Appendix C: Morley-Ellenbrook Line – Preliminary Design Noise and Vibration Assessment (Part 1)

MORLEY-ELLENBROOK LINE

Preliminary Design
Noise and Vibration Assessment - Part 1

Prepared for:

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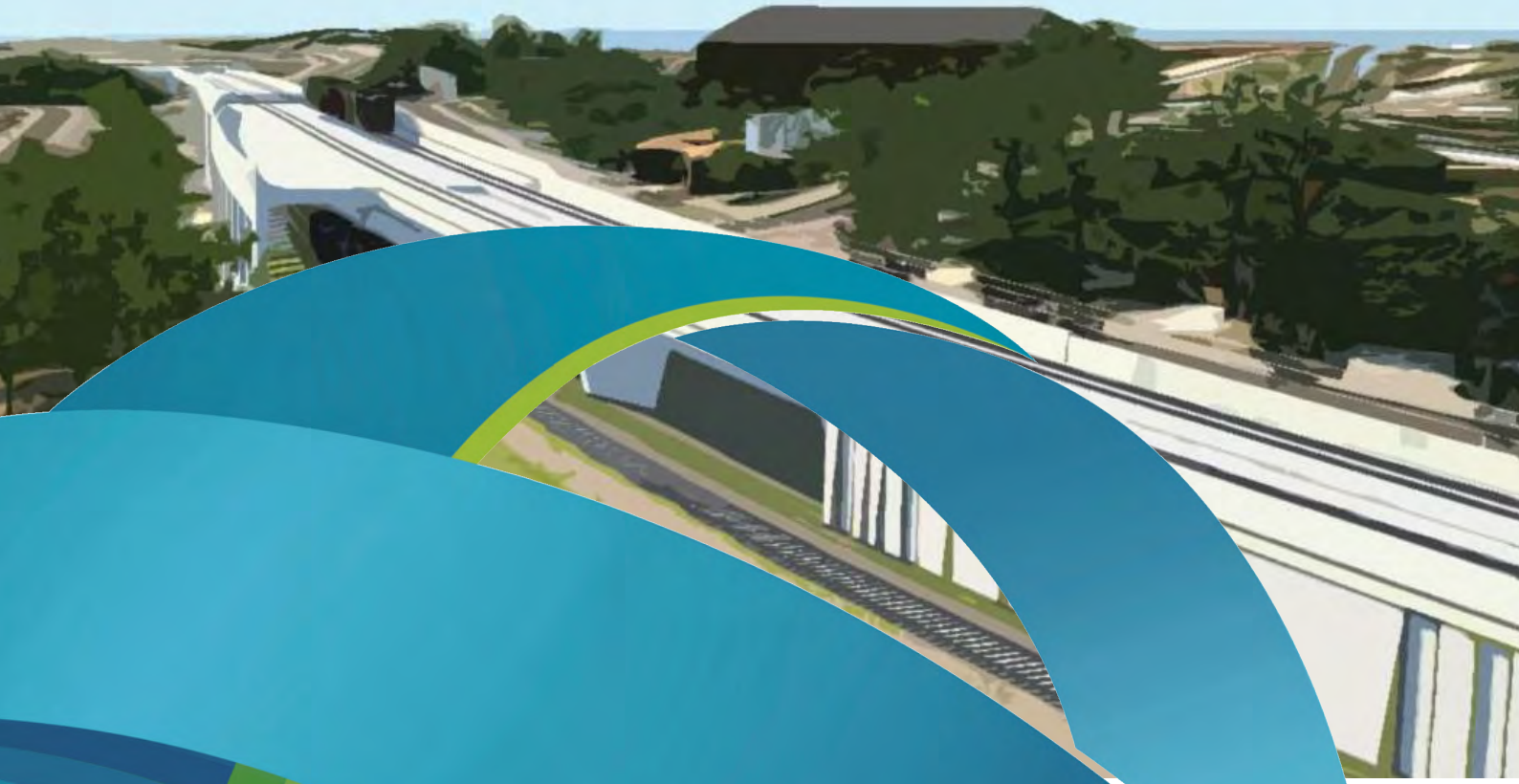

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BASIS OF REPORT

This report has been prepared by SLR Consulting Australia Pty Ltd with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Public Transport Authority (PTA) (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

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EXECUTIVE SUMMARY

The proposed introduction of the Morley to Ellenbrook Line (MEL) will lead to a shift in operational noise and vibration emissions in its vicinity.

This document presents a desktop assessment of existing and future railway noise and vibration levels and provides in principle recommendations for improvement where they may be required.

This report details noise and vibration results for the Part 1 section of MEL alignment which extends from the existing Bayswater Station to the proposed Malaga Station.

Key findings - noise

Design noise targets have been developed from *State Planning Policy 5.4: Road and Rail Transport Noise and Freight Considerations in Land Use Planning* (SPP5.4), industry guidelines and relevant past projects.

In regards to forecast airborne noise levels from MEL rail operations,

- In the Bayswater area, noise levels at around 39 residences from combined rail traffic are expected to increase above 'design' levels which require mitigation to be provided; and
- In the sections between Bayswater and Malaga Station, noise levels are likely to be above 'trigger' levels at various locations but not above 'design' levels. This means that mitigation must be considered for this area, but not necessarily provided if say doing so is unreasonable and/or impracticable. Preliminary consideration of cumulative noise impacts from freeway traffic as per SPP5.4 indicates the existing noise walls along Tonkin Highway may be considered appropriate 'as-is' (as detailed further in **Section 5.2.2**).

An extent of noise walls referred to as 'Revision A' is detailed in **Table 11** in **Section 5.1.4**. Implementation of these noise mitigation treatments is expected to achieve noise objectives at all residences assessed, with the exception of 6 residences which are modelled to receive noise levels within 1 dB. Further refinements to the mitigation are expected as detail in the design develops.

Key findings – vibration

To assess risks of annoyance from ground borne vibration (GBV), investigation trigger levels were adopted from interstate guidelines and historical projects. For residential development, a floor vibration trigger level of $L_{v,RMS}$ 106 dB was used. Ground borne noise (GBN) which is 'rumbly' noise produced by vibration of internal building surfaces can also be a source of annoyance, and a L_{Amax} 35 dB night time investigation trigger level was used consistent with similar past projects.

In regards to forecast vibration levels from MEL rail operations,

- 133 residences are modelled to have GBN levels up to 9 dB above investigation trigger levels. These are located at chainages around 4.5 km (Bayswater area), and between 8.5 to 13.5 km (between Morley East Station and Malaga Station);
- Of these 133 residences, 34 are also modelled to have GBV levels up to 6 dB above investigation trigger levels;
- For context, of all the receivers assessed,
    - The results in Bayswater are largely due to existing rail infrastructure (Midland line), with contributions from the viaduct substantially less (not affecting overall results); and

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- around 16 residences in a concentrated area around 500 m long section north of the proposed Morley East Station are forecast to have GBN levels of L_{Amax} 41 to 44 dB, with another 117 at L_{Amax} 36 to 40 dB i.e. 1-5 dB above the *night* period investigation trigger level (but compliant with the *day* period investigation trigger level); and

- Improvements may be achieved through the use of suitable under ballast matting (UBM) and/or under sleeper pads (USPs) with suitable trackform. Generally such controls if correctly specified and installed can achieve at least a 10 dB reduction in vibration levels, so compliance with recommended vibration investigation trigger levels is considered reasonably practicable.

Recommendations

1. In lieu of detailed design, budget for:
    - Review / optimisation of mitigation and control measures during detailed design in accordance with this report;
    - Either low height (close fitting) or boundary noise walls on both passenger main lines. One option of wall extents and heights is indicated as follows (**Table 11**);

Table Recommended noise wall extent (in lieu of source controls)

References	Nearest main line, position	Approximate chainages, km	Heights, m	Approximate total area, m^2
MEL DN1	MID DN on approach to Bayswater Station	4.255 – 4.454	1.8 – 2.1	332
BSU	Bayswater Station throughout	-	1.5 (Note[1])	-
MEL DN2	MID DN on exit from Bayswater Station	4.689 – 4.727	1.2	46
MEL DN3	MID DN, MEL DN	4.772 – 5.147	2.4 to 3.0	957
MEL DNV1	DN Viaduct (section between Midland Line and Tonkin Highway)	4.680 – 5.600	0.8 m above nearest railway centreline, 2.4 m from railway centreline. 0.8 m within raised platform above MID DN (Note[1])	-
MEL UPV1	UP Viaduct (adjacent to DN Viaduct)	5.600 – 4.680		-
MEL UP1	Uprating of BSU UP3	4.960 – 4.706	3.0 to 4.0	956

Note 1 At locations where concrete upstands are already anticipated as part of structural / safety considerations, i.e. no additional structure

- Vibration mitigation extent as provided in the table below (**Table 13**);

Table Recommended vibration mitigation extent (in lieu of other source controls, subject to review)

Rail development section – Part 1	Reference (Note[1])	Approximate chainages, km	Total length, km
Redevelopment section	UBM1	4.25 – 4.50	0.25
New development section	UBM2	8.30 – 10.35	2.05
	UBM3	10.83 – 11.35	0.52
	UBM4	12.37 – 12.68	0.31
	UBM5	13.13 – 13.33	0.20

Note 1 Refers to both UP and DN lines. Under sleeper pads (USPs) may also suffice subject to detailed review.

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- Detailed review of vibration controls based on local geotechnical information and existing site survey(s); and
- Detailed review of structure-borne noise emitted from the viaduct based on the designed viaduct structure, rail track form and fastening system, with potential effective control measures such as resilient rail fasteners and sidewalls/overhanging noise barriers.

2. Ensure the rail engineering of the passing loops minimises the risk of curving noise through design, such as avoiding short radii curves and situations where there may be regular wheel flange contact with the rails.
3. Develop a project noise and vibration management plan to advise relevant local government authorities (City of Bayswater and City of Swan) of the agreed approach.
4. Consider passenger cabin in-car noise during travel within tunnel sections at speed: this may not be a significant design factor if relatively short in duration.
5. Share outcomes with planning, local government authorities to assist in future land use planning near the project area.
6. Undertake consultation with community stakeholders where there may be a history of complaints or presumed expectations of improvement as part of the upgrade.

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1 Introduction

The Morley-Ellenbrook Line (MEL) project involves the operation of passenger rail services between Bayswater and Ellenbrook with four new stations (currently named Morley East, Malaga, Whiteman Park and Ellenbrook) as indicated in **Figure 1** below. The new railway line will serve Perth's north-east suburbs to support existing communities with improved transport connections and create new communities through integrated station precincts.

In accordance with the State Planning Policy SPP5.4, these proposed rail sections are generally assessed as new major rail infrastructure development, except for the section within the existing transport corridor adjacent to Bayswater Station which is considered to be major redevelopment of an existing railway.

This document presents a desktop assessment of existing and future railway noise and vibration levels for the proposed Morley-Ellenbrook Line and provides in principle recommendations for mitigation where required.

1.1 Scope

SLR was engaged by the Public Transport Authority (PTA) to undertake the following scope of works:

- Identify sensitive noise and vibration receptors in close proximity to the new railway alignments, and relevant operational assessment objectives.
- Undertake modelling predictions of operational noise and vibration levels to be received at the identified sensitive receptors, and assess these levels for compliance with relevant assessment objectives. The assessment is to account for sources of previous measurements, as well as prediction uncertainties determined in accordance with relevant industry guidelines.
- Where predicted noise and vibration levels exceed the assessment objectives, recommend mitigation measures where practicable and reasonable where predicted noise and vibrations levels exceed the assessment objectives to achieve relevant compliance.

Key elements to be considered within this assessment are comprised of the following:

- **Airborne noise**. The major sources for airborne noise emissions from the proposed new rail line include passenger rail operations and some sources near or within proposed train stations, including vehicle movements (within bus loops, kiss and ride areas and carparks), mechanical plants, public address systems and crowd noise etc. Noise from the proposed passenger rail operations is considered as the prime element for the airborne noise assessment, as the proposed rail operations are expected to dominate noise emissions within the rail reserve along the entire alignment.
- **Ground-borne vibration (GBV).** Due to close proximity to existing residential properties from some sections of the proposed new rail alignments, there could be potential for excessive floor vibrations within adjacent residences.
- **Regenerated/ground-borne noise (GBN).** Regenerated noise or ground-borne noise (GBN) and low frequency noise are now widely recognised noise problems, and are commonly perceived as vibration due to its low frequency characteristics. Although these elements are not clearly specified within the current state policy framework in Western Australia, there are well developed applicable objectives that have been used in some other states in Australia and internationally.

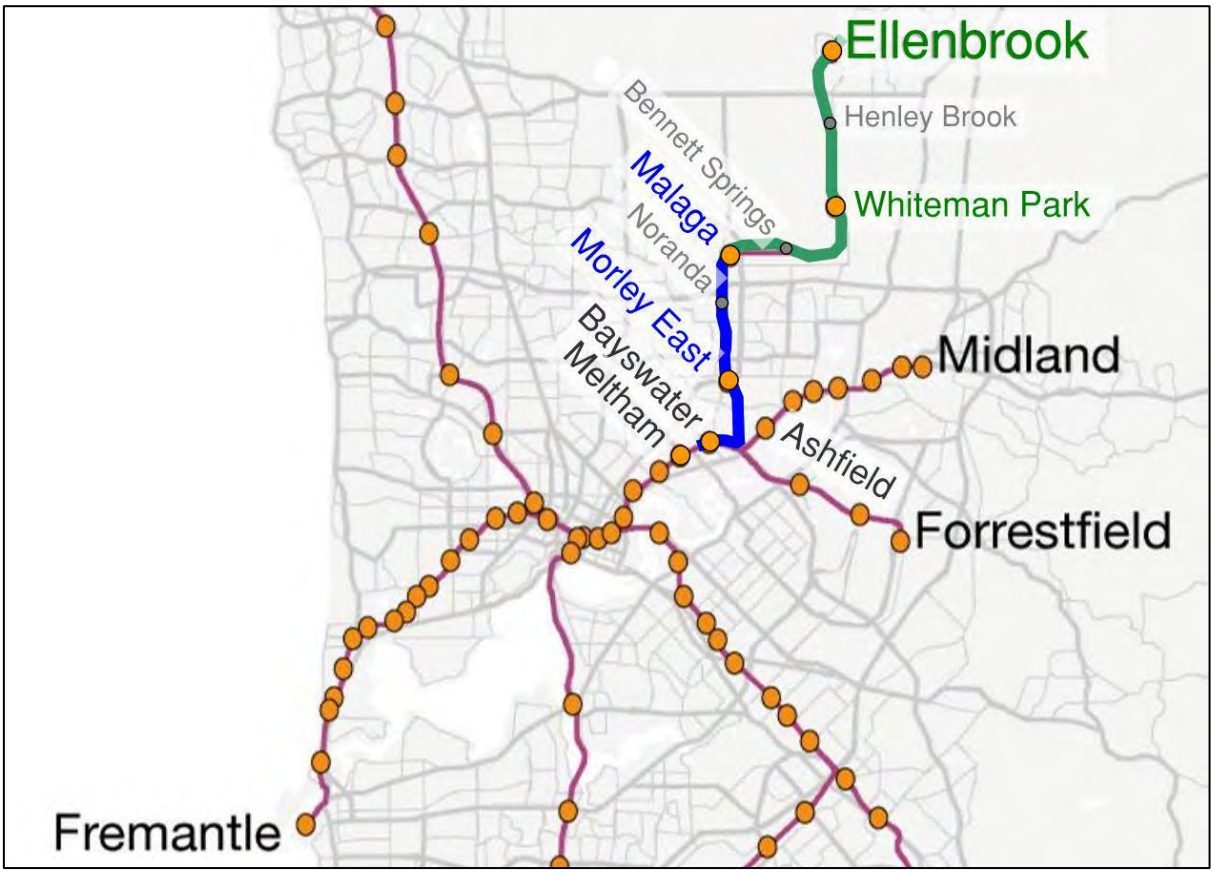
1.2 Locality

The project is divided into the following three sections for the assessment study:

- Part 1: Rail operations between Bayswater Station and Malaga Station;
- Part 2: Rail operations between Malaga Station and Ellenbrook Stowage yards;
- Whole Project: Bus loops, road vehicles and stations associated with Parts 1 and 2 above.

An overview of the site extent is indicated in **Figure 1**.

Figure 1 Annotated map of proposed Perth metro rail network (Source: MEL-MNO-ELUP-RS-RPT-0001.E.IFU). 'Part 1' is coloured blue, 'Part 2' green. This figure also indicates proposed Noranda, Bennett Springs and Henley Brook stations.



This assessment study report only considers noise and vibration impacts associated with Part 1 (coloured blue in **Figure 1**).

2 Review of relevant legislation and guidelines

The following table provides the proposed noise and vibration assessment framework for this project.

Table 1 Morley-Ellenbrook Line Noise and Vibration Assessment Framework

Aspect / Source	Statutory / Government Policy	Australian / International Standards	Industry best practice / SLR recommendation
Operational environmental noise			
Airborne noise from trains, rail operations	SPP5.4[1]	-	SPP5.4 NSWRING[2]
Road vehicle movements (bus loops, kiss and ride areas			-
Station mechanical ventilation plant Crowd noise Public address systems Outdoor Driver communications within stowage / turnback facilities	EPNR1997[3]	AS2107:2016[4]	EPNR1997
Car parking		EU Parking Area Noise 2007[5]	
Operational vibration effects			
Ground-borne vibration (GBV) from rail operations	-	AS/ISO 2631.2:20146 BS 6472:2008 ISO 14837[7]	AS 2670.2:1990[8] NSWRING NSW DEC Guidelines[9] ASHRAE 2011[10]
Ground-borne noise (GBN) ('regenerated noise') noise from rail operations	-	-	NSWRING

Selected aspects to this table are further discussed in the following subsections.

The adopted noise and vibration objectives (for the purpose of recommending mitigation measures within this assessment framework) are listed in **Section 3**.

[1] Western Australia State Planning Policy 5.4, Road and Rail Transport Noise and Freight Considerations in Land Use Planning, GOVERNMENT GAZETTE, WA, 22 September 2009 ("SPP5.4", "The Policy").
[2] New South Wales Rail Infrastructure Noise Guideline, NSW EPA, May 2013.
[3] Western Australia Environmental Protection (Noise) Regulations 1997 ("EPNR1997", "The Regulations") as amended.
[4] Australian/New Zealand Standard 2107:2016 'Recommended design levels and reverberation times for building interiors'.
[5] Bayer, Landesamt für Umwelt 2007, *Parking Area Noise - Recommendations for the Calculation of Sound Emissions of Parking Areas, Motorcar Centers and Bus Stations as well as of Multi-Storey Car Parks and Underground Car Parks*, Bayerisches Landesamt für Umwelt, Parkplatzlämstudie 6, Aufl., August 2007.
[6] AS ISO 2631.2:2014 Mechanical vibration and shock - Evaluation of human exposure to whole-body vibration - Vibration in buildings (1 Hz to 80 Hz).
[7] International Standard ISO 14837-1 2005 "*Mechanical vibration - Ground-borne noise and vibration arising from rail systems - Part 1: General guidance*".
[8] Australian Standard AS 2670.2 1990 "*Evaluation of Human Exposure to Whole Body Vibration - Part 2: Continuous and Shock Induced Vibration in Buildings (1 Hz to 80 Hz)".*
[9] Department of Environment and Conservation NSW, "Assessing Vibration: a technical guideline" (2006) http://www.environment.nsw.gov.au/resources/noise/vibrationguide0643.pdf
[10] American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) 2011, HVAC Applications – SI Edition, Chapter 47.

2.1 Applicable airborne noise legislation and guidelines

The objectives applicable to noise emissions from road, rail and freight related transport noise are based on the following noise parameters:

- period average levels ($L_{Aeq,day}$ and $L_{Aeq,night}$) as outlined in SPP5.4, and
- maximum event levels (L_{Amax}) as discussed in the NSWRING.

Table 2 provides a comparison of the outdoor noise objectives stated within SPP5.4, Table 1 of the NSWRING and past major PTA projects[11]. These noise objectives are relevant to the emission of railway or road traffic noise as received at a sensitive land use such as residential dwellings, schools and child care centres. The objectives are applicable at 1 metre from the most exposed habitable façade of the building receiving the noise, at ground floor level only.

Table 2 Comparison of outdoor noise objectives in SPP5.4 and NSWRING

Type of development	Policy / Reference	Day period average	Night period average	Maximum passby level
"Major new rail infrastructure proposal"	SPP5.4	Noise Target $L_{Aeq,day}$ 55 dB Noise Limit $L_{Aeq,day}$ 60 dB (6am – 10pm)	Noise Target $L_{Aeq,night}$ 50 dB Noise Limit $L_{Aeq,night}$ 55 dB (10pm – 6am)	-
	Historical PTA projects	-	-	Noise Target $L_{Aeq,night}$ 75 dB Noise Limit $L_{Aeq,night}$ 80 dB
"New rail line development"	NSWRING	Predicted rail noise levels exceed: $L_{Aeq,(15h)}$ 60 dB (7am to 10pm)	$L_{Aeq,(9h)}$ 55 dB (10pm – 7am)	L_{AFmax} 80 dB (95% events)
"Major redevelopment of an existing railway"	SPP5.4	Practicable noise management and mitigation measures should be considered [..] having regard to— • the existing transport noise levels; • the likely changes in noise emissions resulting from the proposal; and • the nature and scale of the works and the potential for noise amelioration.		
"Redevelopment of an existing rail line"	NSWRING	Development increases existing $L_{Aeq(period)}$ rail noise levels by 2 dB or more, or existing L_{Amax} rail noise levels by 3 dB or more and Predicted rail noise levels exceed: $L_{Aeq,(15h)}$ 65 dB (7am to 10pm)	$L_{Aeq,(9h)}$ 60 dB (10pm – 7am)	L_{AFmax} 85 dB (95% events)

Discussion of period average (L_{Aeq}) and maximum passby event level (L_{Amax}) objectives are provided in the following subsections.

All other environmental noise sources are proposed to be assessed in accordance with the Regulations (EPNR1997). These noise sources include stationary plant, road vehicle movements not on public roads, crowd noise and public address systems.

[11] E.g. Minister for the Environment. (2003). Metropolitan Region Scheme Amendment No 992/33 Clarkson-Butler (Assessment No. 1139) Statement Number 000629. Perth: Government of Western Australia.

2.1.1 Discussion of period average level objectives

It should be noted that the SPP5.4 Noise Targets and Limits in above are not specifically applicable to the major redevelopment of existing transport infrastructure. As noted from **Figure 1**, a new rail section will operate within the existing transport corridor adjacent to Bayswater Station. This section of the project is considered to be a major redevelopment of an existing railway, as opposed to a new rail infrastructure project.

From **Table 2** it can be seen that here is reasonable alignment between the NSWRING and SPP5.4 such that achieving the SPP5.4 Noise Limits would also likely achieve the NSWRING trigger levels in regards to period average noise levels.

The 5dB difference between the outdoor SPP5.4 Noise Target and Noise Limit in **Table 2** above represents an acceptable margin for compliance. The policy states that "*In most situations in which either the noise-sensitive land use or the major road or railway already exists, it should be practicable to achieve outdoor noise levels within this acceptable margin*". Section 5.3.2 of SPP5.4 states that

> *In the application of the noise criteria to new major road and rail infrastructure projects, the objective of this policy is that the new infrastructure be designed and constructed so that the noise emissions are at a level that—*
>
> - *provides an acceptable level of acoustic amenity for existing noise-sensitive land uses and for the planning of new noise-sensitive developments;*
> - *is consistent with other planning policies and community expectations; and*
> - *is practicably achievable.*
>
> *[..]*
>
> *Transport infrastructure providers are also required to consider design measures to meet the noise target of $L_{Aeq(Day)}$ 55dB and $L_{Aeq(Night)}$ 50dB, and to implement these measures where reasonable and practicable.*
>
> *If a new rail or major road infrastructure project is to be constructed in the vicinity of a future noise-sensitive land use, mitigation measures should be implemented in accordance with this part of the policy. For this purpose, a proposed noise-sensitive land use is any noise sensitive development that is subject to an approved detailed area plan, subdivision approval or development approval, such that the transport infrastructure provider is able to adequately design noise mitigation measures to protect that development. In these instances, the infrastructure provider and developer are both responsible for ensuring that the objectives of this policy are achieved, and a mutually beneficial noise management plan, including individual responsibilities, should be negotiated between the parties.*

Therefore objectives for this project are adopted from SPP5.4 Noise Targets and Noise Limits, which are consistent with the NSWRING noise trigger levels.

2.1.2 Discussion of maximum event noise level objectives

Maximum event noise level objectives are not defined within SPP5.4 but have historically been applied on major railway projects in Western Australia since the early 2000s. From **Table 3** it can be seen that similar to previous PTA projects the NSWRING recommends a maximum event passby noise level of L_{Amax} 80 dB for new rail line development. However, it is considered more stringent than historical PTA projects through the use of the 'Fast' or shorter time constant (i.e. L_{AFmax}) for the noise parameter – the one-second 'Slow' weighting as historically used in WA is less sensitive to noise of very short duration.

Therefore it is here proposed to use a maximum 'Trigger Level' of L_{Amax} 75 dB and 'Design Level' of L_{Amax} 80 dB based on the maximum level parameter with the Slow (S) time weighting (i.e. L_{ASmax}). For simplicity and consistency it is proposed to apply this throughout the study area despite some sections being within an existing rail transport corridor.

2.2 Applicable ground-borne noise and vibration legislation and guidelines

2.2.1 Ground borne noise (GBN)

From a review of relevant guidelines and relevant project experiences, GBN objectives are more critical to compliance than GBV and will drive the design of mitigation within the rail corridor. The NSWRING recommends the following GBN trigger levels for further investigation:

Table 3 NSWRING GBN trigger levels

Sensitive land use	Time of day	Internal noise trigger levels, dB
		Development increases existing rail noise levels by 3 dB or more *and* resulting rail noise levels exceed:
Residential	Day (7 am–10 pm)	L_{ASmax} 40
	Night (10 pm–7 am)	L_{ASmax} 35
Schools, educational institutions, places of worship	When in use	L_{ASmax} 40 to 45

Under the NSWRING, "Residential" typically means "any residential premises located in a zone as defined in a planning instrument that permits new residential land use as a primary use". For this project, that includes any existing residence that is reasonably expected to be occupied during railway operations, or any residence that has Development Approval at the time of the procurement contract, including future residential buildings, hotels and overnight accommodation along or adjacent to the proposed route. This means that:

- Existing buildings apparently used as residences and not to be demolished as part of the project are assessed as residential; and
- Any residential dwellings that are not constructed (or likely to be approved for construction) prior to contractor award are not considered as residential in this assessment.

For schools, educational institutions and places of worship, the lower value of the range is most applicable where low internal noise levels are expected, such as in areas assigned to studying, listening or praying. More stringent objectives may be selected in some cases, particularly where the area is remote and ambient levels are well below L_{Aeq} 30 dB, however this should be balanced with the number of events in each period. The NSWRING states that:

It appears reasonable to conclude that ground-borne noise at or below 30 dB L_{Amax} will not result in adverse reactions, even where the source of noise is new and occurs in areas with low ambient noise levels. Levels of 35–40 dB L_{Amax} are more typically applied and likely to be sufficient for most urban residential situations, even where there are large numbers of pass-by events.

A ground borne noise trigger level of L_{ASmax} 35 dB is here adopted, on the basis of the above and the number of expected train movements in the area during the night period.

2.2.2 Ground borne vibration (GBV)

Table 4 presents objectives for assessing human exposure to continuous vibration from the 2006 NSW DEC guidelines (listed in and referenced by the NSWRING), which are consistent with BS 6472 and the now-withdrawn AS 2670.2:1990. These levels are generally assessed at the floor midspan of a building space with a sensitive usage.

Table 4 Criteria for exposure to continuous vibration (2006 NSW DEC Guidelines)

Place	Time period	Preferred (Note [1])	Maximum (Note [1])
Critical working areas (e.g. hospital operating theatres, precision laboratories)	Day or night	0.10 mm/s (100 dB)	0.20 mm/s (106 dB)
Residences	Day	0.20 mm/s (106 dB)	0.40 mm/s (112 dB)
	Night	0.14 mm/s (103 dB)	0.28 mm/s (109 dB)
Offices	Day or night	0.40 mm/s (112 dB)	0.80 mm/s (118 dB)
Workshops	Day or night	0.80 mm/s (118 dB)	1.6 mm/s (124 dB)

Note 1 These values are assessed as one second root-mean-square (RMS) vertical values at the internal floor midspan of a vibration sensitive space. dB values are referenced to 1 nm/s.

From the table above it can be seen that within this guideline the preferred night time *floor* vibration goal is $L_{v,RMS,1s}$ 103 dB, with a maximum of $L_{v,RMS,1s}$ 109 dB. Historically, a target equivalent to the day period is used given the expected low number of train movements in the area during the night period, and that typical sensitivities are reduced by beds and other soft furniture which does not seem to be addressed by the NSWRING.

On the basis of being consistent with previous rail projects within the Perth metropolitan area, a vibration trigger level of $L_{v,RMS,1s}$ 106 dB is here adopted for residential premises regardless of time period. All other usages are assessed against the 'Preferred' criterion.

3 Design objectives summary

The following subsections detail objectives that are intended to apply to those sensitive land uses along or adjacent to the proposed route that are to be assessed in this study.

3.1 Airborne noise objectives

The table below outlines objective levels in regards to airborne noise during operation. From this point on, only the Rail Operations – Airborne Noise Trigger Level (Trigger Level) and Rail Operations – Airborne Noise Design Level (Design Level) as defined in this table are used to assess railway noise emissions.

Table 5 Project rail operations noise objective levels

#	Parameter	Objective[12]	Value(s) (Note[1])	Basis
N1	Rail Operations – Noise Generally	Noise levels from rail operations will be managed as low as is reasonably practicable.	demonstrated	SPP5.4
N2	Rail Operations – Airborne Noise Trigger Level	Noise mitigation must be considered where the noise level is above the prescribed Rail Operations – Airborne Noise Trigger Level.	$L_{Aeq,day}$ 55 dB $L_{Aeq,night}$ 50 dB L_{Amax} 75 dB	SPP5.4 Noise Target Historical PTA projects
N3	Rail Operations – Airborne Noise Design Level	Noise mitigation must be provided where the combined noise level resulting from the proposal and existing rail operations is • above the $L_{Aeq,day}$ or $L_{Aeq,night}$ Rail Operations – Airborne Noise Trigger Level by more than 5 dB, and • above the $L_{Aeq,day}$ or $L_{Aeq,night}$ noise level that would result from operation of existing rail infrastructure prior to the proposal.	demonstrated	SPP5.4 Noise Limit

Note 1 'Demonstrated' means the objective is achieved to the satisfaction of the approval authority.

Note that these objectives do not mandate the provision of noise mitigation on the basis of maximum noise levels (L_{Amax}) alone. In other words:

- if railway noise levels are above $L_{Aeq,day}$ 55 dB, $L_{Aeq,night}$ 50 dB or L_{Amax} 75 dB (i.e. the Noise Trigger Level), noise mitigation must be considered; and
- If railway noise levels exceed existing railway noise levels in terms of ($L_{Aeq,day}$ or $L_{Aeq,night}$) and also exceed either $L_{Aeq,day}$ 60 dB, $L_{Aeq,night}$ 55 dB (i.e. the Noise Design Level), then mitigation must be provided.

These objectives are assessed outdoors, 1 metre from the main building on a lot associated with a noise sensitive usage. Consistent with SPP5.4, they are assessed at ground level locations however in this report results are provided for all floor levels where identified from surveys.

[12] Airborne noise objectives are referenced to 20 microPascals (dB re 20µPa) and here apply at an external distance of 1 metre from a suitably representative building facade with a noise sensitive use located on noise sensitive premises and 1.5m above ground. L_{Amax} values are applicable to the 95th percentile train passby event.

3.2 Groundborne vibration objectives

Table 6 presents objectives in regards to ground borne vibration (GBV) and noise (GBN) during operation.

Where vibration levels are predicted to be above these objectives, the project will consider the use of reasonable and practicable controls to achieve compliance.

Table 6 Project rail operations GBV and GBN objectives

#	Parameter	Objective[13]	Value (Note[1])	Basis
V1	Rail Operations – Generally	Vibration levels from rail operations will be managed as low as is reasonably practicable.	demonstrated	Industry best practice
V2	Rail Operations Building Vibration Trigger Level	Mitigation of vibration via ground or structural pathways must be considered where the vector sum Rail Operations Building Vibration Trigger Level is exceeded as applicable to the 95th percentile train passby event measured at a reasonably representative location of the building occupancy, with appropriate use of frequency weightings from ISO 2631.1:1997[14] as amended or AS ISO 2631.2:2014[15].		AS2670.2:1990 ISO2631 ASHRAE[16] guidelines NSWRING
		Medical clinical treatment, surgery or recovery areas, or facilities operating precision equipment	Curve 1 ($L_{v,RMS,1s}$ ~100dB)	
		Residential and hotel accommodation	Curve 2 ($L_{v,RMS,1s}$ ~106dB)	
		Commercial premises, Public buildings, Churches and community centres and the like	Curve 4 ($L_{v,RMS,1s}$ ~112dB)	
		Light and general industrial buildings	Curve 8 ($L_{v,RMS,1s}$ ~118dB)	
V3	Rail Operations Regenerated Noise/GBN Trigger Level	Mitigation of vibration via ground or structural pathways must be considered where the Rail Operations Regenerated Noise Trigger Level is exceeded as applicable to the 95th percentile train passby event and measured at centre of reasonably representative interior space(s) of each building usage.		Historical PTA projects NSWRING
		Residential and hotel accommodation, 10pm to 6am	L_{ASmax} 35dB	
		Residential and hotel accommodation, 6am to 10pm	L_{ASmax} 40dB	
		Commercial buildings, Public buildings, Churches and community centres and the like	L_{ASmax} 45dB	
		Retail and point of sale areas	L_{ASmax} 50dB	
		Occupiable light and general industrial buildings	L_{ASmax} 50dB	

Note 1 'Demonstrated' means the objective is achieved to the satisfaction of the approval authority.

[13] Vibration objectives are referenced to 1nm/s (dB re 1nm/s), use the subscript 'v' and are assessed on the basis of 1 second root mean square (RMS) values.
[14] ISO 2631-1:1997 Mechanical vibration and shock - Evaluation of human exposure to whole-body vibration - Part 1: General requirements.
[15] AS ISO 2631.2:2014 Mechanical vibration and shock - Evaluation of human exposure to whole-body vibration - Vibration in buildings (1 Hz to 80 Hz).
[16] American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc (ASHRAE), 2011 ASHRAE Handbook - Heating, Ventilating, and Air-Conditioning APPLICATIONS - SI Edition, Atlanta GA http://www.ashrae.org.

4 Design assumptions

This section outlines some key input assumptions, modelling and assessment methodologies associated with noise and vibration impact assessment studies for the project.

Technical details are provided in Appendix **B.3**.

4.1 Operational scenarios

This assessment refers to three scenarios:

- The '**Existing**' (also referred to as the 'No Build') scenario which represents the configuration, arrangement and traffic volumes that would exist at the time the proposed upgrade would have commenced operations
- The '**Build**' scenario represents 20 years after completion of the upgrade; and
- The '**Build+M**' (Build including mitigation) scenario which has the same geometry and features as the 'Build' scenario, but with any controls considered requisite for compliance with the design objectives.

The assessment considers the following scenarios and traffic volumes developed on the basis of the operational assumptions report[17]. The year 2041 represents the 'ultimate' scenario consistent with a 20 year design horizon as recommended in SPP5.4.

Table 7 Operational scenarios and rolling stock types

Scenarios, Year	Services	Day / Night Volumes (Note [1])	Comments, Rationale
'Existing', 2021	Fremantle – Midland (Series A)	97 / 14	FAL is expected to be operational prior to MEL. ~8 minute headways during peak periods.
	Claremont – Forrestfield (Series B)	97 / 14	
'Build', 2041 'Build+M', 2041	Fremantle – Midland (Series A)	89 / 16	For MEL, 3 car trains replaced with 6 car trains in 2041. All services have 10 minute headways except for 15 minute headways in the evening
	Claremont – Forrestfield (Series B)	89 / 16	
	Bayswater – Ellenbrook (Series B)	74 / 16	

Note 1 Normal Monday to Friday services, one way. Day period refers to 6 am to 10 pm period; Night refers to 10pm to 6 am period.

Series C trains are considered to have similar noise emission profiles and lengths as Series B trains, so no specific scenarios for Series C trains are included.

By inspection of this table, $L_{Aeq,day}$ values are expected to be the controlling factor for the potential noise mitigation design since the difference between $L_{Aeq,day}$ and $L_{Aeq,night}$ due to traffic alone will be more than 5 dB. L_{Amax} values are considered unaffected by the time of day.

[17] METRONET Morley-Ellenbrook Line MEL Project scenario operational assumptions – Option 7A Final report, 06 March 2019, reference 'MEL-MNO-ELUP-RS-RPT-0001.E.IFU'

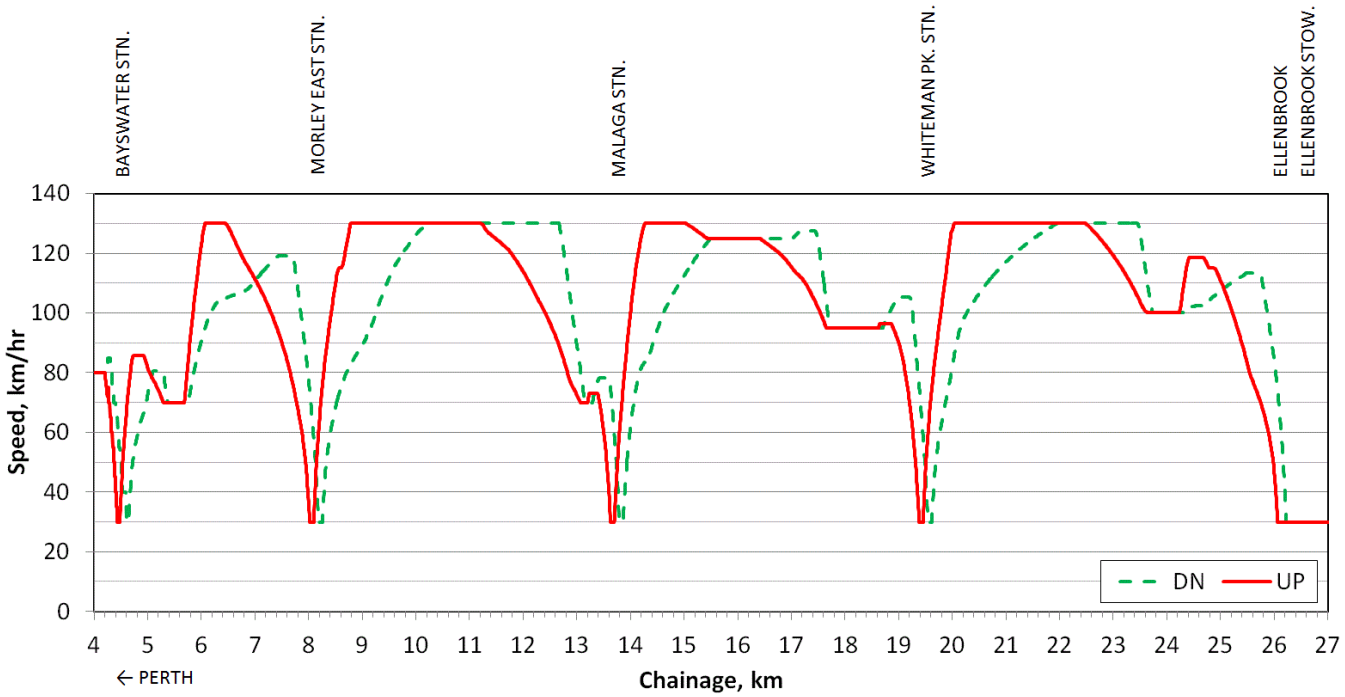
4.2 Speed profiles

Train speed and scheduling has a critical influence on noise and vibration emissions. The modelled speed profiles for both up and down lines as indicated in **Table 8** and **Figure 2** represent a stopping pattern. Note that the first and last trains (referred to as positioning runs) are considered to constitute less than 5% of all traffic. This means that the objectives adopted (which are based on the 5th highest percentile event or averaged over significant time periods) are not sensitive to those events.

