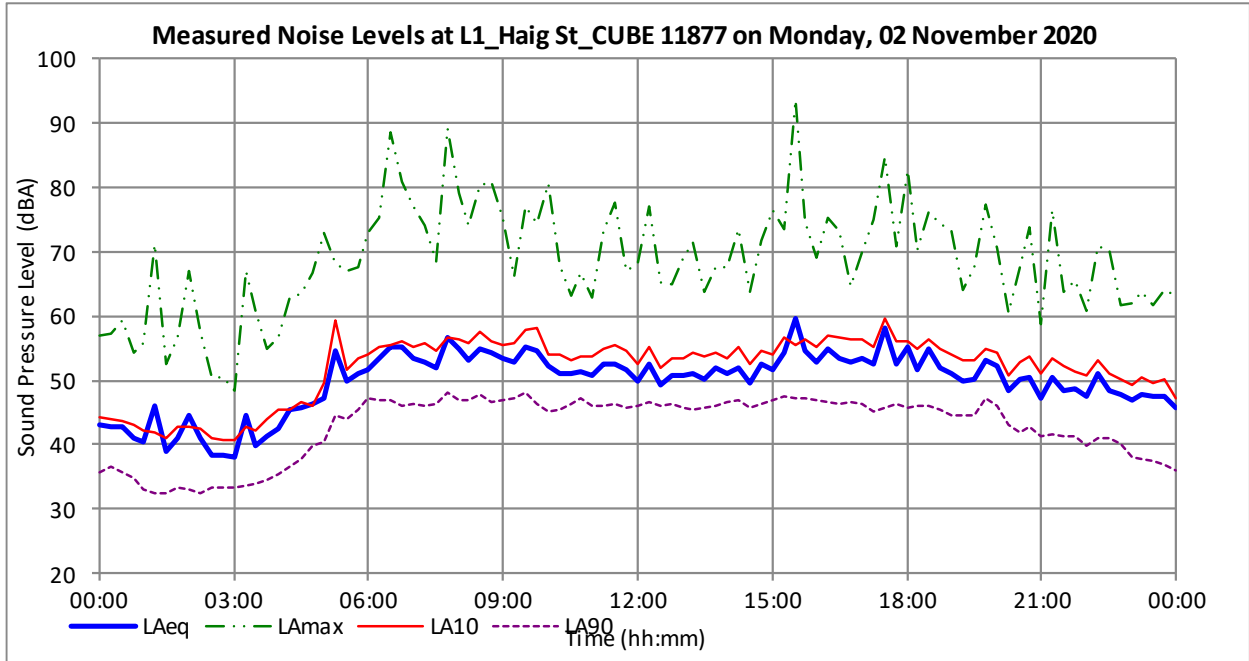


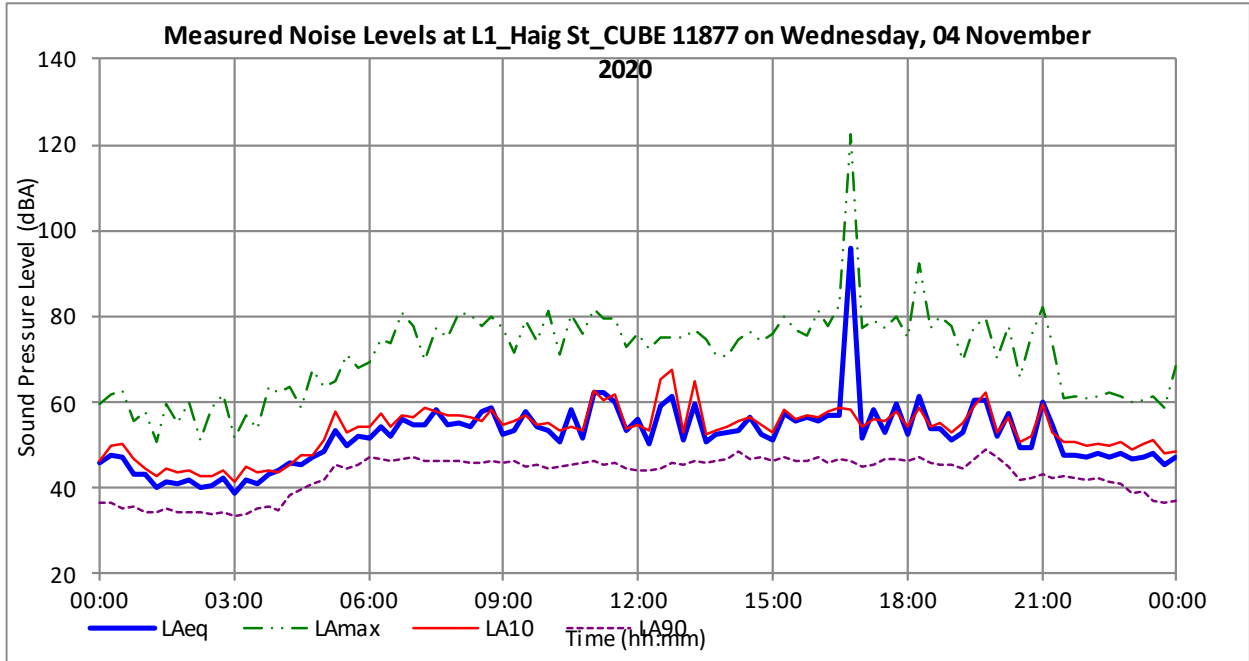




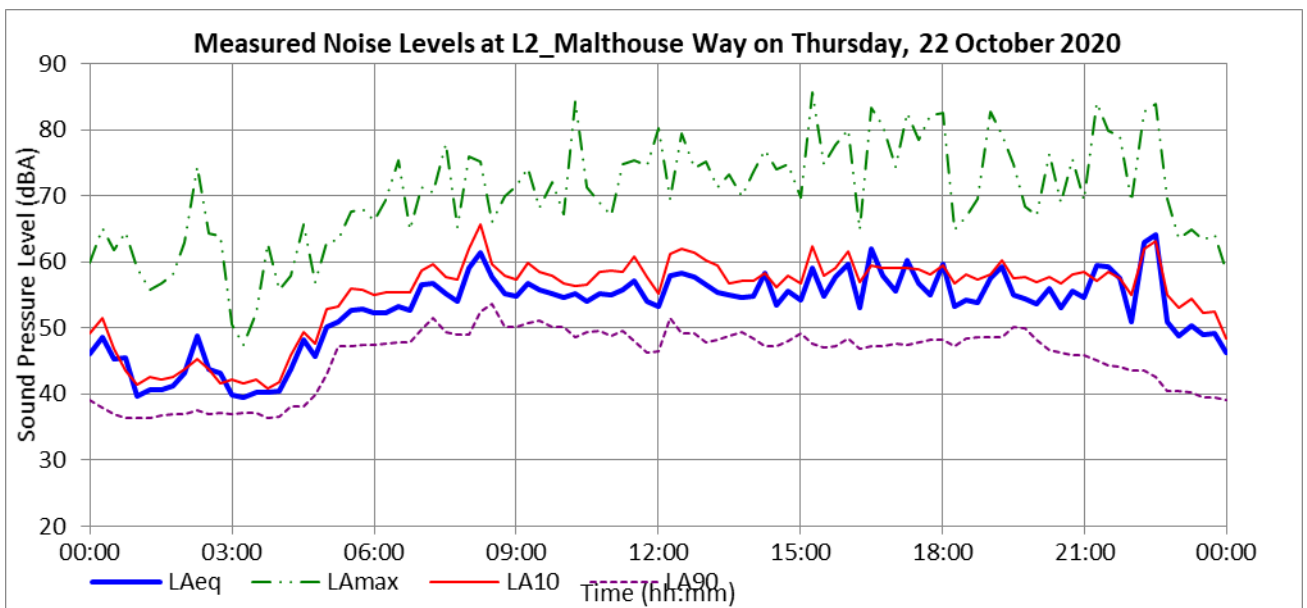
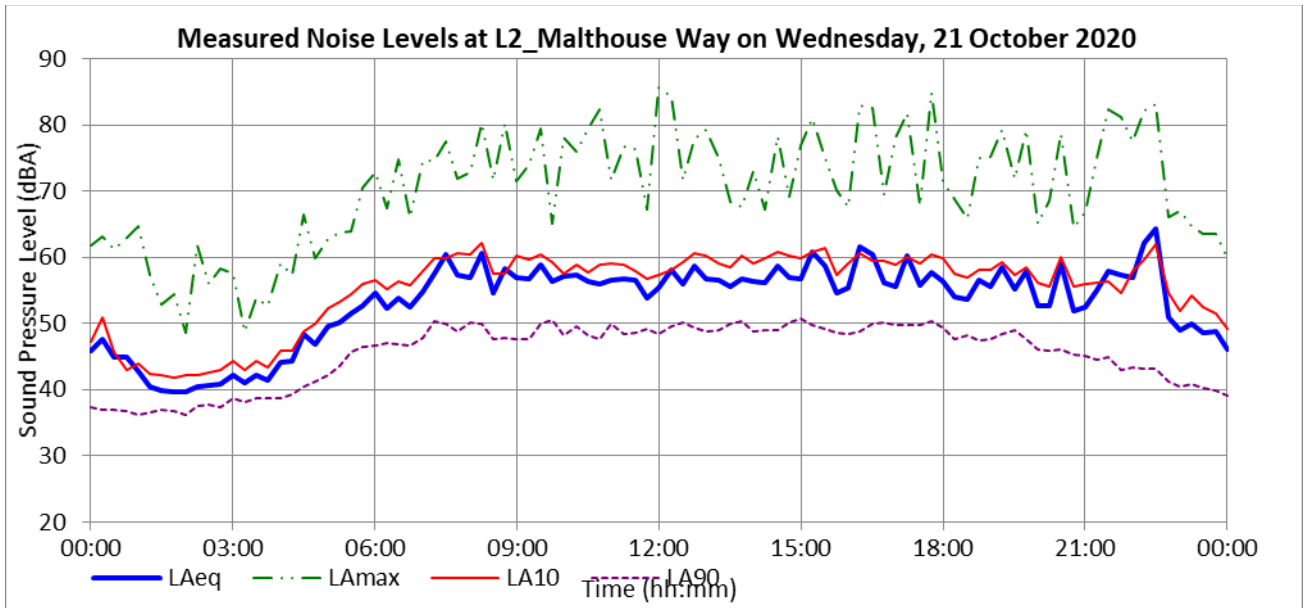


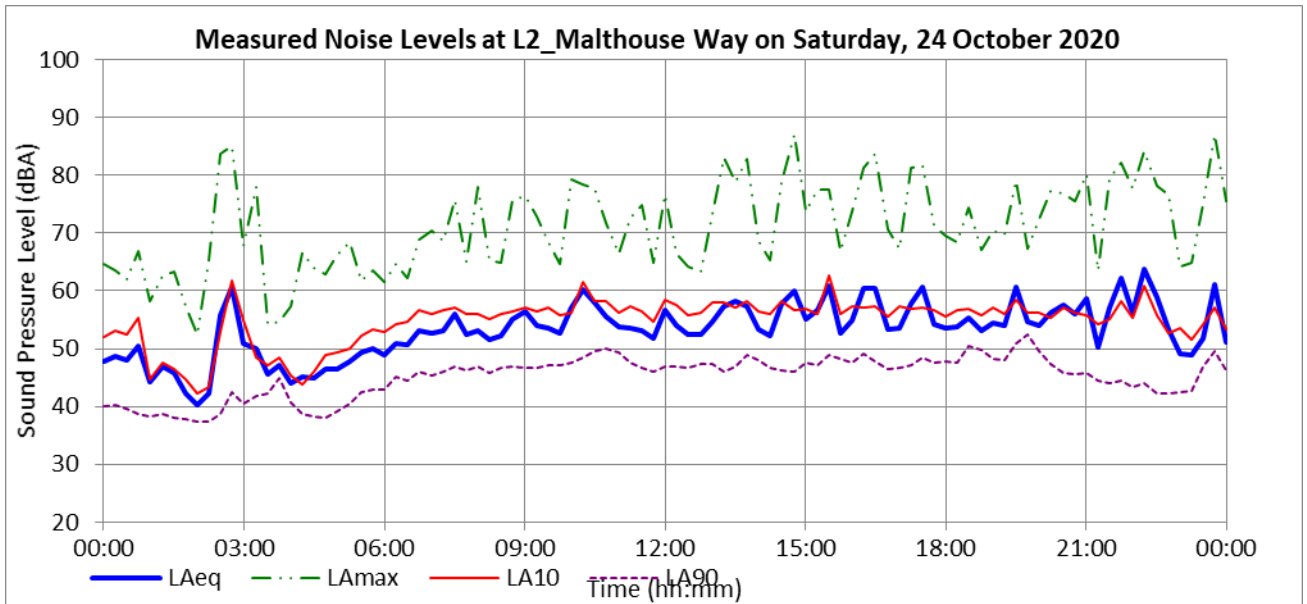
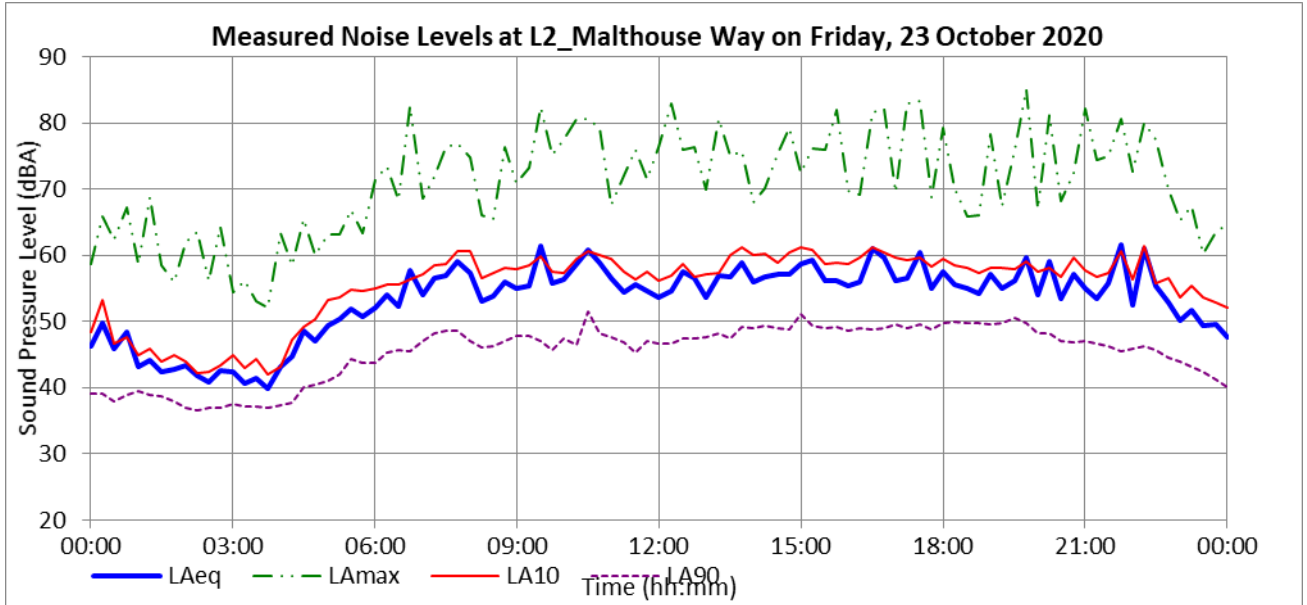


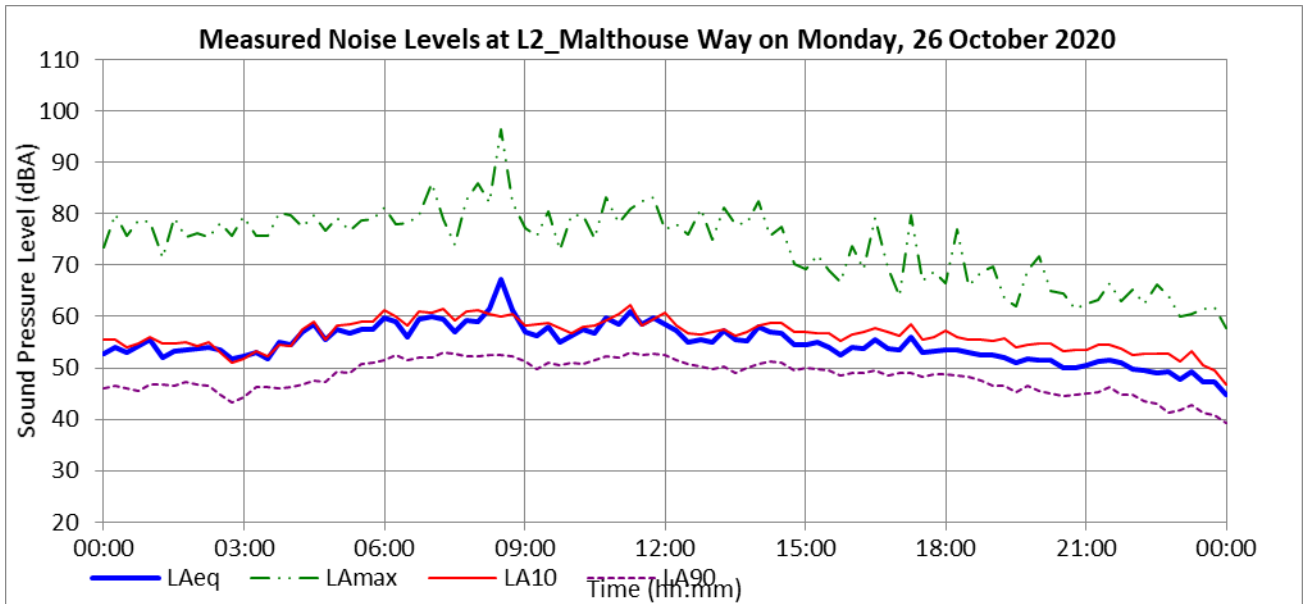
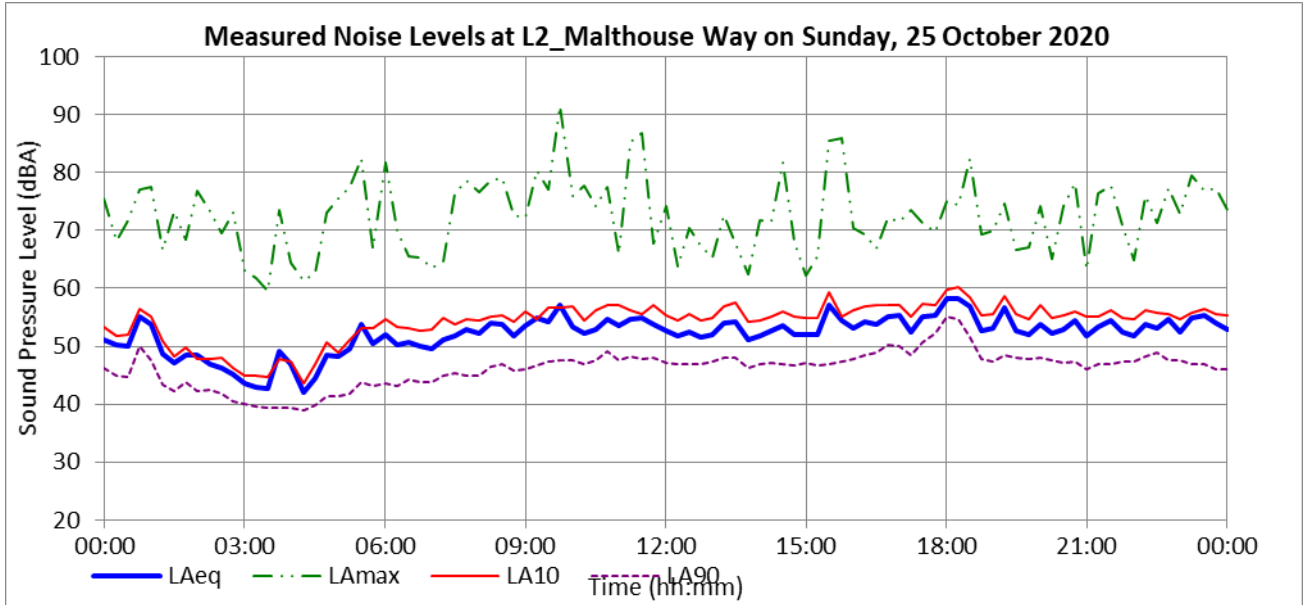


