Noise Assessment

Proposed Additions and Alterations
McDonald's Operation
543 Forest Road
Bexley, NSW

Prepared for: McDonald's Australia Limited
May 2024
MAC170430-03RP1

Muller Acoustic Consulting

Document Information

Noise Assessment

Proposed Additions and Alterations – McDonalds Operation

543 Forest Road

Bexley, NSW

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1 Introduction

Muller Acoustic Consulting Pty Ltd (MAC) has been commissioned by McDonald's Australia Limited (MCD) to prepare a Noise Assessment (NA) to quantify emissions from proposed additions and alterations (the 'proposal') to the existing McDonald's Operation (the 'operation') located at 543 Forest Road, Bexley, NSW.

The NA has quantified potential operational and sleep disturbance noise emissions from the operation and recommends reasonable and feasible noise controls where required. This assessment has been undertaken in accordance with the following documents:

- NSW Environment Protection Authority (EPA), Noise Policy for Industry (NPI) 2017;
- NSW Department of Environment and Climate Change (DECCW) – NSW Interim Construction Noise Guideline (ICNG), July 2009;
- NSW Environment Protection Authority (EPA), Approved methods for the measurement and analysis of environmental noise in NSW, 2022; and
- Australian Standard AS 1055:2018 - Acoustics - Description and measurement of environmental noise - General Procedures.

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

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2 Project Description

2.1 Background

The existing operation is located at 543 Forest Road, Bexley, NSW, which is located in an urban environment. The area surrounding the operation comprises of residential land uses, public roadways, infrastructure and an industrial premises. The site is bound to the south by Forest Road and to the northeast by Highworth Avenue. The nearest residential receivers to the site are located along the northern and northwestern boundaries of the operation site, with additional residential receivers located to the east and northeast across Highworth Avenue. A smash repair facility is located to the southwest of the existing carpark at the operation.

The ambient noise environment surrounding the operation site comprises of commercial, road traffic and aircraft noise during the day period and is dominated by traffic during the evening and night periods.

The existing operation comprises of main building, single lane drive-thru lane and 29 space car park. The proposed additions and alteration include the demolition of the single storey dwelling at 1 Highworth Avenue, Bexley, NSW and extension the existing car park to provide a total of 41 parking spaces. The proposal also includes modification to the drive-thru lane, to allow for dual customer ordering displays and a new loading bay located adjacent to the northeastern boundary of the operation site. Site plans for the proposal are presented in **Appendix B**.

The operation trading hours are not proposed to change as part of the proposal, however it is noted that the operation currently trades during the day, evening and night periods. Accordingly, operational activities have been assessed for all periods.

2.1.1 Receiver Review

A review of residential receivers in proximity to the project has been completed and are summarised in **Table 1. Figure 1** provides a locality plan showing the position of these receivers in relation to the project.

Table 1 Receiver Locations

Receiver	Receiver Type	Receiver Height	Coordinates (MGA56)	
		m	Easting	Northing
R01 SW	Residential	1.5	326434	6241544
R01 SE	Residential	1.5	326448	6241547
R01 NE	Residential	1.5	326454	6241558
R01 NW	Residential	1.5	326435	6241552
R02	Residential	1.5	326429	6241556
R03	Residential	1.5/4.0	326400	6241546
R04	Residential	1.5	326398	6241533
R05	Residential	1.5	326416	6241472
R06	Residential	1.5	326441	6241455
R07	Residential	1.5/4.0	326463	6241470
R08	Residential	1.5	326476	6241473
R09	Residential	1.5	326488	6241482
R10	Residential	1.5	326503	6241488
R11	Residential	1.5	326507	6241499
R12	Residential	1.5	326498	6241538
R13	Residential	1.5	326485	6241564
R14	Residential	1.5/4.0	326475	6241575
I01	Industrial	1.5	326411	6241513

It is noted that the most affect receiver location for R01 is presented in the results tables in **Section 7**.

2.2 Proposed Activities & Operating Hours

There are several key activities associated with the operation that have the potential to generate acoustic impacts on nearby receivers. **Table 2** provides a summary of operation noise generating activities and the assessment period in which they propose to occur.

Table 2 Noise Generating Activities

Activity/Source	Period[1]	Operational
Customer Light Vehicles in Car park (existing and proposed)	Day	✓
	Evening	✓
	Night	✓
COD Operations	Day	✓
	Evening	✓
	Night	✓
Drive-Thru Lane Operations	Day	✓
	Evening	✓
	Night	✓
Mechanical Plant	Day	✓
	Evening	✓
	Night	✓
Consumable Good Deliveries	Day	✓
	Evening	✓
	Night	X

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to

It is noted that waste collections are not proposed to change as part of the redevelopment. Accordingly, waste collections have not been considered further in this assessment.

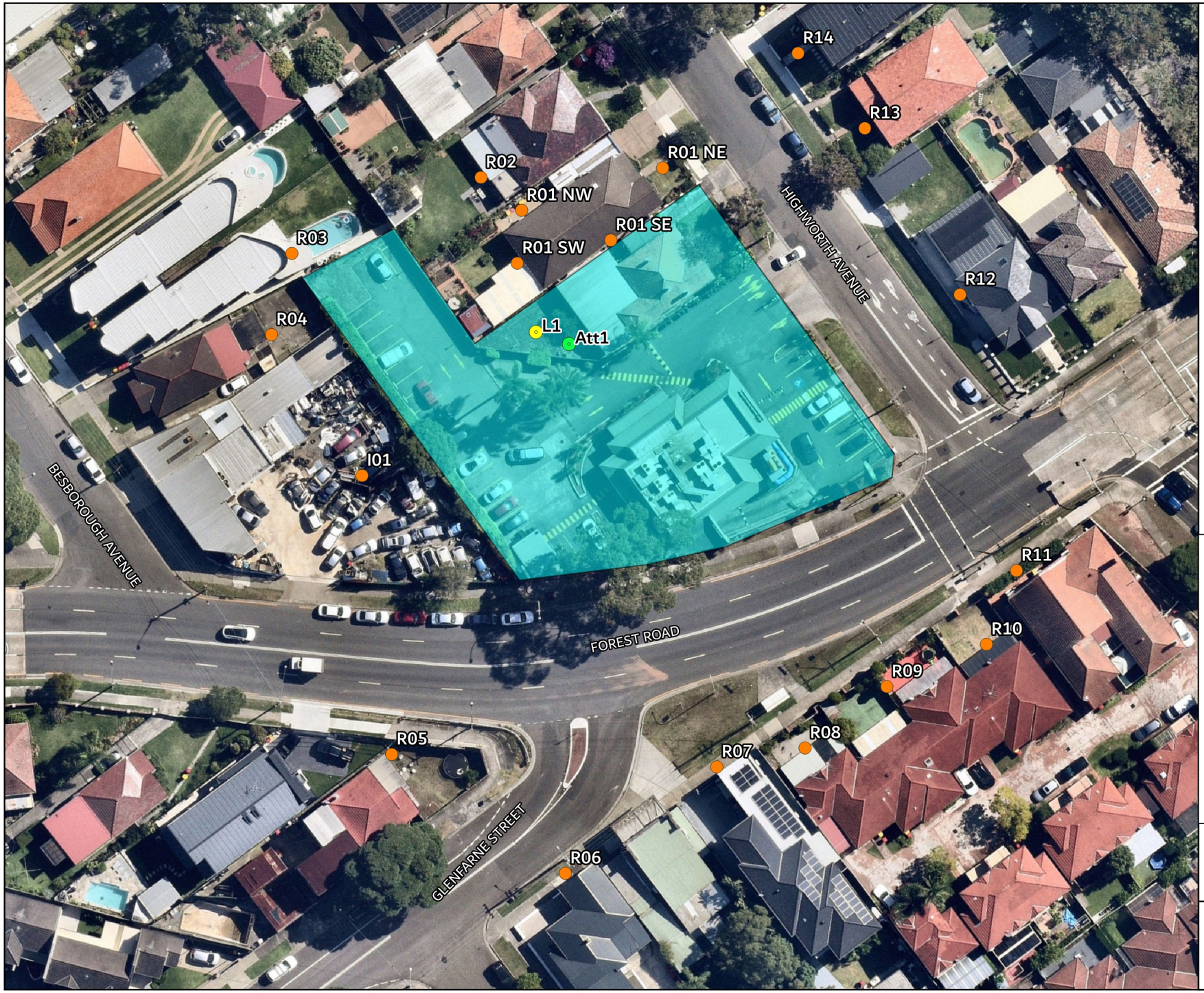

FIGURE 1

Locality Plan

MAC170430-03

Proposed Additions and Alterations

McDonald's Bexley

KEY

- Receiver
- Operation Boundary
- Attended Noise Monitoring Location
- Unattended Noise Monitoring Location

0 6 12 18 24 30 m

N

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3 Noise Policy and Guidelines

3.1 Noise Policy for Industry

The EPA released the Noise Policy for Industry (NPI) in October 2017 which provides a process for establishing noise criteria for consents and licenses enabling the EPA to regulate noise emissions from scheduled premises under the Protection of the Environment Operations Act 1997. The objectives of the NPI are to:

- provide noise criteria that is used to assess the change in both short term and long-term noise levels;
- provide a clear and consistent framework for assessing environmental noise impacts from industrial premises and industrial development proposals;
- promote the use of best-practice noise mitigation measures that are feasible and reasonable where potential impacts have been identified; and
- support a process to guide the determination of achievable noise limits for planning approvals and/or licences, considering the matters that must be considered under the relevant legislation (such as the economic and social benefits and impacts of industrial development).

The policy sets out a process for industrial noise management involving the following key steps:

1. Determine the Project Noise Trigger Levels (PNTLs) (ie criteria) for a development. These are the levels (criteria), above which noise management measures are required to be considered. They are derived by considering two factors: shorter-term intrusiveness due to changes in the noise environment; and maintaining the noise amenity of an area.
2. Predict or measure the noise levels produced by the development with regard to the presence of annoying noise characteristics and meteorological effects such as temperature inversions and wind.
3. Compare the predicted or measured noise level with the PNTL, assessing impacts and the need for noise mitigation and management measures.
4. Consider residual noise impacts - that is, where noise levels exceed the PNTLs after the application of feasible and reasonable noise mitigation measures. This may involve balancing economic, social and environmental costs and benefits from the proposed development against the noise impacts, including consultation with the affected community where impacts are expected to be significant.
5. Set statutory compliance levels that reflect the best achievable and agreed noise limits for the development.
6. Monitor and report environmental noise levels from the development.

3.1.1 Project Noise Trigger Levels (PNTL)

The policy sets out the procedure to determine the PNTLs relevant to an industrial development. The PNTL is the lower (ie, the more stringent) of the **Project Intrusiveness Noise Level** (PINL) and **Project Amenity Noise Level** (PANL) determined in accordance with Section 2.3 and Section 2.4 of the NPI.

3.1.2 Rating Background Level (RBL)

The Rating Background Level (RBL) is a parameter determined from noise monitoring and is used for assessment purposes. As per the NPI, the RBL is an overall single figure background level representing each assessment period (day, evening and night) over the noise monitoring period. The measured RBLs relevant to the project are contained in **Section 4.1**.

3.1.3 Project Intrusiveness Noise Level (PINL)

The PINL ($LA_{eq(15min)}$) is the RBL + 5dB and seeks to limit the degree of change a new noise source introduces to an existing environment. Hence, when assessing intrusiveness, background noise levels need to be measured.

