VicRoads
10-Mar-2015
Doc No. MA1734

Palmers Road Corridor EES

Western Freeway to Calder Freeway

Traffic Noise Assessment

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Traffic Noise Assessment

Client: VicRoads

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10-Mar-2015

Job No.: 60267382

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Quality Information

Document	Palmers Road Corridor EES
	60267382
Ref	p:\602x\60267382\6. draft docs\6.1 reports\noise\2014\ma1734 palmers road corridor traffic noise assessment final.docx
Date	10-Mar-2015
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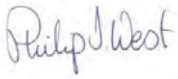
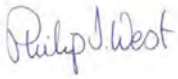
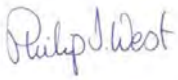
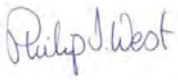
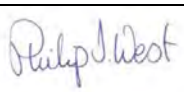
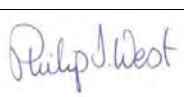
Reviewed by	Jacqueline Davis

Revision History

Revision	Revision Date	Details	Authorised	
			Name/Position	Signature
0	15-July-2013	Draft Report for VicRoads review	Phil West Associate Director – Acoustics	
1	16-July-2013	Draft Report including VicRoads initial comments	Phil West Associate Director – Acoustics	
2	27-September-2013	Draft Report including VicRoads and TRG initial comments	Phil West Associate Director – Acoustics	
4	23-June-2014	Draft Report including Kororoit Creek bridge assessment	Phil West Associate Director – Acoustics	
5	20-Aug-2014	Final Report for VicRoads comments	Phil West Associate Director – Acoustics	
6	15-Sept-2014	Final Report	Phil West Associate Director – Acoustics	
7	10-Mar-2015	Final Report including VicRoads comments	Phil West Associate Director – Acoustics	

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Executive Summary

AECOM was engaged by VicRoads to undertake a traffic noise assessment of the proposed Palmers Road Corridor upgrade between the Western Freeway (Deer Park Bypass) and the Calder Freeway. The 2013 report focused on the Palmers Road Corridor without the connection of Westwood Drive in Burnside.

This report provides supplementary information regarding the Westwood Drive connection between Tenterfield Drive and Westwood Drive, Burnside.

The assessment includes:

- A review of the application of VicRoads Traffic Noise Reduction Policy 2005 to the Palmers Road Corridor
- Details of recent noise measurements at three locations to supplement the eight measurements that were undertaken in 2008-09 and 2013
- Modelling of the existing traffic noise levels, the existing 2-lane road in 2046 and the traffic noise from the proposed upgraded corridor for a 6-lane road in 2046
- Modelling of the connection of Westwood Drive connection and assessment of the noise impacts

Policy Application

The VicRoads Policy applies to the entire corridor.

The Westwood Drive connection will be constructed by Melton City Council. The VicRoads Traffic Noise Reduction Policy applies to roads being planned and constructed by VicRoads; the Policy does not apply to roads being constructed by local councils and specifically Melton City Councils works for the Westwood Drive connection.

It is noted that the current VicRoads Traffic Noise Reduction Policy may not apply to the Palmers Road Corridor in the future as there may be Policy review and revision over time.

Construction noise is addressed by EPA and VicRoads guidelines. These guidelines include:

- Environment Protection Act, 1970
- Public Health and Wellbeing Act, 2008
- Environmental Guidelines for Major Construction Sites, EPA Publication 480
- Environmental Management Guidelines, VicRoads 2006
- Noise Control Guidelines, EPA Publication 1254.

The Councils of Brimbank and Melton do not have guidelines for construction noise.

Environment Management Plans will be developed for the construction of the project and will incorporate the relevant guidelines to manage the construction noise impacts.

Noise Measurements

Traffic noise measurements were undertaken at four locations in 2008 and 2009 in the section of the Corridor between Western Freeway and Calder Freeway. Four additional noise measurements were undertaken in 2013 in the Palmers Road Corridor north of Western Freeway as part of the current investigations to provide a more complete understanding of the existing noise conditions and to improve the accuracy of the traffic noise modelling.

A further three measurements were undertaken in 2014 in the vicinity of the proposed extension of Westwood Drive and construction of the Kororoit Creek bridge in Burnside. These measurements provided a better understanding of the existing conditions in the vicinity of the Westwood Drive connection.

The measured noise levels indicate that the range of measured noise levels was between 41 to 67 dB(A) $L_{A\ (18\ hour)}$. The measured traffic noise levels at 311 Westwood Drive in 2008 are low due to the low traffic volume that was using this road in 2008. The average measured noise levels at 311 Westwood Drive in 2014 were 55 dB(A) $L_{A\ (18\ hour)}$; the increase in noise levels is due to the construction activities in the residential development to the east of Westwood Drive in the vicinity of this residence.

The measured noise levels in Arbour Boulevard, Burnside adjacent to the proposed Westwood Drive extension are between 48 to 49 dB(A) $L_{A\ (18\ hour)}$; the noise levels are relatively low due to the low traffic volumes using this local street.

The highest measured noise levels of 67 dB(A) $L_{A\ (18\ hour)}$ are at 29 Grosvenor Crescent, Derrimut (2013) which is adjacent to Robinsons Road.

The following table shows the average measured existing noise levels at the ten locations in the Corridor.

Range of Measured Noise Levels

Address	Traffic Noise Levels, dB(A) $L_{A10\ (18\ hour)}$					
	Lowest noise level including adverse weather	Highest noise level including adverse weather	Average noise level including adverse weather and weekends	Average noise level, excluding weekends	Average noise level, excluding adverse weather	Average noise level, excluding weekends, & adverse weather
141 Arbour Boulevard, Burnside (2014)	47	51	49	49	49	49
163 Arbour Boulevard, Burnside (2014)	46	53	48	48	48	47
311 Westwood Drive, Burnside (2014)	49	60	55	57	57	54
38 Kanmore Crescent, Hillside (2013)	59	61	60	61	61	61
72 Dundee Way, Sydenham (2013)	57	58	57	57	57	58
11 Padula Court, Hillside (2008)	58	67	63	65	-	-
21 Callista Circuit, Taylors Hill (2009)	57	61	59	59	59	59
7 Catani Court, Burnside Heights (2013)	59	59	59	59	59	59
311 Westwood Drive, Burnside (2008)	41	47	44	45	-	-
170 Robinsons Road, Deer Park (2008)	56	59	58	58	-	-
29 Grosvenor Crescent, Derrimut (2013)	62	67	66	67	67	67

Traffic Noise Modelling

Traffic noise modelling of the existing traffic noise levels at approximately 752 residences adjacent to the corridor was undertaken for existing 2-lane road with and without the Westwood Drive connection. Modelling for the year 2046 was undertaken for the 2 lane road with and without the Westwood Drive connection and the 6 lane duplicated road with the Westwood Drive connection. The following table shows the potential increase in traffic noise levels from the existing conditions (without Westwood Drive connection) to the up-graded 6-lane road in 2046.

Modelled noise level changes (existing without bridge to 2046 6-lane with bridge)

Traffic noise level change dB(A) L_{A10} (18 hour)	Number of noise sensitive buildings; 2046, 6-lane road corridor
0	2
+1 to +3	185
+4 to +6	327
+7 to +9	129
+10 to +12	35
+13 to +15	26
+16 to +18	17
+18 to >+20	31

Most of the residences in the vicinity of the Westwood Drive connection will experience a significant increase in traffic noise levels.

The modelling indicates that there will be a large range of increased traffic noise levels with the upgrade of the Palmers Road Corridor (including the Westwood Drive connection) from 2-lanes to 6-lanes in 2046. The following table shows the range of modelled traffic noise level increases for the change from the 2-lane road to the 6-lane upgraded road.

Modelled noise level changes for 2-lane road to 6-lane road upgrade

Traffic noise level change dB(A) L_{A10} (18 hour)	Number of noise sensitive buildings; 2046, 6-lane road corridor
-1 to 0	29
+1 to +3	499
+4 to +6	186
+7 to +9	38

Westwood Drive Connection

The Palmers Road corridor was identified and set aside in the 1997 Melton East Strategy Plan which set out the land use and transport network through the Caroline Springs-Hillside-Sydenham area. The planning controls applicable to each property are identified within the Contract of Sale, and therefore the Melton East Strategy Plan has been public information and available to the developers and purchasers since the relevant Melton Development Plan Overlay Schedule 1 was implemented.

The affected residential properties in the Kororoit Creek area were all subdivided and constructed after 29 July 1999.

As the Palmers Road corridor was identified and set aside before the residential development, then the objectives of the VicRoads Policy will not apply to the corridor.

The connection of Westwood Drive between Tenterfield Drive in the north and Westwood Drive in the south, including the construction of the bridge over Kororoit Creek, is through an area that currently has low traffic noise impacts. The average measured traffic noise in the Westwood Drive connection area range between 48 dB(A) L_{A10}

$_{(18\ hour)}$ in Arbour Boulevard to 55 dB(A) $L_{A10\ (18\ hour)}$ in Westwood Drive; the measurements at 311 Westwood Drive were affected by local construction activities.

Construction of the connection in 2015 will result in significant increases noise levels at most of the residences within the connection area. The range of the potential increase in noise levels in 2015 is summarised in the following table.

Change with Construction of Westwood Drive Connection (2015)

Traffic noise level change dB(A) $L_{A10\ (18\ hour)}$	Number of noise sensitive buildings; existing 2-lane road connection without barriers
+1 to +3	0
+4 to +6	3
+7 to +9	5
+10 to +12	4
+13 to +15	8
>15	24

Calder Freeway Interchange

With the construction of the 6-lane road and interchange at Calder Freeway there will be a small increase in traffic noise levels (<1 dB(A)) at the residence in Organ Pipes Road and a few residences in Nottingham Way near Calder Park Drive and south of the Melbourne - Bendigo railway line. There will be an increase of <1 dB(A) in noise levels in the Organ Pipes National Park with the construction of the interchange.

There will be a small increase in traffic noise levels at the nearest residences (Power Place) south of the proposed Calder Park Drive/Calder Freeway interchange due to the increase in traffic using Calder Park Drive in 2046, even though the alignment of Calder Park Drive will be moved further away from these residences.

Modelling of the 2046 traffic noise levels at the most exposed residences to the realigned Calder Freeway and Calder Park Drive interchange indicates the future traffic noise levels with the 6-lane upgraded road are less than 63 dB(A) $L_{A\ (18\ hour)}$.

Potential Staging of Corridor Construction

It is noted that the traffic noise modelling and impact assessment is based on the entire corridor being built in 2046. It is accepted that the corridor construction could be built in stages prior to 2046; however the timing and funding for the staged construction is currently unknown. Traffic noise modelling for years prior to 2046 has not been undertaken.

The staging of the project prior to 2046 will result in a lesser increase of the noise levels at the residences adjacent to the stages than the modelled noise levels for 2046; this is because the traffic volumes will be less than for 2046. However, the noise levels at the residences in the areas of earlier staging will eventually increase to the noise levels modelled for 2046.

1.0 Introduction

The Palmers Road Corridor Project (PRCP) is a proposed upgrade of Robinsons Road, Westwood Drive and Calder Park Drive, to a primary arterial comprising six lanes (three in each direction) to accommodate increasing volumes of traffic that are forecast to traverse the area in the future.

VicRoads submitted a referral for the development of the Palmers Road Corridor (Dunnings Road to Calder Freeway) in accordance with the *Environment Effects Act 1978* (Vic).

On 13 November 2009, the Minister for Planning decided that an Environment Effects Statement (EES) was required for the Palmers Road Corridor from the Western Freeway to Calder Freeway because of the potential for the alignment to result in significant effects in relation to residential amenity and well-being, landscape values and Aboriginal cultural heritage.

AECOM was engaged by VicRoads to undertake a traffic noise assessment of the impacts of the up-grading of the Palmers Road Corridor between the Western Freeway (Deer Park Bypass) and the Calder Freeway. The aim of the assessment is to:

- Establish the applicability of the VicRoads Traffic Noise Reduction Policy to the proposed Palmers Road Corridor
- Undertake noise measurements of the existing traffic noise conditions at representative locations
- Determine the future potential traffic noise levels with approach roads and a bridge over Kororoit Creek completed and connecting the corridor
- Determine the future traffic noise levels for the proposed road corridor in 2046 with a 2-lane and 6-lane road

Traffic noise measurements were undertaken in the corridor at four locations in 2008 and 2009 and four locations in 2013. A further three measurements were undertaken in 2014 as part of this assessment. The purpose of the measurements is to:

- Provide an understanding of the existing exposure to traffic noise at representative locations in the corridor
- Calibrate the traffic noise model of the existing road configuration.

Traffic noise modelling involved the following scenarios:

- Palmers Road Corridor with the existing 2-lane road (with and without the connected corridor), with the 6-lane upgraded road with duplicated carriageways (three lanes each way):
  - Model the existing traffic noise levels to calibrate the predictive noise model
  - Model the existing traffic noise levels with and without the Westwood Drive connection
  - Model the 2046 traffic noise levels for the three road configurations (2-lane, 4-lane and 6-lane). Note that the 4-lane road configuration is included for comparison and is not used in the impact assessment
  - Compare noise levels of the future (2046) upgraded 6-lane road with the existing 2-lane road in 2046 (with connected corridor)
- Westwood Drive Connection
  - Model the existing potential traffic noise levels with and without the Westwood Drive connection (without noise barriers)
  - Model the existing potential traffic noise levels with the Westwood Drive connection with noise barriers
- Calder Park Drive
  - Model the future (2046) unattenuated traffic noise levels from the existing 2-lane road, 4-lane and the 6-lane upgraded road at the impacted dwellings
  - Compare noise levels of the future (2046) upgraded 6-lane road with the existing 2-lane road in 2046 (with connected corridor)

1.1 Background

The Palmers Road Corridor Project involves development of a major north-south arterial road in the west of Melbourne between the Calder Freeway and Western Freeway (Deer Park Bypass). In the short term, the project involves reserving a 16 kilometre long and 40 - 60 metre wide corridor for the future development of the arterial road in the Melton and Brimbank Planning Schemes, which corresponds with and connects the corridors of existing local roads: Robinsons Road, Westwood Drive and Calder Park Drive.

The project will ultimately involve construction of a six lane divided road (i.e. three lanes in each direction), with off-road shared bicycle and pedestrian facilities on both sides of the road. Two existing railway crossings would be removed, one at the Melbourne-Bendigo rail line crossing with Calder Park Drive and another at the Melbourne-Ballarat rail line with Robinsons Road. An additional new three lane bridge would be constructed over Kororoit Creek. It is also proposed to construct a raised interchange where the route concludes at the Calder Freeway in the north.

Complete development of the arterial road is expected to be a longer term project that would result in it being constructed potentially by 2046. The area of the Palmers Road Corridor can be seen in Figure 1.

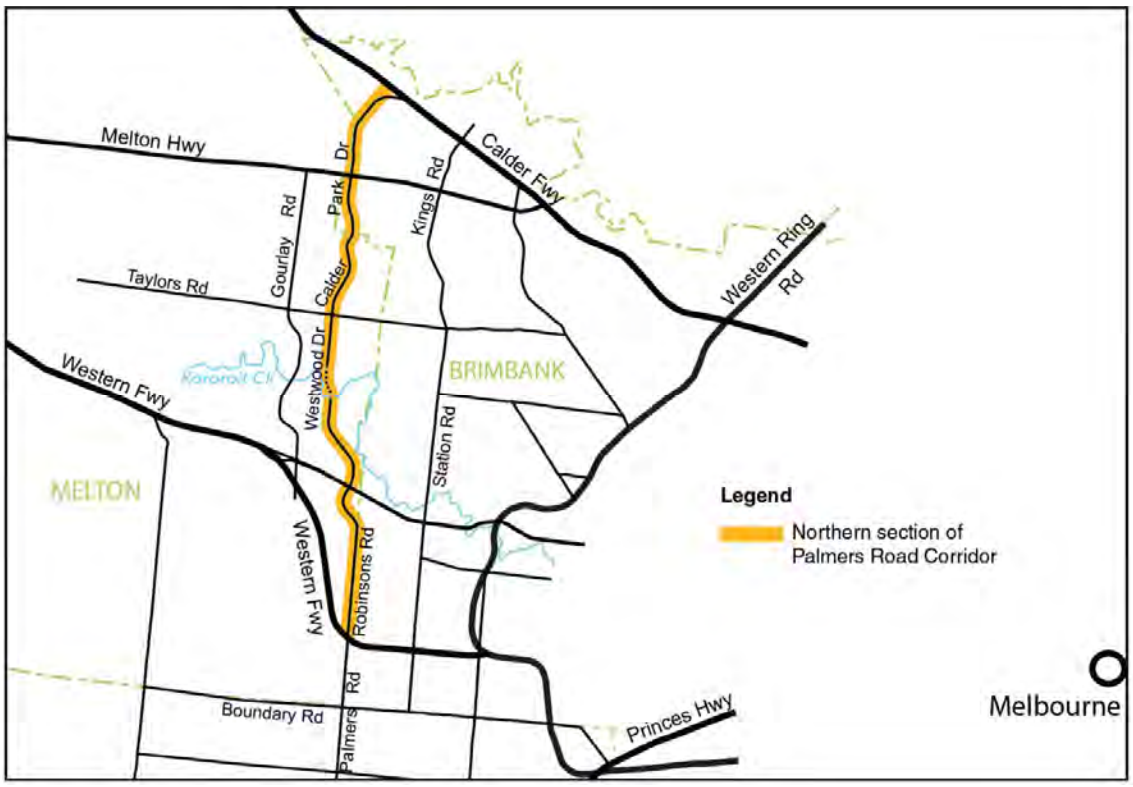

Figure 1: Palmers Road Corridor – Existing Road Network

1.2 Scoping Requirements

The Scoping Requirements (Victorian Government, July 2013) set out the specific matters to be investigated and documented in the EES. The Scoping Requirements were finalised in July 2013 following the consideration of public comments.

The draft evaluation objectives listed in the Scoping Requirements and presented in Table 2 identify desired outcomes in the context of potential project effects. They provide a framework to guide an integrated assessment of environmental effects and alignment with corresponding legislation is shown in the table.

The framing of the Project draft evaluation objectives reflects the key matters to be investigated for the EES, relevant legislation and policies, the objectives and principles of ecologically sustainable development and environmental protection. An additional consideration were the environmental issues identified in the preliminary

documentation including 'Strategic Options and Gap Analysis: Palmers Road Corridor (Western Freeway to Calder Freeway)' (AECOM, 2013).

Table 1: Project Draft Evaluation Objectives

Project Draft Evaluation Objective	Key Legislation
Road Safety and Capacity - To improve the road-based transport capacity and connectivity in western Melbourne, by developing a six-lane dual carriageway arterial road along the Palmers Road corridor between Western Freeway and Calder Freeway, while maintaining the connectivity of the existing local transport routes.	*Transport Integration Act 2010 (Vic)* *Road Management Act 2004* (Vic) *Planning and Environment Act 1987* (Vic)
Amenity and Environmental Quality - To minimise adverse noise and other amenity effects on nearby residents and land uses, to the extent practicable.	*Environment Protection Act 1970* (Vic) *Planning and Environment Act 1987* (Vic)
Social, Land Use and Infrastructure - To minimise adverse social and land use effects, including impacts on existing infrastructure.	*Planning and Environment Act 1987* (Vic)
Visual and Landscape Values - To avoid adverse effects on the landscape and recreational values of the Organ Pipes National Park and minimise visual effects on open space areas.	*Planning and Environment Act 1987* (Vic)
Biodiversity and Habitat - To avoid or minimise adverse effects on native vegetation and listed flora and fauna species and ecological communities, and address opportunities for offsetting potential losses consistent with relevant policy	*Flora and Fauna Guarantee Act 1988* (Vic) *Wildlife Act 1975* (Vic)
Catchment Values - To maintain the functions and values of surface water and floodplain environments.	*Water Act 1989* (Vic) *Planning and Environment Act 1987* (Vic)
Cultural Heritage - To avoid or minimise effects on Aboriginal and historic cultural heritage values.	*Aboriginal Heritage Act 2006* (Vic) *Heritage Act 1995* (Vic)
Environmental Management Framework - To provide a transparent framework with clear accountabilities for managing environmental effects and hazards associated with construction, operation, decommissioning and rehabilitation phases of the project, in order to achieve acceptable environmental outcomes.	*Planning and Environment Act 1987* (Vic) *Environment Protection Act 1970* (Vic) *Aboriginal Heritage Act 2006* (Vic)
Integrated and Sustainable Transport - Overall, to demonstrate that the project would achieve a balance of economic, social and environmental outcomes that contribute to ecologically sustainable development and provide a net community benefit over the short and long-term.	*Environment Effects Act 1978* (Vic) *Transport Integration Act 2010 (Vic)* *Planning and Environment Act 1987* (Vic) *Environment Protection Act 1970* (Vic)

Source: Scoping Requirements for Palmers Road Corridor Project EES (Victorian Government, July 2013)

The amenity and environmental quality objective (to minimise adverse noise and other amenity effects) is relevant to the noise impact assessment.

2.0 What is Traffic Noise?

The following sections provide some details of what is traffic noise and what are its characteristics. These sections will assist in the understanding of the predicted changes in traffic noise levels and how they may influence the response of the residences in the Palmers Road Corridor.

2.1 Noise

It has become common practice to define noise as unwanted sound; what is noise to the ears of one person, may not be noise to the ears of another.

Sounds are not made up equally of all frequencies. For example, at one extreme of the sound spectrum you can hear the low frequency hum made by the transmission of electricity, while the ambulance siren is pitched at the higher frequencies so that we can be warned of its presence.

It is not only the pitch of the noise (frequency) that causes a human response, it is also the source of the noise that will cause a desirable response or cause annoyance. For example the buzzing of a mosquito in the middle of the night will cause enough of a disturbance to wake a sleeping person; the response to a dripping tap will be totally different to rain falling on an iron roof.

Noise is measured on a scale so that numbers describing levels of noise are easily understood. To enable a single figure to be used to compare sounds with different frequency spectra, the term decibel is adopted. The 'A' weighting of a noise level corresponds well with the response of human hearing to sound, and the unit dB(A), decibels A weighted, has been adopted for the measurement of traffic noise. Typical noise levels and sources are depicted in Figure 2.

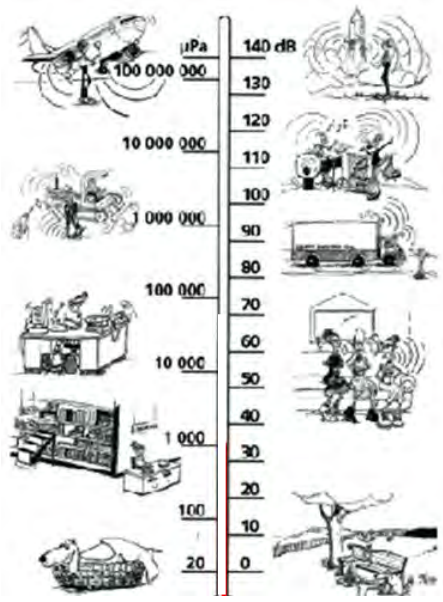

Figure 2: Typical noise levels and sources

Sound/noise covers an enormous range of sound pressures and involves large numbers. The sound pressure near a powerful jet engine may be a million times the sound pressure of a very quiet whisper. As seen in Figure 2, the typical measured noise levels in decibels (A weighted) for various common sources of noise (right side of scale) is more easily represented than expressing noise as sound pressure in micro Pascals (left side of scale).

The logarithmic scale also corresponds well with the way the human ear responds to increases in the volume of noise. However, whilst the logarithmic decibel scale is extremely useful, it can be puzzling. On a linear scale, the total sound pressure due to two identical noise sources would be twice that of one of the sources operating alone. However, on a logarithmic scale, the total sound pressure level resulting from two identical noise sources is 3 dB(A) higher than the level produced by either source alone. For example the noise levels from one alarm clock is 60 dB(A) whilst the noise level form two identical alarm clocks is 63 dB(A).

2.2 Road Traffic Noise

Figure 3 shows a comparison of the level of annoyance due to aircraft noise and road traffic noise[1]. It should be noted that the results for this comparison were obtained many years ago and may not represent the current response to sources of transportation noise.

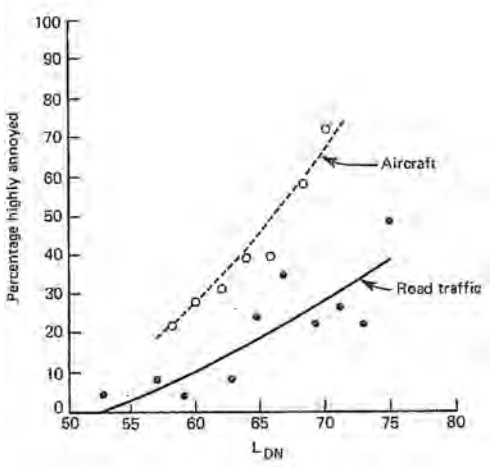

Figure 3: Annoyance of aircraft and road traffic noise

Road traffic noise in Victoria is expressed in units of $L_{A10\ (18\ hour)}$ where L_{A10} is defined as *the value of 'A'-weighted Sound Pressure Level which is exceeded for 10 percent of the time during a given measurement period* (usually 1 hour) and (18 hour) is the *arithmetic average of the hourly L_{10} Sound Pressure Levels measured between 6am and midnight*. The L_{A10} unit is often referred to as the average of the highest noise levels in the measurement period and therefore relates well to the annoyance experienced by some people.

As seen in Figure 3, the units on the x-axis are L_{DN} which is calculated from the weighting and averaging of the daytime and night-time noise levels. The conversion of L_{DN} to $L_{A10\ (18\ hour)}$ is:

$$L_{A10\ (18\ hour)} = L_{DN} - 1.9\ dB(A)\ ^{2}$$

Some common noise terms are defined in Appendix A.

Road Traffic noise varies in intensity over a period of time; on arterial roads there are nosier periods when large numbers of vehicles pass by and there are quiet times when traffic waits for traffic lights to change. Furthermore the noise levels vary during a day with quieter periods at night-time and louder periods during peak hours. Figure 4 shows the measured traffic noise level distribution within an hour; the calculated L_{A10} noise level is determined from all of the noise peaks that make up the six minute period. The measured hourly noise levels at ten residences adjacent to the Palmers Road Corridor are in Appendix D and E and discussed in section four.

It should be noted that in Figure 4 another unit of noise, L_{Aeq} is used which is also defined in Appendix A.

[1] Transportation Noise Reference Book, edited by Peter Nelson, Butterworth, 1987

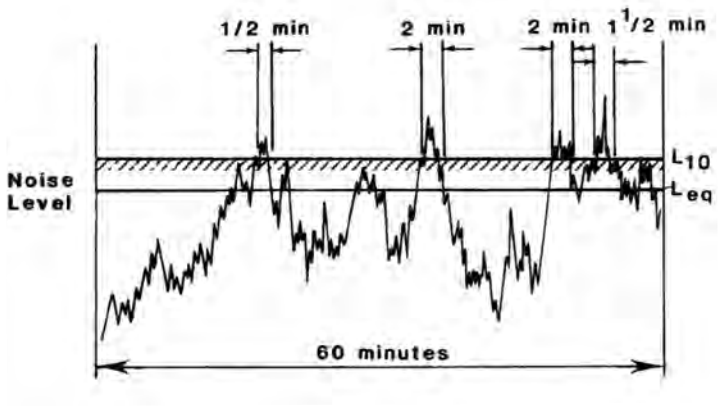

Figure 4: Representation of L_{A10} noise level

2.3 Characteristics of Noise

There are some basic noise characteristics that apply to all sources of noise and can be used to give a better understanding road traffic noise. Some common noise characteristics are:

- A doubling or halving of the energy or sound pressure level of a noise source will result in a change of 3 dB(A); see the alarm clock example in section 2.1
- A 3 dB(A) change in a highly variable noise source such as an arterial road noise is not noticeable (see Figure 2).
- A change of 5 dB(A) is clearly audible and noticeable
- A change of 6 dB(A) is clearly audible and noticeable and represents a quadrupling or quartering of the energy of a noise source (traffic volume for example)
- A change of 10 dB(A) is very noticeable and is regarded as a doubling or halving of the apparent loudness of the noise source. A change of 10 dB(A) also represents a tenfold increase or a tenth of the energy of a noise source. The change in traffic volume from 10,000 to 100,000 vehicles per day results an increase of 10 dB(A)
- A doubling or halving the distance between a line source of noise (typically a road) and a receptor will change the noise level by 3 dB(A); for a point source the change will be 6 dB(A).

2.4 Variation of Road Traffic Noise

There are three major components to the magnitude of traffic noise impacts; the source of noise, the propagation path and the noise receptor. The first two components can be changed to alter the overall noise levels at the receptor (or residence).

2.4.1 Source noise

At the noise source, which is the arterial road in this assessment, the source noise levels can be changed.

- A 10% change in the traffic volumes results in an approximate change of 0.3 dB(A) in traffic noise levels
- A 50% change in the traffic volume results in an approximate change of 1.5 dB(A)
- A doubling or halving of the traffic volumes results in a change of 3 dB(A) in the traffic noise levels which is not noticeable
- A four-times increase in the traffic volumes or a quartering of the traffic volumes will result in a change in traffic noise levels of 6 dB(A) which is clearly audible and significant
- A change in the percentage heavy vehicles of 20% to 30% will increase the noise level by approximately 0.5 dB(A)
- A change in the traffic speed from 60 to 80 kph will increase the noise level by approximately 1.5 dB(A).

The coarseness of the road surface also influences the noise levels at the source. Porous pavements such as open graded asphalt will reduce the noise levels from the tyre/road surface interface compared to impervious dense graded asphalt. However, a coarse road surface such as a stone seal will increase the tyre/road surface noise levels significantly. Table 1 shows the potential tyre/road surface noise levels for a variety of surfaces relative to dense graded asphalt. The effect of the road surface becomes more prominent at speed greater than 70 kph.

Table 1: Relative Surface Noise levels[3]

Surface Type	Approximate Relative Noise Level; dB(A)
Spray seals 10 mm or larger	+4
Spray seals 7 mm	+2
Dense graded asphalt	0
Open graded asphalt	-2
Stone mastic asphalt	-2 to -3
Slurry surfacing	0
Tyned concrete	+1 to +4
Broomed concrete	+1 to +4
Exposed aggregate concrete	-1 to +1

Vehicle noise is determined by Australian Design Rules for motor vehicles; the trend is for a gradual reduction in vehicle noise with time which is in line with the trends in overseas countries where a large number of Australia's fleet is manufactured. The Environment Protection Authority of Victoria has responsibility for the regulation of individual vehicle noise levels.

The manner in which motor vehicles are driven can also determine the noise levels from vehicles. Stop-start traffic with vehicles braking and accelerating can result in higher noise level, while less traffic congestion will potentially reduce traffic noise levels.

2.4.2 Propagation path

Natural and man-made barriers will effectively reduce the traffic noise levels at nearby residences. Buildings in the propagation path perform nearly as well as purpose built noise barriers. Natural features such as hills and earth mounds act like traffic noise barriers.

Vegetation such as trees and shrubs do not effectively reduce noise levels. Trees and shrubs are acoustically porous and allow noise to be propagated through the foliage unless there are tree plantations that are extensive, close-packed and high like mature Cyprus hedges.

2.4.3 Residences

There is little in the way that the noise impacts at the residences can be reduced on the outside of the residence. However, the transmission of traffic noise through the façade of a residence can be reduced significantly making the internal noise levels acceptable.

Building techniques and materials designed to specifically reduce the internal noise levels have been in use for many years in areas where the ambient noise levels are high. Australian Standard ASA2107:2000 (Acoustics – Recommended design sound levels and reverberation times for building interiors) and the Building Code of Australia provide guidance on the acceptable internal noise levels. Australian Standard AS 3671-1989 (Acoustics - Road traffic noise intrusion - Building siting and construction) provides guidance specifically based on attenuating road traffic noise intrusion into noise sensitive buildings.

[3] Guide to the Selection of Road Surfacings, Austroads, 2000

2.5 Traffic noise perceptions

Whilst a doubling or halving of the traffic volume may result in a change in noise levels of 3 dB(A) which is just perceptible, the community reaction to the change in traffic volumes that results in the 3 dB(A) increase will be significant. A relationship between road traffic noise and annoyance is shown in Figure 3 and gives some indication as to the level of potential annoyance within the community.

The potential community reaction to a significant increase to traffic conditions is an aggregation of the various perceptions of the parameters associated with the change. The visual perception of more vehicles using the upgraded road, the potential reduced access across the road associated with the road widening, the potential increase in heavy vehicles using the road, etc., will all add to the community response that there has been a significant change to in the road conditions and the local community. To broadly state that the traffic noise level change will be just perceptible may be true in isolation; however the community will see a substantial increase in traffic volumes (resulting from the road construction) and interpret that as significant increase in traffic noise levels.

Whilst it is possible to calculate the changes in traffic noise levels, it is also important to consider community concerns about their perception of changes in traffic noise levels associated with changes in road conditions.

3.0 Traffic Noise Policy

This section provides an overview of the relevant planning framework, policies, and guidelines, etc., with respect to road traffic noise, and how they may influence the VicRoads planning process for the Palmers Road Corridor.

3.1 Statutory Planning Framework

3.1.1 Transport Integration Act

The Transport Integration Act 2010 provides the framework for the provision of an integrated and sustainable transport system that contributes to an inclusive, prosperous and environmentally responsible State.

The Act includes various transport system objectives in which VicRoads must have regard to in performing its functions. The transport system objective of most relevance to noise is as follows:

Safety and health and wellbeing

The transport system should be safe and support health and wellbeing … [and should] avoid and minimise the risk of harm to persons arising from the transport system.

3.1.2 State Planning Policy Framework

The State Planning Policy Framework seeks to ensure that the objectives of planning in Victoria (as set out in Section 4 of the Planning and Environment Act 1987) are fostered through appropriate land use and development planning policies and practices which integrate relevant environmental, social and economic factors in the interests of net community benefit and sustainable development.

The objective of planning in Victoria of most relevance to noise is as follows:

(c) To secure a pleasant, efficient and safe working, living and recreational environment for all Victorians and visitors to Victoria.

Clause 13.04.01 of the State Planning Policy Framework includes the following requirements in relation to noise abatement:

Objective

To assist the control of noise effects on sensitive land uses.

Strategy

Ensure that development is not prejudiced and community amenity is not reduced by noise emissions, using a range of building design, urban design and land use separation techniques as appropriate to the land use functions and character of the area.

Policy guidelines

Planning must consider as relevant: ……. A Guide to the Reduction of Traffic Noise (VicRoads 2003).

The above mentioned VicRoads Guide indicates that "*VicRoads will not ameliorate traffic noise where new buildings or subdivisions are built next to an existing or future road controlled by VicRoads".*

The Guide briefly explains the situations in which VicRoads will ameliorate traffic noise and the criteria that will be adopted.

It is noted that the purpose of the Guide is to provide traffic noise information to "*Builders, Designers and Residents*". The Guide includes information on the characteristics of traffic noise, a summary of the VicRoads Traffic Noise Reduction Policy, opportunities for noise reduction in new and existing residences and the principles of noise barriers, earth mounds and insulation techniques that can be applied to buildings. The Guide is not a policy document.

3.1.3 Local Planning Policy Framework

Local Planning Policy Frameworks (LPPF) identifies long term directions about land use and development in municipalities and provides the rationale for the zone and overlay requirements and particular provisions in the local planning scheme.

The Planning Schemes of Brimbank City Council and Melton Shire Council do not address road traffic noise from road based activities and therefore the Planning Schemes will not influence this impact assessment of the Palmers Road Corridor.

3.2 VicRoads Traffic Noise Policy

The Policy is currently regarded as State Government policy and is used to determine the level of traffic noise protection that is provided to the community and to determine the application of Government funding.

VicRoads has had a dedicated traffic noise policy since 1989; undergoing revisions in 1997 and 2005; the current Policy is in Appendix B of this report.