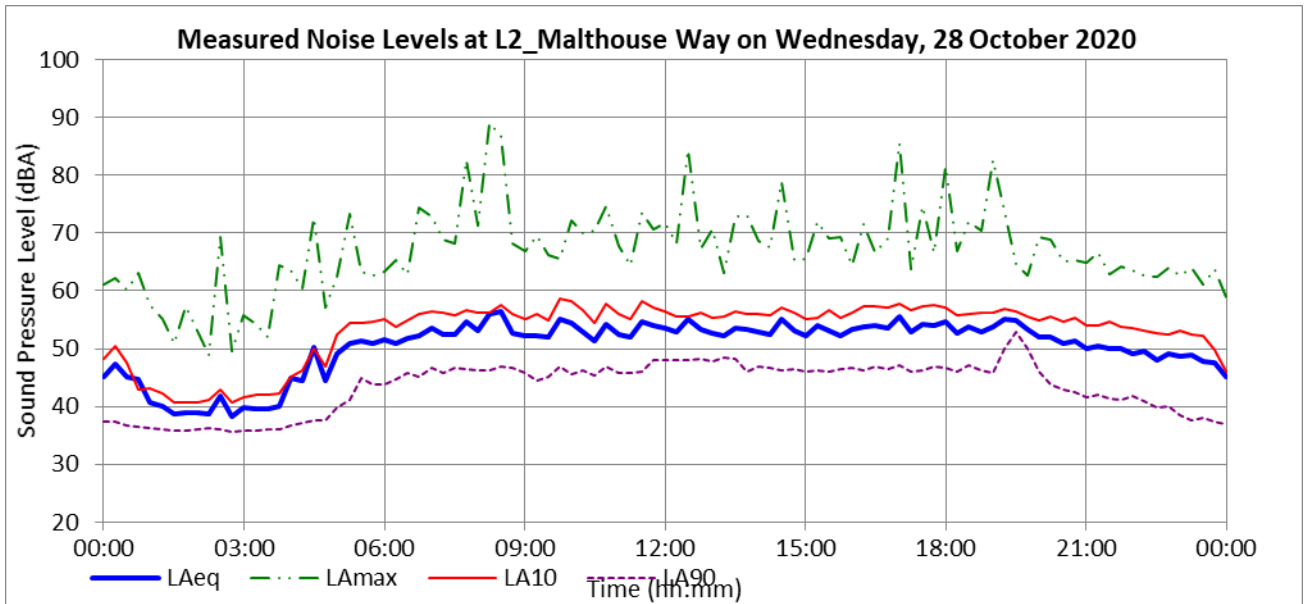
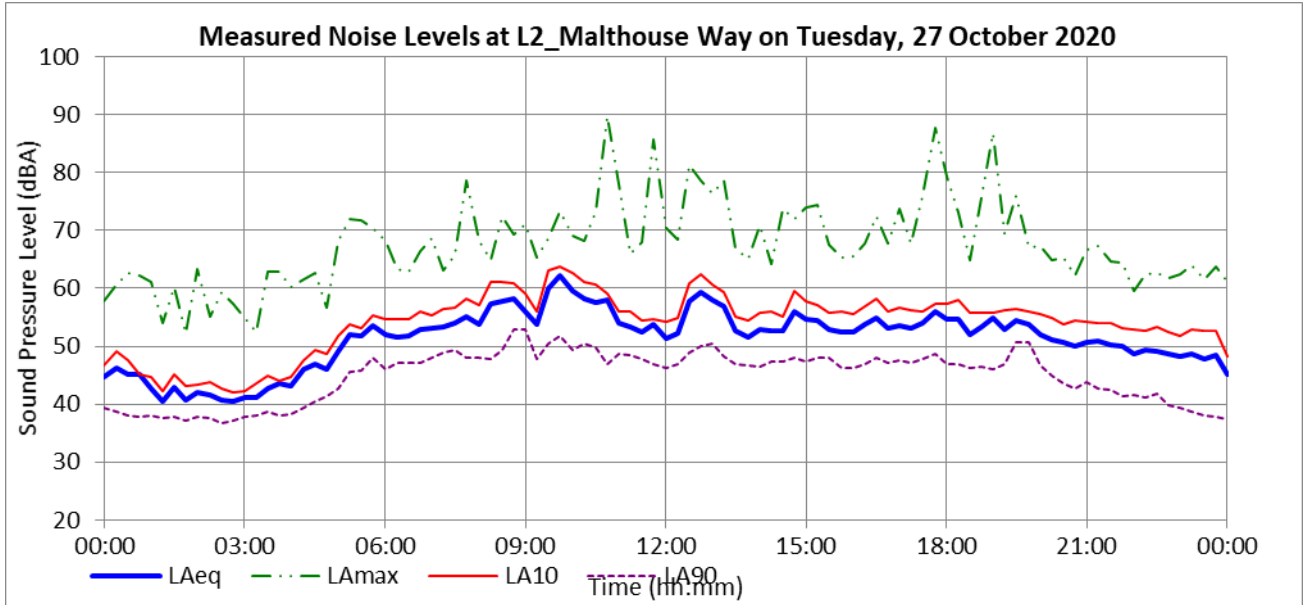


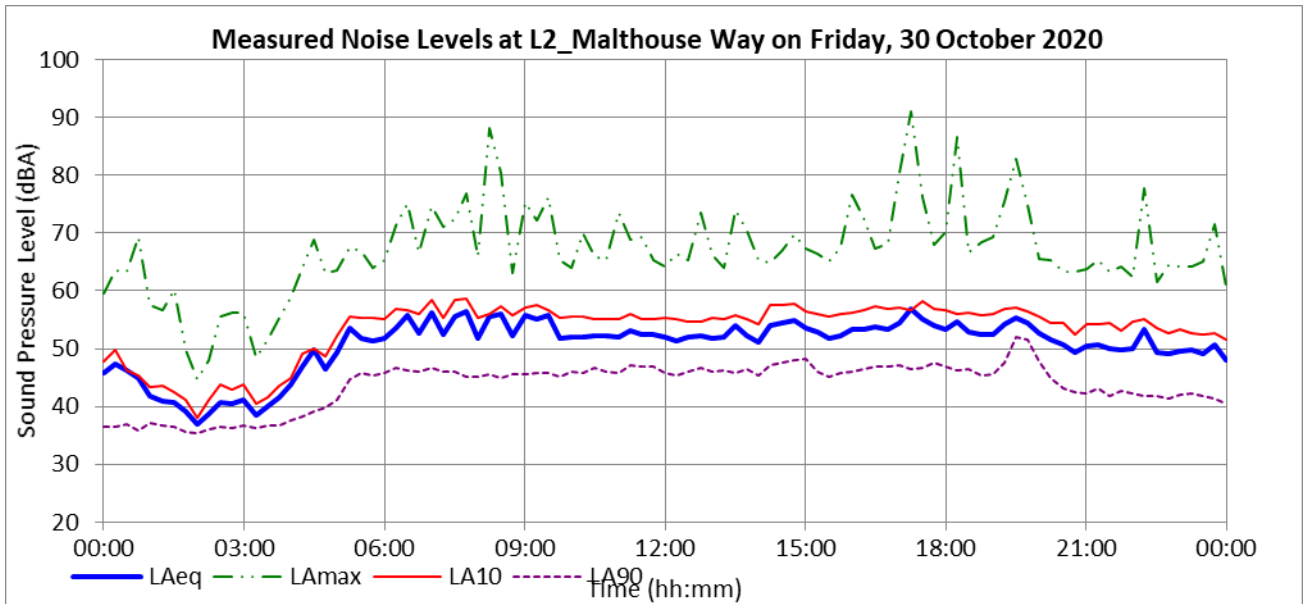
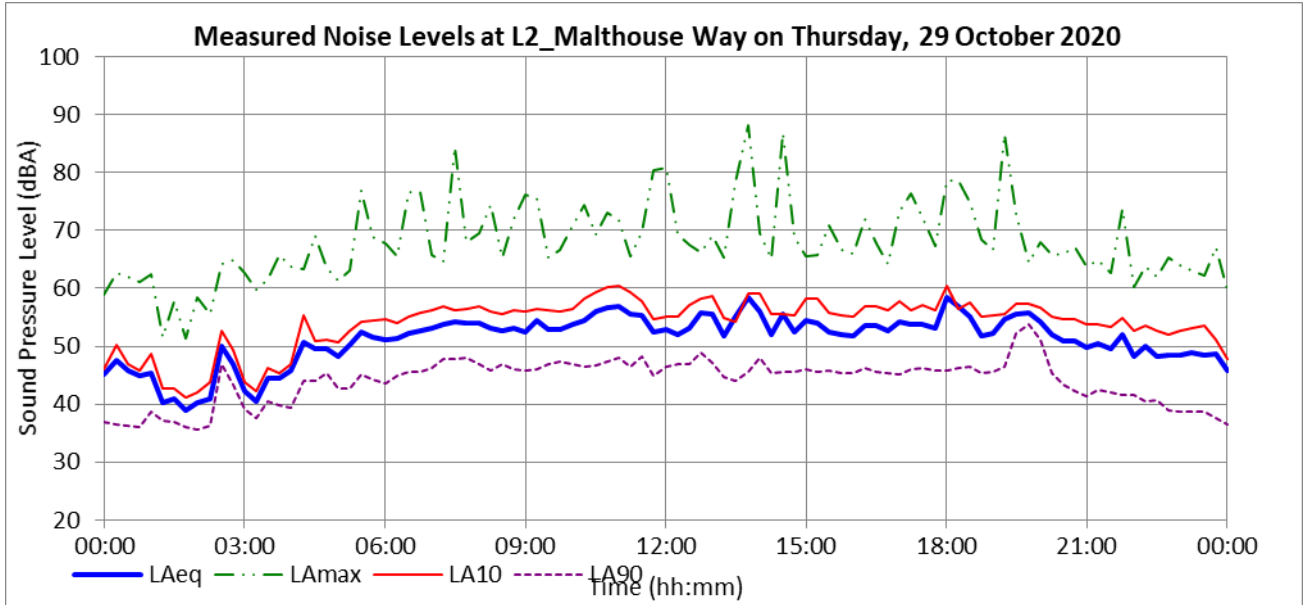
D2 Noise monitoring results at monitoring location BG-02

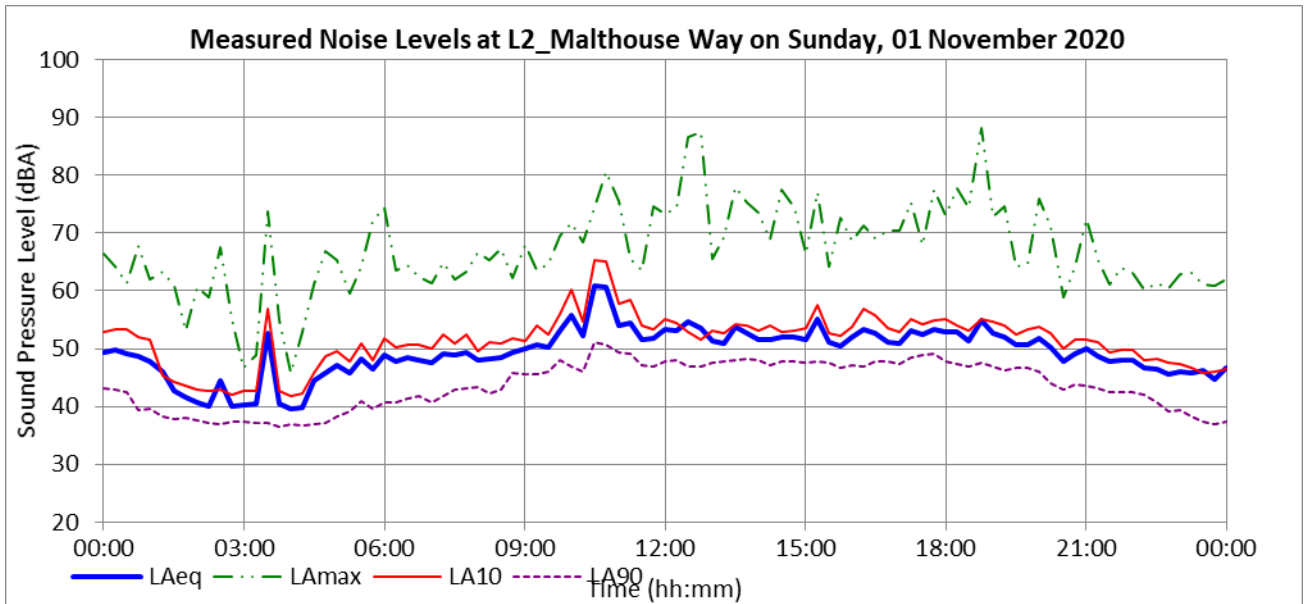
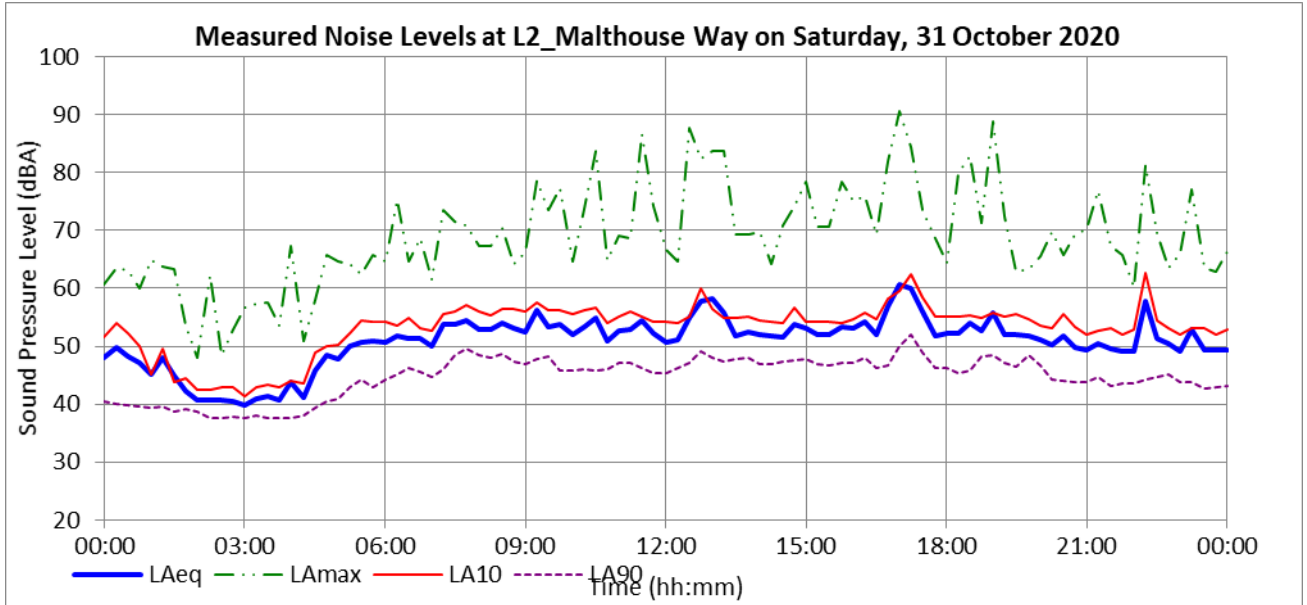


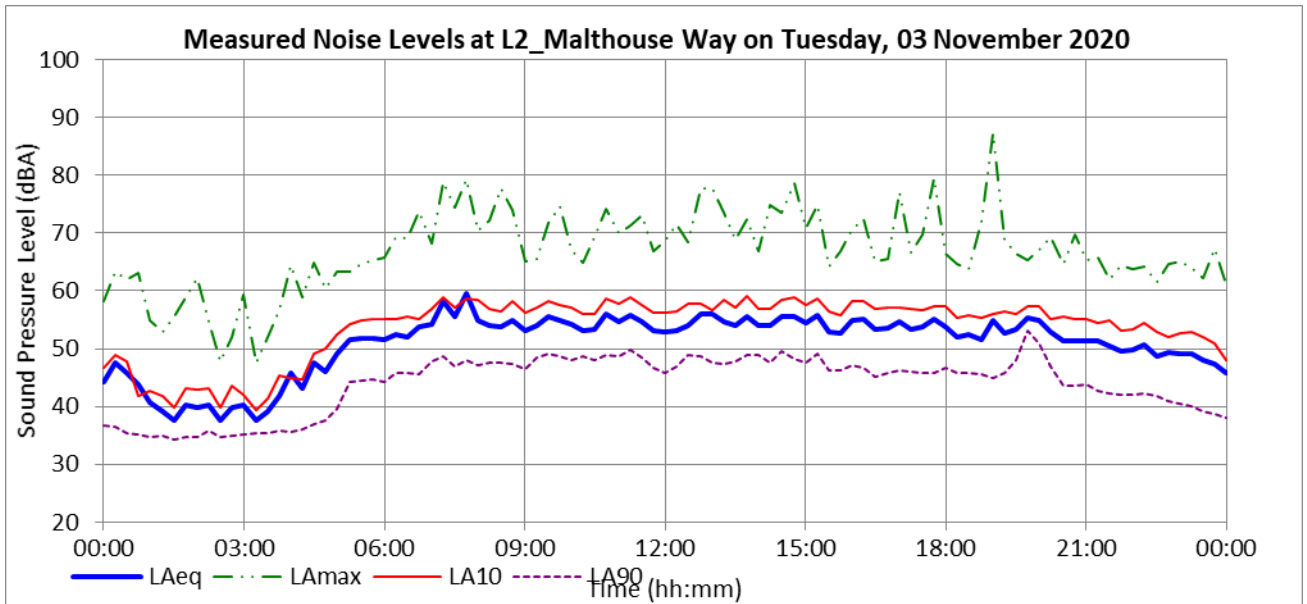
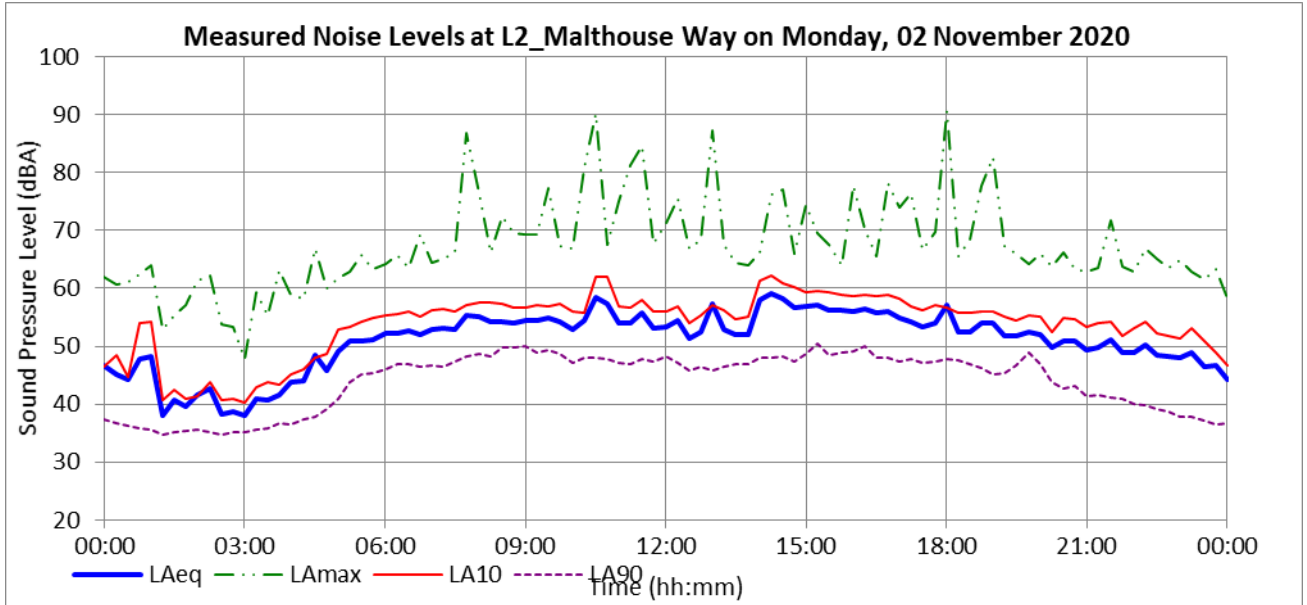