Background noise levels need to be determined before intrusive noise can be assessed. The NPI states that background noise levels to be measured are those that are present at the time of the noise assessment and without the subject development operating. For the assessment of modifications to existing premises, the noise from the existing premises should be excluded from background noise measurements. It is note that the exception is where the premises has been operating for a significant period of time and is considered a normal part of the acoustic environment; it may be included in the background noise assessment under the following circumstances:

- the development must have been operating for a period in excess of 10 years in the assessment period/s being considered and is considered a normal part of the acoustic environment; and,
- the development must be operating in accordance with noise limits and requirements imposed in a consent or licence and/or be applying best practice.

Where a project intrusiveness noise level has been derived in this way, the derived level applies for a period of 10 years to avoid continuous incremental increases in intrusiveness noise levels. This approach is consistent with the purpose of the intrusiveness noise level to limit significant change in the acoustic environment. The purpose of the project amenity noise level is to moderate against background noise creep.

3.1.4 Project Amenity Noise Level (PANL)

The PANL is relevant to a specific land use or locality. To limit continuing increases in intrusiveness levels, the ambient noise level within an area from all combined industrial sources should remain below the recommended amenity noise levels specified in Table 2.2 (of the NPI). The NPI defines two categories of amenity noise levels:

- **Amenity Noise Levels (ANL)** – are determined considering all current and future industrial noise within a receiver area; and
- **Project Amenity Noise Level (PANL)** – is the recommended level for a receiver area, specifically focusing the project being assessed.

Additionally, Section 2.4 of the NPI states: "to ensure that industrial noise levels (existing plus new) remain within the recommended amenity noise levels for an area, a project amenity noise level applies for each new source of industrial noise as follows":

PANL for new industrial developments = recommended **ANL** minus 5dBA.

The following exceptions apply when deriving the PANL:

- areas with high traffic noise levels;
- proposed developments in major industrial clusters;
- existing industrial noise and cumulative industrial noise effects; and
- greenfield sites.

The NPI states with respect to high traffic noise areas:

The level of transport noise, road traffic noise in particular, may be high enough to make noise from an industrial source effectively inaudible, even though the LAeq noise level from that industrial noise source may exceed the project amenity noise level. In such cases the project amenity noise level may be derived from the LAeq, period(traffic) minus 15 dB(A).

Where relevant this assessment has considered influences of traffic with respect to amenity noise levels (ie areas where existing traffic noise levels are 10dB greater than the recommended amenity noise level).

Furthermore, Section 2.4 of the NPI states "*where the project amenity noise level applies and it can be met, no additional consideration of cumulative industrial noise is required.* "

The recommended amenity noise levels as per Table 2.2 of the NPI are reproduced in **Table 3**.

Table 3 Amenity Noise Levels

Receiver Type	Noise Amenity Area	Time of day	Recommended amenity noise level dB LAeq(period)
Residential	Rural	Day	50
		Evening	45
		Night	40
	Suburban	Day	55
		Evening	45
		Night	40
	Urban	Day	60
		Evening	50
		Night	45
Hotels, motels, caretakers' quarters, holiday accommodation, permanent resident caravan parks.	See column 4	See column 4	5dB above the recommended amenity noise level for a residence for the relevant noise amenity area and time of day
School Classroom	All	Noisiest 1-hour period when in use	35 (internal) 45 (external)
Hospital ward			
- internal	All	Noisiest 1-hour	35
- external	All	Noisiest 1-hour	50
Place of worship - internal	All	When in use	40
Passive Recreation	All	When in use	50
Active Recreation	All	When in use	55
Commercial premises	All	When in use	65
Industrial	All	When in use	70

Notes: The recommended amenity noise levels refer only to noise from industrial noise sources. However, they refer to noise from all such sources at the receiver location, and not only noise due to a specific project under consideration. The levels represent outdoor levels except where otherwise stated.

Types of receivers are defined as rural residential; suburban residential; urban residential; industrial interface; commercial; industrial – see Table 2.3 and Section 2.7 of the NPI.

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

3.1.5 Maximum Noise Assessment Trigger Levels

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

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

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

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

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

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

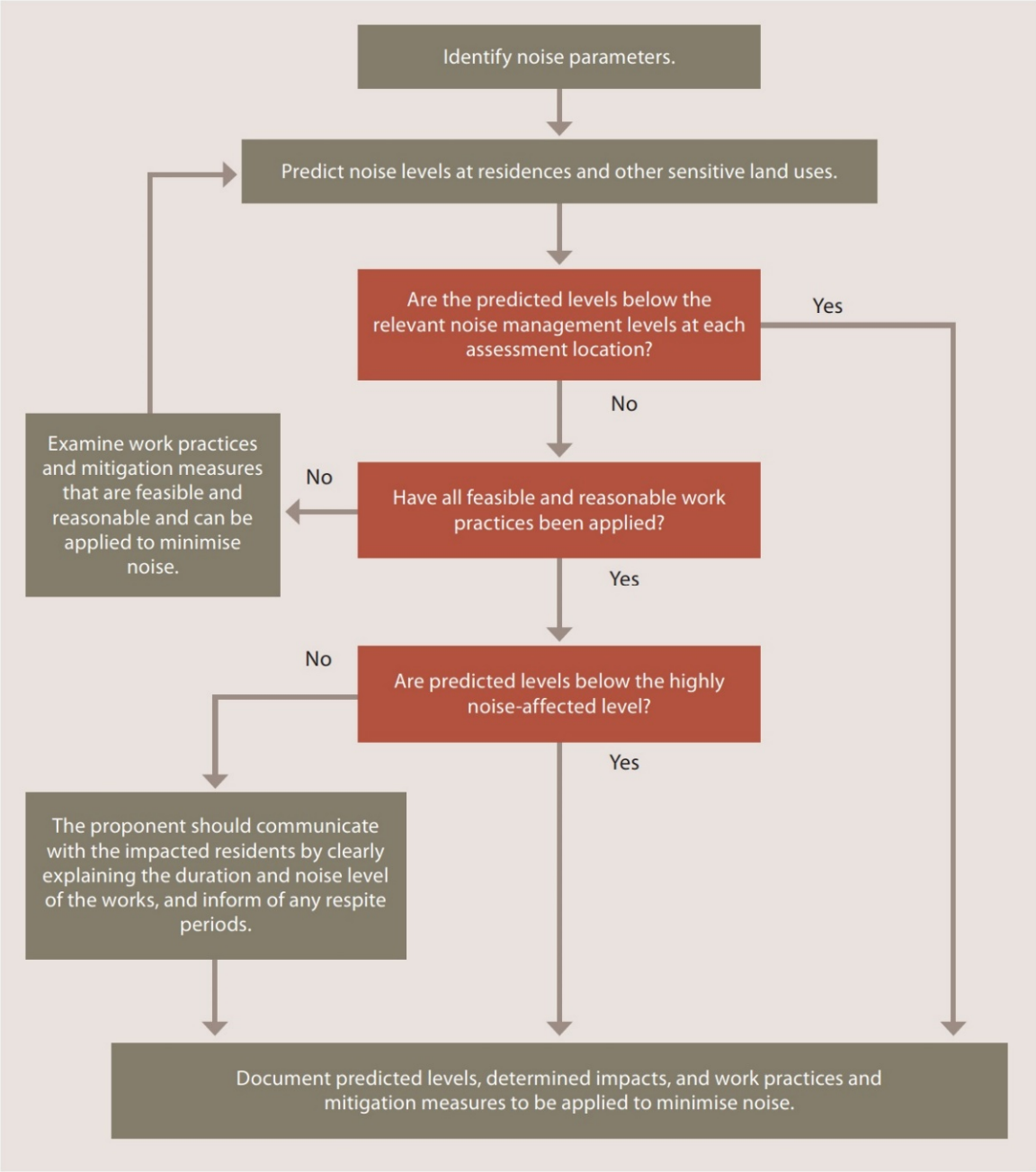
3.2 Interim Construction Noise Guideline

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

- Quantitative, which is suited to major construction projects with typical durations of more than three weeks; and
- Qualitative, which is suited to short term infrastructure maintenance (< three weeks).

The qualitative assessment methodology is a more simplified approach that relies on noise management strategies. This NA has adopted a quantitative assessment approach which is summarised in **Figure 2.** The quantitative approach includes identification of potentially affected receivers, derivation of the construction noise management levels, quantification of potential noise impact at receivers via predictive modelling and, provides management and mitigation recommendations.

Figure 2 Quantitative Assessment Processes for Assessing and Managing Construction Noise



Source: Department of Environment and Climate Change, 2009.

3.2.1 Standard Hours for Construction

Table 4 presents the ICNG recommended standard hours for construction works.

Table 4 Recommended Standard Hours for Construction

Daytime	Construction Hours
Monday to Friday	7am to 6pm
Saturdays	8am to 1pm
Sundays or Public Holidays	No construction

These recommended hours do not apply in the event of direction from police, or other relevant authorities, for safety reasons or where required in an emergency to avoid the loss of lives, property and/or to prevent environmental harm. Construction activities are anticipated to be undertaken during standard construction hours.

3.2.2 Construction Noise Management Levels

Section 4 of the ICNG details the quantitative assessment method involving predicting noise levels and comparing them with the Noise Management Level (NML) and are important indicators of the potential level of construction noise impact. **Table 5** reproduces the ICNG Noise Management Level (NML) for residential receivers. The NML is determined by adding 10dB (standard hours) or 5dB for Out of Hours (OOH) to the Rating Background Level (RBL) for each specific assessment period.

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

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

4 Existing Environment

4.1 Unattended Noise Monitoring

To quantify the existing background noise environment of the area, unattended noise monitoring was conducted at one location representative of the ambient environment surrounding the project site. The selected monitoring location is shown in **Figure 1** and is considered representative of surrounding residential receivers as per Fact Sheet B1.1 of the NPI.

The unattended noise survey was conducted in general accordance with the procedures described in Australian Standard AS 1055:2018, "Acoustics – Description and Measurement of Environmental Noise".

The measurements were carried out using one Svantek 977 noise analyser from Tuesday 30 April 2024 to Friday 10 May 2024. All acoustic instrumentation used carries appropriate and current NATA (or manufacturer) calibration certificates with records of all calibrations maintained by MAC as per Approved Methods for the measurement and analysis of environmental noise in NSW (EPA, 2022) and complies with AS/NZS IEC 61672.1-2019-Electroacoustics - Sound level meters - Specifications. Calibration of all instrumentation was checked prior to and following measurements. Drift in calibration did not exceed ±0.5dBA.

Observations on-site identified the surrounding locality was typical of an urban environment, with road traffic noise, commercial activities and aircraft noise audible.

Data affected by adverse meteorological conditions have been excluded from the results in accordance with methodologies provided in Fact Sheet A4 of the NPI. Residential receivers situated in the surrounding area have been classified under the EPA's urban amenity category. This criteria is used in conjunction with the intrusiveness criteria to determine the limiting criteria. The summary results of long-term unattended noise monitoring are provided in **Table 6**. The measured daily ABLs for the background monitoring are provided in **Table C19** in **Appendix C** along with the daily noise monitoring charts.

Table 6 Background Noise Monitoring Summary

Location	Measured background noise level, RBL, dBA			Measured LA_{eq}, dBA		
	Day 7am to 6pm	Evening 6pm to 10pm	Night 10pm to 7am	Day 7am to 6pm	Evening 6pm to 10pm	Night 10pm to 7am
L1	46	45	39	55	52	50

Note: Excludes periods of wind or rain affected data. Meteorological data obtained from the Bureau of Meteorology weather station Sydney Airport AWS 33.94°S 151.2°E 6m AMSL.

4.2 Attended Noise Monitoring

To supplement the unattended noise assessment and to quantify the changes in ambient noise in the community surrounding the operation, one 15 minute attended measurement was completed.

The attended noise survey was conducted in general accordance with the procedures described in Australian Standard AS 1055:2018, "Acoustics – Description and Measurement of Environmental Noise".