The VicRoads Traffic Noise Reduction Policy 2005 contains a set off overarching traffic noise reduction goals. These are included in the Statement of Policy:

> ***Statement of Policy***
>
> *Road traffic noise is a significant environmental problem, particularly in residential areas. VicRoads is committed to taking whatever steps it can to reduce the overall level of traffic noise, and to limit the effect of traffic noise on nearby residents when new or improved roads are opened to traffic. It will achieve this by:*
>
> - *Seeking to reduce noise emitted by vehicles and road surfaces;*
> - *Encouraging compatible land use next to major roads;*
> - *Limiting traffic noise from new arterial roads and roads upgraded to carry significantly more traffic;*
> - *Retrofitting noise barriers on older freeways.*

The relevant section of the VicRoads Traffic Noise Reduction Policy 2005 that applies to the development of a new road and the upgrade of an existing road states:

> ***Limiting noise next to new or improved roads:***
>
> *Where arterial roads and freeways are built on new alignments, or where existing arterial roads or freeways are widened by two or more lanes and buildings previously protected from traffic noise are exposed by removal of buildings required for widening, the traffic noise level will be limited to the objectives set out below or the level that would have prevailed if the road improvements had not occurred, whichever is the greater.*
>
> - *Category A – For residential dwellings, aged persons home, hospitals, motels, caravan parks and other buildings of a residential nature, the noise level will be 63 dBA $L_{10,18hr}$ measured between 6 am and midnight,*
> - *Category B – For schools, kindergartens libraries and other noise-sensitive community buildings the noise level objective will be 63 dBA $L_{10,12hr}$ measured between 6 am and 6 pm.*
> - *Where the noise level adjacent to Category A and B buildings prior to road improvements is less than 50 dBA, consideration will be given to limiting the noise level increase to 12 dBA.*

The VicRoads Policy contains direction for the retrofitting of noise attenuation measures. These measures include noise barriers and off-reservation treatments at the impacted sensitive uses. The retrofitting section of the policy states:

> ***Noise abatement program - Retrofitting***
>
> *The principle of this part of the Policy is that all eligible projects under the policy are to be included within the noise retrofitting program and acceptable treatment methods are to ensure that the most cost effective approach over the life cycle of the project is considered.*
>
> *The following key elements to the Noise Abatement Program – Retrofitting apply:*
>
> - *VicRoads will continue to retrofit barriers to freeways and arterial roads that have previously been eligible for noise attenuation works*
> - *The retrofitting program will apply throughout Victoria*
> - *The trigger for considering retrofitting will be when the traffic noise levels exceed 68 dB(A)$L_{10\ (18hr)}$*
> - *A target noise level of less than 68 dB(A)$L_{10\ (18hr)}$ should be maintained after the attenuation works*
> - *When determining what measures can be employed to achieve the retrofitting target noise objective, consideration should be given to the "whole of life" attenuation performance and the practicability of the measures*
> - *The noise reduction may be achieved by a combination of noise barriers and other measures such as open graded asphalt, barriers on bridge parapets and crash barriers, etc.,*

- *Off-reservation attenuation measures may be undertaken, subject to practicability testing, and agreement with key stakeholders*
- *Noise retrofitting works will be undertaken as funds permit, and will only apply to Category A and B buildings.*

There are exceptions to the application of the VicRoads policy.

The Policy states:

> ***Exceptions***
>
> *There are a limited number of situations where expenditure of public monies on noise attenuation is not considered to be justified. Accordingly, VicRoads will not take action to protect existing or future development in the following circumstances:*
>
> - ***Category A** or **Category B** buildings, as defined above, where such land use is defined as a non-conforming use in the relevant planning scheme.*
> - *New buildings or subdivisions abutting any exiting road under the control of VicRoads.*
> - *New buildings or subdivisions abutting any road zone shown on any planning scheme for a new road or a road widening.*
> - *Buildings or subdivisions abutting any proposed road zone where the planning approval was obtained after the commencement of the exhibition period to set aside land for a future road in the relevant planning scheme.*

Future noise sensitive developments adjacent to the Corridor will need to be considered based on the exceptions to the Policy.

3.3 1997 Melton East Strategy Plan

The Palmers Road corridor was identified and set aside in the 1997 Melton East Strategy Plan (MESP) which set out the land use and transport network through the Caroline Springs-Hillside-Sydenham area. This document was a review and update of a 1993 MESP, which was also embedded with the local planning scheme. All development in the area since has been required to consider the key principles of the MESP, which has included designing subdivisions and locating activity centres away from the Palmers Road corridor to enable its development ultimately as a six-lane dual carriageway arterial.

After amalgamation and the introduction of new format planning schemes, and during development of the Melton East area, and still today, the land is subject to a Development Plan Overlay Schedule 1 (DPO1). Section 2 of the DPO1 (dated both 29 July 1999 and current) states:

> *Before deciding to approve a Development Plan, the responsible authority must consider … the provisions of the Melton East Strategy Plan.*

The planning controls applicable to each property are identified within the Contract of Sale, and therefore the MESP has been public information and available to the developers and purchasers since the DPO1 was implemented.

The affected residential properties in the Kororoit Creek area were all subdivided and constructed after 29 July 1999.

As the Palmers Road corridor was identified and set aside before the residential development, then the objectives of the VicRoads Policy will not apply to the corridor.

3.4 Application of the VicRoads Traffic Noise Reduction Policy

The VicRoads Traffic Noise Reduction Policy determines where the traffic noise criteria will apply or not.

3.4.1 Calder Freeway Interchange

The proposed new road alignment and interchange layout with the Calder Freeway as well as Calder Park Drive is shown in Appendix C. The duplication of existing Calder Park Drive does not qualify for noise attenuation treatment because the up-grading of the existing road does not require the removal of buildings to facilitate the addition of a new carriageway. The alignment of the current Calder Park Drive is shown in Figure 5.

Figure 5: Map of current Calder Park Drive realignment (Source: www.whereis.com, 20/08/2014)

3.4.2 Westwood Drive Connection

The VicRoads Traffic Noise Reduction Policy applies only to planning and construction activities undertaken by VicRoads and roads directly operated by VicRoads that previously qualified under the policy. The Westwood Drive connection (Westwood Drive extension and bridge across the Kororoit Creek) will be constructed by Melton City Council; the construction of the Westwood Drive connection is not covered by the VicRoads Traffic Noise Reduction Policy because the proposed works are not being undertaken by VicRoads.

For the purposes of this traffic noise assessment the VicRoads Policy is used to determine the extent of the potential traffic noise impacts.

The VicRoads Policy can be used by other authorities as a guide to managing traffic noise impacts, however applying the Policy to non-VicRoads road works is not a requirement when undertaking these types of works. As the Melton Council is proposing to construct the bridge over Kororoit Creek and linking Westwood Drive, there is no requirement for the council to apply the VicRoads policy to these works.

Furthermore, the section of the corridor in Westwood Drive where currently there is no bridge crossing the Kororoit Creek will not qualify under the Policy in the future after the bridge has been built. The application of the Policy is at the time that the road works (for example to increase the Palmers Road Corridor to 6-lanes) are undertaken. Residences in this area of Westwood Drive, will not qualify under the Policy as there will be no buildings removed for the upgrade works (to 6-lanes).

It is important to note that the current VicRoads Traffic Noise Reduction Policy is used for this Corridor assessment as it is the only relevant policy at this time. Furthermore, there is a reasonable possibility that there will be a different policy in place at the time of the up-grading of the corridor; it will be the relevant policy in 2046 that will be used to manage the traffic noise impacts of the up-grading of the road.

Further as discussed in Section 3.3, in the *1997 Melton East Strategy Plan,* the Palmers Road corridor was identified as a six lane arterial road. Surrounding development and subdivisions were required to consider this future six lane arterial road. The subdivisions surrounding the missing Westwood Drive Connection in the Kororoit Creek area were developed after 1999. Therefore the owners should have been aware of the future arterial road.

Further the construction of the missing Westwood Drive connection as a local road is a continuation of the existing sequence of land development that has occurred throughout the corridor. Therefore there is no logical reason why the final section of the Palmers Road Corridor to be constructed as a local road should be treated any differently in relation to noise than any other section of the Palmers Road Corridor. If the Westwood Drive connection was treated differently this would be inequitable.

3.4.3 Residential Developments

Residential developments adjacent to VicRoads roads are covered by the VicRoads Traffic Noise reduction Policy.

Residential developments that are existing prior to VicRoads planning processes are usually covered by the Policy criteria; residential developments initiated after the announcement of a VicRoads planning or construction process are usually not covered by the VicRoads criteria.

In July 2003 VicRoads produced a community bulletin detailing an approach to improving the road safety between Keilor and Diggers Rest on the Calder Freeway. The interchange of Calder Park Drive and Calder Freeway was detailed in the bulletin along with two other interchanges on the Calder Freeway. With respect to the Calder Freeway interchange, July 2003 is the timeline for determining eligibility according to the VicRoads Policy.

In June 2013 VicRoads issued an information up-date regarding the Palmers Road Corridor Environment Effects Statement and Planning Scheme Amendment. This information up-date was to:

> *"…advise the community that VicRoads is commencing further investigations for the bulletin provided information regarding the Effects Statement (EES) and Planning Scheme Amendment (PSA) approval processes to enable the reservation of land for the Palmers Road Corridor from Western Freeway to Calder Freeway."*

Planning for residential developments commencing after the June 2013 information up-date will not be covered by VicRoads Traffic Noise Reduction Policy criteria.

Furthermore, as there has been an existing road within the Palmers Road Corridor for many decades, then the Policy criteria will not apply to all of the previous developments within the Corridor (see section 3.2).

4.0 Construction Noise Policy

4.1 State Government Policy and Guidelines

The following legislation and guidelines could be used to guide construction noise management from the Palmers Road Corridor project:

- Environment Protection Act, 1970
- Public Health and Wellbeing Act, 2008
- Environmental Guidelines for Major Construction Sites, EPA Publication 480
- Environmental Management Guidelines, VicRoads 2006
- Noise Control Guidelines, EPA Publication 1254.

4.1.1 Environment Protection Act, 1970

The Environment Protection Act (EP Act) provides a framework for the EPA to take actions against unreasonable or nuisance noise. Indicators of unreasonable noise include:

- Very loud noise compared to the background noise level;
- Noise with a significant impulsive or tonal component;
- Noisy events that occur during the evening, night-time or early morning period; and
- Noise that occurs on weekends; or
- All practicable noise abatement has not been undertaken during necessary out-of-hours work.

If the EPA determines that the construction noise is unreasonable then they would issue a pollution abatement notice and a minor works pollution abatement notice. This would normally only happen after the EPA has discussed the issue with the project management and/or the construction contractor.

4.1.2 Public Health and Wellbeing Act

The Public Health and Wellbeing Act also addresses noise and its impacts on the community. The Health Act applies to "*any… noise…which is, or is liable to be, dangerous to health or offensive*". Where, offensive means "*noxious or injurious to personal comfort*". It is unlikely that the powers under this Act would be applied given the very similar coverage if the EP Act.

4.1.3 Construction Noise Guidelines

The objectives of the EPA guidelines (*Environmental Guidelines for Major Construction Sites* and the VicRoads guidelines (*Environmental Management Guidelines)* are to assist those involved in construction projects by providing:

- An understanding of the relevant legislation;
- Suggesting working hours applicable to the construction activities;
- Detailing key steps involved in noise management,
- Approaches for community engagement; and
- Ways to clearly identify and effectively minimise construction noise impacts.

The guidelines form the basis of the development of construction Environmental Management Plans (EMP) in relation to noise from construction site activities. The guidelines also provide the EPA and local council with a means to assess construction site noise.

4.1.4 Noise Control Guidelines

The Noise Control Guidelines (EPA Publication 1254) are not used for major construction sites. These guidelines are to be used for smaller (domestic scale) demolition and construction activities; however the guidelines are useful in that they do reiterate the hours of construction, noise limits for extended construction periods and suggest how to select construction equipment and manage construction activities.

4.1.5 Local Council Guidelines

The project spans the Brimbank City and City of Melton Councils. Neither Council has local laws managing the impacts of construction noise.

5.0 Traffic Noise Measurements

The purpose of the noise measurements is to:

- Demonstrate the range of the existing noise levels at a representative sample of residences
- Calibrate the existing traffic conditions noise model.

The measurement locations were based on:

- Representative exposure to existing traffic conditions
- Distribution of the measurement locations based on the traffic volumes for various sections of the corridor
- Access to the property and un-impeded exposure to the traffic noise (minimum shielding from backyard sheds, fences, neighbouring buildings, etc.)
- Minimal extraneous noise (exclusion of local construction activities, traffic noise from cross roads, etc.).

Traffic noise measurements were undertaken at four locations in 2008 and 2009 and four locations in 2013 in the section of the between Western Freeway and Calder Freeway. In 2014 three additional noise measurements were undertaken in the area adjacent to the Westwood Drive connection as part of the current investigations to provide a more complete understanding of the existing noise conditions.

5.1 Procedure

An environmental noise logger was set up at each measurement location in general accordance with the procedures prescribed by VicRoads *"Traffic Noise Measurement Requirements for Acoustic Consultants"* September 2011; see Appendix C of this report. Foer façade measurements, the procedures require the microphone to be positioned outside a building, at a distance of 1 metre from the most exposed window to a habitable room on the lowest level of the dwelling.

The parameters measured included hourly 'A'-weighted L_{10}, L_{90}, L_{eq} and L_{max} Sound Pressure Level; refer to Appendix A for the definitions of these parameters.

Photographs and maps showing the position of the logger at each measurement location are presented in Appendices D (2013) and E (2014) of this report.

Calibration of each noise logger was checked before and after the measurements using a Rion NC-73 Sound Level Calibrator (Serial No. 10786714). At the time of each calibration check the noise loggers were found to be reading correctly.

5.2 Meteorological Data

Weather information was obtained from the Bureau of Meteorology (BOM) Automatic Weather Station (AWS) located at Laverton.

Note: The wind speed data measured at the Bureau of Meteorology weather stations is typically measured at 10m above ground level. Therefore, the wind speeds presented are likely to be greater than the speeds that would have been experienced at the measurement locations where the typical microphone height is approximately 1.2 to 1.5 metres above the ground.

Appendix C contains the VicRoads *"Traffic Noise Measurement Requirements for Acoustic Consultants"* (September 2011). The parameters prescribed by these guidelines in relation to the wind conditions during traffic noise measurements are:

> *The wind speed at the microphone in any direction shall not exceed 3.0 m/s for any significant period/s during the conduct of the measurements.*

The significant period is not defined; as an indication to the duration of the period, the guidelines do allow measurements to be adjusted if the noise levels change as a result of an extraneous uncontrolled noise source.

The guidelines state:

> *Where noise levels change as a result of an extraneous uncontrolled source, then measurements for the whole day shall be rejected if the extraneous noise lasts for more than 3 hours.*
>
> *Where the extraneous source lasts for 3 hours or less, then the affected hourly measurements are to be rejected and derived descriptors presented. These shall be referred to, for example as L10 (18hr) adj or Leq (15hr) adj.*

In line with the treatment of extraneous noise, it is assumed that wind effected data of 3 hours or less duration can be adjusted and wind effected data of more than 3 hours will be rejected.

The following wind speed and direction classifications were adopted in this report:

- Acceptable weather data means that the weather conditions were within the VicRoads Requirements and the traffic noise measurements were not adversely influenced by the prevailing weather conditions.
- Adverse weather means that the wind speed was greater than that specified in the VicRoads measurement guidelines; however the weather conditions did not appear to significantly influence the hourly measured noise level by more than ± 3 dB(A) compared to the average noise levels for the same hour for other day(s).
- Unacceptable weather conditions are when the prevailing weather significantly influenced the measured traffic noise levels for most of the measurement period. For example, the wind speeds were greater than 10 m/s and/or there is significant rainfall.

In Appendices D and E, the summary of the noise measurements, includes the weather conditions which are acceptable (OK), adversely affected (Adv) or unacceptable (Unacc).

5.3 Measurement Results

The traffic noise measurements are summarized in Table 2 below. Appendix D (2013) and Appendix E (2014) contain the hourly measured noise levels for the parameters L_{A10}, L_{Aeq}, L_{A90} and L_{Amax} as well as the daily $L_{A10\ (18\ hour)}$ noise levels for the measurement period.

Table 2: Range of Measured Noise Levels

Address	Traffic Noise Levels, dB(A) $L_{A10\ (18\ hour)}$					
	Lowest noise level including adverse weather	Highest noise level including adverse weather	Average noise level including adverse weather and weekends	Average noise level, excluding weekends	Average noise level, excluding adverse weather	Average noise level, excluding weekends, & adverse weather
141 Arbour Boulevard, Burnside (2014)	47	51	49	49	49	49
163 Arbour Boulevard, Burnside (2014)	46	53	48	48	47	47
311 Westwood Drive, Burnside (2014)	49	60	55	57	54	54
38 Kanmore Crescent, Hillside (2013)	59	61	60	61	61	61
72 Dundee Way, Sydenham (2013)	57	58	57	57	58	58
11 Padula Court, Hillside (2008)	58	67	63	65	-	-
21 Callista Circuit, Taylors Hill (2009)	57	61	59	59	59	59
7 Catani Court, Burnside Heights (2013)	59	59	59	59	59	59
311 Westwood Drive, Burnside (2008)	41	47	44	45	-	-
170 Robinsons Road, Deer Park (2008)	56	59	58	58	-	-
29 Grosvenor Crescent, Derrimut (2013)	62	67	66	67	67	67

The approximate locations of the measurement sites are shown in Figure 6. It is noted that the weather conditions during the noise measurements in September and October 2008 were adverse throughout the measurement period; consequently no results are recorded for “Average noise level, excluding adverse weather” and “Average noise level, excluding weekends and adverse weather” in Table 2.

Figure 6: Map of noise measurement locations

The measured traffic noise levels at 311 Westwood Drive in 2008 are low due to the low traffic volume that was using this Westwood Drive in the vicinity of the measurement location; the average measured noise levels in 2008 were 44 to 45 dB(A) $L_{A\ (18\ hour)}$. The average measured noise levels at 311 Westwood Drive in 2014 were 55 dB(A) $L_{A\ (18\ hour)}$; the higher noise level in 2014 is mostly due to the construction activities in the residential development to the east of Westwood Drive in the vicinity of this residence.

The measured noise levels in Arbour Boulevard, Burnside adjacent to the proposed Westwood Drive extension are between 48 to 49 dB(A) $L_{A\ (18\ hour}$. Two days during the measurement period had acceptable weather conditions; the average measured noise levels during the acceptable weather conditions were 49 dB(A) $L_{A\ (18\ hour)}$ at 141 Arbour Boulevard, Burnside and 47 dB(A) $L_{A\ (18\ hour)}$ at 163 Arbour Boulevard, Burnside. The noise levels are relative low due to the low traffic volumes using this local street. The noise measurements were undertaken in Arbour Boulevard to indicate the existing background noise levels; the measurements at these locations were not used to calibrate the traffic noise model in this area.

The remaining measurement locations are exposed to traffic using the existing roads in the corridor. The highest measured noise levels of 67 dB(A) $L_{A\ (18\ hour)}$ are at 28 Grosvenor Crescent, Derrimut (2013) which is close to Robinsons Road.

6.0 Traffic Noise Modelling

The modelling of the traffic noise impacts from the Palmers Road Corridor was undertaken to:

- Determine the potential existing impacts at the residences adjacent to the corridor
- Determine changes in traffic noise levels between the 2046 existing road and the 2046 upgraded corridor
- Determine the impacts of the construction of the extension of Westwood Drive and the bridge over Kororoit Creek.

Traffic noise levels for the following scenarios were modelled:

- The existing traffic noise levels with the current 2-lane roads in the corridor with and without the extension of Westwood Drive and the bridge over Kororoit Creek
- The future traffic noise levels (2046) with the current 2-lane road and with and without the extension of Westwood Drive and the bridge over Kororoit Creek
- The future traffic noise levels (2046) for the proposed duplication of the road in the corridor with 4 and 6 lanes and the bridge over Kororoit Creek.

6.1 Modelling Inputs

Road traffic noise levels are influenced by a number of parameters including:

- Road traffic volume and percentage of road traffic volume consisting of heavy vehicles
- Traffic speed
- Type of road surface and road geometry
- Ground terrain in the vicinity of the road and surrounding areas (topography)
- Locations of receptors/buildings
- Locations of natural or man-made barriers (residential boundary fences).

6.1.1 Traffic volumes

6.1.1.1 Existing Traffic Volumes

Table 3 shows the existing traffic volumes for the Palmers Road corridor.

Table 3: Existing traffic volumes

Palmers Road Corridor Section (North to South)	Existing Traffic volumes	% heavy vehicles
Calder Freeway to Bendigo Railway	14,000**	5
Bendigo Railway to Melton Highway	14,000**	5
Melton Highway to Community Hub	15,000**	5
Community Hub to Hume Drive	13,400*	3
Hume Drive to Loddon Drive	14,200*	3
Loddon Drive to Taylors Road	13,200*	2
Taylors Road to Commercial Road	11,500*	2
North of Rockbank Middle Road	800*	5
Rockbank Middle Road to Nicol Avenue	13,000*	3
Nicol Avenue To Western Highway	19,500*	3
Western Highway to Robinsons Road	15,300*	10
Robinsons Road to Ballarat Railway	15,000**	10
Ballarat Railway to Riding Boundary Rd	15,000**	10
Riding Boundary Road to Western Freeway	13,000**	10

* Supplied by VicRoads on 29th October 2013; traffic counts undertaken in November and December 2012.

** Estimated based on 2011 volumes.

The section of Westwood Drive between Tenterfield Drive and Fydler Avenue is not constructed. A traffic volume of approximately 200 vehicles per day was assigned to Westwood Drive between Fydler Avenue and Rockbank Middle Road to represent the current local traffic using this section of Westwood Drive.

6.1.1.2 2046 Traffic volumes

The 2046 traffic volumes were derived from the AECOM report "*Palmers Road Corridor Western Freeway to Calder Freeway – Transport Modelling Report*", 20th May 2014. The traffic volumes for the two way - two lane, four lane and six lane roads all with the extension of Westwood Drive and the Kororoit Creek bridge constructed are shown in Figures 7, 8 and 9 respectively.

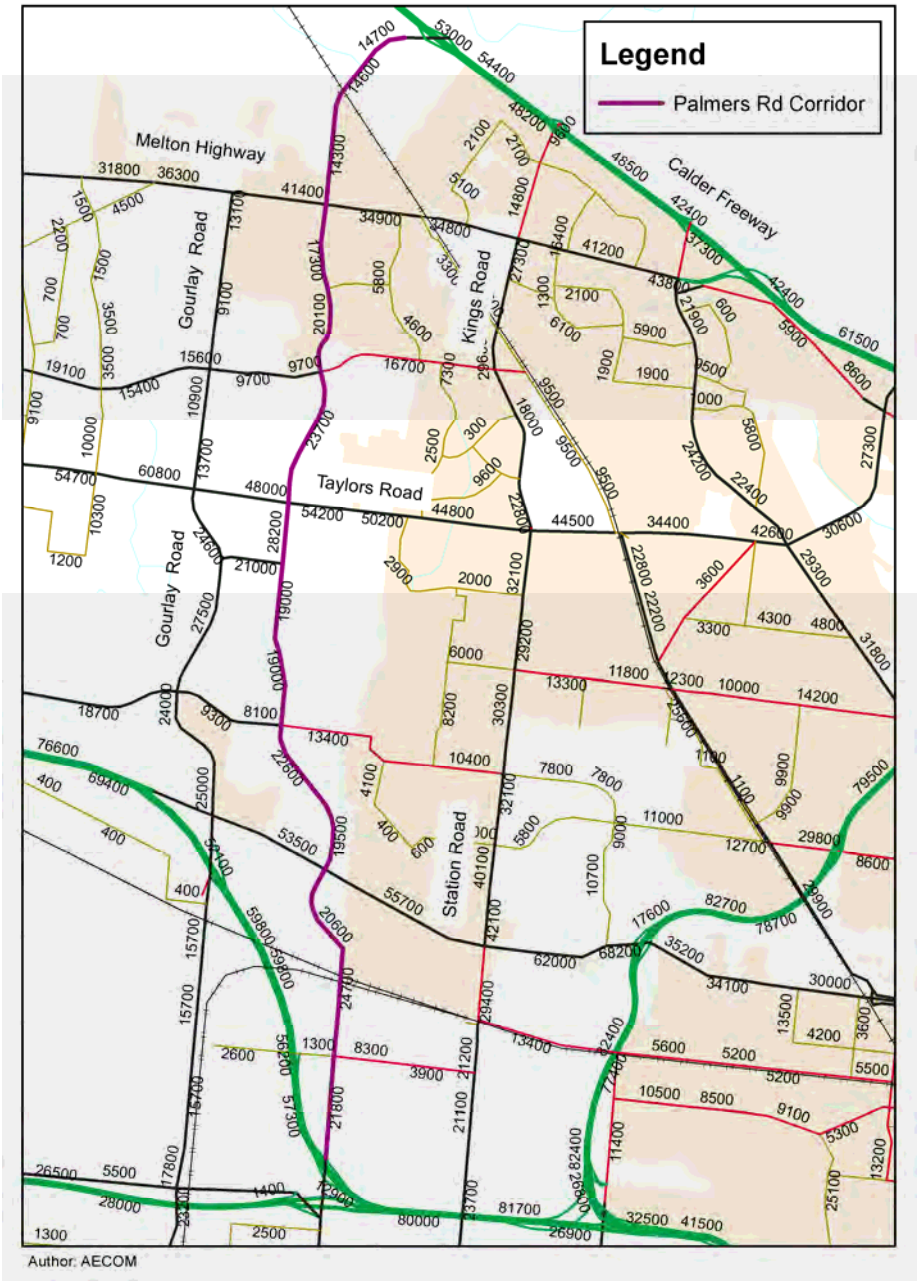

Figure 7: 2046 Daily two way volumes – Two lanes in Westwood Drive connection

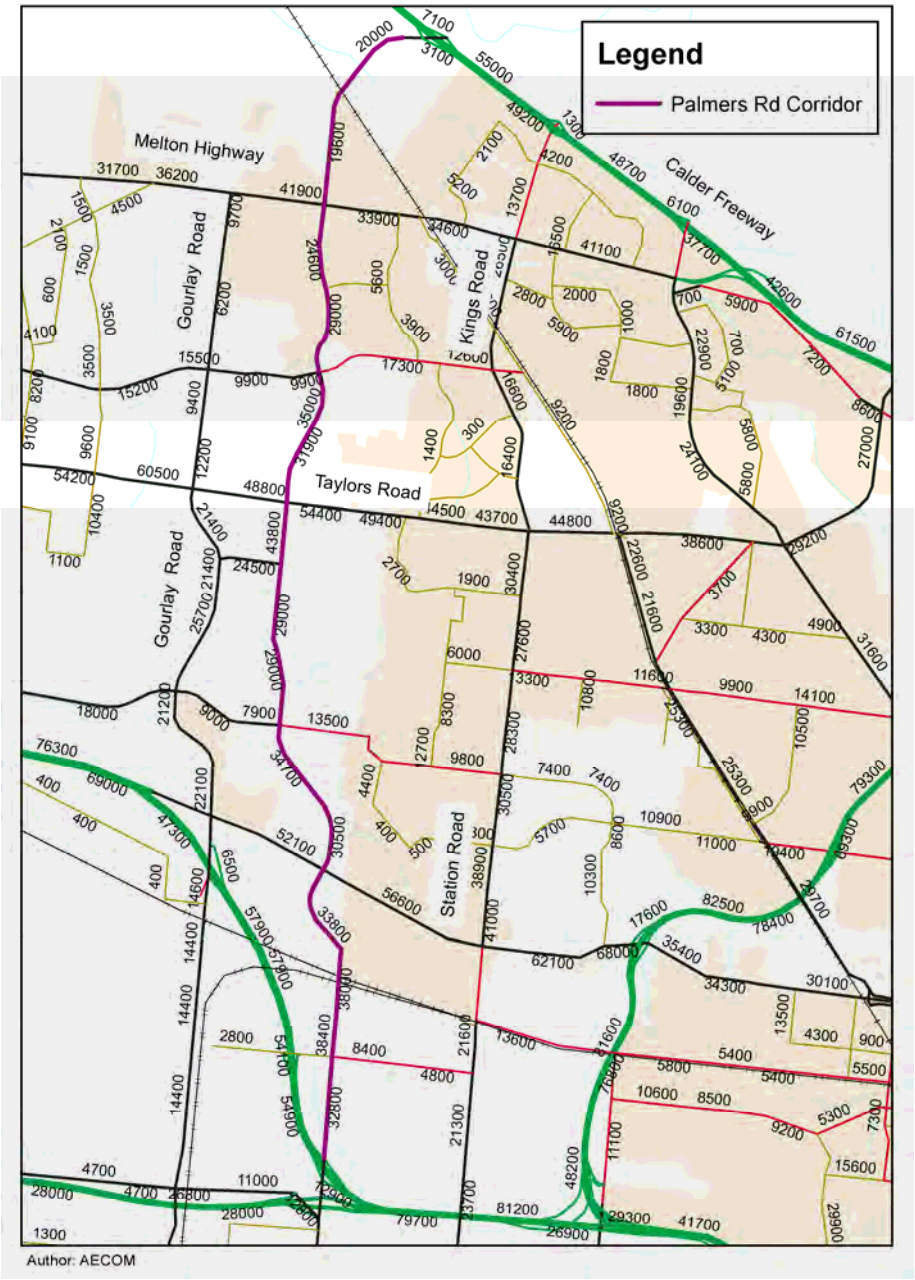

Figure 8: 2046 Daily two way volumes – Four lanes in Westwood Drive connection

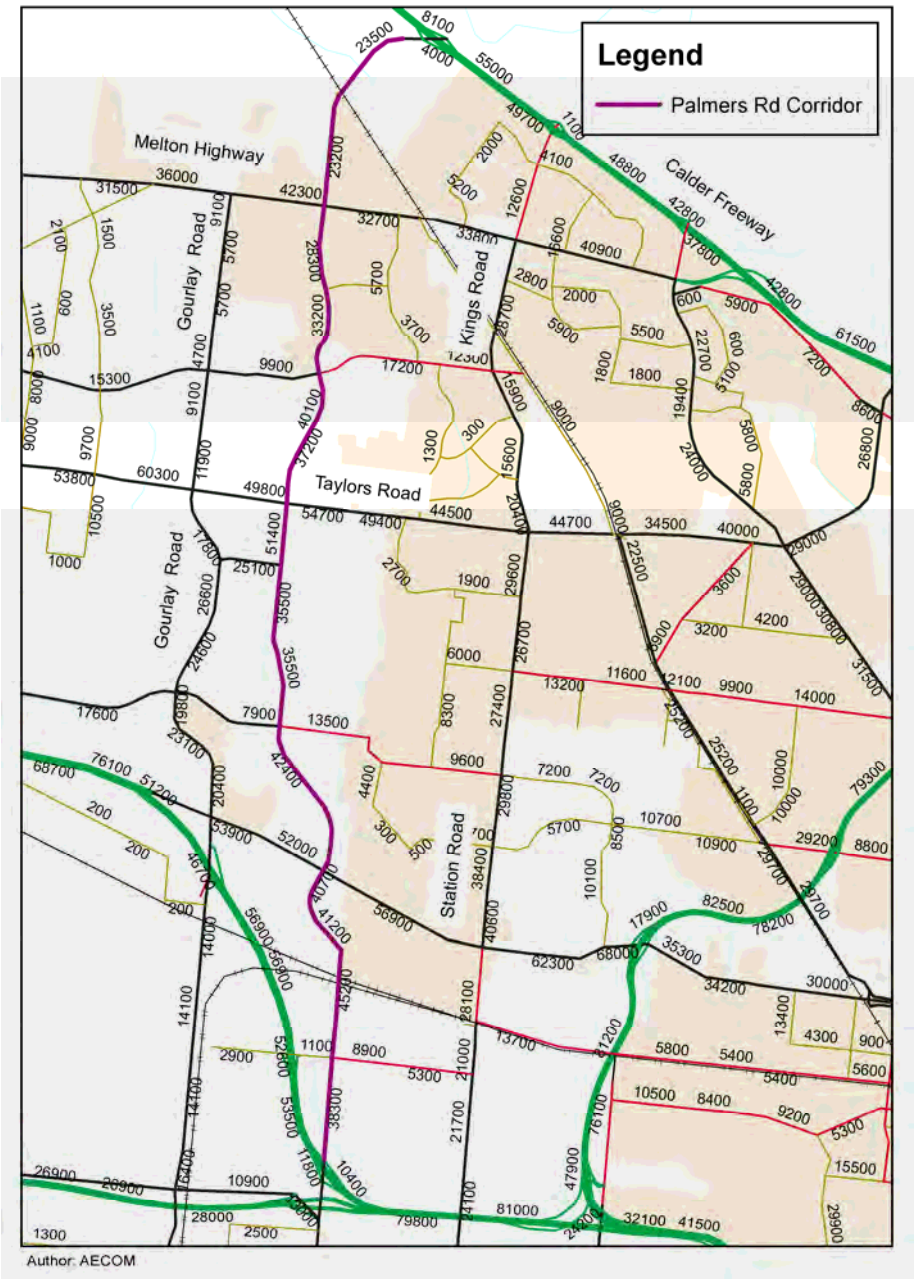

Figure 9: 2046 Daily two way volumes – Six lanes in Westwood Drive connection

It is noted that the traffic noise modelling and impact assessment is based on the entire corridor being built in 2046. It is accepted that the corridor construction could be built in stages prior to 2046; however details such as sequence of construction and the traffic volumes for the years when the sections of the corridor are constructed are not known at this stage.

6.1.1.3 Westwood Drive Connection

The traffic noise impacts of the extension of Westwood Drive and construction of Kororoit Creek bridge are assessed in this report. Table 4 shows the difference in daily volumes for various sections of the Palmers Road Corridor with and without the construction of the Kororoit Creek bridge for the years 2011, 2015 and 2046. Table 4 is from the AECOM report "*Palmers Road Corridor Western Freeway to Calder Freeway – Transport Modelling Report*", 20th May 2014.

It is noted that the forecast traffic volumes in Table 4 are for the area within the vicinity of the extension of Westwood Drive between Taylors Road and Ballarat Road. The forecast traffic volumes in Table 4 are used to provide additional information for the existing traffic volumes in Table 3.

Table 4: Daily volumes with and without the Kororoit Creek Bridge

Location	Vehicles per day					
	2011 no bridge	2011 with bridge	2015 no bridge (Base case)	2015 with bridge	2046 no bridge	2046 with bridge
Calder Park Drive north of Taylors Road	2,100	3,800	13,003	21,266	20,000	21,000
Taylors Road west of Calder Park Drive	13,600	13,300	19,131	17,354	46,500	48,000
Taylors Road east of Calder Park Drive	14,400	15,000	17,914	20,543	56,000	54,200
Calder Park Drive south of Taylors Road	0	4,600	2,743	21,291	24,000	28,200
Commercial Road west of Westwood Drive	0	0	2,743	2,400	24,000	21,000
Westwood Drive south of Commercial Road (bridge)	0	4,600	0	20,240	0	19,000
Rockbank Middle Road west of Westwood Drive	0	100	2,437	1,457	12,800	8,100
Rockbank Middle Road east of Westwood Drive	0	0	1,577	1,531	13,800	13,400
Westwood Drive south of Rockbank Middle Road	6,300	5,800	9,663	22,777	14,800	22,600
Westwood Drive north of Ballarat Road	5,100	6,300	8,171	19,500	12,600	19,500
Westwood Drive south of Ballarat Road	5,900	6,600	10,369	17,589	17,100	20,600
Ballarat Road west of Westwood Drive	40,500	40,000	42,323	40,746	54,900	53,500
Ballarat Road east of Westwood Drive	42,500	42,300	44,826	45,883	61,300	59,700

It is noted that the 2015 traffic volumes without the Westwood Drive connection are the base case traffic volumes.

6.1.2 Traffic Speed

The current sign-posted traffic speed in the Palmers Road Corridor ranges between 60 to 70 km/hr; these speeds were used in the noise model of the existing conditions. The traffic speed in the year 2046 models used a speed of 80 km/hr for all sections of the corridor. It is noted that a change in the traffic speed from 60 to 80 km/hr will increase the traffic noise levels by approximately 2 dB(A).

6.1.3 Road Surface

Table 5 presents a selection of road surface types and the increase or decrease in the noise level that is emitted from each surface type relative to the noise level that is emitted from traffic on dense graded asphalt. The noise level corrections are in accordance with the traffic noise model (CoRTN) procedures used in Victoria.

Table 5: Typical Noise Level Corrections Relative to Dense Graded Asphalt

Surface Type	Approximate Relative Noise Level; dB(A)
Spray seals 10 mm or larger	+4
Spray seals 7 mm	+2
Dense graded asphalt	0
Open graded asphalt	-2
Stone mastic asphalt	-2 to -3
Slurry surfacing	0
Tyned concrete	+1 to +4
Broomed concrete	+1 to +4
Exposed aggregate concrete	-1 to +1

These correction values are based on newly laid materials, and conditions such as dirt and other materials filling the pores of some of the materials over time will change these correction factors. The existing road surface is assumed to be dense graded asphalt; the upgraded corridor is assumed to be dense graded asphalt.

6.1.4 Topography

Topographical (terrain) and cadastral (property boundaries) data was sourced internally within AECOM; the terrain data in the form of contours at 1 metre vertical intervals for use in the noise model.

The location of residences and other noise sensitive buildings (schools, churches, etc.) were determined form aerial photography and site inspections.

The existing road configuration and the upgraded road design were supplied by Sinclair Knight Mertz (SKM).

6.1.5 Receptor Locations

The location modelling receiver points at existing residences and other noise sensitive buildings was determined using an aerial photograph of the area and a recent corridor inspection. The potential locations of future residences in current housing developments are not exactly known and therefore these residences are not modelled.