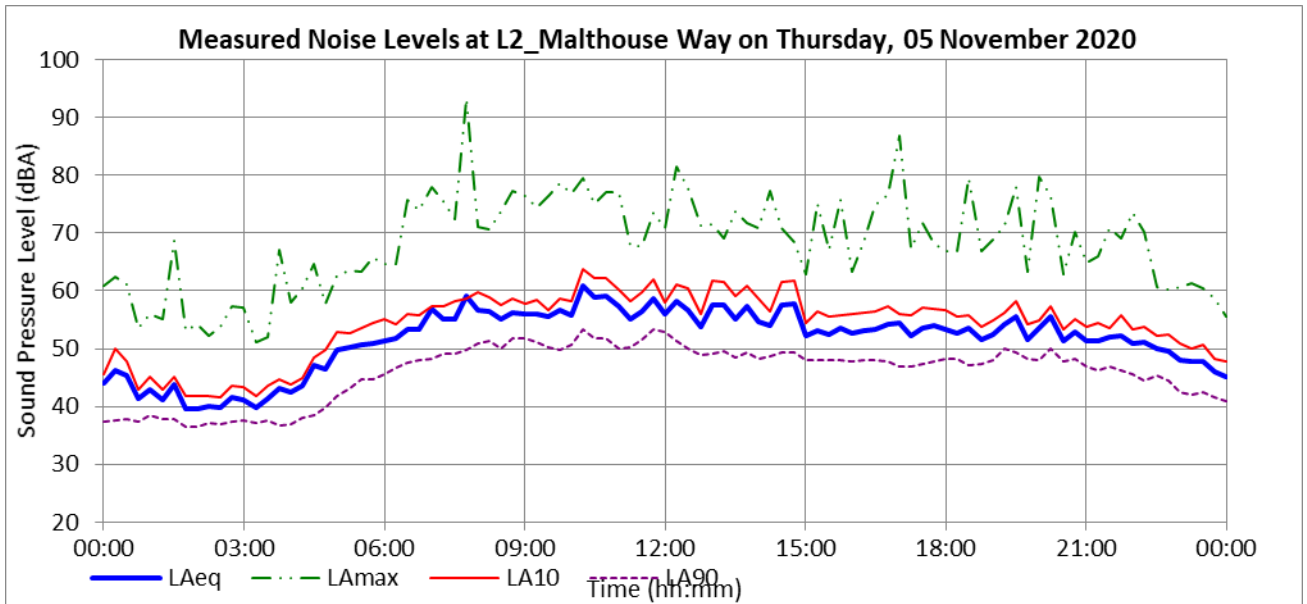
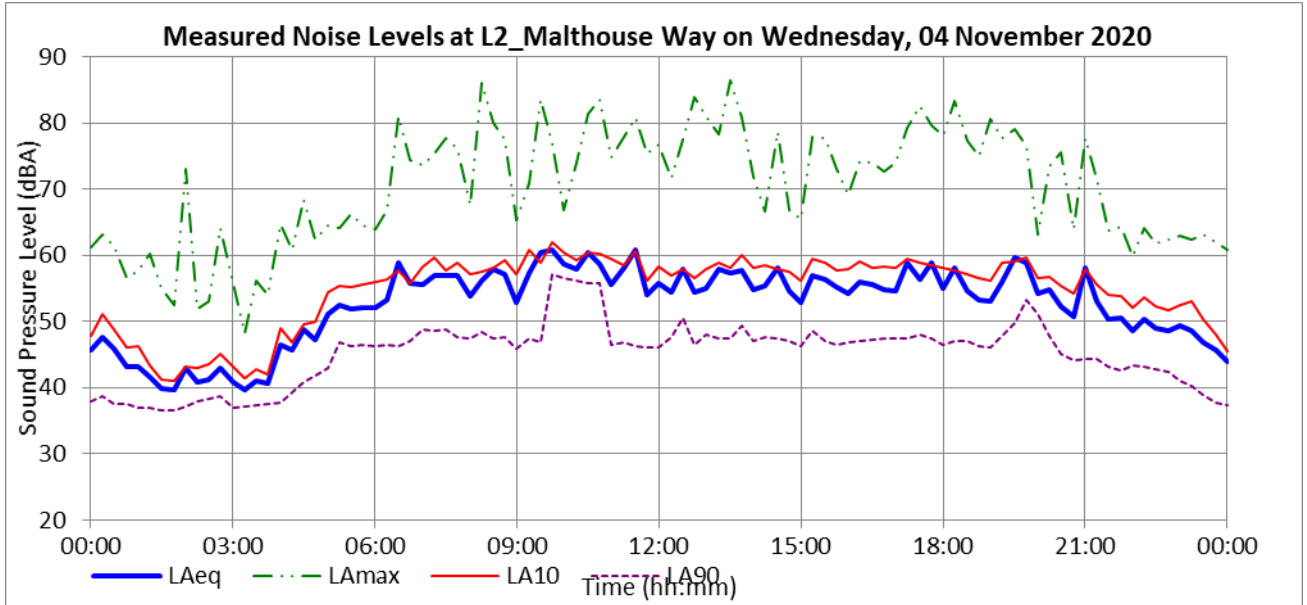




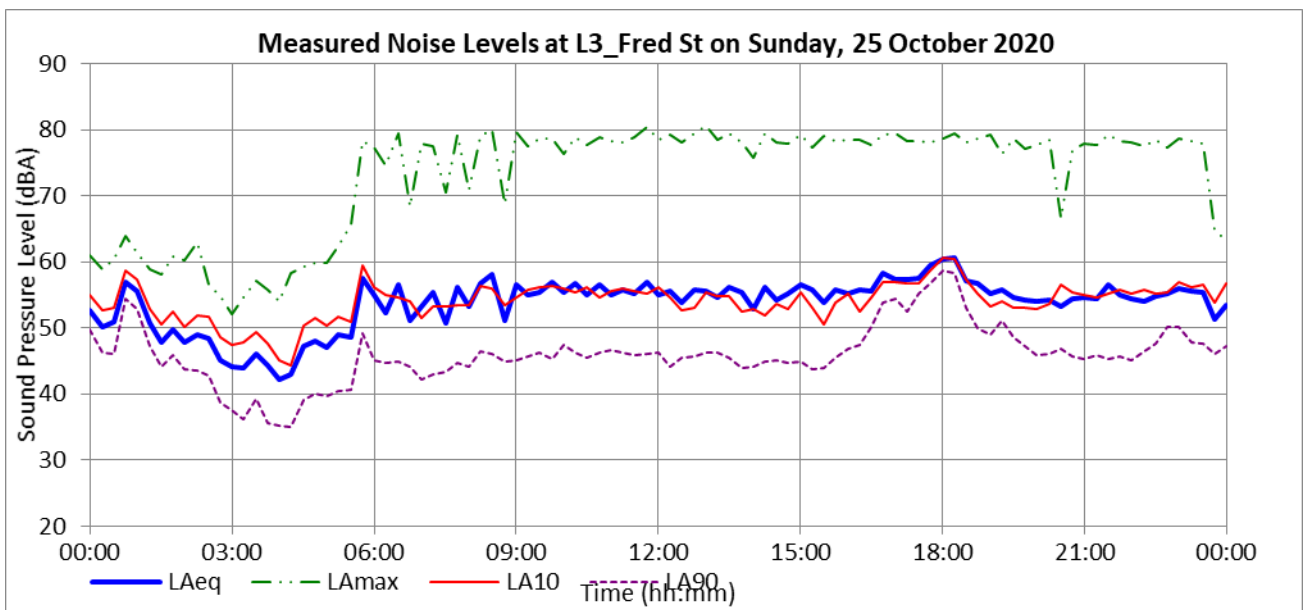
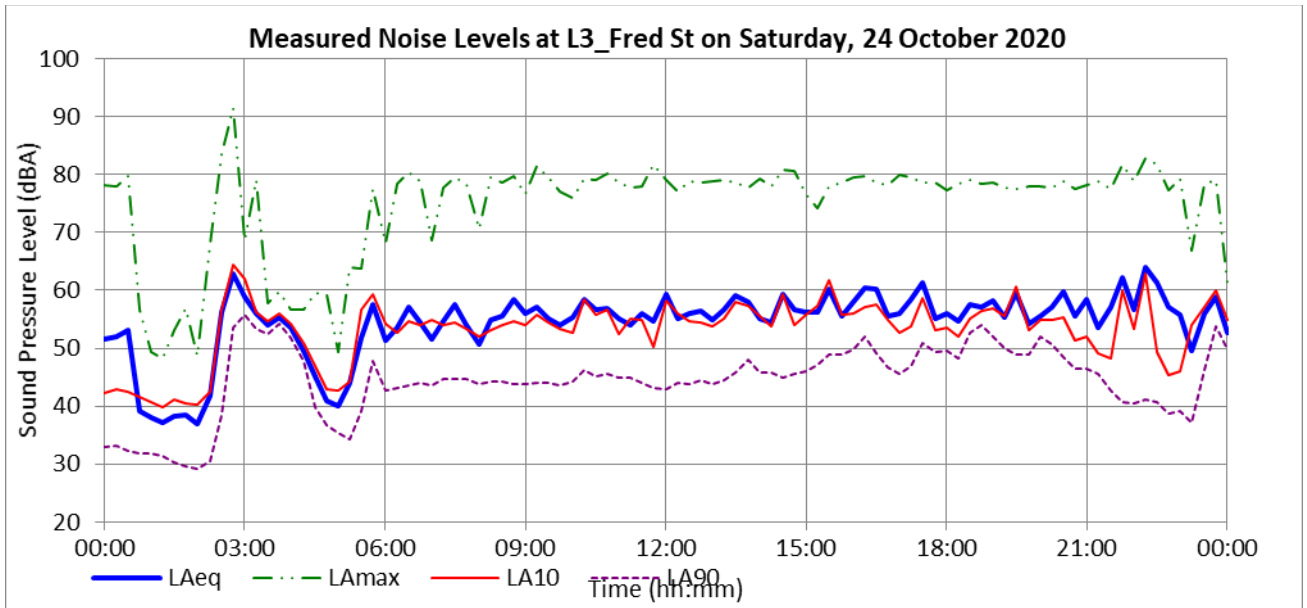


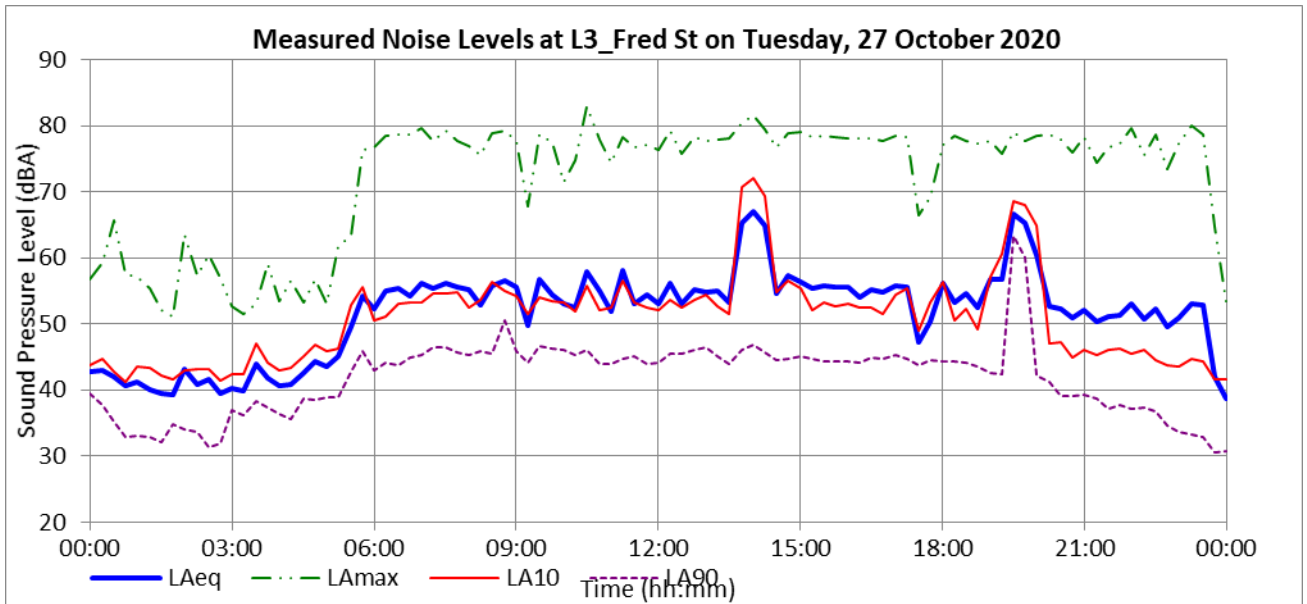
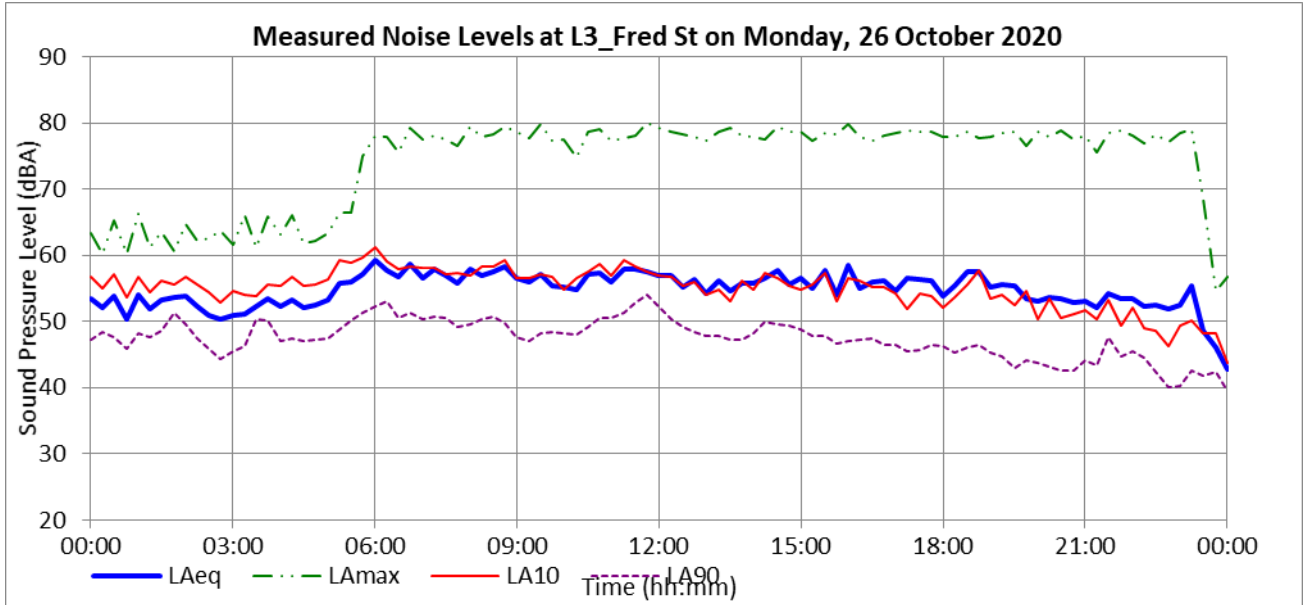


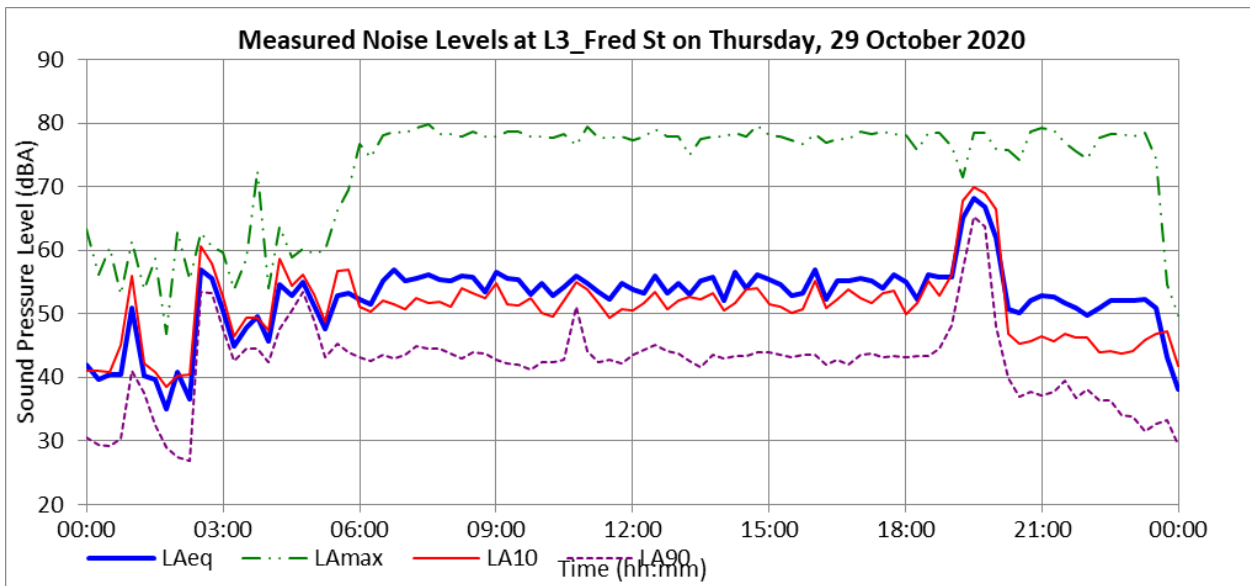
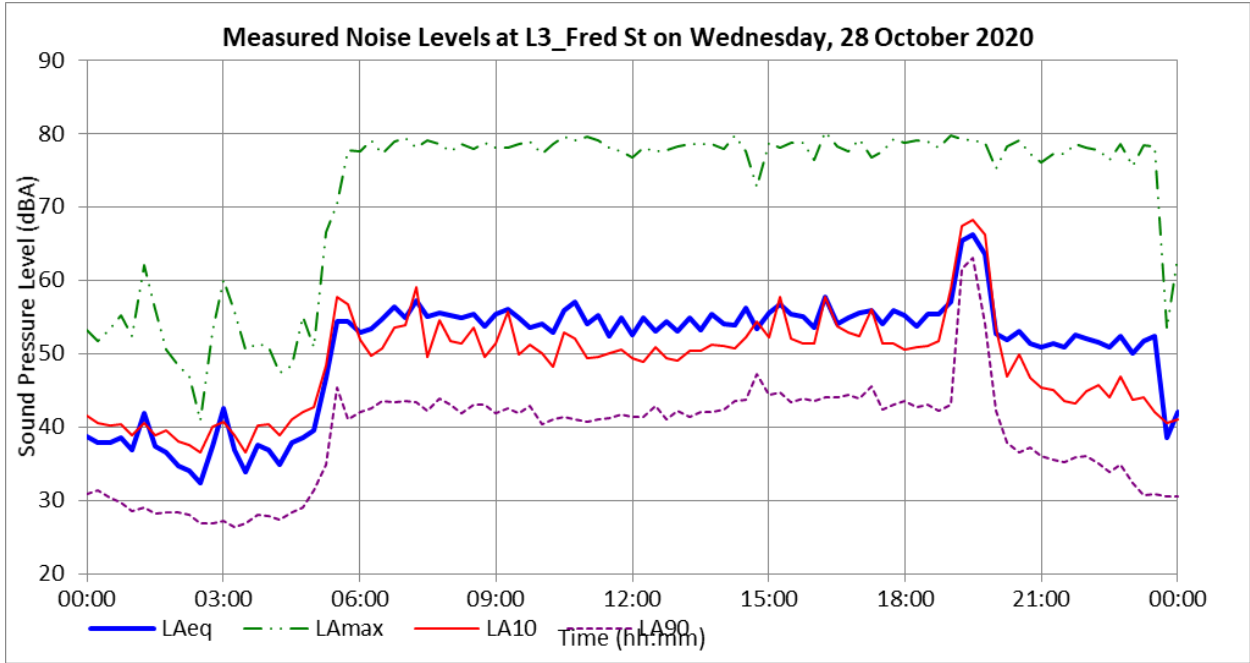