Table 8 Modelled speed profiles

Line	Constraints
Bayswater – Ellenbrook	As per **Figure 2**. Minimum of 30 km/hr within stations and stowage areas.
Fremantle – Midland	80 km/hr signal speed.
Claremont – Forrestfield	Within 200 m of Bayswater station, speed reduced as per **Figure 2**.

Figure 2 MEL modelled speed profile '20190417'



These speed profiles were provided by the PTA and are considered reasonably representative but subject to change during detailed design stages.

Future stations on this line (e.g. Noranda Station indicated in **Figure 1**) are not modelled in this study. However, introducing a station is expected to reduce noise and vibration impacts via reduced speeds. Therefore if other future proposed stations were added, it is unlikely there would be an increase in noise and vibration emissions (provided traffic volumes and signal speeds are maintained).

5 Assessment of airborne noise from rail operations

5.1 Basis

5.1.1 Airborne noise modelling methodology

Given the early stages of planning, this study uses previously established railway noise emission levels to forecast both existing and future noise emission levels. A 3D noise model was constructed to account for varying topographic conditions, shielding and reflecting effects from building structures, planned rail movements and noise emission input data for individual train movements. The development and validation of this model is described further in **Appendix B.1**.

For the 'Existing' scenario, noise barrier and fence heights and locations were sourced as follows:

- Residential fencing separating properties were generally not modelled unless determined to be critical to receiver results at the most exposed properties. This is because the condition and effective height of all such boundary walls is generally unknown.
- Locations of walls facing the railway reserve were sourced from Landgate and reviewed with necessary corrections being made to reflect their realistic existing conditions. The modelling was then carried out on the basis that these fences and barriers are acoustically solid, i.e. they perform as effective noise barriers, being of suitable construction to sufficiently reduce noise transmission.
- The terrain and extent of noise mitigation and rail dampers is as understood to be *proposed* for the Bayswater Station Upgrade (BSU) and Forrestfield Airport Link (FAL) on the basis both projects are complete in 2021. *This includes the use of rail web dampers for large sections of track in the vicinity of the Bayswater Dive and Junction areas*.

The 'Build' scenario uses the noise mitigation in the 'Existing' scenario with the following modifications:

- Noise walls modelled in the 'Existing' scenario are removed for the Build scenario where they appear to conflict with the as-designed MEL alignment and structures. This generally affects walls on the northern boundaries to the alignment near the Bayswater station.

The noise wall extent described was then developed on the following principles:

- Height and extent to achieve the objectives in **Section 3.1**, noting that these will be refined during detailed design with regard to other factors such as visual impact, safety of egress from track, security and vehicle access.
- Heights are limited to 4.0 metres with minimum 0.3 m vertical and 10 metre horizontal stages.
- Walls are located in plan either on the expected rail reserve boundary, on principle shared path (PSP) fence lines, or at least 3.5 metres from the nearest rail centreline (subject to final approval).

  Generally, for flat ground, closer fitting walls do not need to be as tall as those on the boundary. Only in some locations such as where the rail line is in a cutting are walls on the boundary (at the top of the cutting) likely to be more cost effective.

Note that in accordance with SPP5.4 and its guidelines, the design of noise mitigation considers only the railways – not the cumulative noise level from freeway road traffic. This is in part because the proponent of the railway does not have appropriate design control over freeway assets.

The Nordic Rail Traffic Noise Prediction (Kilde 130) algorithm has been utilised within noise modelling platform SoundPLAN 8.1 for the prediction of received noise levels at adjacent noise sensitive receivers. This algorithm has been refined since its introduction in 1984 and is commonly utilised for rail noise assessments within Western Australia. It calculates emission noise level based on the scheduled train operational parameters including speed, length and number of train movements, and it can predict equivalent noise levels (L_{Aeq}) and maximum noise levels (L_{Amax}) as required.

This 3D noise model environment accounts for varying topographic conditions, shielding and reflecting effects from building structures, planned rail movements and noise emission input data for individual train movement that has been validated via in-situ measurements.

Further details regarding the airborne noise modelling methodologies, including reference source levels and environmental model inputs, as well as uncertainty of modelling predictions, are provided in detail in **Appendices B.1** and **B.3**.

5.1.2 Modelled 'existing' rail web dampers

The modelled extent of rail web dampers is detailed in the following table.

Table 9 Rail web dampers

Reference	Chainages, km	Trackform	Total length, km
Midland UP	4.970 – 6.020	Ballasted	1.050
Midland DN	4.940 – 5.510		0.570
FAL UP	0 – 0.300	Ballasted	0.300
	0.300 – 0.410	Track slab	2.460
	1.000 – 1.800		
	2.750 – 3.100		
	3.850 – 5.050		
FAL DN	0 – 0.300	Ballasted	0.300
	0.300 – 0.400	Track slab	2.600
	0.800 – 1.900		
	4.500 – 5.900		

5.1.3 Modelled 'existing' noise walls

The below table details noise walls modelled within the 'Existing' scenario but not yet constructed, based on the drawing packages received to date. Noise walls associated with freeways have also been modelled based on supplied drawings[18].

Table 10 Modelled extent of existing noise walls, by project reference

Project	References	Nearest main line, position	Approximate chainages, km	Heights, m (Note[1])	Approximate total area, m^2
Bayswater Station Upgrade	BSU DN1	Down, near corridor boundary	3.675 – 3.777	1.8 – 3.0	269
	BSU DN2	Down, 3.5 metres from railway centreline	3.748 – 3.910	1.5 – 2.4	306

[18] Teambinder references MEL-MNO-MRWA-CI-REF-0005 and MEL-MNO.MRWA-CI-REF-0047 via MEL-MNO-MET-EXT-E-00189 dated 2 May 2019.

Project	References	Nearest main line, position	Approximate chainages, km	Heights, m (Note[1])	Approximate total area, m^2
	BSU DN3	Down, near corridor boundary	3.898 – 4.152	2.4 – 3.0	757
	BSU DN4	Down, in two sections 3.5 metres from railway centreline	4.136 – 4.323, 4.392 – 4.492	1.5 – 1.8	471
	BSU DN5	Down, 3.5 metres from railway centreline	4.773 – 5.180 (Note [2])	1.5 – 4.0	1,012
	BSU UP1	Up, near PSP retaining wall	3.592 – 3.573	2.4	46
	BSU UP2	Up, in two sections 3.5 metres from railway centreline	3.848 – 3.578, 4.505 – 4.028	1.8 – 3.3	1,808
	BSU UP3	Up, 3.5 metres from railway centreline	4.953 – 4.732	2.4 – 3.6	711
	BSU UP4	Up, near corridor boundary	5.180 – 4.926 (Note [2])	3.0 – 3.3	828
Forrestfield Airport Link	FAL NW1	MID DN near Bayswater station	5.084 – 5.165	N/A	N/A
	FAL NW2	MID UP near Bayswater station	5.240 – 5.570	2.4	792
	FAL NW3	Midland UP 'Flyover' bridge (viaduct) concrete upstand with Class A or B sound absorptive lining according to EN ISO 11654.	5.570 – 5.790	0.8 m above nearest railway centreline	308 (including concrete upstand)

Note 1 Relative to local ground level modelled. Ground levels near ballasted track are modelled as 0.6 metres below top of nearest rail.

Note 2 Scope of work considers controls to 5.180 km and beyond, noting that the Forrestfield Airport Link project will overlap this area.

5.1.4 Modelled extent of new noise walls

Table 11 indicates the extent of mitigation modelled in the Build+M scenario further to that considered to exist at the time of construction.

Table 11 Extent of noise wall mitigation modelled as compliant – Wall extent 'Revision A'

References	Nearest main line, position	Approximate chainages, km	Heights, m	Approximate total area, m^2
MEL DN1	MID DN on approach to Bayswater Station	4.255 – 4.454	1.8 – 2.1	332
BSU	Bayswater Station throughout	-	1.5 (Note[1])	-
MEL DN2	MID DN on exit from Bayswater Station	4.689 – 4.727	1.2	46
MEL DN3	MID DN, MEL DN	4.772 – 5.147	2.4 to 3.0	957
MEL DNF1	DN Viaduct	4.680 – 5.600	0.8 m above nearest railway centreline, 2.4 m from railway centreline. 0.8 m within raised platform above MID DN (Note[1])	-
MEL UPF1	UP Viaduct	5.600 – 4.680		-
MEL UP1	Uprating of BSU UP3	4.960 – 4.706	3.0 to 4.0	956

Note 1 At locations where concrete upstands are already anticipated as part of structural / safety considerations

5.2 Results

Table 12 presents an overall summary of results and these are discussed in the following subsections.

Further detail is also provided in the following appendices

- **Appendix C.1** which presents tabulated results of the noise predictions.
- **Appendix D** presents individual $L_{Aeq,day}$ and L_{Amax} figures for the 'Existing', and 'Build + M' scenario results.
- **Appendix E** presents noise contour maps of selected scenarios:
  - Build railway Day period noise levels prior to mitigation.
  - Build railway Night period noise levels prior to mitigation.
  - Build railway Maximum passby noise levels prior to mitigation.

Table 12 Airborne noise forecast results summary, residential premises

Aspect[1]	Parameter[2]	Existing	Build, 2041 (no mitigation)	Build+M, 2041 (including mitigation)
-	Residences assessed	238	811	811
Period average ($L_{Aeq,day}$, $L_{Aeq,night}$) Rail Operations – Airborne Noise **Trigger Level** Period average levels	Minimum number of exceedances[3]	49 (21%)	128 (16%)	89 (11%)
	Highest exceedance, dB	10	12	6
Maximum passby (L_{Amax}) Rail Operations – Airborne Noise **Trigger Level** Maximum passby levels	Minimum number of exceedances[3]	49 (21%)	257 (32%)	253 (31%)
	Highest exceedance, dB	10	11	11
Period average ($L_{Aeq,day}$, $L_{Aeq,night}$) Rail Operations – Airborne Noise **Design Level** Period average level	Minimum number of exceedances[3]	18 (7.6%)	39 (4.8%)	6 (0.7%)
	Highest exceedance, dB	5	7	1

Note 1 Definitions are provided in **Section 3.1**.

Note 2 Residential premises only.

Note 3 The term 'minimum' is used as there may be multiple dwellings at the same address or similar noise levels at properties further away from (e.g. not adjacent to) the rail reserve which are not represented in this table.

5.2.1 Existing scenario

From **Table 12** it can be seen that for the Existing scenario,

- 238 residences were assessed in the Bayswater area. This is less than the 'Build' and 'Build+M' scenarios because the Existing scenario does not include the Tonkin Highway sections north of Bayswater where rail is yet to be constructed (results would be negligible).
- Around 49 residences are considered to receive noise levels above the Airborne Noise Trigger Level (Line N2 in **Table 5**) of $L_{Aeq,day}$ 55 dB, $L_{Aeq,night}$ 50 dB or L_{Amax} 75 dB, by a margin of up to 10 dB.
- Of this group of 49 residences, 18 are modelled to be above the Airborne Noise Design Level of $L_{Aeq,day}$ 60 dB or $L_{Aeq,night}$ 55 dB (Line N3 in **Table 5**).

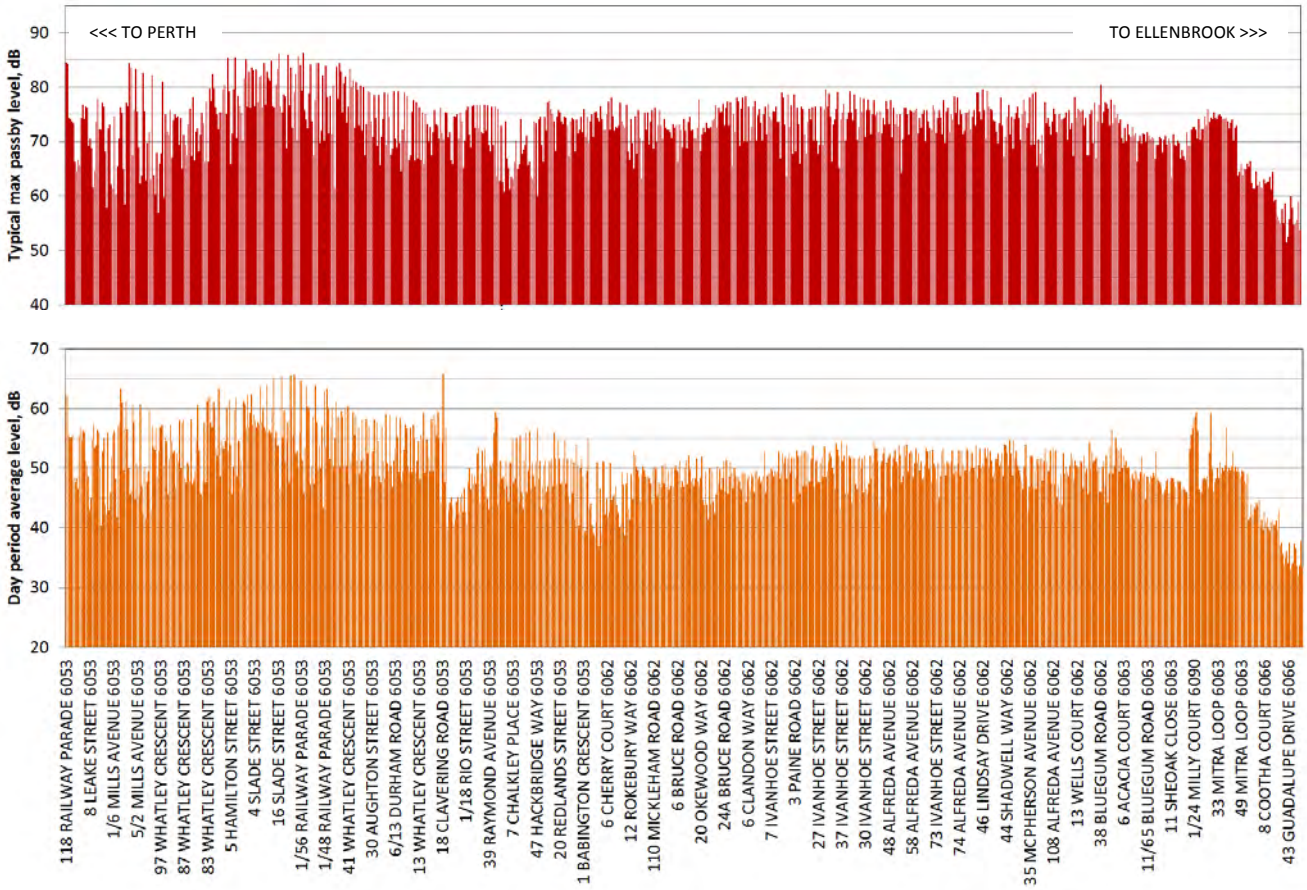
5.2.2 Build scenario

From **Table 12** it can be seen that for the Build scenario (as a result of the project), the number of residences above the Airborne Noise Design Level (**Section 3.1**) increases from 18 to 39 which means mitigation must be provided.

Figure 3 presents the modelled distribution in day period ($L_{Aeq,day}$) and maximum (L_{Amax}) levels, and it indicates that

- higher levels are expected in the Bayswater area (e.g. Whatley Crescent, Railway Parade) compared to the sections where the railway is located within the Tonkin Highway reserve; and
- where the railway is located within the Tonkin Highway reserve, noise levels are significantly below $L_{Aeq,day}$ 55 dB, and therefore unlikely to significantly contribute to a cumulative road and rail traffic noise level above SPP5.4 Noise Limits.

Figure 3 Distribution in residential $L_{Aeq,day}$ and L_{Amax} per address (ordered by chainage), Build scenario.

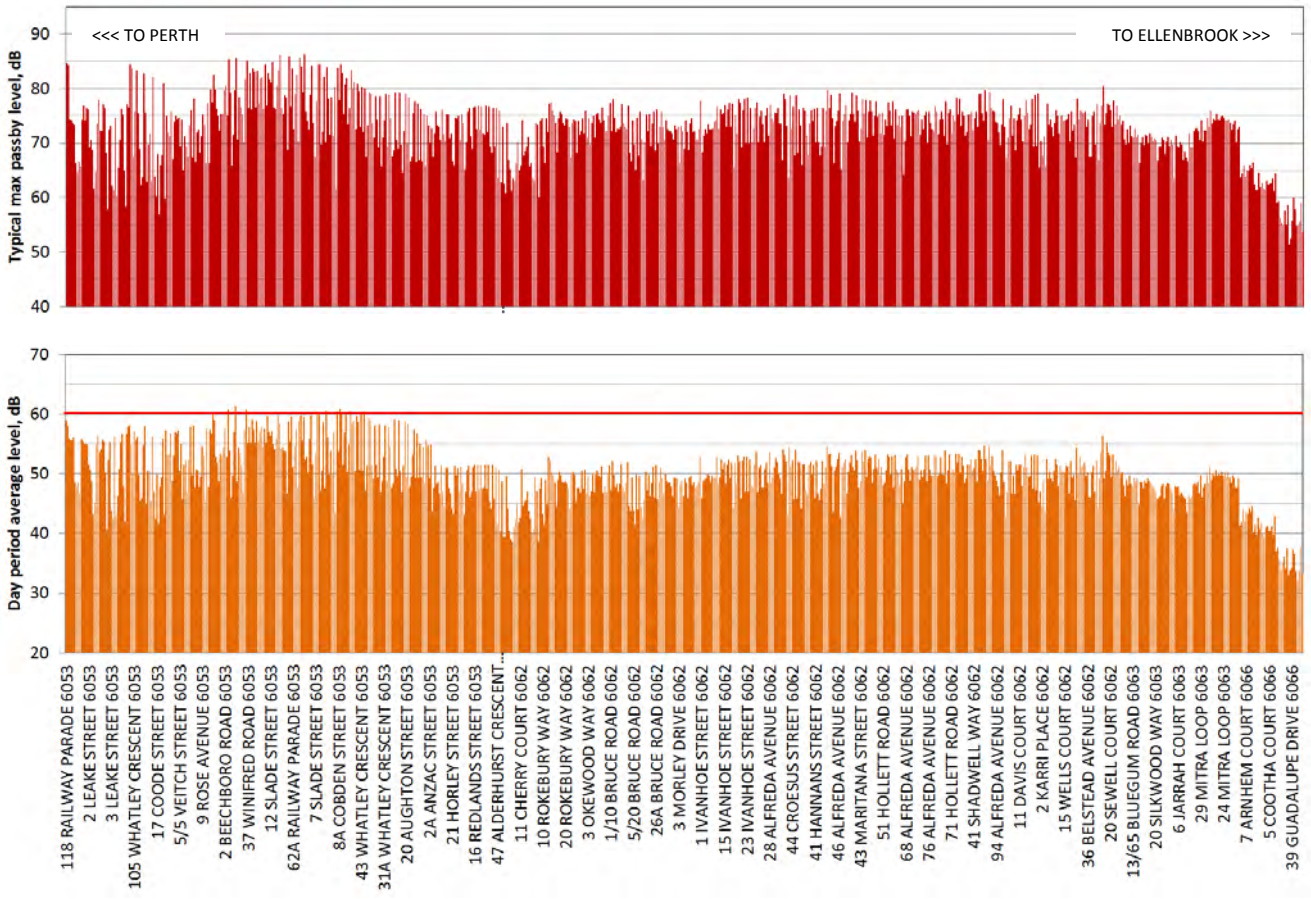


5.2.3 Build+M scenario

Table 12 indicates that with mitigation as described in **Section 5.1.4**, six residences (0.7% of all those assessed) are forecast to be above the design level, with the most affected modelled as 1 dB above the design level.

This is also reflected in **Figure 4** which presents the modelled distribution in day period ($L_{Aeq,day}$) and maximum (L_{Amax}) levels.

Figure 4 Distribution in residential $L_{Aeq,day}$ and L_{Amax} per address (ordered by chainage), Build+M scenario. Airborne Noise Design Level is indicated by red horizontal line.



5.3 Recommended airborne noise controls

Given the site context, airborne noise controls are considered at this design stage to be limited to the following:

- **Noise walls**: To achieve effective noise reductions, noise barriers may be located either within the rail reserve, on defined property boundaries, or in place of existing walls (as a potential upgrade). Generally, wall(s) located closer to the noise source (or receiver) are more effective.

  Table 12 shows that the wall extent 'Revision A' (nominated in **Section 5.1.4**) is effective at reducing noise for all residential receivers to within 1 dB of the objectives listed in **Section 3.1**: the number of residences forecast to be above the Airborne Noise Design Levels is reduced from 39 to 6. Further noise reduction can be achieved with the use of sound absorptive linings, rail web dampers or closer fitting noise walls.

- **Sound absorptive panels:** Within the Bayswater area there are several locations where noise received at sensitive premises is due to reflected noise paths and not just via the most direct pathways. Examples of this are viaducts where the concrete upstands are effective at blocking noise on one side but reflect noise back onto the train cabin and over the walls. Here the solution would be to use sound absorptive panels to control these reflections, on both internal sides of the viaduct.

- **Rail web dampers**: Field trials commissioned by the PTA in 2017 indicate a noise reduction potential of between 4 and 5 dB using rail web dampers[19].

[19] SLR Consulting 2017, *Rail web damper trials – noise and vibration assessment*, SLR Report 675.11094. Ballasted track with RP65221 pads.

Experience with previous projects involving 2 parallel railway lines indicates that the likely costs of rail web dampers are likely to be less than noise walls on one or both railway reserve boundaries, once all construction and operational factors are managed such as structural wind loading, fence removal, construction site mobilization, vandalism, lighting, accessibility around crossings and visual impacts.

The installation of rail dampers carries risks of increased maintenance costs in removing dampers for major trackwork activities (such as rail replacement). However, installation also carries benefits in terms of reduced rates of rail roughness and corrugation growth, which in turn is expected to lead to fewer major trackwork events and therefore reduced maintenance costs.

From the results presented, either control (or a combination thereof) would suffice in terms of meeting the objectives listed in **Section 3.1**, with optimization of extents subject to detailed design.

The detailed design of these treatments will need to suitably interface with controls associated with other projects under construction.

6 Assessment of GBN and GBV from rail operations

6.1 Basis

6.1.1 Methodology

The GBV and GBN modelling for this project was conducted using an SLR-developed modelling process which is essentially an Environmental Assessment Model as detailed in **Appendix B.2.** The relevant algorithms incorporated into this model are well documented in authoritative references and are widely used within the acoustical consulting profession, both in Australia and internationally.

The assessment was undertaken using the following assumptions:

- The effects of noise walls or retaining structures, as well as ground condition changes associated with road construction development (particularly sections along Tonkin Hwy) are conservatively not considered in the model.
- Study area considers all representative receivers within 100 metres from the centreline of each railway, in 5 metre segments, based on historical field data demonstrating compliance typically within 50 metres.
- Reasonable similarity in ground propagation effects between the locations used for baseline measurements and those near receiver positions.
- The analysis is based on vibration measured in the vertical direction only with adjustments for transverse / longitudinal vibration components (which are considered to be of minimal consequence at extended distances as captured in the design uncertainty).
- Building amplification effects as per **Appendix B.2.3**. In practice building response effects will vary (this variance is captured in the modelled design uncertainty).
- The mitigation option in the form of resilient ballast matting is assumed to achieve overall 10 dB reduction in the vibration source emissions from rail operations.

6.1.2 Modelled extent of mitigation

The following table describes recommended extent of vibration mitigation in the form of resilient ballast matting, in order to achieve relevant GBN and GBV compliance.

Table 13 Vibration mitigation (i.e. resilient under ballast matting) extent

Rail development section – Part 1	Reference (Note[1])	Approximate chainages, km	Total length, km
Redevelopment section	UBM1	4.25 – 4.50	0.25
New development section	UBM2	8.30 – 10.35	2.05
	UBM3	10.83 – 11.35	0.52
	UBM4	12.37 – 12.68	0.31
	UBM5	13.13 – 13.33	0.20

Note 1 Refers to both UP and DN lines

The following subsections present the basis of the above assessment recommendation results.

6.2 Results

GBN and GBV result summaries are presented in **Table 14**, based on the assessment of 534 premises (445 residential, 89 non-residential) against the criteria listed in **Table 6** (**Section 3.2**).

Table 14 Forecast GBV and GBN modelled results – 'Build', 'Build+M' scenarios

Usage	Aspect	Objective (Section 3.2)	'Build' scenario (prior to mitigation)	'Build+M' scenario (with mitigation)	Expected outcome, comments
Residential	Groundborne vibration (GBV)	$L_{v,RMS,1s}$ 106 dB	34 up to 6 dB above objective	All within objective	OK
	Groundborne noise (GBN)	L_{Amax} 35 dB	133 up to 9 dB above objective	7 up to 3 dB above objective	Performance limited by existing rail infrastructure outside scope of MEL. Review as detail develops
Non-residential (Commercial/ Industrial)	Groundborne vibration (GBV)	$L_{v,RMS,1s}$ 112 to 118 dB	3 up to 4 dB above objective	3 up to 4 dB above objective	
	Groundborne noise (GBN)	L_{Amax} 45 to 50 dB	3 up to 4 dB above objective	3 up to 4 dB above objective	

Refer to **Appendix C.2** for individual results.

From these tables it can be seen that as a result of the proposal:

- Without mitigation, 133 residences are predicted to exceed relevant investigation trigger levels by up to 9 dB, and they are distributed within the following chainage sections:
  - near Bayswater Station (due to existing Midland line): 4.15 km – 4.45 km,
  - Sections along Tonkin Hwy between Morley East and Malaga Stations: 8.32 km – 8.53 km, 8.78 km – 8.94 km, 9.32 km – 10.33 km, 12.39 km – 12.66 km and 13.16 km – 13.24 km.
- With the mitigation measures ('Build+M' scenario),
  - the number of properties above GBN investigation trigger levels reduces from 133 to 7 and the maximum difference reduces from 9 to 3 dB.
  - All residences are modelled to have GBV levels below relevant investigation trigger levels.

Note that these estimates include emissions from existing rail infrastructure outside the scope of MEL which limit the project's ability to achieve any specific limits.

Appendix D.2 presents figures indicating modelled GBN and GBV levels versus chainage for selected assessment scenarios under both untreated ('Build') and treated ('Build+M') cases.

Appendix E presents GBN and GBV colour maps of selected scenarios.

6.3 Recommended GBN and GBV controls

Although the model does allow for some variance in source emission levels and ground conditions, specific ground and rail conditions can vary significantly over the alignment beyond that modelled. Also, the performance assumption of a 10 dB reduction from the proposed resilient ballast matting is considered preliminary at this reference design stage and dependent on correct specification and implementation.

Therefore, detailed studies of all major influencing factors, including range of geotechnical and rail conditions along the alignment, as well as the performance specifications of mitigation measure options, are recommended during detailed design stages.

It is important to note that once the rail alignment and trackform is fixed, options to reduce vibration emissions are limited to rail support stiffness, 'above rail' assets (rolling stock) and operational measures. Therefore, the objectives as outlined in **Section 3.2** are used to consider mitigation options and potentially further study to understand and manage the risk of potential environmental impact.

Specifically, should these objectives be exceeded, the next steps in relation to mitigation consideration during detailed design stage will be to:

- Determine the location(s) and level(s) of any exceedances;
- Rank reasonable and practicable noise and vibration mitigation measures in order of overall effectiveness. Key opportunities to reduce vibration emissions from the railway (and therefore both GBV and GBN impacts) are considered to be:
    - Resilient under ballast matting (UBM), which locates between the ballast and below ground support. This system requires careful specification of performance in order to perform optimally.
    - Under-sleeper pads (USPs), which are cast into the base of each sleeper and installed with the sleeper as one unit. This treatment requires careful specification as in some circumstances it can lead to increased generation of low-frequency noise from the sleepers.
    - High attenuation rail support pads/trackforms, which depending on specification can lead to increased rolling noise emissions and affect compliance with airborne noise objectives.
- Identify achievable vibration levels for the project taking into account reasonable mitigation measures.
- Consult with the design team to discuss where and why the trigger levels cannot reasonably be achieved, and options for improvement.

7 Summary

7.1 Key findings

A desktop assessment of existing and future railway noise and vibration levels for Part 1 (Bayswater to Malaga Station) of the Morley-Ellenbrook Line has been undertaken. The findings of this assessment are:

- In regards to airborne noise levels,
  - 811 residential receivers were assessed.
  - As a result of the project, the number of residences modelled to be above levels which require *consideration* of mitigation increases from around 49 to 257, depending on the metric used (period average or maximum passby).
  - Without mitigation, the number of residences above the Airborne Noise Design Level (**Section 3.1**) increases from 18 to 39 which means mitigation must be *provided*.
  - With 'Revision A' mitigation as proposed in **Section 5.1.4**, six residences (0.7% of all those assessed) are forecast to be above the design level by up to 1 dB. Given the accuracy of the model and conservative assumptions made, it is not proposed to review the mitigation extents until the detail in the design further progresses.
- In regards to the ground borne noise (GBN) and ground borne vibration (GBV) objectives in **Section 3.2**, of the 445 residential premises assessed:
  - 34 are forecast to have GBV levels up to 6 dB above the relevant investigation trigger level prior to any specific mitigation;
  - 133 are forecast to have GBN levels up to 9 dB above the relevant investigation trigger level prior to any specific mitigation;
  - A 10 dB reduction in GBN and GBV levels may be achieved through the use of suitable under ballast matting (UBM) as per **Section 6.1.2** at the majority of properties if correctly specified and installed.
- There is risk that trains entering passing loops or crossovers may navigate relatively sharp curvature which under certain conditions can generate additional curving noise (wheel squeal or flanging noise). Such noise if presented would be a key source of annoyance but would not exceed current statutory environmental objectives at nearby dwellings. Care must be taken to maximise the curvature of track where practicable and consider the use of superelevation to assist with steering. Typical local controls in practice if there are issues during service involve wayside friction modifier systems and close fitting noise walls.
- Depending on the detailed design of viaduct structures and rail fastening systems, there is potential that the rail-generated vibration of the viaduct structures generates more noise than at grade. The combined control potential measures in the structural design (e.g. increasing stiffness, avoiding lightweight panels that can flex or rattle), vibration mitigation controls (e.g. resilient track fasteners) and noise mitigation controls (e.g. sidewalls, overhanging barriers, absorptive undercover) are expected to enable compliance with applicable objectives.

7.2 Recommendations

1. In lieu of detailed design, budget for:

- Review / optimisation of mitigation and control measures during detailed design in accordance with this report;
- Either low height (and close fitting) or boundary noise walls on both passenger main lines as indicated in **Table 11**;
- Vibration mitigation extent as provided in **Table 13**;
- Detailed review of vibration controls based on local geotechnical information and existing site survey(s); and
- Detailed review of structure-borne noise emitted from the viaduct based on the designed viaduct structure, rail track form and fastening system, with potential effective control measures such as resilient rail fasteners and sidewalls/overhanging noise barriers.

2. Ensure the rail engineering of the passing loops minimises the risk of curving noise through design, such as avoiding short radii curves and situations where there may be regular wheel flange contact with the rails.
3. Develop a project noise and vibration management plan to advise relevant local government authorities (City of Bayswater and City of Swan) of the agreed approach.
4. Consider passenger cabin in-car noise during travel within tunnel sections at speed: this may not be a significant design factor if relatively short in duration.
5. Share outcomes with planning, local government authorities to assist in future land use planning near the project area.
6. Undertake consultation with community stakeholders where there may be a history of complaints or presumed expectations of improvement as part of the upgrade.

APPENDIX A

A Glossary of terms

The following subsections discuss the applicability of various transport policies and standards in regards to noise and vibration, and several local projects of relevance.

A.1 Terms used

The following table lists key nomenclature used in this report

Table A.15 Terms used

Parameter	Comment
a, a_w	(Vibration) acceleration, the subscript 'w' refers to weighting / frequency correction used. Units are m/s^2.
dB	Decibel, a unit of sound or vibration which is described as a ratio of the result to a fixed reference value. All sound pressure levels (LpA, LA, LAeq etc.) quoted in this report are referenced to 20 micro Pascals (dB re 20µPa).
	Vibration velocity levels (L_v) quoted in this report are referenced to 1 nanometre per second (dB re 10-9 m/s), noting that some US criteria use dB re 10^{-6} in/s.
Guidelines	Implementation Guidelines for State Planning Policy 5.4 Road and Rail Transport Noise and Freight Considerations in Land Use Planning
L_{Amax}	The maximum A-weighted noise level associated with a sampling period.
$L_{Amax,95\%}$	The "typical maximum noise level" for a train pass-by event. For operational rail noise, LAmax refers to the maximum noise level not exceeded for 95% of rail pass-by events measured using the 'slow' (sometimes denoted by subscript 'S') response setting on a sound level meter.
L_{A1}	The A-weighted noise level exceeded for 1% of a given measurement period. This parameter is often used to represent the typical maximum noise level in a given period.
L_{A10}	The A-weighted noise level exceeded for 10% of a given measurement period and is utilised normally to characterise average maximum noise levels.
L_{Aeq}	The A-weighted average noise level. It is defined as the steady noise level that contains the same amount of acoustical energy as a given time-varying noise over the same measurement period.
L_{A90}	The A-weighted noise level exceeded for 90% of a given measurement period and is representative of the average minimum background noise level (in the absence of the source under consideration), or simply the "background" level.
L_v	Unweighted vibration velocity level, see dB.
$L_{v,RMS,1s}$	Maximum unweighted RMS vibration velocity level over a 1 second period.
L_w, L_{wA}	'Sound power' (L_w) refers to the total rate of sound generation of a given item of plant. This quantity is independent of the distance from the plant item (analogous to the wattage power of a light-bulb) and allows direct comparison of the relative acoustic 'size' of different plant items. From this data, the sound pressure level (or noise level) at any offset distance from the plant can be calculated (analogous to the light intensity from a light-bulb – the greater the distance, the less intense).
Policy	State Planning Policy 5.4 – Road and Rail Transport Noise and Freight Considerations in Land Use Planning
RMS	Root Mean Square, a parameter used to estimate the average energy level of a continuous signal.

The following table describes key terms used in this report.

A.2 Noise

The terms “sound” and “noise” are almost interchangeable, except that in common usage “noise” is often used to refer to unwanted sound. Sound (or noise) consists of minute fluctuations in atmospheric pressure capable of evoking the sense of hearing. The human ear responds to changes in sound pressure over a very wide range. The following table presents examples of typical noise levels.

Table A.16 Guide to sound pressure level ranges for selected environments (dB re 20µPa)

Subjective Evaluation	L_{Aeq}	Comments / Examples
Intolerable. Onset of pain. Exceeds daily exposure limit in under a second.	140	Military jet engine at 30 metres
	130	2kW disaster warning siren at 1 metre
Very loud. Risk of exceeding daily noise exposure limit in under a minute.	120	Jet aircraft take-off at runway edge
	110	Rock concert; freight train main horn at 25 metres
Loud. Onset of risk to exceeding daily recommended noise exposure limit.	100	225mm angle grinder at 1 metre, car horn at 3 metres
	90	Heavy industrial factory interior
Noisy	80	Shouting at 1 metre, kerb side of busy street
	70	Freeway at 20 metres
Moderate	60	Normal conversation at 1 metre, department stores
	50	General office areas
Quiet	40	Office air conditioning background level
Very quiet	30	Bedroom in quiet suburban area
Almost silent	20	Whisper, rural bedroom at night
	10	Human breathing at 3 metres
	0	Threshold of typical hearing

The loudest sound pressure to which the human ear responds is ten million times greater than the softest. The decibel (abbreviated as dB) scale reduces this ratio to a more manageable size by the use of logarithms. The symbol ‘A’ represents A-weighted sound pressure level (SPL): the weighting is designed to better represent the hearing ability of the average listener at each frequency.

The ability to discern a change in noise level varies between individual listeners, however it is reasonable to suggest that a change of up to 3 dB in the level of a sound is difficult for most people to detect, and a 3 dB to 5 dB change corresponds to a small but noticeable change in loudness. A 10 dB change corresponds to an approximate doubling or halving in loudness and is readily noticeable.

L_{Aeq} values represent an energy average of sound over time and are basic indicators of loudness. However there other ways to statistically represent sound and common noise level descriptors that may be used are illustrated in the following figure and are described below.

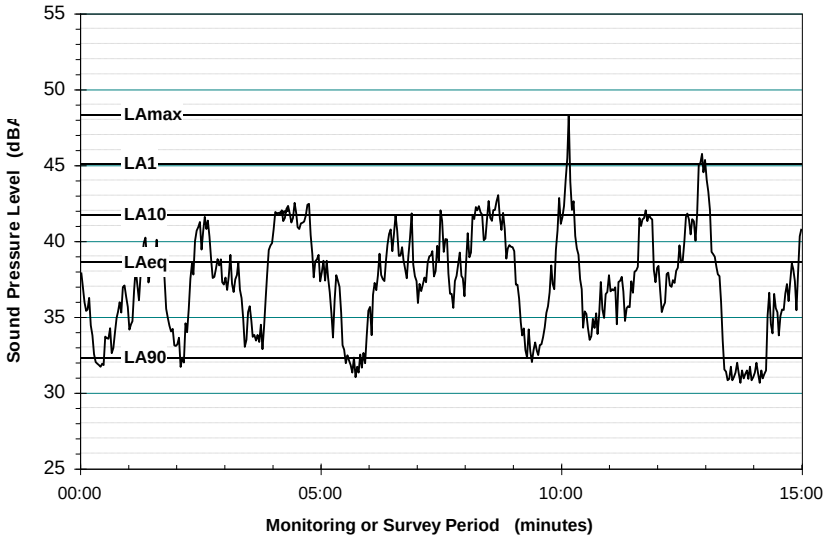


Figure A.5 Example of typical noise indices (1 second logging)

For example, the L_{Amax} parameter is used to describe the highest noise level over a relatively short period (typically 1 second), and the L_{A90} (90^{th} percentile A-weighted result) indicates ambient or background noise levels.

A.3 Ground-borne ('regenerated') noise and vibration

Vibration is the term used to describe the oscillating or transient motions in physical bodies. This motion can be described in terms of vibration displacement, vibration velocity or vibration acceleration. Most ground borne vibration (GBV) assessments are of human response / comfort first, as the risk of cosmetic and structural damage to buildings occurs at vibration levels that are orders of magnitude higher.

Vibration and sound are intimately related. Vibrating objects can generate (radiate) sound and, conversely, sound waves (particularly at lower frequencies) can also cause objects to vibrate. Noise that propagates through a structure as vibration and is radiated by vibrating wall, ceiling and floor surfaces is termed "ground-borne noise" (GBN), "regenerated noise", or sometimes "structure-borne noise".

The primary noise metrics used to describe railway induced GBN emissions in the modelling and assessments are:

- L_{vSmax}: The "typical maximum vibration level" for a train passby event, being the highest 1 second maximum root-mean square (RMS) value in dB re 1 nm/s. For operational rail GBV, this similarly refers to the 5th highest percentile of L_{vSmax} results.
- L_{ASmax}: The "typical maximum noise level" for a train passby event, in dB re 20 µPa. For operational rail GBN, L_{ASmax} refers to the maximum noise level not exceeded for 95% of rail passby events measured using the sound level meter 'slow' (1 second) response setting. Statistically this is the 5th highest percentile of L_{ASmax} results. The subscript "A" indicates that the noise levels are filtered to match normal human hearing characteristics (i.e. A-weighted).

  On the basis of guidance in International Standard ISO 14837-1 2005 Mechanical vibration - Ground-borne noise and vibration arising from rail systems – Part 1: General guidance, ground-borne noise levels are evaluated over the 20 Hz to 315 Hz frequency range.

The following figure gives examples of typical vibration levels associated with surface and underground railway projects together with the approximate sensitivities of buildings, people and precision equipment. The vibration levels are expressed in terms of the vibration velocity (in mm/s and in decibels).