Residences further away from the corridor were not modelled if there is a residence nearby that was modelled and is closer to the existing and future road. In the computer noise model, traffic noise levels were calculated at a distance of 1 metre from the most exposed façade and at lowest habitable level of the noise-sensitive buildings.

6.2 Model Calibration

Traffic noise model calibration involved the adjustment to the modelled traffic noise levels so that the modelled noise levels are similar to the measured noise levels. Table 6 shows the average measured existing noise levels and the calibrated modelled noise levels for the measurement locations. The modelled existing traffic noise levels are within 2 dB(A) of the average measured traffic noise levels (excluding weekends) at all locations.

If the propagation path between the noise source (future traffic) and the receiver (nearby residences) remains similar to the existing conditions, then the existing calibrated noise model is able to predict the future traffic noise levels within the corridor. The main predictable variables are the change in future traffic conditions and the location of the duplicated carriageway in some sections of the corridor. The accuracy of the predicted 2046 traffic noise levels are dependent upon the accuracy of the predicted future traffic conditions and the accuracy of the location of the duplicated and new carriageways (Kororoit Creek area).

The predicted noise levels at the measurement locations are reported in Table 6. Appendix F contains the modelled traffic noise levels at the 752 residences that were modelled in the Palmers Road Corridor.

Table 6 shows the averaged measured traffic noise levels and four modelling scenarios (existing conditions, 2046 with a 2-lane road, 4-lane road and 6-lane road) for the ten measurement locations. It is noted that the modelled traffic noise levels are rounded to the nearest whole decibel.

Table 6: Modelled existing traffic noise levels

Location	Traffic Noise Levels, dB(A) $L_{A10\ (18\ hour)}$					
	Average noise level including adverse weather and weekends	Average noise level, excluding weekends	Modelled existing traffic noise levels	Modelled future traffic noise levels, 2-lane, 2046, with the bridge	Modelled future traffic noise levels, 4-lane, 2046, with the bridge	Modelled future traffic noise levels, 6-lane, 2046, with the bridge
38 Kanmore Crescent, Hillside	60	61	60	61	64	65
72 Dundee Way, Sydenham	57	57	57	59	63	63
11 Padula Court, Hillside	63	65	63	64	65	65
21 Callista Circuit, Taylors Hill	59	59	61	64	64	65
7 Catani Court, Burnside Heights	59	59	57	64	69	70
141 Arbour Boulevard, Burnside	49	49	-	51	56	60
163 Arbour Boulevard, Burnside	48	48	-	56	60	60
311 Westwood Drive, Burnside	44, 55*	45, 57*	52	62	67	68
170 Robinsons Road, Deer Park	58	58	57	61	63	64
29 Grosvenor Crescent, Derrimut	66	67	66	67	67	69

* The second set of noise measurements at 311 Westwood Drive were adversely effected by prevailing weather conditions and residential construction activities to the east of Westwood Drive.

Modelling of the existing noise levels in Arbour Boulevard was not undertaken as the existing traffic volumes using this road are unknown and relatively low.

The modelled existing traffic noise levels in Westwood Drive south of Kororoit Creek are for the scenario where the bridge over creek has not been constructed; the modelled existing traffic noise levels at 311 Westwood Drive (52 dB(A) $L_{A10\ (18\ hour)}$) is based on an estimate of the existing traffic volumes, percentage heavy vehicle content and speed using the roads near this residence.

The modelled traffic noise levels for the 2046 2-lane road, 4-lane road and 6-lane road include the connection of Westwood Drive with the bridge over Kororoit Creek.

The modelled traffic noise levels for the 4-lane dual road in 2046 are included in Table 6 to provide a comparison with the 2-lane and 6-lane roads in 2046. The 4-lane road may be constructed prior to 2046 and would be an interim road until expanded to 6-lanes.

6.3 Traffic Noise Impact Assessment

The traffic noise levels for the 4-lane road in 2046 are included in the results table in Appendix F and the noise contour maps in Appendix K. However as this configuration is an unlikely scenario is not considered in the impact assessment of the potential changes in traffic noise levels.

The future 2046 modelled traffic noise levels do not include noise attenuation barriers in the Westwood Drive connection area.

6.3.1 Increase in noise levels from existing to 2046 6-lane conditions

Table 7 shows potential increase in traffic noise levels from the existing noise levels (without the Kororoit Creek bridge and Westwood Drive connection) to year 2046 with a 6-lane road with the Westwood Drive connection. This scenario represents potentially the highest increase traffic noise levels for the corridor. Figure 10 shows the modelled increase in traffic noise levels for 1 dB(A) increments.

Table 7: Modelled noise level changes (existing without bridge to 2046 6-lane with bridge)

Traffic noise level change dB(A) $L_{A10\ (18\ hour)}$	Number of noise sensitive buildings; 2046, 6-lane road corridor
0	2
+1 to +3	185
+4 to +6	327
+7 to +9	129
+10 to +12	35
+13 to +15	26
+16 to +18	17
+18 to >+20	31

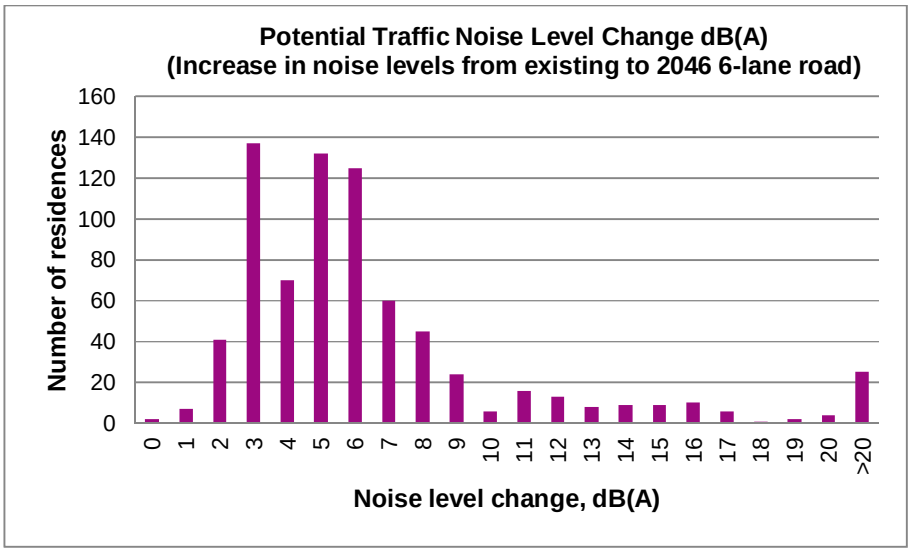

Figure 10: Potential increase in traffic noise levels from existing road to 2046 6-lane road

It is noted that most modelled residences in the corridor will have noise levels increases of between 2 to 8 dB(A). These increases are mostly due to the increase in traffic volumes and the construction of a second carriageway. There are also a significant number which will experience an increase of 10 dB(A) or more; these residences are generally located in the Westwood Drive connection area.

6.3.2 Upgrade form 2-lanes to 6-lanes in 2046

Traffic noise levels for the 2046 2-lane existing road configuration are compared with the 2046 6-lane duplicated and upgraded road configuration. Table 8 shows the range of modelled traffic noise level changes at the 752 residences that were modelled.

Table 8: Modelled noise level changes for 2-lane road to 6-lane road upgrade in 2046

Traffic noise level change dB(A) $L_{A10\ (18\ hour)}$	Number of noise sensitive buildings; (2046, 2-lane road to 6-lane road)
-1 to 0	29
+1 to +3	499
+4 to +6	186
+7 to +9	38

It is noted that the modelled traffic noise levels are rounded to the nearest decibel. The comparison in Table 8 is the result of the addition of two modelled noise level, so that the traffic noise level change may have a rounding error of ± 1 dB(A). Furthermore, typically the error in the modelling of road traffic noise using the Calculation of Road Traffic Noise (CoRTN) implemented in the modelling software SoundPlan is of ± 2 dB(A).

The four ranges in Table 8 are based on:

- -1 to 0 dB(A)) change is from inaudible and being effectively no change in the noise
- +1 to +3 dB(A) change is from inaudible (+1 dB(A)) to a change in noise levels that would be just perceptible (+3 dB(A))
- +4 to +6 dB(A) change is from just perceptible (+4 dB(A) to a change that will be clearly noticeable (+6 dB(A))
- +7 to +9 dB(A) will be clearly noticeable and a change approaching the perception of a doubling of the noise levels.

The traffic noise change at 29 residences of -1 to 0 dB(A) with the upgrade of the road from one carriageway to two carriageways is a result of some of the traffic being moved further away from these residences. Whilst there is an increase in traffic noise levels due to the increase in traffic volumes and posted speed with the upgrade of the road, the shift of traffic further from the residences with the duplication of the road results in a greater change in traffic noise levels.

At the majority of residences (499) the traffic noise level is predicted to increase by +1 to +3 dB(A). The increase is mostly due to an increase in traffic volumes and posted speed; at some locations there will be a small additional increase due to the proposed new carriageway of the upgraded road being closer to the residences compared to the location of the existing single carriageway.

The traffic noise increase of +4 to +6 dB(A) at 186 residences is mostly due to the increase in the traffic volume and the increase in the posted traffic speed with the upgrade of the corridor. There will be an increase of up to 2 dB(A) at some residences due to the location of the proposed new carriageway being closer to these residences compared to the existing carriageway.

The traffic noise level increase in the range of +7 to +9 dB(A) at 38 residences is mostly due to the additional traffic volumes and increase in traffic speed; the increase in noise levels due to the increase in traffic volumes is approximately 3 dB(A) and the posted speed is approximately 2 dB(A). The remaining 2 dB(A) increase is due to the location of the proposed new carriageway.

Figure 11 is a histogram of the modelled potential change in the traffic noise levels between the existing 2-lane road in 2046 and the 6-lane road in 2046. The histogram shows that for the 752 modelled residences the median noise level change is 2 dB(A). Most of the residences will experience an increase in traffic noise levels of 1 to 5 dB(A).

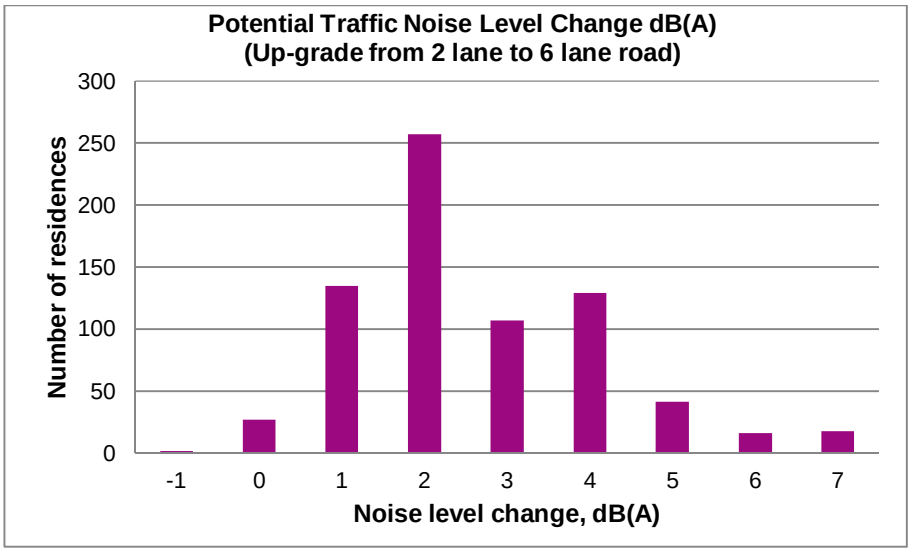

Figure 11: Potential changes in traffic noise levels, 2046 2-lane road upgraded to 6-lane road

6.3.3 Westwood Drive Connection

The traffic noise impacts in 2015 in the vicinity of Westwood Drive connection and the entire corridor are discussed in this section.

6.3.3.1 Traffic noise impacts in the vicinity of the Westwood Drive Connection in 2015

This section discusses the change in traffic noise levels in the vicinity of the Westwood Drive connection with the construction of the connection in 2015.

The Westwood Drive existing traffic volumes are known for most of the major local roads in the Westwood Drive connection area. The forecast existing and 2046 traffic volumes with and without the Westwood Drive connection (and Kororoit Creek bridge) are shown in Table 4; these traffic volumes were used in the traffic noise models. However, there are local roads (for example Arbour Boulevard) where the existing traffic details are not known. As seen in Table 2, the traffic noise from these local roads is low. Modelling of traffic noise from these local roads was not undertaken.

Table 9 shows the modelled traffic noise levels with and without the connection in 2015 for selected residences in the Westwood Drive connection area.

It is noted that the minimum modelled existing noise levels at residences within the Westwood Drive area was set at 45 dB(A) $L_{A10\ (18\ hour)}$. This level was estimated based on the measurements undertaken in the area. For example the range of measured traffic noise levels at 311 Westwood Drive in 2008 was 41 to 47 dB(A) $L_{A10\ (18\ hour)}$ with an average of 44 dB(A) $L_{A10\ (18\ hour)}$. Also, the average measured traffic noise levels in Arbour Boulevard were 48 to 49 dB(A) $L_{A10\ (18\ hour)}$.

Table 9: Changes in noise levels in the Westwood Drive Connection Area

Location	dB(A) $L_{A10\ (18\ hour)}$					
	Modelled existing traffic noise levels with existing 2-lane road without connection	Modelled existing traffic noise levels with existing 2-lane road with connection	Modelled 2046 traffic noise levels with 2-lane road without connection	Modelled 2046 traffic noise levels with 2-lane road with connection	Modelled 2046 traffic noise levels with upgraded 4-lane road with connection	Modelled 2046 traffic noise levels with upgraded 6-lane road with connection
Arbour Boulevard, 124 Caroline Springs	45	50	45	50	54	54
Arbour Boulevard, 133 Caroline Springs	48	52	49	51	54	54
Arbour Boulevard, 141 (49) Caroline Springs	47	53	48	53	56	56
Arbour Boulevard, 149 Caroline Springs	48	57	49	56	61	62
Arbour Boulevard, 151 Caroline Springs	48	58	49	58	63	64
Arbour Boulevard, 153 Caroline Springs	48	61	49	61	66	66
Arbour Boulevard, 155 Caroline Springs	48	62	49	61	67	67
Arbour Boulevard, 157 Caroline Springs	48	62	49	62	67	67
Arbour Boulevard, 159 Caroline Springs	47	61	49	60	65	66
Arbour Boulevard, 161 Caroline Springs	48	60	50	59	64	64
Arbour Boulevard, 163 (48) Caroline Springs	48	58	49	57	62	62
Arbour Boulevard, 165 Caroline Springs	49	56	50	56	60	60
Arbour Boulevard, 167 Caroline Springs	50	55	51	54	58	58
Arroyo Place, 30 Caroline Springs	45	63	47	63	69	70
Arroyo Place, 32 Caroline Springs	45	62	44	62	68	69
Arroyo Place, 34 Caroline Springs	45	63	44	63	69	70
Arroyo Place, 36 Caroline Springs	45	63	47	63	69	71
Arroyo Place, 38 Caroline Springs	45	62	44	62	68	70
Arroyo Place, 40 Caroline Springs	45	63	47	63	69	71
Arroyo Place, 42 Caroline Springs	45	62	47	62	68	69
Arroyo Place, 44 Caroline Springs	45	62	45	62	68	69
Arroyo Place, 46 Caroline Springs	45	63	48	63	69	70
Arroyo Place, 48 Caroline Springs	45	62	48	63	68	70

Location	dB(A) $L_{A10\ (18\ hour)}$					
	Modelled existing traffic noise levels with existing 2-lane road without connection	Modelled existing traffic noise levels with existing 2-lane road with connection	Modelled 2046 traffic noise levels with 2-lane road without connection	Modelled 2046 traffic noise levels with 2-lane road with connection	Modelled 2046 traffic noise levels with upgraded 4-lane road with connection	Modelled 2046 traffic noise levels with upgraded 6-lane road with connection
Arroyo Place, 50 Caroline Springs	45	62	47	62	68	69
Arroyo Place, 52 Caroline Springs	45	62	48	63	68	70
Arroyo Place, 54 Caroline Springs	45	62	48	62	68	70
Arroyo Place, 56 Caroline Springs	45	62	48	62	68	70
Bursaria Drive, 14 Caroline Springs	46	62	48	62	68	70
Bursaria Drive, 16 Caroline Springs	47	63	50	63	69	70
Bursaria Drive, 18 Caroline Springs	48	63	50	63	69	70
Bursaria Drive, 20 Caroline Springs	49	63	50	62	69	70
Bursaria Drive, 22 Caroline Springs	50	63	51	62	69	70
Bursaria Drive, 24 Caroline Springs	53	63	54	63	69	71
Bursaria Drive, 26 Caroline Springs	54	63	55	63	69	71
Bursaria Drive, 28 Caroline Springs	55	63	56	63	69	71
Bursaria Drive, 30 Caroline Springs	55	63	56	63	69	71
Cooma Place, 8 Caroline Springs	45	63	45	59	67	66
Cooma Place, 9 Caroline Springs	45	67	46	61	71	70
Florida Court, 10 Caroline Springs	45	63	45	58	67	66
Florida Court, 9 Caroline Springs	48	65	48	60	69	68
Fydler Avenue, 83 Caroline Springs	46	63	51	61	68	69
Harwood Court, 13 Caroline Springs	45	62	44	59	67	68
Harwood Court, 16 Caroline Springs	45	67	46	61	71	71
Mimosa Way, 50 Caroline Springs	45	62	43	59	67	67
Sullivan Terrace, 2 Caroline Springs	45	59	45	59	64	65

As seen in Table 10 there will be significant increases in the noise levels due to the construction of the Westwood Drive connection in 2015. The large increases are mostly due to the low existing noise levels in the area (there are no significant sources of noise in the area).

Table 10: Modelled noise level changes in Westwood Drive Connection Area in 2015

Traffic noise level change dB(A) $L_{A10\ (18\ hour)}$	Number of noise sensitive buildings; in Westwood Drive area, 2015
+1 to +3	0
+4 to +6	3
+7 to +9	5
+10 to +12	4
+13 to +15	8
>15	24

6.3.3.2 Traffic noise impacts in the entire corridor with the Westwood Drive Connection in 2015

The modelled traffic noise levels for the entire Palmers Road Corridor with the construction of the Westwood Drive Connection in 2015 are in Appendix F. Table 11 shows the change in modelled traffic noise levels for the entire corridor with and without the construction of the connection in 2015.

Table 11: Modelled noise level changes

Traffic noise level change dB(A) $L_{A10\ (18\ hour)}$	Number of noise sensitive buildings;, entire corridor, 2015
0	289
+1 to +3	220
+4 to +6	150
+7 to +9	33
+10 to +12	15
+13 to +15	21
>15	24

It is predicted that there will be no change in traffic noise levels (0 dB(A)) at 289 residences in the Palmers Road corridor with the connection of Westwood Drive. The traffic conditions on the existing roads in the northern and southern sections of the Palmers Road Corridor will not significantly influenced by the construction of the Westwood Drive connection.

The traffic noise levels are predicted to increase by +1 to +3 dB(A) at 220 residences. The traffic conditions on some existing roads near the Westwood Drive connection will be slightly influenced by the construction of the connection.

The traffic noise increase of +4 to +6 dB(A) at 150 residences is mostly due to an increase in traffic volumes on existing roads adjacent to the Westwood Drive connection.

The traffic noise level increase in the range of +7 to +9 dB(A) at 33 residences within the immediate vicinity of the connection is mostly due to the additional traffic volumes and increase in traffic speed as well as new carriageways associated with the construction of the connection.

The increase in traffic noise level of +9 to +12 dB(A) at 15 residences is due to the new road connecting Westwood Drive. For example residences in Arbour Boulevard, Westwood Drive south of Kororoit Creek as well as Westwood Drive north of Tenterfield Drive will be exposed directly to the new traffic noise source.

The increase in traffic noise level of +12 to >15 dB(A) at 45 residences is due to the new road connection in areas not exposed to an existing road. The residences directly adjacent to the new Westwood Drive carriageways will be significantly impacted. For example the predicted increase in traffic noise levels at 2 Sullivan Terrace is 17 dB(A) $L_{A10\ (18\ hour)}$. This residence faces Kororoit Creek and is currently not exposed to traffic noise from nearby roads.

Figure 13 shows the distribution of traffic noise level increase for residences within the Palmers Road Corridor.

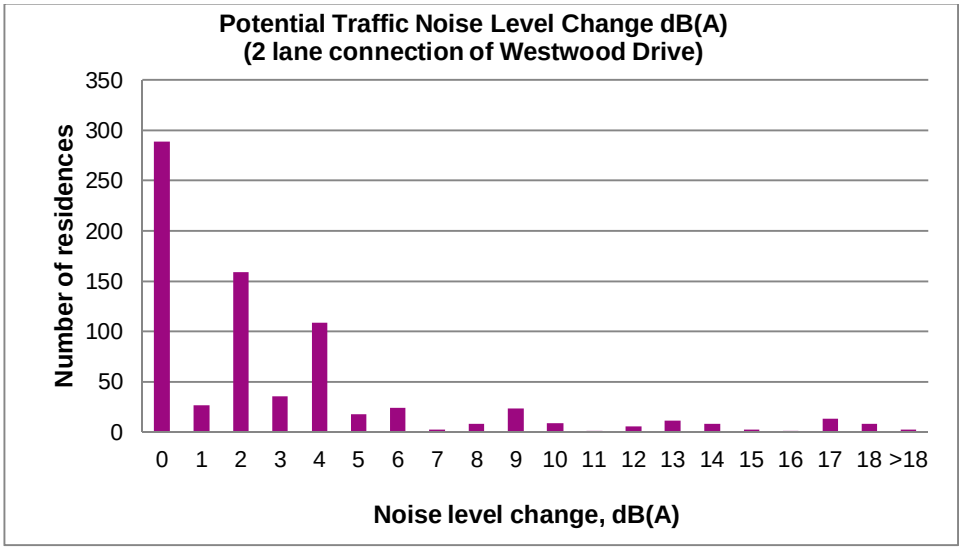

Figure 12: Potential changes in traffic noise levels, 2015 connection of Westwood Drive

6.3.4 Calder Freeway Interchange

The addition of an overpass and connecting ramps at the Palmers Road Corridor interchange with the Calder Freeway does not qualify under the VicRoads Policy.

Currently there are no noise sensitive buildings near the proposed intersection of the Calder Park Drive and Calder Freeway; the closest residence is in Thompsons Road near Organ Pipes Road, approximately 500 metres from the centre of the proposed interchange. Other near-by residences include 10 Power Place, Taylors Lakes (approximately 900 metres from the closest point of the realigned Calder Park Drive) and 15 Nottingham Way, Sydenham (approximately 700 metres from the divergence of the new Calder Park Drive alignment). This interchange area is shown in Appendix C. Traffic noise attenuation will not be provided at this interchange.

The traffic noise impacts of the proposed new interchange were modelled at the residence in Thompsons Road for both the existing road alignment with 2046 traffic volumes and the 6-lane upgraded road/interchange with 2046 traffic volumes; the results are shown in Table 12.

Table 12: Modelled impacts of the Calder Freeway Interchange

Address	Traffic Noise Levels, dB(A) $L_{A10\ (18\ hour)}$		
	2046 Traffic noise levels with existing 2-lane Calder Park Drive alignment	2046 Traffic noise levels with proposed 6-lane Calder Park Drive Interchange	Traffic Noise Level difference
Thompsons Road, Keilor North	57.2	57.6	+0.4
10 Power Place, Taylors Lakes	59.2	60.2	+1
15 Nottingham Way, Sydenham	55.1	56.2	+1.1

All of the increases in traffic noise levels at the residences in Table 12 are insignificant and would not be noticeable. Furthermore there will be an insignificant (<1 dB(A)) increase in noise levels in the Organ Pipes National Park with the construction of the interchange.

6.4 Modelling years and modelling uncertainty

There is a possibility that the Palmers Road Corridor will be upgraded in stages prior to the modelling year 2046. In areas where the road is upgraded prior to 2046, then changes in traffic noise levels will differ to those modelled for 2046 and reported in Appendix F.

For a section of the corridor upgraded to 6-lanes prior to 2046, the increases in traffic noise levels will be less than that modelled for this report (for 2046) as the changes in the traffic volumes associated with the duplication will be less than that forecast for 2046.

In some areas there may be a slight reduction in traffic noise levels as the effect of moving some of the traffic away from the residences will not be outweighed by the increase in the traffic volumes forecast for 2046. However, as the traffic volume increases with time, then the reduction in traffic noise levels may eventually become an increase in noise levels.

There is a significant level of uncertainty in the predicted future traffic noise levels if the corridor is developed in stages; the staging of the construction of the upgraded road is outside the scope of this assessment.

7.0 Construction Noise

The following sections summarise the three most relevant documents relating to the management of construction noise from major projects.

7.1 EPA Environmental Guidelines for Major Construction Sites

With respect to construction noise, the EPA Environmental Guidelines for Major Construction Sites (publication 480) state:

> *While no specific statutory controls exist for noise from construction sites, all noise nuisance should be reduced wherever possible from vehicles, fixed machinery within the site, blasting, general construction activities, and from movements of vehicles servicing the site.*

The EPA Guidelines specify the following control techniques:

> *Operating hours*
>
> *One of the most effective means of reducing noise nuisance from construction activities, where there are residents nearby, is to limit the times of operation of noisy equipment vehicles, and operations. There are occasions when it is necessary to work beyond these times. Exceptions can be made in cases where an activity that has commenced cannot be stopped, such as a concrete pour, and deliveries may need to be made outside normal working hours to avoid a major traffic hazard. Documentation justifying out-of-hours work should be maintained and authorised by site management. Local residents who are affected by such activities should be notified beforehand. Even with such restricted hours, every effort should be made to reduce the noise of all site activities.*
>
> *Vehicles and equipment*
>
> *Noise from vehicles and powered machinery and equipment on-site should not exceed the manufacturer's specifications, based on the installation of a silencer. Equipment should be regularly serviced. Attention should also be given to muffler maintenance and enclosure of noisy equipment.*
>
> *Traffic*
>
> *There is a conflict between operational efficiency and local amenity, with regard to traffic flows in and out of a construction site. During normal business hours when traffic densities are high, deliveries of materials and large equipment can cause severe traffic snarls and even pose a danger to other vehicles. Out of-hours deliveries will cause noise pollution from trucks moving past nearby houses.*
>
> *Noise abatement*
>
> *Depending on the location of the facility, suitable noise suppression or abatement measures may be required, such as the provision of earthen embankments or other noise screens.*

7.2 VicRoads Environmental Management Guidelines

VicRoads Environmental Management Guidelines provide an overview of the environmental management process associated with the planning, design, construction operation and maintenance of roads in Victoria.

The guidelines state:

> *VicRoads construction and maintenance projects have the potential to affect the environment in a variety of ways. Not all projects will interface with all issues but most will have at least one environmental issue that needs to be addressed. Potential environmental issues include: Air (including dust), Cultural heritage, Flora and fauna, Greenhouse, Natural resource use, Noise and Water.*

The VicRoads Guidelines do not detail the potential construction noise impacts or amelioration measures. In practice, VicRoads develops Environmental Management Plans (EMPs) for road construction projects which contain the details for the management of construction noise.

7.3 EPA - Noise Control Guidelines; Publication 1254

The Noise Control Guidelines provide for a level of noise management for activities that are exempt from the requirements of SEPP N-1 (Control of Noise from Commerce, Industry and Trade) and guidelines Noise from Industry in Rural Victoria (2011).

For example construction and demolition noise from building sites are exempt from the SEPP N-1 requirements, however the Noise Control Guidelines recommends some degree of noise management of these activities.

These guidelines are a good basis to develop Environment Management Plans for the construction of the corridor project.

7.3.1 Construction and Demolition Site Noise

This applies to:

- Industrial and commercial premises; and
- Large-scale residential premises under construction in non-residential zones, as defined in regulation 9 of the *Environment Protection (Residential Noise) Regulations 2008*.

Community consultation and work scheduling Community consultation is essential for large-scale projects or high-impact works. Where the community will be significantly impacted, consult on the benefits and drawbacks of different scheduling, planning and remediation options.

- The following requirements apply to large projects with nearby sensitive uses:
- Inform potentially noise-affected neighbours about the nature of construction stages and noise reduction measures;
- Give notice as early as possible for periods of noisier works such as excavation. Describe the activities and how long they are expected to take.
- Keep affected neighbours informed of progress.
- Appoint a principal contact person for community queries.
- Provide 24-hour contact details through letters and site signage.
- Record complaints and follow a complaint response procedure suitable to the scale of works.
- Within normal working hours, where it is reasonable to do so:
    - schedule noisy activities for less sensitive times, (for example, delay a rock-breaking task to the later morning or afternoon)
    - provide periods of respite from noisier works (for example, periodic breaks from jackhammer noise).
- The weekend/evening work hours in the schedule (including Saturday afternoon or Sunday) are more sensitive times and have noise requirements consistent with quieter work.
- The weekend/evening periods are important for community rest and recreation and provide respite when noisy work has been conducted throughout the week. Accordingly, work should not usually be scheduled during these times.

Noise reduction measures should be developed through initial project planning, tenders for equipment and subcontracts. Larger projects should develop a noise management plan (potentially part of a broader environmental management plan) and may require advice from an acoustic specialist, particularly if works are proposed outside of normal working hours. The following measures apply:

- Where work is conducted in a residential area or other noise-sensitive location, use the lowest-noise work practices and equipment that meet the requirements of the job.
- Site buildings, access roads and plant should be positioned such that the minimum disturbance occurs to the locality. Barriers such as hoardings or temporary enclosures should be used. The site should be planned to minimise the need for reversing of vehicles.
- All mechanical plant is to be silenced by the best practical means using current technology. Mechanical plant, including noise-suppression devices, should be maintained to the manufacturer's specifications. Internal combustion engines are to be fitted with a suitable muffler in good repair.
- Fit all pneumatic tools operated near a residential area with an effective silencer on their air exhaust port.
- Install less noisy movement/reversing warning systems for equipment and vehicles that will operate for extended periods, during sensitive times or in close proximity to sensitive sites. Occupational health and safety requirements for use of warning systems must be followed.

- Turn off plant when not being used.
- All vehicular movements to and from the site to only occur during the scheduled normal working hours, unless approval has been granted by the relevant authority.
- Where possible, no truck associated with the work should be left standing with its engine operating in a street adjacent to a residential area.
- Special assessment of vibration risks may be needed, such as for pile-driving or works structurally connected to sensitive premises.
- Noise from the site needs to comply with the requirements of the schedule, except for:
    - unavoidable works;
    - night period low-noise or managed-impact works approved by the local authority.

Unavoidable works are works that cannot practicably meet the schedule requirements because the work involves continuous work such as a concrete pour or would otherwise pose an unacceptable risk to life or property, or risk a major traffic hazard. Affected premises should be notified of the intended work, its duration and times of occurrence. The relevant authority must be contacted and any necessary approvals sought.

Low-noise or managed-impact works are works approved by the local authority:

- that are inherently quiet or unobtrusive (for example, manual painting, internal fit-outs, cabling) or
- where the noise impacts are mitigated (for example, no impulsive noise and average noise levels over any half hour do not exceed the background) through actions specified in a noise management plan supported by expert acoustic assessment.

Low-noise or managed-impact works do not feature intrusive characteristics such as impulsive noise or tonal movement alarms.

Note: Noise from construction of large-scale residential premises in non-residential zones (see regulation 9 of the *Environment Protection (Residential Noise) Regulations 2008*) is subject to the unreasonable noise provisions of s48A(3) of the EP Act at all times of day. In all circumstances, the assessment may have regard to this noise control guideline.

The Guidelines recommend hours of operation of the construction site, and construction noise levels that should be achieved if work must be undertaken outside the normal work hours. These requirements are:

Daytime

Normal working hours

7:00am to 6:00pm Monday to Friday

7:00am to 1:00pm Saturdays

Evening

Noise level at any residential premises not to exceed background noise by:

(i) 10 dB(A) or more for up to 18 months after project commencement.

(ii) 5 dB(A) or more after 18 months.

during the hours of:

6:00pm to 10:00pm Monday to Friday

1:00pm to 10:00pm Saturdays

7:00am to 10:00pm Sundays & public holidays

Night-time

Noise inaudible within a habitable room of any residential premises.

10:00pm to 7:00am Monday to Sunday

8.0 Other sources of noise

Throughout the Palmers Road Corridor there are other sources of noise that will contribute to some extent to the overall noise impacts. These noise sources include:

- Construction activities throughout the corridor
- Railway noise in the vicinity of the Bendigo line (Calder Park) and Ballarat line (Deer Park)
- Aircraft noise near the Calder Park and Organ Pipes National Park
- Commercial activities near Caroline Springs and Ballarat Road
- Crossroad traffic

The extent of the other sources of noise ranges from transient, irregular to constant. Construction noise from residential development will be over a period of several months to years duration depending upon the size of the development. For example, the development on the east side of Westwood Drive south of Kororoit Creek contributed significantly to the measured noise levels at 311 Westwood Drive in 2014 but not in 2008. Construction noise impacts a wider area than the development site as trucks access the area to drop off materials as well as remove unwanted waste. The overall development construction noise impacts in the Palmers Road Corridor can be significant, however after the development is complete then this noise source should not be an impact.

Railway noise in the vicinity of the Ballarat and Bendigo railway lines is mostly of a short duration. The time it takes for a train to pass will depend upon the location of the train (at speed or near a station). The number of train passby events will depend upon the time of the day; several train passby events in an hour during peak periods compared to less events off-peak. During the night-time period there may be no train pass-by events. Rail noise will impact areas near the Ballarat and Bendigo railways; however, the significant impacts in the corridor will be limited to the immediate areas near the railway crossings.

Aircraft noise in the north of the corridor will depend upon the prevailing wind direction. Aircraft using the east-west runway of Melbourne Airport will impact the area in the vicinity of Organ Pipes National Park and to a lesser extent the area to the south of the Calder Freeway interchange with the Palmers Road Corridor. Aircraft using the north-south runway will not directly impact areas near the corridor as most of these flight paths are concentrated to the east of the corridor; albeit some aircraft may fly over the corridor by either approaching or departing the airport in the direction of south west. Aircraft noise in the area of the corridor will increase as the number of flights increases with time. The expansion of the Melbourne Airport with the construction of the second north-south runway to the west of the existing runway and the second east-west runway south of the existing runway will potentially increase noise within the Palmers Road Corridor.

Commercial activities near the corridor generate some noise (for example Caroline Springs); traffic noise from vehicles accessing these areas may use the corridor and the cross roads. The commercial areas are far enough away from the corridor that noise from the commercial activities will not be noticeable.

Crossroads to the corridor range from small local roads to major highways. For example, Melton Highway in the vicinity of the corridor is a major 4-lane dual carriageway highway carrying approximately 30,000 vehicles per day. Local noise levels within the Palmers Road Corridor near these crossroads will be significantly influenced by the traffic flowing across the corridor as well as traffic turning into and out of the corridor.

The impacts of other sources of noise are recognised as a contributor to the overall impacts in the corridor; however, these impacts have not been quantified in the corridor traffic noise impact assessment.

9.0 Assessment against Environment Effect Statement Objectives

9.1 Rating Scale

Performance of the PRCP in relation to each sub-objective was assessed using the VicRoads standard rating scale (see Table 13). The VicRoads standard rating scale is a five point ordinal rating scale which allows for assessment of performance ranging from 'very poor' to 'very well'. The rating scale includes qualitative descriptions of performance consistent with each rating to enable ratings to be assigned.

Table 13: VicRoads Standard Rating Scale

Description	Rating
Best practice, strong level of compliance, major positive impact.	**Very Well**
Improved practice, good policy compliance, positive impact.	**Well**
Partial policy compliance, no distinct positive or negative impact.	**Neutral**
Policy non-compliance and negative impact.	**Poorly**
Major policy non-compliance and major negative impact.	**Very Poor**

The rating scale requires that predicted impacts both positive and negative be assessed in terms of their significance.

9.2 Rating Tool

The VicRoads Traffic Noise Reduction Policy is the only policy in use in Victoria that addresses the impacts of road traffic noise (see Section 3.3). As discussed in section 3.5, the VicRoads Policy does not apply to the Palmers Road Corridor. However, it is possible to use the Policy objectives to determine the traffic noise levels impacts.

The Policy objectives for new and up-graded roads are:

- If the existing noise levels are less than 50 dB(A), consideration is given to limiting the increase in traffic noise levels to 12 dB(A)
- If the existing noise levels are between 50 and 63 dB(A) then the objective is to limits the traffic noise levels to 63 dB(A)
- If the existing traffic noise levels are greater than 63 dB(A) then the objective is to limit the noise level increase to the noise levels that would have prevailed had the works not been constructed; as this is not practical in most circumstances, then the increase is limited to 2 dB(A).

The modelled traffic noise level changes for the following scenarios were compared against the evaluation objectives in Table 14:

- Comparison of the existing noise levels and the 2046 6-lane upgraded road (Table 7) for the entire corridor
- Up-grade of the connected Palmers Road Corridor from 2-lanes to 6-lanes in 2046 (Table 8) for the entire corridor
- Construction of the Westwood Drive connection in 2015 (Table 10) to the area near the connection.