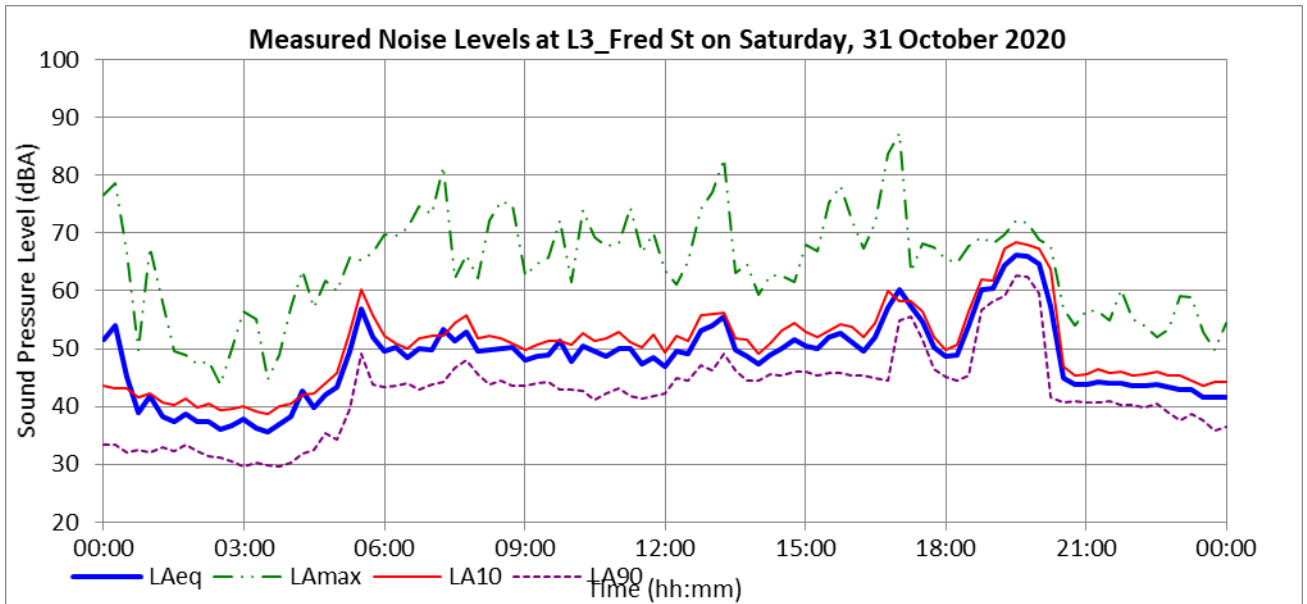
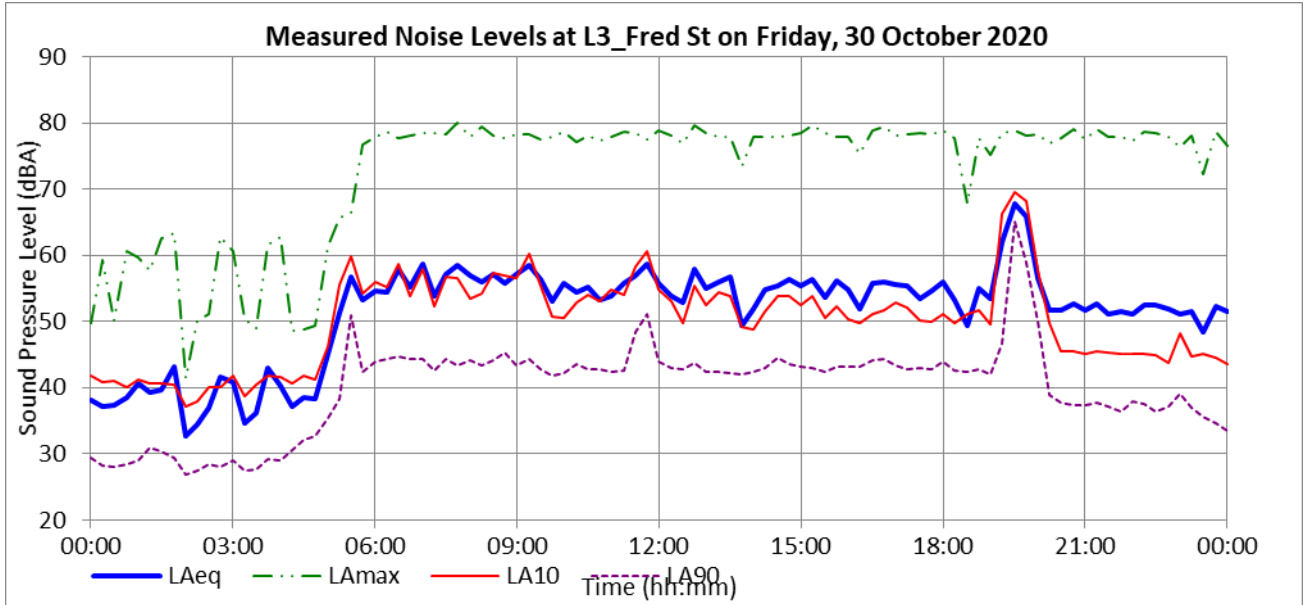


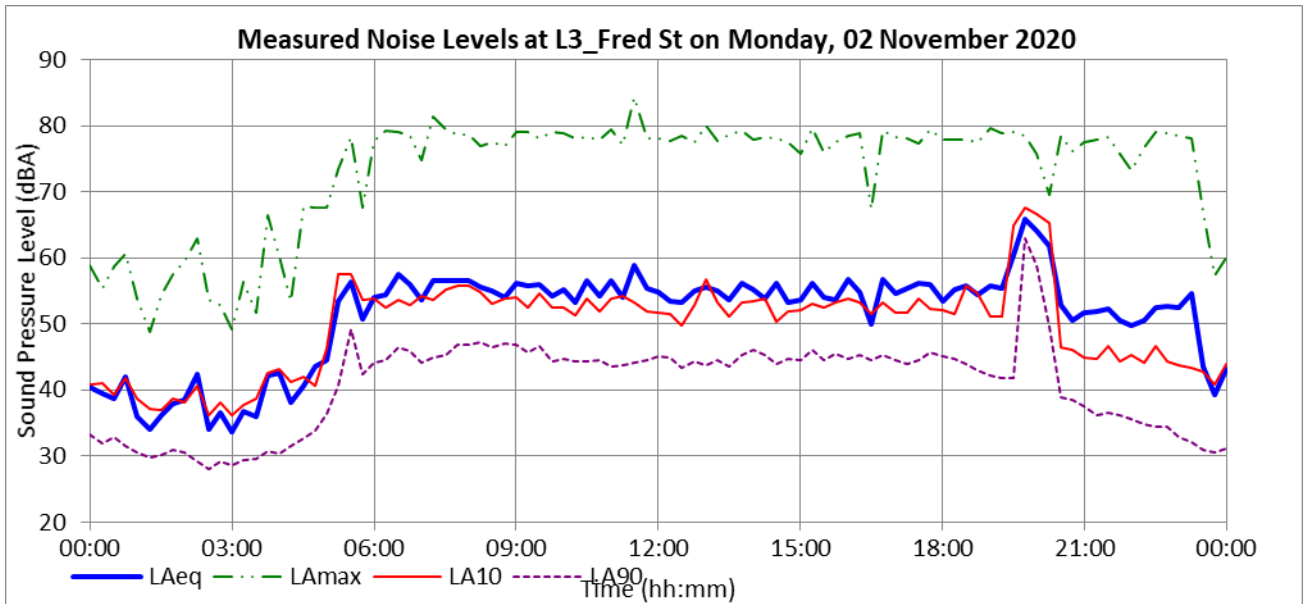
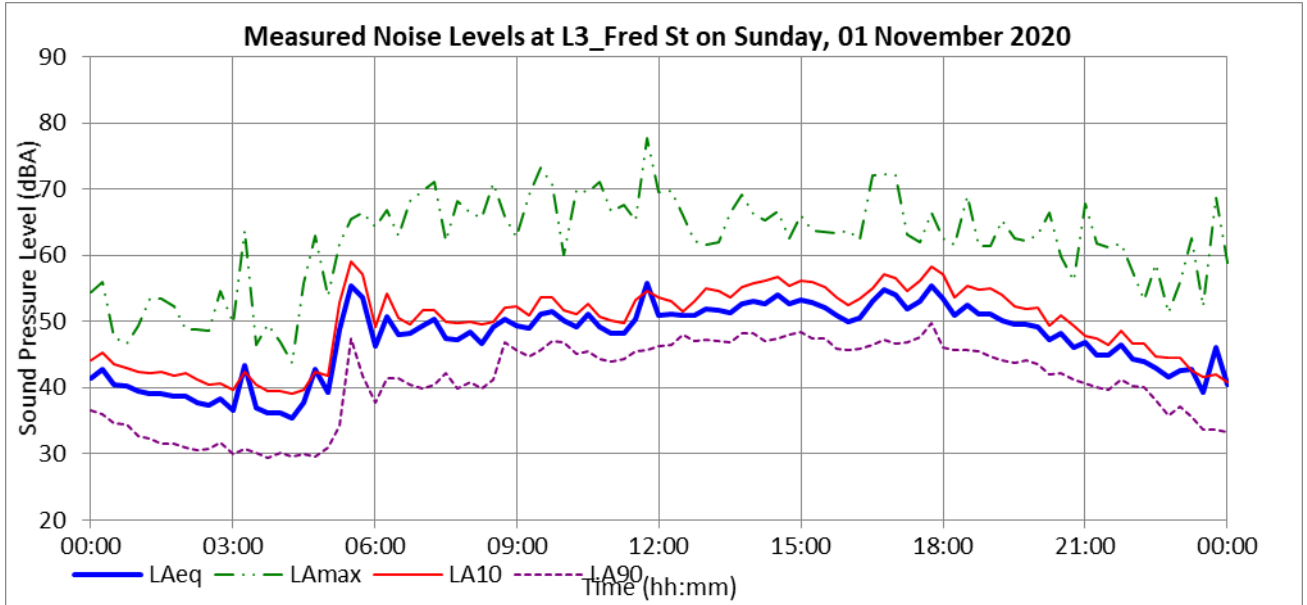
D3 Noise monitoring results at monitoring location BG-03

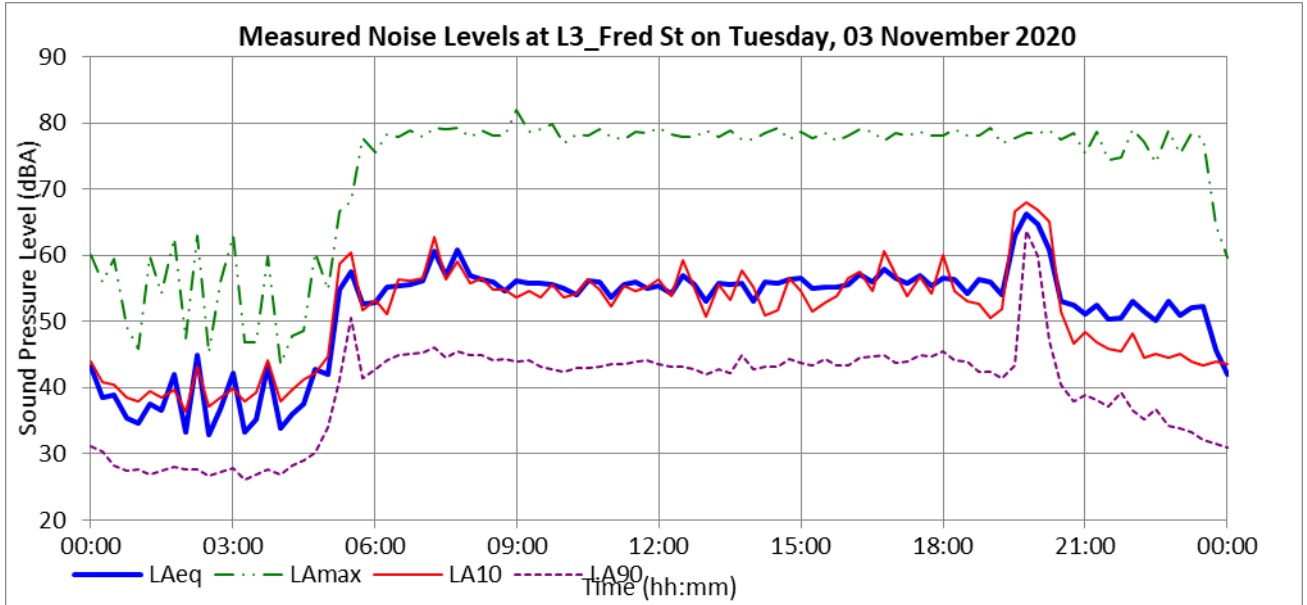




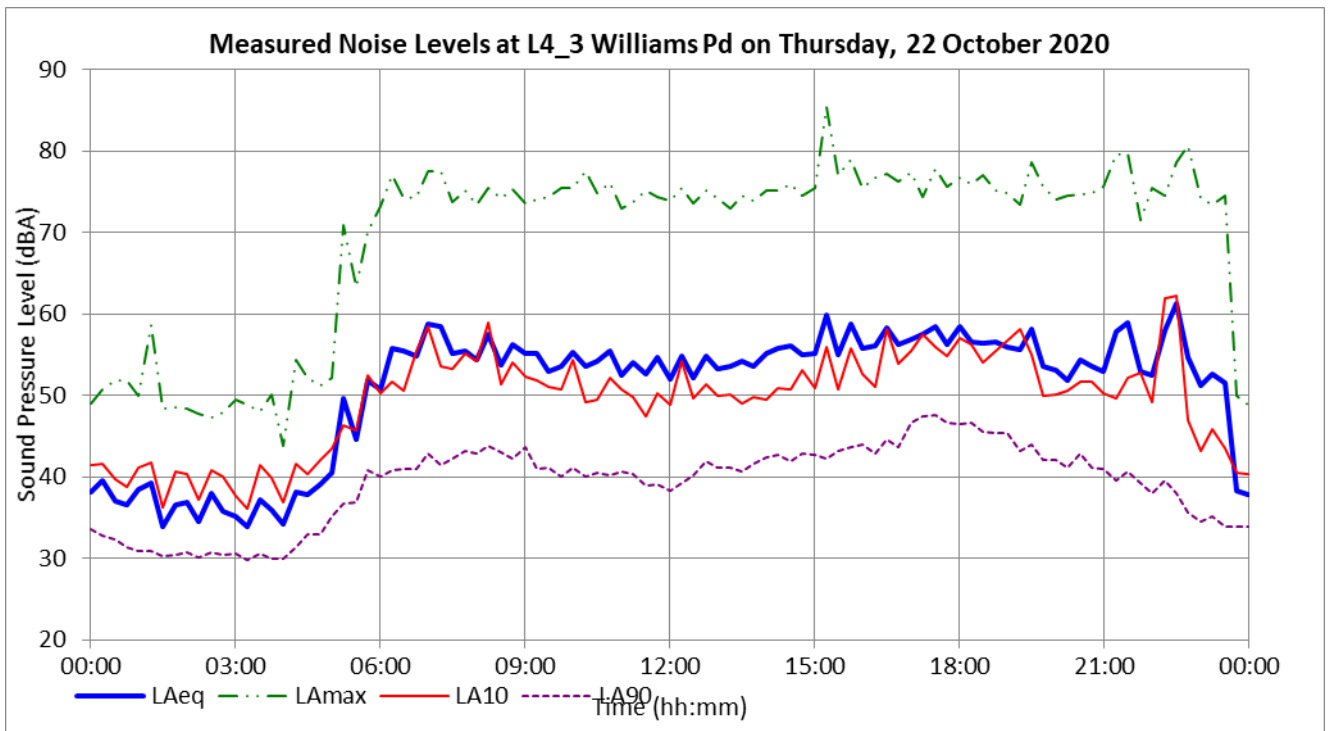
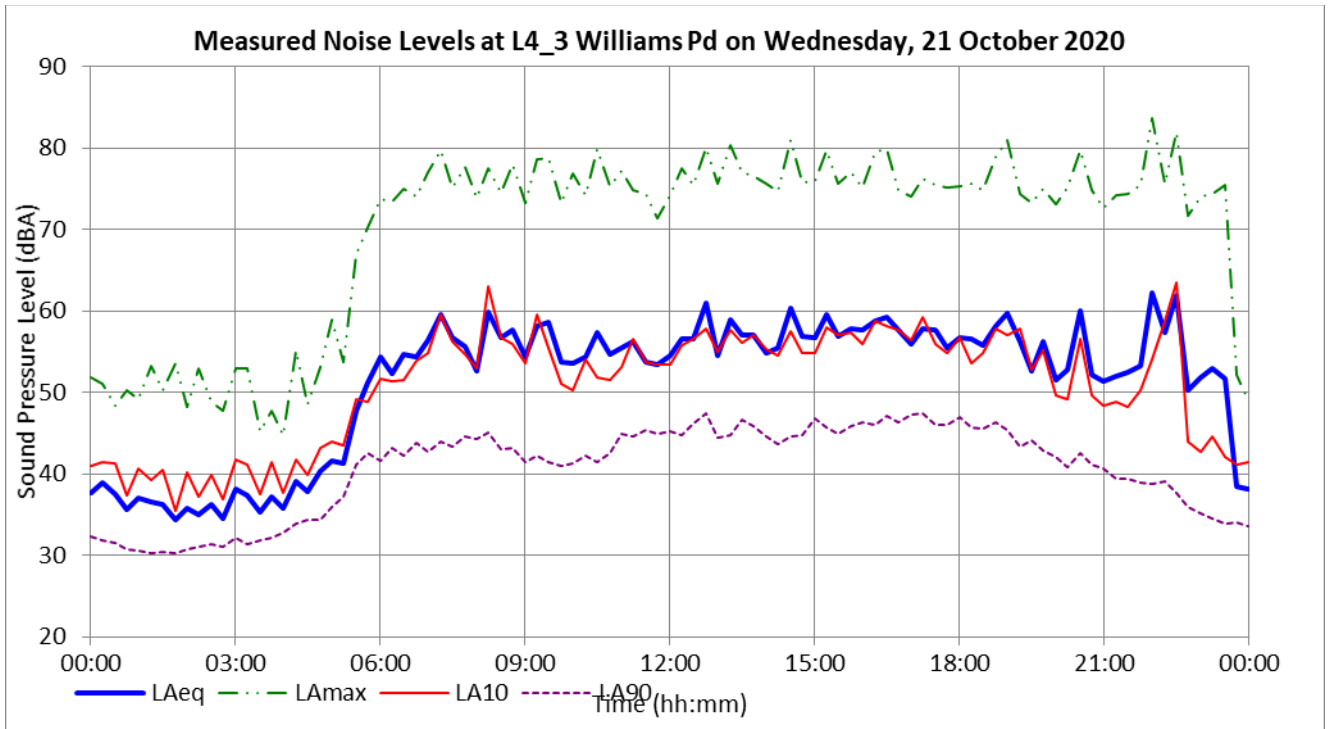


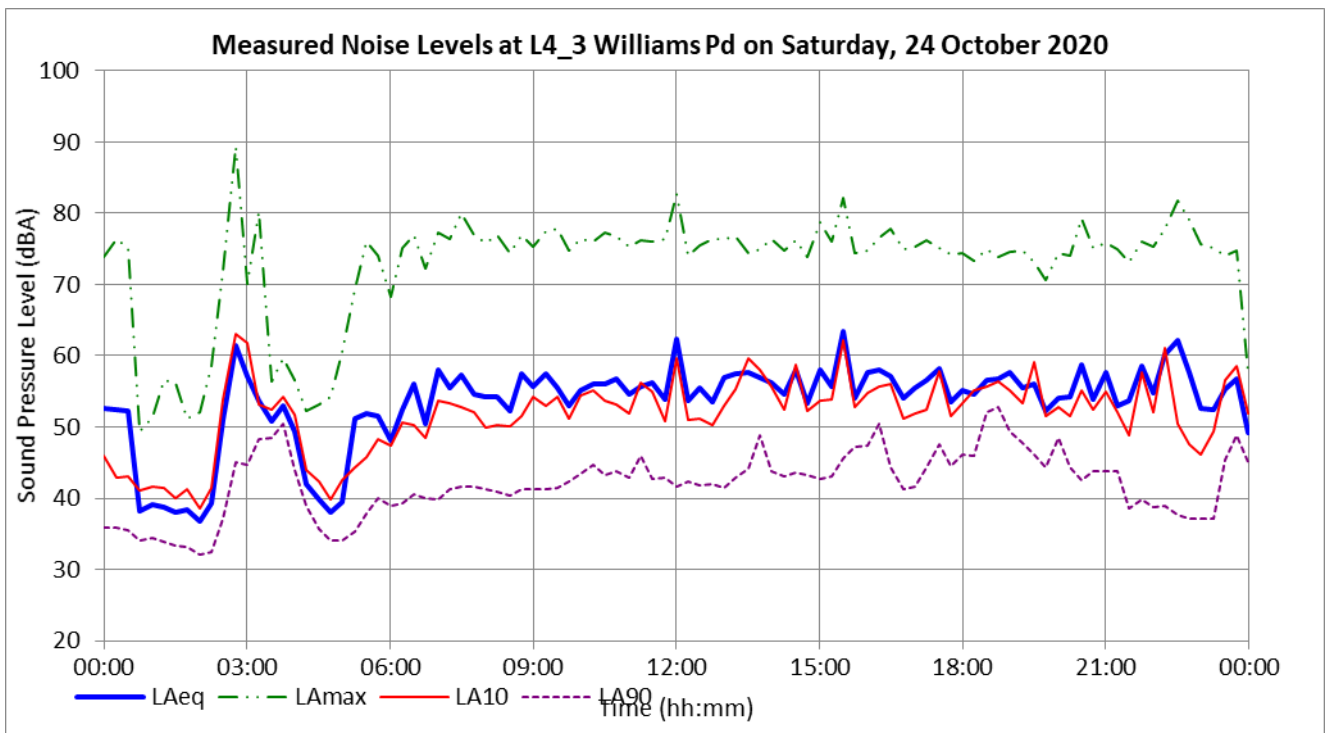
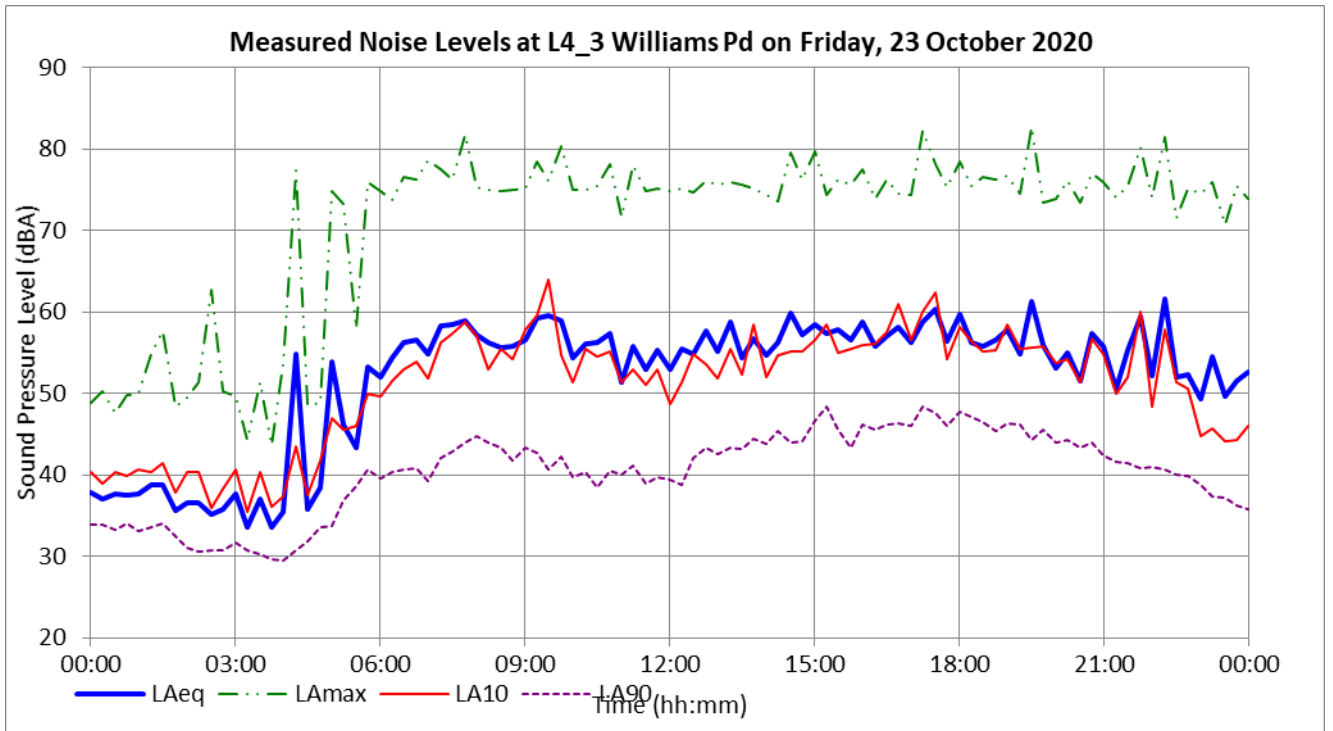