Table A.17 Guide to one-second maximum RMS floor vibration level ranges for selected environments

Typical response	mm/s	dB re 1nm/s	Comments / typical events
Visible response in building items, structural damage risk	16	144	High impact events such as blasting or dynamic compaction in close proximity to structures.
	10	140	
	8.0	138	
Cosmetic damage to some buildings possible over extended periods	5.0	134	
	3.0	130	Impact pile driving, 15 metres. Freight trains at 80 km/h, ~10 metres.
Noticeable. Minor cosmetic damage is feasible to buildings that are in fragile condition / an existing state of disrepair	2.0	126	
	1.0	120	Rock breaking at 15 metres. Vibratory roller at 10 metres.
	0.8	118	Typical target for workshops.
	0.4	112	Freight trains at 80 km/h, ~40 metres. **Regenerated noise highly likely** in typical residential buildings.
Barely noticeable	0.3	110	
	0.2	106	Typical residential daytime target for continuous vibration.
Threshold of human perception to vibration	0.15	104	Passenger trains at 80 km/h, ~30 metres.
Not felt	0.10	100	Operating rooms, surgeries.
Impacts to microscopic and precision equipment	0.050	94	Recommended criterion for bench microscopes < 400x magnification
	0.030	90	
	0.025	88	Micro-surgery devices, eye surgery.
	0.012	82	Electron microscopes <30,000x magnification.
	0.010	80	
	0.006	76	Electron microscopes >30,000x magnification.
	0.003	70	Photolithography to 0.25 microns.

Vibration measurements may be carried out in a single axis or as triaxial measurements. Where triaxial measurements are used, the axes are commonly designated vertical, longitudinal (aligned toward the source) and transverse. Velocity is commonly described in terms of millimetres per second (mm/s).

APPENDIX B

B Basis of assessment

B.1 Noise

B.1.1 Background

As it is not practicable to measure noise at all locations, a validated noise model is used to predict noise levels throughout the area. Two different computation algorithms are here referred to as:

- **'Kilde'**: The Nordic Rail Traffic Noise Prediction Method (Kilde 130) has been used for rail noise assessments. This method has been refined since its introduction in 1984 and is commonly utilised for rail noise assessments within Western Australia. It calculates emission noise level based on the scheduled train operational parameters including speed, length and number of train movements, and it can predict both equivalent (L_{Aeq}) and the maximum noise levels (L_{Amax}) as required.

  The benefits of retaining Kilde 130 over more recent numerical code versions (such as Nord2000 Rail) are consistency with existing model and field data, and relatively short propagation distances over which such weather corrected models are not necessarily more accurate.

- **'N2k'**: The Nord2000 Rail prediction method is an update to the Kilde formulation based on advancements in the late 1990s. The main benefit comes from the fact that the N2k methodology calculates in terms of one-third octave bands, rather than a single number to represent all frequencies. This is critical in regards to the design of noise walls, because their effectiveness is strongly frequency dependent – the difference in noise reduction at higher frequencies is vastly different compared to low frequencies. These differences again vary with each road type, traffic mix and speed.

  Another key difference is that Nord 2000 methodology can also account for environmental factors such as ground roughness (absorption) and weather conditions much more accurately.

For this project and given limitations in as-built environmental data, the Kilde model was utilised for screening assessment purposes.

B.1.2 Source factors

Source noise levels

For both existing and build modelling scenarios, the reference noise emissions adopted for Type A and Type B passenger trains on ballasted track are presented in the following table.

Table B.18 Reference railway noise emissions, ballasted track, 15 m distance

Rolling stock	Reference Conditions		Reference Noise Emissions		Source
	Length, m	Speed, km/h	L_{50} L_{AE}, dB	L_5 L_{Amax}, dB	
Series A trains (4 cars)	86	80	89	89	Historical measurements Refer Appendix A for adjustments due to local track factors
Series B trains (6 cars)	146	80	89	88	
		30 (stowage areas)	78	75	

The reference noise emission values are based on historical noise measurements of train passbys undertaken by SLR Consulting at a number of locations in the Perth metropolitan area. These measurements have been analysed to establish the above reference noise emissions for typical rolling noise under the ballasted trackform.

There are many factors influencing rolling noise levels in practice irrespective of the rolling stock, including:

- **Rail roughness and track condition.** Local noise emissions are particularly sensitive to rail roughness conditions and driver behaviour (e.g. abrupt acceleration/deceleration while exiting/approaching rail curve sections / stations). Track roughness conditions are here assumed to be similar to that during historical measurements.
- **Speed.** The Kilde130 formulation is used to estimate the variation in noise emissions with speed according to the profiles indicated in **Section 4.2**.
- **Trackform and supports**. Trackform and support structure has been modelled throughout as either ballasted or slab track. Where direct fix slab track is introduced over ballasted track, noise levels increase as a result of generally softer rail supports (which tends to increase noise emitted by the rails) and less sound absorption (ballast provides sound absorptive benefits).
- **Local features** such as turnouts can introduce discontinuities or sudden changes which increase noise emissions. Adjustments for turnouts will be applied as per **Appendix A**.
- **Local curving noise gain**. There is potential for flange/wheel squeal noise in areas of short radius turns and turnouts assuming similar wheel and track conditions to existing infrastructure. Such noise if presented could be a key source of annoyance (e.g. exceeding set L_{Amax} trigger levels).

Track condition

Table B.19 describes the track conditions as modelled. In lieu of site specific information these are considered representative of existing and future track within the study area. From this table it can be seen that 200 m within the elevated Bayswater station area and viaducts are modelled as slab track. Noise levels from the slab track sections are likely to be higher than typical ballasted track, due to softer rail supports and no ballast to provide sound absorption.

It has been assumed that the rail tracks are in good condition and the running surface of the rail head is free of audible defects, and tracks being constructed with welded rail joints which does not cause any increase in train passby noise level.

Table B.19 Track conditions

Parameter	Ballasted track	Slab track direct fix
Location(s)	Generally	Bayswater station area (~200 m) Bridges/viaducts in Bayswater
Track structure	Ballasted on grade track, typ. 200-250 mm depth. Concrete monobloc sleepers, 700 mm centres.	Direct slab fix, 700 mm centres
Rail fastener system	AS50kg on Pandrol RP65221 installed thickness 8mm, natural rubber	AS50kg on Delkor 'ALT.1' (c_{dyn} ~20 MN/m)
Rail surface condition	ISO3095. The assessment relies on the track to be continuously welded and ground smooth to the same specification as existing (or better), and maintained to be free of defects.	

Turnouts

Turnouts/switch points have been modelled as swing nose type with a 6 dB increase in noise emissions over a 10 m distance.

Turnouts are modelled at the locations indicated in **Table B.20**.

Table B.20 Track turnout locations and modelled type

Scenarios	General location	Reference	Track and chainage(s), km	Type
Build, Build+M	West of Bayswater Station	UP main passing loop entry	MID UP 4.031	Swing nose frog (SNX)
		UP main passing loop exit	MID UP 3.702	Swing nose frog (SNX)
		DN main passing loop entry	MID DN 3.677	Swing nose frog (SNX)
		DN main passing loop exit	MID DN 4.059	Swing nose frog (SNX)
Build, Build+M		DN start of MEL	MID DN 4.255	Swing nose frog (SNX)
		UP end of MEL	MID UP 4.260	Swing nose frog (SNX)
	Flybridge east of Bayswater Station	UP main passing loop entry	MEL UP 4.960	Swing nose frog (SNX)
		UP main passing loop exit	MEL UP 5.020	Swing nose frog (SNX)
		DN main passing loop entry	MEL DN 4.965	Swing nose frog (SNX)
		DN main passing loop exit	MEL DN 5.025	Swing nose frog (SNX)

Relevance between day and night assessment periods

By inspection of relevant traffic volumes between day and night periods, $L_{Aeq,day}$ values due to traffic alone will be more than 5 dB above $L_{Aeq,night}$ and therefore will control any noise mitigation design as L_{Amax} values are considered unaffected by the time of day.

Risk of Wheel Squeal / Flanging Noise

No correction has been applied for curved track (i.e. less than 600 m radius but more than 300 m radius). It is noted that trains entering passing loops may navigate relatively sharp curvature which under certain conditions can generate additional curving noise (wheel squeal or flanging noise). Such noise if presented would be a key source of annoyance but would not exceed the **Section 3.1** objectives at nearby dwellings. Care must be taken to maximise the curvature of track where practicable and consider the use of superelevation to assist with steering. Typical local controls in practice if there are issues during service involve wayside friction modifier systems and close fitting noise walls.

Risk of Additional Structural Noise

The proposed viaduct structures in **Table B.20** are understood to use concrete spans with slab track form above. Generally, radiated noise from the viaduct structure in this instance is considered to be less significant in terms of overall objectives, and no specific adjustments are proposed. This should be reviewed further if there are attached lightweight panels or joints which could re-radiate noise.

B.1.3 Propagation factors

Outside the rail reserve, the environmental factors relevant to noise propagation of moving sources were modelled as follows:

- Topography dataset of existing conditions for the assessment area was sourced from Landgate, and the 3D rail alignment was provided by the PTA.
- Given the relatively short propagation distances, weather conditions for each time period were considered neutral as 20°C, with no wind or temperature gradient effects.
- Conservatively, for the entire project area 50% of the ground between source and receiver is assumed to be hard reflective, with the exception of significant road and sealed concrete surfaces which are modelled as 90% hard reflective.

B.1.4 Receiver adjustments

Receivers (noise affected premises considered in this assessment) were modelled as follows:

- The noise receivers were identified using aerial imagery surveys dated October 2018 as provided by Landgate and free online map resources.
- Point receivers were placed at one metre from the most exposed habitable façade of the nearest residential buildings and 1.5 m above ground level (and higher for multi-storey developments). The effects of nearby building reflections were directly calculated instead of the default façade correction (+2.5dB).
- The forecasts are made in terms of L_{Amax}, $L_{Aeq,Day}$ and $L_{Aeq,Night}$ for comparison with set objectives.

B.1.5 Uncertainty of prediction

Uncertainty (U_{95}) is the measure of dispersion or variance that may be expected with a claimed performance value. The subscript '95' means a 95% confidence interval. It represents the estimated range in which the true value lies for 95 out of 100 repeated events which is considered to be an internationally established level of risk appetite. The accuracy of the noise prediction methodology is subject to variation as follows:

Inclusions

- On site measurement system during initial noise testing. The uncertainty of measurement is here estimated for the calibration acceleration signal used in accordance with the referenced standard.
- Effect of variation in train speed against that estimated.
- Variation in rail roughness within each track section assessed from that measured.
- Variation in condition of train rolling stock (wheels, suspension etc.).
- Potential error in speed corrections as applied to field results.
- Variation in the additional noise associated with turnouts or track features, based on FTA estimates.
- Time domain effects in calculating L_{AE} results, as speeds along the alignment will vary.
- Variation in train-car length with respect to variability L_{AE} values.
- Ground absorption rate and interaction effects. Variation due to differences in ground surface type and level from that modelled.
- Effects associated with barriers as interpreted within model.
- Variation of position within receiver location.
- Resolution of measurement results reported to overall dB values.
- On site measurement system during final testing, estimated as per previous item (initial testing since the methods are considered equivalent.

The expected level of system measurement uncertainty as estimated according to the ISO Guide to Measurement Uncertainty is outlined in the following table.

Table B.21 Estimated measurement uncertainty by system

Parameter	System	U_{95} (Note [1])	Student's t-factor
L_{Aeq}, L_{Amax}	Kilde130	4 dB	2.00

Note 1 The U_{95} is the expanded uncertainty of measurement for a 95% confidence interval. It represents the estimated range in which the true value lies for 95 out of 100 repeated events.

All sound pressure levels quoted in this report are referenced to 20 micro Pascals (dB re 20µPa).

A U_{95} of 4 dB indicates that the true value is expected to be within 4 dB of the estimates provided for 95% of all observations.

Excluded / Other Sources of Error

The following items have been considered in the study but are not included in the above estimate of uncertainty because their influences were not able to be reasonably estimated:

- Local track features or discontinuities in the rail which could create short term changes in noise level, such as turn outs, short radius turns or insulated rail joints.
- Effectiveness of specific acoustic treatments, such as sound absorptive panels or rail dampers.
- Variation in rolling stock or rail infrastructure condition over time – e.g. from reduced maintenance undertaken.
- Departure in speed from the profile used in the model.

B.2 Vibration

B.2.1 Background

The prediction of ground-borne noise and vibration from rail systems is a complex and developing technical field. Whilst much research has been undertaken into various aspects associated with GBN and vibration from underground rail systems, there is currently no universally accepted modelling approach, and several different modelling approaches are currently in use (including empirical methods, finite element methods, boundary element methods and combinations of these).

International Standard ISO 14837-1 2005 "*Mechanical vibration - Ground-borne noise and vibration arising from rail systems - Part 1: General guidance*" provides useful guidance in relation to the extent of assessment that is typically required for new rail systems including:

- **Scoping Model** at the very earliest stages
- **Environmental Assessment Model** during planning process and preliminary design
- **Detailed Design Model** to finalise extent and form of mitigation for construction

Whilst a number of possible calculation methods are available, each method needs to take into account the key parameters identified in the ISO standard. For this assessment, an Environmental Assessment Model has been adopted noting that local site measurements have not yet been undertaken, although historical data has been used from similar trackform and ground conditions.

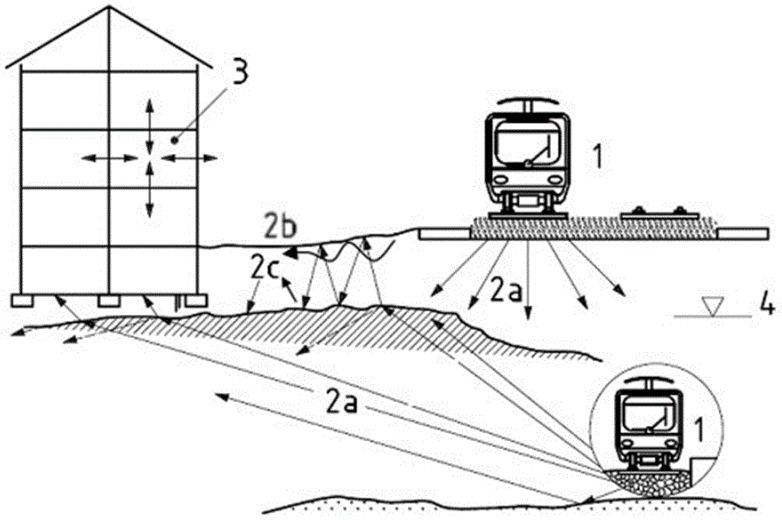
In accordance with the ISO standard, the GBN and vibration modelling considers all of the parameters that are critical in determining the absolute levels of GBN and vibration and the benefits (or otherwise) of different design and mitigation options.

The modelling for this project was conducted using an SLR-developed modelling process for the core calculations. The algorithms incorporated into the in-house model are well documented in authoritative references and are widely used within the acoustical consulting profession, both in Australia and internationally.

An overview of the modelling approach is illustrated in the below figure and takes into account source vibration levels, the vibration propagation between the tunnel and nearby building foundations, and the propagation of vibration within the building elements.

A summary of the key modelling assumptions are provided in the following sections:

- **Source** - route alignment, rolling stock design, rail type, trackform design, tunnel design, construction tolerances, operations and maintenance
- **Propagation Path** - ground type and vibration propagation wave types
- **Receiver** - Building construction



Key

1 source
2 propagation:
2 a body waves (compression, shear)
2 b surface waves (e.g. Rayleigh, Love)
2 c interface waves (e.g. Stoneley)
3 receiver (vibration, re-radiated noise)
4 water table

NOTE The components of the system comprising source, propagation and receiver are interdependent.

Figure B.6 Example of Rail Vibration Source, Propagation and Receiver System (ISO 14837)

For this project, the potential GBN and vibration impacts would be limited to receivers located within an approximate 100 m wide corridor above the centreline of the proposed rail alignments. At each chainage, forecast levels at properties beyond this distance are expected to result in compliance.

In the modelling process, the various vibration contributions from different wave types are not sufficiently defined to allow them to be calculated separately. In comparison, the detailed modelling process via numerical techniques such as finite element analysis and boundary element analysis would require the ground and buildings to be modelled in great detail to represent the propagation path over the required frequency range.

Due to the above, as well as given the extensive land area along the proposed alignment, detailed modelling approach at this stage of the assessment is not feasible. As such, the modelling was carried out using a combination of theoretical and empirical relationships to determine the attenuation and/or amplification of the ground-borne vibration levels.

B.2.2 Source factors

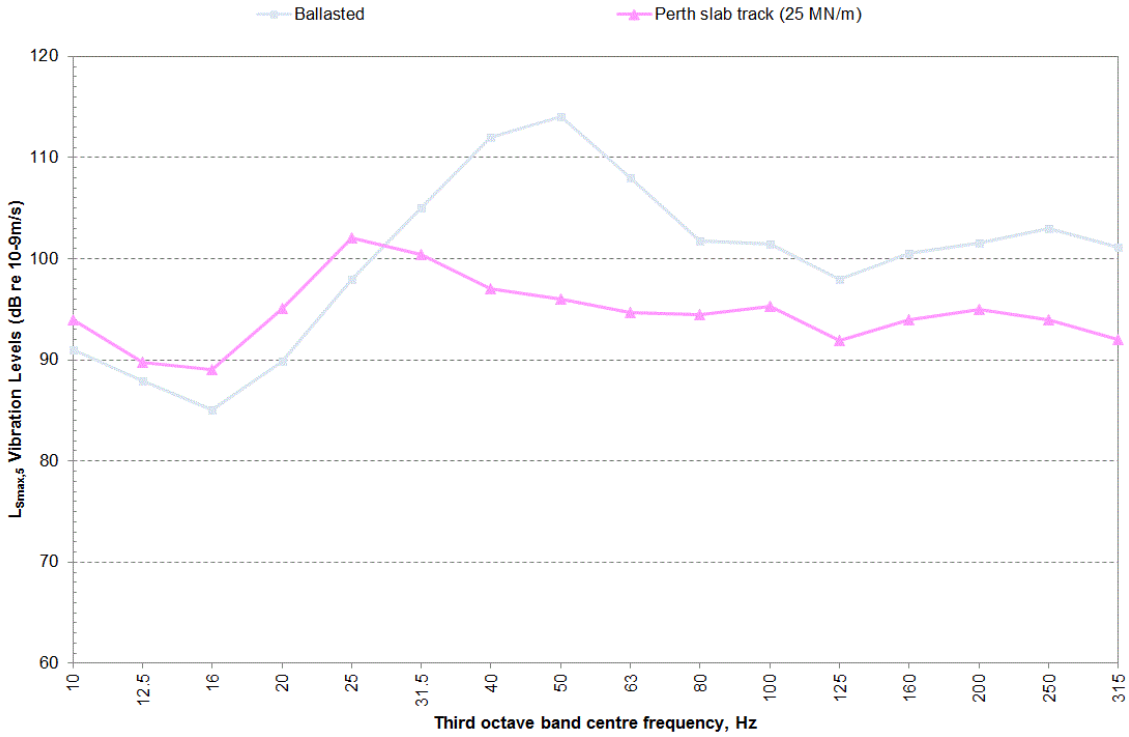
Rail Condition

The track condition is a key factor that influences source vibration levels. Measurements of rail roughness on the Perth network to indicate the track conditions were not undertaken to coincide with any of those historical (pre-EIS) vibration measurements, predominantly due to lack of local capability at the time to undertake these types of measurements.

Trackform

The figure below presents modelled source vibration levels at a set distance and speed.

Figure B.7 Source reference vibration levels modelled at 4 m from railway centreline, 80 km/hr



There are other factors influencing vibration levels in practice irrespective of the rolling stock, including:

- **Rail roughness and track condition.** Track roughness conditions are here assumed to be similar to that during historical measurements.
- **Speed.** Vibration levels are adjusted from the reference case using a '20 log (v/v_{ref})' relationship.
- **Trackform and supports**. A consistent trackform and support structure has been modelled throughout – where softer rail support pads or say track slab sections are introduced, corrections will be applied to estimate the relative change in source level emissions.
- **Local features** such as turnouts can introduce discontinuities or sudden changes which increase vibration emissions. The above source levels do not include adjustments for track that is jointed or presents gaps. The assessment relies on the temporary track to be continuously welded and ground smooth to the same specification as existing or better.

Adjustments for these items have been applied as per **Appendix B.3 below**.

Track Features

An adjustment of +6 dB was applied for track sections within 5 m of turnouts. This is in line with the US FTA "*Transit Noise and Vibration Impact Assessment*" which indicate that vibration levels are typically 6 dB higher for track sections adjacent to swingnose (SNX) turnouts for continuing trains, and is in consistency with SLR's experience on similar projects.

Speed Effects

For the movement of trains, the vibration levels typically increase by 6 dB for doubling of train speed. This relationship has been adopted for this assessment based on being reasonably representative of SLR's experience on other projects where there are relatively small differences in speed.

Speed adjustments from the reference vibration level have been made using the following formula on a 1/3 octave frequency basis:

$$L_{v,adjusted} = L_{v,reference} + 20\log_{10}\left(\frac{v}{v_{reference}}\right)$$

where

- $L_{v,reference}$ is the reference source spectra for 80 km/hr in dB
- v is the modelled speed according to the speed profile (refer **Section 4.2**) in km/hr

It is possible that trains could be timetabled to cross in separate directions adjacent to the same receiver location on a regular basis. The maximum increase in GBN and vibration levels could theoretically be up to 3 dB in the worst case situation. However, in most cases, the increase in GBN levels would only be 1 or 2 dB, due to one track having a higher contribution than the other: and this scenario (at less than 5% event occurrence at any receiver) is filtered through the use of an objective which represents 95% of events.

The maintenance of the track and rolling stock can have a significant influence on GBN and vibration levels. The source vibration levels in **Figure B**.7 are based on measurements for track and rollingstock in Perth, with the train tracks and wheel in good operational condition (i.e. no wheel-flats, corrugation etc.).

B.2.3 Propagation factors

In lieu of detailed geotechnical information, the ground is treated as isotropic and homogenous in structure, with constant distance loss rates across the study area.

Ground losses

The propagation of vibration through the ground is a complex phenomenon. Even for a simple source, the received vibration at any point includes the combined effects of several different wave types, plus reflections and other effects caused by changes in ground conditions along the propagation path.

Attenuation with distance occurs due to the geometric spreading of the wave front and due to other losses within the ground material, known as "damping". The attenuation due to geometric spreading occurs equally for all frequencies, whereas the damping component is frequency dependent, with greater loss per metre occurring at high frequencies than at low frequencies.

For geometric spreading, trains were represented by point sources spaced at 5 m intervals, with the distance attenuation from each point calculated according to:

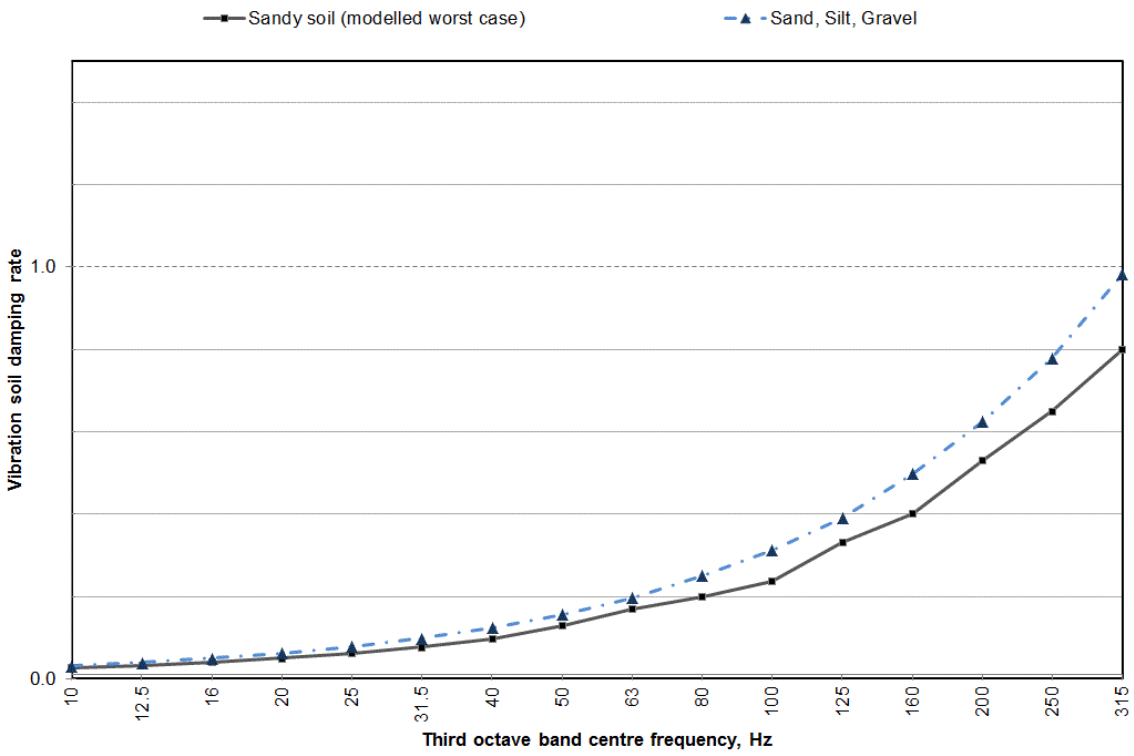
$$V(spreading) = 10\log_{10}\left(\frac{4}{r}\right)$$

where *V(spreading)* is the change in vibration level (in dB re 1 nm/s), distance r is the slant distance between the point source and the receiver location and 4 m is the reference distance of the source vibration spectrum.

Changes in trackform or train speed, curves and other local characteristics can result in variations in vibration emissions within the zone of influence of a given building. Hence, it is desirable for modelling to represent the train over its full length.

Damping losses are also estimated according to the rates shown in **Figure B.8** based on Nelson (1987)[20].

Figure B.8 Modelled ground damping loss rate, dB per metre



Receivers

Vibration incident on building structures will undergo a coupling loss, usually resulting in lower levels of vibration in the building's footings than in the surrounding ground.

Losses also occur with the transfer of vibration from floor-to-floor within buildings. The model incorporates the losses listed in Nelson (1987) and extrapolated to include frequency bands below 16 Hz.

The GBN and vibration levels attenuate by approximately 2 dB per floor for the first 4 floors and by approximately 1 dB per floor thereafter. The majority of receivers are typically either 1 to 2 storey established residences with some commercial properties near the station.

[20] P. Nelson, Chapter 16 Low Frequency Noise and Vibration from Trains (Remington, Kurzweil and Towers), in Transportation Noise Reference Book, Butterworths, 1987

Low-frequency vibration can be amplified within buildings by resonances in floors and walls. The amplification spectra presented has been adopted based on estimates by Nelson (1987).

The indoor GBN level is calculated from the floor vibration levels using a theoretical adjustment of -27 dB in line with historical guidelines; however, an adjustment of -32 dB is likely to be more appropriate in the experience of the author and subject to further study of local conditions.

B.2.4 Receiver adjustments

Adjustments for vibration entering and propagating within buildings are made according to **Table B.22.**

- **Coupling loss between structure and groundsoil** – this is the change in level as vibration enters a structure.
- **Floor to floor adjustment (per floor above ground)** – this is designed to estimate the reduction in vibration level as it transfers into upper floors.
- **Amplification adjustment** – this factor represents the estimated worst case change (increase) in noise and vibration levels due to building resonance effects. In practice, levels will significantly vary depending on location within the receiving space, e.g. whether the measurement position is near a structural wall or is at the mid-span of a floor.

Table B.22 Vibration receiver adjustments, dB

Aspect	Scenario	Third octave band centre frequency, Hz																		
		5	6.3	8	10	12	16	20	25	31.5	40	50	63	80	100	125	160	200	250	315
Coupling loss between structure and groundsoil	Large Masonry on Piles	-6	-6	-6	-6	-7	-7	-7	-8	-9	-10	-11	-12	-13	-13	-14	-14	-15	-15	-15
	Large Masonry on Spread Footings	-11	-11	-11	-11	-12	-13	-14	-14	-15	-15	-15	-15	-14	-14	-14	-14	-13	-12	-11
	2-4 Storey Masonry on Spread Footings	-5	-6	-6	-7	-9	-11	-11	-12	-13	-13	-13	-13	-13	-12	-12	-11	-10	-9	-8
	1-2 Storey Commercial	-4	-5	-5	-6	-7	-8	-8	-9	-9	-9	-9	-9	-9	-8	-8	-8	-7	-6	-5
	Single Residential	-3	-3	-4	-4	-5	-5	-6	-6	-6	-6	-6	-6	-6	-5	-5	-5	-5	-5	-5
Floor to floor adjustment (per floor above ground)	1st floor	-1	-1	-1	-1	-1.5	-1.5	-1.5	-2	-2	-2	-3	-3	-3	-2	-2	-2	-3	-3	-3
	2nd and above	-1	-1	-1	-1	-1.5	-1.5	-1.5	-2	-2	-2	-2	-2	-2	-3	-3	-3	-3	-3	-3
Amplification adjustment	Floor / wall vibration	+10	+10	+10	+10	+10	+10	+10	+11	+11	+11	+10	+9	+9	-	-	-	-	-	-
	Amplification, ground borne noise	-	-	-	-	-	-	+6	+7	+7	+8	+8	+7	+7	+5	+4	+3	+2	+1	+1

B.2.5 Uncertainty of Prediction

Inclusions

The accuracy of the prediction methodologies as outlined for ground-borne vibration ($L_{v,RMS,1s}$, 8 to 80 Hz) and noise (L_{Amax}, 20 to 315 Hz) is subject to variation in results obtained as follows:

Source Levels

- On site measurement system during initial vibration testing. The uncertainty of measurement is here estimated for the calibration acceleration signal used in accordance with the referenced standard.
- Effect of variation in actual train speed against that estimated during baseline measurements. This is taken to be 5%.
- Variation in rail roughness within each track section assessed, assumed to be controlled to within 2 dB of or less than that determined within Subiaco Tunnel in September 2015.
- Variation in condition of train rolling stock (wheels, suspension etc.). This has been estimated from (speed corrected) results for each Series at the same site (Subiaco for Series A, Anketell Tunnel for Series B), allowing for the other factors listed here.
- Potential error in speed corrections as applied to field results.
- Variation in the additional vibration associated with turnouts or track features, based on FTA estimates.
- Time domain effects in calculating one second averaged results, as speeds along the alignment will vary. For example, at speeds above 29 m/s, some one second averaged results will contain vibration from three wheelsets (say one whole car plus half of the next) instead of one or two.
- Variation in unsprung vehicle mass due to wear or condition.

Transmission Path

- Variation in track fastener performance from that claimed. A 2 dB variance has been allowed for tolerances in production and installation, temperature and non-linear effects.
- Variation in wall structural response at the base of the tunnel wall. Effect of variation in the impedance of the tunnel structure along the alignment from that measured previously.
- Ground attenuation rate. Variation due to changes in media damping, water table and stratification / diffraction effects, estimated from FTA guidelines.
- Model effects associated with 3D discretisation of alignment into 5 m lengths and individual train lengths, for a separation distance of 25 m.
- Error in calculation of effective slant distance from estimates of foundation depth, tunnel structure and scaling effects.

Building Floor Response

- Variation in coupling loss and amplification factors due to building foundation design and variation in floor and wall stiffnesses. Estimated from field measurements of residential buildings and adjacent ground soil in Perth and Nelson[21] guidelines.

[21] P. Nelson, Chapter 16 Low Frequency Noise and Vibration from Trains (Remington, Kurzweil and Towers), in Transportation Noise Reference Book, Butterworths, 1987

Room Response

- Variation of position within the receiving room. This has been estimated on the basis of the difference between the highest and lowest measured level at the same moment within a bedroom of typical dimensions and furnishings, for all measurements more than 1.5 m from a reflecting surface.
- Variation in internal reverberation time. Although regenerated noise within a small space is expected to be controlled by direct field contributions, consideration has been given to the range of influence between different furnishings and surfaces.
- Conversion of room surface vibration into airborne noise based on correlation between Nelson and US FTA[22] guidelines.
- Resolution of measurement results reported to overall dB values.
- On site measurement system during final testing, estimated as per previous item (initial testing since the methods are considered equivalent.

The combined uncertainty is provided in the following table according to the ISO Guide to Uncertainty of Measurement (GUM).

Table B.23 Estimated measurement uncertainty by system

Parameter	System	U_{90} (Note [1])	Student's t-factor
L_{vSmax}	SLR numerical code	5 dB	2.00

Note 1 The U_{95} is the expanded uncertainty of measurement for a 95% confidence interval. It represents the estimated range in which the true value lies for 95 out of 100 repeated events.

All sound pressure levels quoted in this report are referenced to 20 micro Pascals (dB re 20µPa).

A U_{90} of 5 dB indicates that the true value is expected to be no more than 5 dB above the estimate provided for 95% of all observations.

Excluded / Other Sources of Error

The following items are not included in the above estimate of uncertainty:

- Local track features or discontinuities in the rail which could create short term changes in noise level, such as turn outs, short radius turns or open joints.
- Effectiveness of specific acoustic treatments, such as sound absorptive panels or rail dampers.
- Variation in rolling stock or rail infrastructure condition over time – e.g. from reduced maintenance undertaken.
- Departure in speed from the profile used in the model.

[22] Transit Noise and Vibration Impact Assessment, United States Federal Transit Association, 2006

B.3 Design assumptions summary

Table B.24 below outlines general design assumptions for the project.

Table B.24 Design assumptions

Aspect	Parameter	Approach	Rationale, Validation
Generally	Study area extents, Part 1	Bayswater Station to Malaga Station	-
	Study area extents, Part 2	Malaga Station to Ellenbrook Stowage yards	-
	Study area extents, Part 3	Bus loops, road vehicles and stations associated with Sections A and B	-
	Track alignment	As provided to date	Have 3D of the DN, but not UP. Have assumed height of UP rail = DN rail at same chainage.
	Locations of turnouts and track features	No turnouts or local track features within tunnels which could modify source levels	-
	Design margin	0.5 dB	Ignores margin of uncertainty
Operations	Number of train movements and mix, Bayswater to Ellenbrook	Table 7	MEL-MNO-ELUP-RS-RPT-0001.E.IFU
	Traffic volumes	Table 7	-
	Rolling stock	Table 7	-
	Speed profile	Section 4.2	Note: not signal or max speed
Construction	Track type	Tunnels: Delkor ALT.1 or performance equivalent direct slab fix Ballasted track on bridges/viaducts: ballasted, AS60kg on concrete monobloc sleepers @ 700 mm centres, 250-500 mm ballast, RP65221 pads	Similar to existing Perth trackform
	Height of track above local ground level, ballasted track	600 mm from top of rail to ground capping layer (underside of ballast layer)	-
	Height of track above local ground level, slab track and bridges/viaducts	300 mm from top of rail to slab surface	-
	Tunnel cross section	Box cut and cover with dimensions 6.1 m (height) by 9.2 m (width)	Subiaco Tunnel example
	Tunnel linings	Minimum 300 mm steel fibre reinforced 40 MPa concrete	-
	Tunnel coupling loss to groundsoil	0 dB	Conservative
	Bridge and Viaduct construction generally	Steel fibre reinforced 40 MPa concrete, free of any loose panels that may generate additional noise under vibration	-

Aspect	Parameter	Approach	Rationale, Validation
	Bridges and Viaducts, dimensions of noise screening elements on each side	Outboard: Minimum 0.8 metres above top of rail, 2.4 metres from rail centreline Inboard (between lines): no screening elements	A reinforced concrete upstand for derailment containment, this dimension also refers to any additional solid screening on top.
	Bridges and Viaducts, finishes of slab and wall surfaces	Brushed concrete, 95% sound reflective	-
Vehicle dynamics	General details, length, axle loads etc.	As provided to date	-
	Wheel condition	Disc braked (UCI) No influence of wheel flats / defects	Unknown what is actual
Track dynamics	Rail type, main lines	AS50kg	-
	Rail type, turnouts	AS60kg	-
	Vertical dynamic stiffness of slab track, Delkor ALT.1	25 MN/m	-
	Vertical dynamic stiffness of ballast track, RP65221 rail pad	100 MN/m	-
	Rail condition	ISO 3095 continuously welded Welded or insulated rail joints are assumed to not increase local noise / vibration emissions.	In lieu of field data comparing to relevant benchmarks such as ISO 3095. The running surface of the rail head is free of significant defects.
	Variation in stiffness over time	Modelled levels are upper limit actual.	Stiffness values can increase with ageing over time, reducing isolation performance.
Source noise emissions	Reference passby rail noise emissions	Table B.19	-
Source vibration emissions	Base vibration overall level, ballasted track on grade, RP65221 rail pad, 5th percentile (L_5)	Figure B.7	SLR field measurements Federal Transit Administration 2006, Transit Noise and Vibration Impact Assessment, ("FTA Guidelines") Report FTA-VA-90-1003-06.
	Base vibration spectra, track slab in tunnel, represent tunnel invert position, Delkor ALT.1, 5th percentile (L_5)	Figure B.7 (Based on ballasted track on grade less 5 dB)	
	Base vibration spectra, slab track in tunnel, for softer rail pads	Adjusted based on single degree of freedom (SDOF) model, using differences in trackform stiffness and sleeper spacings as relevant.	Note some trackforms with secondary resilient elements require a multi-degree of freedom (MDOF) model
Environmental factors, generally	Ground contours	As provided	-
	Dive structures within rail corridor	Commence where ground terrain is less than 0.6 m below rail centreline, terminate to box tunnel where ground level provided is more than 5.5 metres above rail centreline	Estimated in line of design terrain

Aspect	Parameter	Approach	Rationale, Validation
	Ground contour lines / elevation data outside the rail corridor	As provided	Ground terrain outside the rail corridor will not change substantially.
	Spatial conflicted buildings	Removed within 20 metres of railway centrelines	-
Environmental factors, airborne noise	Numerical code	Kilde130	Outdated but conservative and validated against local field measurements.
	Air propagation / diffraction losses for stationary sources	-	-
	Adjustment to source levels for direct fix slab track over ballasted track	+4 dB	FTA guidelines
	Airborne noise correction for swing frog / nose crossing (SNX), per	+6 dB over 15 m	SLR field data
	Airborne noise correction for fixed frog crossing (FFX), per	+10 dB over 15 m	FTA guidelines
	Airborne noise correction for curved track less than 500 m radius but more than 300 m radius	+3 dB	Does not include local curving noise effects such as wheel squeal or flanging
	Airborne noise correction for curved track less than 300 m radius	+4 dB	
Environmental factors, vibration	Vibration correction for curved track less than 500 m radius but more than 300 m radius	+3 dB	-
	Vibration correction for curved track less than 300 m radius	+4 dB	-
	Vibration Correction for swing frog / nose crossing (SNX), per	+6 dB over 15 m	-
	Vibration Correction for fixed frog crossing (FFX), per	+10 dB over 15 m	-
	Ground soil types and layering	Isotropic, homogeneous	Considered homogenous layering
	Propagation model	'1.5D' using 3D distance between nearest building foundation and 5 metre rail segments	Industry standard approach
	Ground vibration propagation losses	Excess attenuation based on 3D distance and Figure B.8	Isotropic, homogenous media. No effects of stratification / layering / water table etc. (requires advanced '2.5D' or higher model)
	Adjustments for coupling losses into buildings	Table B.22	FTA industry guidelines
	Vibration losses between floors	Table B.22	
	Floor amplification values	Table B.22	

APPENDIX C

C Results tables

C.1 Noise

The following table lists forecasted individual property results in terms of airborne noise (ABN) for the Build+M scenario prior to mitigation. $L_{Aeq,night}$ values are omitted for brevity, as $L_{Aeq,day}$ results are forecast to control the level of compliance due to relative traffic volumes in each period. Refer to **Appendix D** for results with mitigation included.