The modelled changes as a result of the construction of the Calder Freeway interchange were not considered significant and are not evaluated against the objectives.

Table 14: Evaluation of compliance and residual impact rating guide – Amenity and Environmental Quality

Evaluation Objective	Key legislation, policy and guidelines	Rating				
		Very Well	Well	Neutral	Poor	Very Poor
Amenity and Environmental Quality To minimise adverse noise and other amenity effects on nearby residents and land uses, to the extent practicable.	Planning and Environment Act 1987 Environment Protection Act 1970 VicRoads Traffic Noise Reduction Policy 2005 EPA Guidelines (e.g. Environmental Guidelines for Major Construction Sites) SEPP (Air Quality Management)	Applicable noise standards met for nearby residents and land uses Strong policy compliance Best practice	Minor exceedances of noise standards for small number of nearby residents and land uses Good policy compliance Improved practice	Minor exceedances of noise standards for a large number of nearby residents and land uses Partial policy compliance Standard practice	Major exceedances for a small number of nearby residents and land uses Policy non-compliance Poor practice	Major exceedances for a large number of nearby residents and land uses Major policy non-compliance Very poor practice

Table 15: Objectives and Assessment Criteria relating to the EES Objective for Amenity and Environmental Quality

Objective	Assessment Criteria	Scenario	Description of scenario	Extent of change in noise levels	Rating
To minimise noise impacts for local residents and surrounding areas	Extent of changes in noise levels at properties	1 - Existing road in 2015 to the 2046 6-lane upgraded road	The existing road does not include the Westwood Drive connection. Noise levels at 752 residences were modelled.	Noise levels will increase at nearly all of the residences adjacent to the corridor. Approximately 237 residences will experience an increased noise level of at least 7 dB(A). 31 residences will experience an increased noise level of at least 18 dB(A). Compliance with VicRoads Traffic Noise Policy	**Poor**
		2 - Upgrade of 2-lane road to 6-lane road in 2046	Includes the Westwood Drive connection. Road is duplicated and number of lanes increased. Noise levels at 752 residences were modelled.	Most of the residences experience an increase in traffic noise levels of 3 dB(A) or less. Approximately 30% will experience an increase of at least 4 dB(A). Compliance with VicRoads Traffic Noise Policy	**Neutral**
		3 - Connection of Westwood Drive in 2015	The bridge over Kororoit Creek and connecting roads to the existing roads are built. Only the 45 residences in the connection area were modelled.	Noise levels will increase by at least 4 dB(A) at all residences. Noise levels will increase by at least 15 dB(A) 24 residences. Compliance with VicRoads Traffic Noise Policy	**Very Poor**
		4 – Construction of roads	Construction of the bridge over Kororoit Creek and connecting roads to the existing roads. Construction of the up-graded road in the remaining sections of the corridor.	Transient noise from construction activities in the vicinity of residences in the corridor will be of several months duration. At some locations the noise impacts will be of a few months duration, other locations where more intensive activities are required (bridge over Bendigo railway line) will be a longer period. Noise impacts will be within the guidelines and EMP.	**Well**

Construction of the Westwood Drive connection will introduce traffic into an area that currently has no traffic noise impacts. The increase in traffic noise levels is at least 4 dB(A) at all residences. More than half of the residences modelled in the connection area will be exposed to noise level increases of at least 15 dB(A). This factor results in a very poor rating.

Whilst the construction of the Westwood Drive connection rated very poor, the scenario is over a period of up to 31 years. The impact of the Westwood Drive connection on the entire Palmers Road Corridor is relatively minor and isolated to the Westwood Drive/Kororoit Creek area (third scenario). The effect of duplication the corridor and increasing the number of lanes (second scenario) results in a small increase in traffic noise at most residences due to an increase in traffic using the corridor in the Kororoit Creek area.

Further as discussed in Section 3.4.2 the construction of the missing Westwood Drive connection is a continuation of the existing sequence of land development that has occurred throughout the corridor. Therefore there is no logical reason why the final section of the Palmers Road Corridor to be constructed as a local road should be treated differently in relation to traffic noise than any other section of the corridor. A different approach or treatment would be inequitable.

Upgrading the corridor from 2-lanes to 6-lanes has a relatively small impact on most of the residences within the corridor. Thirty percent of the residences will experience an increase in noise levels of at least 4 dB(A) due to an increase in the traffic using the corridor and the construction of the duplicated carriageway closer to some of the residences. This scenario is rated as neutral because there is a small increase in noise levels at most of the residences.

Construction activities will be in accordance with the construction Environment Management Plan which will be based on the relevant EPA and VicRoads guidelines (see Section 4). The EMP will specify the construction activities that may exceed the guidelines and how to minimise the noise impacts of these exceedance. For example, working out of normal hours. Compliance with the EMP will ensure the impacts are minimal and therefore the rating is very well.

10.0 Summary

The review of the current VicRoads Traffic Noise Reduction Policy 2005 showed that the noise attenuation criteria do not apply to the Palmers Road corridor and noise attenuation measures will not be used with the Westwood Drive connection and the upgrade of the of the corridor.

The traffic noise levels throughout the corridor with the up-grade of the road from the existing conditions (without the Westwood Drive connection) to the 6-lane connected road in 2046 will increase by from 0 dB(A) to >+20 dB(A). Most of the 752 residences modelled will have an increase in traffic noise levels of 6 dB(A) or less; this increase is due to the increase in traffic volumes over time and the construction of a second carriageway closer to the residences.

The construction of the Westwood Drive connection in 2015 will result in a potential increase in noise levels from +4 to >15 dB(A) in the vicinity of the connection. The noise levels at 24 residences will increase by more than 15 dB(A).

With the Westwood Drive connection in place, modelling of the duplication of the existing 2-lane road to a duplicated 6-lane road in 2046 showed that the traffic noise levels potentially change by -1 to +9 dB(A) $L_{A10\,(18\,hour)}$.

Upgrading the corridor from 2-lanes to 6-lanes has a relatively small impact on most of the residences within the corridor. This scenario is rated as neutral because there is a small increase in noise levels at most of the residences. This scenario is the most appropriate assessment, as it takes into consideration the equity issue that construction of the missing connection of Westwood Drive as a local road should not be treated any differently to other sections of the Palmers Road Corridor.

Construction of the Westwood Drive connection will introduce traffic into an area that currently does not have traffic noise impacts. The increase in traffic noise levels is at least 4 dB(A) at all residences. More than half of the residences modelled in the connection area will be exposed to noise level increases of at least 15 dB(A). This factor results in a very poor rating for the construction of the Westwood Drive connection.

There may be potential to stage the construction of the project prior to the modelling year 2046. For the purpose of the current assessment the VicRoads policy was used as the default policy.

Appendix A: Acoustic Terminology

dB(A)	'A'-weighted Decibels, the unit of Sound Pressure Level. The 'A'-weighting adjusts the levels of frequencies within the sound spectrum to better reflect the sensitivity of the human ear to different frequencies.
L_{10}	The value of 'A'-weighted Sound Pressure Level which is exceeded for 10 percent time during a given measurement period. [Unit: dB(A)]
$L_{10,18hr}$	The arithmetic average of the hourly L_{10} Sound Pressure Levels measured between 6am and midnight. [Unit: dB(A)]
L_{90}	The value of 'A'-weighted Sound Pressure Level which is exceeded for 90 percent time during a given measurement period. L_{90} Sound Pressure Levels are commonly used to represent background noise levels. [Unit: dB(A)]
L_{eq}	The 'A'-weighted Equivalent Continuous Sound Pressure Level, which is the constant Sound Pressure Level that for a given duration would be equivalent in sound energy to the time-varying Sound Pressure Level measured over the same duration. L_{eq} Sound Pressure Levels are commonly referred to as the average Sound Pressure Level. [Unit: dB(A)]
$L_{eq,8hr}$	The arithmetic average of the hourly L_{eq} Sound Pressure Levels measured between 10pm and 6am. [Unit: dB(A)]
$L_{eq,9hr}$	The arithmetic average of the hourly L_{eq} Sound Pressure Levels measured between 10pm and 7am. [Unit: dB(A)]
$L_{eq,15hr}$	The arithmetic average of the hourly L_{eq} Sound Pressure Levels measured between 7am and 10pm. [Unit: dB(A)]
$L_{eq,16hr}$	The arithmetic average of the hourly L_{eq} Sound Pressure Levels measured between 6am and 10pm. [Unit: dB(A)]
L_{max}	The maximum 'A'-weighted Sound Pressure Level measured during a given time period. For traffic noise, the L_{max} would typically represent maximum noise level occurring during short noise events such as a noisy truck passing, engine braking, etc. L_{max} is a relevant descriptor in determining the likelihood of sleep disturbance and general annoyance.
Sound Pressure Level	A measure of the magnitude of a sound wave (Unit: Decibels). Mathematically, it is twenty times the logarithm to the base ten of the ratio of the root mean square sound pressure at a point in a sound field, to the reference sound pressure; where sound pressure is defined as the alternating component of the pressure (Pa) at the point, and the reference sound pressure is $2x10^{-5}$ Pa.
Decibel readings of every day steady sounds	0 dB the faintest sounds we can hear 20 dB quiet bedroom at night 30 dB quiet library of quiet location in the country 40 dB living room 50 dB typical office of ambient city noise 60 dB normal conversational speech 70 dB car pass by 80 dB edge of busy road 90 dB truck pass by 100 dB night club 110 dB jack hammer at 2 metres 120 dB 70 metres from jet aircraft 130 dB threshold of pain

Appendix B: VicRoads Traffic Noise Reduction Policy

Vic Roads - Traffic Noise Reduction Policy

Statement of Policy:

Road traffic noise is a significant environmental problem, particularly in residential areas. VicRoads is committed to taking whatever steps it can to reduce the overall level of traffic noise, and to limit the effect of traffic noise on nearby residents when new or improved roads are opened to traffic. It will achieve this by:

- seeking to reduce noise emitted by vehicles and road surfaces;
- encouraging compatible land use next to major roads;
- limiting traffic noise from new arterial roads and roads upgraded to carry significantly more traffic;
- retrofitting noise barriers on older freeways.

Detailed Requirements and Performance Standards:

Reducing noise emissions at source:

VicRoads will seek to reduce noise emitted by vehicles and road surfaces by:

- supporting more stringent noise standards in Australian Design Rules for motor vehicles;
- using quieter pavement surfaces, where practicable on freeways and major arterial roads through residential areas;
- promoting and supporting measures that reduce engine brake noise.

Encouraging compatible land use:

VicRoads will encourage compatible land use next to major roads by:

- working with Planning Authorities to ensure that wherever possible, permitted land use beside busy roads is relatively insensitive to noise;
- encouraging the development of building regulations which will take into account both the noise level outside and the type of activity proposed inside the building.

Limiting noise next to new or improved roads:

Where arterial roads and freeways are built on new alignments, or where existing arterial roads or freeways are widened by two or more lanes and buildings previously protected from traffic noise are exposed by removal of buildings required for widening, the traffic noise level will be limited to the objectives set out below or the level that would have prevailed if the road improvements had not occurred, whichever is the greater.

- **Category A**: - For residential dwellings, aged persons homes, hospitals, motels, caravan parks and other buildings of a residential nature, the noise level objective will be **63 dB(A) L_{10} (18hr)** measured between 6 am and midnight,

- **Category B**: - For schools, kindergartens libraries and other noise-sensitive community buildings the noise level objective will be **63 dB(A)L_{10} (12hr)** measured between 6 am and 6 pm,

- Where the noise level adjacent to **Category A or B** buildings prior to road improvements is less than **50 dB(A)L_{10} (18hr)**, consideration will be given to limiting the noise level increase to **12 dB(A).**

VicRoads will endeavour to comply with these noise level objectives using the most cost effective technology. The approach taken to controlling noise will include but not be limited to:

- the “whole of life” attenuation performance and the practicability of the measures,
- a combination of noise barriers and other measures such as open graded asphalt, barriers on bridge parapets and crash barriers, etc.,
- off-reservation attenuation measures to be undertaken, subject to practicability testing, and agreement with key stakeholders.

In addition, VicRoads will:

- consult with Councils and affected local communities on the need for and type of protection (if necessary) for small areas of passive open space;
- implement appropriate traffic management measures, if necessary, to ensure that night time noise levels are not excessively high.

Noise abatement program - Retrofitting

The principle of this part of the Policy is that all eligible projects under the policy are to be included within the noise retrofitting program and acceptable treatment methods are to ensure that the most cost effective approach over the life cycle of the project is considered.

The following key elements to the Noise Abatement Program – Retrofitting apply:

- VicRoads will continue to retrofit barriers to freeways and arterial roads that have previously been eligible for noise attenuation works,
- The retrofitting program will apply through out Victoria,
- The trigger for considering retrofitting will be when the traffic noise levels exceed **68 dB(A)L10 (18hr)**,
- A target noise level of less than **68 dB(A)L10 (18hr)** should be maintained after the attenuation works,
- When determining what measures can be employed to achieve the retrofitting target noise objective, consideration should be given to the “whole of life” attenuation performance and the practicability of the measures,
- The noise reduction may be achieved by a combination of noise barriers and other measures such as open graded asphalt, barriers on bridge parapets and crash barriers, etc.,
- Off-reservation attenuation measures may be undertaken, subject to practicability testing, and agreement with key stakeholders,
- Noise retrofitting works will be undertaken as funds permit, and will only apply to **Category A and B** buildings.

Exceptions to this Policy

There are a limited number of situations where expenditure of public monies on noise attenuation is not considered to be justified. Accordingly, VicRoads will not take action to protect existing or future development in the following circumstances:

- **Category A** or **Category B** buildings, as defined above, where such land use is defined as a non-conforming use in the relevant planning scheme.

- new buildings or subdivisions abutting any existing road under the control of VicRoads.

- new buildings or subdivisions abutting any road zone shown on any planning scheme for a new road or a road widening.

- buildings or subdivisions abutting any proposed road zone where the planning approval for the subdivision, was obtained after the commencement of the exhibition period to set aside land for a future road in the relevant planning scheme.

Definitions of terms used to describe traffic noise

Due to its nature traffic noise varies from instant to instant. Statistical terms have evolved to describe its level using a single number value.

dB: This is the abbreviation used for decibel which is the measure of sound pressure level.

dB(A): The (A) denotes that the sound pressure level has been "A" weighted so that the scale approximates the response of the human ear. The ear is less sensitive to high and low frequency sounds than it is to sounds in the midrange. Most community noise is measured in "A" weighted decibels.

L_{10}dB(A): This is the noise level in dB(A) exceeded for 10% of a specified time period. For a one hour period the level would be exceeded for 6 minutes but would be less for the remaining 54 minutes.

L_{10} (18hr)dB(A): This is the standard traffic noise descriptor used in Australia. It is the arithmetic average of the hourly L_{10} levels between 6 am and 12 midnight.

Appendix C: Proposed Calder Park Drive/Calder Freeway Interchange

WARNING

BEWARE OF UNDERGROUND SERVICES

THE LOCATIONS OF UNDERGROUND SERVICES ARE APPROXIMATE ONLY AND THEIR EXACT POSITION SHOULD BE PROVEN ON SITE. NO GUARANTEE IS GIVEN THAT ALL EXISTING SERVICES ARE SHOWN.

TRUNCATE

MELBOURNE - BENDIGO RAILWAY

PROPOSED RETAINING WALL

MAINTENANCE ACCESS AND TURN AROUND AREA

CALDER PARK DRIVE

DESIGN LINE (MC10)

500.3 R

TO SYDENHAM

FOR CONTINUATION REFER SHEET 0038

FOR CONTINUATION REFER SHEET 0040

PROPOSED RETAINING WALL

TO MELBOURNE

MAINTENANCE ACCESS

VICTORIA ROAD

NOTTINGHAM WAY

25.4m WIDE ACCESS ROAD UNDERPASS

CT 15107.967

14840 14860 14880 14900 14920 14940 14960 14980 15000 15020 15040 15060 15080 15100 15120 15140 15160 15180

N 5827000 N 5827100 N 5827200 N 5826900 N 5826800 N 5827000 N 5827100 N 5827200

E 302200 E 302300 E 302400 E 302500

1.0 3.5 3.5 3.5 6.0 3.5 3.5 3.5 4.0 1.0 2.5 3.5 3.0 4.0 3.0 4.0 3.0 3.5 3.5 3.5 3.5 3.0 2.1 2.1 3.0 2.1

LEGEND

- WALKING TRACK
- ROW BOUNDARY
- LAND ACQUISITION AREA

PRELIMINARY ISSUE

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E	01/07/14	CL			PRELIMINARY ISSUE
D	24/09/13	CB			PRELIMINARY ISSUE
C	16/05/13	CL			PRELIMINARY ISSUE
B	08/05/13	CL			PRELIMINARY ISSUE
A	01/03/13	CL			PRELIMINARY ISSUE

DRAWING NUMBER	REFERENCE DRAWING TITLE

vicroads

VICROADS CONTRACT No. | ROAD No.

VICROADS DRAWING No. | CERTIFICATE OF COMPLIANCE | COMPANY | DATE

SKM
A.C.N 001 024 095
Sinclair Knight Merz Pty. Ltd
452 Flinders Street
Melbourne
VIC 3000 AUSTRALIA
Tel: +61 3 8668 3000
Fax: +61 3 8668 3001
Web: www.skmconsulting.com

CLIENT: VICROADS

PROJECT: VICROADS PALMERS ROAD CORRIDOR CONCEPT DESIGN

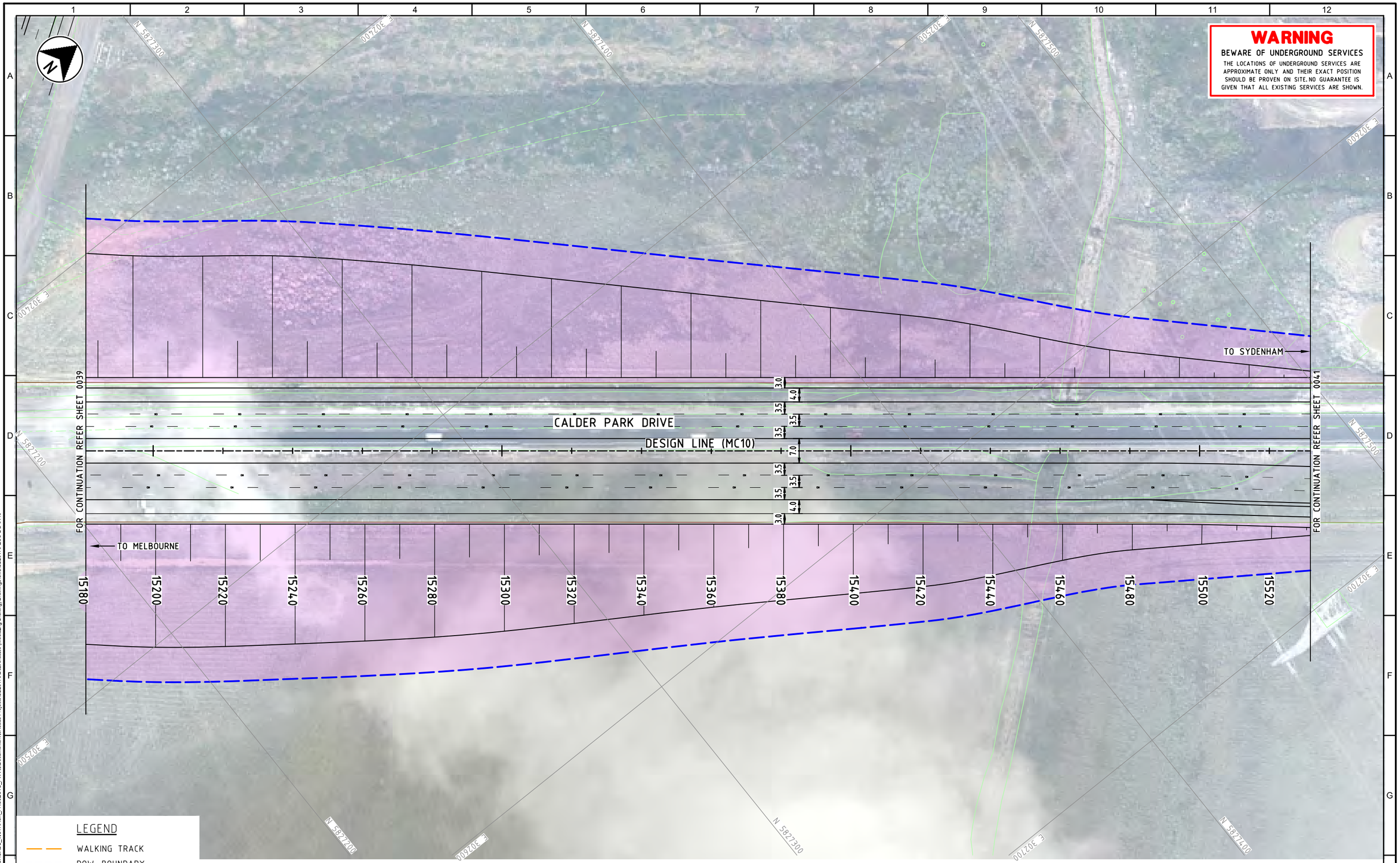
DRAWN	DRAWING CHECK	REVIEWED	APPROVED
CLane			
DESIGNED	DESIGN REVIEW	DATE	DATE

TITLE: PALMERS ROAD CORRIDOR ALIGNMENT PLAN SHEET 39

SCALE: 1:1000 | DRAWING No: SB20176-ECC-DG-0139 | REV: F

A3

DATE: 08-Jul-2014 01:05PM LOGIN NAME: cbond
LOCATION: pw:\\AU-GLB-PW02.skmconsulting.com:VICROADS_VICTRACK_PROJECTS_PWW\Documents\VicRoads Projects\SB20176\Deliverables (Modelling Drafting)\Drawings\Civil\SB20176-ECC-DG-0139



PRELIMINARY ISSUE

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REV	DATE	DRAWN	REV'D	APP'D	REVISION
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D	01/07/14	CL			PRELIMINARY ISSUE
C	16/05/13	CL			PRELIMINARY ISSUE
B	08/05/13	CL			PRELIMINARY ISSUE
A	01/03/13	CL			PRELIMINARY ISSUE

DRAWING NUMBER	REFERENCE DRAWING TITLE

vicroads

VICROADS CONTRACT No. | ROAD No.

VICROADS DRAWING No. | CERTIFICATE OF COMPLIANCE | COMPANY | DATE

SKM
A.C.N 001 024 095
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CLIENT: VICROADS

PROJECT: VICROADS
PALMERS ROAD CORRIDOR CONCEPT DESIGN

DRAWN	DRAWING CHECK	REVIEWED	APPROVED
CLane			
DESIGNED	DESIGN REVIEW	DATE	DATE

TITLE
PALMERS ROAD CORRIDOR
ALIGNMENT PLAN
SHEET 40

SCALE	DRAWING No	REV
1:1000	SB20176-ECC-DG-0140	E

A3

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WARNING

BEWARE OF UNDERGROUND SERVICES

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ACCESS TO CALDER PARK CAR PARK

CALDER PARK DRIVE
DESIGN LINE (MC10)

TO SYDENHAM

TO MELBOURNE

FOR CONTINUATION REFER SHEET 0040

FOR CONTINUATION REFER SHEET 0042

FUTURE DEVELOPMENT ACCESS
(TO BE DETAILED BY DEVELOPERS)

15540 15560 15580 15600 15620 15640 15660 15680 15700 15720 15740 15760 15780 15800 15820 15840 15860 15880

N 5827600 N 5827700 N 5827800 N 5827500

E 302600 E 302700 E 302800 E 302900

LEGEND

- WALKING TRACK
- ROW BOUNDARY
- LAND ACQUISITION AREA

PRELIMINARY ISSUE

1:1000 0 10 20 30 40 50 m

REV	DATE	DRAWN	REV'D	APP'D	REVISION
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E	02/07/14	CB			ADJUSTMENTS TO EASTERN FILL BATTER
D	01/07/14	CL			PRELIMINARY ISSUE
C	16/05/13	CL			PRELIMINARY ISSUE
B	08/05/13	CL			PRELIMINARY ISSUE
A	26/03/13	CL			PRELIMINARY ISSUE

DRAWING NUMBER	REFERENCE DRAWING TITLE

vicroads

VICROADS CONTRACT No. | ROAD No.

VICROADS DRAWING No. | CERTIFICATE OF COMPLIANCE | COMPANY | DATE

SKM
A.C.N 001 024 095
Sinclair Knight Merz Pty. Ltd
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Fax: +61 3 8668 3001
Web: www.skmconsulting.com

CLIENT VICROADS

PROJECT VICROADS
PALMERS ROAD CORRIDOR CONCEPT DESIGN

DRAWN	DRAWING CHECK	REVIEWED	APPROVED
CLane			
DESIGNED	DESIGN REVIEW	DATE	DATE

TITLE
PALMERS ROAD CORRIDOR
ALIGNMENT PLAN
SHEET 41

SCALE 1:1000 | DRAWING No SB20176-ECC-DG-0141 | REV F

DATE: 09-Jul-2014 05:01AM LOGIN NAME: CBond
LOCATION: pw:\\AU-GLB-PW02.skmconsulting.com:\VICROADS_VICTRACK_PROJECTS_PWV\Documents\VicRoads Projects\SB20176\Drawings (Modelling Drafting)\Drawings\Civil\SB20176-ECC-DG-0141

WARNING

BEWARE OF UNDERGROUND SERVICES

THE LOCATIONS OF UNDERGROUND SERVICES ARE APPROXIMATE ONLY AND THEIR EXACT POSITION SHOULD BE PROVEN ON SITE. NO GUARANTEE IS GIVEN THAT ALL EXISTING SERVICES ARE SHOWN.

FOR CONTINUATION REFER SHEET 0044

TO BENDIGO

NORTHBOUND ENTRY RAMP (MC60)

NORTHBOUND ENTRY RAMP (MC80)

CALDER FREEWAY

DESIGN LINE (MC10)

1250 R

300.0 R

118.0 R

FOR CONTINUATION REFER SHEET 0041

FOR CONTINUATION REFER SHEET 0043

TO MELBOURNE

CALDER PARK DRIVE

NORTHBOUND EXIT RAMP (MC50)

FOR CONTINUATION REFER SHEET 0045

TC 15941.419

CT 16082.392

15880 15900 15920 15940 15960 15980 16000 16020 16040 16060 16080 16100 16120 16140 16160 16180 16200 16220 16240

E 302800 E 302900 E 303000 E 303100 E 303200

N 5827800 N 5827900 N 5828000 N 5827700 N 5827600

LEGEND

- WALKING TRACK
- ROW BOUNDARY
- LAND ACQUISITION AREA

PRELIMINARY ISSUE

1:1000 0 10 20 30 40 50 m

REV	DATE	DRAWN	REV'D	APP'D	REVISION
F	10/07/14	CB			WESTERN ROUNDABOUT REPLACED WITH SIGNALISED OPTION
E	29/05/14	CB			PRELIMINARY ISSUE
D	08/05/14	CB			PRELIMINARY ISSUE
C	16/05/13	CL			PRELIMINARY ISSUE
B	08/05/13	CL			PRELIMINARY ISSUE
A	26/03/13	CL			PRELIMINARY ISSUE

DRAWING NUMBER	REFERENCE DRAWING TITLE

vicroads

VICROADS CONTRACT No. | ROAD No.

VICROADS DRAWING No. | CERTIFICATE OF COMPLIANCE | COMPANY | DATE

SKM
A.C.N. 001 024 095
Sinclair Knight Merz Pty. Ltd
452 Flinders Street
Melbourne
VIC 3000 AUSTRALIA
Tel: +61 3 8668 3000
Fax: +61 3 8668 3001
Web: www.skmconsulting.com

CLIENT: VICROADS

PROJECT: VICROADS
PALMERS ROAD CORRIDOR CONCEPT DESIGN

DRAWN	DRAWING CHECK	REVIEWED	APPROVED
CLane			
DESIGNED	DESIGN REVIEW	DATE	DATE

TITLE:
PALMERS ROAD CORRIDOR
ALIGNMENT PLAN
SHEET 42

SCALE	DRAWING No.	REV.
1:1000	SB20176-ECC-DG-0142	F

A3

DATE: 10-Jul-2014 07:56AM LOGIN NAME: cbond
LOCATION: pw:\\AU-GLB-PWIN2.skmconsulting.com:\VICROADS_VICTRACK_PROJECTS_PWW\Documents\VicRoads Projects\SB20176\Deliverables (Modelling Drafting)\Drawings\Civil\SB20176-ECC-DG-0142

WARNING

BEWARE OF UNDERGROUND SERVICES

THE LOCATIONS OF UNDERGROUND SERVICES ARE APPROXIMATE ONLY AND THEIR EXACT POSITION SHOULD BE PROVEN ON SITE. NO GUARANTEE IS GIVEN THAT ALL EXISTING SERVICES ARE SHOWN.

BATTERS LOCALLY STEEPENED TO 2:1 MAX

ORGAN PIPES ROAD CONNECTION (MCL0)

FOR CONTINUATION REFER SHEET 0044

TO BENDIGO

FOR CONTINUATION REFER SHEET 0042

TO MELBOURNE

240 R

DESIGN LINE (MC10)

TC 16268.894

16300 16320 16340 16360 16380 CT 16400.488 16420 POE16439.903

16260 16280 16240

CALDER FREEWAY

SOUTHBOUND EXIT RAMP (MC30)

SOUTHBOUND ENTRY RAMP (MC40)

TO MELBOURNE

FOR CONTINUATION REFER SHEET 0045

E 303100 E 303200 E 303300 E 303400

N 5828100 N 5828200 N 5828000

LEGEND

- WALKING TRACK
- ROW BOUNDARY
- LAND ACQUISITION AREA

1:1000 0 10 20 30 40 50 m

REV	DATE	DRAWN	REVD	APP'D	REVISION
E	02/07/14	CB			ADJUSTMENTS TO ROW BOUNDARY AND STEEPENED FILL BATTERS
D	01/07/14	CB			PRELIMINARY ISSUE
C	16/05/13	CL			PRELIMINARY ISSUE
B	08/05/13	CL			PRELIMINARY ISSUE
A	26/03/13	CL			PRELIMINARY ISSUE

DRAWING NUMBER	REFERENCE DRAWING TITLE

vicroads

VICROADS CONTRACT No. | ROAD No.

VICROADS DRAWING No. | CERTIFICATE OF COMPLIANCE | COMPANY | DATE

SKM

A.C.N 001 024 095
Sinclair Knight Merz Pty. Ltd
452 Flinders Street
Melbourne
VIC 3000 AUSTRALIA

Tel: +61 3 8668 3000
Fax: +61 3 8668 3001
Web: www.skmconsulting.com

CLIENT VICROADS

PROJECT VICROADS
PALMERS ROAD CORRIDOR CONCEPT DESIGN

DRAWN	DRAWING CHECK	REVIEWED	APPROVED
CLane			
DESIGNED	DESIGN REVIEW	DATE	DATE

TITLE
PALMERS ROAD CORRIDOR
ALIGNMENT PLAN
SHEET 43

SCALE	DRAWING No.	REV
1:1000	SB20176-ECC-DG-0143	E

A3

DATE: 02-Jul-2014 12:04PM LOGIN NAME: cbond
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Appendix D: VicRoads Guidelines Traffic Noise Measurement Requirements

Traffic Noise Measurement Requirements

For

Acoustic Consultants

keeping victorians connected

September 2011

Acknowledgements

These guidelines were prepared by VicRoads Environmental Sustainability.

VicRoads would like to acknowledge the assistance of all who provided comments on these guidelines.

1 INTRODUCTION

To ensure that all measurements are of high quality and are consistent over time, the following requirements have been developed and shall be observed by acoustic consultants whether engaged directly by VicRoads, or some other party engaged by VicRoads.

2 INSTRUMENTATION

Sound level meters, tape recorders and data loggers shall comply with paras 5.1.2 to 5.1.5 of *AS 2702 - 1984: Acoustics- Methods for the Measurement of Road Traffic Noise*.

Field checks of instruments shall be carried out with a piston phone, portable calibrator or other portable checking device prior to and on completion of the measurements. Full system calibration shall be carried out at intervals of not more than two years.

3 CERTIFICATION

A person holding a degree or diploma in electrical or mechanical engineering, a degree or diploma in science with a major in physics or such other qualifications and experience as approved by the Superintendent, shall be responsible for:

- overseeing the calibration of the instruments.
- supervising the instrument operator.
- certifying that the results presented are a true record and all relevant paragraphs of these guidelines have been complied with.

Instrument operators shall be adequately trained and then supervised by the person responsible for certification.

4 MICROPHONE POSITION

The microphone shall be substantially unobstructed (approx 135^{o}) and shall be located externally, one metre from the centre of the most exposed window of a habitable room on the lowest habitable level of the building under consideration. Where the prescribed position is inaccessible for some reason, a site which is considered to be equivalent shall be used, but subject to approval by the Superintendent. A note of this shall be included in the final report.

Where free-field measurements are to be taken, the microphone shall be located approximately 1.2 metres above ground level. The desirable area free of vertical reflecting surfaces shall be a circle of 5.0 metres radius centred on the microphone.

5 MEASURING LOCATIONS

All locations where noise is to be measured are subject to the approval of the superintendent. At the construction and post-construction phases of a project, these locations will generally be where noise levels have previously been measured or calculated. Direct comparisons can then be made of the acoustic environment in the before and after situation. However, the superintendent, may approve alternate or additional locations.

It is essential that a clear photographic record of each microphone position, with respect to the exposed facade, will be presented in the report. A map of the measurement location with respect to the noise source, (eg a Melways Map) will be included in the report. The latitude and longitude of the microphone position is also required, in decimal format using the WGS84 datum. These can be determined by GPS or by locating the site with Google Earth.

6 MEASURING PERIODS

Noise measurements must be conducted on weekdays other than public holidays, school holidays, and the last day of any school term. This requirement is to ensure that typical workday traffic patterns are observed.

At least three days' valid measurements are required where the purpose of the test is the determination of pre-existing noise levels prior to the commencement of a project, or acceptance testing after the completion of a project.

It is strongly recommended that noise measurement is carried out for at least five days. This will increase the likelihood of achieving three days' valid data after any measurements affected by adverse weather conditions or other reasons are discarded.

7 WEATHER CONDITIONS

The ideal weather conditions for measuring traffic noise is fine with little or no wind. However, these conditions are not always available and so the instrument operator shall ensure that environmental conditions that may significantly affect the noise levels are controlled within appropriate limits.

The Consultant must report the weather conditions through out the measurement period. As a minimum, the morning and afternoon wind speed and direction as well as rain events must be reported. The location of the weather station must also be reported.

Wind: The effect of wind noise on the microphone shall be at least 10dB(A) below the received noise levels. To ensure the above condition applies, appropriate windshields shall be fitted to the microphone for the duration of the measurement period.

The wind speed at the microphone in any direction shall not exceed 3 m/s for any significant period/s during the conduct of the measurements.

Rain: Occasional light showers during the measuring periods are acceptable. However, when there are periods of heavy rain or continuous light rain measuring shall be abandoned.

Note: It may be requested that wind speed and direction be checked with a hand held anemometer at the beginning and end of each measurement period. However the Consultant should be aware of the weather patterns in the intervening periods and be prepared to report those conditions if requested to do so.

8 INFORMATION TO BE RECORDED

The hourly L_{10} dB(A) and Leq dB(A) levels over the continuous measurement period

VicRoads may request that the Consultant measure hourly L_{max} dB(A) and L_{90} dB(A) for specific projects.

9 INFORMATION TO BE PRESENTED

(a) Hourly L_{10} and Leq levels in dB(A)
(b) Hourly L_{max} dB(A) and L90 dB(A) when requested
(c) The $L_{10\ (18hr)}$, (arithmetic average) 6.00 am to midnight in dB(A), for a single day,
(d) The $L_{eq\ (15hr)}$, (logarithmic average) 7.00 am to 10.00 pm in dB(A), for a single day,
(e) The $L_{eq\ (16hr)}$, (logarithmic average) 6.00 am to 10.00 pm in dB(A), for a single day,
(f) The $L_{eq\ (9hr)}$, 10.00 pm to 7.00 am in dB(A) for a continuous period.
(g) The $L_{eq\ (8hr)}$, 10.00 pm to 6.00 am in dB(A) for a continuous period.
(h) The latitude and longitude of the microphone position to six decimal places.

Items (a) to (h) are to be provided in a Microsoft Excel format. A template for the presentation of this data is available from VicRoads.

10 ADJUSTED AND REJECTED MEASUREMENTS

Where noise levels change as a result of an extraneous uncontrolled source, then measurements for the whole day shall be rejected if the extraneous noise lasts for more than 3 hours.

Where the extraneous source lasts for 3 hours or less, then the affected hourly measurements are to be rejected and derived descriptors presented. These shall be referred to, for example as $L_{10\ (18hr)}$ adj or $L_{eq\ (15hr)}$ adj. Reasons for rejection of any measurements shall be given.