The acoustic instrumentation used carries current NATA calibration and complies with AS/NZS IEC 61672.1-2019-Electroacoustics - Sound level meters - Specifications. Calibration of all instrumentation was checked prior to and following measurements. Drift in calibration did not exceed ±0.5dBA. All equipment carried appropriate and current NATA (or manufacturer) calibration certificates.

The attended noise monitoring was conducted using one Svantek 971 noise analyser at the site (see **Figure 1**) on Friday 10 May 2024 to quantify ambient background noise levels.

The attended measurement was completed during calm and clear meteorological conditions and confirmed that ambient traffic and commercial noise dominated the surrounding environment. The results of the short-term noise measurement and observations are summarised in **Table 7**.

Table 7 Operator-Attended Noise Survey Results

Date/ Time (hrs)	Noise Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
	L_{Amax}	L_{Aeq}	L_{A90}		
10/05/2024 12:19	61	49	46	WD: SE WS: 1.1m/s Rain: Nil	Traffic 40-61 Aircraft 47-52

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

5 Assessment Criteria

5.1 Operational Noise Trigger Levels (Criteria)

This section outlines the determination of PNTLs and Maximum Noise Assessment Trigger Levels in accordance with NPI methodology.

5.1.1 Intrusiveness Noise Levels

The PINL for the project are presented in **Table 8** and have been determined based on the measured RBL +5dBA and only apply to residential receivers.

Table 8 Project Intrusiveness Noise Levels

Receiver Type	Period[1]	Adopted RBL dB LA_{90}	PINL dB $LA_{eq(15min)}$
Residential	Day	46	51
	Evening	45	50
	Night	39	44

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

5.1.2 Determination of NPI Residential Receiver Amenity Category

Classification of residential receivers in the surrounding area have been determined by review of the measured RBLs and a tally of the features for each category described in Table 2.3 of the NPI. The overall tally of features and resulting classifications are provided in **Table 9**. The detailed assessment of receiver categories is provided in **Appendix D.** This classification is used in conjunction with the intrusiveness criteria to determine the limiting criteria.

Table 9 Determination of NPI Residential Receiver Category

Receiver	Rural	Suburban	Urban
Residential	0	0	9

Observations at locations in the surrounding locality support the assessment of the receiver as an urban residential category.

5.1.3 Amenity Noise Levels and Project Amenity Noise Levels

The PANL for residential receivers potentially affected by the project are presented in **Table 10.**

Table 10 Amenity Noise Levels and Project Amenity Noise Levels

Receiver Type	Noise Amenity Area	Assessment Period[1]	NPI Recommended ANL dB $L_{Aeq(period)}$	ANL dB $L_{Aeq(period)}$	PANL dB $L_{Aeq(15min)}$[3]
Residential	Urban	Day	60	55[2]	58
		Evening	50	50	53
		Night	45	45	48
Industrial	Any	When in Use	70	65[2]	68

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

Note 2: Project Amenity Noise Level equals the Amenity Noise Level -5dB as there is other industry in the area.

Note 3: Includes a +3dB adjustment to the amenity period level to convert to a 15-minute assessment period as per Section 2.2 of the NPI.

5.1.4 Project Noise Trigger Levels

The PNTL are the lower of either the PINL or the PANL. **Table 11** presents the derivation of the PNTLs in accordance with the methodologies outlined in the NPI.

Table 11 Project Noise Trigger Levels

Receiver Type	Noise Amenity Area	Assessment Period[1]	PINL dB $L_{Aeq(15min)}$	PANL dB $L_{Aeq(15min)}$	PNTL dB $L_{Aeq(15min)}$
Residential	Urban	Day	51	58	51
		Evening	50	53	50
		Night	44	48	44
Industrial	Any	When in Use	N/A	68	68

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

5.1.5 Maximum Noise Trigger Levels

The maximum noise trigger levels shown in **Table 12** are based on night time RBLs and trigger levels as per Section 2.5 of the NPI. The trigger levels will be applied to transient noise events that have the potential to cause sleep disturbance.

Table 12 Maximum Noise Trigger Levels (Night)

Residential Receivers			
$L_{Aeq(15min)}$		L_{Amax}	
40dB $L_{Aeq(15min)}$ or RBL + 5dB		52dB L_{Amax} or RBL + 15dB	
Trigger	40	Trigger	52
RBL +5dB	44	RBL +15dB	54
Highest	**44**	**Highest**	**54**

Note: Monday to Saturday; Night 10pm to 7am. On Sundays and Public Holidays Night 10pm to 8am.

Note: NPI identifies that maximum of the two values is to be adopted which is shown in bold font.

5.2 Construction Noise Management Levels

The relevant Noise Management Levels (NMLs) for standard construction hours are presented in **Table 13**.

Table 13 Construction Noise Management Levels

Catchment (No) Receiver ID	Assessment Period[1]	Adopted RBL dB LA_{90}	NML dB $LA_{eq(15min)}$
Residential	Standard Hours	46	56 (RBL+10dBA)
Industrial	Standard Hours	N/A	75

Note 1: Refer to Table 4 for Standard Recommended Hours for Construction.

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6 Modelling Methodology

A computer model was developed to quantify project noise emissions to neighbouring receivers using DGMR (iNoise, Version 2024) noise modelling software. iNoise is an intuitive and quality assured software for industrial noise calculations in the environment. 3D noise modelling is considered industry best practice for assessing noise emissions from projects.

The model incorporated a three-dimensional digital terrain map giving all relevant topographic information used in the modelling process. Additionally, the model uses relevant noise source data, ground type, attenuation from barrier or buildings and atmospheric information to predict noise levels at the nearest potentially affected receivers. Where relevant, modifying factors in accordance with Fact Sheet C of the NPI have been applied to calculations.

The model calculation method used to predict noise levels was in accordance with ISO 9613:1 and ISO 9613:2 including corrections for meteorological conditions using CONCAWE[1]. The ISO 9613 standards are the most used noise prediction method worldwide. Many countries refer to ISO 9613 in their noise legislation. However, the ISO 9613 standard does not contain guidelines for quality assured software implementation, which leads to differences between applications in calculated results. In 2015 this changed with the release of ISO/TR 17534-3. This quality standard gives clear recommendations for interpreting the ISO 9613 method. iNoise fully supports these recommendations. The models and results for the 19 test cases are included in the software.

6.1 Noise Assumptions, Attenuation Recommendations and Controls

The noise model incorporated the following:

- the additions and alterations to the operation are constructed as per the site design and plans (as presented in **Appendix B**);
- construction of an impervious barrier surrounding the northern boundary of the operation site (see **Figure 3**). The barrier should be constructed to an RL of 2.0m above the relative ground level of the car park. The barrier should consist of materials with a surface density of at least 10kg/m^2, and not contain any gaps (ie lapped and capped timber or equivalent); and
- the existing 1.8m southwestern boundary fence is retained (see **Figure 3**).

[1] Report no. 4/18, "the propagation of noise from petroleum and petrochemical complexes to neighbouring communities", Prepared by C.J. Manning, M.Sc., M.I.O.A. Acoustic Technology Limited (Ref.AT 931), CONCAWE, Den Haag May 1981

6.2 Sound Power Levels

Table 14 presents the sound power level for each noise source modelled in this assessment. It is noted that sound power levels were sourced from manufacturer's specifications or from in-field measurements at similar project sites.

Table 14 Acoustically Significant Sources – Sound Power Levels dBA *(re 10^{-12} Watts)*

Item and quantity (per 15 minutes)	Sound Power Level dB LAeq	Total Sound Power Level dB LAeq(15min)	Source Height[1]
Operation			
MCD Fan CDG404 (x3)	77	85	0.8m
MCD AC Plant PCA340S (x2)	80	83	1.4m
MCD AC Plant PCG300L/R (x2)	78	81	1.4m
MCD AC Plant PCA260U (x1)	76	76	1.4m
Cold Room Condenser (x1)	75	75	0.5m
Customer Ordering Displays (x2)	71	74	1.0m
Truck Deliveries (x1)	92	92	1.0m
Car idle, start up and drive off (x25)[2]	81	87	0.5m
Customers vehicles travelling through Car Park (25 cars per 15min)	81	87	0.5m
Customers vehicles travelling through Drive-Thru (15 cars per 15min)	81	85	0.5m
Sleep disturbance assessment (L_{Amax}), Night-time periods (10pm to 7am)			
Patron Yelling	92		1.0m
Car Door Slam	87		1.0m
Construction Fleet			
Combined Construction Fleet	108		1.5m

Note 1: Height above the relative ground or building below source.

Note 2: Includes a duration adjustment assuming vehicles operate for three (3) minutes continuously within a period of 15-minutes.

FIGURE 3

Barrier Plan

MAC170430-03

Proposed Additions

and Alterations

McDonald's Bexley

KEY

1.8m High Existing Barrier

2.0m High Acoustic Barrier

0 3 6 9 12 15 m

N

MAC
Muller Acoustic Consulting

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7 Noise Assessment Results

This assessment has quantified operational noise levels at the nearest receivers.

7.1 Operational Noise Assessment

Noise predictions from all operation noise sources have been quantified at surrounding receivers. The coincidence of all plant occurring onsite simultaneously for an entire 15-minute period is unlikely. However, it is probable that several plant may operate simultaneously on occasion for a limited duration. To account for this, modelling has adopted the $LA_{eq(15min)}$ contribution of sources which were derived from manufacturer's specifications or from in-field measurements of operation sources or activities. Results of the noise modelling predictions are presented in **Table 15** for operations without deliveries.

Table 15 Operational Noise Predictions without Deliveries – All Receivers[1]

Residential Receivers

Receiver No	Predicted Noise Level dB $LA_{eq(15min)}$			PNTL dB $LA_{eq(15min)}$			Compliant
	Day	Evening	Night	Day	Evening	Night	
R01	42	42	41	51	50	44	✓
R02	36	36	<35	51	50	44	✓
R03	45	45	42	51	50	44	✓
R04	37	37	<35	51	50	44	✓
R05	37	37	35	51	50	44	✓
R06	38	38	36	51	50	44	✓
R07	40	40	39	51	50	44	✓
R08	39	39	38	51	50	44	✓
R09	40	40	40	51	50	44	✓
R10	38	38	38	51	50	44	✓
R11	39	39	38	51	50	44	✓
R12	41	41	40	51	50	44	✓
R13	41	41	40	51	50	44	✓
R14	41	41	39	51	50	44	✓

Other Receivers

Receiver No	Period	Predicted Noise Level dB $LA_{eq(15min)}$	PNTL dB $LA_{eq(15min)}$	Compliant
I01	When in use	41	68	✓

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

Consumable goods deliveries are expected to be undertaken once per day during the once per day during the day and evening periods by a heavy vehicle. These operations usually take less than a few minutes, however to present a conservative assessment, it has been assumed that it would take up to one hour. Fact Sheet C of the NPI allows for exceedance of the PNTL or adjustment of the PNTL for short term single events that may occur in any 24-hour period. Table C3 of the NPI allows an adjustment to the PNTL of +5dB for the daytime and evening periods, when the event is expected to occur. Results of the noise modelling predictions are presented in **Table 16**.