Table C.25 Individual ABN results by location, prior to mitigation

Address	Ch.	Dist., m	Fl. (Note[1])	Usage	$L_{Aeq,day}$, dB					L_{Amax}, dB					Likely result
					Existing	Build+M	Change	Design Lvl.	Margin	Existing	Build+M	Change	Design Lvl.	Margin	
118 RAILWAY PARADE 6053	4.255	44	GF	Res.	61	59	-2	60	-1	82	80	-2	80	0	OK
120 RAILWAY PARADE 6053	4.255	53	GF	Res.	61	58	-3	60	-2	82	79	-3	80	-1	OK
125 WHATLEY CRESCENT 6053	4.255	40	GF	Res.	54	56	2	60	-4	73	74	1	80	-6	OK
127 WHATLEY CRESCENT 6053	4.255	45	GF	Res.	54	56	2	60	-4	73	75	2	80	-5	OK
129 WHATLEY CRESCENT 6053	4.255	52	GF	Res.	54	56	2	60	-4	73	75	2	80	-5	OK
131 WHATLEY CRESCENT 6053	4.255	58	GF	Res.	55	56	1	60	-4	73	74	1	80	-6	OK
3 ROBERTS STREET 6053	4.257	112	GF	Res.	47	49	2	60	-11	65	66	1	80	-14	OK
1 ROBERTS STREET 6053	4.260	88	GF	Res.	47	48	1	60	-12	64	65	1	80	-15	OK
5 ROBERTS STREET 6053	4.260	121	GF	Res.	47	49	2	60	-11	65	67	2	80	-13	OK
7 ROBERTS STREET 6053	4.265	138	GF	Res.	45	47	2	60	-13	64	66	2	80	-14	OK
123 WHATLEY CRESCENT 6053	4.265	39	GF	Res.	54	56	2	60	-4	72	75	3	80	-5	OK
46 BURNSIDE STREET 6053	4.271	136	GF	Res.	55	55	0	60	-5	73	76	3	80	-4	OK
121 WHATLEY CRESCENT 6053	4.279	41	GF	Res.	53	55	2	60	-5	72	74	2	80	-6	OK
44 BURNSIDE STREET 6053	4.280	139	GF	Res.	55	55	0	60	-5	73	76	3	80	-4	OK
42 BURNSIDE STREET 6053	4.288	143	GF	Res.	54	55	1	60	-5	73	76	3	80	-4	OK
2 LEAKE STREET 6053	4.288	71	GF	Res.	50	52	2	60	-8	67	69	2	80	-11	OK
4 LEAKE STREET 6053	4.303	84	GF	Res.	49	51	2	60	-9	68	71	3	80	-9	OK
6 LEAKE STREET 6053	4.306	97	GF	Res.	47	49	2	60	-11	68	69	1	80	-11	OK
8 LEAKE STREET 6053	4.306	110	GF	Res.	41	43	2	60	-17	59	62	3	80	-18	OK
10 LEAKE STREET 6053	4.315	121	GF	Res.	44	45	1	60	-15	64	65	1	80	-15	OK
119 WHATLEY CRESCENT 6053	4.325	38	GF	Res.	53	55	2	60	-5	71	74	3	80	-6	OK
35 BURNSIDE STREET 6053	4.332	120	GF	Res.	56	56	0	60	-4	74	78	4	80	-2	OK
117 WHATLEY CRESCENT 6053	4.334	43	GF	Res.	52	54	2	60	-6	70	72	2	80	-8	OK
115 WHATLEY CRESCENT 6053	4.346	44	GF	Res.	52	54	2	60	-6	70	72	2	80	-8	OK
33 BURNSIDE STREET 6053	4.348	118	GF	Res.	55	56	1	60	-4	74	77	3	80	-3	OK
31 BURNSIDE STREET 6053	4.356	123	GF	Res.	54	55	1	60	-5	73	76	3	80	-4	OK
1 LEAKE STREET 6053	4.356	77	GF	Res.	49	50	1	60	-10	66	68	2	80	-12	OK
7 LEAKE STREET 6053	4.359	112	GF	Res.	39	41	2	60	-19	55	58	3	80	-22	OK
31 BURNSIDE STREET 6053	4.360	131	GF	Res.	51	52	1	60	-8	71	72	1	80	-8	OK
113 WHATLEY CRESCENT 6053	4.360	43	GF	Res.	53	55	2	60	-5	71	73	2	80	-7	OK
3 LEAKE STREET 6053	4.361	87	GF	Res.	42	44	2	60	-16	60	62	2	80	-18	OK
5 LEAKE STREET 6053	4.365	102	GF	Res.	41	43	2	60	-17	60	62	2	80	-18	OK
111 WHATLEY CRESCENT 6053	4.370	44	GF	Res.	54	56	2	60	-4	72	75	3	80	-5	OK
9 LEAKE STREET 6053	4.372	121	GF	Res.	40	43	3	60	-17	55	60	5	80	-20	OK
3 LEAKE STREET 6053	4.373	92	GF	Res.	45	46	1	60	-14	62	66	4	80	-14	OK
27 BURNSIDE STREET 6053	4.377	131	GF	Res.	50	51	1	60	-9	68	68	0	80	-12	OK
1/6 MILLS AVENUE 6053	4.381	86	GF	Res.	54	55	1	60	-5	74	76	2	80	-4	OK
109 WHATLEY CRESCENT 6053	4.383	46	GF	Res.	54	57	3	60	-3	72	75	3	80	-5	OK
25 BURNSIDE STREET 6053	4.384	140	GF	Res.	46	48	2	60	-12	62	64	2	80	-16	OK
11 LEAKE STREET 6053	4.386	133	GF	Res.	40	42	2	60	-18	57	59	2	80	-21	OK
1/6 MILLS AVENUE 6053	4.393	69	GF	Res.	55	57	2	60	-3	75	77	2	80	-3	OK
107 WHATLEY CRESCENT 6053	4.395	46	GF	Res.	55	58	3	60	-2	73	77	4	80	-3	OK
102A RAILWAY PARADE 6053	4.397	32	F 1	Res.	60	58	-2	60	-2	81	78	-3	80	-2	OK
102A RAILWAY PARADE 6053	4.397	32	GF	Res.	58	55	-3	60	-5	80	76	-4	80	-4	OK
4A VEITCH STREET 6053	4.399	81	GF	Res.	47	50	3	60	-10	63	68	5	80	-12	OK
105 WHATLEY CRESCENT 6053	4.407	49	GF	Res.	54	57	3	60	-3	73	77	4	80	-3	OK

Address	[illegible]	[illegible]	[illegible]	[illegible]	$L_{Aeq,day}$, dB					L_{Amax}, dB					[illegible]
102 RAILWAY PARADE 6053	4.408	31	GF	Res.	58	56	-2	60	-4	80	74	-6	80	-6	OK
3/2 MILLS AVENUE 6053	4.411	80	GF	Res.	54	56	2	60	-4	74	75	1	80	-5	OK
2/2 MILLS AVENUE 6053	4.412	115	GF	Res.	47	50	3	60	-10	64	69	5	80	-11	OK
23 COODE STREET 6053	4.416	141	GF	Res.	43	45	2	60	-15	60	62	2	80	-18	OK
25 COODE STREET 6053	4.416	150	GF	Res.	45	46	1	60	-14	64	63	-1	80	-17	OK
100 RAILWAY PARADE 6053	4.421	33	GF	Res.	58	55	-3	60	-5	79	75	-4	80	-5	OK
103 WHATLEY CRESCENT 6053	4.421	46	GF	Res.	55	58	3	60	-2	72	76	4	80	-4	OK
6 VEITCH STREET 6053	4.422	109	GF	Res.	41	45	4	60	-15	58	63	5	80	-17	OK
5/2 MILLS AVENUE 6053	4.424	92	GF	Res.	47	51	4	60	-9	65	70	5	80	-10	OK
4 VEITCH STREET 6053	4.424	92	GF	Res.	46	51	5	60	-9	63	72	9	80	-8	OK
21 COODE STREET 6053	4.432	131	GF	Res.	43	45	2	60	-15	59	63	4	80	-17	OK
98 RAILWAY PARADE 6053	4.433	34	GF	Res.	58	56	-2	60	-4	79	74	-5	80	-6	OK
19 COODE STREET 6053	4.434	125	GF	Res.	44	47	3	60	-13	60	64	4	80	-16	OK
8 VEITCH STREET 6053	4.434	120	GF	Res.	39	42	3	60	-18	56	60	4	80	-20	OK
17 COODE STREET 6053	4.439	113	GF	Res.	47	50	3	60	-10	65	67	2	80	-13	OK
18 MURRAY STREET 6053	4.442	146	GF	Res.	39	42	3	60	-18	53	57	4	80	-23	OK
96 RAILWAY PARADE 6053	4.443	51	GF	Res.	44	48	4	60	-12	63	66	3	80	-14	OK
15 COODE STREET 6053	4.446	107	GF	Res.	46	49	3	60	-11	65	67	2	80	-13	OK
3/1 MILLS AVENUE 6053	4.448	33	GF	Res.	57	56	-1	60	-4	78	75	-3	80	-5	OK
12 MURRAY STREET 6053	4.452	138	GF	Res.	40	43	3	60	-17	57	60	3	80	-20	OK
101 WHATLEY CRESCENT 6053	4.453	46	GF	Res.	53	57	4	60	-3	69	75	6	80	-5	OK
11 COODE STREET 6053	4.457	80	GF	Res.	51	53	2	60	-7	69	72	3	80	-8	OK
9 COODE STREET 6053	4.465	67	GF	Res.	48	53	5	60	-7	66	71	5	80	-9	OK
99 WHATLEY CRESCENT 6053	4.465	47	GF	Res.	53	57	4	60	-3	69	76	7	80	-4	OK
7 COODE STREET 6053	4.478	64	GF	Res.	45	49	4	60	-11	62	67	5	80	-13	OK
3 VEITCH STREET 6053	4.478	89	GF	Res.	48	53	5	60	-7	66	74	8	80	-6	OK
97 WHATLEY CRESCENT 6053	4.478	44	GF	Res.	53	57	4	60	-3	68	75	7	80	-5	OK
5 COODE STREET 6053	4.481	53	GF	Res.	53	57	4	60	-3	72	74	2	80	-6	OK
95 WHATLEY CRESCENT 6053	4.491	42	GF	Res.	53	57	4	60	-3	69	75	6	80	-5	OK
5/5 VEITCH STREET 6053	4.499	105	GF	Res.	45	51	6	60	-9	64	69	5	80	-11	OK
93 WHATLEY CRESCENT 6053	4.503	44	GF	Res.	51	55	4	60	-5	67	74	7	80	-6	OK
4 COODE STREET 6053	4.511	89	GF	CO	50	54	4	-	-	66	73	7	-	-	OK
4 MURRAY STREET 6053	4.511	110	GF	Res.	41	46	5	60	-14	57	65	8	80	-15	OK
2 MURRAY STREET 6053	4.521	92	GF	Res.	46	52	6	60	-8	65	71	6	80	-9	OK
89 WHATLEY CRESCENT 6053	4.528	37	GF	CO	54	57	3	-	-	70	76	6	-	-	OK
4A KING WILLIAM STREET 6053	4.556	48	GF	CO	52	54	2	-	-	70	76	6	-	-	OK
12/86 RAILWAY PARADE 6053	4.561	96	GF	Res.	50	52	2	60	-8	68	69	1	80	-11	OK
4A KING WILLIAM STREET 6053	4.562	52	GF	CO	50	53	3	-	-	69	74	5	-	-	OK
1 MURRAY STREET 6053	4.565	136	GF	Res.	42	47	5	60	-13	61	68	7	80	-12	OK
6D KING WILLIAM STREET 6053	4.567	62	GF	Res.	49	52	3	60	-8	69	73	4	80	-7	OK
10 KING WILLIAM STREET 6053	4.573	72	GF	CO	48	51	3	-	-	67	71	4	-	-	OK
86 RAILWAY PARADE 6053	4.574	58	GF	Res.	54	58	4	60	-2	71	76	5	80	-4	OK
5/86 RAILWAY PARADE 6053	4.580	82	GF	Res.	48	50	2	60	-10	67	67	0	80	-13	OK
87 WHATLEY CRESCENT 6053	4.582	40	GF	CO	54	58	4	-	-	72	78	6	-	-	OK
87 WHATLEY CRESCENT 6053	4.598	40	GF	Res.	55	58	3	60	-2	73	78	5	80	-2	OK
11 KING WILLIAM STREET 6053	4.604	91	GF	RC	44	48	4	-	-	62	68	6	-	-	OK
86 RAILWAY PARADE 6053	4.604	98	GF	Res.	43	48	5	60	-12	58	67	9	80	-13	OK
8/86 RAILWAY PARADE 6053	4.606	79	GF	Res.	47	51	4	60	-9	64	72	8	80	-8	OK
13A ROSE AVENUE 6053	4.611	112	GF	Res.	44	51	7	60	-9	63	72	9	80	-8	OK
15 ROSE AVENUE 6053	4.615	122	GF	Res.	43	48	5	60	-12	60	68	8	80	-12	OK
5 KING WILLIAM STREET 6053	4.617	48	GF	CO	55	58	3	-	-	75	80	5	-	-	OK
7 KING WILLIAM STREET 6053	4.621	67	GF	CO	43	47	4	-	-	61	68	7	-	-	OK
9 KING WILLIAM STREET 6053	4.624	80	GF	RC	44	48	4	-	-	62	69	7	-	-	OK
11 ROSE AVENUE 6053	4.625	103	GF	Res.	46	50	4	60	-10	64	71	7	80	-9	OK
9 ROSE AVENUE 6053	4.631	90	GF	Res.	49	55	6	60	-5	69	75	6	80	-5	OK
85 WHATLEY CRESCENT 6053	4.635	41	GF	RC	56	61	5	-	-	76	81	5	-	-	OK
7 ROSE AVENUE 6053	4.639	81	GF	Res.	48	53	5	60	-7	68	73	5	80	-7	OK
15 KING WILLIAM STREET 6053	4.640	112	GF	CO	41	46	5	-	-	60	66	6	-	-	OK
17 KING WILLIAM STREET 6053	4.643	120	GF	Res.	41	46	5	60	-14	60	66	6	80	-14	OK
13B KING WILLIAM STREET 6053	4.644	98	GF	CO	43	48	5	-	-	62	69	7	-	-	OK
5 ROSE AVENUE 6053	4.644	67	GF	Res.	53	58	5	60	-2	70	77	7	80	-3	OK

Address	[illegible]	[illegible]	[illegible]	[illegible]	$L_{Aeq,day}$, dB					L_{Amax}, dB					[illegible]
18 ROSE AVENUE 6053	4.650	140	GF	Res.	44	48	4	60	-12	57	66	9	80	-14	OK
83 WHATLEY CRESCENT 6053	4.651	41	GF	RC	56	61	5	-	-	77	82	5	-	-	OK
81 WHATLEY CRESCENT 6053	4.663	40	GF	RC	57	62	5	-	-	78	83	5	-	-	OK
79 WHATLEY CRESCENT 6053	4.673	40	GF	RC	58	62	4	-	-	79	84	5	-	-	OK
78 RAILWAY PARADE 6053	4.674	75	F 1	H	53	57	4	60	-3	72	80	8	80	0	OK
78 RAILWAY PARADE 6053	4.674	75	GF	H	52	57	5	60	-3	72	78	6	80	-2	OK
78 RAILWAY PARADE 6053	4.701	49	F 1	H	58	60	2	60	0	77	83	6	80	3	OK
78 RAILWAY PARADE 6053	4.701	49	GF	H	56	59	3	60	-1	74	80	6	80	0	OK
4/4 HAMILTON STREET 6053	4.707	96	GF	Res.	50	53	3	60	-7	71	76	5	80	-4	OK
6 HAMILTON STREET 6053	4.717	105	GF	Res.	49	52	3	60	-8	69	75	6	80	-5	OK
75A WHATLEY CRESCENT 6053	4.728	43	GF	CO	61	62	1	-	-	83	86	3	-	-	OK
10 HAMILTON STREET 6053	4.741	132	GF	Res.	43	49	6	60	-11	63	72	9	80	-8	OK
1B BEECHBORO ROAD 6053	4.743	110	GF	RC	53	54	1	-	-	73	77	4	-	-	OK
4 BEECHBORO ROAD 6053	4.771	93	GF	Res.	51	53	2	60	-7	72	75	3	80	-5	OK
4 BEECHBORO ROAD 6053	4.774	109	GF	Res.	51	53	2	60	-7	72	75	3	80	-5	OK
1 HAMILTON STREET 6053	4.774	94	GF	Res.	48	54	6	60	-6	67	80	13	80	0	OK
2 BEECHBORO ROAD 6053	4.776	65	GF	Res.	60	58	-2	60	-2	79	79	0	80	-1	OK
8 BEECHBORO ROAD 6053	4.776	121	GF	Res.	51	53	2	60	-7	72	75	3	80	-5	OK
69 WHATLEY CRESCENT 6053	4.776	46	GF	Res.	57	61	4	60	1	77	85	8	80	5	**+1 dB**
5 HAMILTON STREET 6053	4.786	99	GF	Res.	48	54	6	60	-6	69	79	10	80	-1	OK
7A HAMILTON STREET 6053	4.786	116	GF	Res.	42	46	4	60	-14	58	66	8	80	-14	OK
39 WINIFRED ROAD 6053	4.790	131	GF	Res.	47	50	3	60	-10	63	72	9	80	-8	OK
4A BEECHBORO ROAD 6053	4.794	77	GF	Res.	60	57	-3	60	-3	78	78	0	80	-2	OK
67 WHATLEY CRESCENT 6053	4.799	44	GF	Res.	57	61	4	60	1	75	86	11	80	6	**+1 dB**
9 HAMILTON STREET 6053	4.801	122	GF	Res.	43	49	6	60	-11	60	71	11	80	-9	OK
5 HAMILTON STREET 6053	4.803	91	GF	Res.	49	54	5	60	-6	67	78	11	80	-2	OK
41 WINIFRED ROAD 6053	4.804	130	GF	Res.	52	54	2	60	-6	69	77	8	80	-3	OK
7A HAMILTON STREET 6053	4.809	104	GF	Res.	45	51	6	60	-9	64	75	11	80	-5	OK
11 HAMILTON STREET 6053	4.811	132	GF	Res.	41	47	6	60	-13	57	70	13	80	-10	OK
74 RAILWAY PARADE 6053	4.812	61	GF	Res.	61	57	-4	60	-3	80	78	-2	80	-2	OK
65 WHATLEY CRESCENT 6053	4.816	51	GF	Res.	55	61	6	60	1	73	85	12	80	5	**+1 dB**
37 WINIFRED ROAD 6053	4.823	113	GF	Res.	55	55	0	60	-5	73	76	3	80	-4	OK
72 RAILWAY PARADE 6053	4.831	53	GF	Res.	62	58	-4	60	-2	81	78	-3	80	-2	OK
35 WINIFRED ROAD 6053	4.833	115	GF	Res.	55	55	0	60	-5	74	76	2	80	-4	OK
2 SLADE STREET 6053	4.840	71	GF	Res.	52	59	7	60	-1	70	84	14	80	4	OK
70 RAILWAY PARADE 6053	4.850	52	GF	Res.	63	57	-6	60	-3	81	78	-3	80	-2	OK
33 WINIFRED ROAD 6053	4.855	105	GF	Res.	55	55	0	60	-5	75	77	2	80	-3	OK
4 SLADE STREET 6053	4.864	75	GF	Res.	52	59	7	60	-1	70	83	13	80	3	OK
31 WINIFRED ROAD 6053	4.870	98	GF	Res.	57	55	-2	60	-5	77	77	0	80	-3	OK
6 SLADE STREET 6053	4.873	88	GF	Res.	49	57	8	60	-3	68	82	14	80	2	OK
8 SLADE STREET 6053	4.881	94	GF	Res.	49	58	9	60	-2	67	82	15	80	2	OK
29 WINIFRED ROAD 6053	4.886	109	GF	Res.	56	55	-1	60	-5	76	76	0	80	-4	OK
68 RAILWAY PARADE 6053	4.889	42	GF	Res.	64	58	-6	60	-2	83	78	-5	80	-2	OK
27 WINIFRED ROAD 6053	4.892	104	GF	Res.	57	55	-2	60	-5	76	77	1	80	-3	OK
61 WHATLEY CRESCENT 6053	4.895	51	GF	Res.	55	60	5	60	0	72	83	11	80	3	OK
10 SLADE STREET 6053	4.896	102	GF	Res.	48	57	9	60	-3	66	82	16	80	2	OK
12 SLADE STREET 6053	4.906	109	GF	Res.	47	56	9	60	-4	64	81	17	80	1	OK
66 RAILWAY PARADE 6053	4.909	39	GF	Res.	64	57	-7	60	-3	83	78	-5	80	-2	OK
25 WINIFRED ROAD 6053	4.912	108	GF	Res.	54	55	1	60	-5	73	77	4	80	-3	OK
66A RAILWAY PARADE 6053	4.917	61	GF	Res.	55	54	-1	60	-6	76	76	0	80	-4	OK
14 SLADE STREET 6053	4.918	118	GF	Res.	46	56	10	60	-4	63	80	17	80	0	OK
59 WHATLEY CRESCENT 6053	4.929	53	GF	Res.	55	60	5	60	0	74	83	9	80	3	OK
64 RAILWAY PARADE 6053	4.930	32	GF	Res.	65	58	-7	60	-2	85	78	-7	80	-2	OK
23 WINIFRED ROAD 6053	4.930	109	GF	Res.	53	54	1	60	-6	71	76	5	80	-4	OK
64A RAILWAY PARADE 6053	4.935	62	GF	Res.	54	54	0	60	-6	74	75	1	80	-5	OK
16 SLADE STREET 6053	4.935	132	GF	Res.	44	54	10	60	-6	61	79	18	80	-1	OK
1A SLADE STREET 6053	4.937	72	GF	Res.	49	54	5	60	-6	69	78	9	80	-2	OK
18 SLADE STREET 6053	4.942	141	GF	Res.	40	47	7	60	-13	55	69	14	80	-11	OK
62 RAILWAY PARADE 6053	4.950	32	GF	Res.	65	59	-6	60	-1	85	79	-6	80	-1	OK
21A WINIFRED ROAD 6053	4.951	83	GF	Res.	49	55	6	60	-5	65	77	12	80	-3	OK
57 WHATLEY CRESCENT 6053	4.952	55	GF	Res.	54	60	6	60	0	73	84	11	80	4	OK

Address	Ch.	D...	F...	Use	$L_{Aeq,day}$, dB					L_{Amax}, dB					...
62A RAILWAY PARADE 6053	4.955	54	GF	Res.	46	51	5	60	-9	63	73	10	80	-7	OK
1 SLADE STREET 6053	4.966	86	GF	Res.	48	55	7	60	-5	66	79	13	80	-1	OK
1 SLADE STREET 6053	4.966	68	GF	Res.	51	58	7	60	-2	71	82	11	80	2	OK
3 SLADE STREET 6053	4.966	96	GF	Res.	43	48	5	60	-12	62	70	8	80	-10	OK
60 RAILWAY PARADE 6053	4.971	34	GF	Res.	65	59	-6	60	-1	84	80	-4	80	0	OK
55 WHATLEY CRESCENT 6053	4.984	59	GF	Res.	54	60	6	60	0	74	84	10	80	4	OK
1/56 RAILWAY PARADE 6053	4.985	54	GF	Res.	48	56	8	60	-4	66	79	13	80	-1	OK
2/56 RAILWAY PARADE 6053	4.988	27	GF	Res.	65	60	-5	60	0	85	81	-4	80	1	OK
3A SLADE STREET 6053	4.988	79	GF	Res.	47	52	5	60	-8	66	76	10	80	-4	OK
9 WINIFRED ROAD 6053	4.993	79	GF	Res.	47	53	6	60	-7	63	74	11	80	-6	OK
3/7 WINIFRED ROAD 6053	5.000	112	GF	Res.	44	50	6	60	-10	61	72	11	80	-8	OK
3/56 RAILWAY PARADE 6053	5.012	57	GF	Res.	49	56	7	60	-4	67	79	12	80	-1	OK
1/56 RAILWAY PARADE 6053	5.015	30	GF	Res.	63	60	-3	60	0	83	82	-1	80	2	OK
9 WINIFRED ROAD 6053	5.025	78	GF	Res.	46	52	6	60	-8	63	74	11	80	-6	OK
9 SLADE STREET 6053	5.026	132	GF	Res.	40	46	6	60	-14	56	68	12	80	-12	OK
7 SLADE STREET 6053	5.029	93	GF	Res.	47	54	7	60	-6	66	78	12	80	-2	OK
54 RAILWAY PARADE 6053	5.030	34	GF	CO	63	60	-3	-	-	82	83	1	-	-	OK
53 WHATLEY CRESCENT 6053	5.033	61	GF	Res.	51	60	9	60	0	70	84	14	80	4	OK
2 COBDEN STREET 6053	5.040	62	GF	Res.	51	60	9	60	0	71	85	14	80	5	OK
11 SLADE STREET 6053	5.040	135	GF	Res.	41	47	6	60	-13	56	70	14	80	-10	OK
22/7 WINIFRED ROAD 6053	5.041	111	GF	Res.	45	50	5	60	-10	61	72	11	80	-8	OK
4 COBDEN STREET 6053	5.064	74	GF	Res.	48	59	11	60	-1	65	82	17	80	2	OK
13 SLADE STREET 6053	5.070	143	GF	Res.	41	48	7	60	-12	56	70	14	80	-10	OK
50B RAILWAY PARADE 6053	5.071	24	GF	Res.	63	61	-2	60	1	82	84	2	80	4	**+1 dB**
50B RAILWAY PARADE 6053	5.071	56	GF	Res.	55	56	1	60	-4	75	78	3	80	-2	OK
2/7 WINIFRED ROAD 6053	5.071	97	GF	Res.	44	50	6	60	-10	59	71	12	80	-9	OK
6 COBDEN STREET 6053	5.072	92	GF	Res.	43	54	11	60	-6	62	79	17	80	-1	OK
17 WINIFRED ROAD 6053	5.086	81	GF	Res.	44	50	6	60	-10	60	71	11	80	-9	OK
1/48 RAILWAY PARADE 6053	5.090	58	GF	Res.	49	57	8	60	-3	65	80	15	80	0	OK
10 COBDEN STREET 6053	5.094	133	GF	Res.	39	44	5	60	-16	55	62	7	80	-18	OK
1/48 RAILWAY PARADE 6053	5.094	27	GF	Res.	62	60	-2	60	0	80	84	4	80	4	OK
8A COBDEN STREET 6053	5.098	108	GF	Res.	44	54	10	60	-6	60	78	18	80	-2	OK
46 RAILWAY PARADE 6053	5.102	26	GF	Res.	62	61	-1	60	1	81	84	3	80	4	**+1 dB**
1A COBDEN STREET 6053	5.105	60	GF	Res.	50	60	10	60	0	66	83	17	80	3	OK
10 COBDEN STREET 6053	5.108	116	GF	Res.	42	52	10	60	-8	58	75	17	80	-5	OK
7/30 WINIFRED ROAD 6053	5.108	71	GF	Res.	48	57	9	60	-3	66	81	15	80	1	OK
1 COBDEN STREET 6053	5.125	56	GF	Res.	52	60	8	60	0	70	82	12	80	2	OK
12 COBDEN STREET 6053	5.125	130	GF	Res.	41	50	9	60	-10	56	74	18	80	-6	OK
1A BASSENDEAN ROAD 6053	5.127	54	GF	Res.	50	55	5	60	-5	67	76	9	80	-4	OK
1 BASSENDEAN ROAD 6053	5.129	38	GF	Res.	58	61	3	60	1	76	84	8	80	4	**+1 dB**
82/30 WINIFRED ROAD 6053	5.129	79	GF	Res.	54	59	5	60	-1	71	80	9	80	0	OK
49 WHATLEY CRESCENT 6053	5.133	62	GF	Res.	51	59	8	60	-1	70	81	11	80	1	OK
14 COBDEN STREET 6053	5.142	139	GF	Res.	41	50	9	60	-10	56	73	17	80	-7	OK
47 WHATLEY CRESCENT 6053	5.160	62	GF	Res.	53	60	7	60	0	73	81	8	80	1	OK
45 WHATLEY CRESCENT 6053	5.173	61	GF	Res.	53	59	6	60	-1	73	80	7	80	0	OK
5 COBDEN STREET 6053	5.192	114	GF	Res.	45	51	6	60	-9	65	73	8	80	-7	OK
43 WHATLEY CRESCENT 6053	5.200	63	GF	Res.	57	60	3	60	0	78	80	2	80	0	OK
41 WHATLEY CRESCENT 6053	5.207	105	GF	Res.	46	51	5	60	-9	65	72	7	80	-8	OK
41 WHATLEY CRESCENT 6053	5.219	59	GF	Res.	59	60	1	60	0	80	80	0	80	0	OK
41 WHATLEY CRESCENT 6053	5.222	90	GF	Res.	43	47	4	60	-13	62	68	6	80	-12	OK
38 AUGHTON STREET 6053	5.229	128	GF	Res.	45	51	6	60	-9	65	73	8	80	-7	OK
8 BASSENDEAN ROAD 6053	5.242	74	GF	ID	48	53	5	-	-	69	77	8	-	-	OK
39 WHATLEY CRESCENT 6053	5.243	64	GF	Res.	60	59	-1	60	-1	80	79	-1	80	-1	OK
42 RAILWAY PARADE 6053	5.256	65	GF	ID	51	56	5	-	-	70	79	9	-	-	OK
37 WHATLEY CRESCENT 6053	5.258	65	GF	Res.	60	59	-1	60	-1	80	79	-1	80	-1	OK
34A AUGHTON STREET 6053	5.273	106	GF	Res.	47	51	4	60	-9	67	74	7	80	-6	OK
38 RAILWAY PARADE 6053	5.277	49	GF	ID	51	57	6	-	-	70	80	10	-	-	OK
34 AUGHTON STREET 6053	5.282	128	GF	Res.	44	49	5	60	-11	63	71	8	80	-9	OK
27 DURHAM ROAD 6053	5.286	131	GF	ID	44	51	7	-	-	60	74	14	-	-	OK
35 WHATLEY CRESCENT 6053	5.291	65	GF	Res.	60	58	-2	60	-2	80	79	-1	80	-1	OK
32 AUGHTON STREET 6053	5.293	125	GF	Res.	43	52	9	60	-8	60	74	14	80	-6	OK

Address	Ch.	Dist.	Floor	Use	$L_{Aeq,day}$, dB					L_{Amax}, dB					Impact
33 WHATLEY CRESCENT 6053	5.301	87	GF	Res.	45	49	4	60	-11	60	69	9	80	-11	OK
33 WHATLEY CRESCENT 6053	5.303	65	GF	Res.	60	58	-2	60	-2	80	79	-1	80	-1	OK
25 DURHAM ROAD 6053	5.304	110	GF	ID	44	53	9	-	-	62	76	14	-	-	OK
36 RAILWAY PARADE 6053	5.312	35	GF	ID	51	57	6	-	-	72	81	9	-	-	OK
31A WHATLEY CRESCENT 6053	5.318	105	GF	Res.	43	47	4	60	-13	58	66	8	80	-14	OK
30 AUGHTON STREET 6053	5.320	130	GF	Res.	42	49	7	60	-11	58	71	13	80	-9	OK
31A WHATLEY CRESCENT 6053	5.326	85	GF	Res.	51	53	2	60	-7	72	74	2	80	-6	OK
31 WHATLEY CRESCENT 6053	5.332	59	GF	Res.	61	58	-3	60	-2	82	79	-3	80	-1	OK
28A AUGHTON STREET 6053	5.339	113	GF	Res.	44	49	5	60	-11	60	69	9	80	-11	OK
29 WHATLEY CRESCENT 6053	5.348	66	GF	Res.	60	58	-2	60	-2	81	79	-2	80	-1	OK
29A WHATLEY CRESCENT 6053	5.349	87	GF	Res.	53	54	1	60	-6	74	75	1	80	-5	OK
23 DURHAM ROAD 6053	5.357	92	GF	ID	44	49	5	-	-	65	72	7	-	-	OK
26 AUGHTON STREET 6053	5.358	132	GF	Res.	43	48	5	60	-12	60	68	8	80	-12	OK
32 RAILWAY PARADE 6053	5.359	22	GF	ID	51	57	6	-	-	70	80	10	-	-	OK
8/13 DURHAM ROAD 6053	5.367	67	GF	ID	45	51	6	-	-	66	75	9	-	-	OK
26 AUGHTON STREET 6053	5.368	122	GF	Res.	44	48	4	60	-12	61	69	8	80	-11	OK
27A WHATLEY CRESCENT 6053	5.368	64	GF	Res.	61	59	-2	60	-1	82	79	-3	80	-1	OK
27C WHATLEY CRESCENT 6053	5.368	86	GF	Res.	46	51	5	60	-9	63	71	8	80	-9	OK
24 AUGHTON STREET 6053	5.375	140	GF	Res.	45	50	5	60	-10	62	69	7	80	-11	OK
25 WHATLEY CRESCENT 6053	5.382	66	GF	Res.	61	59	-2	60	-1	82	79	-3	80	-1	OK
25A WHATLEY CRESCENT 6053	5.382	90	GF	Res.	45	50	5	60	-10	62	70	8	80	-10	OK
23A WHATLEY CRESCENT 6053	5.392	119	GF	Res.	43	47	4	60	-13	60	65	5	80	-15	OK
23A WHATLEY CRESCENT 6053	5.395	99	GF	Res.	50	51	1	60	-9	72	72	0	80	-8	OK
6/13 DURHAM ROAD 6053	5.396	52	GF	ID	47	53	6	-	-	68	77	9	-	-	OK
23 WHATLEY CRESCENT 6053	5.398	72	GF	Res.	60	59	-1	60	-1	81	79	-2	80	-1	OK
11 DURHAM ROAD 6053	5.408	38	GF	ID	49	55	6	-	-	68	79	11	-	-	OK
20 AUGHTON STREET 6053	5.409	119	GF	Res.	47	49	2	60	-11	66	70	4	80	-10	OK
21A WHATLEY CRESCENT 6053	5.414	75	GF	Res.	60	58	-2	60	-2	81	78	-3	80	-2	OK
3/20 AUGHTON STREET 6053	5.415	121	GF	Res.	45	48	3	60	-12	64	67	3	80	-13	OK
18 AUGHTON STREET 6053	5.420	139	GF	Res.	46	50	4	60	-10	65	68	3	80	-12	OK
19A WHATLEY CRESCENT 6053	5.425	95	GF	Res.	54	53	-1	60	-7	77	76	-1	80	-4	OK
19 WHATLEY CRESCENT 6053	5.432	81	GF	Res.	60	57	-3	60	-3	81	78	-3	80	-2	OK
11 DURHAM ROAD 6053	5.435	29	GF	ID	50	57	7	-	-	69	80	11	-	-	OK
10 DURHAM ROAD 6053	5.438	144	GF	ID	42	50	8	-	-	59	71	12	-	-	OK
17A WHATLEY CRESCENT 6053	5.440	112	GF	Res.	46	49	3	60	-11	65	67	2	80	-13	OK
17 WHATLEY CRESCENT 6053	5.443	87	GF	Res.	59	57	-2	60	-3	81	77	-4	80	-3	OK
15A WHATLEY CRESCENT 6053	5.456	118	GF	Res.	47	49	2	60	-11	67	67	0	80	-13	OK
5/7 DURHAM ROAD 6053	5.459	21	GF	ID	51	57	6	-	-	69	81	12	-	-	OK
15 WHATLEY CRESCENT 6053	5.460	96	GF	Res.	58	55	-3	60	-5	80	76	-4	80	-4	OK
12A AUGHTON STREET 6053	5.461	142	GF	Res.	46	49	3	60	-11	64	67	3	80	-13	OK
3/8 DURHAM ROAD 6053	5.467	124	GF	ID	44	51	7	-	-	60	73	13	-	-	OK
13 WHATLEY CRESCENT 6053	5.470	103	GF	Res.	57	55	-2	60	-5	80	75	-5	80	-5	OK
9A WHATLEY CRESCENT 6053	5.489	142	GF	Res.	46	48	2	60	-12	67	66	-1	80	-14	OK
11 WHATLEY CRESCENT 6053	5.489	113	GF	Res.	58	56	-2	60	-4	80	75	-5	80	-5	OK
9 WHATLEY CRESCENT 6053	5.498	118	GF	Res.	57	55	-2	60	-5	79	73	-6	80	-7	OK
30 RAILWAY PARADE 6053	5.503	16	GF	ID	49	59	10	-	-	70	85	15	-	-	OK
2A ANZAC STREET 6053	5.505	146	GF	Res.	49	49	0	60	-11	72	70	-2	80	-10	OK
7 WHATLEY CRESCENT 6053	5.511	129	GF	Res.	56	55	-1	60	-5	78	73	-5	80	-7	OK
4 DURHAM ROAD 6053	5.543	71	GF	ID	46	55	9	-	-	64	78	14	-	-	OK
6 DURHAM ROAD 6053	5.556	131	GF	ID	44	52	8	-	-	62	73	11	-	-	OK
3 CLAVERING ROAD 6053	5.558	148	GF	ID	42	50	8	-	-	59	70	11	-	-	OK
10 CLAVERING ROAD 6053	5.613	28	GF	ID	47	58	11	-	-	66	83	17	-	-	OK
14 CLAVERING ROAD 6053	5.628	93	GF	ID	41	50	9	-	-	58	72	14	-	-	OK
4/10 CLAVERING ROAD 6053	5.649	20	GF	ID	46	59	13	-	-	66	84	18	-	-	OK
4/10 CLAVERING ROAD 6053	5.655	89	GF	ID	52	57	5	-	-	71	79	8	-	-	OK
12 CLAVERING ROAD 6053	5.660	44	GF	ID	39	55	16	-	-	59	79	20	-	-	OK
10 CLAVERING ROAD 6053	5.665	11	GF	ID	46	59	13	-	-	66	85	19	-	-	OK
14 CLAVERING ROAD 6053	5.694	59	GF	ID	35	55	20	-	-	53	80	27	-	-	OK
20 CLAVERING ROAD 6053	5.712	107	GF	ID	36	44	8	-	-	51	65	14	-	-	OK
18 CLAVERING ROAD 6053	5.732	87	GF	ID	38	54	16	-	-	59	79	20	-	-	OK
12 RAILWAY PARADE 6053	5.753	17	GF	ID	44	66	22	-	-	60	92	32	-	-	OK