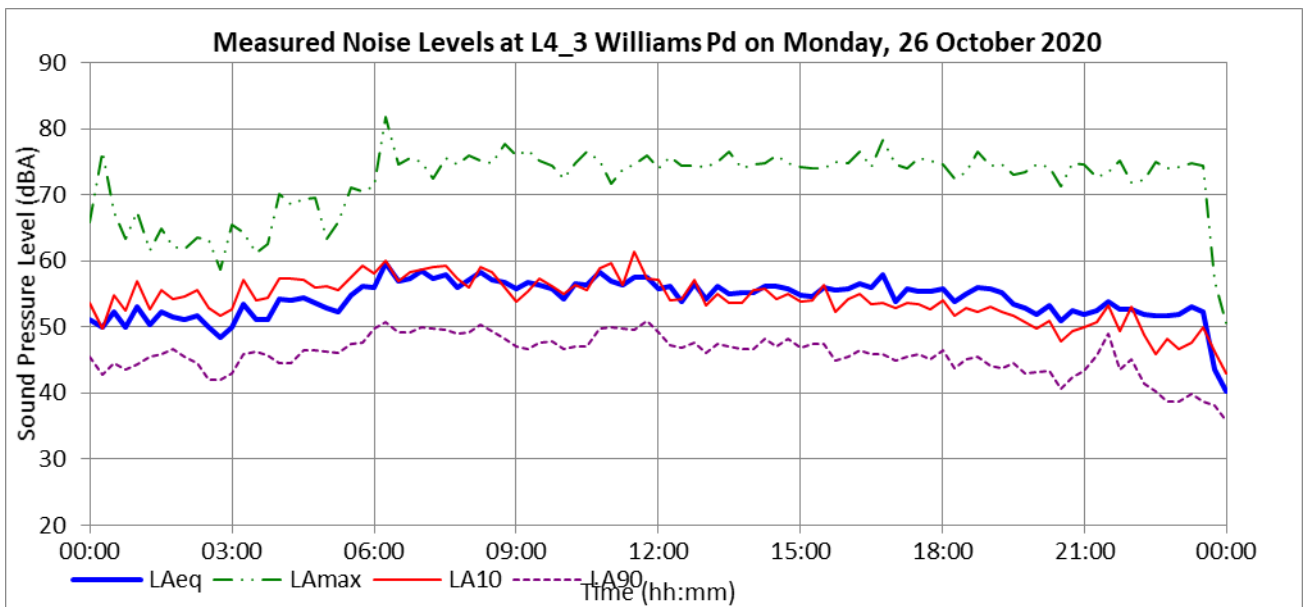
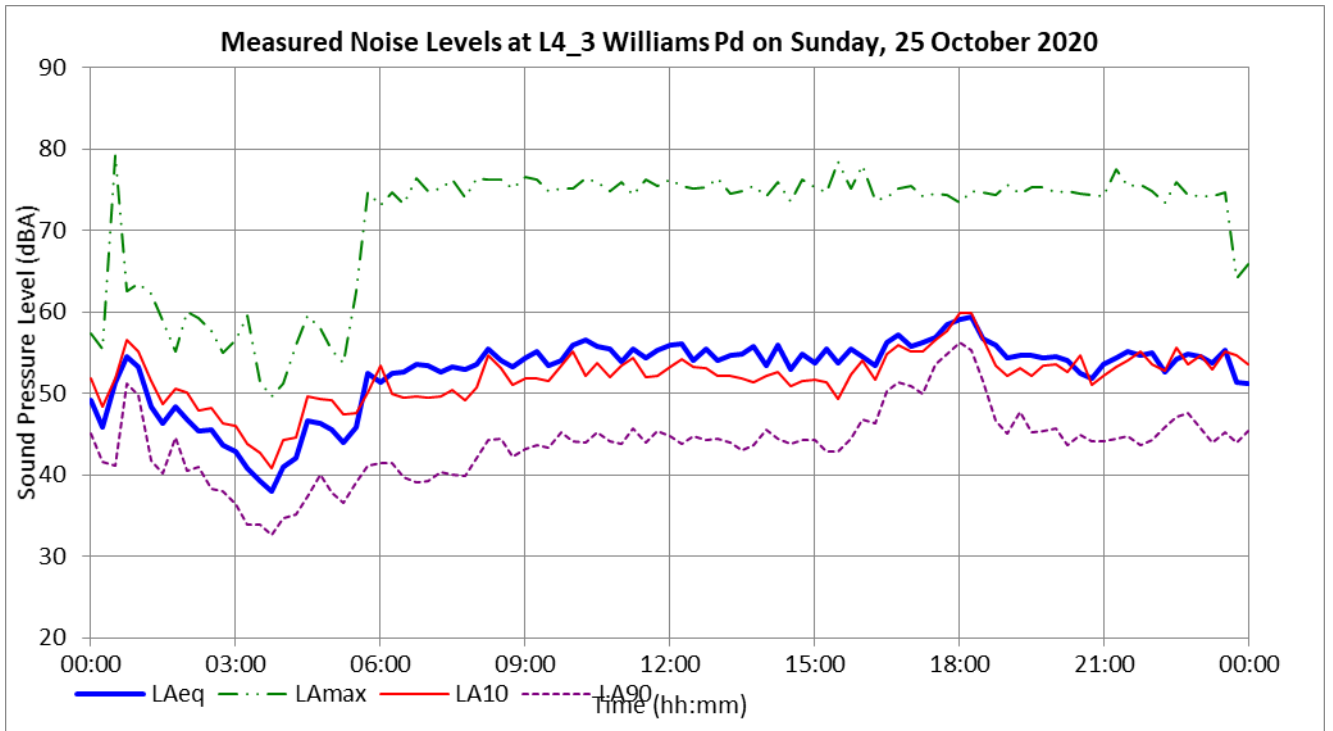


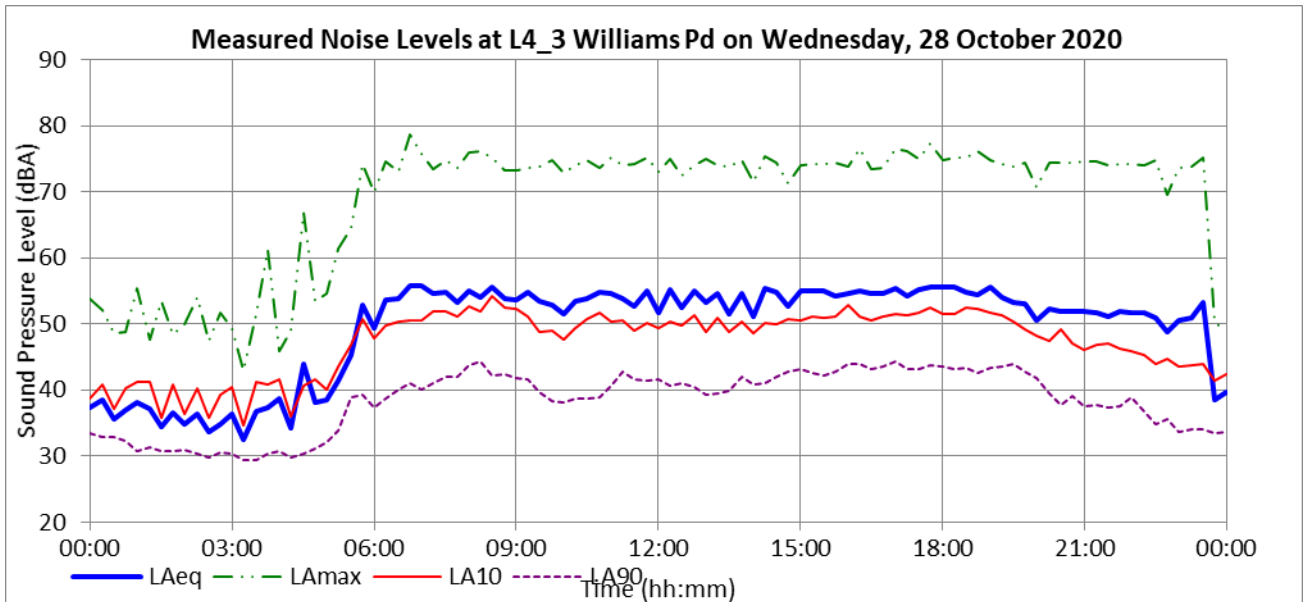
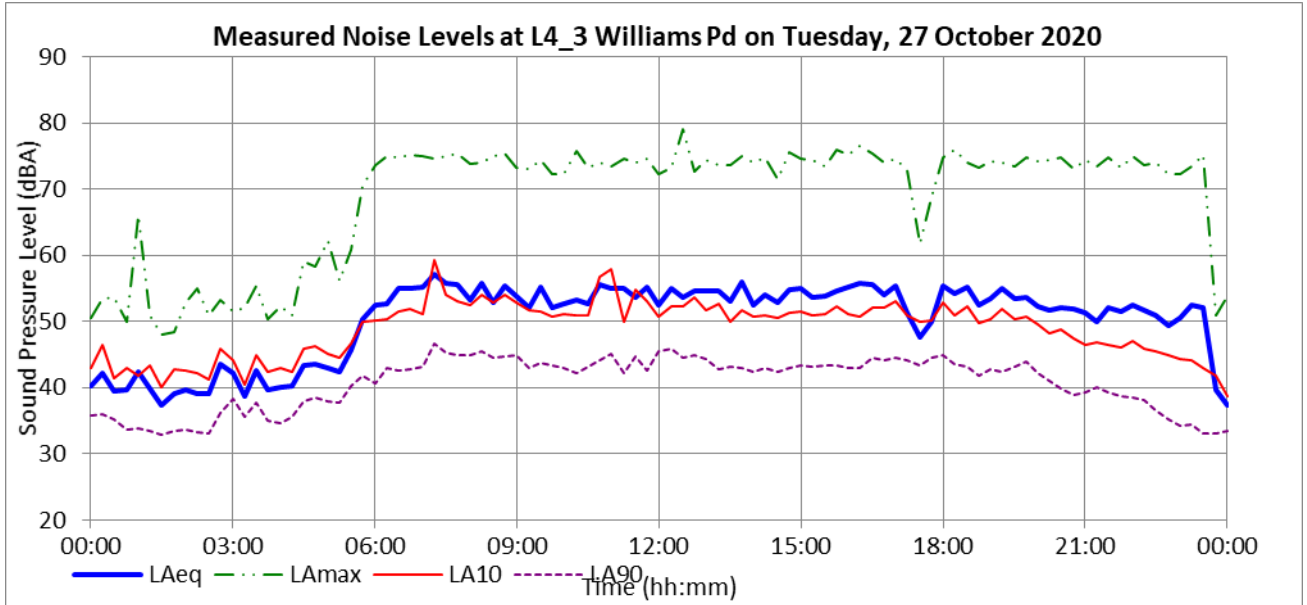


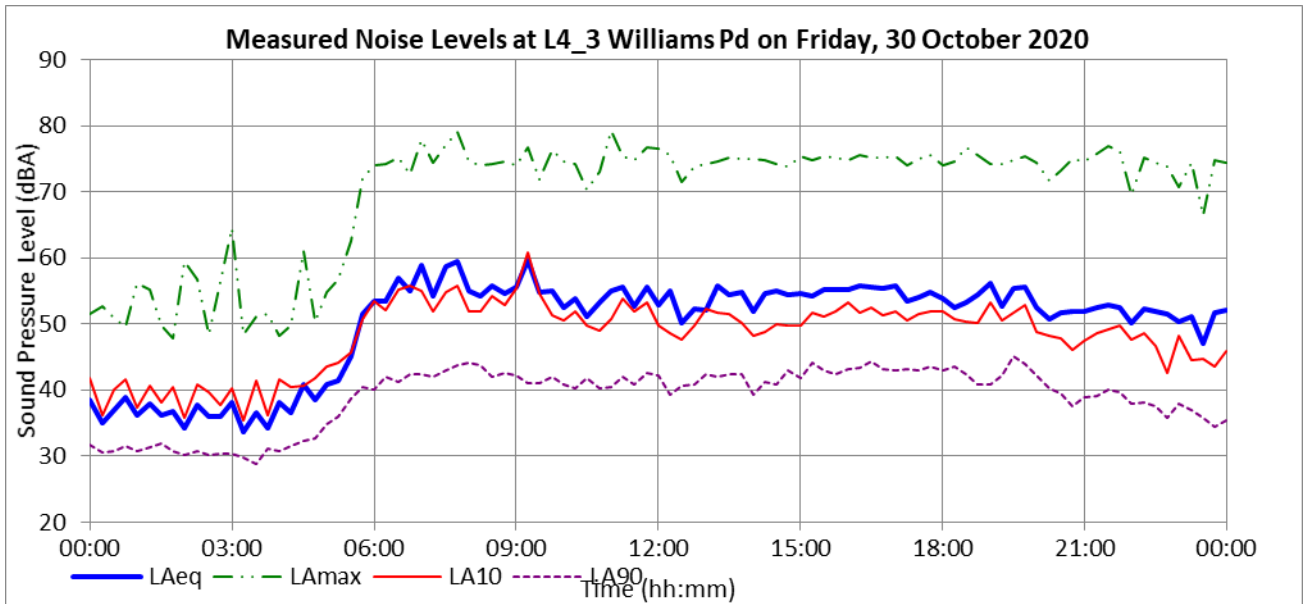
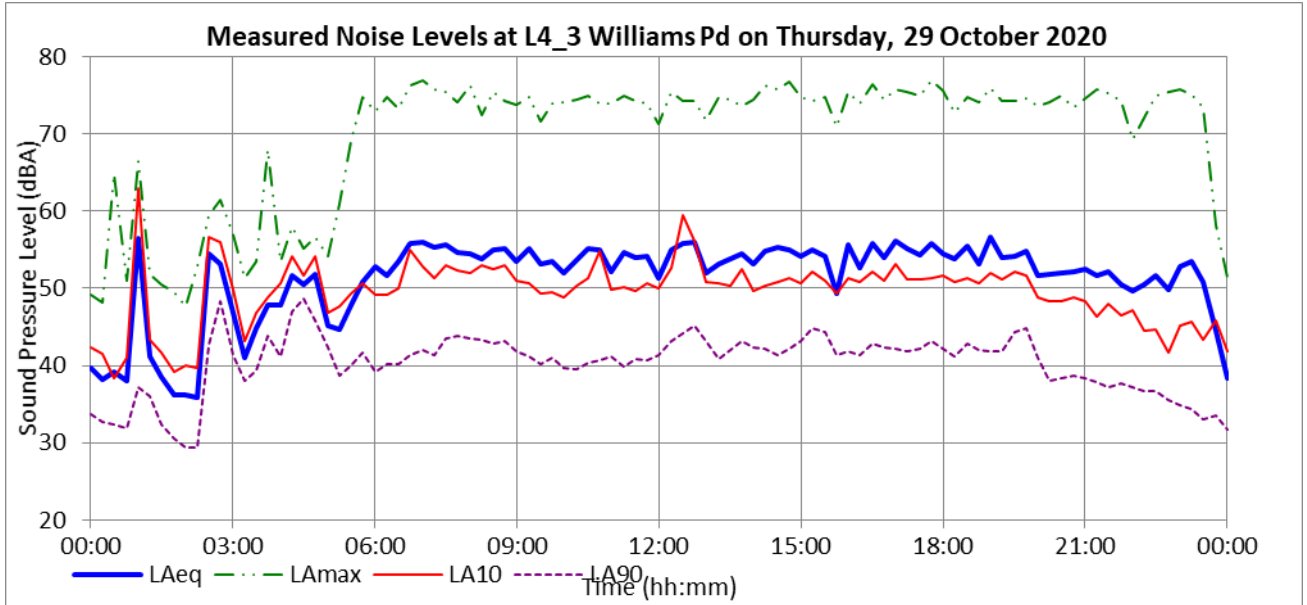
D4 Noise monitoring results at monitoring location BG-04