Table 16 Operational Noise Predictions– with Consumable Goods Deliveries – All Receivers[1]

Residential Receivers

Receiver No	Predicted Noise Level dB $LA_{eq(15min)}$		PNTL dB $LA_{eq(15min)}$		Compliant
	Day	Evening	Day	Evening	
R01	46	46	56	55	✓
R02	37	37	56	55	✓
R03	46	46	56	55	✓
R04	37	37	56	55	✓
R05	37	37	56	55	✓
R06	40	40	56	55	✓
R07	43	43	56	55	✓
R08	46	46	56	55	✓
R09	48	48	56	55	✓
R10	47	47	56	55	✓
R11	48	48	56	55	✓
R12	53	53	56	55	✓
R13	51	51	56	55	✓
R14	50	50	56	55	✓

Other Receivers

Receiver No	Period	Predicted Noise Level dB $LA_{eq(15min)}$	PNTL dB $LA_{eq(15min)}$	Compliant
I01	When in use	42	68	✓

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

7.2 Maximum Noise Level Assessment

In assessing maximum noise events, typical LAmax noise levels from transient events were assessed at the nearest residential receivers. For the sleep disturbance assessment, a sound power level of 87dBA for a car door slam and 92dBA for a customer yelling were adopted for maximum noise level (LAmax) events during the night period. Predicted noise levels from LAmax events for assessed receivers are presented in **Table 17.**

Table 17 Maximum Noise Level Assessment (Night)[1]

Receiver	Predicted Noise Level dB LAmax			Trigger Levels dB LAmax	Compliant
	Door Slam in new Northeastern Car Park	Door Slam in new Northwestern Car Park	Yell at new COD Area		
R01	46	49	41	54	✓
R02	<35	<35	<35	54	✓
R03	<35	35	<35	54	✓
R04	<35	<35	<35	54	✓
R05	<35	<35	<35	54	✓
R06	<35	35	42	54	✓
R07	<35	<35	45	54	✓
R08	<35	<35	46	54	✓
R09	38	<35	47	54	✓
R10	38	<35	47	54	✓
R11	38	36	48	54	✓
R12	43	40	50	54	✓
R13	46	41	48	54	✓
R14	46	38	46	54	✓

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

7.3 Construction Noise Assessment

Table 18 presents the results of modelled construction noise emissions. Predictions identify that emissions from construction are above the noise management levels at several of the assessed receivers. Accordingly, recommendations to reduce the impact of construction noise emissions on surrounding receivers are provided in **Section 8**.

Table 18 Construction Noise Levels – All Receivers

Receiver	Period[1]	Predicted Noise Level dB $LA_{eq(15min)}$		Management Level dB $LA_{eq(15min)}$	Compliant
		New COD and Loading Bay	Additional Car Park Spaces		
R01	Day	58	67	56	X
R02	Day	39	54	56	✓
R03	Day	52	58	56	X
R04	Day	42	50	56	✓
R05	Day	51	52	56	✓
R06	Day	57	56	56	X
R07	Day	62	56	56	X
R08	Day	63	53	56	X
R09	Day	64	54	56	X
R10	Day	64	57	56	X
R11	Day	65	59	56	X
R12	Day	70	64	56	X
R13	Day	66	65	56	X
R14	Day	64	63	56	X
I01	Day	48	59	75	✓

Note 1: Refer to Table 4 for Standard Recommended Hours for Construction.

8 Construction Recommendations

The results of the Noise Assessment demonstrate that levels during standard construction hours have the potential to be above the applicable ICNG noise management levels at several of the nearest receivers in proximity to the operation. Accordingly, it is recommended that noise management and mitigation measures be adopted during noise intensive construction activities to limit impact on surrounding receivers.

Recommendations for consideration during construction activities for this operation may include:

- implement boundary fences/retaining walls as early as possible to maximise their attenuation benefits to surrounding receivers;
- toolbox and induction of personnel prior to shift to discuss noise control measures that may be implemented to reduce noise emissions to the community;
- where possible use mobile screens or construction hording to act as barriers between construction works and receivers;
- all plant should be shut down when not in use. Plant to be parked/started at farthest point from relevant assessment locations;
- operating plant in a conservative manner (no over-revving);
- selection of the quietest suitable machinery available for each activity;
- avoidance of noisy plant/machinery working simultaneously where practicable;
- minimisation of metallic impact noise;
- all plant are to utilise a broadband reverse alarm in lieu of the traditional hi frequency type reverse alarm; and
- undertake letter box drops to notify receivers of potential works.

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9 Discussion and Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has completed a Noise Assessment (NA) to quantify emissions from the proposed additions and alterations to the existing McDonald's Operation located at 543 Forest Road, Bexley, NSW

The assessment has quantified potential operation emissions pertaining to generated noise, including customer light vehicles, mechanical plant noise and deliveries for the proposed additions and alterations to the operation.

The results of the Noise Assessment demonstrate that noise emissions from the operation would satisfy the relevant Project Noise Trigger Levels at all assessed receivers for all assessment periods once noise controls for the project are implemented (see **Section 6.1**):

- the additions and alterations to the operation are constructed as per the site design and plans (as presented in **Appendix B**);
- construction of an impervious barrier surrounding the northern boundary of the operation site (see **Figure 3**). The barrier should be constructed to an RL of 2.0m above the relative ground level of the car park. The barrier should consist of materials with a surface density of at least 10kg/m^2, and not contain any gaps (ie lapped and capped timber or equivalent); and
- the existing 1.8m southwestern boundary fence is retained (see **Figure 3**).

Furthermore, sleep disturbance is not anticipated, as emissions from maximum noise events (ie car door slams and patron yells) are predicted to satisfy the NPIs maximum noise trigger levels.

Modelled noise emissions from construction activities identify that predicted noise emissions levels may be above the applicable construction management levels at several assessed receivers. Accordingly, noise management measures are provided in this report to reduce potential impacts on surrounding receivers.

In summary, the Noise Assessment supports the Development Application for the proposal incorporating the recommendations and controls outlined in this report.

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Appendix A – Glossary of Terms

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

Table A1 Glossary of Acoustical Terms

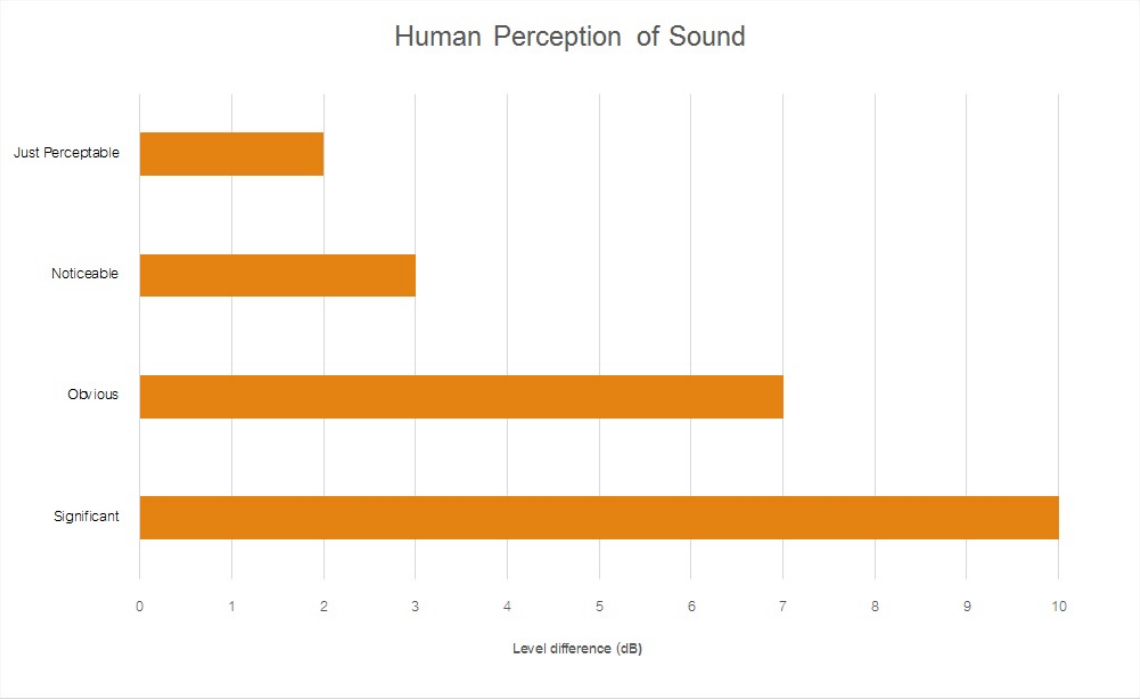
Term	Description
1/3 Octave	Single octave bands divided into three parts
Octave	A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit.
ABL	Assessment Background Level (ABL) is defined in the NPI as a single figure background level for each assessment period (day, evening and night). It is the tenth percentile of the measured L90 statistical noise levels.
Ambient Noise	The total noise associated with a given environment. Typically, a composite of sounds from all sources located both near and far where no particular sound is dominant.
A Weighting	A standard weighting of the audible frequencies designed to reflect the response of the human ear to sound.
Background Noise	The underlying level of noise present in the ambient noise, excluding the noise source under investigation, when extraneous noise is removed. This is usually represented by the LA90 descriptor
dBA	Noise is measured in units called decibels (dB). There are several scales for describing noise, the most common being the 'A-weighted' scale. This attempts to closely approximate the frequency response of the human ear.
dB(Z), dB(L)	Decibels Z-weighted or decibels Linear (unweighted).
Extraneous Noise	Sound resulting from activities that are not typical of the area.
Hertz (Hz)	The measure of frequency of sound wave oscillations per second - 1 oscillation per second equals 1 hertz.
LA10	A sound level which is exceeded 10% of the time.
LA90	Commonly referred to as the background noise, this is the level exceeded 90% of the time.
LAeq	Represents the average noise energy or equivalent sound pressure level over a given period.
LAmax	The maximum sound pressure level received at the microphone during a measuring interval.
Masking	The phenomenon of one sound interfering with the perception of another sound. For example, the interference of traffic noise with use of a public telephone on a busy street.
RBL	The Rating Background Level (RBL) as defined in the NPI, is an overall single figure representing the background level for each assessment period over the whole monitoring period. The RBL, as defined is the median of ABL values over the whole monitoring period.
Sound power level (Lw or SWL)	This is a measure of the total power radiated by a source in the form of sound and is given by 10.log10 (W/Wo). Where W is the sound power in watts to the reference level of 10^{-12} watts.
Sound pressure level (Lp or SPL)	the level of sound pressure; as measured at a distance by a standard sound level meter. This differs from Lw in that it is the sound level at a receiver position as opposed to the sound 'intensity' of the source.