Address	C h .	D i	F l	U s a	$L_{Aeq,day}$, dB					L_{Amax}, dB					
26 CLAVERING ROAD 6053	5.809	146	GF	ID	36	48	12	-	-	53	73	20	-	-	OK
2 MURIEL STREET 6053	5.839	58	GF	ID	41	57	16	-	-	61	81	20	-	-	OK
12 COSSOM PLACE 6053	5.993	138	GF	ID	34	40	6	-	-	50	58	8	-	-	OK
9/40 BASSENDEAN ROAD 6053	5.994	122	GF	ID	35	43	8	-	-	53	63	10	-	-	OK
9/40 BASSENDEAN ROAD 6053	6.011	99	GF	ID	36	44	8	-	-	53	64	11	-	-	OK
3 MURIEL STREET 6053	6.020	85	GF	ID	37	45	8	-	-	53	65	12	-	-	OK
6/5 MURIEL STREET 6053	6.060	69	GF	ID	30	44	14	-	-	46	64	18	-	-	OK
46 BASSENDEAN ROAD 6053	6.116	119	GF	ID	32	40	8	-	-	48	62	14	-	-	OK
45 BASSENDEAN ROAD 6053	6.205	137	GF	ID	27	41	14	-	-	45	63	18	-	-	OK
25 MOONEY STREET 6053	6.271	111	GF	ID	32	44	12	-	-	46	66	20	-	-	OK
25 MOONEY STREET 6053	6.272	87	GF	ID	28	45	17	-	-	44	67	23	-	-	OK
21 MOONEY STREET 6053	6.296	144	GF	ID	34	43	9	-	-	49	64	15	-	-	OK
25 MOONEY STREET 6053	6.318	103	GF	ID	28	45	17	-	-	45	66	21	-	-	OK
25 MOONEY STREET 6053	6.337	108	GF	ID	26	46	20	-	-	44	68	24	-	-	OK
7 RIO STREET 6053	6.408	102	GF	ID	29	43	14	-	-	47	67	20	-	-	OK
11 RIO STREET 6053	6.470	89	GF	ID	26	47	21	-	-	46	69	23	-	-	OK
1/18 RIO STREET 6053	6.540	112	GF	ID	24	43	19	-	-	41	68	27	-	-	OK
14 CULLEN STREET 6053	6.577	139	GF	ID	25	41	16	-	-	41	64	23	-	-	OK
41 CLUNE STREET 6053	6.600	109	GF	ID	1	48	47	-	-	0	71	71	-	-	OK
15 CULLEN STREET 6053	6.600	78	GF	ID	1	50	49	-	-	0	74	74	-	-	OK
52 IRVINE STREET 6053	6.659	145	GF	ID	1	46	45	-	-	0	72	72	-	-	OK
47 CLUNE STREET 6053	6.665	95	GF	ID	1	49	48	-	-	0	74	74	-	-	OK
51 IRVINE STREET 6053	6.755	111	GF	ID	1	47	46	-	-	0	75	75	-	-	OK
50 CLUNE STREET 6053	6.769	84	GF	ID	1	49	48	-	-	0	74	74	-	-	OK
36 PICKETT STREET 6053	6.778	135	GF	ID	1	47	46	-	-	0	72	72	-	-	OK
55 IRVINE STREET 6053	6.784	75	GF	ID	1	53	52	-	-	0	78	78	-	-	OK
1 FLINDERS STREET 6053	6.849	90	GF	ID	1	54	53	-	-	0	79	79	-	-	OK
35 PICKETT STREET 6053	6.854	144	GF	ID	1	44	43	-	-	0	68	68	-	-	OK
50 CLUNE STREET 6053	6.855	81	GF	ID	1	49	48	-	-	0	73	73	-	-	OK
3/1 FLINDERS STREET 6053	6.873	89	GF	ID	1	53	52	-	-	0	78	78	-	-	OK
60 CLUNE STREET 6053	6.881	97	GF	ID	1	47	46	-	-	0	71	71	-	-	OK
43 RAYMOND AVENUE 6053	6.958	84	GF	ID	1	53	52	-	-	0	78	78	-	-	OK
43A RAYMOND AVENUE 6053	6.977	112	GF	ID	1	50	49	-	-	0	72	72	-	-	OK
41 RAYMOND AVENUE 6053	7.006	138	GF	ID	1	45	44	-	-	0	69	69	-	-	OK
39 RAYMOND AVENUE 6053	7.011	157	GF	ID	1	43	42	-	-	0	66	66	-	-	OK
232 COLLIER ROAD 6053	7.091	98	GF	ID	1	51	50	-	-	0	72	72	-	-	OK
273 COLLIER ROAD 6053	7.137	121	GF	ID	1	50	49	-	-	0	73	73	-	-	OK
271 COLLIER ROAD 6053	7.243	98	GF	ID	1	51	50	-	-	0	76	76	-	-	OK
271 COLLIER ROAD 6053	7.325	64	GF	ID	1	56	55	-	-	0	81	81	-	-	OK
245 COLLIER ROAD 6053	7.356	64	GF	ID	1	59	58	-	-	0	85	85	-	-	OK
7 CHALKLEY PLACE 6053	7.493	70	GF	ID	1	59	58	-	-	0	84	84	-	-	OK
21 SHALFORD STREET 6053	7.495	147	GF	Res.	1	44	43	55	-11	0	68	68	75	-7	OK
23 SHALFORD STREET 6053	7.500	129	GF	Res.	1	48	47	55	-7	0	72	72	75	-3	OK
27 SHALFORD STREET 6053	7.510	83	GF	Res.	1	51	50	55	-4	0	76	76	75	1	OK
27 SHALFORD STREET 6053	7.516	115	GF	Res.	1	48	47	55	-7	0	73	73	75	-2	OK
25 SHALFORD STREET 6053	7.520	118	GF	Res.	1	49	48	55	-6	0	73	73	75	-2	OK
18 HORLEY STREET 6053	7.532	147	GF	Res.	1	47	46	55	-8	0	71	71	75	-4	OK
2 REDLANDS STREET 6053	7.533	91	GF	Res.	1	51	50	55	-4	0	76	76	75	1	OK
20 HORLEY STREET 6053	7.536	128	GF	Res.	1	47	46	55	-8	0	72	72	75	-3	OK
22 HORLEY STREET 6053	7.538	102	GF	Res.	1	45	44	55	-10	0	70	70	75	-5	OK
4 REDLANDS STREET 6053	7.550	84	GF	Res.	1	51	50	55	-4	0	75	75	75	0	OK
4 REDLANDS STREET 6053	7.564	82	GF	Res.	1	51	50	55	-4	0	75	75	75	0	OK
7 CHALKLEY PLACE 6053	7.571	115	GF	ID	1	55	54	-	-	0	80	80	-	-	OK
19 HORLEY STREET 6053	7.580	152	GF	Res.	1	48	47	55	-7	0	71	71	75	-4	OK
7 CHALKLEY PLACE 6053	7.583	147	GF	ID	1	48	47	-	-	0	73	73	-	-	OK
10/26 WOTTON STREET 6053	7.585	109	GF	ID	1	55	54	-	-	0	81	81	-	-	OK
23 HORLEY STREET 6053	7.594	116	GF	Res.	1	47	46	55	-8	0	72	72	75	-3	OK
21 HORLEY STREET 6053	7.597	133	GF	Res.	1	44	43	55	-11	0	67	67	75	-8	OK
1/26 WOTTON STREET 6053	7.601	105	GF	ID	1	55	54	-	-	0	81	81	-	-	OK
11/26 WOTTON STREET 6053	7.601	141	GF	ID	1	46	45	-	-	0	70	70	-	-	OK
27 HORLEY STREET 6053	7.606	104	GF	Res.	1	43	42	55	-12	0	66	66	75	-9	OK

Address	[illegible]	[illegible]	[illegible]	[illegible]	$L_{Aeq,day}$, dB					L_{Amax}, dB					[illegible]
27 HORLEY STREET 6053	7.609	86	GF	Res.	1	51	50	55	-4	0	75	75	75	0	OK
7 CHALKLEY PLACE 6053	7.613	98	GF	ID	1	56	55	-	-	0	82	82	-	-	OK
10/26 WOTTON STREET 6053	7.614	135	GF	ID	1	46	45	-	-	0	70	70	-	-	OK
27 HORLEY STREET 6053	7.620	93	GF	Res.	1	50	49	55	-5	0	75	75	75	0	OK
7 CHALKLEY PLACE 6053	7.627	93	GF	ID	1	56	55	-	-	0	82	82	-	-	OK
12/26 WOTTON STREET 6053	7.629	129	GF	ID	1	47	46	-	-	0	72	72	-	-	OK
8A REDLANDS STREET 6053	7.636	86	GF	Res.	1	51	50	55	-4	0	75	75	75	0	OK
4/26 WOTTON STREET 6053	7.643	122	GF	ID	1	49	48	-	-	0	74	74	-	-	OK
43 HACKBRIDGE WAY 6053	7.648	147	GF	Res.	1	47	46	55	-8	0	71	71	75	-4	OK
47 HACKBRIDGE WAY 6053	7.653	91	GF	Res.	1	51	50	55	-4	0	75	75	75	0	OK
6/26 WOTTON STREET 6053	7.653	82	GF	ID	1	57	56	-	-	0	83	83	-	-	OK
45A HACKBRIDGE WAY 6053	7.662	117	GF	Res.	1	48	47	55	-7	0	74	74	75	-1	OK
7 CHALKLEY PLACE 6053	7.669	111	GF	ID	1	51	50	-	-	0	79	79	-	-	OK
46 HACKBRIDGE WAY 6053	7.692	141	GF	Res.	1	43	42	55	-12	0	65	65	75	-10	OK
48 HACKBRIDGE WAY 6053	7.699	126	GF	Res.	1	47	46	55	-8	0	70	70	75	-5	OK
50 HACKBRIDGE WAY 6053	7.704	97	GF	Res.	1	51	50	55	-4	0	76	76	75	1	OK
12 REDLANDS STREET 6053	7.727	79	GF	Res.	1	51	50	55	-4	0	77	77	75	2	OK
31 ALDERHURST CRESCENT 6053	7.737	149	GF	Res.	1	46	45	55	-9	0	71	71	75	-4	OK
33 ALDERHURST CRESCENT 6053	7.750	115	GF	Res.	1	47	46	55	-8	0	69	69	75	-6	OK
14 REDLANDS STREET 6053	7.750	77	GF	Res.	1	51	50	55	-4	0	77	77	75	2	OK
8/170 BEECHBORO ROAD 6053	7.767	102	GF	ID	1	51	50	-	-	0	76	76	-	-	OK
16 REDLANDS STREET 6053	7.770	80	GF	Res.	1	52	51	55	-3	0	77	77	75	2	OK
33B ALDERHURST CRESCENT 6053	7.771	125	GF	Res.	1	47	46	55	-8	0	73	73	75	-2	OK
25 WOTTON STREET 6053	7.771	57	GF	ID	1	56	55	-	-	0	84	84	-	-	OK
18 REDLANDS STREET 6053	7.777	78	GF	Res.	1	52	51	55	-3	0	77	77	75	2	OK
35 ALDERHURST CRESCENT 6053	7.780	127	GF	Res.	1	47	46	55	-8	0	72	72	75	-3	OK
5/170 BEECHBORO ROAD 6053	7.791	75	GF	ID	1	55	54	-	-	0	82	82	-	-	OK
20 REDLANDS STREET 6053	7.794	79	GF	Res.	1	52	51	55	-3	0	77	77	75	2	OK
37 ALDERHURST CRESCENT 6053	7.802	127	GF	Res.	1	47	46	55	-8	0	72	72	75	-3	OK
39 ALDERHURST CRESCENT 6053	7.810	126	GF	Res.	1	48	47	55	-7	0	72	72	75	-3	OK
22 REDLANDS STREET 6053	7.810	78	GF	Res.	1	52	51	55	-3	0	77	77	75	2	OK
1/184 BEECHBORO ROAD 6053	7.819	84	GF	ID	1	55	54	-	-	0	82	82	-	-	OK
41 ALDERHURST CRESCENT 6053	7.828	111	GF	Res.	1	47	46	55	-8	0	72	72	75	-3	OK
24 REDLANDS STREET 6053	7.835	79	GF	Res.	1	52	51	55	-3	0	77	77	75	2	OK
43 ALDERHURST CRESCENT 6053	7.848	126	GF	Res.	1	45	44	55	-10	0	69	69	75	-6	OK
26A REDLANDS STREET 6053	7.851	95	GF	Res.	1	44	43	55	-11	0	68	68	75	-7	OK
26B REDLANDS STREET 6053	7.852	78	GF	Res.	1	52	51	55	-3	0	77	77	75	2	OK
45 ALDERHURST CRESCENT 6053	7.864	119	GF	Res.	1	46	45	55	-9	0	69	69	75	-6	OK
28 REDLANDS STREET 6053	7.865	79	GF	Res.	1	51	50	55	-4	0	76	76	75	1	OK
47 ALDERHURST CRESCENT 6053	7.876	128	GF	Res.	1	41	40	55	-14	0	64	64	75	-11	OK
5/184 BEECHBORO ROAD 6053	7.876	68	GF	ID	1	54	53	-	-	0	81	81	-	-	OK
30 REDLANDS STREET 6053	7.882	77	GF	Res.	1	51	50	55	-4	0	76	76	75	1	OK
4 BABINGTON CRESCENT 6053	7.890	100	GF	Res.	1	40	39	55	-15	0	63	63	75	-12	OK
171 BEECHBORO ROAD 6062	7.911	115	GF	ID	1	50	49	-	-	0	76	76	-	-	OK
173 BEECHBORO ROAD 6062	7.922	92	GF	ID	1	52	51	-	-	0	78	78	-	-	OK
1 BABINGTON CRESCENT 6053	7.932	77	GF	Res.	1	49	48	55	-6	0	73	73	75	-2	OK
3 BABINGTON CRESCENT 6053	7.937	111	GF	Res.	1	39	38	55	-16	0	63	63	75	-12	OK
5 BABINGTON CRESCENT 6053	7.940	133	GF	Res.	1	40	39	55	-15	0	61	61	75	-14	OK
198 BEECHBORO ROAD 6053	7.940	52	GF	Res.	1	50	49	55	-5	0	74	74	75	-1	OK
193 BEECHBORO ROAD 6062	7.954	51	GF	ID	1	55	54	-	-	0	80	80	-	-	OK
179 BEECHBORO ROAD 6062	7.965	106	GF	ID	1	43	42	-	-	0	70	70	-	-	OK
200 BEECHBORO ROAD 6053	7.967	76	GF	Res.	1	44	43	55	-11	0	67	67	75	-8	OK
200 BEECHBORO ROAD 6053	7.980	97	GF	Res.	1	41	40	55	-14	0	65	65	75	-10	OK
208 BEECHBORO ROAD 6053	7.988	126	GF	Res.	1	39	38	55	-16	0	61	61	75	-14	OK
206 BEECHBORO ROAD 6053	7.989	113	GF	Res.	1	39	38	55	-16	0	64	64	75	-11	OK
210A BEECHBORO ROAD 6053	7.999	146	GF	Res.	1	41	40	55	-14	0	63	63	75	-12	OK
2/231 BEECHBORO ROAD 6062	8.058	54	GF	ID	1	51	50	-	-	0	75	75	-	-	OK
5/5 SHEEN PLACE 6062	8.097	138	GF	ID	1	37	36	-	-	0	56	56	-	-	OK
1/9 SHEEN PLACE 6062	8.117	80	GF	ID	1	47	46	-	-	0	71	71	-	-	OK
1/7 SHEEN PLACE 6062	8.137	111	GF	ID	1	39	38	-	-	0	59	59	-	-	OK
197 BEECHBORO ROAD 6062	8.153	54	GF	ID	1	51	50	-	-	0	75	75	-	-	OK

Address	[illegible]	[illegible]	[illegible]	[illegible]	$L_{Aeq,day}$, dB					L_{Amax}, dB					[illegible]
197 BEECHBORO ROAD 6062	8.200	54	GF	ID	1	51	50	-	-	0	76	76	-	-	OK
10 CHERRY COURT 6062	8.285	96	GF	Res.	1	42	41	55	-13	0	66	66	75	-9	OK
6 CHERRY COURT 6062	8.306	68	GF	Res.	1	45	44	55	-10	0	70	70	75	-5	OK
13 CHERRY COURT 6062	8.318	151	GF	Res.	1	42	41	55	-13	0	65	65	75	-10	OK
11 CHERRY COURT 6062	8.330	134	GF	Res.	1	43	42	55	-12	0	66	66	75	-9	OK
4 CHERRY COURT 6062	8.337	55	GF	Res.	1	51	50	55	-4	0	74	74	75	-1	OK
9A CHERRY COURT 6062	8.339	118	GF	Res.	1	45	44	55	-10	0	68	68	75	-7	OK
9 CHERRY COURT 6062	8.346	107	GF	Res.	1	45	44	55	-10	0	69	69	75	-6	OK
7 CHERRY COURT 6062	8.355	94	GF	Res.	1	46	45	55	-9	0	69	69	75	-6	OK
37 ADDLESTONE ROAD 6062	8.358	71	GF	Res.	1	47	46	55	-8	0	71	71	75	-4	OK
33 ADDLESTONE ROAD 6062	8.361	116	GF	Res.	1	44	43	55	-11	0	66	66	75	-9	OK
35 ADDLESTONE ROAD 6062	8.365	93	GF	Res.	1	43	42	55	-12	0	66	66	75	-9	OK
7C CHERRY COURT 6062	8.368	120	GF	Res.	1	40	39	55	-15	0	63	63	75	-12	OK
31 ADDLESTONE ROAD 6062	8.371	141	GF	Res.	1	41	40	55	-14	0	63	63	75	-12	OK
428A WALTER ROAD 6062	8.375	68	GF	Res.	1	49	48	55	-6	0	74	74	75	-1	OK
428D WALTER ROAD 6062	8.377	48	GF	Res.	1	47	46	55	-8	0	73	73	75	-2	OK
7B CHERRY COURT 6062	8.380	126	GF	Res.	1	39	38	55	-16	0	60	60	75	-15	OK
428D WALTER ROAD 6062	8.389	64	GF	Res.	1	47	46	55	-8	0	74	74	75	-1	OK
7A CHERRY COURT 6062	8.390	110	GF	Res.	1	49	48	55	-6	0	75	75	75	0	OK
10 ROKEBURY WAY 6062	8.396	137	GF	Res.	1	43	42	55	-12	0	69	69	75	-6	OK
12 ROKEBURY WAY 6062	8.402	134	GF	Res.	1	41	40	55	-14	0	66	66	75	-9	OK
428D WALTER ROAD 6062	8.402	43	GF	Res.	1	49	48	55	-6	0	75	75	75	0	OK
12A ROKEBURY WAY 6062	8.403	123	GF	Res.	1	45	44	55	-10	0	72	72	75	-3	OK
428E WALTER ROAD 6062	8.408	59	GF	Res.	1	53	52	55	-2	0	77	77	75	2	OK
428E WALTER ROAD 6062	8.413	77	GF	Res.	1	52	51	55	-3	0	78	78	75	3	OK
424 WALTER ROAD 6062	8.422	93	GF	Res.	1	50	49	55	-5	0	76	76	75	1	OK
14 ROKEBURY WAY 6062	8.429	105	GF	Res.	1	50	49	55	-5	0	75	75	75	0	OK
445 WALTER ROAD 6062	8.454	66	GF	Res.	1	49	48	55	-6	0	74	74	75	-1	OK
443 WALTER ROAD 6062	8.462	108	GF	Res.	1	45	44	55	-10	0	68	68	75	-7	OK
16 ROKEBURY WAY 6062	8.466	95	GF	Res.	1	49	48	55	-6	0	75	75	75	0	OK
443 WALTER ROAD 6062	8.471	84	GF	Res.	1	50	49	55	-5	0	76	76	75	1	OK
441A WALTER ROAD 6062	8.479	97	GF	Res.	1	50	49	55	-5	0	75	75	75	0	OK
18 ROKEBURY WAY 6062	8.495	90	GF	Res.	1	49	48	55	-6	0	74	74	75	-1	OK
437 WALTER ROAD 6062	8.496	139	GF	Res.	1	49	48	55	-6	0	73	73	75	-2	OK
20 ROKEBURY WAY 6062	8.511	103	GF	Res.	1	49	48	55	-6	0	75	75	75	0	OK
22 ROKEBURY WAY 6062	8.522	113	GF	Res.	1	48	47	55	-7	0	74	74	75	-1	OK
22A ROKEBURY WAY 6062	8.540	118	GF	Res.	1	47	46	55	-8	0	73	73	75	-2	OK
110 MICKLEHAM ROAD 6062	8.581	95	GF	Res.	1	44	43	55	-11	0	67	67	75	-8	OK
110 MICKLEHAM ROAD 6062	8.593	78	GF	Res.	1	50	49	55	-5	0	74	74	75	-1	OK
106A ROBINSON ROAD 6062	8.600	84	GF	Res.	1	50	49	55	-5	0	74	74	75	-1	OK
106 ROBINSON ROAD 6062	8.623	81	GF	Res.	1	50	49	55	-5	0	74	74	75	-1	OK
104 ROBINSON ROAD 6062	8.624	117	GF	Res.	1	45	44	55	-10	0	68	68	75	-7	OK
106 ROBINSON ROAD 6062	8.633	107	GF	Res.	1	48	47	55	-7	0	74	74	75	-1	OK
113 MICKLEHAM ROAD 6062	8.634	124	GF	Res.	1	48	47	55	-7	0	72	72	75	-3	OK
100 ROBINSON ROAD 6062	8.638	139	GF	Res.	1	47	46	55	-8	0	72	72	75	-3	OK
111 MICKLEHAM ROAD 6062	8.646	78	GF	Res.	1	51	50	55	-4	0	75	75	75	0	OK
2 BRUCE ROAD 6062	8.665	127	GF	Res.	1	47	46	55	-8	0	72	72	75	-3	OK
87 ROBINSON ROAD 6062	8.669	86	GF	Res.	1	51	50	55	-4	0	76	76	75	1	OK
85 ROBINSON ROAD 6062	8.670	107	GF	Res.	1	47	46	55	-8	0	71	71	75	-4	OK
3 OKEWOOD WAY 6062	8.671	87	GF	Res.	1	50	49	55	-5	0	75	75	75	0	OK
4 OKEWOOD WAY 6062	8.672	137	GF	Res.	1	46	45	55	-9	0	70	70	75	-5	OK
2A BRUCE ROAD 6062	8.693	122	GF	Res.	1	47	46	55	-8	0	74	74	75	-1	OK
5A OKEWOOD WAY 6062	8.695	83	GF	Res.	1	50	49	55	-5	0	75	75	75	0	OK
6 OKEWOOD WAY 6062	8.695	136	GF	Res.	1	47	46	55	-8	0	71	71	75	-4	OK
4B BRUCE ROAD 6062	8.697	108	GF	Res.	1	50	49	55	-5	0	75	75	75	0	OK
5 OKEWOOD WAY 6062	8.713	82	GF	Res.	1	51	50	55	-4	0	76	76	75	1	OK
6 BRUCE ROAD 6062	8.720	114	GF	Res.	1	50	49	55	-5	0	74	74	75	-1	OK
8 BRUCE ROAD 6062	8.740	114	GF	Res.	1	50	49	55	-5	0	74	74	75	-1	OK
30 HARVEST ROAD 6062	8.749	84	GF	Res.	1	51	50	55	-4	0	77	77	75	2	OK
9 OKEWOOD WAY 6062	8.758	101	GF	Res.	1	47	46	55	-8	0	74	74	75	-1	OK
8 OKEWOOD WAY 6062	8.763	143	GF	Res.	1	48	47	55	-7	0	72	72	75	-3	OK

Address	[illegible]	[illegible]	[illegible]	[illegible]	$L_{Aeq,day}$, dB					L_{Amax}, dB					[illegible]
1/10 BRUCE ROAD 6062	8.770	117	GF	Res.	1	47	46	55	-8	0	72	72	75	-3	OK
10 BRUCE ROAD 6062	8.771	61	GF	Res.	1	50	49	55	-5	0	75	75	75	0	OK
11 OKEWOOD WAY 6062	8.774	92	GF	Res.	1	51	50	55	-4	0	77	77	75	2	OK
1/10 BRUCE ROAD 6062	8.775	88	GF	Res.	1	47	46	55	-8	0	72	72	75	-3	OK
34 HARVEST ROAD 6062	8.786	87	GF	Res.	1	52	51	55	-3	0	78	78	75	3	OK
3/10 BRUCE ROAD 6062	8.790	62	GF	Res.	1	50	49	55	-5	0	75	75	75	0	OK
12B BRUCE ROAD 6062	8.790	111	GF	Res.	1	48	47	55	-7	0	72	72	75	-3	OK
10 OKEWOOD WAY 6062	8.791	144	GF	Res.	1	48	47	55	-7	0	73	73	75	-2	OK
12A BRUCE ROAD 6062	8.796	90	GF	Res.	1	47	46	55	-8	0	73	73	75	-2	OK
14 BRUCE ROAD 6062	8.809	104	GF	Res.	1	48	47	55	-7	0	73	73	75	-2	OK
15 OKEWOOD WAY 6062	8.814	90	GF	Res.	1	52	51	55	-3	0	77	77	75	2	OK
16 BRUCE ROAD 6062	8.815	68	GF	Res.	1	48	47	55	-7	0	74	74	75	-1	OK
16 BRUCE ROAD 6062	8.819	70	GF	Res.	1	47	46	55	-8	0	73	73	75	-2	OK
20 OKEWOOD WAY 6062	8.823	139	GF	Res.	1	48	47	55	-7	0	73	73	75	-2	OK
17 OKEWOOD WAY 6062	8.836	85	GF	Res.	1	52	51	55	-3	0	77	77	75	2	OK
18A BRUCE ROAD 6062	8.844	90	GF	Res.	1	45	44	55	-10	0	68	68	75	-7	OK
18A BRUCE ROAD 6062	8.845	111	GF	Res.	1	44	43	55	-11	0	67	67	75	-8	OK
2/20 BRUCE ROAD 6062	8.845	64	GF	Res.	1	49	48	55	-6	0	74	74	75	-1	OK
5/20 BRUCE ROAD 6062	8.858	89	GF	Res.	1	44	43	55	-11	0	70	70	75	-5	OK
3/20 BRUCE ROAD 6062	8.862	121	GF	Res.	1	41	40	55	-14	0	65	65	75	-10	OK
20 BRUCE ROAD 6062	8.864	66	GF	Res.	1	50	49	55	-5	0	75	75	75	0	OK
3/20 BRUCE ROAD 6062	8.864	103	GF	Res.	1	44	43	55	-11	0	68	68	75	-7	OK
19 OKEWOOD WAY 6062	8.868	95	GF	Res.	1	50	49	55	-5	0	76	76	75	1	OK
22 BRUCE ROAD 6062	8.873	128	GF	Res.	1	45	44	55	-10	0	71	71	75	-4	OK
23 OKEWOOD WAY 6062	8.877	137	GF	Res.	1	43	42	55	-12	0	63	63	75	-12	OK
22 BRUCE ROAD 6062	8.880	104	GF	Res.	1	46	45	55	-9	0	70	70	75	-5	OK
24B BRUCE ROAD 6062	8.880	74	GF	Res.	1	50	49	55	-5	0	75	75	75	0	OK
21 OKEWOOD WAY 6062	8.885	118	GF	Res.	1	47	46	55	-8	0	72	72	75	-3	OK
38 HARVEST ROAD 6062	8.893	80	GF	Res.	1	50	49	55	-5	0	75	75	75	0	OK
24 BRUCE ROAD 6062	8.899	114	GF	Res.	1	46	45	55	-9	0	70	70	75	-5	OK
14 GAYSWOOD WAY 6062	8.904	105	GF	Res.	1	48	47	55	-7	0	74	74	75	-1	OK
24A BRUCE ROAD 6062	8.906	76	GF	Res.	1	51	50	55	-4	0	76	76	75	1	OK
26 BRUCE ROAD 6062	8.913	113	GF	Res.	1	46	45	55	-9	0	69	69	75	-6	OK
26A BRUCE ROAD 6062	8.919	80	GF	Res.	1	51	50	55	-4	0	76	76	75	1	OK
12 GAYSWOOD WAY 6062	8.921	133	GF	Res.	1	46	45	55	-9	0	70	70	75	-5	OK
14 GAYSWOOD WAY 6062	8.925	118	GF	Res.	1	49	48	55	-6	0	73	73	75	-2	OK
28A BRUCE ROAD 6062	8.937	83	GF	Res.	1	51	50	55	-4	0	76	76	75	1	OK
28 BRUCE ROAD 6062	8.938	121	GF	Res.	1	49	48	55	-6	0	73	73	75	-2	OK
10 GAYSWOOD WAY 6062	8.944	161	GF	Res.	1	47	46	55	-8	0	71	71	75	-4	OK
30B BRUCE ROAD 6062	8.953	128	GF	Res.	1	50	49	55	-5	0	74	74	75	-1	OK
20 GAYSWOOD WAY 6062	8.977	97	GF	Res.	1	49	48	55	-6	0	73	73	75	-2	OK
22 GAYSWOOD WAY 6062	8.998	98	GF	Res.	1	49	48	55	-6	0	72	72	75	-3	OK
24 GAYSWOOD WAY 6062	9.006	97	GF	Res.	1	49	48	55	-6	0	72	72	75	-3	OK
15 GAYSWOOD WAY 6062	9.010	149	GF	Res.	1	48	47	55	-7	0	72	72	75	-3	OK
15 GAYSWOOD WAY 6062	9.036	156	GF	Res.	1	46	45	55	-9	0	71	71	75	-4	OK
7 CLANDON WAY 6062	9.093	127	GF	Res.	1	49	48	55	-6	0	73	73	75	-2	OK
2A ABBEY STREET 6062	9.103	103	GF	Res.	1	49	48	55	-6	0	73	73	75	-2	OK
3 CLANDON WAY 6062	9.110	134	GF	Res.	1	49	48	55	-6	0	73	73	75	-2	OK
3 MORLEY DRIVE 6062	9.119	124	GF	Res.	1	44	43	55	-11	0	66	66	75	-9	OK
6 CLANDON WAY 6062	9.123	85	GF	Res.	1	48	47	55	-7	0	73	73	75	-2	OK
2 ABBEY STREET 6062	9.126	102	GF	Res.	1	49	48	55	-6	0	72	72	75	-3	OK
5B MORLEY DRIVE 6062	9.127	143	GF	Res.	1	46	45	55	-9	0	69	69	75	-6	OK
4 CLANDON WAY 6062	9.137	79	GF	Res.	1	49	48	55	-6	0	74	74	75	-1	OK
4 ABBEY STREET 6062	9.141	101	GF	Res.	1	49	48	55	-6	0	72	72	75	-3	OK
3 MORLEY DRIVE 6062	9.143	123	GF	Res.	1	46	45	55	-9	0	69	69	75	-6	OK
1 CLANDON WAY 6062	9.147	131	GF	Res.	1	49	48	55	-6	0	74	74	75	-1	OK
59 HAMERSLEY PLACE 6062	9.149	85	GF	Res.	1	50	49	55	-5	0	75	75	75	0	OK
6 ABBEY STREET 6062	9.165	99	GF	Res.	1	48	47	55	-7	0	72	72	75	-3	OK
41 HAMERSLEY AVENUE 6062	9.173	93	GF	Res.	1	49	48	55	-6	0	72	72	75	-3	OK
39 HAMERSLEY AVENUE 6062	9.190	129	GF	Res.	1	48	47	55	-7	0	71	71	75	-4	OK
37 HAMERSLEY AVENUE 6062	9.191	142	GF	Res.	1	48	47	55	-7	0	71	71	75	-4	OK

Address	[illegible]	[illegible]	[illegible]	[illegible]	$L_{Aeq,day}$, dB					L_{Amax}, dB					[illegible]
44 HAMERSLEY AVENUE 6062	9.225	76	GF	Res.	1	49	48	55	-6	0	73	73	75	-2	OK
65 Hamersley Pl, Morley WA 6062	9.227	97	GF	IA	1	53	52	60	-7	0	78	78	80	-2	OK
1 IVANHOE STREET 6062	9.231	101	GF	Res.	1	46	45	55	-9	0	68	68	75	-7	OK
40 HAMERSLEY AVENUE 6062	9.237	146	GF	Res.	1	49	48	55	-6	0	71	71	75	-4	OK
3B IVANHOE STREET 6062	9.249	90	GF	Res.	1	49	48	55	-6	0	73	73	75	-2	OK
2 IVANHOE STREET 6062	9.251	140	GF	Res.	1	49	48	55	-6	0	72	72	75	-3	OK
7 IVANHOE STREET 6062	9.288	99	GF	Res.	1	50	49	55	-5	0	74	74	75	-1	OK
6 IVANHOE STREET 6062	9.294	137	GF	Res.	1	50	49	55	-5	0	73	73	75	-2	OK
9 IVANHOE STREET 6062	9.300	67	GF	Res.	1	49	48	55	-6	0	72	72	75	-3	OK
43 ARALUEN STREET 6062	9.306	138	GF	Res.	1	50	49	55	-5	0	73	73	75	-2	OK
9 IVANHOE STREET 6062	9.310	83	GF	Res.	1	49	48	55	-6	0	74	74	75	-1	OK
11 IVANHOE STREET 6062	9.319	84	GF	Res.	1	49	48	55	-6	0	74	74	75	-1	OK
65 Hamersley Pl, Morley WA 6062	9.330	92	GF	IA	1	53	52	60	-7	0	77	77	80	-3	OK
13A IVANHOE STREET 6062	9.342	62	GF	Res.	1	48	47	55	-7	0	73	73	75	-2	OK
13A IVANHOE STREET 6062	9.353	91	GF	Res.	1	49	48	55	-6	0	76	76	75	1	OK
65 Hamersley Pl, Morley WA 6062	9.355	84	GF	IA	1	52	51	60	-8	0	75	75	80	-5	OK
44 ARALUEN STREET 6062	9.361	133	GF	Res.	1	51	50	55	-4	0	76	76	75	1	OK
15 IVANHOE STREET 6062	9.366	82	GF	Res.	1	52	51	55	-3	0	77	77	75	2	OK
15 IVANHOE STREET 6062	9.368	58	GF	Res.	1	48	47	55	-7	0	73	73	75	-2	OK
12A IVANHOE STREET 6062	9.382	125	GF	Res.	1	52	51	55	-3	0	76	76	75	1	OK
17 IVANHOE STREET 6062	9.385	78	GF	Res.	1	52	51	55	-3	0	77	77	75	2	OK
3 PAINE ROAD 6062	9.396	91	GF	Res.	1	49	48	55	-6	0	73	73	75	-2	OK
14 IVANHOE STREET 6062	9.399	125	GF	Res.	1	52	51	55	-3	0	77	77	75	2	OK
7 PAINE ROAD 6062	9.402	127	GF	Res.	1	44	43	55	-11	0	65	65	75	-10	OK
3 PAINE ROAD 6062	9.405	68	GF	Res.	1	52	51	55	-3	0	75	75	75	0	OK
5 PAINE ROAD 6062	9.408	104	GF	Res.	1	48	47	55	-7	0	72	72	75	-3	OK
19 IVANHOE STREET 6062	9.409	79	GF	Res.	1	53	52	55	-2	0	78	78	75	3	OK
14 IVANHOE STREET 6062	9.415	120	GF	Res.	1	52	51	55	-3	0	77	77	75	2	OK
9 HOLLETT ROAD 6062	9.418	140	GF	Res.	1	46	45	55	-9	0	69	69	75	-6	OK
20 ALFREDA AVENUE 6062	9.424	72	GF	Res.	1	52	51	55	-3	0	76	76	75	1	OK
21 IVANHOE STREET 6062	9.425	71	GF	Res.	1	53	52	55	-2	0	78	78	75	3	OK
11 HOLLETT ROAD 6062	9.439	117	GF	Res.	1	47	46	55	-8	0	70	70	75	-5	OK
23 IVANHOE STREET 6062	9.444	66	GF	Res.	1	53	52	55	-2	0	78	78	75	3	OK
22 ALFREDA AVENUE 6062	9.446	95	GF	Res.	1	47	46	55	-8	0	70	70	75	-5	OK
22 ALFREDA AVENUE 6062	9.446	76	GF	Res.	1	52	51	55	-3	0	76	76	75	1	OK
13A HOLLETT ROAD 6062	9.460	121	GF	Res.	1	48	47	55	-7	0	70	70	75	-5	OK
25 IVANHOE STREET 6062	9.461	71	GF	Res.	1	48	47	55	-7	0	73	73	75	-2	OK
25 IVANHOE STREET 6062	9.462	50	GF	Res.	1	52	51	55	-3	0	76	76	75	1	OK
24 ALFREDA AVENUE 6062	9.467	76	GF	Res.	1	54	53	55	-1	0	78	78	75	3	OK
15 HOLLETT ROAD 6062	9.474	144	GF	Res.	1	47	46	55	-8	0	70	70	75	-5	OK
44 TURON STREET 6062	9.477	119	GF	Res.	1	51	50	55	-4	0	75	75	75	0	OK
27A IVANHOE STREET 6062	9.482	47	GF	Res.	1	51	50	55	-4	0	76	76	75	1	OK
27 IVANHOE STREET 6062	9.483	72	GF	Res.	1	48	47	55	-7	0	74	74	75	-1	OK
17 HOLLETT ROAD 6062	9.492	139	GF	Res.	1	48	47	55	-7	0	70	70	75	-5	OK
20 IVANHOE STREET 6062	9.497	117	GF	Res.	1	51	50	55	-4	0	75	75	75	0	OK
29A IVANHOE STREET 6062	9.504	46	GF	Res.	1	52	51	55	-3	0	77	77	75	2	OK
28 ALFREDA AVENUE 6062	9.505	100	GF	Res.	1	49	48	55	-6	0	71	71	75	-4	OK
28 ALFREDA AVENUE 6062	9.507	80	GF	Res.	1	54	53	55	-1	0	77	77	75	2	OK
29A IVANHOE STREET 6062	9.513	73	GF	Res.	1	49	48	55	-6	0	75	75	75	0	OK
31A IVANHOE STREET 6062	9.519	58	GF	Res.	1	50	49	55	-5	0	74	74	75	-1	OK
31A IVANHOE STREET 6062	9.521	44	GF	Res.	1	51	50	55	-4	0	76	76	75	1	OK
30 ALFREDA AVENUE 6062	9.527	84	GF	Res.	1	53	52	55	-2	0	76	76	75	1	OK
43 CROESUS STREET 6062	9.537	110	GF	Res.	1	52	51	55	-3	0	76	76	75	1	OK
32 ALFREDA AVENUE 6062	9.541	90	GF	Res.	1	50	49	55	-5	0	74	74	75	-1	OK
41 CROESUS STREET 6062	9.549	136	GF	Res.	1	49	48	55	-6	0	74	74	75	-1	OK
21 HOLLETT ROAD 6062	9.550	149	GF	Res.	1	47	46	55	-8	0	67	67	75	-8	OK
33 IVANHOE STREET 6062	9.551	62	GF	Res.	1	54	53	55	-1	0	79	79	75	4	OK
35 IVANHOE STREET 6062	9.558	68	GF	Res.	1	53	52	55	-2	0	78	78	75	3	OK
34 ALFREDA AVENUE 6062	9.566	84	GF	Res.	1	52	51	55	-3	0	73	73	75	-2	OK
25B HOLLETT ROAD 6062	9.579	145	GF	Res.	1	43	42	55	-12	0	64	64	75	-11	OK
37 IVANHOE STREET 6062	9.582	66	GF	Res.	1	55	54	55	0	0	79	79	75	4	OK