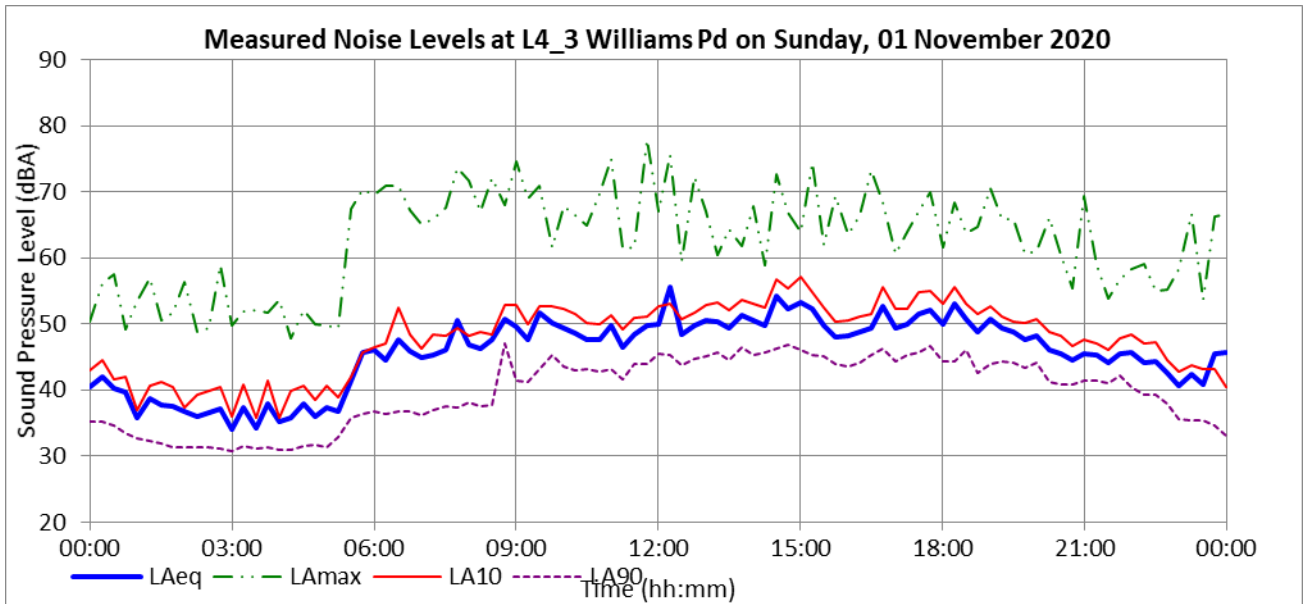
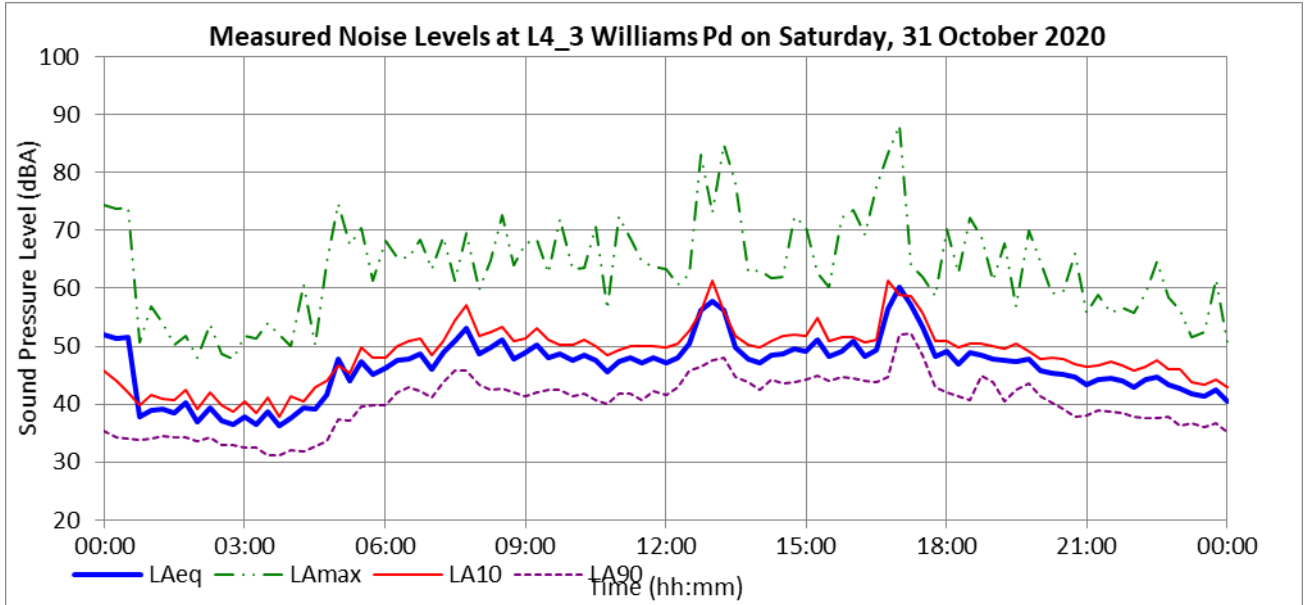


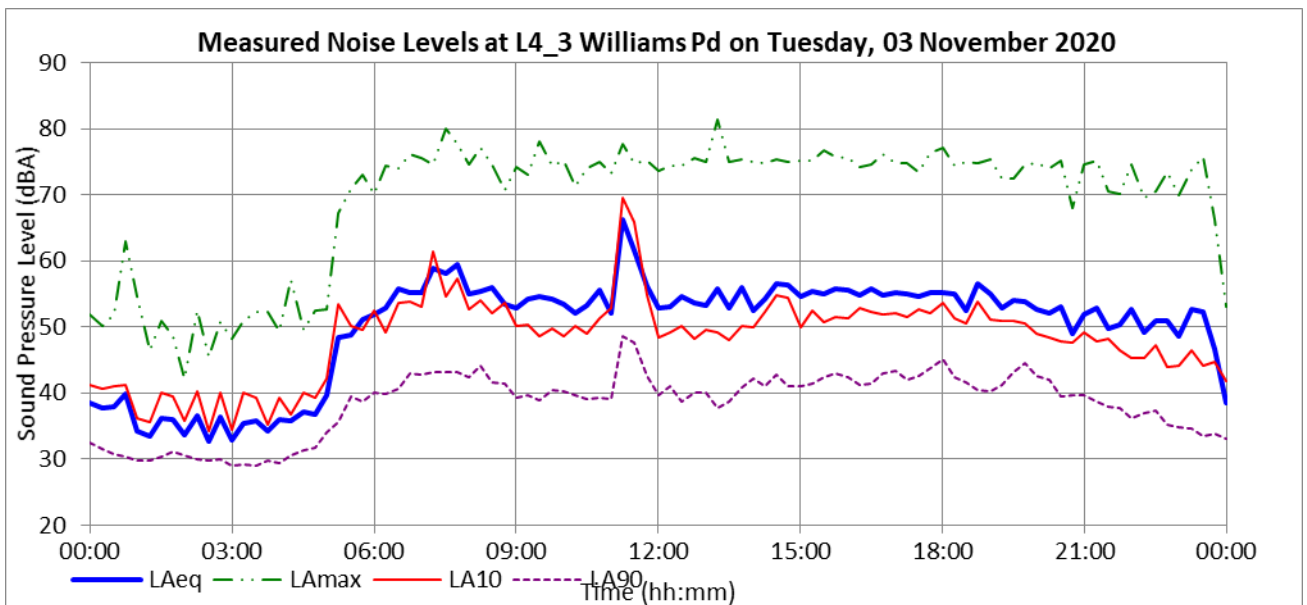
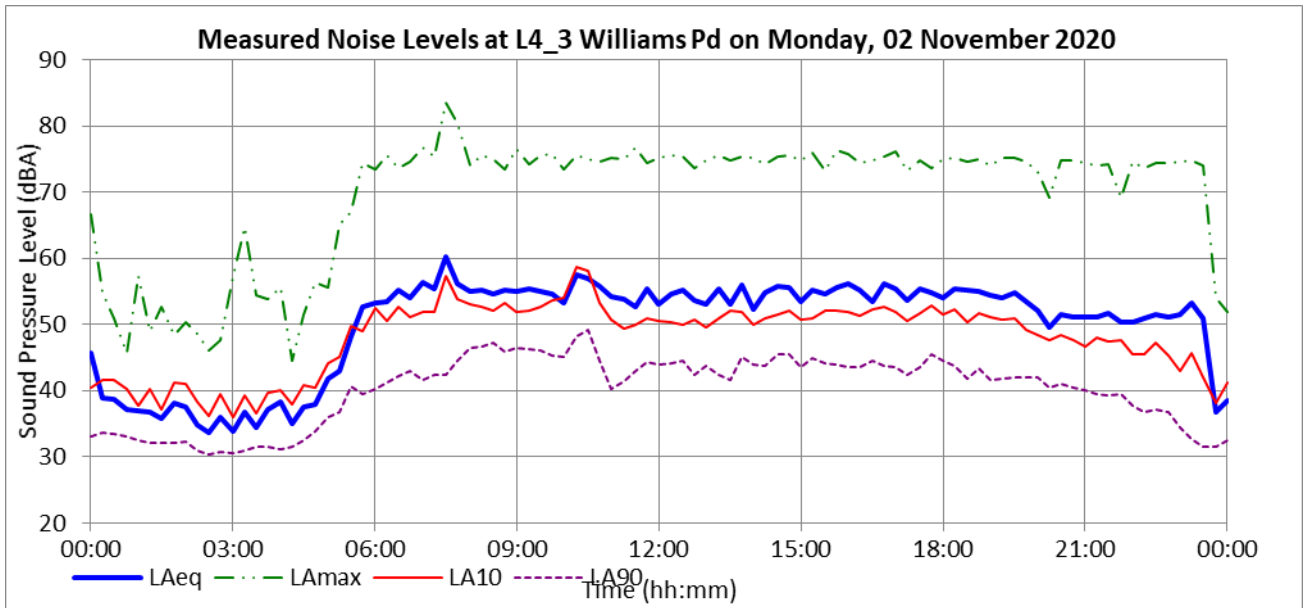


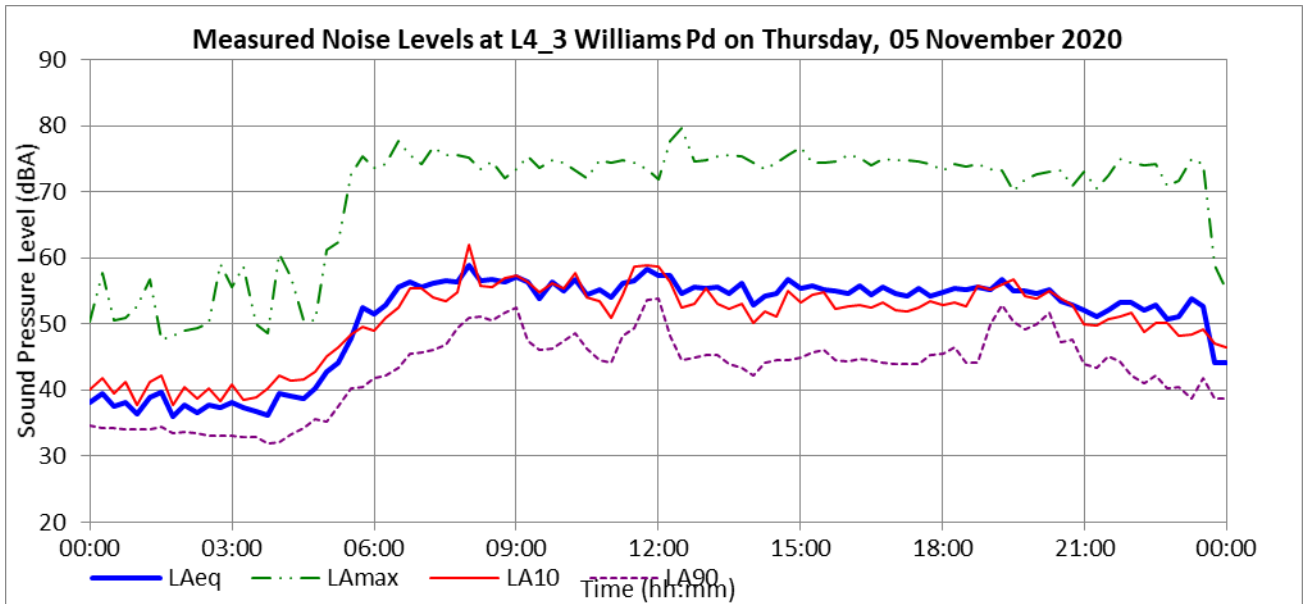
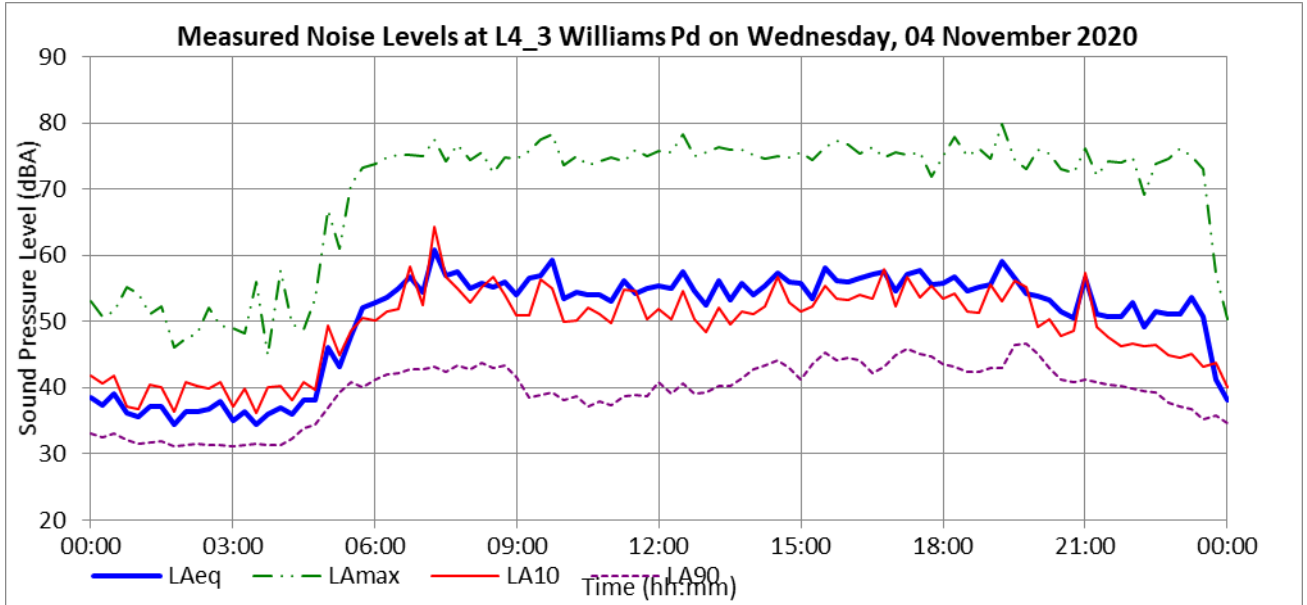




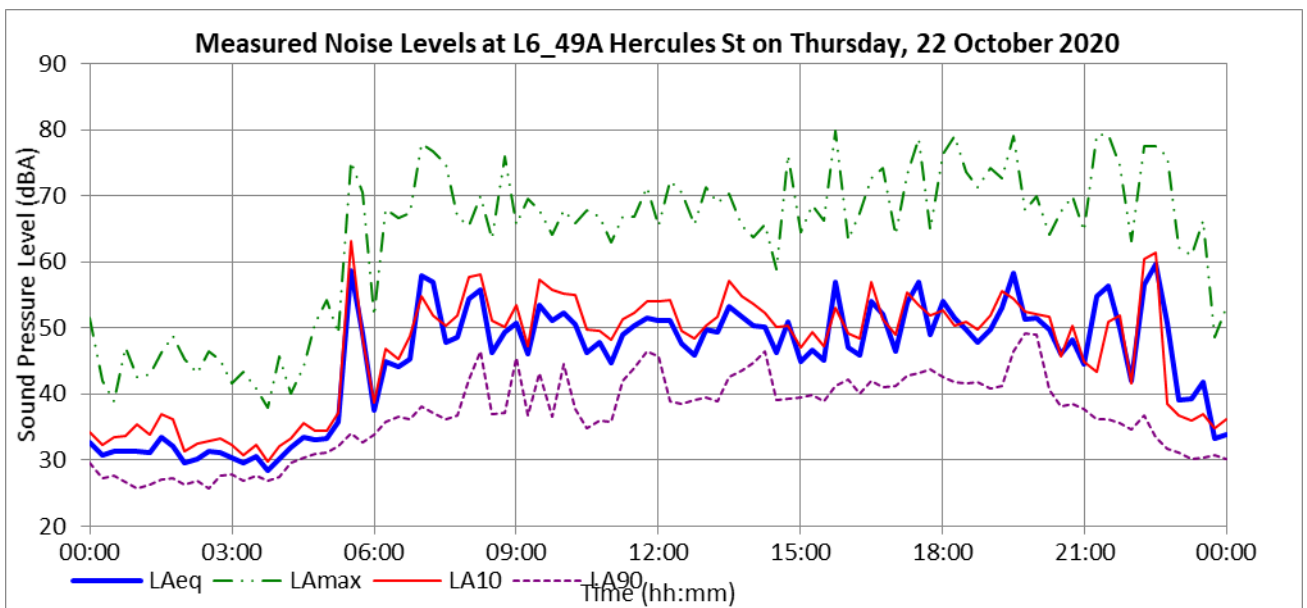
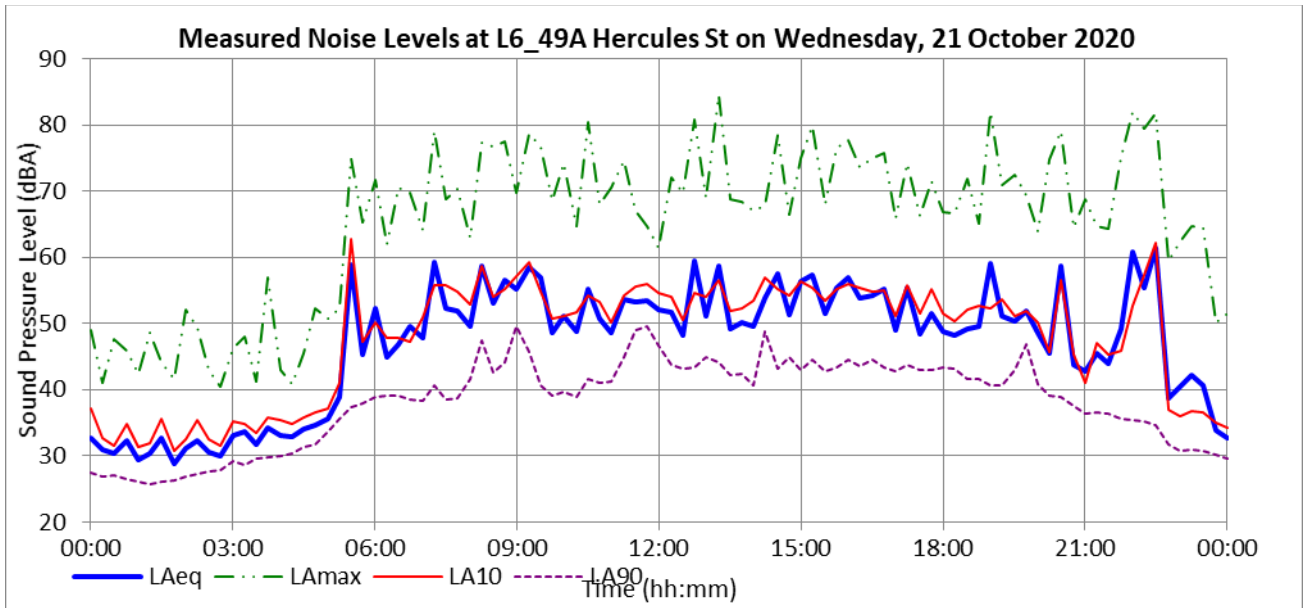


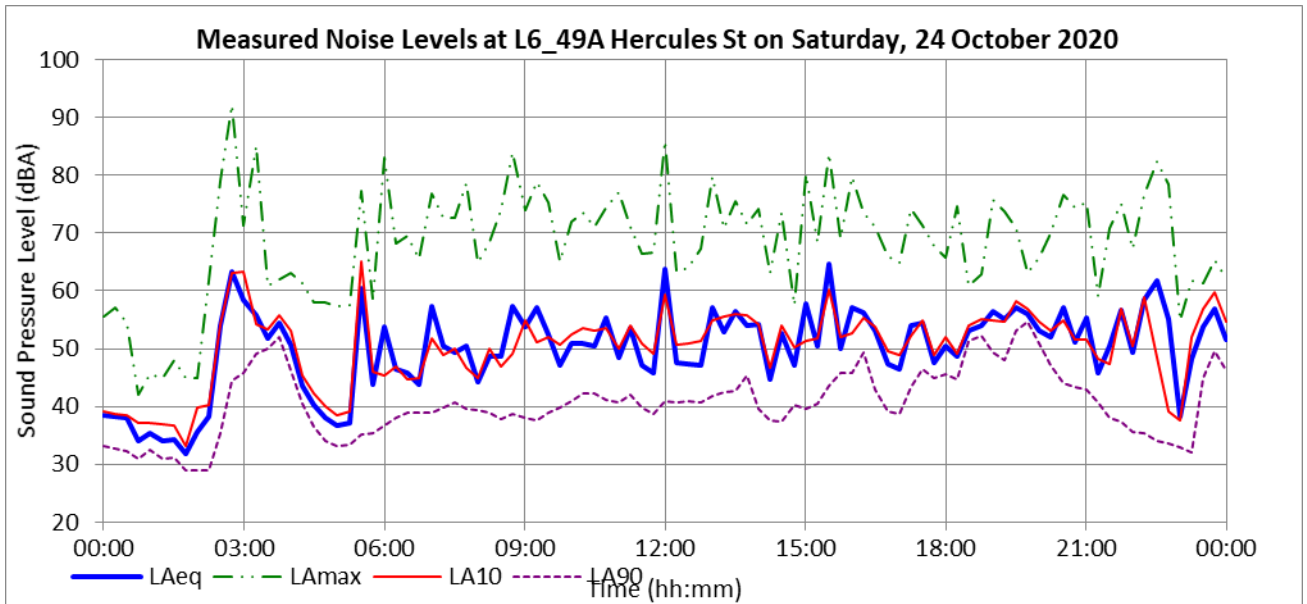
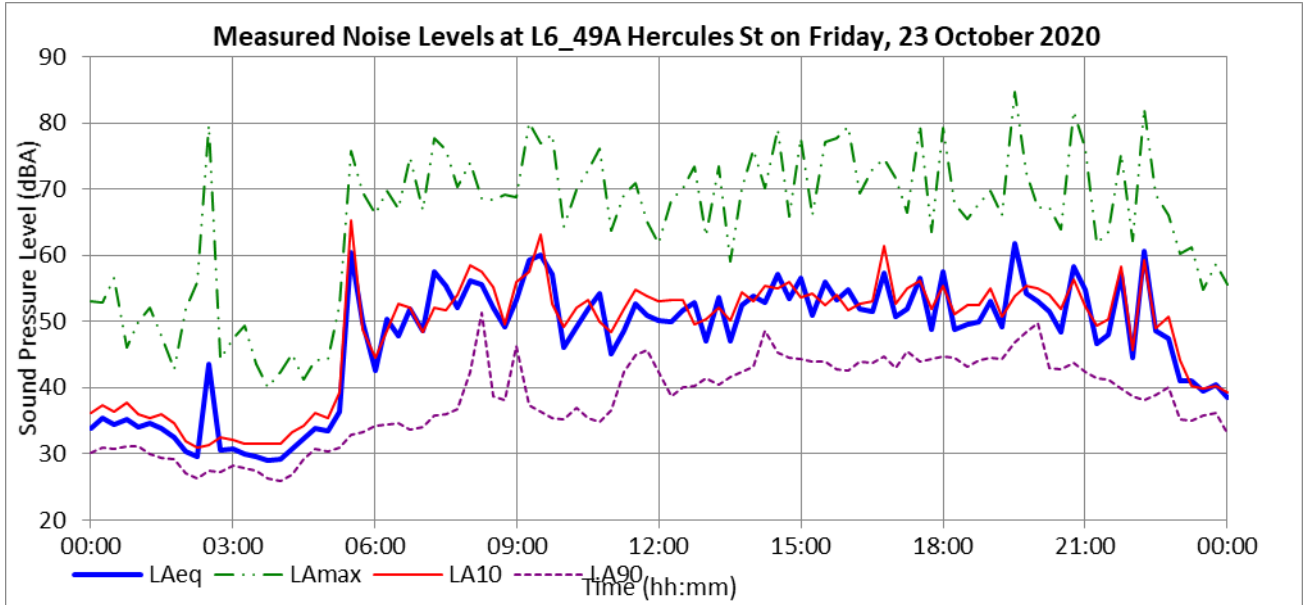