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

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

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

Figure A1 – Human Perception of Sound



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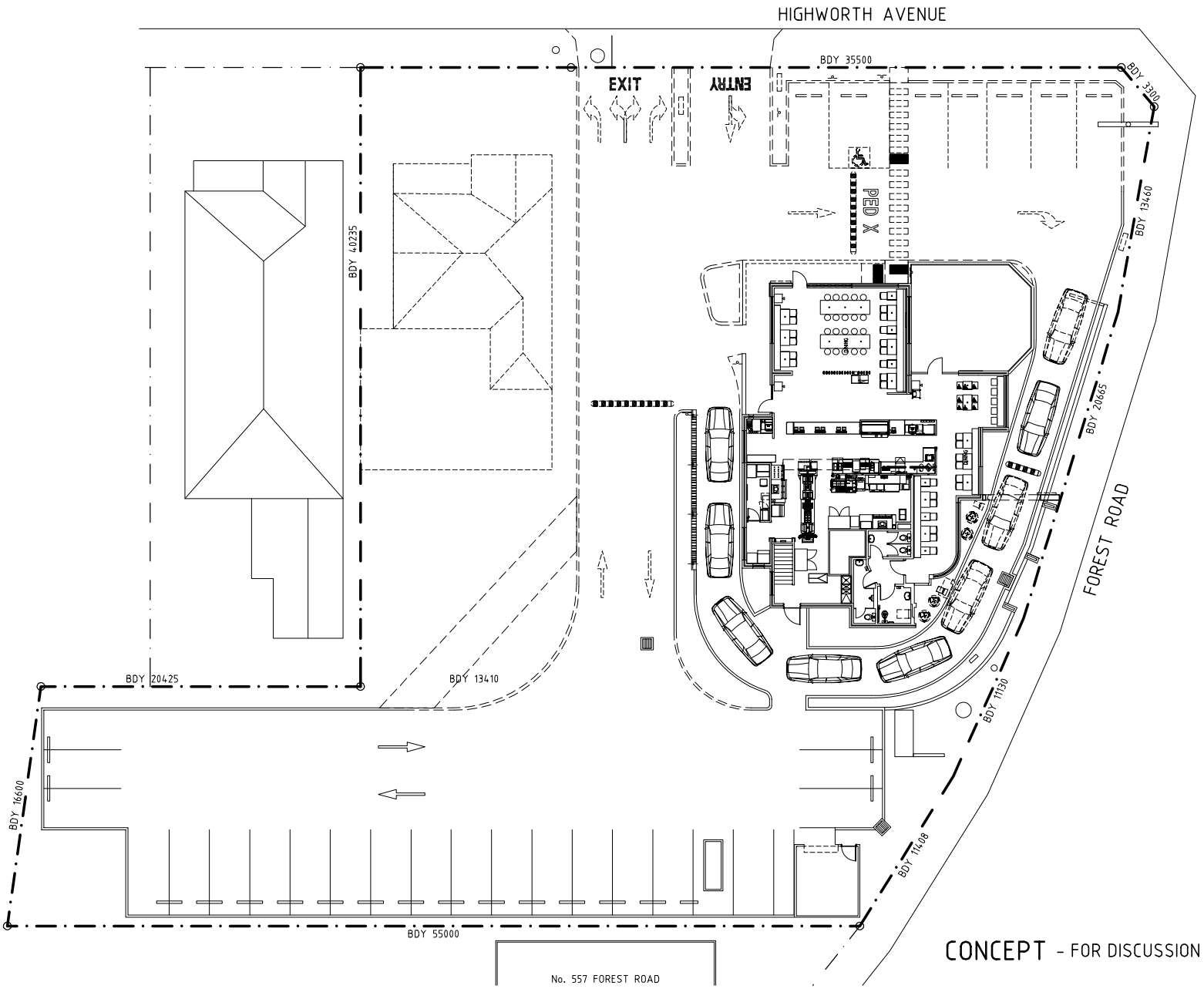
Appendix B – Site Plans



CONCEPT - FOR DISCUSSION PURPOSES ONLY

ISSUE	AMENDMENT	DATE	INT
A	CIRCULATION ISSUE	13.03.2015	AC

NOTES.

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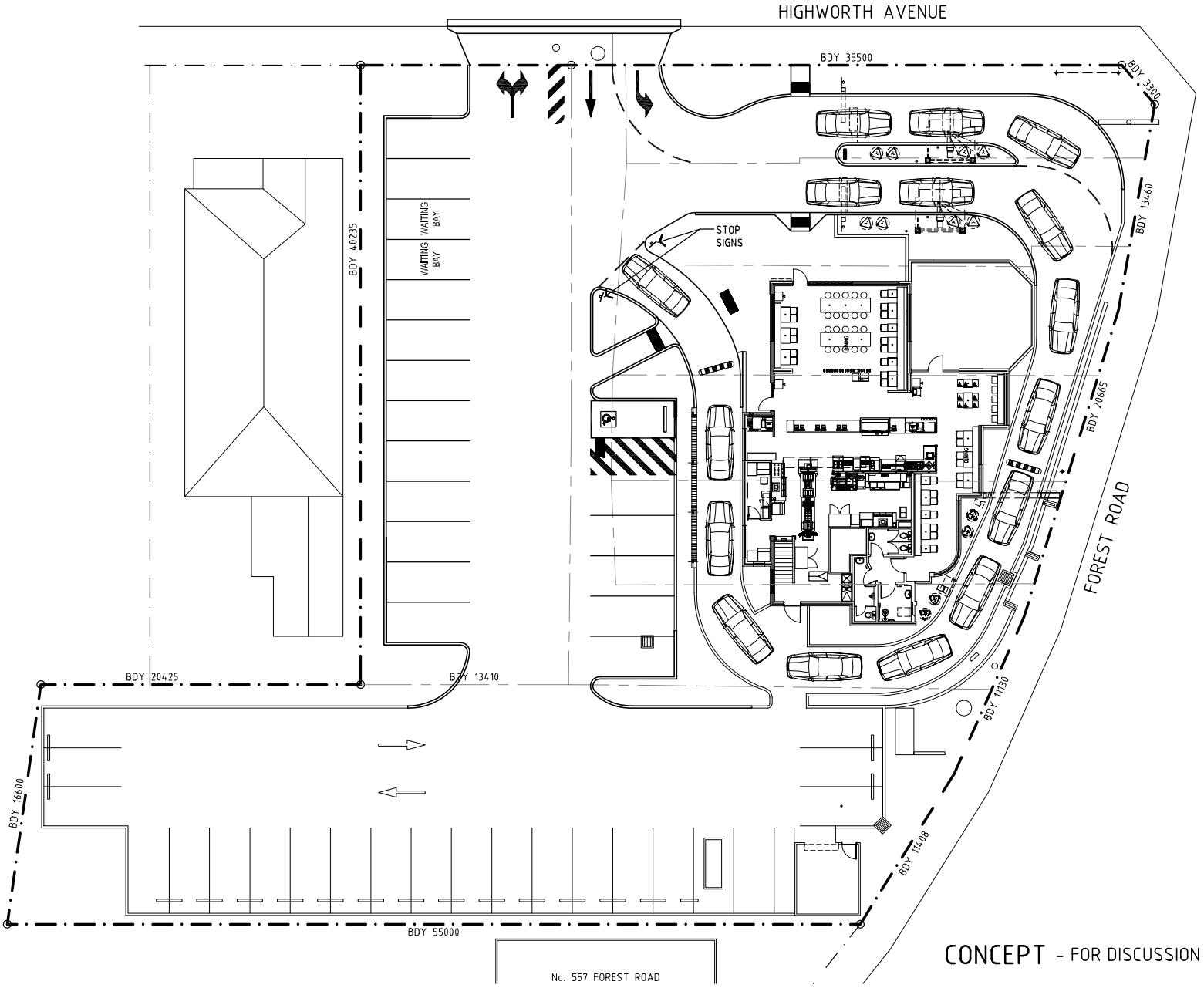
NDG NATIONAL DEVELOPMENT GROUP

STATUS	CIRCULATION	DATE:	MARCH 2015
SERIES	REF.	○ UNMODIFIED MASTER DRAWING	
COD	01	● PROJECT SPECIFIC DRAWING	

PROJECT: REF: 150044
PROPOSED ALTERATIONS TO EXISTING McDONALDS RESTAURANT AT 543 FOREST RD BEXLEY NSW 2747
TITLE : DEMOLITION SITE PLAN

DRAWN	CHECKED	SCALE	DWG. NO.	REV.
AC	SH	1:250	A001	A



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NDG NATIONAL DEVELOPMENT GROUP

PROJECT: REF: 150044
PROPOSED ALTERATIONS TO EXISTING McDONALDS RESTAURANT AT 543 FOREST RD BEXLEY NSW 2747

STATUS CIRCULATION DATE: MARCH 2015 TITLE : PROPOSED SITE PLAN

SERIES	REF.		DRAWN	CHECKED	SCALE	DWG. NO.	REV.
COD	01	UNMODIFIED MASTER DRAWING / PROJECT SPECIFIC DRAWING	AC	SH	1:250	A002	B

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Appendix C – Noise Monitoring Charts

Table C19 Background Noise Monitoring Summary – Unattended Noise Monitoring (L1)

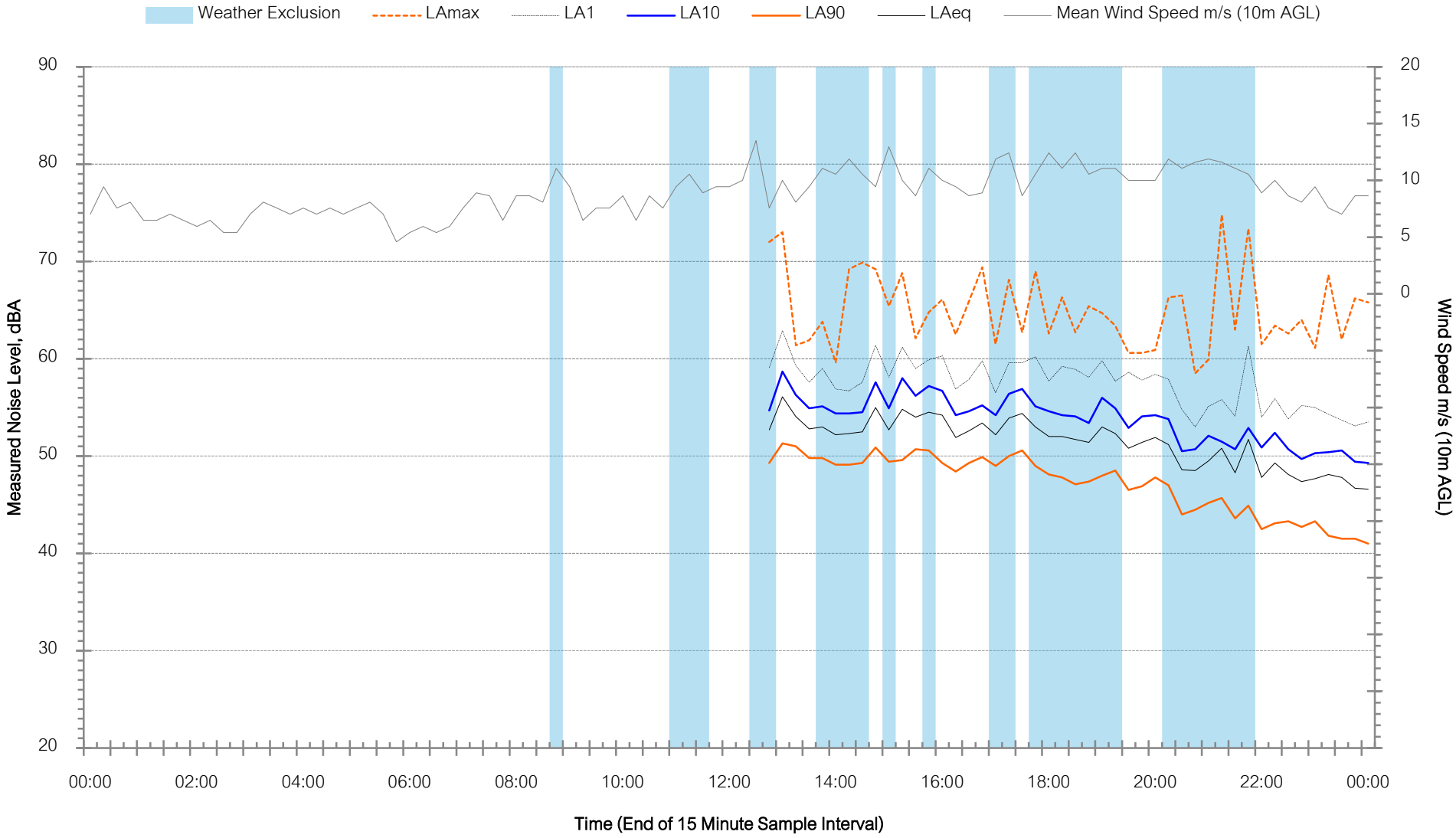
Date	Measured Background Noise Level (LA90) dB ABL[1]			Measured dB LAeq(period)		
	Day	Evening	Night	Day	Evening	Night
Tuesday 30 April 2024	-[2]	-[2]	-[2]	-[2]	-[2]	-[2]
Wednesday 1 May 2024	-[2]	-[2]	40	-[2]	-[2]	49
Thursday 2 May 2024	46	46	39	52	52	48
Friday 3 May 2024	46	45	39	54	51	47
Saturday 4 May 2024	46	46	-[2]	51	-[2]	-[2]
Sunday 5 May 2024	47	-[2]	-[2]	53	-[2]	-[2]
Monday 6 May 2024	-[2]	42	40	-[2]	51	51
Tuesday 7 May 2024	44	43	39	61	50	51
Wednesday 8 May 2024	45	46	38	51	53	53
Thursday 9 May 2024	46	44	39	52	51	48
Friday 10 May 2024	-[2]	-[2]	-[2]	-[2]	-[2]	-[2]
RBL / Leq Overall	46	45	39	55	52	50

Note 1: Assessment background level (ABL) – the single-figure background level representing each assessment period day, evening and night as per NPI Fact Sheet A.