Address	[illegible]	[illegible]	[illegible]	[illegible]	$L_{Aeq,day}$, dB					L_{Amax}, dB					[illegible]
36 ALFREDA AVENUE 6062	9.583	87	GF	Res.	1	51	50	55	-4	0	73	73	75	-2	OK
44 CROESUS STREET 6062	9.585	107	GF	Res.	1	52	51	55	-3	0	77	77	75	2	OK
25B HOLLETT ROAD 6062	9.586	130	GF	Res.	1	46	45	55	-9	0	68	68	75	-7	OK
39A IVANHOE STREET 6062	9.600	55	GF	Res.	1	54	53	55	-1	0	79	79	75	4	OK
4A BRIAN AVENUE 6062	9.603	123	GF	Res.	1	46	45	55	-9	0	68	68	75	-7	OK
1/44 CROESUS STREET 6062	9.603	108	GF	Res.	1	52	51	55	-3	0	76	76	75	1	OK
38 ALFREDA AVENUE 6062	9.608	88	GF	Res.	1	52	51	55	-3	0	73	73	75	-2	OK
2 BRIAN AVENUE 6062	9.617	142	GF	Res.	1	44	43	55	-11	0	66	66	75	-9	OK
41A IVANHOE STREET 6062	9.618	39	GF	Res.	1	52	51	55	-3	0	76	76	75	1	OK
1/44 CROESUS STREET 6062	9.619	108	GF	Res.	1	52	51	55	-3	0	76	76	75	1	OK
41A IVANHOE STREET 6062	9.619	58	GF	Res.	1	47	46	55	-8	0	71	71	75	-4	OK
4 BRIAN AVENUE 6062	9.623	125	GF	Res.	1	46	45	55	-9	0	68	68	75	-7	OK
40 ALFREDA AVENUE 6062	9.631	89	GF	Res.	1	52	51	55	-3	0	74	74	75	-1	OK
28 IVANHOE STREET 6062	9.636	108	GF	Res.	1	52	51	55	-3	0	76	76	75	1	OK
43A IVANHOE STREET 6062	9.640	57	GF	Res.	1	50	49	55	-5	0	74	74	75	-1	OK
43A IVANHOE STREET 6062	9.640	38	GF	Res.	1	52	51	55	-3	0	76	76	75	1	OK
41 HANNANS STREET 6062	9.641	125	GF	Res.	1	46	45	55	-9	0	70	70	75	-5	OK
30 IVANHOE STREET 6062	9.653	106	GF	Res.	1	52	51	55	-3	0	77	77	75	2	OK
41 HANNANS STREET 6062	9.657	128	GF	Res.	1	47	46	55	-8	0	70	70	75	-5	OK
41 HANNANS STREET 6062	9.659	149	GF	Res.	1	46	45	55	-9	0	68	68	75	-7	OK
3 BRIAN AVENUE 6062	9.662	145	GF	Res.	1	47	46	55	-8	0	69	69	75	-6	OK
43 HANNANS STREET 6062	9.665	106	GF	Res.	1	52	51	55	-3	0	76	76	75	1	OK
3 BRIAN AVENUE 6062	9.673	122	GF	Res.	1	48	47	55	-7	0	69	69	75	-6	OK
5 BRIAN AVENUE 6062	9.676	96	GF	Res.	1	51	50	55	-4	0	76	76	75	1	OK
47B IVANHOE STREET 6062	9.685	50	GF	Res.	1	55	54	55	0	0	80	80	75	5	OK
44A ALFREDA AVENUE 6062	9.687	88	GF	Res.	1	53	52	55	-2	0	77	77	75	2	OK
49 IVANHOE STREET 6062	9.701	60	GF	Res.	1	53	52	55	-2	0	79	79	75	4	OK
44 HANNANS STREET 6062	9.705	105	GF	Res.	1	51	50	55	-4	0	75	75	75	0	OK
42A HANNANS STREET 6062	9.707	125	GF	Res.	1	44	43	55	-11	0	66	66	75	-9	OK
35A HOLLETT ROAD 6062	9.709	134	GF	Res.	1	51	50	55	-4	0	73	73	75	-2	OK
36 IVANHOE STREET 6062	9.712	104	GF	Res.	1	51	50	55	-4	0	74	74	75	-1	OK
46 ALFREDA AVENUE 6062	9.716	89	GF	Res.	1	53	52	55	-2	0	76	76	75	1	OK
51 IVANHOE STREET 6062	9.718	60	GF	Res.	1	54	53	55	-1	0	79	79	75	4	OK
38 IVANHOE STREET 6062	9.727	123	GF	Res.	1	43	42	55	-12	0	65	65	75	-10	OK
38 IVANHOE STREET 6062	9.727	103	GF	Res.	1	51	50	55	-4	0	74	74	75	-1	OK
48 ALFREDA AVENUE 6062	9.737	89	GF	Res.	1	52	51	55	-3	0	75	75	75	0	OK
53A IVANHOE STREET 6062	9.739	35	GF	Res.	1	52	51	55	-3	0	77	77	75	2	OK
53 IVANHOE STREET 6062	9.740	62	GF	Res.	1	47	46	55	-8	0	70	70	75	-5	OK
39B HOLLETT ROAD 6062	9.748	143	GF	Res.	1	50	49	55	-5	0	74	74	75	-1	OK
50 ALFREDA AVENUE 6062	9.754	93	GF	Res.	1	52	51	55	-3	0	75	75	75	0	OK
55 IVANHOE STREET 6062	9.766	50	GF	Res.	1	53	52	55	-2	0	79	79	75	4	OK
43 MARITANA STREET 6062	9.774	105	GF	Res.	1	51	50	55	-4	0	75	75	75	0	OK
41A HOLLETT ROAD 6062	9.776	134	GF	Res.	1	51	50	55	-4	0	74	74	75	-1	OK
57 IVANHOE STREET 6062	9.777	47	GF	Res.	1	54	53	55	-1	0	79	79	75	4	OK
52 ALFREDA AVENUE 6062	9.781	90	GF	Res.	1	52	51	55	-3	0	76	76	75	1	OK
39 MARITANA STREET 6062	9.781	153	GF	Res.	1	48	47	55	-7	0	70	70	75	-5	OK
43 MARITANA STREET 6062	9.784	130	GF	Res.	1	49	48	55	-6	0	73	73	75	-2	OK
59 IVANHOE STREET 6062	9.804	54	GF	Res.	1	54	53	55	-1	0	78	78	75	3	OK
54 ALFREDA AVENUE 6062	9.813	94	GF	Res.	1	52	51	55	-3	0	76	76	75	1	OK
61B IVANHOE STREET 6062	9.823	49	GF	Res.	1	54	53	55	-1	0	78	78	75	3	OK
45A HOLLETT ROAD 6062	9.830	132	GF	Res.	1	50	49	55	-5	0	71	71	75	-4	OK
56 ALFREDA AVENUE 6062	9.831	88	GF	Res.	1	53	52	55	-2	0	76	76	75	1	OK
63 IVANHOE STREET 6062	9.840	60	GF	Res.	1	53	52	55	-2	0	78	78	75	3	OK
58 ALFREDA AVENUE 6062	9.852	87	GF	Res.	1	53	52	55	-2	0	76	76	75	1	OK
47 HOLLETT ROAD 6062	9.852	147	GF	Res.	1	49	48	55	-6	0	71	71	75	-4	OK
46 IVANHOE STREET 6062	9.852	105	GF	Res.	1	51	50	55	-4	0	75	75	75	0	OK
65 IVANHOE STREET 6062	9.860	56	GF	Res.	1	53	52	55	-2	0	78	78	75	3	OK
50 IVANHOE STREET 6062	9.868	105	GF	Res.	1	51	50	55	-4	0	75	75	75	0	OK
60 ALFREDA AVENUE 6062	9.871	88	GF	Res.	1	53	52	55	-2	0	76	76	75	1	OK
49A HOLLETT ROAD 6062	9.875	131	GF	Res.	1	50	49	55	-5	0	72	72	75	-3	OK
67A IVANHOE STREET 6062	9.880	37	GF	Res.	1	51	50	55	-4	0	76	76	75	1	OK

Address	[illegible]	[illegible]	[illegible]	[illegible]	$L_{Aeq,day}$, dB					L_{Amax}, dB					[illegible]
51 HOLLETT ROAD 6062	9.888	141	GF	Res.	1	48	47	55	-7	0	72	72	75	-3	OK
67 IVANHOE STREET 6062	9.888	66	GF	Res.	1	49	48	55	-6	0	74	74	75	-1	OK
50 IVANHOE STREET 6062	9.900	106	GF	Res.	1	51	50	55	-4	0	73	73	75	-2	OK
69 IVANHOE STREET 6062	9.900	58	GF	Res.	1	53	52	55	-2	0	78	78	75	3	OK
62 ALFREDA AVENUE 6062	9.901	86	GF	Res.	1	53	52	55	-2	0	76	76	75	1	OK
53 HOLLETT ROAD 6062	9.917	144	GF	Res.	1	50	49	55	-5	0	73	73	75	-2	OK
71 IVANHOE STREET 6062	9.922	60	GF	Res.	1	53	52	55	-2	0	78	78	75	3	OK
55A HOLLETT ROAD 6062	9.936	153	GF	Res.	1	48	47	55	-7	0	71	71	75	-4	OK
66 ALFREDA AVENUE 6062	9.938	83	GF	Res.	1	53	52	55	-2	0	76	76	75	1	OK
55A HOLLETT ROAD 6062	9.942	129	GF	Res.	1	51	50	55	-4	0	73	73	75	-2	OK
73 IVANHOE STREET 6062	9.944	39	GF	Res.	1	50	49	55	-5	0	75	75	75	0	OK
75 IVANHOE STREET 6062	9.953	60	GF	Res.	1	48	47	55	-7	0	73	73	75	-2	OK
75A IVANHOE STREET 6062	9.961	41	GF	Res.	1	51	50	55	-4	0	75	75	75	0	OK
57A HOLLETT ROAD 6062	9.962	128	GF	Res.	1	45	44	55	-10	0	64	64	75	-11	OK
68A ALFREDA AVENUE 6062	9.963	107	GF	Res.	1	49	48	55	-6	0	70	70	75	-5	OK
68 ALFREDA AVENUE 6062	9.966	83	GF	Res.	1	53	52	55	-2	0	76	76	75	1	OK
70 ALFREDA AVENUE 6062	9.980	77	GF	Res.	1	53	52	55	-2	0	76	76	75	1	OK
4/81 IVANHOE STREET 6062	9.981	42	GF	Res.	1	51	50	55	-4	0	75	75	75	0	OK
59 HOLLETT ROAD 6062	9.987	149	GF	Res.	1	49	48	55	-6	0	71	71	75	-4	OK
3/81 IVANHOE STREET 6062	9.990	61	GF	Res.	1	51	50	55	-4	0	76	76	75	1	OK
3/81 IVANHOE STREET 6062	9.992	71	GF	Res.	1	51	50	55	-4	0	76	76	75	1	OK
81 IVANHOE STREET 6062	10.000	72	GF	Res.	1	51	50	55	-4	0	75	75	75	0	OK
81 IVANHOE STREET 6062	10.002	59	GF	Res.	1	51	50	55	-4	0	76	76	75	1	OK
72 ALFREDA AVENUE 6062	10.008	81	GF	Res.	1	53	52	55	-2	0	76	76	75	1	OK
61 HOLLETT ROAD 6062	10.008	146	GF	Res.	1	49	48	55	-6	0	72	72	75	-3	OK
4/81 IVANHOE STREET 6062	10.015	45	GF	Res.	1	51	50	55	-4	0	74	74	75	-1	OK
63 HOLLETT ROAD 6062	10.026	122	GF	Res.	1	50	49	55	-5	0	73	73	75	-2	OK
77 IVANHOE STREET 6062	10.027	74	GF	Res.	1	51	50	55	-4	0	75	75	75	0	OK
74 ALFREDA AVENUE 6062	10.029	83	GF	Res.	1	53	52	55	-2	0	76	76	75	1	OK
63 HOLLETT ROAD 6062	10.032	146	GF	Res.	1	49	48	55	-6	0	70	70	75	-5	OK
76 ALFREDA AVENUE 6062	10.044	84	GF	Res.	1	53	52	55	-2	0	76	76	75	1	OK
50 CHAFFERS STREET 6062	10.046	97	GF	Res.	1	51	50	55	-4	0	74	74	75	-1	OK
46 CHAFFERS STREET 6062	10.048	119	GF	Res.	1	50	49	55	-5	0	73	73	75	-2	OK
65 HOLLETT ROAD 6062	10.052	142	GF	Res.	1	50	49	55	-5	0	72	72	75	-3	OK
50 CHAFFERS STREET 6062	10.062	70	GF	Res.	1	53	52	55	-2	0	77	77	75	2	OK
78 ALFREDA AVENUE 6062	10.069	85	GF	Res.	1	53	52	55	-2	0	76	76	75	1	OK
67 HOLLETT ROAD 6062	10.073	142	GF	Res.	1	50	49	55	-5	0	72	72	75	-3	OK
48A CHAFFERS STREET 6062	10.075	92	GF	Res.	1	50	49	55	-5	0	74	74	75	-1	OK
80 ALFREDA AVENUE 6062	10.087	88	GF	Res.	1	53	52	55	-2	0	76	76	75	1	OK
47A DEVONSHIRE STREET 6062	10.087	92	GF	Res.	1	50	49	55	-5	0	74	74	75	-1	OK
69 HOLLETT ROAD 6062	10.092	136	GF	Res.	1	50	49	55	-5	0	71	71	75	-4	OK
51 DEVONSHIRE STREET 6062	10.096	52	GF	Res.	1	54	53	55	-1	0	78	78	75	3	OK
47B DEVONSHIRE STREET 6062	10.102	97	GF	Res.	1	48	47	55	-7	0	70	70	75	-5	OK
51 DEVONSHIRE STREET 6062	10.114	81	GF	Res.	1	51	50	55	-4	0	76	76	75	1	OK
48 LINDSAY DRIVE 6062	10.116	79	GF	Res.	1	53	52	55	-2	0	76	76	75	1	OK
71 HOLLETT ROAD 6062	10.128	125	GF	Res.	1	50	49	55	-5	0	72	72	75	-3	OK
46 LINDSAY DRIVE 6062	10.133	95	GF	Res.	1	51	50	55	-4	0	75	75	75	0	OK
44 LINDSAY DRIVE 6062	10.134	108	GF	Res.	1	50	49	55	-5	0	74	74	75	-1	OK
1/48 SHADWELL WAY 6062	10.143	32	GF	Res.	1	53	52	55	-2	0	78	78	75	3	OK
38 DEVONSHIRE STREET 6062	10.152	96	GF	Res.	1	52	51	55	-3	0	75	75	75	0	OK
4/48 SHADWELL WAY 6062	10.164	33	GF	Res.	1	53	52	55	-2	0	78	78	75	3	OK
35 LINDSAY DRIVE 6062	10.167	108	GF	Res.	1	50	49	55	-5	0	73	73	75	-2	OK
37 LINDSAY DRIVE 6062	10.167	82	GF	Res.	1	53	52	55	-2	0	76	76	75	1	OK
45 SHADWELL WAY 6062	10.170	92	GF	Res.	1	51	50	55	-4	0	75	75	75	0	OK
31 LINDSAY DRIVE 6062	10.171	156	GF	Res.	1	49	48	55	-6	0	71	71	75	-4	OK
35 LINDSAY DRIVE 6062	10.171	131	GF	Res.	1	49	48	55	-6	0	72	72	75	-3	OK
43 SHADWELL WAY 6062	10.191	95	GF	Res.	1	52	51	55	-3	0	75	75	75	0	OK
4/48 SHADWELL WAY 6062	10.194	51	GF	Res.	1	52	51	55	-3	0	75	75	75	0	OK
86 ALFREDA AVENUE 6062	10.199	87	GF	Res.	1	53	52	55	-2	0	76	76	75	1	OK
3 BATT COURT 6062	10.207	118	GF	Res.	1	51	50	55	-4	0	72	72	75	-3	OK
41 SHADWELL WAY 6062	10.213	100	GF	Res.	1	51	50	55	-4	0	75	75	75	0	OK

Address	[illegible]	[illegible]	[illegible]	[illegible]	$L_{Aeq,day}$, dB					L_{Amax}, dB					[illegible]
1 BATT COURT 6062	10.221	88	GF	Res.	1	53	52	55	-2	0	76	76	75	1	OK
5 BATT COURT 6062	10.222	142	GF	Res.	1	49	48	55	-6	0	73	73	75	-2	OK
46 SHADWELL WAY 6062	10.222	44	GF	Res.	1	54	53	55	-1	0	79	79	75	4	OK
44 SHADWELL WAY 6062	10.244	48	GF	Res.	1	54	53	55	-1	0	79	79	75	4	OK
90 ALFREDA AVENUE 6062	10.260	91	GF	Res.	1	53	52	55	-2	0	76	76	75	1	OK
6 BATT COURT 6062	10.265	147	GF	Res.	1	51	50	55	-4	0	74	74	75	-1	OK
42 SHADWELL WAY 6062	10.273	51	GF	Res.	1	55	54	55	0	0	80	80	75	5	OK
92 ALFREDA AVENUE 6062	10.277	92	GF	Res.	1	53	52	55	-2	0	76	76	75	1	OK
4 BATT COURT 6062	10.280	122	GF	Res.	1	49	48	55	-6	0	71	71	75	-4	OK
40 SHADWELL WAY 6062	10.291	62	GF	Res.	1	55	54	55	0	0	79	79	75	4	OK
40 SHADWELL WAY 6062	10.295	82	GF	Res.	1	52	51	55	-3	0	76	76	75	1	OK
94 ALFREDA AVENUE 6062	10.299	88	GF	Res.	1	53	52	55	-2	0	76	76	75	1	OK
36 SHADWELL WAY 6062	10.307	91	GF	Res.	1	51	50	55	-4	0	76	76	75	1	OK
1 DAVIS COURT 6062	10.316	88	GF	Res.	1	50	49	55	-5	0	74	74	75	-1	OK
94 ALFREDA AVENUE 6062	10.321	118	GF	Res.	1	49	48	55	-6	0	74	74	75	-1	OK
30 MCPHERSON AVENUE 6062	10.322	133	GF	Res.	1	48	47	55	-7	0	72	72	75	-3	OK
28 MCPHERSON AVENUE 6062	10.324	156	GF	Res.	1	46	45	55	-9	0	70	70	75	-5	OK
2 DAVIS COURT 6062	10.325	124	GF	Res.	1	50	49	55	-5	0	73	73	75	-2	OK
3 DAVIS COURT 6062	10.326	65	GF	Res.	1	54	53	55	-1	0	78	78	75	3	OK
35 MCPHERSON AVENUE 6062	10.353	122	GF	Res.	1	49	48	55	-6	0	73	73	75	-2	OK
6 DAVIS COURT 6062	10.354	138	GF	Res.	1	43	42	55	-12	0	67	67	75	-8	OK
35 MCPHERSON AVENUE 6062	10.354	139	GF	Res.	1	47	46	55	-8	0	71	71	75	-4	OK
37 MCPHERSON AVENUE 6062	10.355	98	GF	Res.	1	52	51	55	-3	0	75	75	75	0	OK
4 DAVIS COURT 6062	10.356	99	GF	Res.	1	52	51	55	-3	0	77	77	75	2	OK
6 DAVIS COURT 6062	10.359	123	GF	Res.	1	47	46	55	-8	0	71	71	75	-4	OK
8 DAVIS COURT 6062	10.380	136	GF	Res.	1	50	49	55	-5	0	75	75	75	0	OK
2/9 HICKEY CLOSE 6062	10.387	133	GF	Res.	1	47	46	55	-8	0	69	69	75	-6	OK
98 ALFREDA AVENUE 6062	10.394	102	GF	Res.	1	52	51	55	-3	0	74	74	75	-1	OK
10 DAVIS COURT 6062	10.402	149	GF	Res.	1	51	50	55	-4	0	75	75	75	0	OK
11 DAVIS COURT 6062	10.404	91	GF	Res.	1	52	51	55	-3	0	76	76	75	1	OK
100 ALFREDA AVENUE 6062	10.413	99	GF	Res.	1	52	51	55	-3	0	74	74	75	-1	OK
7 HICKEY CLOSE 6062	10.415	131	GF	Res.	1	48	47	55	-7	0	70	70	75	-5	OK
102 ALFREDA AVENUE 6062	10.427	104	GF	Res.	1	51	50	55	-4	0	75	75	75	0	OK
13 DAVIS COURT 6062	10.430	106	GF	Res.	1	53	52	55	-2	0	78	78	75	3	OK
7 HICKEY CLOSE 6062	10.438	136	GF	Res.	1	51	50	55	-4	0	76	76	75	1	OK
15 DAVIS COURT 6062	10.455	109	GF	Res.	1	50	49	55	-5	0	73	73	75	-2	OK
5 HICKEY CLOSE 6062	10.459	137	GF	Res.	1	50	49	55	-5	0	73	73	75	-2	OK
106 ALFREDA AVENUE 6062	10.471	105	GF	Res.	1	53	52	55	-2	0	78	78	75	3	OK
3 HICKEY CLOSE 6062	10.478	137	GF	Res.	1	47	46	55	-8	0	69	69	75	-6	OK
108 ALFREDA AVENUE 6062	10.487	102	GF	Res.	1	53	52	55	-2	0	79	79	75	4	OK
1 HICKEY CLOSE 6062	10.491	132	GF	Res.	1	47	46	55	-8	0	70	70	75	-5	OK
110 ALFREDA AVENUE 6062	10.494	103	GF	Res.	1	53	52	55	-2	0	79	79	75	4	OK
5A KARRI PLACE 6062	10.590	134	GF	Res.	1	45	44	55	-10	0	65	65	75	-10	OK
4 KARRI PLACE 6062	10.616	127	GF	Res.	1	47	46	55	-8	0	70	70	75	-5	OK
2 KARRI PLACE 6062	10.622	159	GF	Res.	1	45	44	55	-10	0	68	68	75	-7	OK
16 WELLS COURT 6062	10.631	113	GF	Res.	1	49	48	55	-6	0	71	71	75	-4	OK
14 WELLS COURT 6062	10.638	136	GF	Res.	1	44	43	55	-11	0	66	66	75	-9	OK
19 BLUEGUM ROAD 6062	10.646	127	GF	Res.	1	53	52	55	-2	0	77	77	75	2	OK
18 WELLS COURT 6062	10.668	108	GF	Res.	1	49	48	55	-6	0	73	73	75	-2	OK
21 BLUEGUM ROAD 6062	10.672	116	GF	Res.	1	50	49	55	-5	0	74	74	75	-1	OK
20 WELLS COURT 6062	10.682	101	GF	Res.	1	49	48	55	-6	0	73	73	75	-2	OK
23 BLUEGUM ROAD 6062	10.696	109	GF	Res.	1	49	48	55	-6	0	71	71	75	-4	OK
22 WELLS COURT 6062	10.705	110	GF	Res.	1	51	50	55	-4	0	74	74	75	-1	OK
25 BLUEGUM ROAD 6062	10.711	113	GF	Res.	1	53	52	55	-2	0	76	76	75	1	OK
24 WELLS COURT 6062	10.726	101	GF	Res.	1	52	51	55	-3	0	75	75	75	0	OK
27 BLUEGUM ROAD 6062	10.728	120	GF	Res.	1	48	47	55	-7	0	72	72	75	-3	OK
27 BLUEGUM ROAD 6062	10.731	103	GF	Res.	1	51	50	55	-4	0	75	75	75	0	OK
13 WELLS COURT 6062	10.745	149	GF	Res.	1	51	50	55	-4	0	75	75	75	0	OK
29 BLUEGUM ROAD 6062	10.757	112	GF	Res.	1	50	49	55	-5	0	74	74	75	-1	OK
15 WELLS COURT 6062	10.758	130	GF	Res.	1	50	49	55	-5	0	74	74	75	-1	OK
31 BLUEGUM ROAD 6062	10.769	97	GF	Res.	1	51	50	55	-4	0	74	74	75	-1	OK

Address	[illegible]	[illegible]	[illegible]	[illegible]	$L_{Aeq,day}$, dB					L_{Amax}, dB					[illegible]
17 WELLS COURT 6062	10.784	109	GF	Res.	1	51	50	55	-4	0	75	75	75	0	OK
28 BELSTEAD AVENUE 6062	10.787	139	GF	Res.	1	47	46	55	-8	0	70	70	75	-5	OK
33 BLUEGUM ROAD 6062	10.794	94	GF	Res.	1	52	51	55	-3	0	76	76	75	1	OK
19A WELLS COURT 6062	10.799	84	GF	Res.	1	49	48	55	-6	0	72	72	75	-3	OK
30 BELSTEAD AVENUE 6062	10.805	124	GF	Res.	1	50	49	55	-5	0	73	73	75	-2	OK
43 BANKSIA ROAD 6062	10.812	146	GF	Res.	1	46	45	55	-9	0	67	67	75	-8	OK
35 BLUEGUM ROAD 6062	10.814	91	GF	Res.	1	54	53	55	-1	0	78	78	75	3	OK
32 BELSTEAD AVENUE 6062	10.817	110	GF	Res.	1	50	49	55	-5	0	74	74	75	-1	OK
37 BLUEGUM ROAD 6062	10.833	93	GF	Res.	1	53	52	55	-2	0	76	76	75	1	OK
34 BELSTEAD AVENUE 6062	10.835	92	GF	Res.	1	51	50	55	-4	0	76	76	75	1	OK
36 BELSTEAD AVENUE 6062	10.852	81	GF	Res.	1	51	50	55	-4	0	76	76	75	1	OK
39 BLUEGUM ROAD 6062	10.853	90	GF	Res.	1	52	51	55	-3	0	76	76	75	1	OK
1 LYONS CLOSE 6062	10.863	144	GF	Res.	1	50	49	55	-5	0	73	73	75	-2	OK
36 BELSTEAD AVENUE 6062	10.872	78	GF	Res.	1	50	49	55	-5	0	74	74	75	-1	OK
38 BLUEGUM ROAD 6062	10.879	142	GF	Res.	1	46	45	55	-9	0	68	68	75	-7	OK
40 BLUEGUM ROAD 6062	10.888	143	GF	Res.	1	46	45	55	-9	0	68	68	75	-7	OK
27 BELSTEAD AVENUE 6062	10.889	115	GF	Res.	1	50	49	55	-5	0	75	75	75	0	OK
29 BELSTEAD AVENUE 6062	10.895	106	GF	Res.	1	51	50	55	-4	0	76	76	75	1	OK
42 BLUEGUM ROAD 6062	10.914	145	GF	Res.	1	47	46	55	-8	0	70	70	75	-5	OK
3/41 BLUEGUM ROAD 6062	10.917	68	GF	Res.	1	52	51	55	-3	0	77	77	75	2	OK
6 LYONS CLOSE 6062	10.922	149	GF	Res.	1	44	43	55	-11	0	67	67	75	-8	OK
4 LYONS CLOSE 6062	10.926	124	GF	Res.	1	49	48	55	-6	0	74	74	75	-1	OK
31 BELSTEAD AVENUE 6062	10.929	94	GF	Res.	1	54	53	55	-1	0	77	77	75	2	OK
5A ACACIA COURT 6062	10.946	57	GF	Res.	1	56	55	55	1	0	80	80	75	5	+1 dB
51 BLUEGUM ROAD 6062	10.947	112	GF	Res.	1	49	48	55	-6	0	73	73	75	-2	OK
3 ACACIA COURT 6062	10.952	90	GF	Res.	1	50	49	55	-5	0	76	76	75	1	OK
33 BELSTEAD AVENUE 6062	10.959	86	GF	Res.	1	55	54	55	0	0	77	77	75	2	OK
22 SEWELL COURT 6062	10.964	118	GF	Res.	1	54	53	55	-1	0	77	77	75	2	OK
20 SEWELL COURT 6062	10.967	139	GF	Res.	1	53	52	55	-2	0	76	76	75	1	OK
53 BLUEGUM ROAD 6063	10.988	94	GF	Res.	1	50	49	55	-5	0	73	73	75	-2	OK
4 ACACIA COURT 6063	10.989	65	GF	Res.	1	53	52	55	-2	0	78	78	75	3	OK
55 BLUEGUM ROAD 6063	11.004	103	GF	Res.	1	50	49	55	-5	0	73	73	75	-2	OK
6 ACACIA COURT 6063	11.006	74	GF	Res.	1	52	51	55	-3	0	77	77	75	2	OK
57 BLUEGUM ROAD 6063	11.024	105	GF	Res.	1	51	50	55	-4	0	74	74	75	-1	OK
8 ACACIA COURT 6063	11.037	75	GF	Res.	1	51	50	55	-4	0	75	75	75	0	OK
59 BLUEGUM ROAD 6063	11.050	111	GF	Res.	1	50	49	55	-5	0	73	73	75	-2	OK
10 ACACIA COURT 6063	11.051	70	GF	Res.	1	50	49	55	-5	0	74	74	75	-1	OK
10 ACACIA COURT 6063	11.053	53	GF	Res.	1	48	47	55	-7	0	71	71	75	-4	OK
61 BLUEGUM ROAD 6063	11.062	125	GF	Res.	1	46	45	55	-9	0	70	70	75	-5	OK
3 WILLOW PLACE 6063	11.073	85	GF	Res.	1	49	48	55	-6	0	73	73	75	-2	OK
61 BLUEGUM ROAD 6063	11.078	116	GF	Res.	1	48	47	55	-7	0	70	70	75	-5	OK
5 WILLOW PLACE 6063	11.088	63	GF	Res.	1	50	49	55	-5	0	73	73	75	-2	OK
30 DELLA ROAD 6062	11.095	301	GF	RC	1	49	48	-	-	0	74	74	-	-	OK
11/65 BLUEGUM ROAD 6063	11.096	147	GF	Res.	1	48	47	55	-7	0	71	71	75	-4	OK
13/65 BLUEGUM ROAD 6063	11.106	127	GF	Res.	1	48	47	55	-7	0	71	71	75	-4	OK
7 WILLOW PLACE 6063	11.113	64	GF	Res.	1	49	48	55	-6	0	73	73	75	-2	OK
30 DELLA ROAD 6062	11.115	262	GF	RC	1	52	51	-	-	0	75	75	-	-	OK
9/65 BLUEGUM ROAD 6063	11.119	110	GF	Res.	1	49	48	55	-6	0	71	71	75	-4	OK
9 WILLOW PLACE 6063	11.136	65	GF	Res.	1	49	48	55	-6	0	72	72	75	-3	OK
11/65 BLUEGUM ROAD 6063	11.139	135	GF	Res.	1	45	44	55	-10	0	66	66	75	-9	OK
11/65 BLUEGUM ROAD 6063	11.145	119	GF	Res.	1	49	48	55	-6	0	70	70	75	-5	OK
11 WILLOW PLACE 6063	11.158	69	GF	Res.	1	49	48	55	-6	0	71	71	75	-4	OK
12B WILLOW PLACE 6063	11.162	141	GF	Res.	1	48	47	55	-7	0	70	70	75	-5	OK
13A WILLOW PLACE 6063	11.172	72	GF	Res.	1	49	48	55	-6	0	72	72	75	-3	OK
13A WILLOW PLACE 6063	11.189	63	GF	Res.	1	48	47	55	-7	0	71	71	75	-4	OK
17 WILLOW PLACE 6063	11.193	106	GF	Res.	1	49	48	55	-6	0	70	70	75	-5	OK
15 WILLOW PLACE 6063	11.202	76	GF	Res.	1	49	48	55	-6	0	72	72	75	-3	OK
30 DELLA ROAD 6062	11.224	193	GF	RC	1	53	52	-	-	0	76	76	-	-	OK
21 SILKWOOD WAY 6063	11.225	77	GF	Res.	1	48	47	55	-7	0	71	71	75	-4	OK
19 SILKWOOD WAY 6063	11.233	109	GF	Res.	1	48	47	55	-7	0	70	70	75	-5	OK
23 SILKWOOD WAY 6063	11.259	65	GF	Res.	1	48	47	55	-7	0	71	71	75	-4	OK

Address	C h .	D ..	F ..	D s a	$L_{Aeq,day}$, dB					L_{Amax}, dB					. .. .
20 SILKWOOD WAY 6063	11.267	67	GF	Res.	1	47	46	55	-8	0	71	71	75	-4	OK
14 SILKWOOD WAY 6063	11.278	126	GF	Res.	1	46	45	55	-9	0	67	67	75	-8	OK
18 SILKWOOD WAY 6063	11.286	87	GF	Res.	1	46	45	55	-9	0	69	69	75	-6	OK
16 SILKWOOD WAY 6063	11.290	104	GF	Res.	1	46	45	55	-9	0	69	69	75	-6	OK
9 SHEOAK CLOSE 6063	11.313	88	GF	Res.	1	48	47	55	-7	0	71	71	75	-4	OK
7 SHEOAK CLOSE 6063	11.320	110	GF	Res.	1	48	47	55	-7	0	71	71	75	-4	OK
7 SHEOAK CLOSE 6063	11.332	133	GF	Res.	1	46	45	55	-9	0	68	68	75	-7	OK
11 SHEOAK CLOSE 6063	11.333	70	GF	Res.	1	48	47	55	-7	0	70	70	75	-5	OK
14 SHEOAK CLOSE 6063	11.355	69	GF	Res.	1	48	47	55	-7	0	71	71	75	-4	OK
10 SHEOAK CLOSE 6063	11.368	109	GF	Res.	1	48	47	55	-7	0	70	70	75	-5	OK
12 SHEOAK CLOSE 6063	11.375	85	GF	Res.	1	48	47	55	-7	0	71	71	75	-4	OK
13 JARRAH COURT 6063	11.396	110	GF	Res.	1	47	46	55	-8	0	70	70	75	-5	OK
11 JARRAH COURT 6063	11.402	130	GF	Res.	1	44	43	55	-11	0	63	63	75	-12	OK
15 JARRAH COURT 6063	11.410	91	GF	Res.	1	48	47	55	-7	0	71	71	75	-4	OK
10 JARRAH COURT 6063	11.428	83	GF	Res.	1	48	47	55	-7	0	69	69	75	-6	OK
6 JARRAH COURT 6063	11.450	122	GF	Res.	1	48	47	55	-7	0	69	69	75	-6	OK
8 JARRAH COURT 6063	11.451	99	GF	Res.	1	46	45	55	-9	0	70	70	75	-5	OK
9 WOODMAN PLACE 6063	11.480	123	GF	Res.	1	47	46	55	-8	0	70	70	75	-5	OK
7 WOODMAN PLACE 6063	11.491	148	GF	Res.	1	46	45	55	-9	0	67	67	75	-8	OK
16 WOODMAN PLACE 6063	11.496	108	GF	Res.	1	46	45	55	-9	0	68	68	75	-7	OK
14 WOODMAN PLACE 6063	11.522	116	GF	Res.	1	46	45	55	-9	0	67	67	75	-8	OK
12 WOODMAN PLACE 6063	11.534	132	GF	Res.	1	44	43	55	-11	0	67	67	75	-8	OK
1/18 MILLY COURT 6090	12.183	153	GF	ID	1	53	52	-	-	0	79	79	-	-	OK
22 MILLY COURT 6090	12.222	113	GF	ID	1	56	55	-	-	0	81	81	-	-	OK
22 MILLY COURT 6090	12.254	92	GF	ID	1	57	56	-	-	0	83	83	-	-	OK
1/24 MILLY COURT 6090	12.276	76	GF	ID	1	58	57	-	-	0	84	84	-	-	OK
1/26 MILLY COURT 6090	12.292	72	GF	ID	1	59	58	-	-	0	84	84	-	-	OK
2/28 MILLY COURT 6090	12.314	67	GF	ID	1	59	58	-	-	0	85	85	-	-	OK
9 METAL CIRCUIT 6090	12.334	73	GF	ID	1	56	55	-	-	0	83	83	-	-	OK
17 MITRA LOOP 6063	12.339	110	GF	Res.	1	46	45	55	-9	0	72	72	75	-3	OK
19 MITRA LOOP 6063	12.354	87	GF	Res.	1	46	45	55	-9	0	69	69	75	-6	OK
21 MITRA LOOP 6063	12.370	82	GF	Res.	1	46	45	55	-9	0	69	69	75	-6	OK
23 MITRA LOOP 6063	12.393	83	GF	Res.	1	48	47	55	-7	0	72	72	75	-3	OK
8 MITRA LOOP 6063	12.404	118	GF	Res.	1	48	47	55	-7	0	73	73	75	-2	OK
25 MITRA LOOP 6063	12.412	74	GF	Res.	1	48	47	55	-7	0	73	73	75	-2	OK
2 LAELIA STREET 6063	12.420	113	GF	Res.	1	49	48	55	-6	0	72	72	75	-3	OK
27 MITRA LOOP 6063	12.423	68	GF	Res.	1	47	46	55	-8	0	71	71	75	-4	OK
9 METAL CIRCUIT 6090	12.434	113	GF	ID	1	53	52	-	-	0	79	79	-	-	OK
9 METAL CIRCUIT 6090	12.435	49	GF	ID	1	59	58	-	-	0	86	86	-	-	OK
29 MITRA LOOP 6063	12.440	68	GF	Res.	1	50	49	55	-5	0	74	74	75	-1	OK
1 LAELIA STREET 6063	12.459	128	GF	Res.	1	46	45	55	-9	0	70	70	75	-5	OK
31 MITRA LOOP 6063	12.459	60	GF	Res.	1	48	47	55	-7	0	72	72	75	-3	OK
1 LAELIA STREET 6063	12.474	101	GF	Res.	1	48	47	55	-7	0	72	72	75	-3	OK
33 MITRA LOOP 6063	12.477	59	GF	Res.	1	50	49	55	-5	0	75	75	75	0	OK
14 MITRA LOOP 6063	12.482	102	GF	Res.	1	48	47	55	-7	0	73	73	75	-2	OK
35 MITRA LOOP 6063	12.486	62	GF	Res.	1	51	50	55	-4	0	76	76	75	1	OK
16 MITRA LOOP 6063	12.501	103	GF	Res.	1	49	48	55	-6	0	74	74	75	-1	OK
37 MITRA LOOP 6063	12.504	56	GF	Res.	1	50	49	55	-5	0	74	74	75	-1	OK
18 MITRA LOOP 6063	12.520	101	GF	Res.	1	50	49	55	-5	0	74	74	75	-1	OK
39 MITRA LOOP 6063	12.524	61	GF	Res.	1	51	50	55	-4	0	75	75	75	0	OK
9 METAL CIRCUIT 6090	12.529	94	GF	ID	1	57	56	-	-	0	82	82	-	-	OK
20 MITRA LOOP 6063	12.529	102	GF	Res.	1	50	49	55	-5	0	74	74	75	-1	OK
41 MITRA LOOP 6063	12.538	57	GF	Res.	1	50	49	55	-5	0	74	74	75	-1	OK
22 MITRA LOOP 6063	12.552	101	GF	Res.	1	50	49	55	-5	0	75	75	75	0	OK
43 MITRA LOOP 6063	12.555	60	GF	Res.	1	50	49	55	-5	0	75	75	75	0	OK
1/655 MARSHALL ROAD 6090	12.556	132	GF	ID	1	53	52	-	-	0	79	79	-	-	OK
24 MITRA LOOP 6063	12.561	101	GF	Res.	1	50	49	55	-5	0	75	75	75	0	OK
45 MITRA LOOP 6063	12.571	59	GF	Res.	1	50	49	55	-5	0	74	74	75	-1	OK
26 MITRA LOOP 6063	12.576	101	GF	Res.	1	50	49	55	-5	0	74	74	75	-1	OK
47 MITRA LOOP 6063	12.588	59	GF	Res.	1	50	49	55	-5	0	74	74	75	-1	OK
28 MITRA LOOP 6063	12.593	103	GF	Res.	1	49	48	55	-6	0	74	74	75	-1	OK

Address	[illegible]	[illegible]	[illegible]	[illegible]	$L_{Aeq,day}$, dB					L_{Amax}, dB					[illegible]
49 MITRA LOOP 6063	12.600	54	GF	Res.	1	49	48	55	-6	0	72	72	75	-3	OK
30 MITRA LOOP 6063	12.612	102	GF	Res.	1	50	49	55	-5	0	74	74	75	-1	OK
51 MITRA LOOP 6063	12.619	59	GF	Res.	1	49	48	55	-6	0	74	74	75	-1	OK
57 MITRA LOOP 6063	12.649	84	GF	Res.	1	48	47	55	-7	0	70	70	75	-5	OK
53 MITRA LOOP 6063	12.655	55	GF	Res.	1	48	47	55	-7	0	73	73	75	-2	OK
55 MITRA LOOP 6063	12.664	73	GF	Res.	1	49	48	55	-6	0	73	73	75	-2	OK
10 ARNHEM COURT 6066	13.007	142	GF	Res.	1	41	40	55	-14	0	64	64	75	-11	OK
12 ARNHEM COURT 6066	13.013	120	GF	Res.	1	42	41	55	-13	0	64	64	75	-11	OK
14 ARNHEM COURT 6066	13.032	105	GF	Res.	1	44	43	55	-11	0	66	66	75	-9	OK
16 ARNHEM COURT 6066	13.039	96	GF	Res.	1	42	41	55	-13	0	64	64	75	-11	OK
7 ARNHEM COURT 6066	13.044	142	GF	Res.	1	44	43	55	-11	0	65	65	75	-10	OK
18 ARNHEM COURT 6066	13.061	95	GF	Res.	1	43	42	55	-12	0	65	65	75	-10	OK
9 ARNHEM COURT 6066	13.065	141	GF	Res.	1	44	43	55	-11	0	66	66	75	-9	OK
20 ARNHEM COURT 6066	13.077	90	GF	Res.	1	44	43	55	-11	0	65	65	75	-10	OK
11 ARNHEM COURT 6066	13.087	134	GF	Res.	1	45	44	55	-10	0	66	66	75	-9	OK
22 ARNHEM COURT 6066	13.102	74	GF	Res.	1	40	39	55	-15	0	62	62	75	-13	OK
24 ARNHEM COURT 6066	13.114	91	GF	Res.	1	41	40	55	-14	0	61	61	75	-14	OK
24 ARNHEM COURT 6066	13.118	107	GF	Res.	1	40	39	55	-15	0	61	61	75	-14	OK
8 COOTHA COURT 6066	13.138	83	GF	Res.	1	43	42	55	-12	0	65	65	75	-10	OK
10 COOTHA COURT 6066	13.151	68	GF	Res.	1	41	40	55	-14	0	62	62	75	-13	OK
6 COOTHA COURT 6066	13.153	107	GF	Res.	1	42	41	55	-13	0	63	63	75	-12	OK
6 COOTHA COURT 6066	13.158	123	GF	Res.	1	40	39	55	-15	0	62	62	75	-13	OK
9 COOTHA COURT 6066	13.172	71	GF	Res.	1	40	39	55	-15	0	62	62	75	-13	OK
7 COOTHA COURT 6066	13.189	71	GF	Res.	1	41	40	55	-14	0	63	63	75	-12	OK
3 COOTHA COURT 6066	13.194	99	GF	Res.	1	41	40	55	-14	0	62	62	75	-13	OK
5 COOTHA COURT 6066	13.202	71	GF	Res.	1	41	40	55	-14	0	63	63	75	-12	OK
1 COOTHA COURT 6066	13.203	127	GF	Res.	1	41	40	55	-14	0	63	63	75	-12	OK
6 LAE COURT 6066	13.221	69	GF	Res.	1	41	40	55	-14	0	63	63	75	-12	OK
4 LAE COURT 6066	13.230	104	GF	Res.	1	40	39	55	-15	0	61	61	75	-14	OK
8 LAE COURT 6066	13.235	67	GF	Res.	1	43	42	55	-12	0	64	64	75	-11	OK
9 LAE COURT 6066	13.254	60	GF	Res.	1	37	36	55	-18	0	59	59	75	-16	OK
1 LAE COURT 6066	13.260	110	GF	Res.	1	38	37	55	-17	0	59	59	75	-16	OK
7 LAE COURT 6066	13.265	70	GF	Res.	1	36	35	55	-19	0	56	56	75	-19	OK
7 LAE COURT 6066	13.268	82	GF	Res.	1	34	33	55	-21	0	55	55	75	-20	OK
3 LAE COURT 6066	13.284	99	GF	Res.	1	35	34	55	-20	0	55	55	75	-20	OK
45 GUADALUPE DRIVE 6066	13.285	120	GF	Res.	1	36	35	55	-19	0	58	58	75	-17	OK
43 GUADALUPE DRIVE 6066	13.296	132	GF	Res.	1	34	33	55	-21	0	55	55	75	-20	OK
41 GUADALUPE DRIVE 6066	13.297	110	GF	Res.	1	38	37	55	-17	0	59	59	75	-16	OK
34 YERILLA GLEN 6066	13.298	82	GF	Res.	1	33	32	55	-22	0	51	51	75	-24	OK
32 YERILLA GLEN 6066	13.314	93	GF	Res.	1	34	33	55	-21	0	53	53	75	-22	OK
39 GUADALUPE DRIVE 6066	13.315	143	GF	Res.	1	34	33	55	-21	0	56	56	75	-19	OK
37 GUADALUPE DRIVE 6066	13.320	149	GF	Res.	1	37	36	55	-18	0	60	60	75	-15	OK
30 YERILLA GLEN 6066	13.326	99	GF	Res.	1	37	36	55	-18	0	58	58	75	-17	OK
28 YERILLA GLEN 6066	13.332	115	GF	Res.	1	34	33	55	-21	0	55	55	75	-20	OK
26 YERILLA GLEN 6066	13.340	127	GF	Res.	1	32	31	55	-23	0	55	55	75	-20	OK
26 YERILLA GLEN 6066	13.345	140	GF	Res.	1	34	33	55	-21	0	56	56	75	-19	OK
17 YERILLA GLEN 6066	13.361	126	GF	Res.	1	38	37	55	-17	0	59	59	75	-16	OK
15 YERILLA GLEN 6066	13.375	144	GF	Res.	1	33	32	55	-22	0	54	54	75	-21	OK

Note 1 "GF" Ground floor; "F 1" first floor.