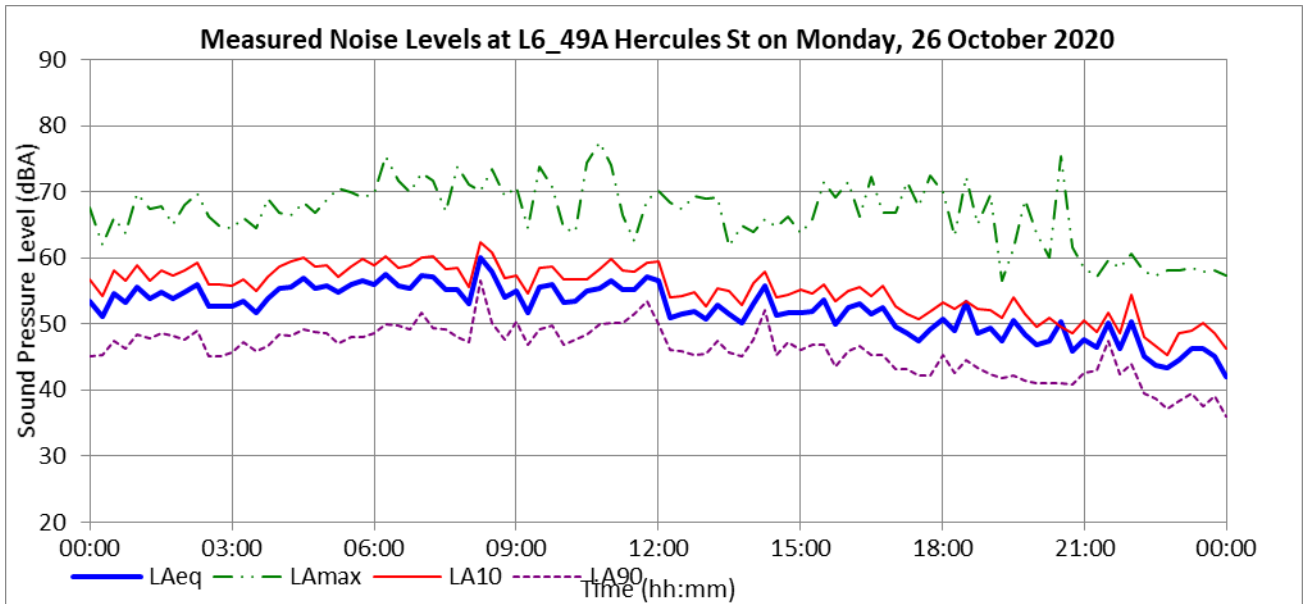
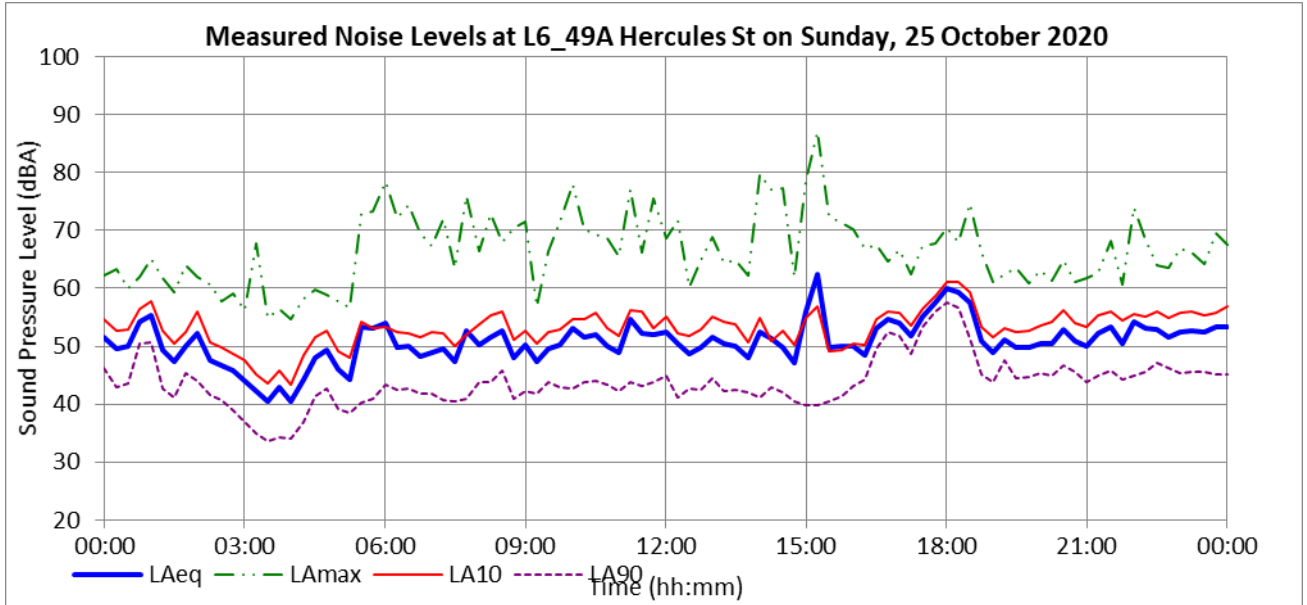


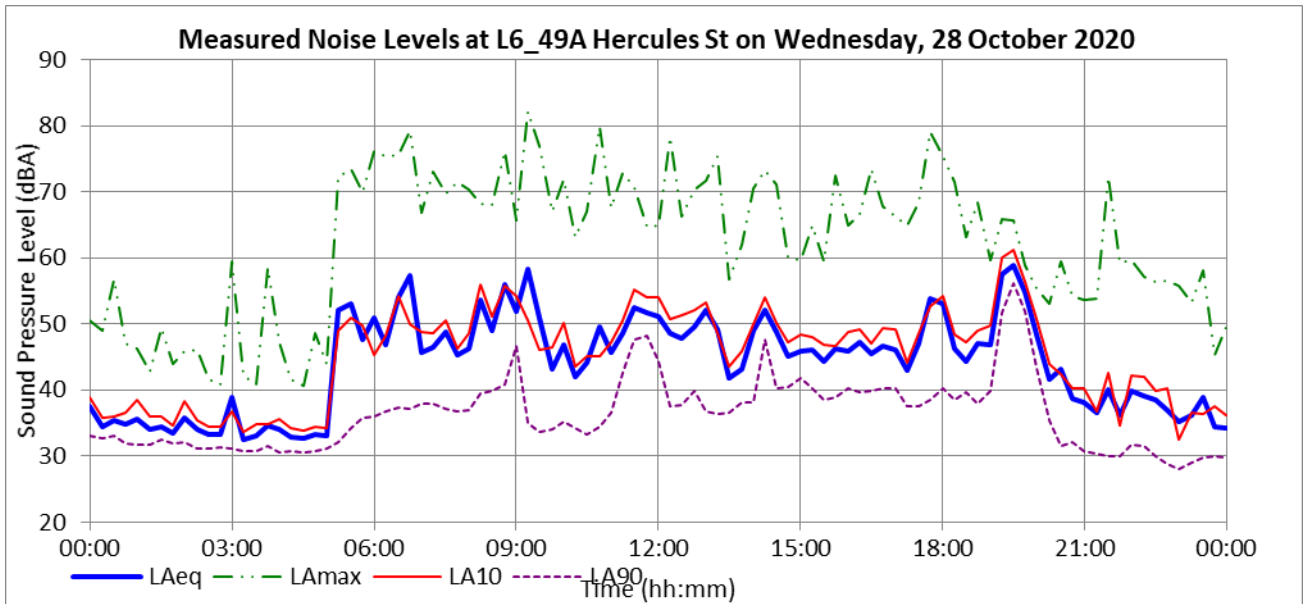
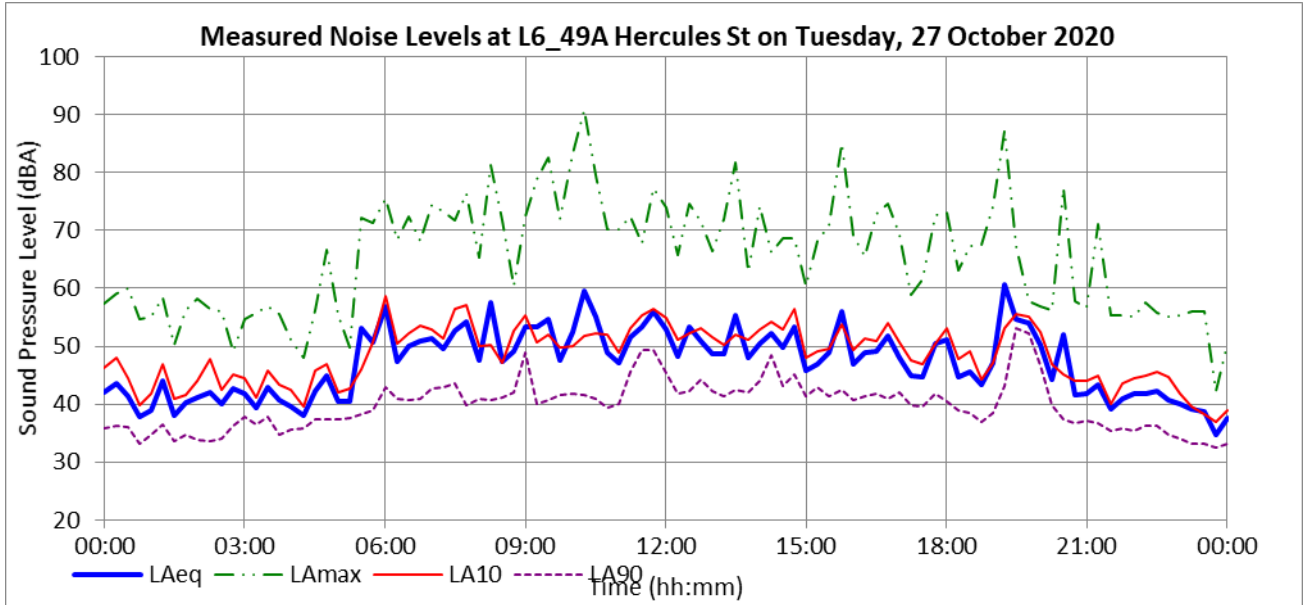


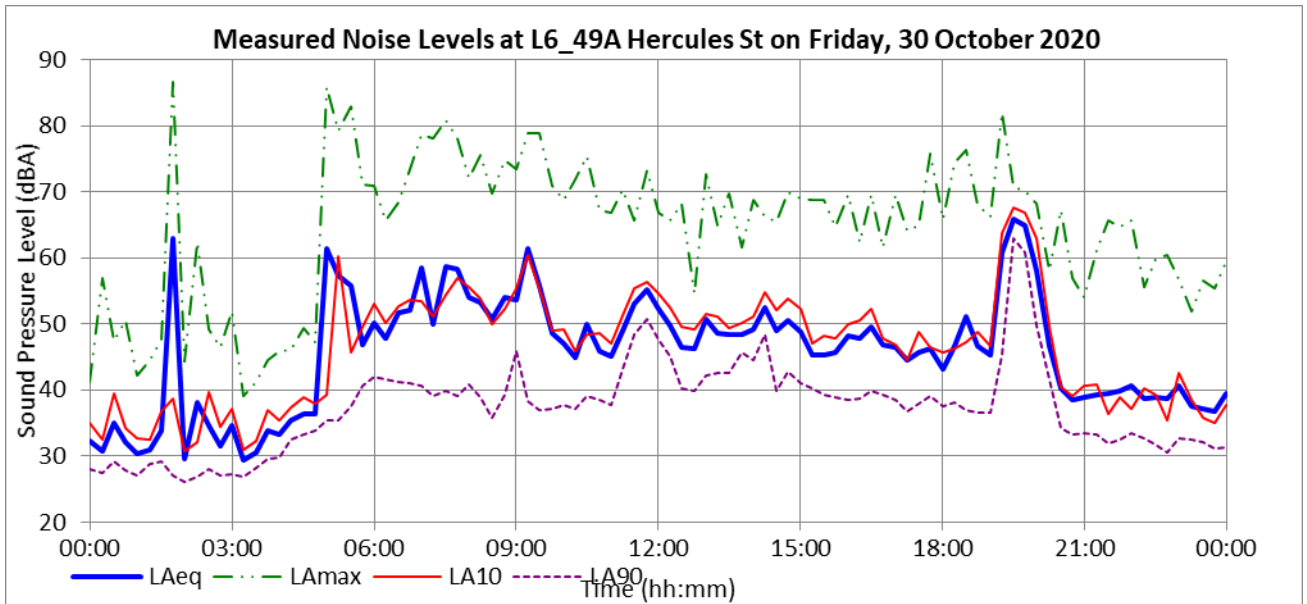
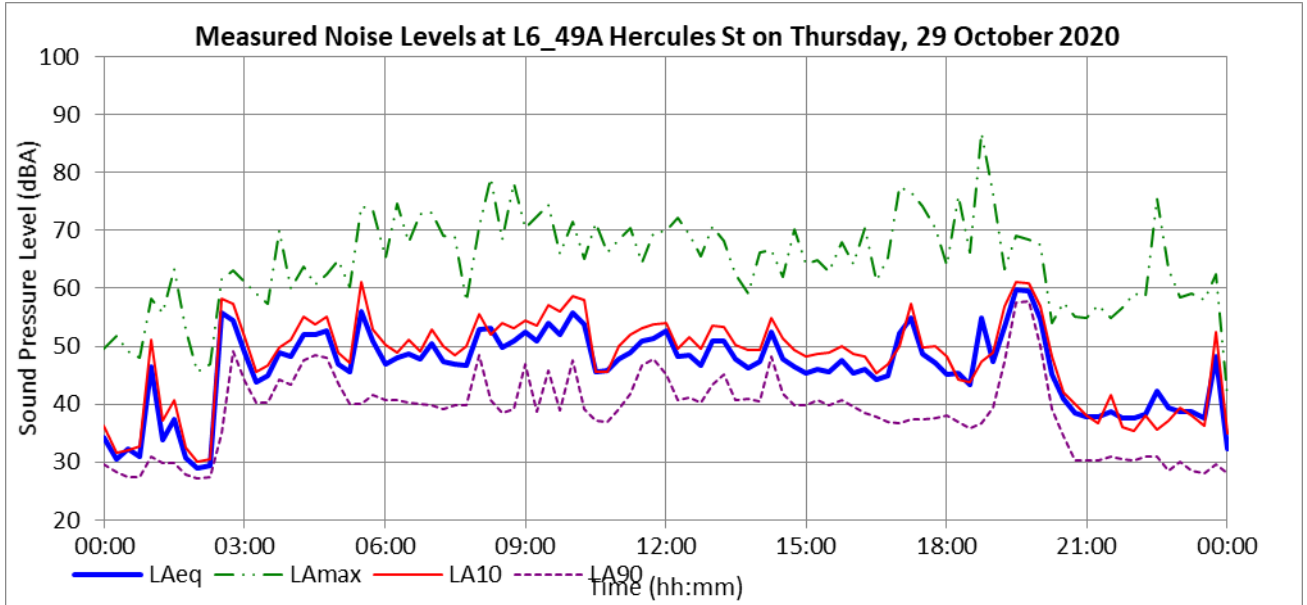
D5 Noise monitoring results at monitoring location BG-05

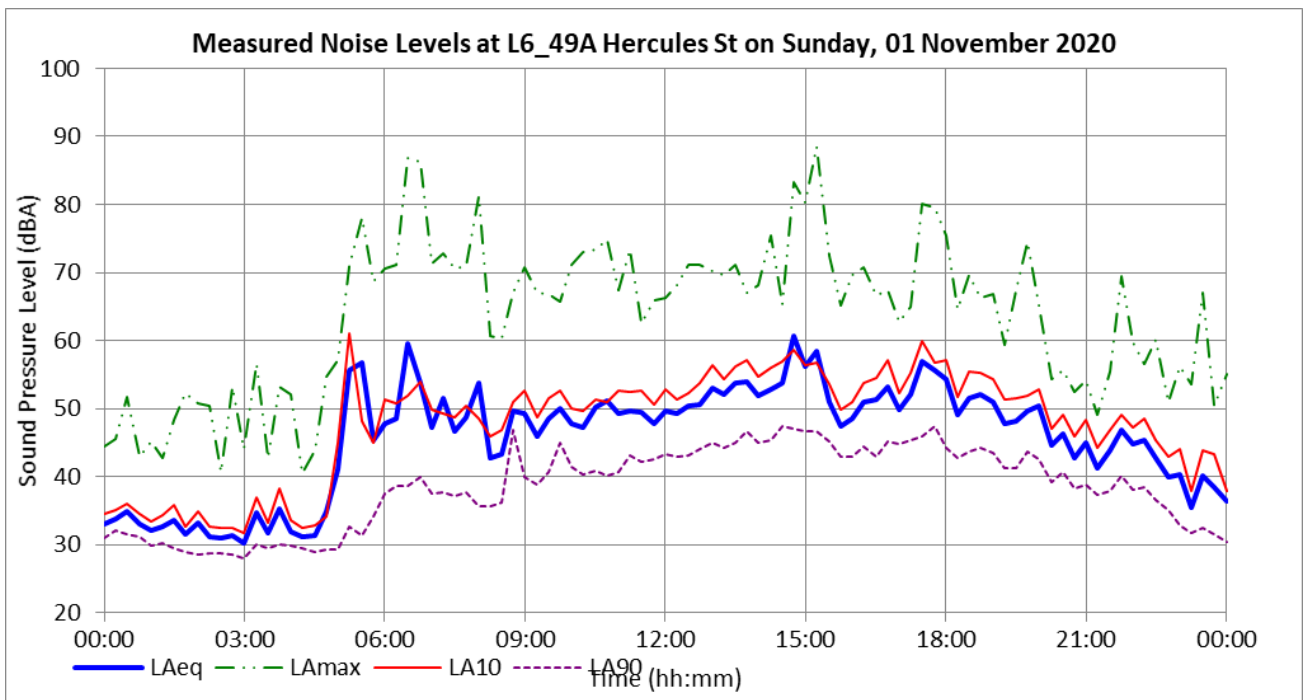
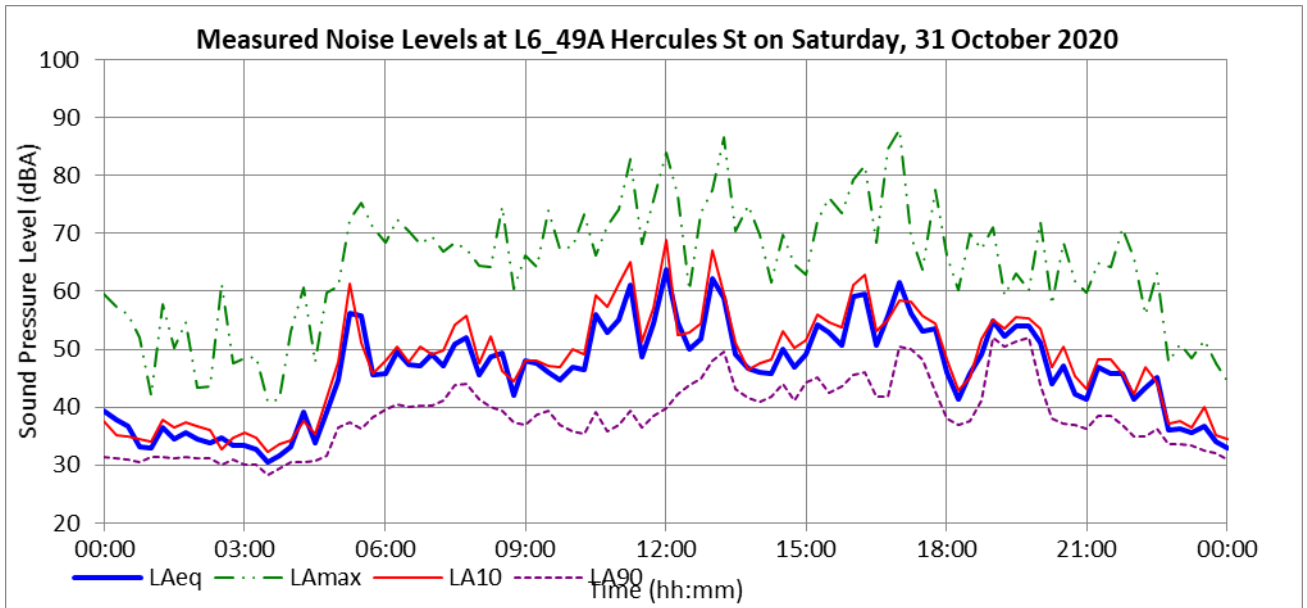