11 REVISION NOTES

Date	Revision
23/11/2005	Guidelines issued
3/12/2009	Allowance for wind speed up to 10 m/s deleted
14/12/2010	Latitude, Longitude, and summary sheet requirement added
26/9/2011	Measurement periods updated, prohibition of weekend measurement removed, treatment of adjusted and rejected measurements changed.

Appendix E: Traffic Noise Measurements, 2013

Noise Monitoring Location Summary Page

Site: 38 Kanmore Crescent, Hillside
Measurement Period: Saturday 22/6 to Saturday 29/6/2013
Microphone Position: East side of property
Prevailing Ambient Noise Source: Calder Park Drive

Date	22-Jun	23-Jun	24-Jun	25-Jun	26-Jun	27-Jun	28-Jun
Measured $L_{10,18hr}$ dB(A)		59	60	60	61	61	61
Weather		OK	OK	Adv	Adv	OK	OK
Average $LA_{10,18hr}$ dB(A)	60						

Site Location

(Imagery: Google Earth Pro sourced 2/7/2013)

Photographs of Logger Location

Logger Location at Residence

View in Direction of Road from Logger Location

Hourly Measurement Results

Location:	38 Kanmore Crescent, Hillside	**Microphone Location:**	East side of property	**Calibration Start:**	94 dB(A)
Measurement Period:	Saturday 22/6 to Saturday 29/6/2013	**Instrument:**	ARL315 Serial 414	**Calibration End:**	94 dB(A)

Start Time	Sound Pressure Level, dB(A)																											
	22/06/2013				23/06/2013				24/06/2013				25/06/2013				26/06/2013				27/06/2013				28/06/2013			
	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}
0:00					61	45	57	75	55	39	51	73	55	43	52	78	57	40	53	70	57	41	54	81	58	41	54	70
1:00					59	43	54	72	50	37	48	72	53	40	51	79	55	38	50	69	56	41	52	70	57	38	54	78
2:00					57	42	54	77	47	35	45	68	48	38	47	75	50	38	48	76	50	37	49	69	52	35	50	77
3:00					55	40	51	70	46	33	45	69	46	37	49	80	48	38	48	69	47	35	46	63	48	35	48	76
4:00					53	37	50	72	48	34	46	63	47	36	46	64	47	39	48	70	53	35	49	73	49	36	47	68
5:00					51	40	51	77	53	38	49	67	51	37	48	73	53	42	51	75	56	42	53	78	55	40	52	76
6:00					52	42	49	65	60	42	56	75	59	45	55	77	61	50	58	77	60	47	56	72	62	46	59	88
7:00					58	43	54	76	60	47	56	72	60	48	57	71	63	53	60	85	62	50	59	81	62	51	59	84
8:00					59	46	57	81	61	47	59	81	62	50	59	75	64	55	62	83	64	54	62	80	64	54	62	78
9:00					60	49	57	84	61	48	58	75	62	49	59	77	63	53	60	76	63	52	60	80	64	53	61	80
10:00					60	49	57	76	59	43	56	77	60	48	57	73	59	42	55	69	61	49	58	75	59	47	56	74
11:00					60	44	57	79	59	40	55	72	59	45	56	83	58	37	57	84	60	42	56	75	59	43	55	76
12:00					60	45	57	75	59	43	56	79	59	44	56	75	59	41	55	79	59	42	55	77	58	41	54	70
13:00					60	44	58	81	61	47	58	84	59	43	56	84	58	44	54	70	59	43	56	78	58	42	55	76
14:00					59	45	56	76	60	47	57	74	59	41	56	74	58	41	55	81	59	43	56	73	59	46	56	74
15:00					59	46	57	77	61	50	58	72	61	46	58	78	60	48	57	80	61	48	58	74	61	48	59	86
16:00					59	46	56	71	63	53	60	84	63	53	60	78	64	53	61	82	62	52	60	76	63	53	60	76
17:00	62	51	59	76	61	50	59	80	62	52	60	77	64	54	61	82	64	55	62	77	63	54	61	81	63	55	61	77
18:00	62	53	59	74	62	51	60	86	61	52	59	75	63	57	61	76	63	56	61	75	64	57	62	87	64	56	62	80
19:00	62	52	59	78	60	50	57	75	61	52	58	79	63	53	61	88	63	51	60	78	62	51	59	78	62	52	60	81
20:00	60	49	58	84	59	47	56	78	60	51	58	86	60	48	57	76	59	45	56	74	62	48	59	75	61	50	58	76
21:00	57	46	57	88	58	45	54	78	59	50	56	73	58	46	54	70	60	45	57	79	62	47	58	77	59	47	57	83
22:00	57	42	53	70	56	42	52	73	58	49	55	73	58	44	55	76	61	46	57	82	61	47	57	78	60	45	56	75
23:00	59	41	55	74	55	40	51	74	56	45	53	73	58	39	54	73	59	45	55	73	59	44	56	75	59	44	55	72
$L_{10,18hr,\ Arith\ Av,\ 6\text{-}24h}$					59				60				60				61				61				61			
$L_{eq,15hr,\ Log\ Av,\ 7\text{-}22h}$							57				58				58				59				59			
$L_{eq,16hr,\ Log\ Av,\ 6\text{-}22h}$							57				58				58				59				59			
$L_{eq,8hr,\ Log\ Av,\ 22\text{-}6h}$							54				49				51				51				53			
$L_{eq,9hr,\ Log\ Av,\ 22\text{-}7h}$							53				51				52				53				54			
Wind @0900h, m/s	NNE 1.7				N 1.7				NW 1.7				ESE 5.3				CALM 0				NNE 3.1				CALM 0			
Wind @1500h, m/s	SSE 3.1				SE 3.1				E 1.7				SE 6.1				SE 3.6				NNW 1.7				SE 3.1			

10-Mar-2015
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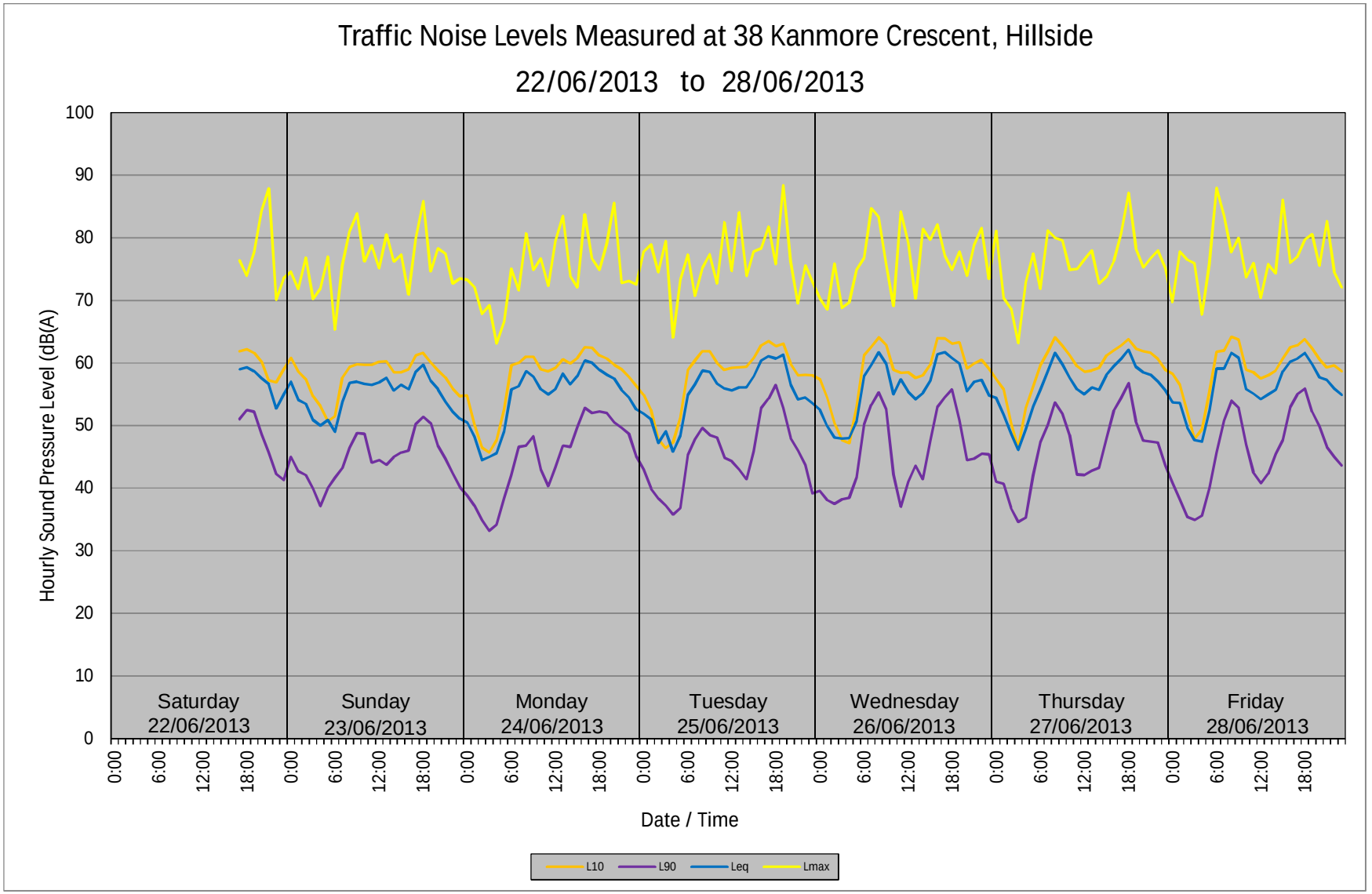


10-Mar-2015
Prepared for – VicRoads – ABN: 61 760 960 480

Noise Monitoring Location Summary Page

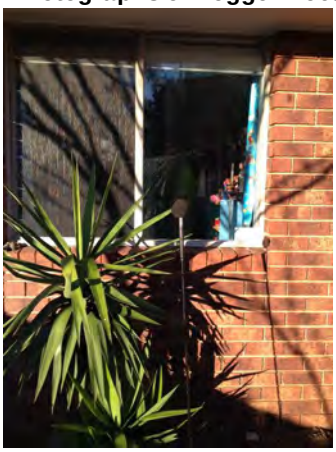
Site: 72 Dundee Way, Sydneham
Measurement Period: Saturday 22/6 to Saturday 29/6/2013
Microphone Position: East side of property
Prevailing Ambient Noise Source: Calder Park Drive

Date	22-Jun	23-Jun	24-Jun	25-Jun	26-Jun	27-Jun	28-Jun
Measured $L_{10,18hr}$ dB(A)		58	58	57	57	57	58
Weather		OK	OK	Adv	Adv	OK	OK
Average $LA_{10,18hr}$ dB(A)	57						

Site Location

(Imagery: Google Earth Pro sourced 2/7/2013)

Photographs of Logger Location



Logger Location at Residence

View in Direction of Road from Logger Location

Hourly Measurement Results

Location:	72 Dundee Way, Sydneham	**Microphone Location:**	East side of property	**Calibration Start:**	94 dB(A)
Measurement Period:	Saturday 22/6 to Saturday 29/6/2013	**Instrument:**	ARL315 Serial	**Calibration End:**	94 dB(A)

Start Time	Sound Pressure Level, dB(A)																											
	22/06/2013				23/06/2013				24/06/2013				25/06/2013				26/06/2013				27/06/2013				28/06/2013			
	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}
0:00					57	48	54	75	56	43	52	65	56	41	52	67	56	44	61	96	55	45	55	88	57	47	54	75
1:00					57	49	54	71	55	40	51	68	53	37	49	68	54	41	51	76	54	43	50	64	55	42	52	69
2:00					55	45	51	67	53	36	49	74	53	34	48	65	52	39	48	65	51	40	48	66	53	39	50	72
3:00					54	42	50	70	48	31	45	69	46	32	43	61	48	34	45	62	50	36	46	65	51	35	48	68
4:00					53	40	49	72	46	31	44	63	46	30	43	66	49	33	46	75	49	34	45	63	48	34	44	65
5:00					51	38	47	67	51	32	46	65	47	30	45	65	48	34	44	62	51	36	47	70	48	33	46	70
6:00					51	38	47	73	53	37	52	89	51	33	46	66	52	40	48	63	53	40	49	67	51	39	48	68
7:00					51	37	47	72	59	45	55	69	56	37	51	66	56	45	53	81	55	46	52	65	56	45	53	67
8:00					54	40	50	66	59	49	56	69	56	42	53	73	58	51	56	70	57	49	54	72	57	50	54	70
9:00					55	44	53	77	59	48	56	76	59	46	56	76	61	53	59	83	59	52	57	80	60	52	64	94
10:00					56	45	53	78	60	52	60	83	62	51	60	81	61	54	59	82	59	52	59	84	61	54	63	93
11:00					57	43	56	90	59	47	70	102	58	46	56	82	59	46	58	86	56	48	55	80	56	45	60	96
12:00					57	45	58	88	59	45	58	89	57	45	56	86	56	42	54	73	56	43	56	86	56	42	62	94
13:00					57	45	58	93	58	44	59	90	55	43	58	93	56	42	54	77	56	43	55	80	58	45	55	79
14:00					57	48	62	92	57	43	64	95	54	41	52	84	54	39	52	74	56	43	54	82	58	46	55	73
15:00					80	49	77	94	58	47	56	76	56	41	53	71	54	40	52	76	56	46	59	91	57	44	59	91
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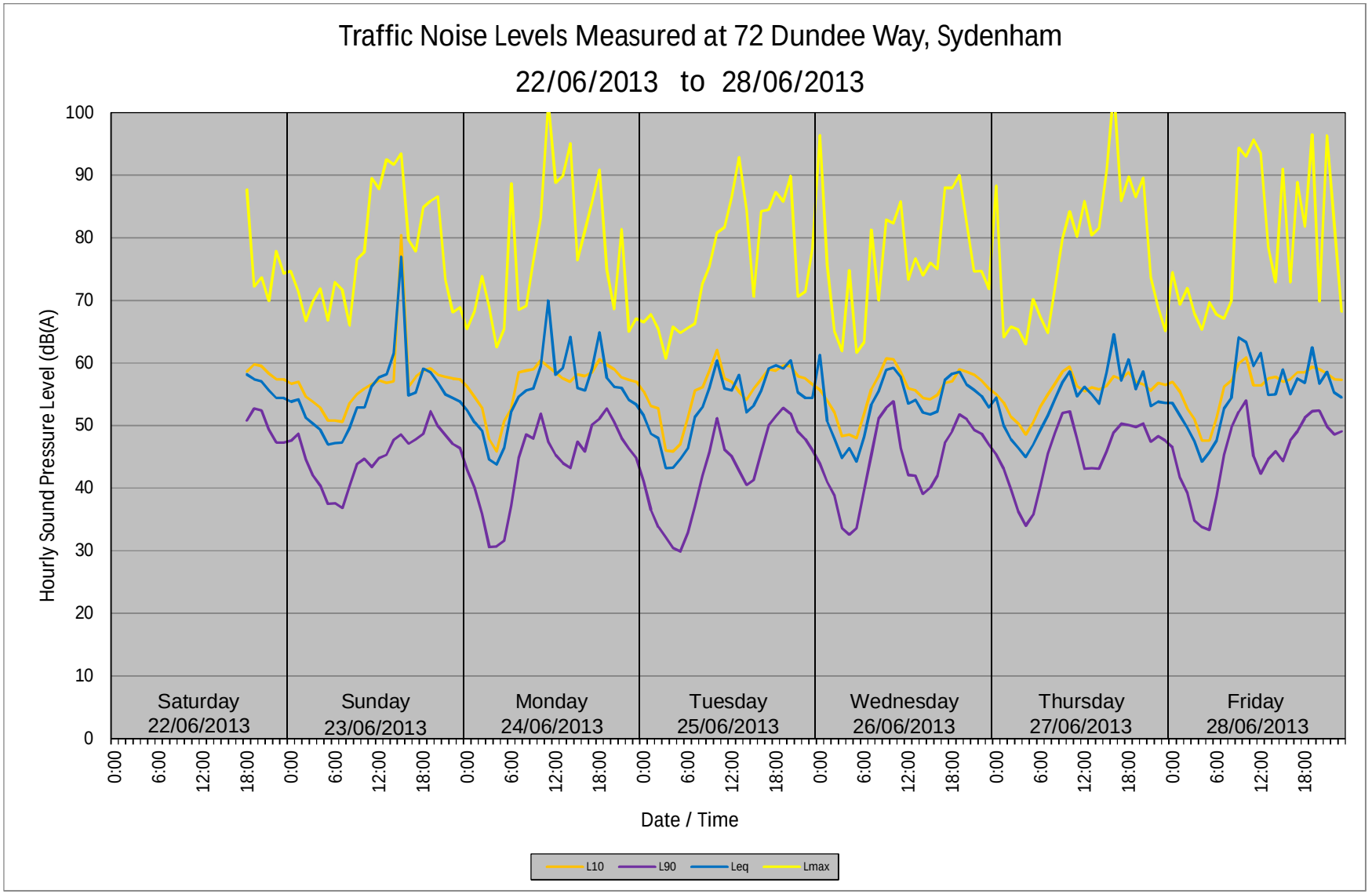
21:00	58	49	56	70	58	49	55	73	58	48	56	81	58	49	55	71	58	49	56	75	56	47	53	74	58	50	59	96
22:00	57	47	54	78	58	47	54	68	57	46	54	65	58	48	54	71	57	49	55	75	57	48	54	69	57	49	55	82
23:00	57	47	54	74	57	46	54	69	57	45	53	67	57	46	54	78	56	47	53	72	57	48	54	65	57	49	55	68
$L_{10,18hr,\ Arith\ Av,\ 6\text{-}24h}$					58				58				57				57				57				58			
$L_{eq,15hr,\ Log\ Av,\ 7\text{-}22h}$							66				62				57				56				58				59	
$L_{eq,16hr,\ Log\ Av,\ 6\text{-}22h}$							65				61				57				56				58				59	
$L_{eq,8hr,\ Log\ Av,\ 22\text{-}6h}$							53				51				50				54				51				51	
$L_{eq,9hr,\ Log\ Av,\ 22\text{-}7h}$							52				51				50				54				51				51	
Wind @0900h, m/s	NNE 1.7				N 1.7				NW 1.7				ESE 5.3				CALM 0				NNE 3.1				CALM 0			
Wind @1500h, m/s	SSE 3.1				SE 3.1				E 1.7				SE 6.1				SE 3.6				NNW 1.7				SE 3.1			

10-Mar-2015
Prepared for – VicRoads – ABN: 61 760 960 480



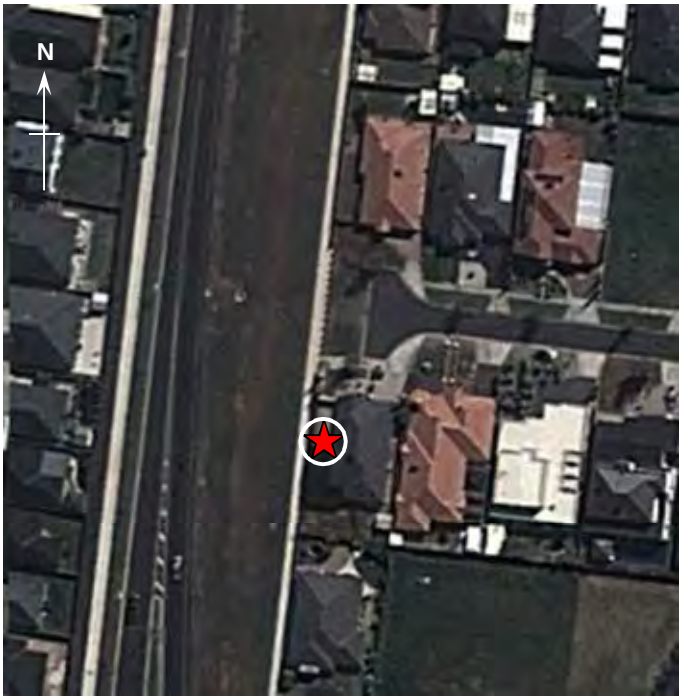
10-Mar-2015
Prepared for – VicRoads – ABN: 61 760 960 480

Noise Monitoring Location Summary Page

Site: 7 Catani Court, Burnside Heights
Measurement Period: Sunday 23/6 to Saturday 29/6/2013
Microphone Position: West side of property
Prevailing Ambient Noise Source: Westwood Drive

Date	23-Jun	24-Jun	25-Jun	26-Jun	27-Jun	28-Jun	29-Jun
Measured $L_{10,18hr}$ dB(A)		59	59	59	59	59	
Weather		OK	Adv	Adv	OK	OK	
Average $LA_{10,18hr}$ dB(A)	59						

Site Location



(Imagery: Google Earth Pro sourced 2/7/2013)

Photographs of Logger Location

Logger Location at Residence

View in Direction of Road from Logger Location

Hourly Measurement Results

Location:	7 Catani Court, Burnside Heights	**Microphone Location:**	West side of property	**Calibration Start:**	94 dB(A)
Measurement Period:	Sunday 23/6 to Saturday 29/6/2013	**Instrument:**	ARL215 Serial 641	**Calibration End:**	94 dB(A)

Start Time	Sound Pressure Level, dB(A)																											
	23/06/2013				24/06/2013				25/06/2013				26/06/2013				27/06/2013				28/06/2013				29/06/2013			
	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}
0:00					56	40	51	69	55	36	51	79	55	40	50	73	56	42	52	71	56	41	51	68	57	43	53	74
1:00					52	37	49	69	54	34	50	70	52	37	48	71	53	37	49	72	53	38	48	65	57	41	56	90
2:00					44	35	44	67	46	31	47	74	48	35	45	64	50	35	46	63	50	35	46	66	53	38	49	67
3:00					47	35	44	63	41	31	45	70	46	33	44	63	49	34	46	69	46	34	44	64	52	37	50	70
4:00					52	37	48	70	44	32	43	67	49	37	46	67	51	35	52	82	48	35	46	68	52	38	50	76
5:00					52	37	49	76	51	33	47	70	52	38	48	66	53	39	48	63	52	39	48	63	50	37	50	81
6:00					57	44	53	70	56	36	51	73	57	43	52	68	57	43	53	72	57	43	55	88	53	40	51	80
7:00					60	46	56	78	58	42	55	71	60	48	56	75	59	47	56	75	59	48	56	76	56	44	52	72
8:00					60	47	57	80	60	47	57	83	61	50	57	73	60	51	57	71	60	50	57	74	57	46	53	76
9:00					62	51	59	78	62	53	59	75	65	56	61	74	61	54	59	77	62	54	59	79	59	48	56	78
10:00					61	45	57	81	60	46	57	81	62	47	58	75	59	49	57	79	60	49	58	85				
11:00					60	45	58	88	59	43	56	79	58	44	55	83	58	48	56	80	58	44	56	76				
12:00					59	46	57	76	58	46	56	77	58	45	55	80	58	44	54	73	58	46	56	83				
13:00					59	45	57	82	58	46	55	76	59	43	55	76	59	47	56	75	57	43	55	78				
14:00	58	43	55	76	59	46	58	85	58	43	55	84	57	43	54	83	59	45	57	83	58	46	55	73				
15:00	59	46	56	78	60	48	57	77	59	44	56	75	58	44	55	77	59	50	56	73	59	47	56	76				
16:00	59	46	56	82	60	51	58	78	60	50	57	76	60	50	57	81	60	53	57	73	59	48	56	74				
17:00	59	46	57	82	61	51	59	81	60	51	58	79	60	51	57	78	61	52	58	82	60	49	57	79				
18:00	59	48	56	80	61	52	59	83	60	52	58	77	60	52	57	74	61	53	58	73	60	51	57	80				
19:00	58	46	55	83	60	50	57	77	61	51	58	74	60	51	57	74	60	52	58	77	60	51	57	72				
20:00	58	44	54	73	59	45	55	72	59	48	56	74	59	48	57	84	59	49	57	85	60	48	57	80				
21:00	58	45	54	76	58	43	55	83	59	47	56	75	58	48	56	91	60	48	57	79	59	48	56	75				
22:00	58	44	54	70	58	42	54	77	58	45	57	87	58	47	59	92	58	47	56	89	58	47	56	87				
23:00	57	43	53	72	56	39	52	73	57	43	54	81	58	44	54	74	57	44	54	73	58	45	54	80				
$L_{10,18hr,\ Arith\ Av,\ 6\text{-}24h}$					59				59				59				59				59							
$L_{eq,15hr,\ Log\ Av,\ 7\text{-}22h}$							57				57				57				57			56				
$L_{eq,16hr,\ Log\ Av,\ 6\text{-}22h}$							57				56				57				56			56				
$L_{eq,8hr,\ Log\ Av,\ 22\text{-}6h}$							50				50				51				53			51				
$L_{eq,9hr,\ Log\ Av,\ 22\text{-}7h}$							51				50				51				53			51				
Wind @0900h, m/s	N 1.7				NW 1.7				ESE 5.3				CALM 0				NNE 3.1				CALM 0				N 2.5			
Wind @1500h, m/s	SE 3.1				E 1.7				SE 6.1				SE 3.6				NNW 1.7				SE 3.1				N 4.7			

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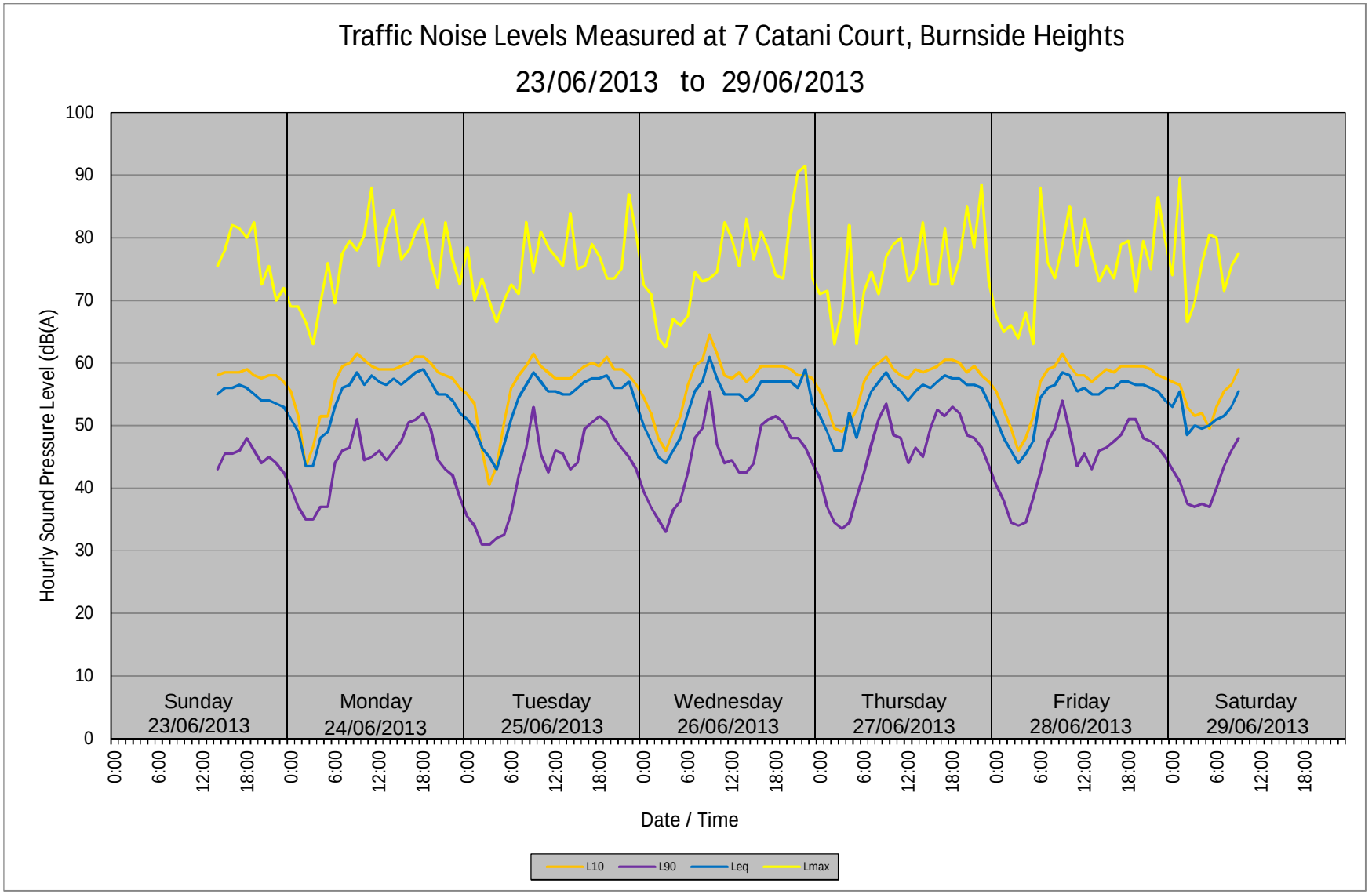

10-Mar-2015
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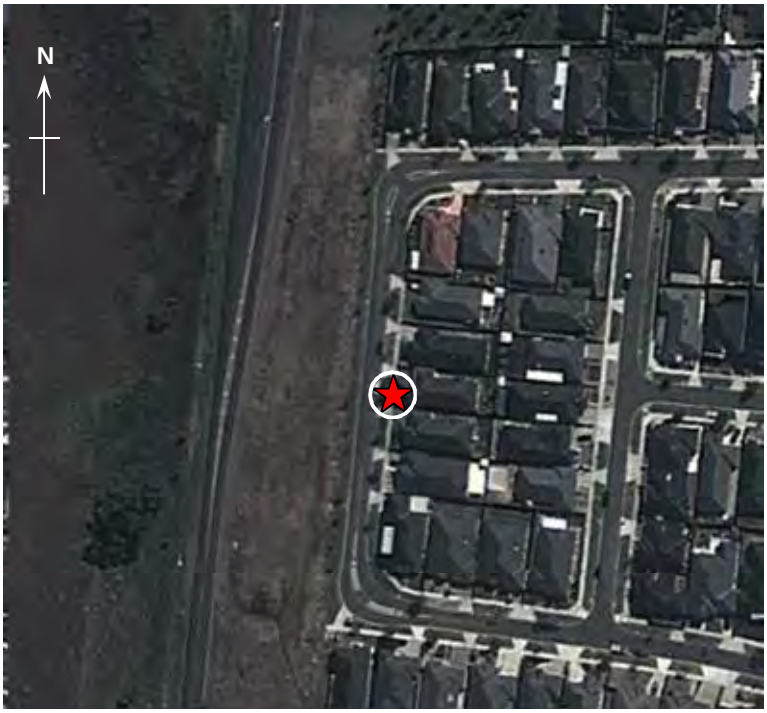
Noise Monitoring Location Summary Page

Site: 29 Grosvenor Cres, Derrimut
Measurement Period: Saturday 22/6 to Saturday 29/6/2013
Microphone Position: West side of property
Prevailing Ambient Noise Source: Robinsons Rd

Date	22-Jun	23-Jun	24-Jun	25-Jun	26-Jun	27-Jun	28-Jun
Measured $L_{10,18hr}$ dB(A)		62	66	66	67	67	67
Weather		OK	OK	Adv	Adv	OK	OK
Average $LA_{10,18hr}$ dB(A)	66						

Site Location



(Imagery: Google Earth Pro sourced 2/7/2013)

Photographs of Logger Location

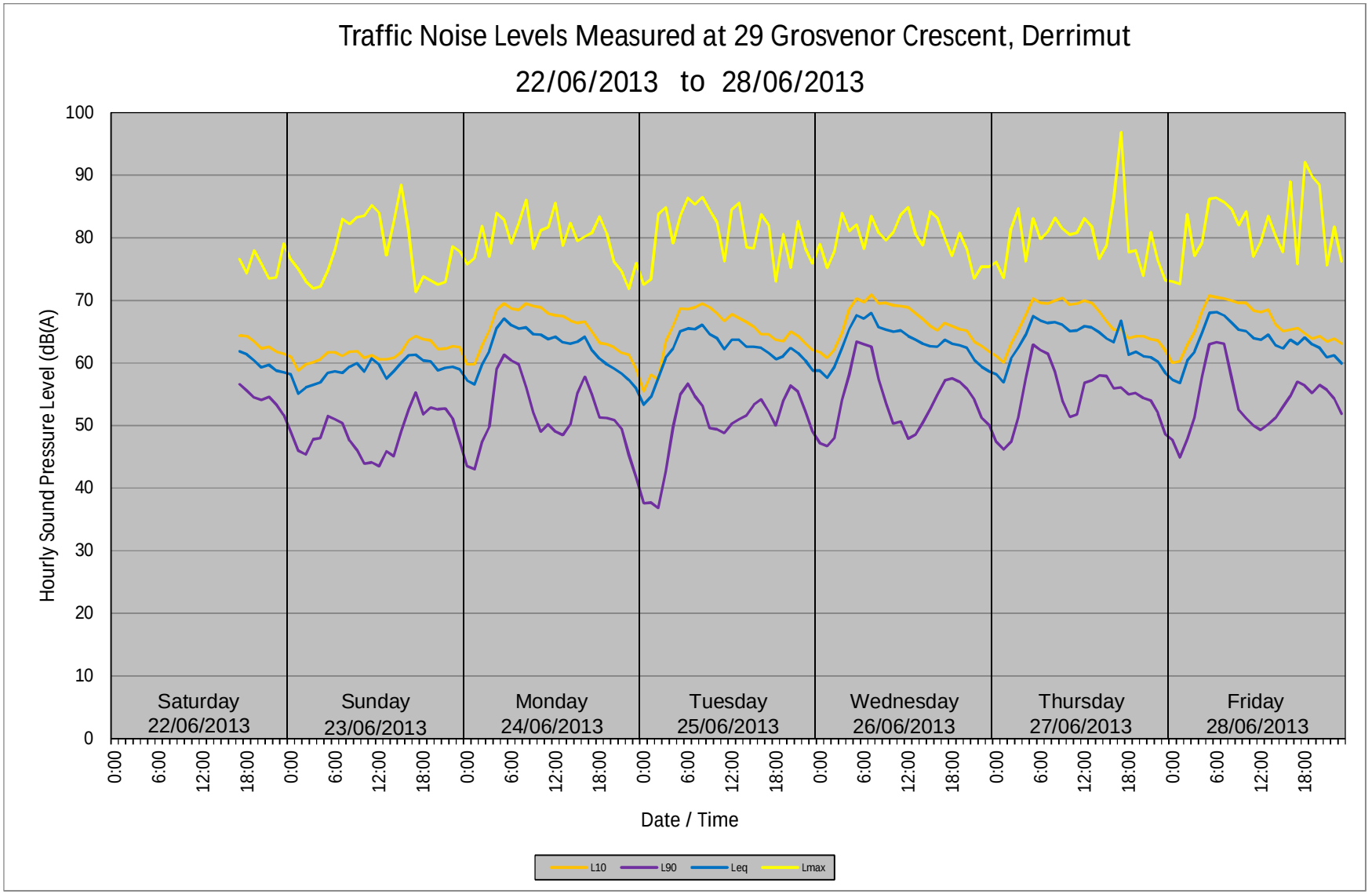
Logger Location at Residence

View in Direction of Road from Logger Location

Hourly Measurement Results

Location:	29 Grosvenor Cres, Derrimut	**Microphone Location:**	West side of property	**Calibration Start:**	94 dB(A)
Measurement Period:	Saturday 22/6 to Saturday 29/6/2013	**Instrument:**	Rion NL-21 Serial 768	**Calibration End:**	94 dB(A)