Note 2: Measurement removed due to adverse weather as per NPI Fact Sheet A.

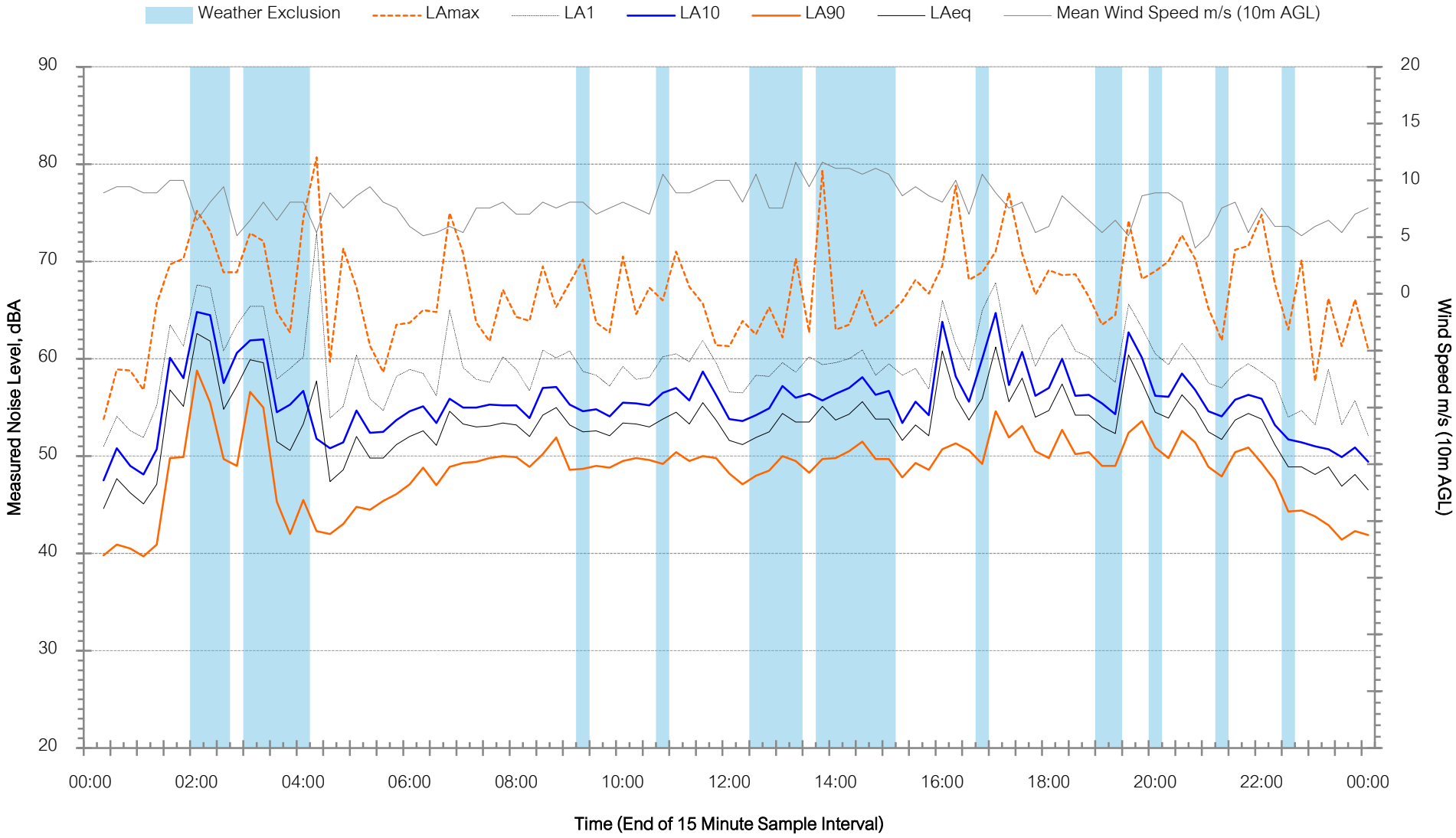
Background Noise Levels

1 Highworth Avenue, Bexley - Tuesday 30 April 2024



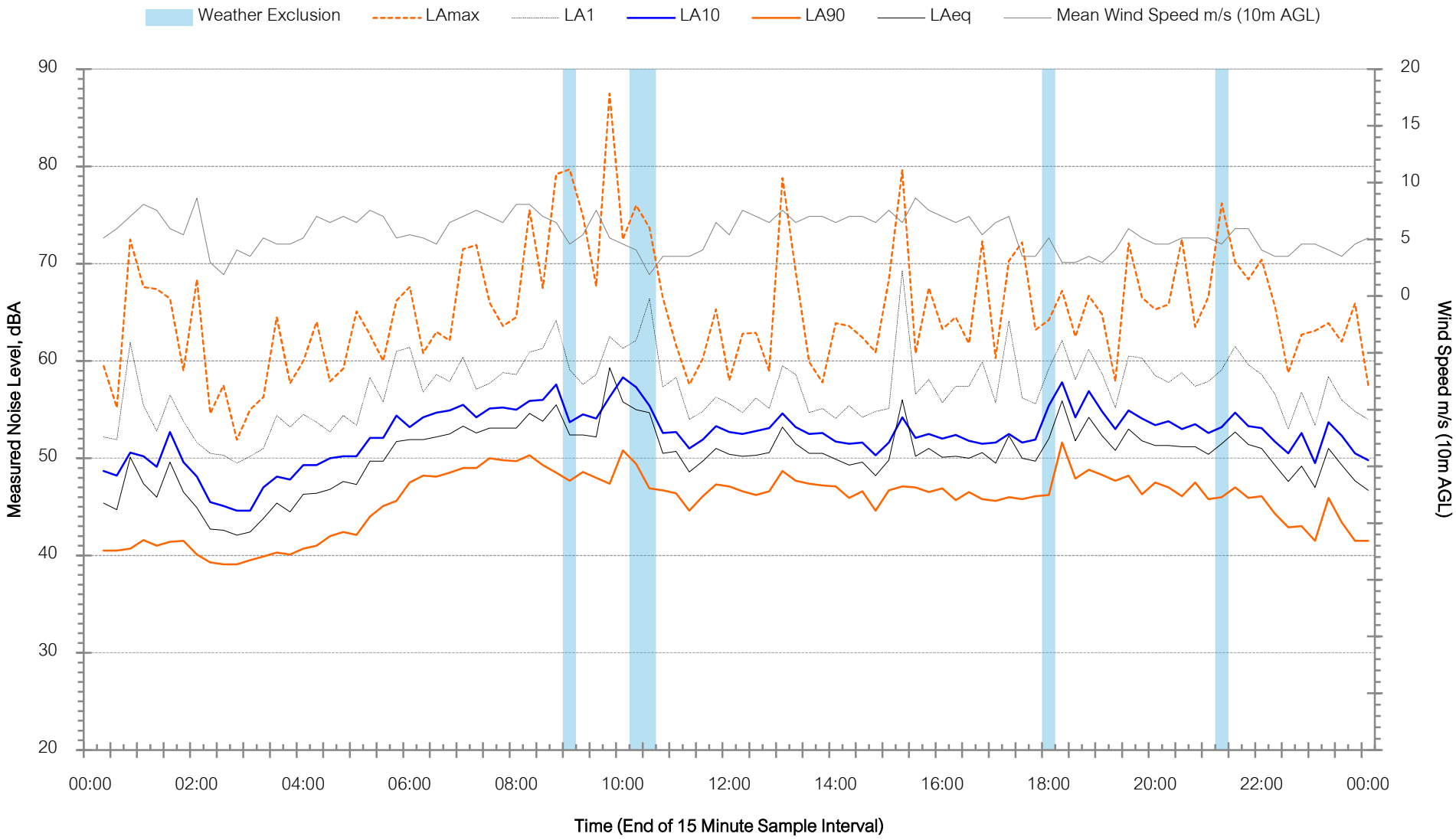
Background Noise Levels

1 Highworth Avenue, Bexley - Wednesday 1 May 2024



Background Noise Levels

1 Highworth Avenue, Bexley - Thursday 2 May 2024



Background Noise Levels

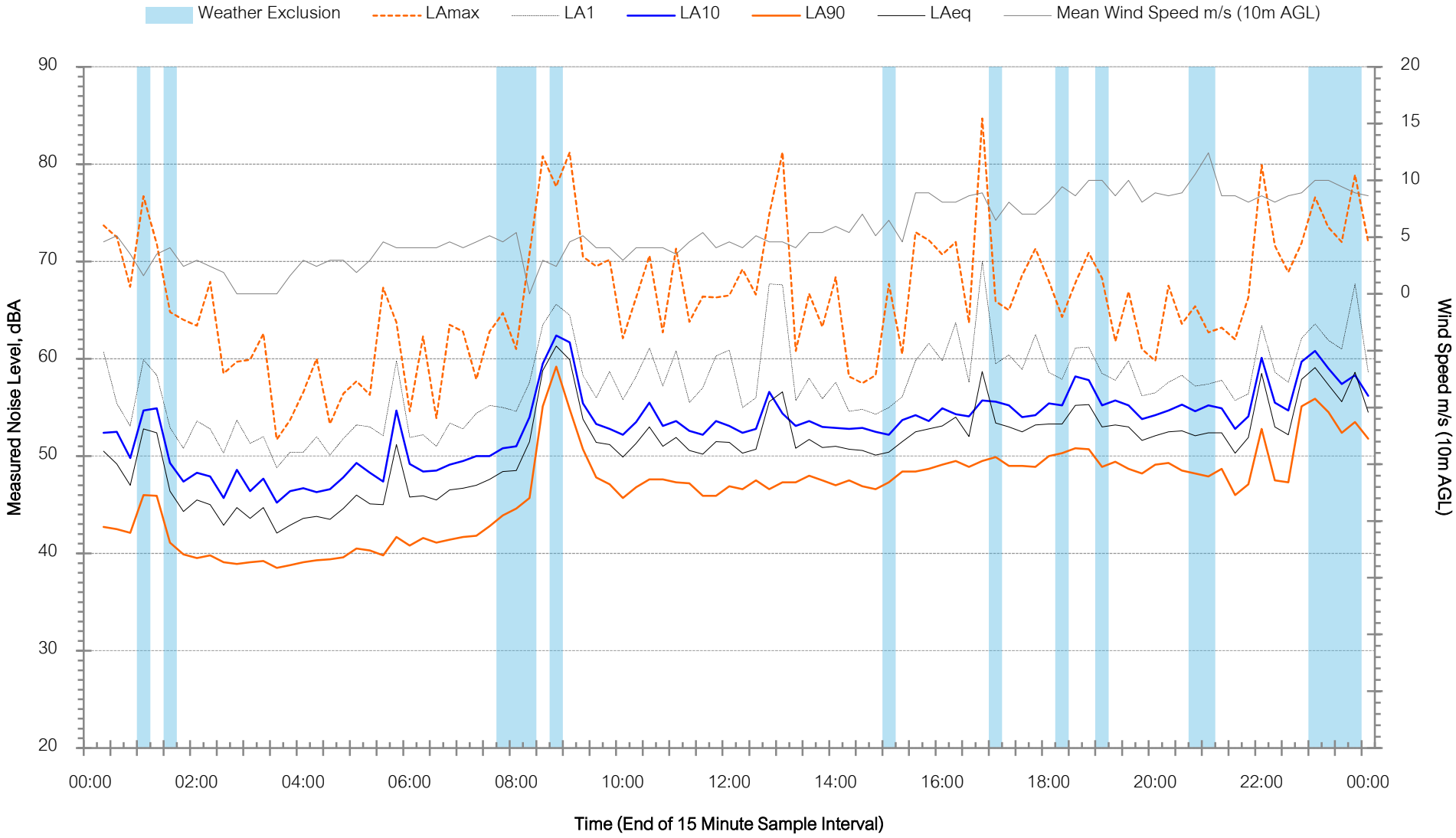
1 Highworth Avenue, Bexley - Friday 3 May 2024