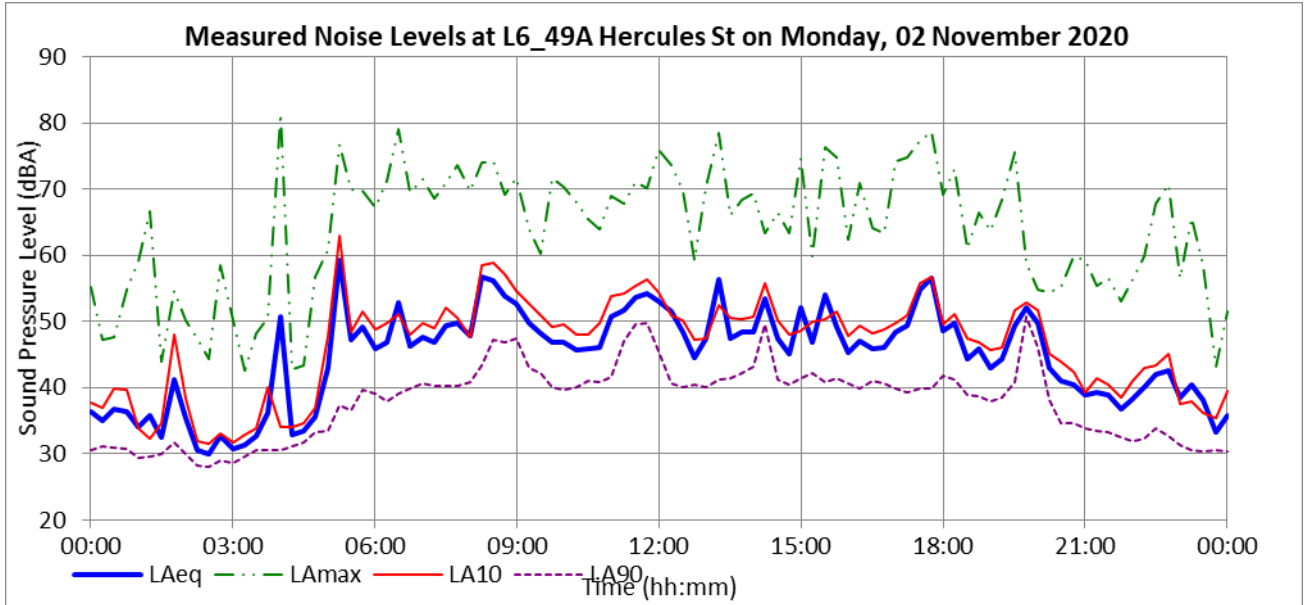












APPENDIX E PROJECT SPECIFIC CRITERIA

Interim Construction Noise Guideline

Airborne noise

The 'Interim Construction Noise Guideline' (ICNG) aims to provide a clear understanding of ways to identify and minimise noise from construction works through applying all 'feasible' and 'reasonable' work practises to control noise impacts. The guideline identifies sensitive land uses and recommends construction hours, provides quantitative and qualitative assessment methods and subsequently advises on appropriate work practises.

For the project site, nearby residential receivers have been identified as sensitive land uses for consideration. It is understood that construction activities on-site will not extend outside of the recommended standard hours detailed in Table E1.

Table E1: ICNG recommended standard hours of work

Work Type	Recommended standard hours of work
Standard hours	Monday to Friday 0700 to 1800 hrs Saturdays 0800 to 1300 hrs No work on Sundays or public holidays

Based on the recommended standard hours, the guideline provides airborne noise criteria for residential receivers as detailed in Table E2. The "Noise Affected" management level is derived on a Rating Background Level (RBL) + 10 dB basis during Standard hours and RBL + 5 dB during periods Outside Standard hours, with RBL values taken from the measured average background noise levels shown in Table E2. The "Highly Noise Affected" management level is prescriptively set at $L_{Aeq(15\ min)}$ 75 dB.

Table E2: Noise Management levels for Residential receivers, dB $L_{Aeq(15\ minute)}$

Monitoring Location	Standard hours		Outside Standard hours	
	Noise Affected	Highly Noise affected	Evening (OSH-1)	Night (OSH-2)
BG-01	54	75	47	39
BG-02	56	75	47	42
BG-03	53	75	42	35
BG-04	50	75	44	36
BG-05	47	75	38	35

In accordance with the ICNG, other sensitive land uses (non-residential), typically consider noise from construction to be disruptive when the properties are being used. Table E3 provides NMLs for other sensitive receivers for various land uses.

Table E3: NMLs for other Sensitive Land Uses

Land Use	NML ¹ $L_{Aeq(15\ minute)}$, dBA
Classrooms at schools and other educational institutions	45 (Internal) ^{2,3}
Hospital wards and operating theatres	45 (Internal) ^{2,3}
Places of worship	45 (Internal) ^{2,3}
Active recreation areas	65 (external) ⁴
Passive recreation areas	60 (external) ⁴

Land Use	NML ¹ LAeq(15minute), dBA
Community centres	Depends on the intended use of the centre. Refer to the recommended 'maximum' internal levels in AS2107 for specific uses
Offices, retail outlets	75 (external) ⁵
Industrial Premises	75 (external) ⁵

Note: 1- NML applies when properties are being used

2- Internal noise levels are to be assessed at the centre of the occupied room

3- Where internal noise levels cannot be measured, external noise levels may be used. A conservative estimate of the difference between internal and external noise levels is 10 dB for buildings other than residences.

4- External noise levels are to be assessed at the most affected point within 50 m of the area boundary

5- Assessed at the most affected occupied point of the premises.

Where noise from construction works is above the "Noise Affected" level, all feasible and reasonable work practises should be applied. Where the noise from construction works is above "Highly Affected management level, restrictions to the hours of construction may be required.

APPENDIX F ASSUMED CONSTRUCTION PLANT ITEMS

A summary of equipment and the assumed duty (percentage of operation per 15-minute period) of equipment to be operating simultaneously in a 15-minute period for each construction work, is provided in Table F1.

Table F1: Assumed duration (% of 15-minute) of equipment to be operating simultaneously in a 15-minute period at construction sites

Construction Equipment	W-01		W-02		W-03		W-04		W-05		W-06		W-07		W-08		W-09		W-10		WF	CS-01 - CS-07	
	TA	TW	TA	TW	TA	TW	TA	TW	TA	TW	TA	TW	TA	TW	TA	TW	TA	TW	TA	TW		E	O
Excavator Hammer	25	-	25	-	-	-	-	-	25	-	25	-	25	-	-	-	50	-	-	-	-	-	-
Excavator (20T)	25	-	25	-	50	-	50	-	25	-	25	-	25	-	50	-	50	-	50	-	-	50	-
Concrete Pump	100	-	100	-	100	-	100	-	100	-	100	-	100	-	100	-	100	-	100	-	-	-	-
Concrete Truck	100	100	100	-	100	-	100	-	100	-	100	100	100	100	100	100	100	-	100	-	-	-	-
Concrete Saw	25	-	25	-	-	-	-	-	25	-	-	-	25	-	-	-	25	-	-	-	-	-	-
Site dumpers	50	-	50	50	50	50	50	-	50	-	50	-	-	-	50	-	-	-	50	-	-	-	-
5T tipper trucks	50	-	-	-	50	-	50	-	25	-	25	-	25	-	25	-	25	-	25	-	-	25	25
Generator	75	-	75	-	75	-	75	-	75	-	75	-	75	-	-	-	75	-	75	-	-	-	-
Oxy acetylene torch	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hand-held power tools	25	25	25	-	-	-	25	-	25	-	25	-	-	-	-	-	-	-	25	-	75	75	75
Piling rig	-	-	100	100	100	100	-	-	-	-	-	-	100	100	-	-	50	50	-	-	-	-	-
Mobile Crane	-	-	25	-	25	-	-	-	25	-	25	-	25	-	-	-	25	-	-	-	-	-	50
Beam Lifter	-	-	25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Compactor	-	-	-	-	-	-	50	50	-	-	50	50	-	-	-	-	-	-	50	50	-	-	-
Positrack	-	-	-	-	-	-	50	50	-	-	-	-	-	-	25	25	-	-	50	50	-	-	-
Tunnel jacking equipment	-	-	-	-	-	-	-	-	100	100	-	-	-	-	-	-	-	-	-	-	-	-	-
Heavy vac truck	-	-	-	-	-	-	-	-	50	50	-	-	50	-	-	-	-	-	-	-	-	-	-
Water cart	-	-	-	-	-	-	-	-	-	-	25	-	-	-	50	-	-	-	50	-	-	-	-
Dump Truck	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	25	25	-	-	-	-	-
Front End Loader	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	75	-	-	-	-
Post hole auger	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	75	75	-

Note: Assessment Scenarios are described in Section 5.1.1. **TA** = 'Typical Average', **TW** = 'Typical Worst', **E** = 'Establishment' and **O** = 'Operations'

APPENDIX G CONSTRUCTION NOISE SOURCES

A variety of excavation and construction equipment will be used for this project. At this early stage, a comprehensive plan of staging and equipment selection is not known. Table G1 provides a schedule of construction equipment that is anticipated to be used on this site and their noise levels as taken from:

- AS2436-2010: 'Guide to noise and vibration control on construction, demolition and maintenance sites'
- AS2436-1980: 'Guide to noise and vibration control on construction, demolition and maintenance sites'
- BS5228-1-2009: 'Code of practice for noise and vibration control on construction and open sites – Part 1: Noise'

Table G1: Construction noise source sound power levels, L_{Aeq} dB

Noise source	Source	A-weighted sound power level, L_{Aeq} dB SWL
Excavator Hammer	BS5228-1-2009	111*
Excavator (20T)	BS5228-1-2009	103
Concrete Truck & Pump	AS2436-2010	108
Concrete Saw	BS5228-1-2009	122*
Site dumpers	BS5228-1-2009	106
5T tipper trucks	AS2436-1981	103
Generator	AS2436-2010	99
Oxy acetylene torch	AS2436-1981	96
Hand-held power tools	AS2436-2010	102
Piling rig	AS2436-2010	111
Mobile Crane	AS2436-2010	104
Beam Lifter	AS2436-2010	105
Compactor	AS2436-2010	113
Positrack	BS5228-1-2009	110
Tunnel jacking equipment	Assumed. Should be reviewed when detailed construction methodology is available	100
Heavy vac truck	Assumed. Based on large Ditch Witch® truck vacuum excavators	110
Water cart	AS2436-2010	107
Dump Truck	AS2436-2010	117
Front End Loader	AS2436-2010	113
Post hole auger	Based on Lw of ROSS® published data	110

* Includes a +5 dB factor in accordance with recommendations given in Section 4.5 of the ICNG.

APPENDIX H PROPOSED INCLUSIONS FOR CONSTRUCTION NOISE AND VIBRATION MANAGEMENT PLAN

As part of the detailed design phase of the project, once a contractor is appointed and proposed construction methodologies and plant and equipment are finalised a Construction Noise and Vibration Management Plan (CNVMP) will need to be prepared. The CNVMP is a documented plan that should assist the construction team in managing and mitigating noise impacts as well communicating effectively with impacted stakeholders. Whilst the details of the CNVMP are outside of the scope of this document the following is provided for the consideration of those preparing the plan.

Many complaints about construction noise are due to preventable activities during construction periods. The following should be considered for adoption on site:

- Regularly train workers and contractors (such as at toolbox talks) to use equipment in ways to minimise noise
- Ensure site managers periodically check the site and nearby residences and other sensitive land uses for noise problems so that solutions can be quickly applied
- Include in tenders, employment contracts, subcontractor agreements and work method statements clauses that require minimisation of noise and compliance with directions from management to minimise noise
- Avoid the use of radios or stereos outdoors where neighbours can be affected
- Avoid the overuse of public address systems
- Avoid shouting and minimise talking loudly and slamming vehicle doors
- 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)
- Develop a one-page summary of approval or consent conditions that relate to relevant work practices and pin it to a noticeboard so that all site operators can quickly reference noise information
- Workers may at times need to discuss or negotiate practices with their managers

H1 Consultation and negotiation

The community is more likely to be understanding and accepting of noise if the information provided is frank, does not attempt to understate the likely noise level, and if commitments are firmly adhered to.

Notification Before and During Construction

- Provide, reasonably ahead of time, information such as total building time, what works are expected to be noisy, their duration, what is being done to minimise noise and when respite periods will occur. For works outside standard hours, inform affected residents and other sensitive land use occupants between five and 14 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
- Use 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 after-hours emergency contact details
- Maintain good communication between the community and the project staff
- Appoint a community liaison officer where required

- For larger projects consider a regular newsletter with site news, significant project events and timing of different activities
- Provide a toll-free contact phone number for enquiries during the works
- Facilitate contact with people to ensure that everyone can see that the site manager understands potential issues, that a planned approach is in place and that there is an ongoing commitment to minimise noise

Complaints Handling

- Provide a readily accessible contact point, for example, through a 24-hour toll-free information and complaints line
- 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
- Call back as soon as possible to keep people informed of action to be taken to address noise problems. Call back at Night-time only if requested by the complainant to avoid further disturbance
- Provide a quick response to complaints, with complaint handling staff having both a good knowledge of the project and ready access to information
- Implement all feasible and reasonable measures to address the source of the complaint
- Keep a register of any complaints, including details of the complaint such as date, time, the person receiving the complaint, complainant's contact number, the person referred to, description of the complaint, work area (for larger projects), time of verbal response and timeframe for written response where appropriate

H2 Plant and equipment

In terms of both cost and results, controlling noise at the source is one of the most effective methods of minimising the noise impacts from any construction activities.

Use quieter methods

- Examine and implement, where feasible and reasonable, alternatives to rock-breaking work methods, such as hydraulic splitters for rock and concrete, hydraulic jaw crushers, chemical rock and concrete splitting, and controlled blasting such as penetrating cone fracture. The suitability of alternative methods should be considered on a case-by-case basis
- Use alternatives to diesel and petrol engines and pneumatic units, such as hydraulic or electric controlled units where feasible and reasonable. Where there is no electricity supply, use an electrical generator located away from residences

Use quieter equipment

- Examine different types of machines that perform the same function and compare the noise level data to select the least noisy machine. For example, rubber-wheeled tractors can be less noisy than steel tracked tractors
- Noise labels are required by NSW legislation for pavement breakers, mobile compressors, chainsaws and mobile garbage compactors. These noise labels can be used to assist in selecting a less noisy plant
- Pneumatic equipment is traditionally a problem – select super silenced compressors, silenced jackhammers and damped bits where possible
- When renting, select quieter items of plant and equipment where feasible and reasonable

- When purchasing, select, where feasible and reasonable, the most effective mufflers, enclosures and low-noise tool bits and blades. Always seek the manufacturer's advice before making modifications to plant to reduce noise
- Operate plant in a quiet and efficient manner
- Reduce throttle setting and turn off equipment when not being used.
- Examine and implement, where feasible and reasonable, the option of reducing noise from metal chutes and bins by placing damping material in the bin

Maintain equipment

- Regularly inspect and maintain equipment to ensure it is in good working order. Also, check the condition of mufflers
- Equipment must not be operated until it is maintained or repaired, where maintenance or repair would address the annoying character of noise identified
- For machines with enclosures, check that doors and door seals are in good working order and that the doors close properly against the seals
- Return any hired equipment that is causing noise that is not typical for the equipment – the increased noise may indicate the need for repair
- Ensure air lines on pneumatic equipment do not leak

H3 On-site

Barriers and acoustic sheds are most suited to longer-term fixed works, as in these cases the associated cost is typically outweighed by the overall time savings.

Location of plant

- Place as much distance as possible between the plant or equipment and residences and other sensitive land uses
- Restrict areas in which mobile plant can operate so that it is away from residences and other sensitive land uses at particular times
- Locate site vehicle entrances away from residences and other sensitive land uses
- Carry out noisy fabrication work at another site (for example, within enclosed factory premises) and then transport to site

Alternatives to reversing alarms

- Avoid the use of reversing alarms by designing site layout to avoid reversing, such as by including drive-through for parking and deliveries
- Install where feasible and reasonable less annoying alternatives to the typical 'beeper' alarms taking into account the requirements of the Occupational Health and Safety legislation; examples are smart alarms that adjust their volume depending on the ambient level of noise and multifrequency alarms that emit noise over a wide range of frequencies
- In all circumstances, the requirements of the relevant Occupational Health and Safety legislation must be complied with. For information on replacing audible warning alarms on a mobile plant with less annoying alternatives.

Maximise shielding

- Reuse existing structures rather than demolish and reconstruct

- Use temporary site buildings and materials stockpiles as noise barriers
- Schedule construction of any permanent walls so that they can be used as early as possible as noise barriers
- Use natural landform as a noise barrier – place fixed equipment in cuttings, or behind earth berms
- Note large reflecting surfaces on and off-site that might increase noise levels and avoid placing noise-producing equipment in locations where reflected noise will increase noise exposure or reduce the effectiveness of mitigation measures

H4 Work scheduling

Scheduling noisy work during periods when people are least affected is an important way of reducing noise impact.

Provide respite periods

- Consult with affected education facilities to ensure that noise-generating construction works in the vicinity of affected education buildings are not scheduled to occur during examination periods, unless other arrangements (such as relocation to an alternative location) acceptable to the affected parties can be made.
- Where night work near residences cannot be feasibly or reasonably avoided, restrict the number of nights per week and/or the number of nights per calendar month that the works are undertaken, in consultation with residents who will be most affected.

Schedule activities to minimise noise impacts

- Organise work to be undertaken during the recommended standard hours where possible
- When works outside the recommended standard hours are planned, avoid scheduling on Sundays or public holidays
- 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
- Consult with affected neighbours about scheduling activities to minimise noise impacts

Organise deliveries and access

- Nominate an off-site truck parking area, away from residences, for trucks arriving prior to gates opening
- 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 on-site parking for staff and on-site truck waiting areas away from residences and other sensitive land uses. Truck waiting areas may require bunding or walls to minimise noise
- Schedule deliveries to nominated hours only

H5 Transmission path

Physical methods to reduce the transmission of noise between the construction works and residences or other sensitive land uses are generally suited to works where there is longer-term exposure to the noise.

- Reduce the line-of-sight noise transmission to residences or other sensitive land uses using temporary barriers
- Temporary noise barriers can be constructed from hoarding (plywood boards, panels of steel sheeting or compressed fibre cement board) with no gaps between the panels at the site boundary. Stockpiles, shipping containers and site office transportable can be effective barriers
- Erect temporary noise barriers before work commences to reduce noise from works as soon as possible
- Consult with most affected neighbours about how effective the proposed noise mitigation measures will be in addressing their concerns