Start Time	Sound Pressure Level, dB(A)																											
	22/06/2013				23/06/2013				24/06/2013				25/06/2013				26/06/2013				27/06/2013				28/06/2013			
	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}
0:00					61	49	58	77	60	44	57	76	56	38	53	73	62	47	59	79	61	47	58	76	60	48	57	73
1:00					59	46	55	75	60	43	57	77	58	38	55	73	61	47	58	75	60	46	57	74	60	45	57	73
2:00					60	45	56	73	63	47	60	82	57	37	58	84	62	48	59	78	63	47	61	82	63	48	60	84
3:00					60	48	57	72	65	50	62	77	64	43	61	85	65	54	62	84	65	51	63	85	65	51	62	77
4:00					61	48	57	72	69	59	66	84	66	50	62	79	69	58	65	81	68	58	65	76	68	58	65	79
5:00					62	52	58	75	70	61	67	83	69	55	65	84	70	63	68	82	70	63	68	83	71	63	68	86
6:00					62	51	59	78	69	60	66	79	69	57	66	86	70	63	67	78	70	62	67	80	71	63	68	86
7:00					61	50	58	83	69	60	66	82	69	55	65	85	71	63	68	84	70	62	66	81	70	63	68	86
8:00					62	48	59	82	70	56	66	86	70	53	66	87	70	57	66	81	70	59	67	83	70	58	67	85
9:00					62	46	60	83	69	52	65	78	69	50	65	84	70	54	65	80	70	54	66	82	70	53	65	82
10:00					61	44	59	84	69	49	65	81	68	49	64	83	69	50	65	81	69	51	65	81	70	51	65	84
11:00					61	44	61	85	68	50	64	82	67	49	62	76	69	51	65	84	70	52	65	81	68	50	64	77
12:00					61	44	60	84	68	49	64	86	68	50	64	85	69	48	64	85	70	57	66	83	68	49	64	79
13:00					61	46	58	77	68	49	63	79	67	51	64	86	68	49	64	81	70	57	66	82	69	50	65	84
14:00					61	45	59	83	67	50	63	82	67	52	63	79	67	51	63	79	68	58	65	77	66	51	63	80
15:00					62	49	60	89	66	55	63	80	66	53	63	78	66	53	63	84	67	58	64	79	65	53	62	78
16:00					64	53	61	81	67	58	64	80	65	54	62	84	65	55	63	83	65	56	63	87	65	55	64	89
17:00	64	57	62	77	64	55	61	71	65	55	62	81	65	52	62	82	66	57	64	80	65	56	67	97	66	57	63	76
18:00	64	56	61	74	64	52	60	74	63	51	61	83	64	50	61	73	66	58	63	77	64	55	61	78	65	56	64	92
19:00	63	55	60	78	64	53	60	73	63	51	60	81	64	54	61	81	65	57	63	81	64	55	62	78	64	55	63	90
20:00	62	54	59	76	62	53	59	73	63	51	59	76	65	56	62	75	65	56	62	78	64	54	61	74	64	57	62	88
21:00	63	55	60	74	62	53	59	73	62	50	58	75	64	55	62	83	63	54	61	74	64	54	61	81	63	56	61	76
22:00	62	53	59	74	63	51	59	79	61	45	57	72	63	52	60	78	63	51	59	75	64	52	60	76	64	54	61	82
23:00	62	52	59	79	63	47	59	78	59	42	56	76	62	49	59	76	62	50	59	75	62	49	58	73	63	52	60	76
$L_{10,18hr,\ Arith\ Av,\ 6\text{-}24h}$					62				66				66				67				67				67			
$L_{eq,15hr,\ Log\ Av,\ 7\text{-}22h}$							60				63				63				64				65			64	
$L_{eq,16hr,\ Log\ Av,\ 6\text{-}22h}$							60				64				63				64				65			65	
$L_{eq,8hr,\ Log\ Av,\ 22\text{-}6h}$							57				62				60				63				62			63	
$L_{eq,9hr,\ Log\ Av,\ 22\text{-}7h}$							58				63				61				63				63			64	
Wind @0900h, m/s	NNE 1.7				N 1.7				NW 1.7				ESE 5.3				CALM 0				NNE 3.1				CALM 0			
Wind @1500h, m/s	SSE 3.1				SE 3.1				E 1.7				SE 6.1				SE 3.6				NNW 1.7				SE 3.1			



10-Mar-2015
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Appendix F: Traffic Noise Measurements, 2014

Noise Monitoring Location Summary Page

Site:	141 Arbour Boulevard, Caroline Springs
Measurement Period:	Tuesday 6/5 to Wednesday 14/5/2014
Microphone Position:	North west side of property
Prevailing Ambient Noise Source:	Arbour Boulevard

Date	6-May	7-May	8-May	9-May	10-May	11-May	12-May
Measured $L_{A10,18hr}$ dB(A)		49	49	51	49	49	47
Weather		Adv	Adv	Adv	Adv	Adv	OK
Date	13-May	14-May					
Measured $L_{A10,18hr}$ dB(A)	50						
Weather	OK						
Average $L_{A10,18hr}$ dB(A)	**49**						
Average Weekday $L_{A10,18hr}$ dB(A)	**49**						

Site Location

(Imagery: Google Maps sourced 15/5/2014)

Photographs of Logger Location

Logger Location at Residence

View in Direction of Road from Logger Location

Hourly Measurement Results

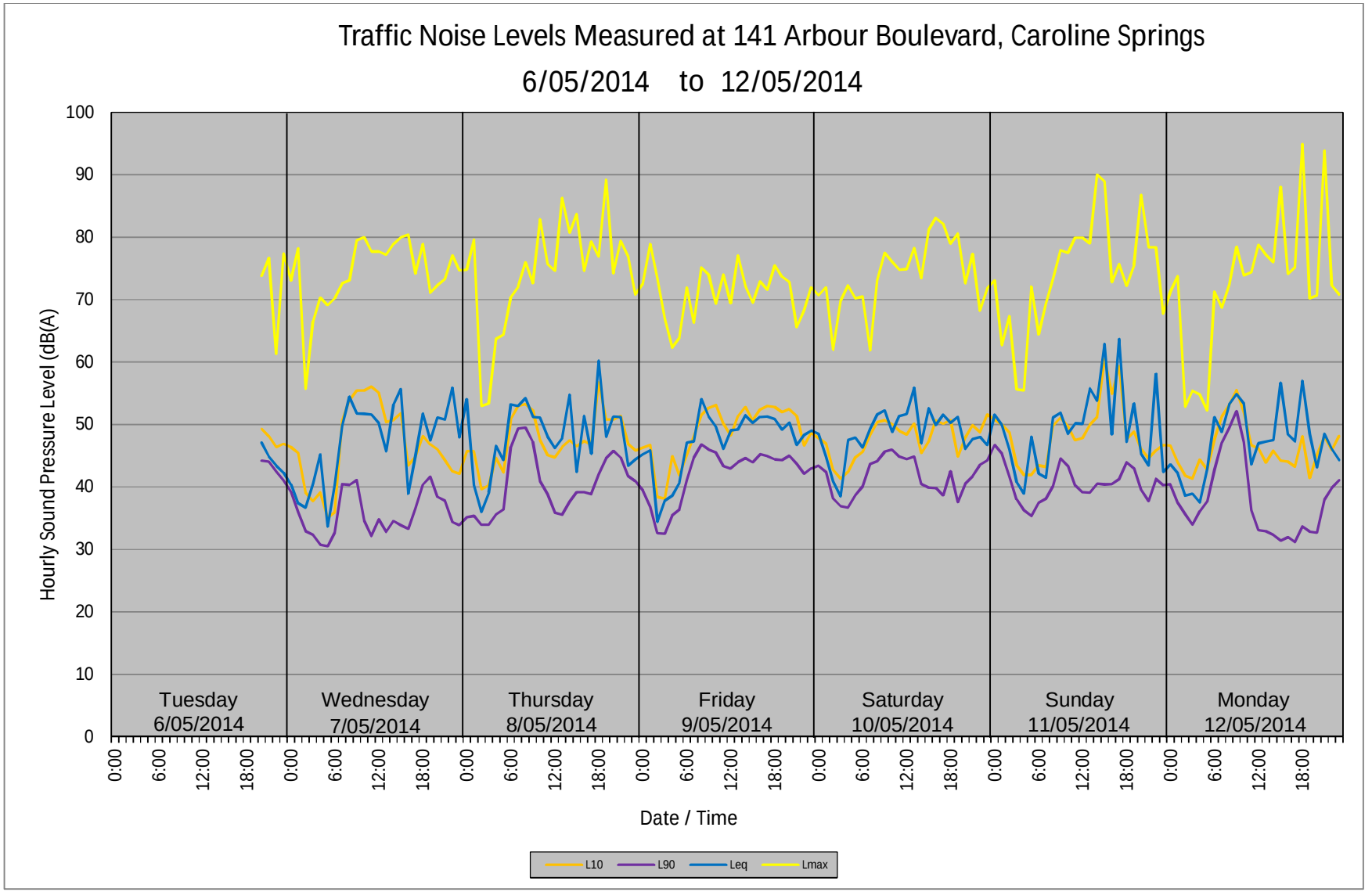
Location:	141 Arbour Boulevard, Caroline Springs	**Microphone Location:**	North west side of property	**Calibration Start:**	94 dB(A)
Measurement Period:	Tuesday 6/5 to Wednesday 14/5/2014	**Instrument:**	ARL315 Serial 453	**Calibration End:**	94 dB(A)

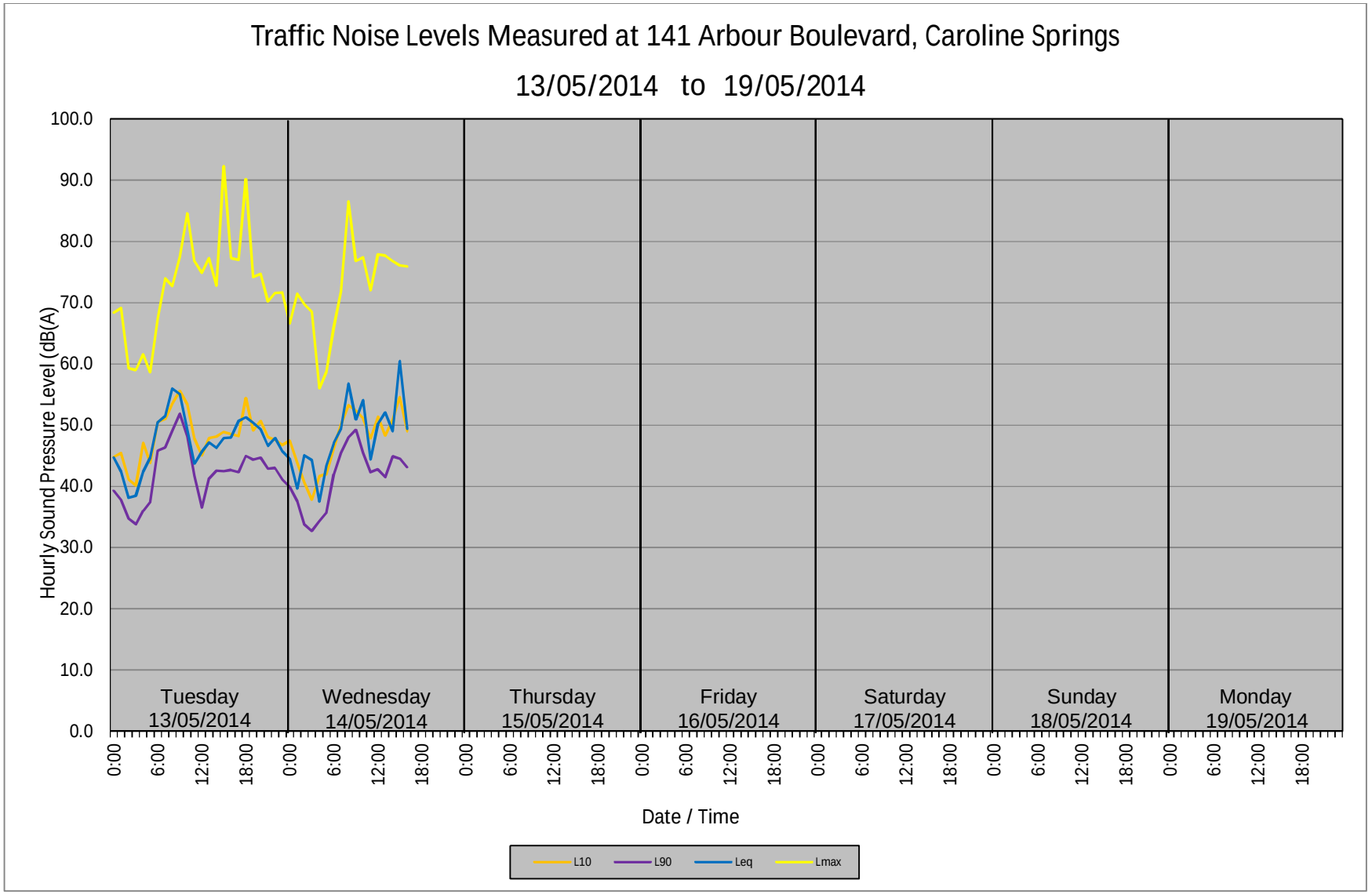
Start Time	Sound Pressure Level, dB(A)																											
	6/05/2014				7/05/2014				8/05/2014				9/05/2014				10/05/2014				11/05/2014				12/05/2014			
	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}
0:00					46	39	40	73	46	35	54	75	46	39	45	73	48	43	49	71	51	47	52	73	47	40	44	71
1:00					46	36	37	78	46	35	40	80	47	37	46	79	47	42	45	72	50	45	50	63	44	37	42	74
2:00					39	33	37	56	40	34	36	53	38	33	34	74	43	38	41	62	49	42	46	67	42	36	39	53
3:00					38	32	41	67	40	34	39	53	38	33	38	67	41	37	39	70	43	38	41	56	41	34	39	55
4:00					39	31	45	70	45	36	47	64	45	35	39	62	42	37	48	72	42	36	39	56	44	36	38	55
5:00					35	31	34	69	42	36	44	64	42	36	41	64	45	39	48	70	42	35	48	72	43	38	43	52
6:00					36	33	40	70	51	46	53	70	45	41	47	72	46	40	46	71	43	37	42	64	48	43	51	71
7:00					51	40	50	73	53	49	53	72	48	45	47	66	48	44	49	62	43	38	42	69	51	47	49	69
8:00					54	40	55	73	53	50	54	76	51	47	54	75	50	44	52	73	50	40	51	73	53	49	53	72
9:00					55	41	52	80	52	47	51	73	53	46	51	74	51	46	52	78	51	45	52	78	56	52	55	79
10:00					55	35	52	80	48	41	51	83	53	45	50	69	50	46	49	76	50	43	49	78	52	47	53	74
11:00					56	32	52	78	45	39	48	76	50	43	46	74	49	45	51	75	48	40	50	80	47	36	44	74
12:00					55	35	50	78	45	36	46	75	48	43	49	69	48	44	52	75	48	39	50	80	46	33	47	79
13:00					50	33	46	77	46	36	48	86	51	44	49	77	50	45	56	78	50	39	56	79	44	33	47	77
14:00					51	35	53	79	47	38	55	81	53	45	52	72	45	40	47	73	51	41	54	90	46	32	48	76
15:00					52	34	56	80	47	39	42	84	51	44	50	70	47	40	53	81	60	40	63	89	44	31	57	88
16:00					43	33	39	80	47	39	51	75	52	45	51	73	51	40	50	83	55	40	48	73	44	32	48	74
17:00					45	37	45	74	47	39	45	79	53	45	51	72	50	39	52	82	59	41	64	76	43	31	47	75
18:00					48	40	52	79	57	42	60	77	53	44	51	76	51	43	50	79	48	44	47	72	48	34	57	95
19:00					47	42	48	71	51	45	48	89	52	44	49	74	45	38	51	81	49	43	53	76	41	33	49	70
20:00	49	44	47	74	46	38	51	72	51	46	51	74	52	45	50	73	48	40	46	73	46	40	45	87	45	33	43	71
21:00	48	44	45	77	44	38	51	73	51	45	51	79	51	44	47	66	50	42	48	77	45	38	43	78	48	38	49	94
22:00	46	42	43	61	43	34	56	77	47	42	43	77	47	42	48	68	49	44	48	68	46	41	58	78	46	40	46	72
23:00	47	41	42	77	42	34	48	75	46	41	44	71	49	43	49	72	52	44	47	72	47	40	42	68	48	41	44	71
$L_{10,18hr,\ Arith\ Av,\ 6\text{-}24h}$					49				49				51				49				49				47			
$L_{eq,15hr,\ Log\ Av,\ 7\text{-}22h}$							51				53				50				51			56				52	
$L_{eq,16hr,\ Log\ Av,\ 6\text{-}22h}$							51				53				50				51			56				52	
$L_{eq,8hr,\ Log\ Av,\ 22\text{-}6h}$							41				50				43				47			48				50	
$L_{eq,9hr,\ Log\ Av,\ 22\text{-}7h}$							41				51				43				47			47				50	
Wind @0900h, m/s	WSW 3.6				SSE 3.6				NNE 2.5				NNE 7.2				NNE 4.2				E 2.5				CALM 0			
Wind @1500h, m/s	SSW 6.1				S 4.2				NNE 4.2				NNE 7.2				S 2.5				WSW 4.7				ESE 2.5			

Hourly Measurement Results

Location:	141 Arbour Boulevard, Caroline Springs	**Microphone Location:**	North west side of property	**Calibration Start:**	94 dB(A)
Measurement Period:	Tuesday 6/5 to Wednesday 14/5/2014	**Instrument:**	ARL315 Serial 453	**Calibration End:**	94 dB(A)

Start Time	Sound Pressure Level, dB(A)																											
	13/05/2014				14/05/2014				15/05/2014				16/05/2014				17/05/2014				18/05/2014				19/05/2014			
	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}
0:00	45	39	45	68	47	40	45	67																				
1:00	45	38	42	69	44	38	40	72																				
2:00	41	35	38	59	41	34	45	70																				
3:00	40	34	39	59	38	33	44	69																				
4:00	47	36	42	62	42	34	38	56																				
5:00	44	37	45	59	42	36	43	59																				
6:00	51	46	51	67	46	42	47	66																				
7:00	51	46	52	74	50	45	49	72																				
8:00	54	49	56	73	53	48	57	87																				
9:00	56	52	55	78	52	49	51	77																				
10:00	53	48	49	85	51	45	54	77																				
11:00	48	42	44	77	48	42	44	72																				
12:00	45	37	46	75	51	43	50	78																				
13:00	48	41	47	77	48	41	52	78																				
14:00	48	43	46	73	51	45	49	77																				
15:00	49	43	48	92	55	45	61	76																				
16:00	49	43	48	77	49	43	49	76																				
17:00	48	42	51	77																								
18:00	54	45	51	90																								
19:00	49	44	50	74																								
20:00	51	45	49	75																								
21:00	48	43	47	70																								
22:00	48	43	48	72																								
23:00	47	41	46	72																								
$L_{10,18hr,\ Arith\ Av,\ 6\text{-}24h}$	50																											
$L_{eq,15hr,\ Log\ Av,\ 7\text{-}22h}$			51																									
$L_{eq,16hr,\ Log\ Av,\ 6\text{-}22h}$			51																									
$L_{eq,8hr,\ Log\ Av,\ 22\text{-}6h}$			43																									
$L_{eq,9hr,\ Log\ Av,\ 22\text{-}7h}$			45																									
Wind @0900h, m/s	NW 1.9				NNE 5.3																							
Wind @1500h, m/s	NNW 3.1				NNE 5.3																							


Traffic Noise Levels Measured at 141 Arbour Boulevard, Caroline Springs
6/05/2014 to 12/05/2014
Hourly Sound Pressure Level (dB(A)
100
90
80
70
60
50
40
30
20
10
0
Tuesday 6/05/2014
Wednesday 7/05/2014
Thursday 8/05/2014
Friday 9/05/2014
Saturday 10/05/2014
Sunday 11/05/2014
Monday 12/05/2014
0:00
6:00
12:00
18:00
Date / Time
L10
L90
Leq
Lmax

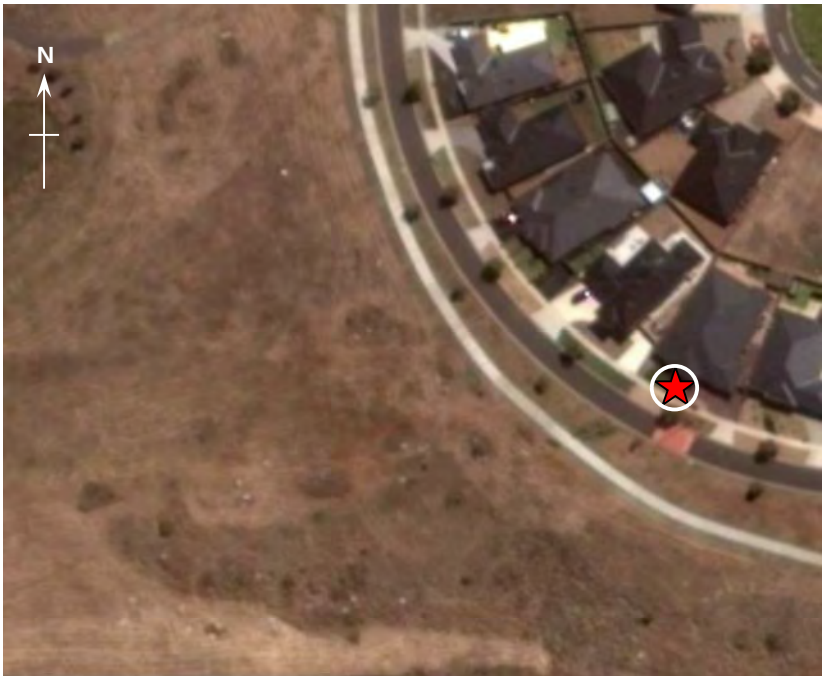

Traffic Noise Levels Measured at 141 Arbour Boulevard, Caroline Springs
13/05/2014 to 19/05/2014
Hourly Sound Pressure Level (dB(A)
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Tuesday 13/05/2014
Wednesday 14/05/2014
Thursday 15/05/2014
Friday 16/05/2014
Saturday 17/05/2014
Sunday 18/05/2014
Monday 19/05/2014
0:00 6:00 12:00 18:00
Date / Time
L10
L90
Leq
Lmax

Noise Monitoring Location Summary Page

Site: 163 Arbour Boulevard, Caroline Springs
Measurement Period: Tuesday 6/5 to Wednesday 14/5/2014
Microphone Position: South west side of property
Prevailing Ambient Noise Source: Arbour Boulevard

Date	6-May	7-May	8-May	9-May	10-May	11-May	12-May
Measured $L_{A10,18hr}$ dB(A)		53	45	47	47	49	48
Weather		Adv	Adv	Adv	Adv	Adv	OK
Date	13-May	14-May					
Measured $L_{A10,18hr}$ dB(A)	46						
Weather	OK						
Average $L_{A10,18hr}$ dB(A)	**48**						
Average Weekday $L_{A10,18hr}$ dB(A)	**48**						

Site Location



(Imagery: Google Maps sourced 15/5/2014)

Photographs of Logger Location

Logger Location at Residence

View in Direction of Road from Logger Location

Hourly Measurement Results

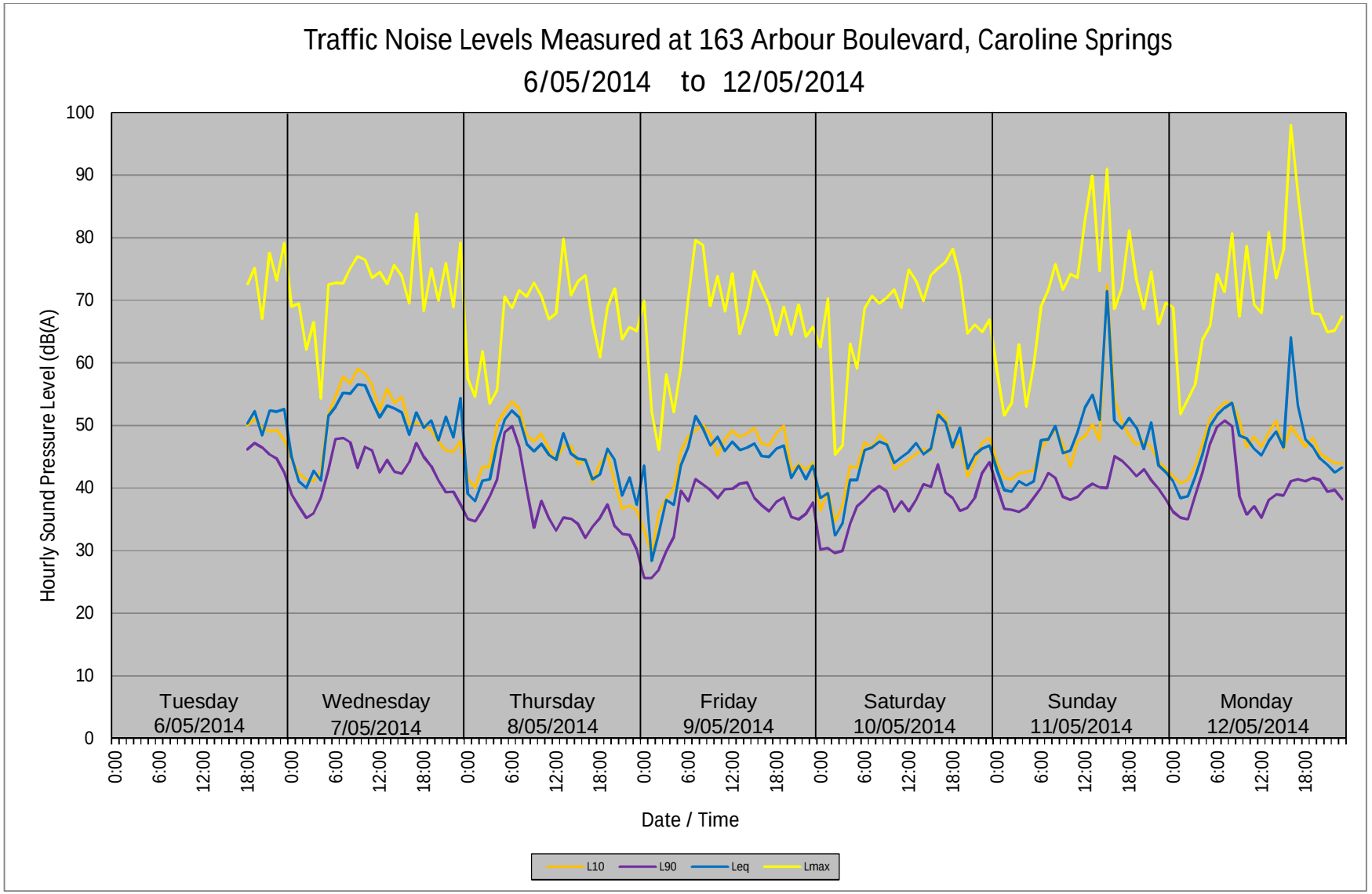
Location:	163 Arbour Boulevard, Caroline Springs	**Microphone Location:**	South w est side of property	**Calibration Start:**	94 dB(A)
Measurement Period:	Tuesday 6/5 to Wednesday 14/5/2014	**Instrument:**	Rion NL-21 Serial 265112	**Calibration End:**	94 dB(A)

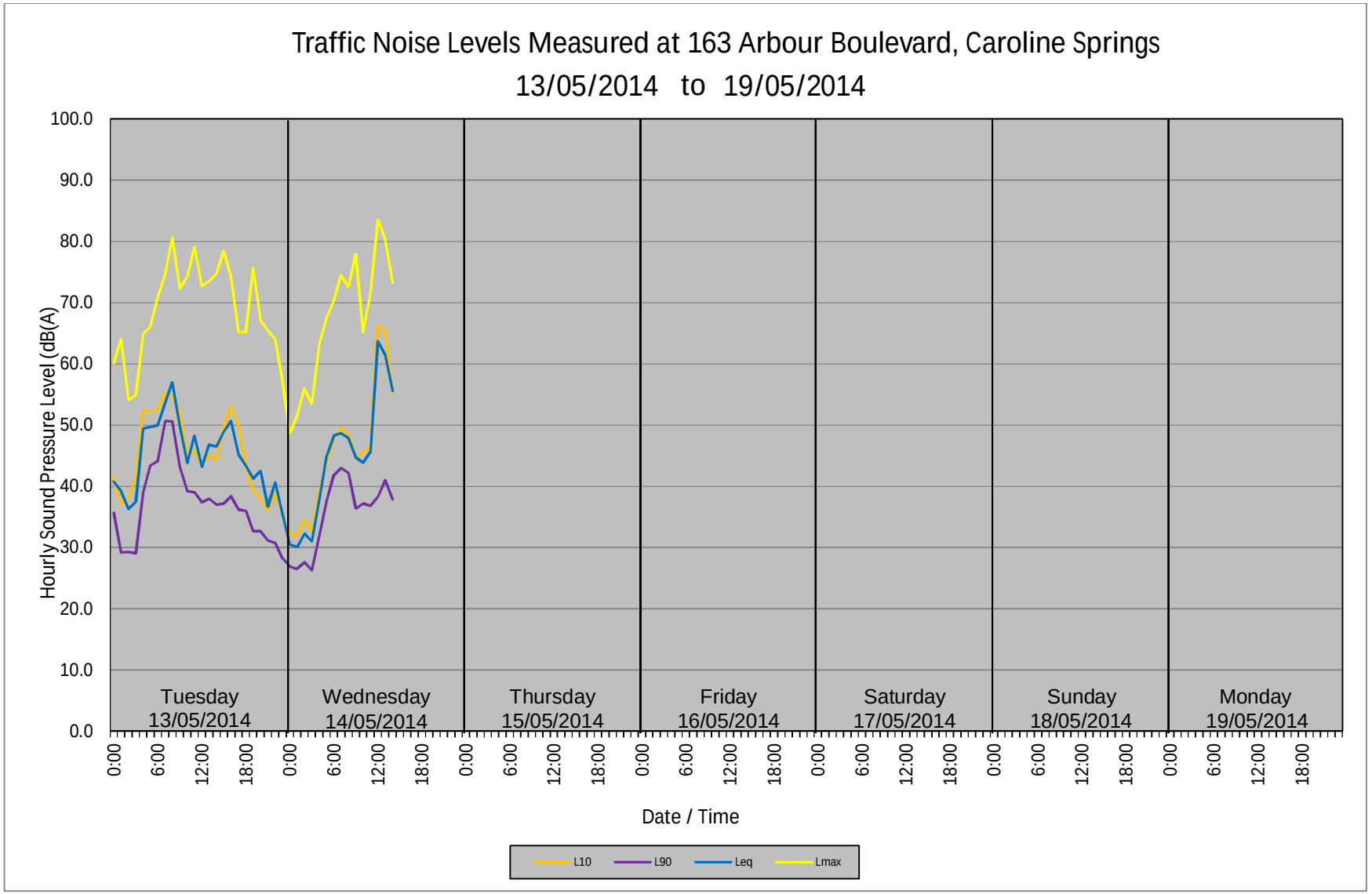
Start Time	Sound Pressure Level, dB(A)																											
	6/05/2014				7/05/2014				8/05/2014				9/05/2014				10/05/2014				11/05/2014				12/05/2014			
	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}
0:00					45	39	45	69	42	35	39	57	33	26	44	70	36	30	38	63	44	40	43	59	42	36	41	69
1:00					42	37	41	70	40	35	38	55	29	26	28	52	39	30	39	70	42	37	40	52	41	35	38	52
2:00					41	35	40	62	43	37	41	62	36	27	33	46	35	30	32	45	41	37	39	54	41	35	39	54
3:00					41	36	43	67	43	39	41	54	38	30	38	58	37	30	34	47	42	36	41	63	44	39	42	57
4:00					43	39	41	54	50	41	47	56	40	32	37	52	44	34	41	63	43	37	40	53	47	43	45	64
5:00					52	43	52	73	52	49	51	71	46	40	44	59	43	37	41	59	43	38	41	60	51	47	50	66
6:00					55	48	53	73	54	50	52	69	48	38	47	71	47	38	46	69	46	40	48	69	53	50	52	74
7:00					58	48	55	73	53	47	51	72	49	41	52	80	47	40	47	71	48	42	48	72	54	51	53	71
8:00					57	47	55	75	48	40	47	71	50	41	50	79	49	40	47	70	49	42	50	76	54	50	54	81
9:00					59	43	57	77	48	34	46	73	49	40	47	69	47	40	47	70	47	39	46	72	51	39	48	67
10:00					58	47	56	77	49	38	47	71	45	38	48	74	43	36	44	72	43	38	46	74	47	36	48	79
11:00					56	46	54	74	46	35	45	67	48	40	46	68	44	38	45	69	48	39	49	74	48	37	46	69
12:00					52	43	51	75	44	33	45	68	49	40	47	74	45	36	46	75	48	40	53	83	47	35	45	68
13:00					56	45	53	73	47	35	49	80	48	41	46	65	46	38	47	73	50	41	55	90	49	38	48	81
14:00					54	43	53	76	47	35	46	71	49	41	47	69	46	41	45	70	48	40	51	75	51	39	49	74
15:00					55	42	52	74	44	34	45	73	50	38	47	75	46	40	46	74	73	40	72	91	46	39	47	78
16:00					50	44	49	70	45	32	45	74	47	37	45	72	52	44	52	75	54	45	51	69	50	41	64	98
17:00					51	47	52	84	41	34	41	66	47	36	45	69	51	39	51	76	51	44	50	72	48	41	53	87
18:00					50	45	50	68	44	35	42	61	49	38	46	64	47	38	47	78	48	43	51	81	47	41	48	77
19:00					49	44	51	75	45	37	46	69	50	39	47	69	48	36	50	74	47	42	50	73	48	42	47	68
20:00	50	47	48	67	47	41	48	70	41	34	45	72	43	35	42	65	42	37	43	65	48	43	46	69	46	41	45	68
21:00	49	45	52	78	46	39	51	76	37	33	39	64	44	35	44	69	44	39	45	66	47	41	51	75	45	39	44	65
22:00	49	45	52	73	46	39	48	69	37	33	42	66	43	36	41	64	47	42	46	65	44	40	44	66	44	40	43	65
23:00	48	43	53	79	48	37	54	79	37	30	37	65	44	38	44	66	48	44	47	67	43	38	43	70	44	38	43	67
$L_{10,18hr,\ Arith\ Av,\ 6-24h}$					53				45				47				47				49				48			
$L_{eq,15hr,\ Log\ Av,\ 7-22h}$							53				46				47				47			60			54	
$L_{eq,16hr,\ Log\ Av,\ 6-22h}$							53				47				47				47			60			54	
$L_{eq,8hr,\ Log\ Av,\ 22-6h}$							49				48				40				40			43			44	
$L_{eq,9hr,\ Log\ Av,\ 22-7h}$							49				49				41				41			44			46	
Wind @0900h, m/s	WSW 3.6				SSE 3.6				NNE 2.5				NNE 7.2				NNE 4.2				E 2.5				CALM 0			
Wind @1500h, m/s	SSW 6.1				S 4.2				NNE 4.2				NNE 7.2				S 2.5				WSW 4.7				ESE 2.5			

Hourly Measurement Results

Location:	163 Arbour Boulevard, Caroline Springs	**Microphone Location:**	South w est side of property	**Calibration Start:**	94 dB(A)
Measurement Period:	Tuesday 6/5 to Wednesday 14/5/2014	**Instrument:**	Rion NL-21 Serial 265112	**Calibration End:**	94 dB(A)

Start Time	Sound Pressure Level, dB(A)																											
	13/05/2014				14/05/2014				15/05/2014				16/05/2014				17/05/2014				18/05/2014				19/05/2014			
	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}
0:00	42	36	41	60	32	27	31	49																				
1:00	37	29	39	64	32	27	30	52																				
2:00	38	29	36	54	35	28	32	56																				
3:00	41	29	38	55	33	26	31	54																				
4:00	52	39	50	65	39	32	38	63																				
5:00	52	43	50	66	44	38	45	67																				
6:00	53	44	50	71	48	42	48	70																				
7:00	55	51	54	75	50	43	49	75																				
8:00	55	51	57	81	48	42	48	73																				
9:00	52	43	50	72	45	36	45	78																				
10:00	45	39	44	74	46	37	44	65																				
11:00	46	39	48	79	47	37	46	72																				
12:00	44	37	43	73	66	38	64	84																				
13:00	45	38	47	74	66	41	62	80																				
14:00	44	37	47	75	55	38	56	73																				
15:00	50	37	49	79																								
16:00	53	38	51	74																								
17:00	50	36	45	65																								
18:00	44	36	43	65																								
19:00	39	33	41	76																								
20:00	38	33	43	67																								
21:00	36	31	37	65																								
22:00	39	31	41	64																								
23:00	36	28	36	57																								
$L_{10,18hr,\ Arith\ Av,\ 6\text{-}24h}$	46																											
$L_{eq,15hr,\ Log\ Av,\ 7\text{-}22h}$			49																									
$L_{eq,16hr,\ Log\ Av,\ 6\text{-}22h}$			49																									
$L_{eq,8hr,\ Log\ Av,\ 22\text{-}6h}$			45																									
$L_{eq,9hr,\ Log\ Av,\ 22\text{-}7h}$			46																									
Wind @0900h, m/s	NW 1.9				NNE 5.3																							
Wind @1500h, m/s	NNW 3.1				NNE 5.3																							


Traffic Noise Levels Measured at 163 Arbour Boulevard, Caroline Springs
6/05/2014 to 12/05/2014
Hourly Sound Pressure Level (dB(A)
100
90
80
70
60
50
40
30
20
10
0
Tuesday 6/05/2014
Wednesday 7/05/2014
Thursday 8/05/2014
Friday 9/05/2014
Saturday 10/05/2014
Sunday 11/05/2014
Monday 12/05/2014
0:00
6:00
12:00
18:00
Date / Time
L10
L90
Leq
Lmax


Traffic Noise Levels Measured at 163 Arbour Boulevard, Caroline Springs
13/05/2014 to 19/05/2014
Hourly Sound Pressure Level (dB(A)
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Tuesday 13/05/2014
Wednesday 14/05/2014
Thursday 15/05/2014
Friday 16/05/2014
Saturday 17/05/2014
Sunday 18/05/2014
Monday 19/05/2014
0:00 6:00 12:00 18:00
Date / Time
L10
L90
Leq
Lmax