C.2 Vibration

The following table lists forecasted individual property results in terms of ground-borne vibration (GBV) and ground-borne noise (GBN).

Table C.26 Individual GBV and GBN results by location (ordered by increasing chainage)

Address	Usage	Existing DN chainage, km	Dist., m	GBV (dB re 1nm/s)					GBN (dB re 20 µpa)					Likely Result
				Target	Build	Margin	Build+M	Margin	Target	Build	Margin	Build+M	Margin	
130 RAILWAY PARADE 6053	Residential	4.15	41	106	101	-5	101	-5	35	33	-2	33	-2	OK
135 WHATLEY CRESCENT 6053	Residential	4.16	39	106	105	-1	105	-1	35	37	2	37	2	+2 dB
128 RAILWAY PARADE 6053	Residential	4.17	38	106	103	-3	103	-3	35	35	0	35	0	OK
126 RAILWAY PARADE 6053	Residential	4.18	42	106	102	-4	102	-4	35	35	0	35	0	OK
1B LAWRENCE STREET 6053	Residential	4.19	69	106	98	-8	98	-8	35	30	-5	30	-5	OK
3 LAWRENCE STREET 6053	Residential	4.19	85	106	97	-9	96	-10	35	29	-6	28	-7	OK
124 RAILWAY PARADE 6053	Residential	4.20	36	106	104	-2	103	-3	35	36	1	36	1	+1 dB
133 WHATLEY CRESCENT 6053	Residential	4.20	43	106	105	-1	105	-1	35	37	2	37	2	+2 dB
1 LAWRENCE STREET 6053	Residential	4.20	72	106	98	-8	98	-8	35	30	-5	30	-5	OK
122 RAILWAY PARADE 6053	Residential	4.21	43	106	103	-3	103	-3	35	36	1	35	0	OK
120 RAILWAY PARADE 6053	Residential	4.21	37	106	105	-1	104	-2	35	37	2	37	2	+2 dB
131 WHATLEY CRESCENT 6053	Residential	4.22	39	106	106	0	105	-1	35	38	3	38	3	+3 dB
1A ROBERTS STREET 6053	Residential	4.22	72	106	100	-6	99	-7	35	32	-3	31	-4	OK
118 RAILWAY PARADE 6053	Residential	4.23	38	106	106	0	105	-1	35	38	3	37	2	+2 dB
129 WHATLEY CRESCENT 6053	Residential	4.23	40	106	105	-1	104	-2	35	38	3	37	2	+2 dB
129A WHATLEY CRESCENT 6053	Residential	4.24	56	106	102	-4	101	-5	35	34	-1	33	-2	OK
127 WHATLEY CRESCENT 6053	Residential	4.25	40	106	105	-1	103	-3	35	37	2	35	0	OK
1 ROBERTS STREET 6053	Residential	4.25	99	106	96	-10	95	-11	35	28	-7	27	-8	OK
127A WHATLEY CRESCENT 6053	Residential	4.25	58	106	100	-6	98	-8	35	33	-2	30	-5	OK
125 WHATLEY CRESCENT 6053	Residential	4.25	39	106	105	-1	102	-4	35	37	2	34	-1	OK
1 ROBERTS STREET 6053	Residential	4.25	87	106	97	-9	95	-11	35	29	-6	27	-8	OK
123 WHATLEY CRESCENT 6053	Residential	4.25	38	106	105	-1	100	-6	35	38	3	33	-2	OK
121 WHATLEY CRESCENT 6053	Residential	4.29	40	106	104	-2	98	-8	35	37	2	30	-5	OK
2 LEAKE STREET 6053	Residential	4.30	69	106	99	-7	94	-12	35	31	-4	26	-9	OK
4 LEAKE STREET 6053	Residential	4.31	80	106	98	-8	93	-13	35	30	-5	24	-11	OK
6 LEAKE STREET 6053	Residential	4.32	95	106	96	-10	91	-15	35	28	-7	23	-12	OK
119 WHATLEY CRESCENT 6053	Residential	4.34	39	106	103	-3	94	-12	35	36	1	26	-9	OK
117 WHATLEY CRESCENT 6053	Residential	4.35	44	106	102	-4	93	-13	35	34	-1	25	-10	OK
115 WHATLEY CRESCENT 6053	Residential	4.36	45	106	102	-4	92	-14	35	34	-1	24	-11	OK
113 WHATLEY CRESCENT 6053	Residential	4.37	44	106	102	-4	92	-14	35	34	-1	24	-11	OK
3 LEAKE STREET 6053	Residential	4.37	85	106	97	-9	87	-19	35	29	-6	19	-16	OK
1 LEAKE STREET 6053	Residential	4.37	77	106	98	-8	88	-18	35	30	-5	20	-15	OK
5 LEAKE STREET 6053	Residential	4.38	98	106	95	-11	86	-20	35	27	-8	18	-17	OK
111 WHATLEY CRESCENT 6053	Residential	4.38	46	106	102	-4	92	-14	35	34	-1	24	-11	OK
1/6 MILLS AVENUE 6053	Residential	4.38	86	106	97	-9	87	-19	35	29	-6	19	-16	OK
3 LEAKE STREET 6053	Residential	4.39	92	106	96	-10	86	-20	35	28	-7	18	-17	OK
1/6 MILLS AVENUE 6053	Residential	4.39	68	106	99	-7	89	-17	35	31	-4	21	-14	OK
109 WHATLEY CRESCENT 6053	Residential	4.40	47	106	102	-4	92	-14	35	34	-1	24	-11	OK
102A RAILWAY PARADE 6053	Residential	4.40	28	106	107	1	97	-9	35	40	5	30	-5	OK
4A VEITCH STREET 6053	Residential	4.41	82	106	97	-9	87	-19	35	29	-6	19	-16	OK
107 WHATLEY CRESCENT 6053	Residential	4.41	47	106	102	-4	92	-14	35	34	-1	24	-11	OK
3/2 MILLS AVENUE 6053	Residential	4.41	78	106	98	-8	88	-18	35	30	-5	20	-15	OK
105 WHATLEY CRESCENT 6053	Residential	4.42	50	106	101	-5	91	-15	35	33	-2	23	-12	OK
4 VEITCH STREET 6053	Residential	4.42	87	106	96	-10	86	-20	35	28	-7	18	-17	OK
103 WHATLEY CRESCENT 6053	Residential	4.42	47	106	102	-4	92	-14	35	34	-1	24	-11	OK
5/2 MILLS AVENUE 6053	Residential	4.43	92	106	96	-10	86	-20	35	28	-7	18	-17	OK
100 RAILWAY PARADE 6053	Residential	4.42	32	106	106	0	96	-10	35	38	3	28	-7	OK

Address	Usage	Existing DN chainage, km	Dist., m	GBV (dB re 1nm/s)					GBN (dB re 20 µpa)					Likely Result
				Target	Build	Margin	Build+M	Margin	Target	Build	Margin	Build+M	Margin	
98 RAILWAY PARADE 6053	Residential	4.43	34	106	105	-1	95	-11	35	38	3	28	-7	OK
96 RAILWAY PARADE 6053	Residential	4.44	50	106	102	-4	92	-14	35	34	-1	24	-11	OK
3/1 MILLS AVENUE 6053	Residential	4.45	32	106	105	-1	95	-11	35	37	2	27	-8	OK
101 WHATLEY CRESCENT 6053	Residential	4.46	47	106	101	-5	91	-15	35	33	-2	23	-12	OK
11 COODE STREET 6053	Residential	4.46	77	106	97	-9	87	-19	35	29	-6	19	-16	OK
9 COODE STREET 6053	Residential	4.47	68	106	98	-8	88	-18	35	30	-5	20	-15	OK
7 COODE STREET 6053	Residential	4.47	61	106	98	-8	88	-18	35	31	-4	21	-14	OK
5 COODE STREET 6053	Residential	4.48	50	106	100	-6	90	-16	35	32	-3	22	-13	OK
3 VEITCH STREET 6053	Residential	4.48	89	106	94	-12	84	-22	35	26	-9	16	-19	OK
97 WHATLEY CRESCENT 6053	Residential	4.49	45	106	99	-7	89	-17	35	31	-4	21	-14	OK
95 WHATLEY CRESCENT 6053	Residential	4.50	43	106	98	-8	88	-18	35	30	-5	20	-15	OK
4 COODE STREET 6053	Commercial	4.51	88	112	93	-19	83	-29	45	25	-20	15	-30	OK
93 WHATLEY CRESCENT 6053	Residential	4.51	45	106	96	-10	86	-20	35	28	-7	18	-17	OK
89 WHATLEY CRESCENT 6053	Commercial	4.52	38	112	96	-16	86	-26	45	28	-17	19	-26	OK
2 MURRAY STREET 6053	Residential	4.53	91	106	90	-16	81	-25	35	22	-13	13	-22	OK
12/86 RAILWAY PARADE 6053	Residential	4.56	97	106	87	-19	78	-28	35	19	-16	10	-25	OK
4A KING WILLIAM STREET 6053	Residential	4.56	48	106	88	-18	81	-25	35	20	-15	14	-21	OK
5/86 RAILWAY PARADE 6053	Residential	4.57	83	106	87	-19	78	-28	35	19	-16	9	-26	OK
4A KING WILLIAM STREET 6053	Residential	4.57	58	106	87	-19	80	-26	35	19	-16	12	-23	OK
86 RAILWAY PARADE 6053	Residential	4.58	59	106	85	-21	79	-27	35	17	-18	11	-24	OK
87 WHATLEY CRESCENT 6053	Commercial	4.60	41	112	83	-29	83	-29	45	16	-29	16	-29	OK
86 RAILWAY PARADE 6053	Residential	4.60	96	106	81	-25	75	-31	35	13	-22	7	-28	OK
87 WHATLEY CRESCENT 6053	Commercial	4.61	41	112	84	-28	84	-28	45	16	-29	16	-29	OK
11 KING WILLIAM STREET 6053	Commercial	4.61	91	112	80	-32	76	-36	45	12	-33	8	-37	OK
8/86 RAILWAY PARADE 6053	Residential	4.61	80	106	80	-26	77	-29	35	12	-23	9	-26	OK
5 KING WILLIAM STREET 6053	Commercial	4.62	48	112	83	-29	83	-29	45	15	-30	15	-30	OK
7 KING WILLIAM STREET 6053	Commercial	4.62	63	112	80	-32	80	-32	45	13	-32	13	-32	OK
9 KING WILLIAM STREET 6053	Commercial	4.62	76	112	79	-33	79	-33	45	11	-34	11	-34	OK
9 ROSE AVENUE 6053	Residential	4.63	90	106	77	-29	77	-29	35	8	-27	8	-27	OK
7 ROSE AVENUE 6053	Residential	4.64	80	106	78	-28	78	-28	35	10	-25	10	-25	OK
13B KING WILLIAM STREET 6053	Commercial	4.64	94	112	77	-35	77	-35	45	9	-36	9	-36	OK
5 ROSE AVENUE 6053	Residential	4.65	66	106	80	-26	80	-26	35	12	-23	12	-23	OK
85 WHATLEY CRESCENT 6053	Commercial	4.65	42	112	85	-27	85	-27	45	17	-28	17	-28	OK
Bayswater WA 6053	Residential	4.66	5	106	95	-11	95	-11	35	29	-6	29	-6	OK
83 WHATLEY CRESCENT 6053	Commercial	4.66	41	112	84	-28	84	-28	45	16	-29	16	-29	OK
81 WHATLEY CRESCENT 6053	Commercial	4.67	41	112	85	-27	85	-27	45	18	-27	18	-27	OK
79 WHATLEY CRESCENT 6053	Commercial	4.68	41	112	86	-26	86	-26	45	18	-27	18	-27	OK
78 RAILWAY PARADE 6053	Commercial	4.69	44	112	83	-29	83	-29	45	15	-30	15	-30	OK
4/4 HAMILTON STREET 6053	Residential	4.71	93	106	78	-28	78	-28	35	10	-25	10	-25	OK
75A WHATLEY CRESCENT 6053	Commercial	4.73	44	112	85	-27	85	-27	45	18	-27	18	-27	OK
1 HAMILTON STREET 6053	Residential	4.77	91	106	79	-27	79	-27	35	11	-24	11	-24	OK
2 BEECHBORO ROAD 6053	Residential	4.78	66	106	81	-25	81	-25	35	13	-22	13	-22	OK
4 BEECHBORO ROAD 6053	Residential	4.78	83	106	79	-27	79	-27	35	11	-24	11	-24	OK
69 WHATLEY CRESCENT 6053	Residential	4.79	45	106	85	-21	85	-21	35	18	-17	18	-17	OK
6 BEECHBORO ROAD 6053	Residential	4.79	98	106	77	-29	77	-29	35	9	-26	9	-26	OK
5 HAMILTON STREET 6053	Residential	4.79	99	106	78	-28	78	-28	35	10	-25	10	-25	OK
4A BEECHBORO ROAD 6053	Residential	4.80	77	106	79	-27	79	-27	35	11	-24	11	-24	OK
5 HAMILTON STREET 6053	Residential	4.80	88	106	79	-27	79	-27	35	11	-24	11	-24	OK
67 WHATLEY CRESCENT 6053	Residential	4.81	44	106	85	-21	85	-21	35	18	-17	18	-17	OK
74 RAILWAY PARADE 6053	Residential	4.82	62	106	81	-25	81	-25	35	13	-22	13	-22	OK
65 WHATLEY CRESCENT 6053	Residential	4.83	51	106	84	-22	84	-22	35	16	-19	16	-19	OK
72 RAILWAY PARADE 6053	Residential	4.84	53	106	83	-23	83	-23	35	15	-20	15	-20	OK
2 SLADE STREET 6053	Residential	4.85	70	106	81	-25	81	-25	35	13	-22	13	-22	OK
70 RAILWAY PARADE 6053	Residential	4.86	52	106	83	-23	83	-23	35	15	-20	15	-20	OK
4 SLADE STREET 6053	Residential	4.87	74	106	81	-25	81	-25	35	13	-22	13	-22	OK

Address	Usage	Existing DN chainage, km	Dist., m	GBV (dB re 1nm/s)					GBN (dB re 20 µpa)					Likely Result
				Target	Build	Margin	Build+M	Margin	Target	Build	Margin	Build+M	Margin	
31 WINIFRED ROAD 6053	Residential	4.87	99	106	77	-29	77	-29	35	9	-26	9	-26	OK
6 SLADE STREET 6053	Residential	4.87	85	106	79	-27	79	-27	35	11	-24	11	-24	OK
8 SLADE STREET 6053	Residential	4.88	92	106	78	-28	78	-28	35	10	-25	10	-25	OK
68 RAILWAY PARADE 6053	Residential	4.88	0	106	0	-106	0	-106	35	0	-35	0	-35	OK
10 SLADE STREET 6053	Residential	4.90	99	106	78	-28	78	-28	35	10	-25	10	-25	OK
61 WHATLEY CRESCENT 6053	Residential	4.90	51	106	84	-22	84	-22	35	16	-19	16	-19	OK
66 RAILWAY PARADE 6053	Residential	4.90	0	106	0	-106	0	-106	35	0	-35	0	-35	OK
66A RAILWAY PARADE 6053	Residential	4.91	60	106	81	-25	81	-25	35	14	-21	14	-21	OK
64 RAILWAY PARADE 6053	Residential	4.93	33	106	86	-20	86	-20	35	18	-17	18	-17	OK
59 WHATLEY CRESCENT 6053	Residential	4.93	53	106	84	-22	84	-22	35	16	-19	16	-19	OK
64A RAILWAY PARADE 6053	Residential	4.94	63	106	81	-25	81	-25	35	13	-22	13	-22	OK
1A SLADE STREET 6053	Residential	4.94	70	106	81	-25	81	-25	35	13	-22	13	-22	OK
21A WINIFRED ROAD 6053	Residential	4.95	84	106	78	-28	78	-28	35	10	-25	10	-25	OK
62 RAILWAY PARADE 6053	Residential	4.95	33	106	86	-20	86	-20	35	18	-17	18	-17	OK
62A RAILWAY PARADE 6053	Residential	4.95	55	106	82	-24	82	-24	35	14	-21	14	-21	OK
57 WHATLEY CRESCENT 6053	Residential	4.95	54	106	82	-24	82	-24	35	15	-20	15	-20	OK
60 RAILWAY PARADE 6053	Residential	4.97	34	106	86	-20	86	-20	35	18	-17	18	-17	OK
1 SLADE STREET 6053	Residential	4.97	84	106	79	-27	79	-27	35	11	-24	11	-24	OK
1 SLADE STREET 6053	Residential	4.97	67	106	81	-25	81	-25	35	13	-22	13	-22	OK
3 SLADE STREET 6053	Residential	4.97	96	106	78	-28	78	-28	35	10	-25	10	-25	OK
1/56 RAILWAY PARADE 6053	Residential	4.99	54	106	82	-24	82	-24	35	14	-21	14	-21	OK
2/56 RAILWAY PARADE 6053	Residential	4.99	28	106	87	-19	87	-19	35	19	-16	19	-16	OK
3A SLADE STREET 6053	Residential	4.99	75	106	80	-26	80	-26	35	12	-23	12	-23	OK
9 WINIFRED ROAD 6053	Residential	5.00	78	106	79	-27	79	-27	35	11	-24	11	-24	OK
55 WHATLEY CRESCENT 6053	Residential	5.00	53	106	83	-23	83	-23	35	16	-19	16	-19	OK
3/56 RAILWAY PARADE 6053	Residential	5.01	58	106	82	-24	82	-24	35	14	-21	14	-21	OK
1/56 RAILWAY PARADE 6053	Residential	5.02	31	106	86	-20	86	-20	35	19	-16	19	-16	OK
54 RAILWAY PARADE 6053	Commercial	5.02	35	112	85	-27	85	-27	45	17	-28	17	-28	OK
7 SLADE STREET 6053	Commercial	5.03	89	112	77	-35	77	-35	45	9	-36	9	-36	OK
53 WHATLEY CRESCENT 6053	Residential	5.03	58	106	82	-24	82	-24	35	15	-20	15	-20	OK
9 WINIFRED ROAD 6053	Residential	5.05	78	106	79	-27	79	-27	35	11	-24	11	-24	OK
2 COBDEN STREET 6053	Residential	5.05	59	106	82	-24	82	-24	35	14	-21	14	-21	OK
2/7 WINIFRED ROAD 6053	Residential	5.07	97	106	77	-29	77	-29	35	9	-26	9	-26	OK
50B RAILWAY PARADE 6053	Residential	5.07	57	106	82	-24	82	-24	35	14	-21	14	-21	OK
50B RAILWAY PARADE 6053	Residential	5.07	25	106	89	-17	89	-17	35	22	-13	22	-13	OK
4 COBDEN STREET 6053	Residential	5.07	73	106	80	-26	80	-26	35	12	-23	12	-23	OK
17 WINIFRED ROAD 6053	Residential	5.08	82	106	79	-27	79	-27	35	11	-24	11	-24	OK
6 COBDEN STREET 6053	Residential	5.08	91	106	78	-28	78	-28	35	10	-25	10	-25	OK
1/48 RAILWAY PARADE 6053	Residential	5.09	58	106	82	-24	82	-24	35	14	-21	14	-21	OK
1/48 RAILWAY PARADE 6053	Residential	5.09	26	106	89	-17	89	-17	35	21	-14	21	-14	OK
46 RAILWAY PARADE 6053	Residential	5.10	27	106	89	-17	89	-17	35	21	-14	21	-14	OK
1A COBDEN STREET 6053	Residential	5.10	59	106	82	-24	82	-24	35	14	-21	14	-21	OK
7/30 WINIFRED ROAD 6053	Residential	5.11	72	106	80	-26	80	-26	35	12	-23	12	-23	OK
1 COBDEN STREET 6053	Residential	5.13	57	106	82	-24	82	-24	35	14	-21	14	-21	OK
82/30 WINIFRED ROAD 6053	Residential	5.13	80	106	79	-27	79	-27	35	11	-24	11	-24	OK
1A BASSENDEAN ROAD 6053	Residential	5.13	54	106	83	-23	83	-23	35	15	-20	15	-20	OK
1 BASSENDEAN ROAD 6053	Residential	5.13	38	106	86	-20	86	-20	35	18	-17	18	-17	OK
49 WHATLEY CRESCENT 6053	Residential	5.14	81	106	79	-27	79	-27	35	11	-24	11	-24	OK
49 WHATLEY CRESCENT 6053	Residential	5.14	62	106	81	-25	81	-25	35	13	-22	13	-22	OK
47 WHATLEY CRESCENT 6053	Residential	5.16	62	106	81	-25	81	-25	35	13	-22	13	-22	OK
45 WHATLEY CRESCENT 6053	Residential	5.18	61	106	81	-25	81	-25	35	13	-22	13	-22	OK
43 WHATLEY CRESCENT 6053	Residential	5.20	63	106	81	-25	81	-25	35	13	-22	13	-22	OK
41 WHATLEY CRESCENT 6053	Residential	5.22	60	106	81	-25	81	-25	35	13	-22	13	-22	OK
41 WHATLEY CRESCENT 6053	Residential	5.22	90	106	77	-29	77	-29	35	9	-26	9	-26	OK
8 BASSENDEAN ROAD 6053	Commercial	5.24	65	112	80	-32	80	-32	45	12	-33	12	-33	OK

Address	Usage	Existing DN chainage, km	Dist., m	GBV (dB re 1nm/s)					GBN (dB re 20 µpa)					Likely Result
				Target	Build	Margin	Build+M	Margin	Target	Build	Margin	Build+M	Margin	
39 WHATLEY CRESCENT 6053	Residential	5.24	64	106	81	-25	81	-25	35	13	-22	13	-22	OK
42 RAILWAY PARADE 6053	Commercial	5.24	0	112	0	-112	0	-112	45	0	-45	0	-45	OK
37 WHATLEY CRESCENT 6053	Residential	5.26	66	106	80	-26	80	-26	35	13	-22	13	-22	OK
38 RAILWAY PARADE 6053	Commercial	5.29	42	112	84	-28	84	-28	45	16	-29	16	-29	OK
35 WHATLEY CRESCENT 6053	Residential	5.29	66	106	80	-26	80	-26	35	12	-23	12	-23	OK
33 WHATLEY CRESCENT 6053	Residential	5.30	65	106	80	-26	80	-26	35	12	-23	12	-23	OK
33 WHATLEY CRESCENT 6053	Residential	5.30	87	106	78	-28	78	-28	35	10	-25	10	-25	OK
36 RAILWAY PARADE 6053	Commercial	5.32	34	112	85	-27	85	-27	45	18	-27	18	-27	OK
31A WHATLEY CRESCENT 6053	Residential	5.33	86	106	77	-29	77	-29	35	9	-26	9	-26	OK
31 WHATLEY CRESCENT 6053	Residential	5.34	60	106	81	-25	81	-25	35	13	-22	13	-22	OK
23 DURHAM ROAD 6053	Commercial	5.35	85	112	77	-35	77	-35	45	9	-36	9	-36	OK
32 RAILWAY PARADE 6053	Commercial	5.36	22	112	88	-24	88	-24	45	20	-25	20	-25	OK
29A WHATLEY CRESCENT 6053	Residential	5.35	88	106	77	-29	77	-29	35	9	-26	9	-26	OK
29 WHATLEY CRESCENT 6053	Residential	5.35	66	106	80	-26	80	-26	35	12	-23	12	-23	OK
8/13 DURHAM ROAD 6053	Commercial	5.37	64	112	79	-33	79	-33	45	12	-33	12	-33	OK
27A WHATLEY CRESCENT 6053	Residential	5.37	64	106	80	-26	80	-26	35	12	-23	12	-23	OK
27C WHATLEY CRESCENT 6053	Residential	5.37	86	106	77	-29	77	-29	35	9	-26	9	-26	OK
6/13 DURHAM ROAD 6053	Commercial	5.40	50	112	82	-30	82	-30	45	14	-31	14	-31	OK
25 WHATLEY CRESCENT 6053	Residential	5.39	67	106	80	-26	80	-26	35	12	-23	12	-23	OK
25A WHATLEY CRESCENT 6053	Residential	5.38	90	106	77	-29	77	-29	35	9	-26	9	-26	OK
11 DURHAM ROAD 6053	Commercial	5.42	35	112	84	-28	84	-28	45	17	-28	17	-28	OK
23A WHATLEY CRESCENT 6053	Residential	5.40	98	106	76	-30	76	-30	35	8	-27	8	-27	OK
23 WHATLEY CRESCENT 6053	Residential	5.40	72	106	79	-27	79	-27	35	11	-24	11	-24	OK
21A WHATLEY CRESCENT 6053	Residential	5.42	75	106	79	-27	79	-27	35	11	-24	11	-24	OK
11 DURHAM ROAD 6053	Commercial	5.45	23	112	87	-25	87	-25	45	20	-25	20	-25	OK
19A WHATLEY CRESCENT 6053	Residential	5.43	95	106	76	-30	76	-30	35	8	-27	8	-27	OK
19 WHATLEY CRESCENT 6053	Residential	5.43	81	106	78	-28	78	-28	35	10	-25	10	-25	OK
5/7 DURHAM ROAD 6053	Commercial	5.47	17	112	90	-22	90	-22	45	22	-23	22	-23	OK
15 WHATLEY CRESCENT 6053	Residential	5.46	95	106	76	-30	76	-30	35	8	-27	8	-27	OK
17 WHATLEY CRESCENT 6053	Residential	5.45	86	106	77	-29	77	-29	35	9	-26	9	-26	OK
6D KING WILLIAM STREET 6053	Residential	4.57	67	106	86	-20	78	-28	35	18	-17	10	-25	OK
10 KING WILLIAM STREET 6053	Commercial	4.58	79	112	84	-28	76	-36	45	16	-29	8	-37	OK
99 WHATLEY CRESCENT 6053	Residential	4.47	48	106	100	-6	90	-16	35	32	-3	22	-13	OK
30 RAILWAY PARADE 6053	Commercial	5.51	15	112	110	-2	110	-2	45	43	-2	43	-2	OK
5 DURHAM ROAD 6053	Commercial	5.55	3	112	116	4	116	4	45	49	4	49	4	+4 dB
4 DURHAM ROAD 6053	Commercial	5.55	68	112	99	-13	99	-13	45	31	-14	31	-14	OK
10 CLAVERING ROAD 6053	Commercial	5.59	6	112	115	3	115	3	45	49	4	49	4	+4 dB
10 CLAVERING ROAD 6053	Commercial	5.63	26	112	107	-5	107	-5	45	40	-5	40	-5	OK
14 CLAVERING ROAD 6053	Commercial	5.64	92	112	96	-16	96	-16	45	28	-17	28	-17	OK
12 RAILWAY PARADE 6053	Commercial	5.66	72	112	98	-14	98	-14	45	30	-15	30	-15	OK
12 CLAVERING ROAD 6053	Commercial	5.66	37	112	104	-8	104	-8	45	37	-8	37	-8	OK
4/10 CLAVERING ROAD 6053	Commercial	5.66	18	112	110	-2	110	-2	45	43	-2	43	-2	OK
10 CLAVERING ROAD 6053	Commercial	5.68	8	112	115	3	115	3	45	49	4	49	4	+4 dB
14 CLAVERING ROAD 6053	Commercial	5.69	49	112	102	-10	102	-10	45	34	-11	34	-11	OK
18 CLAVERING ROAD 6053	Commercial	5.72	87	112	97	-15	97	-15	45	29	-16	29	-16	OK
12 RAILWAY PARADE 6053	Commercial	5.75	17	112	112	0	112	0	45	45	0	45	0	OK
2 MURIEL STREET 6053	Commercial	5.87	47	112	102	-10	102	-10	45	43	-2	43	-2	OK
9/40 BASSENDEAN ROAD 6053	Commercial	6.02	93	112	96	-16	96	-16	45	35	-10	35	-10	OK
3 MURIEL STREET 6053	Commercial	6.03	79	112	98	-14	98	-14	45	38	-7	38	-7	OK
6/5 MURIEL STREET 6053	Commercial	6.06	70	112	100	-12	100	-12	45	40	-5	40	-5	OK
25 MOONEY STREET 6053	Commercial	6.27	86	112	97	-15	97	-15	45	37	-8	37	-8	OK
7 RIO STREET 6053	Commercial	6.41	99	112	95	-17	95	-17	45	34	-11	34	-11	OK
11 RIO STREET 6053	Commercial	6.46	90	112	96	-16	96	-16	45	36	-9	36	-9	OK
15 CULLEN STREET 6053	Commercial	6.57	78	112	98	-14	98	-14	45	38	-7	38	-7	OK
47 CLUNE STREET 6053	Commercial	6.66	100	112	95	-17	95	-17	45	35	-10	35	-10	OK

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				Target	Build	Margin	Build+M	Margin	Target	Build	Margin	Build+M	Margin	
50 CLUNE STREET 6053	Commercial	6.78	75	112	102	-10	102	-10	45	35	-10	35	-10	OK
55 IRVINE STREET 6053	Commercial	6.79	74	112	102	-10	102	-10	45	34	-11	34	-11	OK
1 FLINDERS STREET 6053	Commercial	6.84	89	112	100	-12	100	-12	45	32	-13	32	-13	OK
50 CLUNE STREET 6053	Commercial	6.85	82	112	101	-11	101	-11	45	33	-12	33	-12	OK
60 CLUNE STREET 6053	Commercial	6.87	98	112	100	-12	100	-12	45	32	-13	32	-13	OK
3/1 FLINDERS STREET 6053	Commercial	6.87	90	112	100	-12	100	-12	45	32	-13	32	-13	OK
43A RAYMOND AVENUE 6053	Commercial	6.96	77	112	101	-11	101	-11	45	33	-12	33	-12	OK
232 COLLIER ROAD 6053	Commercial	7.10	96	112	99	-13	99	-13	45	31	-14	31	-14	OK
271 COLLIER ROAD 6053	Commercial	7.24	97	112	99	-13	99	-13	45	31	-14	31	-14	OK
271 COLLIER ROAD 6053	Commercial	7.31	65	112	103	-9	103	-9	45	35	-10	35	-10	OK
245 COLLIER ROAD 6053	Commercial	7.37	63	112	104	-8	104	-8	45	36	-9	36	-9	OK
27 SHALFORD STREET 6053	Residential	7.50	83	106	102	-4	102	-4	35	34	-1	34	-1	OK
7 CHALKLEY PLACE 6053	Commercial	7.51	70	112	104	-8	104	-8	45	36	-9	36	-9	OK
2 REDLANDS STREET 6053	Residential	7.52	90	106	101	-5	101	-5	35	33	-2	33	-2	OK
22 HORLEY STREET 6053	Residential	7.53	100	106	100	-6	100	-6	35	32	-3	32	-3	OK
4 REDLANDS STREET 6053	Residential	7.55	84	106	102	-4	102	-4	35	34	-1	34	-1	OK
4 REDLANDS STREET 6053	Residential	7.56	82	106	102	-4	102	-4	35	34	-1	34	-1	OK
27 HORLEY STREET 6053	Residential	7.60	87	106	101	-5	101	-5	35	33	-2	33	-2	OK
27 HORLEY STREET 6053	Residential	7.62	94	106	100	-6	100	-6	35	32	-3	32	-3	OK
7 CHALKLEY PLACE 6053	Commercial	7.62	97	112	101	-11	101	-11	45	33	-12	33	-12	OK
7 CHALKLEY PLACE 6053	Commercial	7.63	91	112	101	-11	101	-11	45	33	-12	33	-12	OK
8A REDLANDS STREET 6053	Residential	7.64	87	106	101	-5	101	-5	35	33	-2	33	-2	OK
6/26 WOTTON STREET 6053	Commercial	7.67	77	112	102	-10	102	-10	45	34	-11	34	-11	OK
50 HACKBRIDGE WAY 6053	Residential	7.70	97	106	100	-6	100	-6	35	32	-3	32	-3	OK
47 HACKBRIDGE WAY 6053	Residential	7.66	91	106	101	-5	101	-5	35	33	-2	33	-2	OK
12 REDLANDS STREET 6053	Residential	7.73	79	106	102	-4	102	-4	35	34	-1	34	-1	OK
14 REDLANDS STREET 6053	Residential	7.74	78	106	102	-4	102	-4	35	34	-1	34	-1	OK
25 WOTTON STREET 6053	Commercial	7.77	51	112	106	-6	106	-6	45	38	-7	38	-7	OK
16 REDLANDS STREET 6053	Residential	7.77	81	106	101	-5	101	-5	35	33	-2	33	-2	OK
18 REDLANDS STREET 6053	Residential	7.77	79	106	101	-5	101	-5	35	33	-2	33	-2	OK
8/170 BEECHBORO ROAD 6053	Commercial	7.78	98	112	99	-13	99	-13	45	31	-14	31	-14	OK
20 REDLANDS STREET 6053	Residential	7.79	80	106	101	-5	101	-5	35	33	-2	33	-2	OK
5/170 BEECHBORO ROAD 6053	Commercial	7.80	72	112	102	-10	102	-10	45	34	-11	34	-11	OK
22 REDLANDS STREET 6053	Residential	7.80	79	106	101	-5	101	-5	35	33	-2	33	-2	OK
24 REDLANDS STREET 6053	Residential	7.82	80	106	101	-5	101	-5	35	33	-2	33	-2	OK
1/184 BEECHBORO ROAD 6053	Commercial	7.83	79	112	101	-11	101	-11	45	33	-12	33	-12	OK
26A REDLANDS STREET 6053	Residential	7.84	96	106	99	-7	99	-7	35	31	-4	31	-4	OK
26B REDLANDS STREET 6053	Residential	7.84	79	106	101	-5	101	-5	35	33	-2	33	-2	OK
28 REDLANDS STREET 6053	Residential	7.85	80	106	100	-6	100	-6	35	32	-3	32	-3	OK
30 REDLANDS STREET 6053	Residential	7.86	78	106	100	-6	100	-6	35	32	-3	32	-3	OK
5/184 BEECHBORO ROAD 6053	Commercial	7.88	67	112	102	-10	102	-10	45	34	-11	34	-11	OK
1 BABINGTON CRESCENT 6053	Residential	7.92	76	106	100	-6	100	-6	35	31	-4	31	-4	OK
173 BEECHBORO ROAD 6062	Commercial	7.93	87	112	98	-14	98	-14	45	30	-15	30	-15	OK
198 BEECHBORO ROAD 6053	Commercial	7.94	49	112	102	-10	102	-10	45	34	-11	34	-11	OK
193 BEECHBORO ROAD 6062	Commercial	7.95	52	112	103	-9	103	-9	45	35	-10	35	-10	OK
179 BEECHBORO ROAD 6062	Commercial	7.96	97	112	97	-15	97	-15	45	29	-16	29	-16	OK
200 BEECHBORO ROAD 6053	Residential	7.96	76	106	99	-7	99	-7	35	31	-4	31	-4	OK
204 BEECHBORO ROAD 6053	Residential	7.96	93	106	97	-9	97	-9	35	29	-6	29	-6	OK
2/231 BEECHBORO ROAD 6062	Commercial	8.00	55	112	100	-12	100	-12	45	32	-13	32	-13	OK
1/9 SHEEN PLACE 6062	Commercial	8.11	81	112	94	-18	94	-18	45	26	-19	26	-19	OK
197 BEECHBORO ROAD 6062	Commercial	8.14	55	112	98	-14	98	-14	45	30	-15	30	-15	OK
197 BEECHBORO ROAD 6062	Commercial	8.18	55	112	100	-12	100	-12	45	32	-13	32	-13	OK
10 CHERRY COURT 6062	Residential	8.28	94	106	98	-8	96	-10	35	30	-5	28	-7	OK
6 CHERRY COURT 6062	Residential	8.31	68	106	101	-5	98	-8	35	33	-2	30	-5	OK
4 CHERRY COURT 6062	Residential	8.33	54	106	104	-2	98	-8	35	36	1	30	-5	OK