Background Noise Levels

1 Highworth Avenue, Bexley - Saturday 4 May 2024

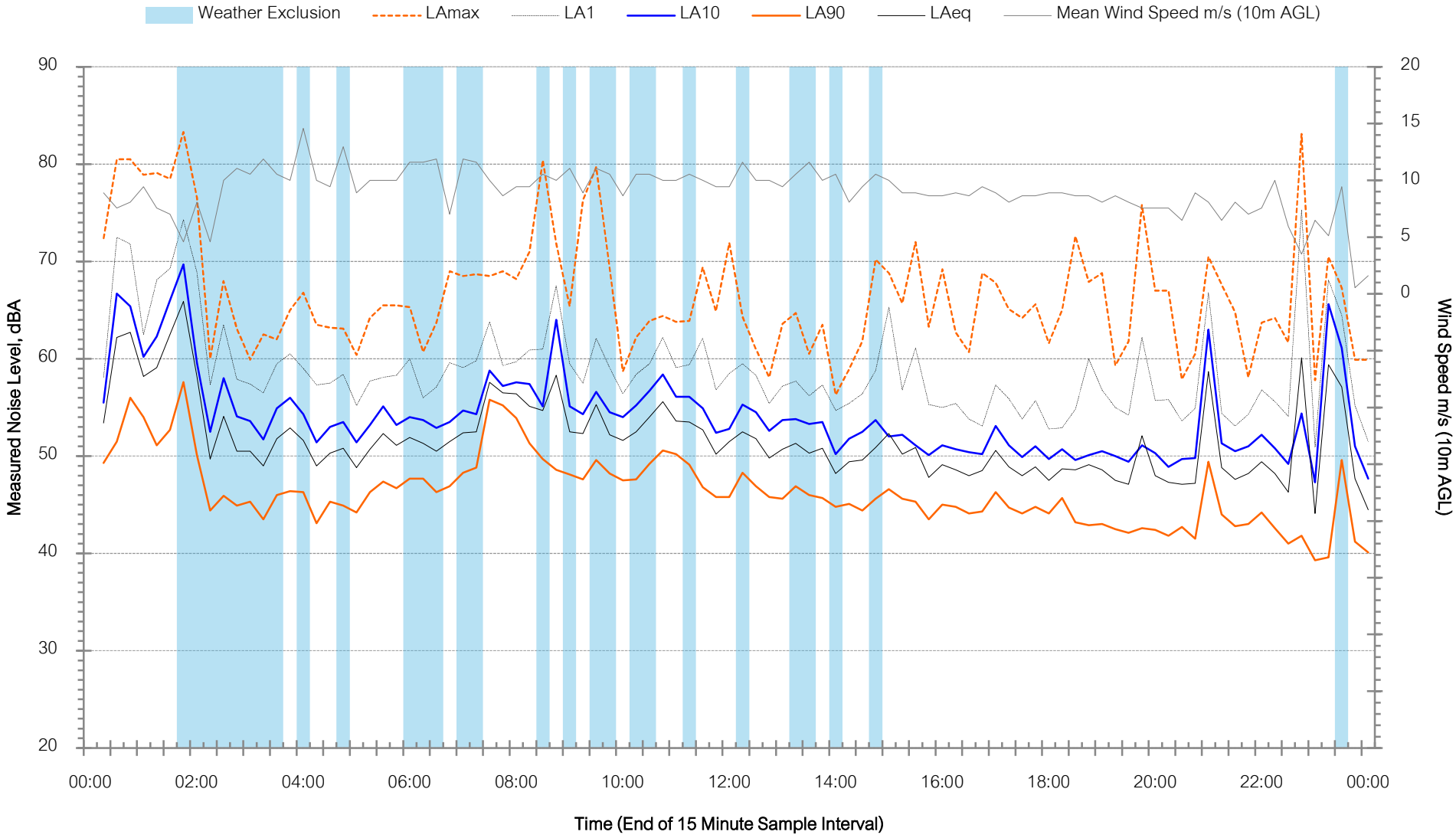
Background Noise Levels

1 Highworth Avenue, Bexley - Sunday 5 May 2024



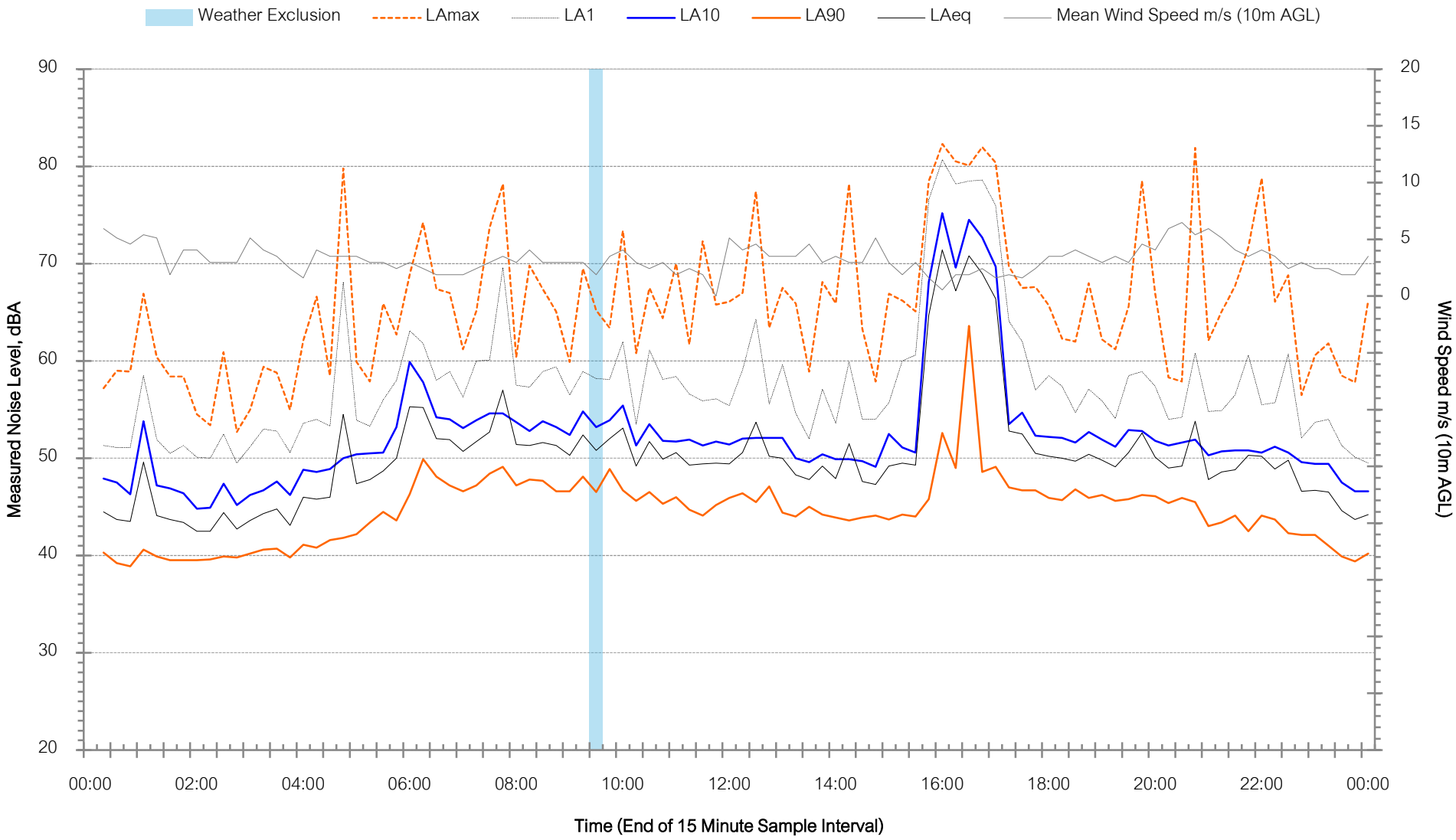
Background Noise Levels

1 Highworth Avenue, Bexley - Monday 6 May 2024



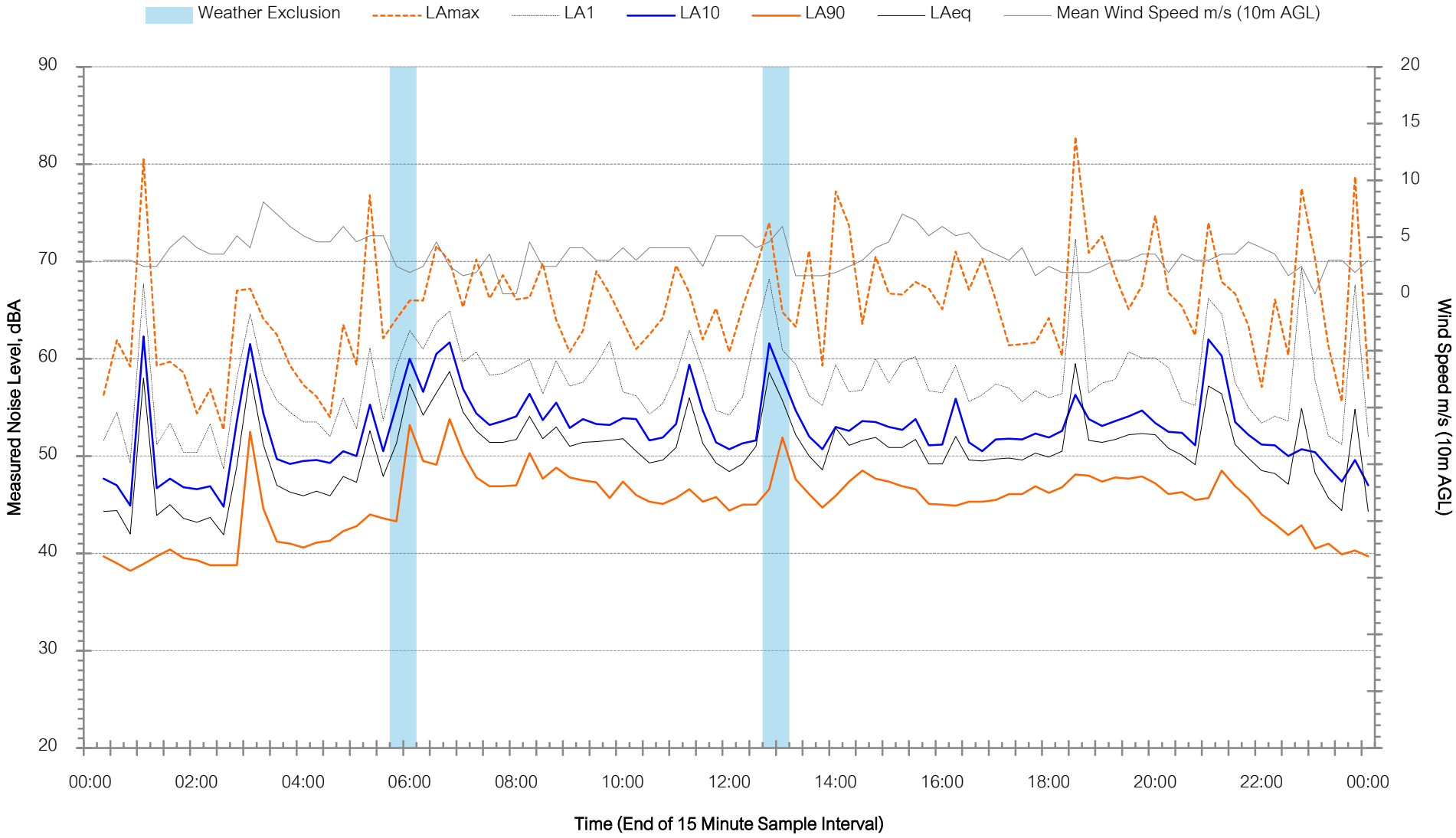
Background Noise Levels

1 Highworth Avenue, Bexley - Tuesday 7 May 2024



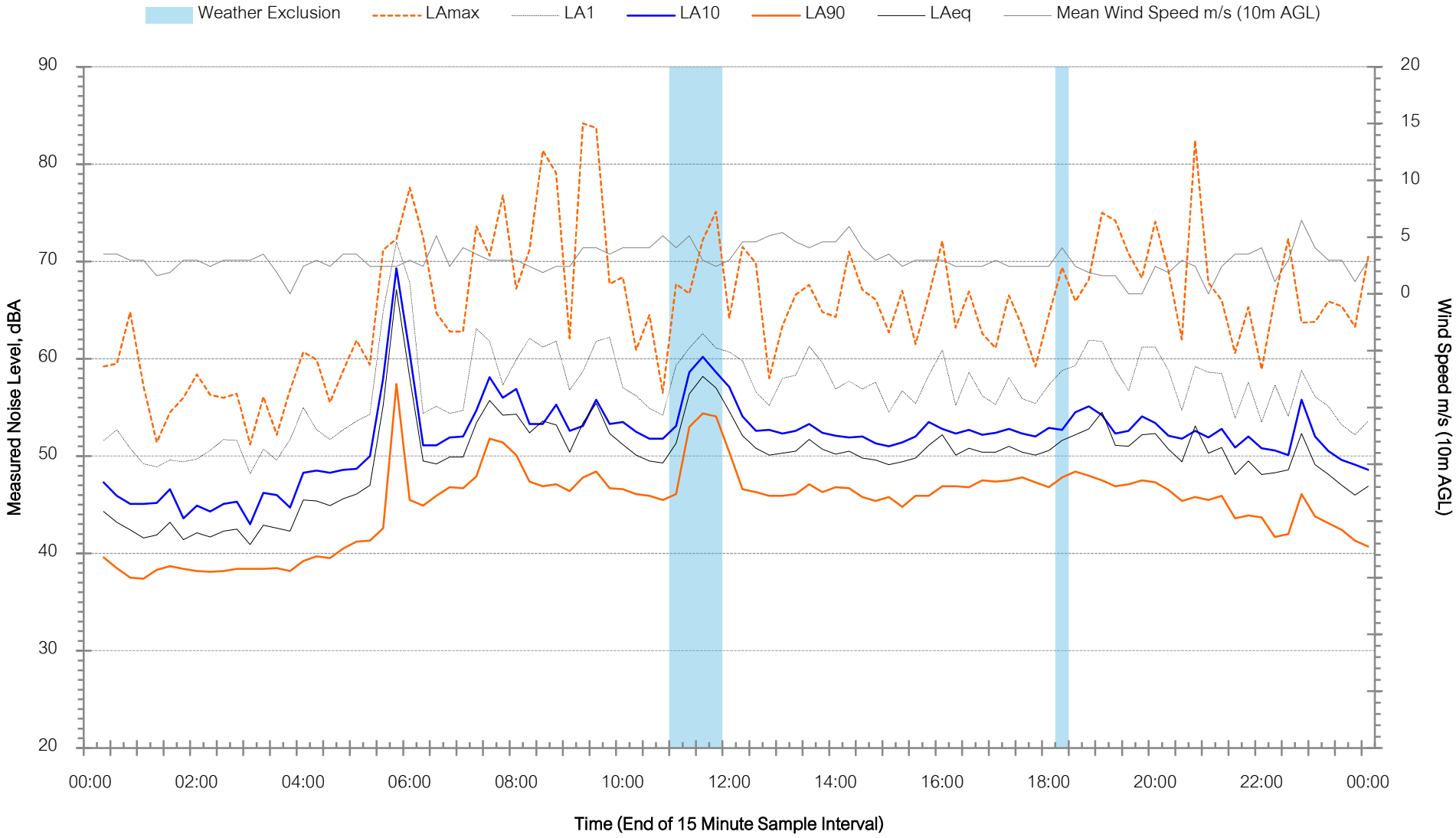
Background Noise Levels

1 Highworth Avenue, Bexley - Wednesday 8 May 2024



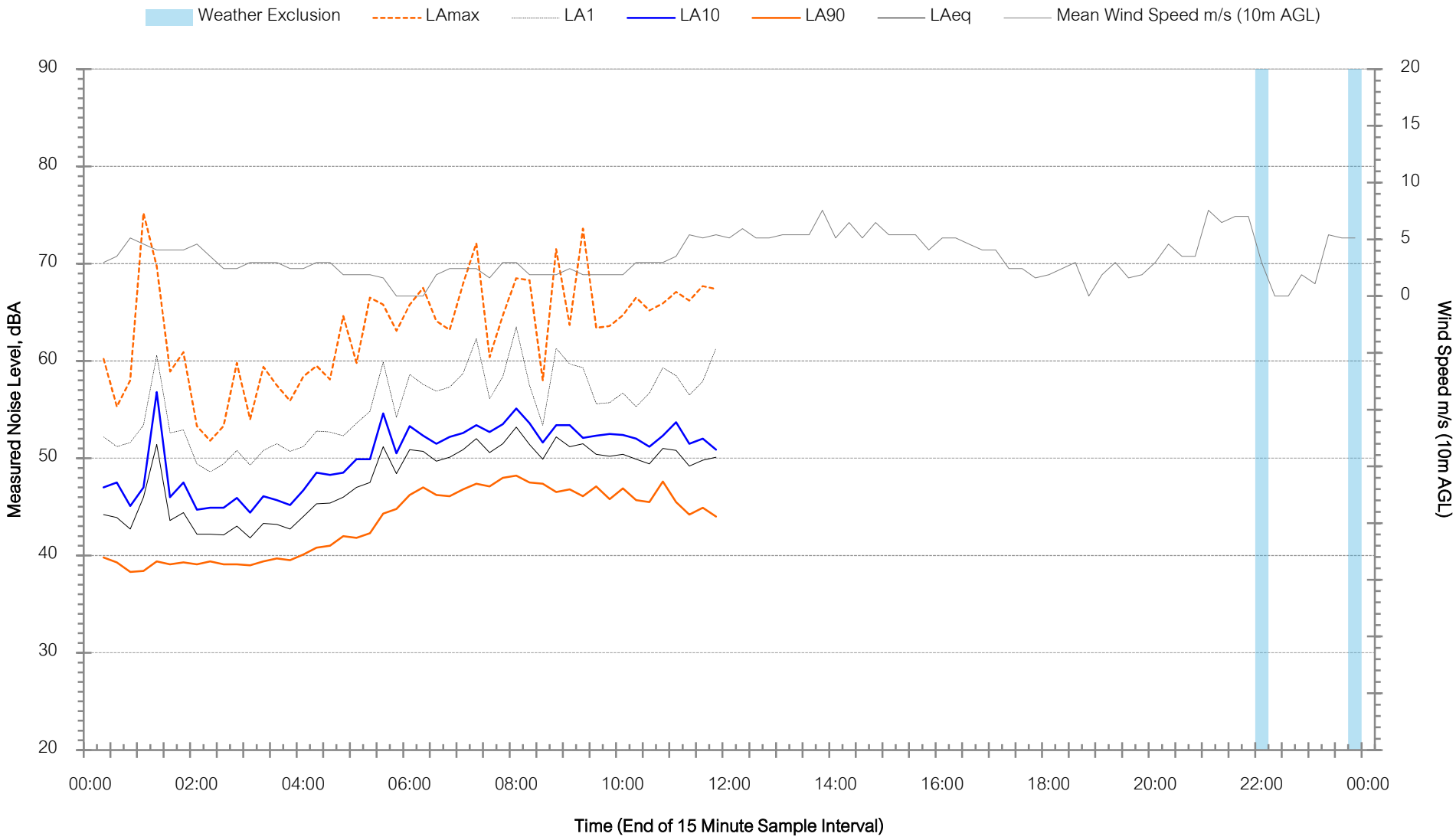
Background Noise Levels

1 Highworth Avenue, Bexley - Thursday 9 May 2024



Background Noise Levels

1 Highworth Avenue, Bexley - Friday 10 May 2024



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Appendix D – Determination of Receiver Category

Table D19 - Determination of NPI Residential Receiver Category

Location/ Catchment	Period	Measured RBL dB LA90(period)	Land Use Zone: Rural (RU1, RU2, RU4, R5, E4)	Land Use Zone: Suburban (RU5, RU6, R2, R3, R4, E2, E3)	Land Use Zone: Urban (R1, R4, B1, B2, B4)	Land Use Zone: Commercial, Industrial (Others)	Typical Existing Background Noise Levels Table 2.3 NPI: RURAL Daytime <40 Eve <35 Night <30	Typical Existing Background Noise Levels Table 2.3 NPI: SUBURBAN Daytime <45 Eve <40 Night <35	Typical Existing Background Noise Levels Table 2.3 NPI: URBAN Daytime >45 Eve >40 Night >35	Rural Residential - an area with an acoustical environment that: is dominated by natural sounds.	Rural Residential: having little or no road traffic noise	Rural Residential: generally characterised by low background noise levels.	Rural Residential: Settlement patterns would be typically sparse	Suburban Residential - an area that has: local traffic with characteristically intermittent traffic flows	Suburban Residential: or with some limited commerce or industry.	Suburban Residential: evening ambient noise levels defined by the natural environment and human activity.	Urban Residential- an area with an acoustical environment that: is dominated by 'urban hum' or industrial source noise	Urban Residential: has through-traffic with characteristically heavy and continuous traffic flows during peak periods	Urban Residential: is near commercial districts or industrial districts	Urban Residential: has any combination of the above
Location 1	Day	46		✓		✓			✓								✓	✓		
	Evening	45		✓		✓			✓								✓	✓		
	Night	39		✓		✓			✓								✓	✓		

where urban hum means the aggregate sound of many unidentifiable, mostly traffic and/or industrial related sound sources

Assessment

Location	Rural	Suburban	Urban		Rural - RBL	Suburban - RBL	Urban - RBL	Rural - Description				Suburban - Description			Urban - Description			
Location 1	0	0	**9**		0	0	3	0	0	0	0	0	0	0	3	3	0	0

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