Noise Monitoring Location Summary Page

Site: 311 Westwood Drive, Caroline Springs
Measurement Period: Tuesday 6/5 to Wednesday 14/5/2014
Microphone Position: East side of property
Prevailing Ambient Noise Source: Westwood Drive

Date	6-May	7-May	8-May	9-May	10-May	11-May	12-May
Measured $L_{A10,18hr}$ dB(A)		60	57	59	51	49	56
Weather		Adv	Adv	Adv	Adv	Adv	OK
Date	13-May	14-May					
Measured $L_{A10,18hr}$ dB(A)	52						
Weather	OK						
Average $L_{A10,18hr}$ dB(A)	**55**						
Average Weekday $L_{A10,18hr}$ dB(A)	**57**						

Site Location

(Imagery: Google Maps sourced 15/5/2014)

Photographs of Logger Location

Hourly Measurement Results

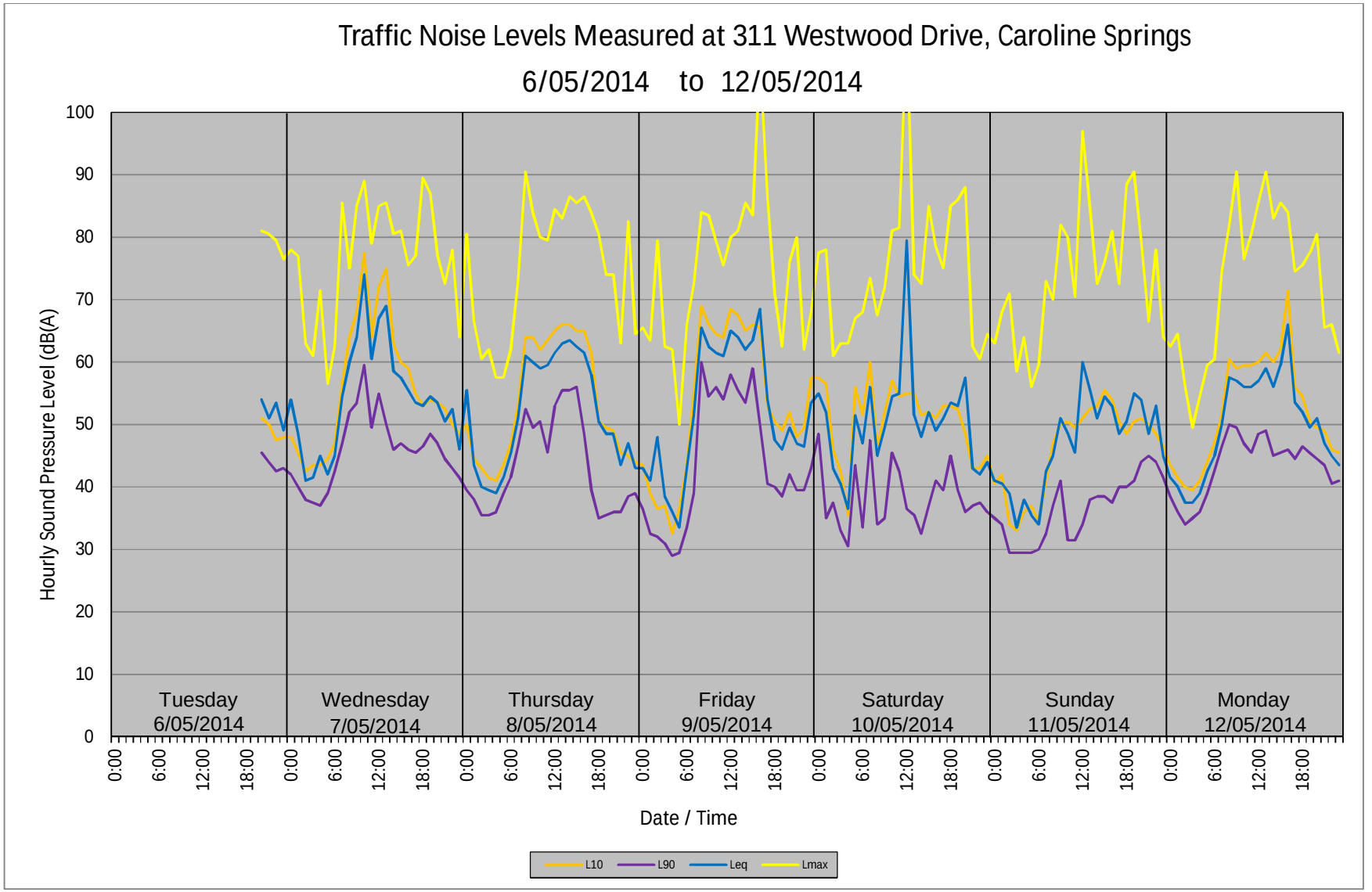
Location:	311 Westwood Drive, Caroline Springs	**Microphone Location:**	East side of property	**Calibration Start:**	94 dB(A)
Measurement Period:	Tuesday 6/5 to Wednesday 14/5/2014	**Instrument:**	ARL215 Serial 194641	**Calibration End:**	94 dB(A)

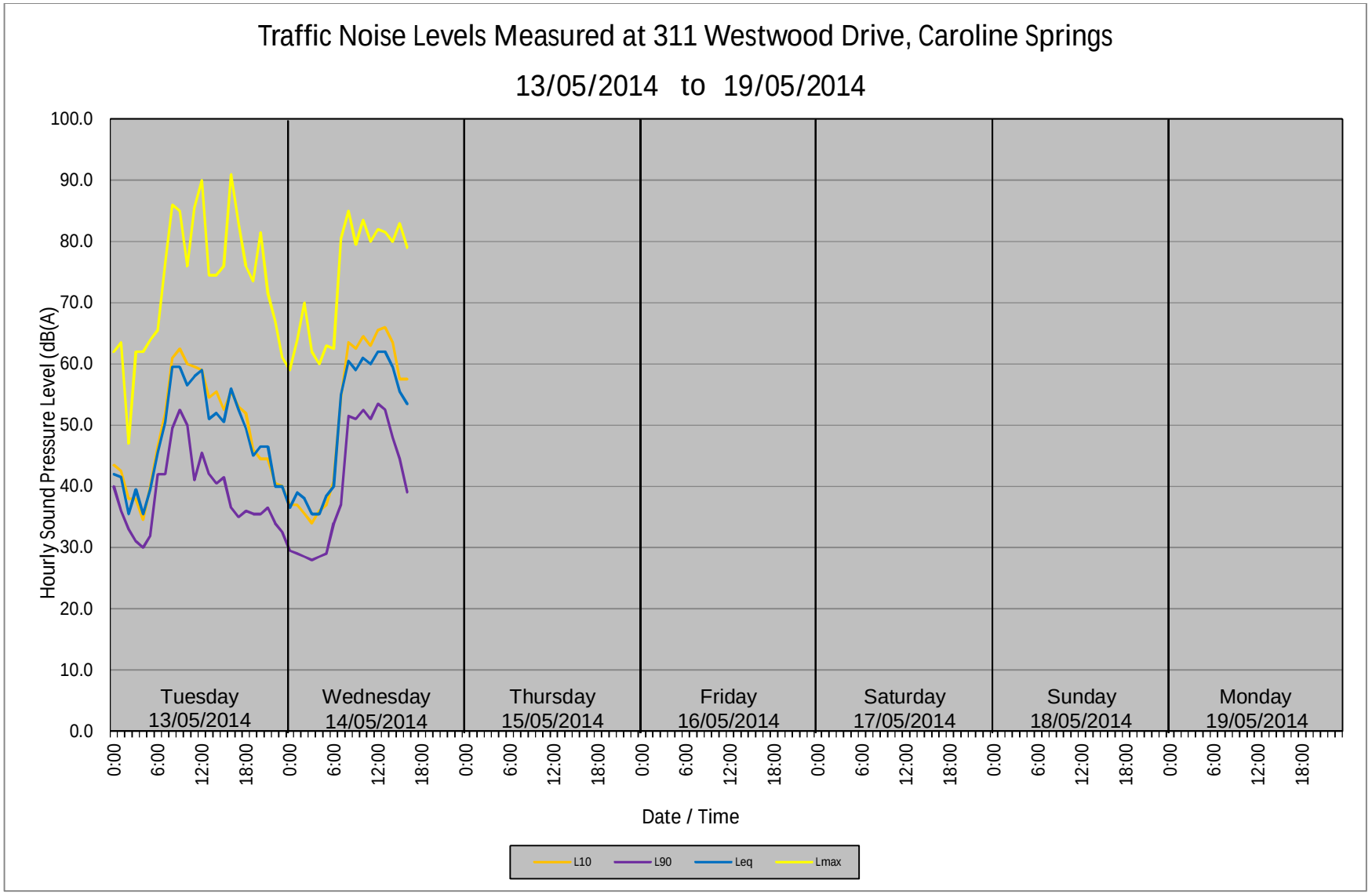
Start Time	Sound Pressure Level, dB(A)																											
	6/05/2014				7/05/2014				8/05/2014				9/05/2014				10/05/2014				11/05/2014				12/05/2014			
	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}
0:00					48	42	54	78	50	40	56	81	44	37	43	66	58	49	55	78	41	35	41	63	44	39	42	63
1:00					46	40	49	77	45	38	44	67	39	33	41	64	57	35	52	78	42	34	41	68	42	36	40	65
2:00					43	38	41	63	43	36	40	61	37	32	48	80	46	38	43	61	34	30	39	71	40	34	38	56
3:00					44	38	42	61	42	36	40	62	37	31	39	63	43	33	41	63	33	30	34	59	40	35	38	50
4:00					44	37	45	72	41	36	39	58	33	29	36	62	36	31	37	63	36	30	38	64	41	36	39	55
5:00					45	39	42	57	44	39	42	58	37	30	34	50	56	44	52	67	37	30	36	56	44	39	43	60
6:00					47	43	45	63	47	42	46	62	44	34	43	66	52	34	47	68	35	30	34	60	47	43	45	61
7:00					57	47	55	86	53	47	51	73	55	39	52	73	60	48	56	74	41	33	43	73	52	47	50	75
8:00					64	52	60	75	64	53	61	91	69	60	66	84	46	34	45	68	47	37	45	70	61	50	58	82
9:00					68	54	64	85	64	50	60	84	66	55	63	84	52	35	50	72	50	41	51	82	59	50	57	91
10:00					78	60	74	89	62	51	59	80	65	56	62	80	57	46	55	81	51	32	49	80	60	47	56	77
11:00					64	50	61	79	64	46	60	80	64	54	61	76	55	43	55	82	50	32	46	71	60	46	56	81
12:00					72	55	67	85	65	53	62	85	69	58	65	80	55	37	80	114	51	34	60	97	60	49	57	86
13:00					75	50	69	86	66	56	63	83	68	56	64	81	55	36	52	74	53	38	56	85	62	49	59	91
14:00					63	46	59	81	66	56	64	87	65	54	62	86	52	33	48	73	53	39	51	73	60	45	56	83
15:00					60	47	58	81	65	56	63	86	66	59	64	84	52	37	52	85	56	39	55	76	62	46	60	86
16:00					59	46	56	76	65	49	62	87	66	50	69	109	51	41	49	79	54	38	53	81	72	46	66	84
17:00					55	46	54	77	62	40	58	84	53	41	54	87	53	40	51	75	51	40	49	73	56	45	54	75
18:00					53	47	53	90	51	35	51	81	51	40	48	71	53	45	54	85	49	40	51	89	55	47	52	76
19:00					54	49	55	87	50	36	49	74	49	39	46	63	53	40	53	86	51	41	55	91	51	46	50	78
20:00	51	46	54	81	54	47	54	77	49	36	49	74	52	42	50	76	49	36	58	88	51	44	54	80	50	45	51	81
21:00	50	44	51	81	53	45	51	73	46	36	44	63	48	40	47	80	43	37	43	63	50	45	49	67	49	44	47	66
22:00	48	43	54	80	50	43	53	78	45	39	47	83	50	40	47	62	43	38	42	61	49	44	53	78	46	41	45	66
23:00	48	43	49	77	49	42	46	64	44	39	43	65	58	43	54	68	45	36	44	65	47	42	45	64	46	41	44	62
$L_{10,18hr,\ Arith\ Av,\ 6\text{-}24h}$					60				57				59				51				49				56			
$L_{eq,15hr,\ Log\ Av,\ 7\text{-}22h}$							65				60				62				68			53				58	
$L_{eq,16hr,\ Log\ Av,\ 6\text{-}22h}$							65				59				62				68			53				58	
$L_{eq,8hr,\ Log\ Av,\ 22\text{-}6h}$							49				49				43				51			40				46	
$L_{eq,9hr,\ Log\ Av,\ 22\text{-}7h}$							49				49				43				50			40				46	
Wind @0900h, m/s	WSW 3.6				SSE 3.6				NNE 2.5				NNE 7.2				NNE 4.2				E 2.5				CALM 0			
Wind @1500h, m/s	SSW 6.1				S 4.2				NNE 4.2				NNE 7.2				S 2.5				WSW 4.7				ESE 2.5			

Hourly Measurement Results

Location:	311 Westwood Drive, Caroline Springs	**Microphone Location:**	East side of property	**Calibration Start:**	94 dB(A)
Measurement Period:	Tuesday 6/5 to Wednesday 14/5/2014	**Instrument:**	ARL215 Serial 194641	**Calibration End:**	94 dB(A)

Start Time	Sound Pressure Level, dB(A)																											
	13/05/2014				14/05/2014				15/05/2014				16/05/2014				17/05/2014				18/05/2014				19/05/2014			
	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}
0:00	44	40	42	62	37	30	37	59																				
1:00	43	36	42	64	37	29	39	64																				
2:00	38	33	36	47	36	29	38	70																				
3:00	38	31	40	62	34	28	36	62																				
4:00	35	30	36	62	36	29	36	60																				
5:00	40	32	40	64	37	29	39	63																				
6:00	47	42	46	66	41	34	40	63																				
7:00	52	42	51	77	55	37	55	81																				
8:00	61	50	60	86	64	52	61	85																				
9:00	63	53	60	85	63	51	59	80																				
10:00	60	50	57	76	65	53	61	84																				
11:00	60	41	58	86	63	51	60	80																				
12:00	59	46	59	90	66	54	62	82																				
13:00	55	42	51	75	66	53	62	82																				
14:00	56	41	52	75	64	48	60	80																				
15:00	53	42	51	76	58	45	56	83																				
16:00	56	37	56	91	58	39	54	79																				
17:00	53	35	53	83																								
18:00	52	36	50	76																								
19:00	46	36	45	74																								
20:00	45	36	47	82																								
21:00	45	37	47	72																								
22:00	41	34	40	67																								
23:00	40	33	40	61																								
$L_{10,18hr,\ Arith\ Av,\ 6\text{-}24h}$	52																											
$L_{eq,15hr,\ Log\ Av,\ 7\text{-}22h}$			55																									
$L_{eq,16hr,\ Log\ Av,\ 6\text{-}22h}$			55																									
$L_{eq,8hr,\ Log\ Av,\ 22\text{-}6h}$			41																									
$L_{eq,9hr,\ Log\ Av,\ 22\text{-}7h}$			42																									
Wind @0900h, m/s	NW 1.9				NNE 5.3																							
Wind @1500h, m/s	NNW 3.1				NNE 5.3																							


Traffic Noise Levels Measured at 311 Westwood Drive, Caroline Springs
6/05/2014 to 12/05/2014
Hourly Sound Pressure Level (dB(A)
100
90
80
70
60
50
40
30
20
10
0
Tuesday 6/05/2014
Wednesday 7/05/2014
Thursday 8/05/2014
Friday 9/05/2014
Saturday 10/05/2014
Sunday 11/05/2014
Monday 12/05/2014
0:00
6:00
12:00
18:00
Date / Time
L10
L90
Leq
Lmax


Traffic Noise Levels Measured at 311 Westwood Drive, Caroline Springs
13/05/2014 to 19/05/2014
Hourly Sound Pressure Level (dB(A)
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Tuesday 13/05/2014
Wednesday 14/05/2014
Thursday 15/05/2014
Friday 16/05/2014
Saturday 17/05/2014
Sunday 18/05/2014
Monday 19/05/2014
0:00 6:00 12:00 18:00
Date / Time
L10
L90
Leq
Lmax

Appendix G: Modelled Traffic Noise Levels

Modelled traffic noise levels

Location	dB(A) $L_{A10\ (18\ hour)}$					
	Modelled existing traffic noise levels with existing 2-lane road without bridge	Modelled existing traffic noise levels with existing 2-lane road with bridge	Modelled 2046 traffic noise levels with 2-lane road without bridge	Modelled 2046 traffic noise levels with 2-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 4-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 6-lane road with bridge
Aberfeldie Way, 11 Caroline Springs	60	66	66	67	67	68
Aberfeldie Way, 13 Caroline Springs	59	65	66	66	67	68
Aberfeldie Way, 14 Caroline Springs	60	66	66	66	67	68
Aberfeldie Way, 15 Caroline Springs	59	65	66	66	66	67
Aberfeldie Way, 16 Caroline Springs	59	65	66	66	66	67
Aberfeldie Way, 17 Caroline Springs	59	65	66	66	66	67
Aberfeldie Way, 18 Caroline Springs	58	64	65	66	66	67
Aberfeldie Way, 19 Caroline Springs	58	65	66	66	66	67
Aberfeldie Way, 20 Caroline Springs	57	65	66	66	66	67
Aberfeldie Way, 21 Caroline Springs	57	65	67	67	67	68
Aberfeldie Way, 22 Caroline Springs	57	65	67	67	68	69
Aberfeldie Way, 23 Caroline Springs	56	64	66	66	67	68
Aberfeldie Way, 24 Caroline Springs	56	65	66	66	67	68
Aberfeldie Way, 25 Caroline Springs	56	64	66	66	67	68
Aberfeldie Way, 9 Caroline Springs	61	67	67	67	68	69
Albert Court, 6 Caroline Springs	57	66	67	68	70	71
Albert Court, 7 Caroline Springs	57	66	67	68	71	72
Albert Road, 1/12 Sydenham	60	60	61	61	63	64
Albert Road, 1/38 Sydenham	58	58	59	59	60	61
Albert Road, 1/40 Sydenham	58	58	59	59	60	61
Albert Road, 10 Sydenham	59	58	60	60	62	63
Albert Road, 14 Sydenham	59	58	60	60	61	62
Albert Road, 16 Sydenham	60	59	61	61	62	63

Location	dB(A) $L_{A10\ (18\ hour)}$					
	Modelled existing traffic noise levels with existing 2-lane road without bridge	Modelled existing traffic noise levels with existing 2-lane road with bridge	Modelled 2046 traffic noise levels with 2-lane road without bridge	Modelled 2046 traffic noise levels with 2-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 4-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 6-lane road with bridge
Albert Road, 18 Sydenham	59	59	61	61	62	63
Albert Road, 2 Sydenham	59	59	62	62	63	64
Albert Road, 2/12 Sydenham	55	54	59	59	59	60
Albert Road, 2/38 Sydenham	49	48	51	52	52	52
Albert Road, 2/40 Sydenham	51	51	53	53	54	54
Albert Road, 20 Sydenham	60	59	61	61	62	63
Albert Road, 22 Sydenham	58	58	59	59	61	61
Albert Road, 24 Sydenham	59	60	61	61	62	63
Albert Road, 26 Sydenham	58	58	60	60	61	61
Albert Road, 28 Sydenham	59	59	60	60	61	62
Albert Road, 3/12 Sydenham	53	53	58	58	58	59
Albert Road, 3/40 Sydenham	47	47	50	50	50	51
Albert Road, 30 Sydenham	59	59	60	60	61	61
Albert Road, 32 Sydenham	59	59	60	60	61	62
Albert Road, 34 Sydenham	59	59	60	60	61	61
Albert Road, 36 Sydenham	58	58	59	59	60	61
Albert Road, 4 Sydenham	59	59	62	62	63	64
Albert Road, 42 Sydenham	56	56	57	57	58	58
Albert Road, 6 Sydenham	59	59	61	61	63	63
Albert Road, 8 Sydenham	59	59	61	61	63	64
Allenby Road, 1 Hillside	67	67	69	69	69	69
Allenby Road, 3 Hillside	60	60	62	62	62	63
Allenby Road, 5 Hillside	57	57	59	59	60	60
Amber Lee Circuit, 1 Taylors Hill	57	59	60	60	63	64
Amber Lee Circuit, 10 Taylors Hill	57	59	60	60	63	63

Location	dB(A) $L_{A10\ (18\ hour)}$					
	Modelled existing traffic noise levels with existing 2-lane road without bridge	Modelled existing traffic noise levels with existing 2-lane road with bridge	Modelled 2046 traffic noise levels with 2-lane road without bridge	Modelled 2046 traffic noise levels with 2-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 4-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 6-lane road with bridge
Amber Lee Circuit, 2 Taylors Hill	57	59	60	60	64	64
Amber Lee Circuit, 3 Taylors Hill	57	59	60	60	64	64
Amber Lee Circuit, 4 Taylors Hill	57	59	60	60	63	64
Amber Lee Circuit, 5 Taylors Hill	57	59	60	60	63	63
Amber Lee Circuit, 6 Taylors Hill	57	59	60	60	63	63
Amber Lee Circuit, 7 Taylors Hill	57	59	60	60	63	64
Amber Lee Circuit, 8 Taylors Hill	57	59	60	60	63	63
Amber Lee Circuit, 9 Taylors Hill	57	59	60	60	63	63
Answer Close, 1/15 Sydenham	52	52	55	55	57	57
Answer Close, 11 Sydenham	58	58	60	60	63	64
Answer Close, 12 Sydenham	56	56	58	58	60	60
Answer Close, 13 Sydenham	57	57	59	59	62	63
Answer Close, 14 Sydenham	57	57	59	59	62	62
Answer Close, 2/15 Sydenham	60	60	62	62	66	67
Arbour Boulevard, 124 Caroline Springs	-	50	45	50	54	54
Arbour Boulevard, 133 Caroline Springs	-	52	49	51	54	54
Arbour Boulevard, 141 (49) Caroline Springs	-	53	48	53	56	56
Arbour Boulevard, 149 Caroline Springs	-	57	49	56	61	60
Arbour Boulevard, 151 Caroline Springs	-	58	49	58	62	62
Arbour Boulevard, 153 Caroline Springs	-	61	49	61	64	64
Arbour Boulevard, 155 Caroline Springs	-	62	49	61	64	64
Arbour Boulevard, 157 Caroline Springs	-	62	49	62	64	64
Arbour Boulevard, 159 Caroline Springs	-	61	49	60	62	63
Arbour Boulevard, 161 Caroline Springs	-	60	50	59	63	63
Arbour Boulevard, 163 (48) Caroline Springs	-	58	49	57	60	60

Location	dB(A) $L_{A10\ (18\ hour)}$					
	Modelled existing traffic noise levels with existing 2-lane road without bridge	Modelled existing traffic noise levels with existing 2-lane road with bridge	Modelled 2046 traffic noise levels with 2-lane road without bridge	Modelled 2046 traffic noise levels with 2-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 4-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 6-lane road with bridge
Arbour Boulevard, 165 Caroline Springs	-	56	50	56	59	59
Arbour Boulevard, 167 Caroline Springs	-	55	51	54	56	57
Arroyo Place, 30 Caroline Springs	-	63	47	63	69	70
Arroyo Place, 32 Caroline Springs	-	62	44	62	68	69
Arroyo Place, 34 Caroline Springs	-	63	44	63	69	70
Arroyo Place, 36 Caroline Springs	-	63	47	63	69	71
Arroyo Place, 38 Caroline Springs	-	62	44	62	68	70
Arroyo Place, 40 Caroline Springs	-	63	47	63	69	71
Arroyo Place, 42 Caroline Springs	-	62	47	62	68	69
Arroyo Place, 44 Caroline Springs	-	62	45	62	68	69
Arroyo Place, 46 Caroline Springs	-	63	48	63	69	70
Arroyo Place, 48 Caroline Springs	-	62	48	63	68	70
Arroyo Place, 50 Caroline Springs	-	62	47	62	68	69
Arroyo Place, 52 Caroline Springs	-	62	48	63	68	70
Arroyo Place, 54 Caroline Springs	-	62	48	62	68	70
Arroyo Place, 56 Caroline Springs	-	62	48	62	68	70
Atherton Avenue, 1 Caroline Springs	59	70	60	69	71	71
Atherton Avenue, 10 Caroline Springs	54	63	55	62	65	65
Atherton Avenue, 12 Caroline Springs	54	62	55	62	65	65
Atherton Avenue, 14 Caroline Springs	54	62	55	62	65	65
Atherton Avenue, 16 Caroline Springs	53	62	55	61	65	65
Atherton Avenue, 19 Caroline Springs	60	70	61	70	71	71
Atherton Avenue, 2 Caroline Springs	53	62	54	62	65	65
Atherton Avenue, 21 Caroline Springs	58	68	61	67	71	71
Atherton Avenue, 3 Caroline Springs	53	62	54	62	65	65

Location	dB(A) $L_{A10\ (18\ hour)}$					
	Modelled existing traffic noise levels with existing 2-lane road without bridge	Modelled existing traffic noise levels with existing 2-lane road with bridge	Modelled 2046 traffic noise levels with 2-lane road without bridge	Modelled 2046 traffic noise levels with 2-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 4-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 6-lane road with bridge
Atherton Avenue, 5 Caroline Springs	54	63	54	62	65	65
Atherton Avenue, 5 Caroline Springs	54	63	54	62	65	65
Atherton Avenue, 6 Caroline Springs	59	69	59	68	71	71
Atherton Avenue, 8 Caroline Springs	54	63	55	62	65	65
Bank Place, 2 Hillside	63	63	64	64	65	66
Bank Place, 3 Hillside	63	63	64	64	66	66
Bank Place, 4 Hillside	63	63	64	64	66	66
Bank Place, 5 Hillside	62	63	64	64	65	66
Bank Place, 6 Hillside	63	63	64	64	65	65
Bank Place, 7 Hillside	61	62	63	63	63	64
Bank Place, 8 Hillside	66	66	67	67	70	70
Bank Place, 9 Hillside	60	60	62	62	62	63
Boberrit Wynd, 66 Hillside	61	61	63	63	66	67
Boberrit Wynd, 68 Hillside	61	61	63	63	66	67
Boberrit Wynd, 70 Hillside	61	61	63	63	66	67
Boberrit Wynd, 72 Hillside	62	62	63	63	67	68
Boberrit Wynd, 74 Hillside	62	62	64	64	67	68
Boberrit Wynd, 76 Hillside	61	61	63	63	66	67
Boberrit Wynd, 78 Hillside	58	58	60	60	62	63
Boberrit Wynd, 80 Hillside	61	61	62	62	66	66
Boberrit Wynd, 82 Hillside	60	60	62	62	65	66
Boberrit Wynd, 84 Hillside	53	53	54	54	57	57
Bowman Court, 12 Taylors Hill	62	64	65	65	65	65
Bowman Court, 14 Taylors Hill	62	64	65	65	65	66
Bowman Court, 15 Taylors Hill	53	55	56	56	57	57

Location	dB(A) $L_{A10\ (18\ hour)}$					
	Modelled existing traffic noise levels with existing 2-lane road without bridge	Modelled existing traffic noise levels with existing 2-lane road with bridge	Modelled 2046 traffic noise levels with 2-lane road without bridge	Modelled 2046 traffic noise levels with 2-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 4-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 6-lane road with bridge
Bungarim Wynd, 46 Hillside	62	62	63	63	67	68
Bungarim Wynd, 48 Hillside	60	60	61	61	65	65
Bungarim Wynd, 50 Hillside	60	60	61	61	65	65
Bungarim Wynd, 51 Hillside	59	59	60	60	63	63
Bursaria Drive, 14 Caroline Springs	46	62	48	62	68	70
Bursaria Drive, 16 Caroline Springs	47	63	50	63	69	70
Bursaria Drive, 18 Caroline Springs	48	63	50	63	69	70
Bursaria Drive, 20 Caroline Springs	49	63	50	62	69	70
Bursaria Drive, 22 Caroline Springs	50	63	51	62	69	70
Bursaria Drive, 24 Caroline Springs	53	63	54	63	69	71
Bursaria Drive, 26 Caroline Springs	54	63	55	63	69	71
Bursaria Drive, 28 Caroline Springs	55	63	56	63	69	71
Bursaria Drive, 30 Caroline Springs	55	63	56	63	69	71
Callista Circuit 25 Taylors Hill	62	64	65	65	65	65
Callista Circuit, 15 Taylors Hill	61	63	64	64	66	66
Callista Circuit, 17 Taylors Hill	62	64	65	65	66	66
Callista Circuit, 19 Taylors Hill	60	63	63	63	64	64
Callista Circuit, 21 (59) Taylors Hill	61	64	64	64	64	65
Callista Circuit, 23 Taylors Hill	62	64	65	65	65	65
Callista Circuit, 27 Taylors Hill	62	65	65	65	65	65
Callista Circuit, 29 Taylors Hill	63	65	65	65	65	65
Callista Circuit, 31 Taylors Hill	63	65	65	65	66	66
Callista Circuit, 33 Taylors Hill	63	65	66	66	66	66
Callista Circuit, 35 Taylors Hill	62	64	65	65	65	65
Callista Circuit, 37 Taylors Hill	62	64	65	65	65	65

Location	dB(A) $L_{A10\ (18\ hour)}$					
	Modelled existing traffic noise levels with existing 2-lane road without bridge	Modelled existing traffic noise levels with existing 2-lane road with bridge	Modelled 2046 traffic noise levels with 2-lane road without bridge	Modelled 2046 traffic noise levels with 2-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 4-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 6-lane road with bridge
Callista Circuit, 39 Taylors Hill	62	64	64	64	65	65
Callista Circuit, 41 Taylors Hill	62	64	65	65	65	65
Callista Circuit, 43 Taylors Hill	60	63	63	63	64	64
Callista Circuit, 45 Taylors Hill	61	63	64	64	64	65
Carew Way, 25 Derrimut	65	65	65	65	67	67
Carew Way, 27 Derrimut	64	64	65	65	67	67
Carew Way, 28 Derrimut	66	67	68	68	69	69
Carew Way, 29 Derrimut	64	64	65	65	67	67
Carew Way, 31 Derrimut	64	64	65	65	67	67
Carew Way, 33 Derrimut	64	64	65	65	66	67
Carew Way, 35 Derrimut	64	64	65	65	66	67
Carew Way, 37 Derrimut	64	64	65	65	66	67
Carew Way, 39 Derrimut	64	64	65	65	66	67
Carew Way, 41 Derrimut	64	64	65	65	66	67
Carew Way, 43 Derrimut	64	64	65	65	66	67
Carew Way, 45 Derrimut	64	64	65	65	66	67
Carew Way, 49 Derrimut	64	64	65	65	66	67
Carew Way, 51 Derrimut	64	64	65	65	66	67
Carinya Boulevard, 1 Caroline Springs	62	66	66	66	67	68
Carisbrook Court, 10 Taylors Hill	64	66	66	66	66	67
Carisbrook Court, 11 Taylors Hill	61	63	64	64	65	65
Carisbrook Court, 9 Taylors Hill	53	55	56	56	57	57
Carlton Court, 10 Hillside	63	63	64	64	69	69
Carlton Court, 9 Hillside	63	63	64	64	69	70
Catani Court, 7 (59) Caroline Springs	57	62	64	64	69	70

Location	dB(A) $L_{A10\ (18\ hour)}$					
	Modelled existing traffic noise levels with existing 2-lane road without bridge	Modelled existing traffic noise levels with existing 2-lane road with bridge	Modelled 2046 traffic noise levels with 2-lane road without bridge	Modelled 2046 traffic noise levels with 2-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 4-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 6-lane road with bridge
Catani Court, 8 Caroline Springs	57	63	65	64	71	71
Catherine Drive, 1A Sydenham	53	53	56	56	57	57
Catherine Drive, 1B Sydenham	64	64	66	66	67	67
Catherine Drive, 2 Sydenham	65	65	66	66	67	68
Catherine Drive, 4 Sydenham	54	54	56	56	56	57
Catherine Drive, 6 Sydenham	50	50	53	53	53	53
Central Drive, 87 Caroline Springs	58	66	64	67	71	72
Central Drive, 89 Caroline Springs	58	66	67	68	70	72
Chircop Close, 11 Sydenham	56	55	58	58	60	61
Chircop Close, 12 Sydenham	57	57	59	59	62	63
Chircop Close, 13 Sydenham	58	58	60	60	64	65
Chircop Close, 14 Sydenham	58	58	60	60	64	65
Chircop Close, 15 Sydenham	58	58	60	60	64	65
Chris Court, 1/32 Sydenham	58	58	60	60	61	62
Chris Court, 10 Sydenham	62	61	63	63	64	65
Chris Court, 12 Sydenham	62	62	64	64	65	66
Chris Court, 14 Sydenham	62	61	64	64	65	66
Chris Court, 16 Sydenham	61	61	63	63	65	65
Chris Court, 18 Sydenham	60	60	62	62	63	64
Chris Court, 2/32 Sydenham	56	55	58	58	58	59
Chris Court, 20 Sydenham	61	61	63	63	65	65
Chris Court, 22 Sydenham	61	61	63	63	64	65
Chris Court, 24 Sydenham	61	60	62	62	64	65
Chris Court, 26 Sydenham	59	59	61	61	62	63
Chris Court, 28 Sydenham	61	61	63	63	64	65

Location	dB(A) $L_{A10\ (18\ hour)}$					
	Modelled existing traffic noise levels with existing 2-lane road without bridge	Modelled existing traffic noise levels with existing 2-lane road with bridge	Modelled 2046 traffic noise levels with 2-lane road without bridge	Modelled 2046 traffic noise levels with 2-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 4-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 6-lane road with bridge
Chris Court, 30 Sydenham	59	59	61	61	62	63
Chris Court, 34 Sydenham	49	49	52	52	53	53
Chris Court, 4 Sydenham	60	59	61	61	62	63
Chris Court, 50 Sydenham	63	63	65	65	66	66
Chris Court, 52 Sydenham	63	63	65	65	65	66
Chris Court, 54 Sydenham	63	63	65	65	65	65
Chris Court, 56 Sydenham	60	60	62	62	63	63
Chris Court, 58-60 Sydenham	63	63	65	65	65	65
Chris Court, 6 Sydenham	60	60	62	62	63	64
Chris Court, 8 Sydenham	62	62	64	64	65	65
Cityview Close, 1 Hillside	57	57	59	59	59	60
Cityview Close, 2 Hillside	61	61	62	62	63	63
Cityview Close, 3 Hillside	66	66	67	67	68	68
Cityview Close, 5 Hillside	62	62	63	63	64	64
Cityview Close, 6 Hillside	61	61	63	63	63	64
Cityview Close, 7 Hillside	62	62	63	63	64	64
Cityview Close, 8 Hillside	62	62	63	63	64	64
Community Hub, 90 Sydenham	68	68	72	72	73	73
Como Ave, 11 Caroline Springs	54	59	61	61	64	65
Como Ave, 13 Caroline Springs	55	60	62	62	65	66
Como Ave, 14 Caroline Springs	58	63	66	66	71	71
Como Ave, 15 Caroline Springs	54	60	61	62	65	65
Como Ave, 16 Caroline Springs	57	63	65	65	71	71
Como Ave, 9 Caroline Springs	54	59	62	61	65	65
Contursi Drive, 24 Hillside	62	62	64	64	68	68

Location	dB(A) $L_{A10\ (18\ hour)}$					
	Modelled existing traffic noise levels with existing 2-lane road without bridge	Modelled existing traffic noise levels with existing 2-lane road with bridge	Modelled 2046 traffic noise levels with 2-lane road without bridge	Modelled 2046 traffic noise levels with 2-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 4-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 6-lane road with bridge
Contursi Drive, 24 Hillside	62	62	64	64	68	69
Cooma Place, 8 Caroline Springs	45	63	45	59	66	66
Cooma Place, 9 Caroline Springs	45	67	46	61	70	70
Cynthia Court, 1/18 Sydenham	47	47	52	52	52	52
Cynthia Court, 1/20 Sydenham	46	46	51	51	51	51
Cynthia Court, 2/18 Sydenham	47	47	52	52	51	52
Cynthia Court, 2/20 Sydenham	64	64	66	66	67	67
Cynthia Court, 22 Sydenham	61	61	63	63	65	65
Cynthia Court, 24 Sydenham	60	60	62	62	63	64
Cynthia Court, 29 Sydenham	60	60	63	63	64	65
Cynthia Court, 3/18 Sydenham	64	64	66	66	67	68
Cynthia Court, 31 Sydenham	61	60	63	63	65	65
Cynthia Court, 33 Sydenham	62	62	64	64	66	66
Deer Street, 30 Deer Park	49	52	53	53	55	56
Deer Street, 31 Deer Park	50	51	53	53	54	55
Deer Street, 31 Deer Park	57	59	60	60	62	63
Drummond Circuit, 15	66	67	67	67	68	69
Drummond Circuit, 17	66	67	67	67	68	69
Drummond Circuit, 20	66	66	67	67	68	69
Dundee Way, 1/46 Sydenham	49	49	54	54	55	55
Dundee Way, 1/62 Sydenham	51	51	54	54	56	56
Dundee Way, 1/64 Sydenham	50	50	54	54	55	55
Dundee Way, 1/66 Sydenham	52	52	55	55	57	57
Dundee Way, 2/46 Sydenham	62	62	67	67	68	68
Dundee Way, 2/62 Sydenham	61	61	63	63	67	68