Address	Usage	Existing DN chainage, km	Dist., m	GBV (dB re 1nm/s)					GBN (dB re 20 µpa)					Likely Result
				Target	Build	Margin	Build+M	Margin	Target	Build	Margin	Build+M	Margin	
7 CHERRY COURT 6062	Residential	8.35	94	106	99	-7	92	-14	35	31	-4	24	-11	OK
37 ADDLESTONE ROAD 6062	Residential	8.36	70	106	101	-5	92	-14	35	33	-2	24	-11	OK
35 ADDLESTONE ROAD 6062	Residential	8.36	90	106	98	-8	90	-16	35	30	-5	22	-13	OK
428A WALTER ROAD 6062	Residential	8.37	66	106	101	-5	92	-14	35	33	-2	24	-11	OK
428D WALTER ROAD 6062	Residential	8.38	48	106	104	-2	94	-12	35	36	1	26	-9	OK
428D WALTER ROAD 6062	Residential	8.39	64	106	102	-4	92	-14	35	34	-1	24	-11	OK
428D WALTER ROAD 6062	Residential	8.40	40	106	106	0	96	-10	35	38	3	28	-7	OK
428E WALTER ROAD 6062	Residential	8.41	56	106	103	-3	93	-13	35	35	0	25	-10	OK
426 WALTER ROAD 6062	Residential	8.41	71	106	101	-5	91	-15	35	33	-2	23	-12	OK
424 WALTER ROAD 6062	Residential	8.42	89	106	99	-7	89	-17	35	31	-4	21	-14	OK
445 WALTER ROAD 6062	Residential	8.46	66	106	102	-4	92	-14	35	34	-1	24	-11	OK
16 ROKEBURY WAY 6062	Residential	8.46	96	106	100	-6	90	-16	35	32	-3	22	-13	OK
443 WALTER ROAD 6062	Residential	8.47	81	106	101	-5	91	-15	35	33	-2	23	-12	OK
441 WALTER ROAD 6062	Residential	8.48	100	106	99	-7	89	-17	35	31	-4	21	-14	OK
18 ROKEBURY WAY 6062	Residential	8.48	89	106	101	-5	91	-15	35	33	-2	23	-12	OK
441A WALTER ROAD 6062	Residential	8.49	95	106	99	-7	89	-17	35	31	-4	21	-14	OK
14 HARVEST ROAD 6062	Residential	8.53	46	106	108	2	98	-8	35	40	5	30	-5	OK
16 HARVEST ROAD 6062	Residential	8.55	50	106	107	1	97	-9	35	39	4	29	-6	OK
112 MICKLEHAM ROAD 6062	Residential	8.56	94	106	101	-5	91	-15	35	33	-2	23	-12	OK
110 MICKLEHAM ROAD 6062	Residential	8.59	78	106	103	-3	93	-13	35	35	0	25	-10	OK
104 ROBINSON ROAD 6062	Residential	8.63	99	106	100	-6	90	-16	35	32	-3	22	-13	OK
106A ROBINSON ROAD 6062	Residential	8.61	84	106	101	-5	91	-15	35	33	-2	23	-12	OK
106 ROBINSON ROAD 6062	Residential	8.63	81	106	102	-4	92	-14	35	34	-1	24	-11	OK
111 MICKLEHAM ROAD 6062	Residential	8.63	77	106	103	-3	93	-13	35	35	0	25	-10	OK
3 OKEWOOD WAY 6062	Residential	8.66	87	106	102	-4	92	-14	35	34	-1	24	-11	OK
87 ROBINSON ROAD 6062	Residential	8.68	86	106	101	-5	91	-15	35	33	-2	23	-12	OK
5A OKEWOOD WAY 6062	Residential	8.69	84	106	102	-4	92	-14	35	34	-1	24	-11	OK
5 OKEWOOD WAY 6062	Residential	8.71	83	106	103	-3	93	-13	35	35	0	25	-10	OK
30 HARVEST ROAD 6062	Residential	8.71	0	106	0	-106	0	-106	35	0	-35	0	-35	OK
9 OKEWOOD WAY 6062	Residential	8.75	98	106	101	-5	91	-15	35	33	-2	23	-12	OK
11 OKEWOOD WAY 6062	Residential	8.77	93	106	102	-4	92	-14	35	34	-1	24	-11	OK
1/10 BRUCE ROAD 6062	Residential	8.77	0	106	0	-106	0	-106	35	0	-35	0	-35	OK
34 HARVEST ROAD 6062	Residential	8.78	88	106	102	-4	92	-14	35	34	-1	24	-11	OK
10 BRUCE ROAD 6062	Residential	8.78	62	106	105	-1	95	-11	35	37	2	27	-8	OK
3/10 BRUCE ROAD 6062	Residential	8.79	63	106	105	-1	95	-11	35	37	2	27	-8	OK
12A BRUCE ROAD 6062	Residential	8.79	79	106	103	-3	93	-13	35	35	0	25	-10	OK
15 OKEWOOD WAY 6062	Residential	8.81	91	106	102	-4	92	-14	35	34	-1	24	-11	OK
17 OKEWOOD WAY 6062	Residential	8.84	86	106	103	-3	93	-13	35	35	0	25	-10	OK
18A BRUCE ROAD 6062	Residential	8.84	91	106	102	-4	92	-14	35	34	-1	24	-11	OK
2/20 BRUCE ROAD 6062	Residential	8.84	65	106	105	-1	95	-11	35	37	2	27	-8	OK
19 OKEWOOD WAY 6062	Residential	8.86	93	106	102	-4	92	-14	35	34	-1	24	-11	OK
20 BRUCE ROAD 6062	Residential	8.86	66	106	104	-2	94	-12	35	37	2	27	-8	OK
5/20 BRUCE ROAD 6062	Residential	8.86	83	106	102	-4	92	-14	35	34	-1	24	-11	OK
24B BRUCE ROAD 6062	Residential	8.88	74	106	103	-3	93	-13	35	36	1	26	-9	OK
38 HARVEST ROAD 6062	Residential	8.89	81	106	103	-3	93	-13	35	35	0	25	-10	OK
24A BRUCE ROAD 6062	Residential	8.90	77	106	103	-3	93	-13	35	35	0	25	-10	OK
26A BRUCE ROAD 6062	Residential	8.92	80	106	103	-3	93	-13	35	35	0	25	-10	OK
44 HARVEST ROAD 6062	Residential	8.94	69	106	105	-1	95	-11	35	37	2	27	-8	OK
28A BRUCE ROAD 6062	Residential	8.94	83	106	103	-3	93	-13	35	35	0	25	-10	OK
20 GAYSWOOD WAY 6062	Residential	8.98	98	106	101	-5	91	-15	35	33	-2	23	-12	OK
22 GAYSWOOD WAY 6062	Residential	9.00	99	106	101	-5	91	-15	35	33	-2	23	-12	OK
24 GAYSWOOD WAY 6062	Residential	9.01	98	106	101	-5	91	-15	35	33	-2	23	-12	OK
6 CLANDON WAY 6062	Residential	9.12	86	106	102	-4	92	-14	35	34	-1	24	-11	OK
4 CLANDON WAY 6062	Residential	9.14	80	106	103	-3	93	-13	35	35	0	25	-10	OK
59 HAMERSLEY PLACE 6062	Residential	9.14	85	106	102	-4	92	-14	35	34	-1	24	-11	OK

Address	Usage	Existing DN chainage, km	Dist., m	GBV (dB re 1nm/s)					GBN (dB re 20 µpa)					Likely Result
				Target	Build	Margin	Build+M	Margin	Target	Build	Margin	Build+M	Margin	
6 ABBEY STREET 6062	Residential	9.17	99	106	101	-5	91	-15	35	33	-2	23	-12	OK
41 HAMERSLEY AVENUE 6062	Residential	9.17	94	106	102	-4	92	-14	35	34	-1	24	-11	OK
65 Hamersley Pl, Morley WA 6062	Commercial	9.22	98	112	100	-12	90	-22	45	32	-13	22	-23	OK
44 HAMERSLEY AVENUE 6062	Residential	9.23	76	106	104	-2	94	-12	35	36	1	26	-9	OK
3B IVANHOE STREET 6062	Residential	9.25	91	106	102	-4	92	-14	35	34	-1	24	-11	OK
7 IVANHOE STREET 6062	Residential	9.30	98	106	101	-5	91	-15	35	33	-2	23	-12	OK
9 IVANHOE STREET 6062	Residential	9.30	67	106	105	-1	95	-11	35	37	2	27	-8	OK
9 IVANHOE STREET 6062	Residential	9.31	83	106	103	-3	93	-13	35	35	0	25	-10	OK
11 IVANHOE STREET 6062	Residential	9.32	85	106	103	-3	93	-13	35	35	0	25	-10	OK
65 Hamersley Pl, Morley WA 6062	Commercial	9.33	93	112	100	-12	90	-22	45	32	-13	22	-23	OK
13A IVANHOE STREET 6062	Residential	9.35	84	106	103	-3	93	-13	35	35	0	25	-10	OK
13A IVANHOE STREET 6062	Residential	9.35	62	106	106	0	96	-10	35	38	3	28	-7	OK
65 Hamersley Pl, Morley WA 6062	Commercial	9.35	85	112	101	-11	91	-21	45	33	-12	23	-22	OK
15 IVANHOE STREET 6062	Residential	9.37	82	106	103	-3	93	-13	35	35	0	25	-10	OK
15 IVANHOE STREET 6062	Residential	9.37	58	106	106	0	96	-10	35	39	4	29	-6	OK
17 IVANHOE STREET 6062	Residential	9.39	78	106	104	-2	94	-12	35	36	1	26	-9	OK
3 PAINE ROAD 6062	Residential	9.40	68	106	104	-2	94	-12	35	36	1	26	-9	OK
3A PAINE ROAD 6062	Residential	9.40	82	106	102	-4	92	-14	35	34	-1	24	-11	OK
19 IVANHOE STREET 6062	Residential	9.41	79	106	103	-3	93	-13	35	36	1	26	-9	OK
20 ALFREDA AVENUE 6062	Residential	9.42	73	106	104	-2	94	-12	35	36	1	26	-9	OK
21 IVANHOE STREET 6062	Residential	9.43	72	106	105	-1	95	-11	35	37	2	27	-8	OK
22 ALFREDA AVENUE 6062	Residential	9.44	76	106	103	-3	93	-13	35	35	0	25	-10	OK
23 IVANHOE STREET 6062	Residential	9.45	66	106	105	-1	95	-11	35	37	2	27	-8	OK
22 ALFREDA AVENUE 6062	Residential	9.45	96	106	101	-5	91	-15	35	33	-2	23	-12	OK
25 IVANHOE STREET 6062	Residential	9.46	72	106	105	-1	95	-11	35	37	2	27	-8	OK
24 ALFREDA AVENUE 6062	Residential	9.46	77	106	103	-3	93	-13	35	35	0	25	-10	OK
25 IVANHOE STREET 6062	Residential	9.46	0	106	0	-106	0	-106	35	0	-35	0	-35	OK
27 IVANHOE STREET 6062	Residential	9.49	66	106	105	-1	95	-11	35	37	2	27	-8	OK
27A IVANHOE STREET 6062	Residential	9.49	47	106	108	2	98	-8	35	41	6	31	-4	OK
28 ALFREDA AVENUE 6062	Residential	9.50	81	106	103	-3	93	-13	35	35	0	25	-10	OK
29A IVANHOE STREET 6062	Residential	9.51	63	106	106	0	96	-10	35	38	3	28	-7	OK
29A IVANHOE STREET 6062	Residential	9.51	47	106	108	2	98	-8	35	41	6	31	-4	OK
31A IVANHOE STREET 6062	Residential	9.52	59	106	106	0	96	-10	35	39	4	29	-6	OK
30 ALFREDA AVENUE 6062	Residential	9.52	84	106	102	-4	92	-14	35	34	-1	24	-11	OK
31A IVANHOE STREET 6062	Residential	9.53	44	106	109	3	99	-7	35	41	6	31	-4	OK
32 ALFREDA AVENUE 6062	Residential	9.54	91	106	102	-4	92	-14	35	34	-1	24	-11	OK
33 IVANHOE STREET 6062	Residential	9.55	63	106	106	0	96	-10	35	38	3	28	-7	OK
34 ALFREDA AVENUE 6062	Residential	9.56	84	106	102	-4	92	-14	35	34	-1	24	-11	OK
35 IVANHOE STREET 6062	Residential	9.56	69	106	105	-1	95	-11	35	37	2	27	-8	OK
36 ALFREDA AVENUE 6062	Residential	9.58	88	106	102	-4	92	-14	35	34	-1	24	-11	OK
37 IVANHOE STREET 6062	Residential	9.59	67	106	105	-1	95	-11	35	37	2	27	-8	OK
39A IVANHOE STREET 6062	Residential	9.60	56	106	107	1	97	-9	35	39	4	29	-6	OK
38 ALFREDA AVENUE 6062	Residential	9.60	88	106	102	-4	92	-14	35	34	-1	24	-11	OK
40 ALFREDA AVENUE 6062	Residential	9.62	88	106	102	-4	92	-14	35	34	-1	24	-11	OK
41A IVANHOE STREET 6062	Residential	9.62	59	106	106	0	96	-10	35	39	4	29	-6	OK
41A IVANHOE STREET 6062	Residential	9.62	40	106	110	4	100	-6	35	42	7	32	-3	OK
43A IVANHOE STREET 6062	Residential	9.64	58	106	106	0	96	-10	35	39	4	29	-6	OK
43A IVANHOE STREET 6062	Residential	9.64	38	106	110	4	100	-6	35	43	8	33	-2	OK
5 BRIAN AVENUE 6062	Residential	9.67	95	106	101	-5	91	-15	35	33	-2	23	-12	OK
44A ALFREDA AVENUE 6062	Residential	9.68	89	106	102	-4	92	-14	35	34	-1	24	-11	OK
47B IVANHOE STREET 6062	Residential	9.69	51	106	108	2	98	-8	35	40	5	30	-5	OK
49 IVANHOE STREET 6062	Residential	9.70	61	106	106	0	96	-10	35	38	3	28	-7	OK
46 ALFREDA AVENUE 6062	Residential	9.71	90	106	102	-4	92	-14	35	34	-1	24	-11	OK
51 IVANHOE STREET 6062	Residential	9.72	61	106	106	0	96	-10	35	38	3	28	-7	OK
48 ALFREDA AVENUE 6062	Residential	9.74	90	106	102	-4	92	-14	35	34	-1	24	-11	OK

Address	Usage	Existing DN chainage, km	Dist., m	GBV (dB re 1nm/s)					GBN (dB re 20 µpa)					Likely Result
				Target	Build	Margin	Build+M	Margin	Target	Build	Margin	Build+M	Margin	
53 IVANHOE STREET 6062	Residential	9.74	63	106	106	0	96	-10	35	38	3	28	-7	OK
53A IVANHOE STREET 6062	Residential	9.75	36	106	111	5	101	-5	35	43	8	33	-2	OK
50 ALFREDA AVENUE 6062	Residential	9.76	93	106	101	-5	91	-15	35	33	-2	23	-12	OK
57 IVANHOE STREET 6062	Residential	9.77	48	106	108	2	98	-8	35	41	6	31	-4	OK
55 IVANHOE STREET 6062	Residential	9.77	51	106	108	2	98	-8	35	40	5	30	-5	OK
52 ALFREDA AVENUE 6062	Residential	9.79	90	106	102	-4	92	-14	35	34	-1	24	-11	OK
59 IVANHOE STREET 6062	Residential	9.80	55	106	107	1	97	-9	35	39	4	29	-6	OK
61B IVANHOE STREET 6062	Residential	9.81	50	106	108	2	98	-8	35	40	5	30	-5	OK
54 ALFREDA AVENUE 6062	Residential	9.82	95	106	101	-5	91	-15	35	33	-2	23	-12	OK
63 IVANHOE STREET 6062	Residential	9.83	61	106	106	0	96	-10	35	38	3	28	-7	OK
56 ALFREDA AVENUE 6062	Residential	9.84	89	106	102	-4	92	-14	35	34	-1	24	-11	OK
65 IVANHOE STREET 6062	Residential	9.85	57	106	107	1	97	-9	35	39	4	29	-6	OK
58 ALFREDA AVENUE 6062	Residential	9.86	88	106	102	-4	92	-14	35	34	-1	24	-11	OK
67 IVANHOE STREET 6062	Residential	9.87	56	106	107	1	97	-9	35	39	4	29	-6	OK
67A IVANHOE STREET 6062	Residential	9.87	37	106	110	4	100	-6	35	43	8	33	-2	OK
60 ALFREDA AVENUE 6062	Residential	9.88	89	106	102	-4	92	-14	35	34	-1	24	-11	OK
69 IVANHOE STREET 6062	Residential	9.89	59	106	106	0	96	-10	35	39	4	29	-6	OK
62 ALFREDA AVENUE 6062	Residential	9.91	87	106	102	-4	92	-14	35	34	-1	24	-11	OK
71 IVANHOE STREET 6062	Residential	9.91	61	106	106	0	96	-10	35	38	3	28	-7	OK
73 IVANHOE STREET 6062	Residential	9.94	40	106	110	4	100	-6	35	42	7	32	-3	OK
75 IVANHOE STREET 6062	Residential	9.95	58	106	107	1	97	-9	35	39	4	29	-6	OK
75A IVANHOE STREET 6062	Residential	9.95	42	106	109	3	99	-7	35	42	7	32	-3	OK
3/81 IVANHOE STREET 6062	Residential	9.96	54	106	107	1	97	-9	35	39	4	29	-6	OK
81 IVANHOE STREET 6062	Residential	9.96	67	106	105	-1	95	-11	35	37	2	27	-8	OK
4/81 IVANHOE STREET 6062	Residential	9.97	43	106	109	3	99	-7	35	42	7	32	-3	OK
66 ALFREDA AVENUE 6062	Residential	9.95	83	106	103	-3	93	-13	35	35	0	25	-10	OK
68 ALFREDA AVENUE 6062	Residential	9.97	84	106	103	-3	93	-13	35	35	0	25	-10	OK
83 IVANHOE STREET 6062	Residential	9.98	67	106	105	-1	95	-11	35	37	2	27	-8	OK
70 ALFREDA AVENUE 6062	Residential	9.99	77	106	104	-2	94	-12	35	36	1	26	-9	OK
81 IVANHOE STREET 6062	Residential	10.00	56	106	107	1	97	-9	35	39	4	29	-6	OK
81 IVANHOE STREET 6062	Residential	10.00	69	106	105	-1	95	-11	35	37	2	27	-8	OK
4/81 IVANHOE STREET 6062	Residential	10.00	45	106	109	3	99	-7	35	41	6	31	-4	OK
77 IVANHOE STREET 6062	Residential	10.01	70	106	105	-1	95	-11	35	37	2	27	-8	OK
72 ALFREDA AVENUE 6062	Residential	10.01	82	106	103	-3	93	-13	35	35	0	25	-10	OK
74 ALFREDA AVENUE 6062	Residential	10.04	84	106	103	-3	93	-13	35	35	0	25	-10	OK
50 CHAFFERS STREET 6062	Residential	10.05	69	106	105	-1	95	-11	35	37	2	27	-8	OK
48 CHAFFERS STREET 6062	Residential	10.05	89	106	102	-4	92	-14	35	34	-1	24	-11	OK
76 ALFREDA AVENUE 6062	Residential	10.06	84	106	103	-3	93	-13	35	35	0	25	-10	OK
48A CHAFFERS STREET 6062	Residential	10.06	93	106	102	-4	92	-14	35	34	-1	24	-11	OK
78 ALFREDA AVENUE 6062	Residential	10.08	86	106	103	-3	93	-13	35	35	0	25	-10	OK
47A DEVONSHIRE STREET 6062	Residential	10.08	93	106	102	-4	92	-14	35	34	-1	24	-11	OK
51 DEVONSHIRE STREET 6062	Residential	10.08	52	106	107	1	97	-9	35	40	5	30	-5	OK
49 DEVONSHIRE STREET 6062	Residential	10.09	74	106	104	-2	94	-12	35	36	1	26	-9	OK
47B DEVONSHIRE STREET 6062	Residential	10.09	98	106	101	-5	91	-15	35	33	-2	23	-12	OK
80 ALFREDA AVENUE 6062	Residential	10.10	88	106	102	-4	92	-14	35	34	-1	24	-11	OK
48 LINDSAY DRIVE 6062	Residential	10.12	80	106	103	-3	93	-13	35	35	0	25	-10	OK
1/48 SHADWELL WAY 6062	Residential	10.13	33	106	112	6	102	-4	35	44	9	34	-1	OK
46 LINDSAY DRIVE 6062	Residential	10.13	92	106	102	-4	92	-14	35	34	-1	24	-11	OK
38 DEVONSHIRE STREET 6062	Residential	10.14	97	106	102	-4	92	-14	35	33	-2	23	-12	OK
4/48 SHADWELL WAY 6062	Residential	10.15	33	106	111	5	101	-5	35	44	9	34	-1	OK
45 SHADWELL WAY 6062	Residential	10.16	93	106	102	-4	92	-14	35	34	-1	24	-11	OK
37 LINDSAY DRIVE 6062	Residential	10.17	82	106	103	-3	93	-13	35	35	0	25	-10	OK
43 SHADWELL WAY 6062	Residential	10.18	95	106	102	-4	92	-14	35	34	-1	24	-11	OK
48 SHADWELL WAY 6062	Residential	10.19	47	106	108	2	98	-8	35	41	6	31	-4	OK
86 ALFREDA AVENUE 6062	Residential	10.19	0	106	0	-106	0	-106	35	0	-35	0	-35	OK

Address	Usage	Existing DN chainage, km	Dist., m	GBV (dB re 1nm/s)					GBN (dB re 20 µpa)					Likely Result
				Target	Build	Margin	Build+M	Margin	Target	Build	Margin	Build+M	Margin	
46 SHADWELL WAY 6062	Residential	10.21	44	106	109	3	99	-7	35	41	6	31	-4	OK
1 BATT COURT 6062	Residential	10.23	88	106	102	-4	92	-14	35	34	-1	24	-11	OK
44 SHADWELL WAY 6062	Residential	10.23	0	106	0	-106	0	-106	35	0	-35	0	-35	OK
42 SHADWELL WAY 6062	Residential	10.26	50	106	108	2	98	-8	35	40	5	30	-5	OK
90 ALFREDA AVENUE 6062	Residential	10.27	91	106	102	-4	94	-12	35	34	-1	26	-9	OK
40 SHADWELL WAY 6062	Residential	10.28	61	106	106	0	98	-8	35	38	3	30	-5	OK
38 SHADWELL WAY 6062	Residential	10.28	77	106	104	-2	96	-10	35	36	1	28	-7	OK
92 ALFREDA AVENUE 6062	Residential	10.28	93	106	102	-4	95	-11	35	34	-1	27	-8	OK
94 ALFREDA AVENUE 6062	Residential	10.30	89	106	102	-4	96	-10	35	34	-1	28	-7	OK
36 SHADWELL WAY 6062	Residential	10.30	90	106	102	-4	97	-9	35	34	-1	29	-6	OK
1 DAVIS COURT 6062	Residential	10.31	88	106	102	-4	98	-8	35	34	-1	30	-5	OK
3 DAVIS COURT 6062	Residential	10.33	66	106	105	-1	101	-5	35	37	2	33	-2	OK
4 DAVIS COURT 6062	Residential	10.36	97	106	101	-5	100	-6	35	33	-2	32	-3	OK
37 MCPHERSON AVENUE 6062	Residential	10.36	99	106	101	-5	100	-6	35	33	-2	32	-3	OK
11 DAVIS COURT 6062	Residential	10.40	90	106	102	-4	102	-4	35	34	-1	34	-1	OK
100 ALFREDA AVENUE 6062	Residential	10.42	100	106	101	-5	101	-5	35	33	-2	33	-2	OK
31 BLUEGUM ROAD 6062	Residential	10.78	97	106	101	-5	101	-5	35	33	-2	33	-2	OK
33 BLUEGUM ROAD 6062	Residential	10.80	94	106	102	-4	101	-5	35	34	-1	33	-2	OK
19A WELLS COURT 6062	Residential	10.81	84	106	103	-3	102	-4	35	35	0	34	-1	OK
35 BLUEGUM ROAD 6062	Residential	10.82	91	106	102	-4	101	-5	35	34	-1	33	-2	OK
34 BELSTEAD AVENUE 6062	Residential	10.83	91	106	102	-4	100	-6	35	34	-1	32	-3	OK
37 BLUEGUM ROAD 6062	Residential	10.84	94	106	102	-4	99	-7	35	34	-1	31	-4	OK
36 BELSTEAD AVENUE 6062	Residential	10.85	80	106	103	-3	100	-6	35	35	0	32	-3	OK
39 BLUEGUM ROAD 6062	Residential	10.86	91	106	102	-4	98	-8	35	34	-1	30	-5	OK
36 BELSTEAD AVENUE 6062	Residential	10.87	78	106	104	-2	98	-8	35	36	1	30	-5	OK
3/41 BLUEGUM ROAD 6062	Residential	10.91	65	106	106	0	96	-10	35	38	3	28	-7	OK
3 ACACIA COURT 6062	Residential	10.93	84	106	103	-3	93	-13	35	35	0	25	-10	OK
5A ACACIA COURT 6062	Residential	10.94	57	106	107	1	97	-9	35	39	4	29	-6	OK
31 BELSTEAD AVENUE 6062	Residential	10.94	95	106	102	-4	92	-14	35	34	-1	24	-11	OK
33 BELSTEAD AVENUE 6062	Residential	10.97	86	106	103	-3	93	-13	35	35	0	25	-10	OK
53 BLUEGUM ROAD 6063	Residential	10.98	95	106	102	-4	92	-14	35	34	-1	24	-11	OK
4 ACACIA COURT 6063	Residential	10.98	66	106	105	-1	95	-11	35	37	2	27	-8	OK
6 ACACIA COURT 6063	Residential	11.00	75	106	104	-2	94	-12	35	36	1	26	-9	OK
8 ACACIA COURT 6063	Residential	11.04	74	106	104	-2	94	-12	35	36	1	26	-9	OK
10 ACACIA COURT 6063	Residential	11.04	53	106	107	1	97	-9	35	40	5	30	-5	OK
10 ACACIA COURT 6063	Residential	11.04	0	106	0	-106	0	-106	35	0	-35	0	-35	OK
3 WILLOW PLACE 6063	Residential	11.06	82	106	103	-3	93	-13	35	35	0	25	-10	OK
5 WILLOW PLACE 6063	Residential	11.09	64	106	106	0	96	-10	35	38	3	28	-7	OK
7 WILLOW PLACE 6063	Residential	11.11	65	106	106	0	96	-10	35	38	3	28	-7	OK
9 WILLOW PLACE 6063	Residential	11.12	65	106	106	0	96	-10	35	38	3	28	-7	OK
11 WILLOW PLACE 6063	Residential	11.15	70	106	105	-1	95	-11	35	37	2	27	-8	OK
13A WILLOW PLACE 6063	Residential	11.16	72	106	105	-1	95	-11	35	37	2	27	-8	OK
13A WILLOW PLACE 6063	Residential	11.18	64	106	106	0	96	-10	35	38	3	28	-7	OK
15 WILLOW PLACE 6063	Residential	11.19	77	106	104	-2	94	-12	35	36	1	26	-9	OK
21 SILKWOOD WAY 6063	Residential	11.19		106	0	-106	0	-106	35	0	-35	0	-35	OK
23 SILKWOOD WAY 6063	Residential	11.25	66	106	105	-1	95	-11	35	37	2	27	-8	OK
20 SILKWOOD WAY 6063	Residential	11.28	67	106	104	-2	96	-10	35	36	1	28	-7	OK
18 SILKWOOD WAY 6063	Residential	11.29	84	106	103	-3	96	-10	35	35	0	28	-7	OK
9 SHEOAK CLOSE 6063	Residential	11.31	88	106	102	-4	97	-9	35	34	-1	29	-6	OK
11 SHEOAK CLOSE 6063	Residential	11.33	70	106	105	-1	100	-6	35	37	2	32	-3	OK
14 SHEOAK CLOSE 6063	Residential	11.35	69	106	105	-1	102	-4	35	37	2	34	-1	OK
12 SHEOAK CLOSE 6063	Residential	11.37	86	106	103	-3	102	-4	35	35	0	34	-1	OK
15 JARRAH COURT 6063	Residential	11.40	88	106	102	-4	102	-4	35	34	-1	34	-1	OK
10 JARRAH COURT 6063	Residential	11.42	84	106	103	-3	103	-3	35	35	0	35	0	OK
8 JARRAH COURT 6063	Residential	11.44	98	106	101	-5	101	-5	35	33	-2	33	-2	OK

Address	Usage	Existing DN chainage, km	Dist., m	GBV (dB re 1nm/s)					GBN (dB re 20 µpa)					Likely Result
				Target	Build	Margin	Build+M	Margin	Target	Build	Margin	Build+M	Margin	
22 MILLY COURT 6090	Commercial	12.25	93	112	101	-11	101	-11	45	33	-12	33	-12	OK
1/24 MILLY COURT 6090	Commercial	12.28	76	112	103	-9	103	-9	45	35	-10	35	-10	OK
1/26 MILLY COURT 6090	Commercial	12.31	71	112	104	-8	104	-8	45	36	-9	36	-9	OK
2/28 MILLY COURT 6090	Commercial	12.33	65	112	104	-8	104	-8	45	37	-8	36	-9	OK
9 METAL CIRCUIT 6090	Commercial	12.33	74	112	103	-9	103	-9	45	35	-10	35	-10	OK
19 MITRA LOOP 6063	Residential	12.36	88	106	102	-4	101	-5	35	34	-1	33	-2	OK
21 MITRA LOOP 6063	Residential	12.38	82	106	103	-3	100	-6	35	35	0	32	-3	OK
23 MITRA LOOP 6063	Residential	12.40	82	106	103	-3	99	-7	35	35	0	31	-4	OK
25 MITRA LOOP 6063	Residential	12.41	74	106	104	-2	98	-8	35	36	1	30	-5	OK
27 MITRA LOOP 6063	Residential	12.43	67	106	104	-2	98	-8	35	37	2	30	-5	OK
9 METAL CIRCUIT 6090	Commercial	12.44	45	112	108	-4	99	-13	45	40	-5	31	-14	OK
29 MITRA LOOP 6063	Residential	12.44	67	106	104	-2	96	-10	35	37	2	28	-7	OK
31 MITRA LOOP 6063	Residential	12.46	61	106	105	-1	96	-10	35	38	3	28	-7	OK
33 MITRA LOOP 6063	Residential	12.48	60	106	106	0	96	-10	35	38	3	28	-7	OK
35 MITRA LOOP 6063	Residential	12.48	63	106	105	-1	95	-11	35	37	2	27	-8	OK
37 MITRA LOOP 6063	Residential	12.50	57	106	106	0	96	-10	35	38	3	28	-7	OK
9 METAL CIRCUIT 6090	Commercial	12.52	95	112	101	-11	91	-21	45	33	-12	23	-22	OK
41 MITRA LOOP 6063	Residential	12.53	58	106	106	0	96	-10	35	38	3	28	-7	OK
39 MITRA LOOP 6063	Residential	12.53	62	106	105	-1	95	-11	35	37	2	27	-8	OK
43 MITRA LOOP 6063	Residential	12.54	61	106	105	-1	95	-11	35	37	2	27	-8	OK
45 MITRA LOOP 6063	Residential	12.57	60	106	106	0	96	-10	35	38	3	28	-7	OK
47 MITRA LOOP 6063	Residential	12.59	59	106	106	0	96	-10	35	38	3	28	-7	OK
49 MITRA LOOP 6063	Residential	12.60	55	106	106	0	97	-9	35	38	3	29	-6	OK
51 MITRA LOOP 6063	Residential	12.61	60	106	105	-1	96	-10	35	38	3	29	-6	OK
53 MITRA LOOP 6063	Residential	12.65	51	106	107	1	100	-6	35	39	4	32	-3	OK
57 MITRA LOOP 6063	Residential	12.65	85	106	102	-4	98	-8	35	34	-1	30	-5	OK
55 MITRA LOOP 6063	Residential	12.66	67	106	104	-2	100	-6	35	36	1	32	-3	OK
16 ARNHEM COURT 6066	Residential	13.05	96	106	98	-8	98	-8	35	30	-5	30	-5	OK
18 ARNHEM COURT 6066	Residential	13.07	94	106	97	-9	97	-9	35	31	-4	31	-4	OK
20 ARNHEM COURT 6066	Residential	13.09	89	106	97	-9	97	-9	35	32	-3	31	-4	OK
22 ARNHEM COURT 6066	Residential	13.10	75	106	98	-8	98	-8	35	35	0	34	-1	OK
24 ARNHEM COURT 6066	Residential	13.13	90	106	95	-11	95	-11	35	33	-2	31	-4	OK
8 COOTHA COURT 6066	Residential	13.15	82	106	94	-12	94	-12	35	34	-1	31	-4	OK
10 COOTHA COURT 6066	Residential	13.16	67	106	97	-9	93	-13	35	38	3	32	-3	OK
9 COOTHA COURT 6066	Residential	13.18	71	106	96	-10	90	-16	35	37	2	29	-6	OK
7 COOTHA COURT 6066	Residential	13.20	72	106	96	-10	88	-18	35	36	1	28	-7	OK
3 COOTHA COURT 6066	Residential	13.20	99	106	91	-15	86	-20	35	31	-4	23	-12	OK
5 COOTHA COURT 6066	Residential	13.21	72	106	96	-10	88	-18	35	36	1	28	-7	OK
6 LAE COURT 6066	Residential	13.22	69	106	96	-10	89	-17	35	37	2	29	-6	OK
8 LAE COURT 6066	Residential	13.24	68	106	97	-9	92	-14	35	37	2	32	-3	OK
9 LAE COURT 6066	Residential	13.25	61	106	98	-8	94	-12	35	39	4	35	0	OK
7 LAE COURT 6066	Residential	13.26	69	106	96	-10	94	-12	35	37	2	34	-1	OK
5 LAE COURT 6066	Residential	13.27	78	106	95	-11	93	-13	35	35	0	33	-2	OK
3 LAE COURT 6066	Residential	13.28	97	106	92	-14	90	-16	35	31	-4	30	-5	OK
34 YERILLA GLEN 6066	Residential	13.30	78	106	95	-11	94	-12	35	35	0	34	-1	OK
32 YERILLA GLEN 6066	Residential	13.31	87	106	93	-13	93	-13	35	33	-2	33	-2	OK
30 YERILLA GLEN 6066	Residential	13.32	97	106	92	-14	92	-14	35	31	-4	31	-4	OK

APPENDIX D

D Result figures

D.1 Noise

Figure D.9 Single point receiver results, 'Build' scenario, Day period: Forecast $L_{Aeq,day}$ results prior to mitigation. Sheet 1 of 6.

Figure D.10 Single point receiver results, 'Build' scenario, Day period: Forecast $L_{Aeq,day}$ results prior to mitigation. Sheet 2 of 6.

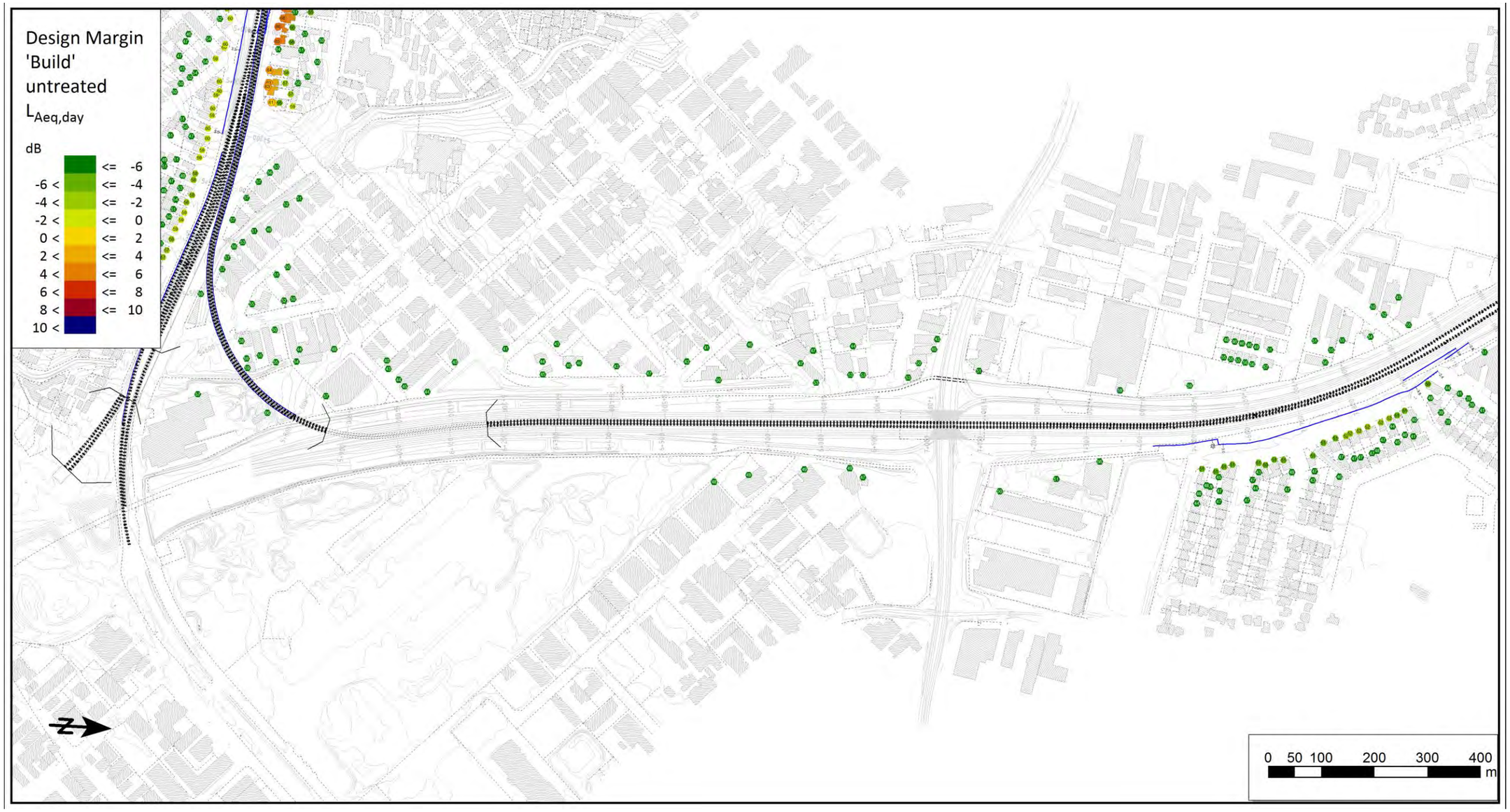

Figure D.11 Single point receiver results, 'Build' scenario, Day period: Forecast $L_{Aeq,day}$ results prior to mitigation. Sheet 3 of 6.

Figure D.12 Single point receiver results, 'Build' scenario, Day period: Forecast $L_{Aeq,day}$ results prior to mitigation. Sheet 4 of 6.

Figure D.13 Single point receiver results, 'Build' scenario, Day period: Forecast $L_{Aeq,day}$ results prior to mitigation. Sheet 5 of 6.

Figure D.14 Single point receiver results, 'Build' scenario, Day period: Forecast $L_{Aeq,day}$ results prior to mitigation. Sheet 6 of 6.

Figure D.15 Single point receiver results, 'Build+M' (Build with mitigation) scenario, Day period: Forecast $L_{Aeq,day}$ results with mitigation. Sheet 1 of 6.

Figure D.16 Single point receiver results, 'Build+M' (Build with mitigation) scenario, Day period: Forecast $L_{Aeq,day}$ results with mitigation. Sheet 2 of 6.

Figure D.17 Single point receiver results, 'Build+M'' (Build with mitigation) scenario, Day period: Forecast $L_{Aeq,day}$ results with mitigation. Sheet 3 of 6.

Figure D.18 Single point receiver results, 'Build+M' (Build with mitigation) scenario, Day period: Forecast $L_{Aeq,day}$ results with mitigation. Sheet 4 of 6.

Figure D.19 Single point receiver results, 'Build+M' (Build with mitigation) scenario, Day period: Forecast $L_{Aeq,day}$ results with mitigation. Sheet 5 of 6.

Figure D.20 Single point receiver results, 'Build+M' (Build with mitigation) scenario, Day period: Forecast $L_{Aeq,day}$ results with mitigation. Sheet 6 of 6.

Figure D.21 Single point receiver results, 'Build+M' (Build with mitigation) scenario, Day period: Forecast L_{Amax} results with mitigation. Sheet 1 of 6.