Location	dB(A) $L_{A10\ (18\ hour)}$					
	Modelled existing traffic noise levels with existing 2-lane road without bridge	Modelled existing traffic noise levels with existing 2-lane road with bridge	Modelled 2046 traffic noise levels with 2-lane road without bridge	Modelled 2046 traffic noise levels with 2-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 4-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 6-lane road with bridge
Dundee Way, 2/64 Sydenham	60	60	61	61	66	66
Dundee Way, 2/66 Sydenham	60	60	62	62	67	67
Dundee Way, 3/46 Sydenham	63	63	66	66	69	69
Dundee Way, 4/46 Sydenham	62	61	64	64	68	68
Dundee Way, 42 Sydenham	62	62	68	68	68	68
Dundee Way, 48 Sydenham	58	58	61	61	63	63
Dundee Way, 50 Sydenham	58	58	61	61	63	64
Dundee Way, 52 Sydenham	58	58	61	61	63	63
Dundee Way, 54 Sydenham	58	58	60	60	63	63
Dundee Way, 56 Sydenham	58	58	61	61	63	64
Dundee Way, 58 Sydenham	55	55	57	57	59	59
Dundee Way, 60 Sydenham	57	57	60	60	62	63
Dundee Way, 68 Sydenham	56	56	58	58	61	61
Dundee Way, 70 Sydenham	55	55	57	57	60	61
Dundee Way, 72 (57) Sydenham	57	57	59	60	63	63
Dundee Way, 74 Sydenham	57	57	59	59	62	62
Dundee Way, 76 Sydenham	58	57	60	60	62	63
Dundee Way, 78 Sydenham	56	56	58	58	61	61
Dundee Way, 80 Sydenham	58	57	60	60	62	63
Dundee Way, 82 Sydenham	57	57	59	59	62	62
Dundee Way, 84 Sydenham	57	57	59	59	61	62
Durack Circuit, 23 Taylors Hill	59	61	61	61	63	64
Durack Circuit, 25 Taylors Hill	59	61	61	61	64	64
Durack Circuit, 27 Taylors Hill	58	60	61	61	63	64
Durack Circuit, 29 Taylors Hill	58	60	61	61	63	64

Location	dB(A) $L_{A10\ (18\ hour)}$					
	Modelled existing traffic noise levels with existing 2-lane road without bridge	Modelled existing traffic noise levels with existing 2-lane road with bridge	Modelled 2046 traffic noise levels with 2-lane road without bridge	Modelled 2046 traffic noise levels with 2-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 4-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 6-lane road with bridge
Durack Circuit, 31 Taylors Hill	58	60	60	60	63	63
Durack Circuit, 33 Taylors Hill	57	59	60	60	63	63
Durack Circuit, 35 Taylors Hill	57	59	59	59	62	63
Durack Circuit, 37 Taylors Hill	56	58	59	59	62	63
Durack Circuit, 39 Taylors Hill	56	58	59	59	62	63
Durack Circuit, 41 Taylors Hill	56	58	59	59	62	63
Durack Circuit, 43 Taylors Hill	56	58	59	59	62	63
Durack Circuit, 45 Taylors Hill	56	58	59	59	62	63
Durack Circuit, 47 Taylors Hill	55	57	58	58	61	62
Durack Circuit, 49 Taylors Hill	58	60	61	61	65	65
Earlington Boulevard, 1 Caroline Springs	61	65	65	65	69	70
Earlington Boulevard, 2 Caroline Spring	61	65	65	65	70	71
Earlington Boulevard, 3 Caroline Springs	53	56	56	56	59	60
Earlington Boulevard, 4 Caroline Spring	53	57	57	57	60	61
Elliot Court, 1 Burnside	63	66	66	66	67	68
Fairweather Drive, 3 Caroline Springs	51	63	53	61	65	66
Florida Court, 10 Caroline Springs	45	63	45	58	67	66
Florida Court, 9 Caroline Springs	48	65	48	60	69	68
Forbes Place, 12 Taylors Hill	63	65	65	65	65	66
Fydler Avenue, 70 Caroline Springs	49	64	52	61	68	69
Fydler Avenue, 83 Caroline Springs	46	63	51	61	68	69
George St, 104 Taylors Hill	60	62	63	63	66	66
George St, 107 Taylors Hill	61	63	63	63	66	66
Glenbruar Drive, 1 Sydenham	60	60	61	61	63	63
Glenbruar Drive, 3 Sydenham	54	54	55	55	56	57

Location	dB(A) $L_{A10\ (18\ hour)}$					
	Modelled existing traffic noise levels with existing 2-lane road without bridge	Modelled existing traffic noise levels with existing 2-lane road with bridge	Modelled 2046 traffic noise levels with 2-lane road without bridge	Modelled 2046 traffic noise levels with 2-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 4-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 6-lane road with bridge
Glenbruar Drive, 5 Sydenham	50	51	53	53	53	53
Glenbruar Drive, 7 Sydenham	48	49	52	52	51	52
Glenbruar Drive, 9 Sydenham	47	47	51	51	50	50
Gould Place, 1 Caroline Springs	51	55	55	55	57	58
Gould Place, 2 Caroline Springs	52	55	56	56	58	58
Gould Place, 3 Caroline Springs	53	56	56	56	58	59
Gould Place, 4 Caroline Springs	53	56	56	56	59	59
Gould Place, 5 Caroline Springs	53	56	56	56	59	59
Gould Place, 6 Caroline Springs	58	61	61	61	65	65
Grosvenor Crescent, 25 Derrimut	65	65	65	65	67	68
Grosvenor Crescent, 26 Derrimut	65	65	66	66	67	68
Grosvenor Crescent, 27 Derrimut	65	65	66	66	67	68
Grosvenor Crescent, 28 Derrimut	66	66	67	67	68	69
Grosvenor Crescent, 29 (66-67) Derrimut	65	65	66	66	67	68
Grosvenor Crescent, 30 Derrimut	65	65	66	66	67	68
Grosvenor Crescent, 38 Derrimut	66	67	67	67	68	69
Hannah Avenue, 10 Sydenham	62	62	65	65	65	66
Hannah Avenue, 12 Sydenham	64	64	66	66	66	66
Hannah Avenue, 14 Sydenham	63	63	65	65	65	66
Hannah Avenue, 16 Sydenham	63	63	65	65	65	65
Hannah Avenue, 18 Sydenham	63	62	64	64	65	65
Hannah Avenue, 2 Sydenham	63	63	68	68	68	68
Hannah Avenue, 20 Sydenham	64	64	65	65	65	66
Hannah Avenue, 22 Sydenham	62	62	64	64	64	65
Hannah Avenue, 24 Sydenham	63	63	65	65	65	65

Location	dB(A) $L_{A10\ (18\ hour)}$					
	Modelled existing traffic noise levels with existing 2-lane road without bridge	Modelled existing traffic noise levels with existing 2-lane road with bridge	Modelled 2046 traffic noise levels with 2-lane road without bridge	Modelled 2046 traffic noise levels with 2-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 4-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 6-lane road with bridge
Hannah Avenue, 26 Sydenham	63	63	65	65	65	66
Hannah Avenue, 28 Sydenham	62	62	64	64	65	65
Hannah Avenue, 30 Sydenham	63	63	65	65	65	65
Hannah Avenue, 32 Sydenham	63	63	65	65	65	66
Hannah Avenue, 34 Sydenham	63	63	65	65	65	66
Hannah Avenue, 4 Sydenham	62	62	66	66	67	67
Hannah Avenue, 6 Sydenham	62	62	65	65	67	67
Hannah Avenue, 8 Sydenham	62	62	65	65	66	66
Harwood Court, 13 Caroline Springs	45	62	44	59	66	66
Harwood Court, 16 Caroline Springs	45	67	46	61	70	70
Hepbum Place, 13 Sydenham	59	59	61	61	65	66
Hepbum Place, 15 Sydenham	60	60	62	62	66	67
Hepbum Place, 16 Sydenham	59	59	61	61	65	65
Hepbum Place, 18 Sydenham	59	59	61	61	65	66
Huegill Drive, 1 Caroline Springs	51	63	54	61	65	66
Huegill Drive, 3 Caroline Springs	51	63	55	61	65	66
Hulme Court, 6 Sydenham	59	59	61	61	62	63
Hulme Court, 7 Sydenham	60	60	62	62	63	64
Hume Drive, 1 Taylors Hill	59	61	62	62	65	65
Hume Drive, 10 Taylors Hill	59	61	62	62	65	66
Hume Drive, 11 Taylors Hill	59	61	62	62	66	66
Hume Drive, 12 Taylors Hill	59	61	62	62	65	66
Hume Drive, 13 Taylors Hill	59	61	61	61	65	65
Hume Drive, 14 Taylors Hill	59	61	62	62	66	66
Hume Drive, 15 Taylors Hill	58	60	61	61	65	66

Location	dB(A) $L_{A10\ (18\ hour)}$					
	Modelled existing traffic noise levels with existing 2-lane road without bridge	Modelled existing traffic noise levels with existing 2-lane road with bridge	Modelled 2046 traffic noise levels with 2-lane road without bridge	Modelled 2046 traffic noise levels with 2-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 4-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 6-lane road with bridge
Hume Drive, 16 Taylors Hill	54	56	57	57	60	61
Hume Drive, 17 Taylors Hill	59	61	62	62	63	63
Hume Drive, 18 Taylors Hill	58	60	61	61	62	62
Hume Drive, 19 Taylors Hill	58	60	61	61	61	62
Hume Drive, 2 Taylors Hill	59	61	62	62	66	66
Hume Drive, 20 Taylors Hill	58	60	60	60	61	61
Hume Drive, 21 Taylors Hill	58	60	60	60	61	62
Hume Drive, 22 Taylors Hill	59	61	62	62	62	62
Hume Drive, 23 Taylors Hill	62	64	65	65	67	67
Hume Drive, 3 Taylors Hill	59	61	62	62	65	65
Hume Drive, 4 Taylors Hill	59	61	62	62	65	66
Hume Drive, 5 Taylors Hill	59	61	61	61	65	65
Hume Drive, 6 Taylors Hill	59	61	61	61	65	65
Hume Drive, 7 Taylors Hill	59	61	61	61	65	66
Hume Drive, 8 Taylors Hill	59	61	61	61	66	66
Hume Drive, 9 Taylors Hill	59	61	61	61	65	66
Hurlingham Place, 10 Caroline Springs	61	67	67	67	68	69
Hurlingham Place, 11 Caroline Springs	62	67	68	68	69	70
Hurlingham Place, 12 Caroline Springs	61	67	67	67	68	69
Hurlingham Place, 13 Caroline Springs	61	67	67	67	68	69
Hurlingham Place, 14 Caroline Springs	63	68	68	69	69	70
Hurlingham Place, 8 Caroline Springs	65	70	70	70	72	72
Illawarra Court, 12 Taylors Hill	55	57	58	58	61	61
Illawarra Court, 13 Taylors Hill	55	57	58	58	60	60
Illawarra Court, 14 Taylors Hill	55	57	58	58	61	61

Location	dB(A) $L_{A10\ (18\ hour)}$					
	Modelled existing traffic noise levels with existing 2-lane road without bridge	Modelled existing traffic noise levels with existing 2-lane road with bridge	Modelled 2046 traffic noise levels with 2-lane road without bridge	Modelled 2046 traffic noise levels with 2-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 4-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 6-lane road with bridge
Illawarra Court, 15 Taylors Hill	55	57	58	58	61	62
Illawarra Court, 16 Taylors Hill	55	57	58	58	61	61
Illawarra Court, 17 Taylors Hill	57	59	60	60	63	64
Illawarra Court, 18 Taylors Hill	55	57	58	58	61	61
Ingram Place, 4 Taylors Hill	61	63	64	64	65	65
Ingram Place, 5 Taylors Hill	61	63	64	64	66	66
Ingram Place, 6 Taylors Hill	61	63	64	64	66	66
Jells Place, 4 Taylors Hill	62	67	68	68	70	71
Jells Place, 5 Taylors Hill	63	68	69	69	71	72
Kanmore Crescent, 38 (61) Sydenham	60	61	61	61	64	65
Kanmore Crescent, 40 Sydenham	60	60	61	61	64	65
Kanmore Crescent, 40 Sydenham	60	60	61	61	64	65
Kanmore Crescent, 42 Sydenham	60	60	61	61	64	65
Kanmore Crescent, 44 Sydenham	60	60	61	61	64	65
Kanmore Crescent, 46 Sydenham	60	60	61	61	64	65
Kanmore Crescent, 48 Sydenham	60	60	61	61	64	65
Kanmore Crescent, 50 Sydenham	60	60	61	61	64	65
Kanmore Crescent, 52 Sydenham	60	60	61	61	64	65
Kanmore Crescent, 54 Sydenham	60	60	61	61	64	65
Kanmore Crescent, 56 Sydenham	60	60	61	61	64	65
Kanmore Crescent, 58 Sydenham	60	60	61	61	64	65
Kanmore Crescent, 60 Sydenham	59	59	61	61	63	64
Kanmore Crescent, 62 Sydenham	60	60	61	61	63	64
Kanmore Crescent, 64 Sydenham	60	60	61	61	63	64
Kelly Avenue, 2 Burnside	59	62	62	62	66	68

Location	dB(A) $L_{A10\ (18\ hour)}$					
	Modelled existing traffic noise levels with existing 2-lane road without bridge	Modelled existing traffic noise levels with existing 2-lane road with bridge	Modelled 2046 traffic noise levels with 2-lane road without bridge	Modelled 2046 traffic noise levels with 2-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 4-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 6-lane road with bridge
Kelly Avenue, 4 Burnside	52	55	55	55	57	59
Kenswick Park Drive, 10 Sydenham	60	60	61	61	63	64
Kenswick Park Drive, 12 Sydenham	60	60	61	61	63	64
Kenswick Park Drive, 14 Sydenham	60	60	61	61	64	64
Kenswick Park Drive, 16 Sydenham	60	60	61	61	64	64
Kenswick Park Drive, 18 Sydenham	60	60	61	61	64	65
Kenswick Park Drive, 2 Sydenham	59	60	61	61	62	63
Kenswick Park Drive, 20 Sydenham	60	60	61	61	64	65
Kenswick Park Drive, 22 Sydenham	60	60	61	61	64	65
Kenswick Park Drive, 24 Sydenham	60	60	61	61	64	64
Kenswick Park Drive, 26 Sydenham	59	60	61	61	63	64
Kenswick Park Drive, 28 Sydenham	59	59	60	60	63	64
Kenswick Park Drive, 30 Sydenham	59	59	60	60	63	64
Kenswick Park Drive, 32 Sydenham	59	60	60	60	63	64
Kenswick Park Drive, 34 Sydenham	59	60	60	60	63	64
Kenswick Park Drive, 36 Sydenham	60	60	61	61	64	64
Kenswick Park Drive, 38 Sydenham	60	60	61	61	64	64
Kenswick Park Drive, 4 Sydenham	60	60	61	61	62	63
Kenswick Park Drive, 42 Sydenham	60	60	61	61	64	65
Kenswick Park Drive, 44 Sydenham	60	60	61	61	64	65
Kenswick Park Drive, 46 Sydenham	60	61	61	61	64	65
Kenswick Park Drive, 6 Sydenham	60	60	61	61	63	63
Kenswick Park Drive, 8 Sydenham	60	60	61	61	63	63
Landy Court, 12 Burnside	63	67	66	66	67	69
Loxwood Court, 10 Deer Park	66	68	69	69	70	71

Location	dB(A) $L_{A10\ (18\ hour)}$					
	Modelled existing traffic noise levels with existing 2-lane road without bridge	Modelled existing traffic noise levels with existing 2-lane road with bridge	Modelled 2046 traffic noise levels with 2-lane road without bridge	Modelled 2046 traffic noise levels with 2-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 4-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 6-lane road with bridge
Loxwood Court, 11 Deer Park	68	69	72	72	73	73
Loxwood Court, 12 Deer Park	68	69	72	72	73	74
Loxwood Court, 13 Deer Park	67	69	72	72	73	73
Loxwood Court, 14 Deer Park	68	69	72	72	73	74
Loxwood Court, 15 Deer Park	68	69	72	72	73	74
Loxwood Court, 16 Deer Park	67	69	72	72	73	73
Loddon Drive, 91 Taylors Hill	59	62	62	62	64	65
Lucas Terrace, 12 Taylors Hill	62	64	64	64	65	65
Lucas Terrace, 23 Taylors Hill	53	54	56	56	57	57
Lucas Terrace, 25 Taylors Hill	54	56	57	57	58	58
Lucas Terrace, 27 Taylors Hill	59	61	62	62	63	63
Lucas Terrace, 29 Taylors Hill	58	60	61	61	61	62
Lucas Terrace, 31 Taylors Hill	58	60	61	61	62	62
Lucas Terrace, 35 Taylors Hill	58	60	61	61	62	62
Lucas Terrace, 35 Taylors Hill	58	60	61	61	62	62
Lucas Terrace, 37 Taylors Hill	58	60	60	60	61	62
Lucas Terrace, 39 Taylors Hill	58	60	61	61	62	62
Lucas Terrace, 41 Taylors Hill	57	59	60	60	61	61
Manchester Drive, 1/1 Sydenham	68	68	68	68	67	68
Manchester Drive, 2 Sydenham	68	68	69	69	68	68
Manchester Drive, 2/1 Sydenham	68	68	68	68	68	68
Manchester Drive, 3/1 Sydenham	67	68	68	68	68	68
Manchester Drive, 42 Sydenham	68	68	69	69	68	69
Manchester Drive, 49 Sydenham	67	67	68	68	68	68
Manchester Drive, 51 Sydenham	55	55	56	56	56	57

Location	dB(A) $L_{A10\ (18\ hour)}$					
	Modelled existing traffic noise levels with existing 2-lane road without bridge	Modelled existing traffic noise levels with existing 2-lane road with bridge	Modelled 2046 traffic noise levels with 2-lane road without bridge	Modelled 2046 traffic noise levels with 2-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 4-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 6-lane road with bridge
Manchester Drive, 53 Sydenham	50	51	52	52	53	53
Marin Court, 3 Taylors Hill	60	62	62	62	63	63
Marin Court, 4 Taylors Hill	63	65	66	66	66	66
Marin Court, 5 Taylors Hill	60	62	63	63	63	63
Marin Court, 6 Taylors Hill	63	65	66	66	66	66
Meade Way, 1 Sydenham	57	57	58	58	61	61
Melton Highway, 574 Sydenham	61	61	65	65	66	66
Mimosa Way, 50 Caroline Springs	45	62	43	59	67	66
Moira Court, 4 Taylors Hill	56	58	59	59	62	63
Moira Court, 5 Taylors Hill	57	59	59	59	63	63
Morgan Court, 12 Hillside	62	62	63	63	64	64
Morgan Court, 13 Hillside	59	59	61	61	61	62
Morgan Court, 14 Hillside	63	63	65	65	65	66
Morgan Court, 15 Hillside	66	66	67	67	67	68
Morgan Court, 16 Hillside	63	63	64	64	65	66
Morgan Court, 17 Hillside	63	63	64	64	65	65
Nepean Way, 18 Taylors Hill	50	52	53	53	55	55
Nepean Way, 19 Taylors Hill	56	58	59	59	61	61
Nepean Way, 20 Taylors Hill	59	61	61	61	65	65
Nepean Way, 21 Taylors Hill	56	58	58	58	60	61
Nepean Way, 22 Taylors Hill	58	60	61	61	65	65
Nepean Way, 23 Taylors Hill	56	58	59	59	61	61
Nepean Way, 25 Taylors Hill	56	58	59	59	61	61
Nepean Way, 27 Taylors Hill	56	58	59	59	61	61
Nepean Way, 29 Taylors Hill	56	58	59	59	61	61

Location	dB(A) $L_{A10\ (18\ hour)}$					
	Modelled existing traffic noise levels with existing 2-lane road without bridge	Modelled existing traffic noise levels with existing 2-lane road with bridge	Modelled 2046 traffic noise levels with 2-lane road without bridge	Modelled 2046 traffic noise levels with 2-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 4-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 6-lane road with bridge
Nepean Way, 31 Taylors Hill	56	58	59	59	61	61
Nicol Avenue, 1 Burnside	59	63	63	63	67	68
Nicol Avenue, 2 Burnside	59	63	63	63	67	68
Nicol Avenue, 3 Burnside	59	62	63	63	67	68
Nicol Avenue, 4 Burnside	57	60	61	61	64	64
Nicol Avenue, 5 Burnside	57	60	61	61	64	65
Nottingham Way, 1 Sydenham	61	61	62	62	64	65
Nottingham Way, 11 Sydenham	54	54	55	55	57	57
Nottingham Way, 13 Sydenham	49	50	51	51	52	53
Nottingham Way, 15 Sydenham	54	54	55	55	56	57
Nottingham Way, 5 Sydenham	59	59	60	60	62	63
Nottingham Way, 5 Sydenham	60	60	61	61	63	64
Nottingham Way, 7 Sydenham	62	62	63	63	66	67
Nottingham Way, 9 Sydenham	56	56	57	57	58	59
Organ Pipes NP bottom of track	44	45	47	47	47	47
Organ Pipes NP carpark	50	50	53	53	53	53
Organ Pipes NP mid track	46	46	49	49	48	48
Organ Pipes NP top of track	44	49	48	48	47	47
Organ Pipes Rd, Calder Park	55	58	57	57	57	57
Oxford Court, 14 Sydenham	68	68	69	69	68	68
Oxford Court, 7 Sydenham	68	68	69	69	68	69
Padula 11 Court, (63-65) Hillside	63	63	64	64	65	65
Padula Court, 1/12 Hillside	49	49	51	51	51	52
Padula Court, 13 Hillside	64	64	65	65	66	66
Padula Court, 14 Hillside	65	65	66	66	67	67

Location	dB(A) $L_{A10\ (18\ hour)}$					
	Modelled existing traffic noise levels with existing 2-lane road without bridge	Modelled existing traffic noise levels with existing 2-lane road with bridge	Modelled 2046 traffic noise levels with 2-lane road without bridge	Modelled 2046 traffic noise levels with 2-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 4-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 6-lane road with bridge
Padula Court, 15 Hillside	65	65	66	66	67	67
Padula Court, 16 Hillside	65	65	66	66	67	67
Padula Court, 2/12 Hillside	68	68	70	70	70	70
Palmers Road, 170	68	68	68	68	70	70
Pembroke Crescent, 19	67	69	68	68	70	71
Pembroke Crescent, 21	67	69	68	68	70	70
Pembroke Crescent, 23	67	69	68	68	69	70
Pembroke Crescent, 25	67	69	68	68	69	70
Pembroke Crescent, 27	68	70	68	68	70	71
Pembroke Crescent, 29	68	70	69	69	70	71
Pembroke Crescent, 31	68	70	69	69	70	71
Pembroke Crescent, 33	64	65	65	65	66	67
Pembroke Crescent, 35	62	64	64	64	65	66
Penzance Place, 22 Sydenham	68	68	69	69	68	69
Penzance Place, 25 Sydenham	68	68	69	69	68	69
Power Place, 10 facing Interchange	59	56	61	61	61	61
Quinn Street, 141 Deer Park	55	57	59	59	60	61
Quinn Street, 143 Deer Park	68	71	72	72	73	74
Quinn Street, 30 Deer Park	56	58	59	59	61	62
Regent Court, 7 Caroline Springs	58	63	65	66	71	71
Regent Court, 8 Caroline Springs	58	63	65	65	70	70
Robinsons Rd ,170 (58) Deer Park	57	59	61	61	63	64
Robinsons Road, 100 Deer Park	54	55	57	57	59	59
Robinsons Road, 102 Deer Park	55	57	58	58	60	61
Robinsons Road, 104 Deer Park	55	57	59	59	60	61

Location	dB(A) $L_{A10\ (18\ hour)}$					
	Modelled existing traffic noise levels with existing 2-lane road without bridge	Modelled existing traffic noise levels with existing 2-lane road with bridge	Modelled 2046 traffic noise levels with 2-lane road without bridge	Modelled 2046 traffic noise levels with 2-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 4-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 6-lane road with bridge
Robinsons Road, 108 Deer Park	57	59	60	60	62	63
Robinsons Road, 110 Deer Park	58	60	61	61	63	64
Robinsons Road, 112 Deer Park	59	61	62	62	64	65
Robinsons Road, 114 Deer Park	59	61	63	63	64	65
Robinsons Road, 116 Deer Park	60	62	64	64	65	66
Robinsons Road, 118 Deer Park	60	63	64	64	65	66
Robinsons Road, 120 Deer Park	61	64	65	65	66	67
Robinsons Road, 122 Deer Park	63	65	66	66	68	68
Robinsons Road, 124 Deer Park	63	65	66	66	68	68
Robinsons Road, 126 Deer Park	65	67	69	69	70	71
Robinsons Road, 128 Deer Park	65	68	69	69	70	71
Robinsons Road, 130 Deer Park	66	69	70	70	71	72
Robinsons Road, 132 Deer Park	65	67	69	69	70	71
Robinsons Road, 134 Deer Park	68	70	71	71	72	73
Robinsons Road, 136 Deer Park	68	71	72	72	73	74
Robinsons Road, 142 Deer Park	67	69	70	70	71	72
Robinsons Road, 144a Deer Park	67	70	71	71	72	73
Robinsons Road, 144b Deer Park	49	51	52	52	54	55
Robinsons Road, 146 Deer Park	67	70	71	71	72	73
Robinsons Road, 148 Deer Park	67	69	71	71	72	73
Robinsons Road, 150 Deer Park	64	66	68	68	70	71
Robinsons Road, 152 Deer Park	65	68	69	69	70	72
Robinsons Road, 154 Deer Park	64	66	69	69	70	71
Robinsons Road, 154 Deer Park	67	69	70	70	72	73
Robinsons Road, 156 Deer Park	65	67	69	69	70	71

Location	dB(A) $L_{A10\ (18\ hour)}$					
	Modelled existing traffic noise levels with existing 2-lane road without bridge	Modelled existing traffic noise levels with existing 2-lane road with bridge	Modelled 2046 traffic noise levels with 2-lane road without bridge	Modelled 2046 traffic noise levels with 2-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 4-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 6-lane road with bridge
Robinsons Road, 158 Deer Park	65	67	69	69	71	71
Robinsons Road, 160 Deer Park	65	66	69	69	71	71
Robinsons Road, 162 Deer Park	65	66	69	69	70	71
Robinsons Road, 164 Deer Park	65	66	69	69	71	71
Robinsons Road, 166 Deer Park	65	66	69	69	71	71
Robinsons Road, 168 Deer Park	65	66	69	69	71	71
Rose Street, 1 Burnside	58	62	62	62	65	66
Roycroft Avenue, 11 Caroline Springs	51	54	54	54	56	57
Selwyn Close, 4 Caroline Springs	63	69	69	69	71	71
Selwyn Close, 5 Caroline Springs	64	69	69	69	71	72
Sherrington Grange, 101 Derrimut	66	67	67	67	69	69
Sherrington Grange, 103 Derrimut	66	67	67	67	68	69
Sherrington Grange, 45 Derrimut	58	58	59	59	59	59
Sherrington Grange, 47 Derrimut	58	58	59	59	59	59
Sherrington Grange, 49 Derrimut	58	58	59	59	60	60
Sherrington Grange, 51 Derrimut	58	58	59	59	60	60
Sherrington Grange, 53 Derrimut	59	59	59	59	60	61
Sherrington Grange, 55 Derrimut	59	59	60	60	61	61
Sherrington Grange, 57 Derrimut	60	60	61	61	62	62
Sherrington Grange, 59 Derrimut	61	62	62	62	63	64
Sherrington Grange, 61 Derrimut	63	64	64	64	65	66
Sherrington Grange, 63 Derrimut	66	66	66	66	68	68
Sherrington Grange, 65 Derrimut	66	67	67	67	68	69
Sherrington Grange, 67 Derrimut	66	66	67	67	68	69
Sherrington Grange, 69 Derrimut	66	67	67	67	68	69

Location	dB(A) $L_{A10\ (18\ hour)}$					
	Modelled existing traffic noise levels with existing 2-lane road without bridge	Modelled existing traffic noise levels with existing 2-lane road with bridge	Modelled 2046 traffic noise levels with 2-lane road without bridge	Modelled 2046 traffic noise levels with 2-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 4-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 6-lane road with bridge
Sherrington Grange, 71 Derrimut	66	66	67	67	68	69
Sherrington Grange, 73 Derrimut	66	66	67	67	68	69
Sherrington Grange, 75 Derrimut	66	67	67	67	68	69
Sherrington Grange, 77 Derrimut	66	67	67	67	68	69
Sherrington Grange, 79 Derrimut	66	67	67	67	68	69
Sherrington Grange, 81 Derrimut	66	67	67	67	68	69
Sherrington Grange, 83 Derrimut	66	67	67	67	68	69
Sherrington Grange, 85 Derrimut	66	67	67	67	68	69
Sherrington Grange, 87 Derrimut	66	67	67	67	68	69
Sherrington Grange, 89 Derrimut	66	67	67	67	68	69
Sherrington Grange, 91 Derrimut	66	67	67	67	68	69
Sherrington Grange, 93 Derrimut	66	67	67	67	68	69
Sherrington Grange, 95 Derrimut	66	67	67	67	68	69
Sherrington Grange, 97 Derrimut	66	67	67	67	69	69
Sherrington Grange, 99 Derrimut	67	67	67	67	69	69
Southbank Walk, 10 Hillside	67	67	68	68	68	69
Southbank Walk, 11 Hillside	65	65	67	67	67	68
Southbank Walk, 9 Hillside	58	58	59	59	60	60
St James Court, 6 Caroline Springs	56	65	66	66	70	71
St James Court, 7 Caroline Springs	56	64	65	65	71	72
Sullivan Terrace, 2 Caroline Springs	40	59	46	58	64	65
Surrey Place, 4 Caroline Springs	64	69	69	70	71	72
Surrey Place, 5 Caroline Springs	64	69	69	69	71	72
Syon Court, 7 Caroline Springs	58	67	61	67	71	71
Syon Court, 8 Caroline Springs	57	66	62	66	71	71

Location	dB(A) $L_{A10\ (18\ hour)}$					
	Modelled existing traffic noise levels with existing 2-lane road without bridge	Modelled existing traffic noise levels with existing 2-lane road with bridge	Modelled 2046 traffic noise levels with 2-lane road without bridge	Modelled 2046 traffic noise levels with 2-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 4-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 6-lane road with bridge
Tarcoola Drive, 1 Caroline Springs	66	70	70	70	70	71
Tarcoola Drive, 2 Caroline Springs	67	71	71	71	71	72
Tarcoola Drive, 3 Caroline Springs	53	56	56	56	58	58
Tarcoola Drive, 4 Caroline Springs	55	58	58	58	59	60
Taurima Court, 4 Caroline Springs	51	65	52	62	68	70
Taurima Court, 5 Caroline Springs	51	65	53	62	68	70
Taylors Boulevard, 1 Hillside	62	62	63	63	63	64
Taylors Boulevard, 2 Hillside	63	63	64	64	64	65
Taylors Road, 1 Caroline Springs	62	66	68	68	70	70
Taylors Road, 2 Caroline Springs	60	64	66	66	68	69
Taylors Road, 3 Caroline Springs	59	63	65	65	68	68
Taylors Road, 4 Caroline Springs	59	63	65	65	68	68
Taylors Road, 5 Caroline Springs	59	63	65	65	68	69
Taylors Road, 6 Caroline Springs	58	63	65	65	68	69
Taylors Road, 7 Caroline Springs	57	62	64	64	68	68
Taylors Road, 8 Caroline Springs	57	62	64	64	68	68
Taylors Road, 9 Caroline Springs	57	61	64	63	67	68
Tenterfield Drive, 178 Caroline Springs	58	67	58	67	70	70
Tenterfield Drive, 185 Caroline Springs	52	65	53	61	69	68
Tonbridge Circle, 18 Derrimut	64	65	65	65	67	67
Tonbridge Circle, 23 Derrimut	64	65	65	65	67	67
Tonbridge Circle, 24 Derrimut	67	68	68	68	69	70
Tonbridge Circle, 21 Derrimut	67	67	68	68	69	70
Torowatta Place, 1 Burnside	63	67	66	66	67	68
Torowatta Place, 2 Burnside	63	67	66	66	67	68

Location	dB(A) $L_{A10\ (18\ hour)}$					
	Modelled existing traffic noise levels with existing 2-lane road without bridge	Modelled existing traffic noise levels with existing 2-lane road with bridge	Modelled 2046 traffic noise levels with 2-lane road without bridge	Modelled 2046 traffic noise levels with 2-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 4-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 6-lane road with bridge
Wells Avenue, 1 Taylors Hill	58	60	62	62	65	65
Wells Avenue, 2 Taylors Hill	58	60	61	61	64	65
Wenden Court, 17 Burnside	64	68	67	67	68	70
Westwood Drive, 124 Burnside	62	64	65	65	66	67
Westwood Drive, 128 Burnside	62	64	64	65	66	67
Westwood Drive, 130 Burnside	63	66	66	66	67	68
Westwood Drive, 132 Burnside	63	66	66	66	67	69
Westwood Drive, 134 Burnside	62	65	65	65	67	68
Westwood Drive, 136 Burnside	63	66	66	66	67	69
Westwood Drive, 140 Burnside	63	66	66	66	67	68
Westwood Drive, 140 Burnside	62	65	65	65	66	68
Westwood Drive, 142 Burnside	62	66	65	65	67	68
Westwood Drive, 148 Burnside	62	65	65	65	66	68
Westwood Drive, 150 Burnside	63	66	66	66	67	68
Westwood Drive, 152 Burnside	61	65	65	65	66	67
Westwood Drive, 158 Burnside	62	66	65	65	66	67
Westwood Drive, 160 Burnside	62	65	65	65	66	67
Westwood Drive, 162 Burnside	61	65	64	64	65	66
Westwood Drive, 164 Burnside	59	62	62	62	62	64
Westwood Drive, 166 Burnside	61	65	64	64	65	66
Westwood Drive, 168 Burnside	62	65	65	65	66	67
Westwood Drive, 170 Burnside	62	65	65	65	66	67
Westwood Drive, 176 Burnside	62	66	66	66	67	68
Westwood Drive, 178 Burnside	61	65	65	65	66	67
Westwood Drive, 180 Burnside	62	66	66	66	67	68

Location	dB(A) $L_{A10\ (18\ hour)}$					
	Modelled existing traffic noise levels with existing 2-lane road without bridge	Modelled existing traffic noise levels with existing 2-lane road with bridge	Modelled 2046 traffic noise levels with 2-lane road without bridge	Modelled 2046 traffic noise levels with 2-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 4-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 6-lane road with bridge
Westwood Drive, 181 Burnside	58	61	61	61	64	65
Westwood Drive, 182 Burnside	62	66	66	66	67	68
Westwood Drive, 183 Burnside	58	62	62	62	65	66
Westwood Drive, 184 Burnside	63	66	66	66	67	68
Westwood Drive, 185 Burnside	58	62	62	62	65	66
Westwood Drive, 186 Burnside	62	66	66	66	67	67
Westwood Drive, 187 Burnside	58	61	61	61	65	65
Westwood Drive, 188 Burnside	61	65	65	65	66	67
Westwood Drive, 189 Burnside	58	62	62	62	65	66
Westwood Drive, 190 Burnside	62	65	65	65	66	67
Westwood Drive, 191 Burnside	58	62	62	62	65	66
Westwood Drive, 192 Burnside	61	65	65	65	66	67
Westwood Drive, 193 Burnside	58	62	62	62	65	66
Westwood Drive, 194 Burnside	61	65	65	65	66	67
Westwood Drive, 195 Burnside	57	61	61	61	64	65
Westwood Drive, 196 Burnside	62	66	66	66	67	68
Westwood Drive, 198 Burnside	61	65	65	65	66	67
Westwood Drive, 199 Burnside	58	61	61	61	64	65
Westwood Drive, 200 Burnside	62	65	65	65	66	67
Westwood Drive, 201 Burnside	58	62	62	62	65	66
Westwood Drive, 202 Burnside	62	66	66	66	67	68
Westwood Drive, 203 Burnside	58	62	62	62	65	67
Westwood Drive, 204 Burnside	61	65	65	65	66	67
Westwood Drive, 205 Burnside	58	62	62	62	65	66
Westwood Drive, 206 Burnside	61	65	65	65	66	67

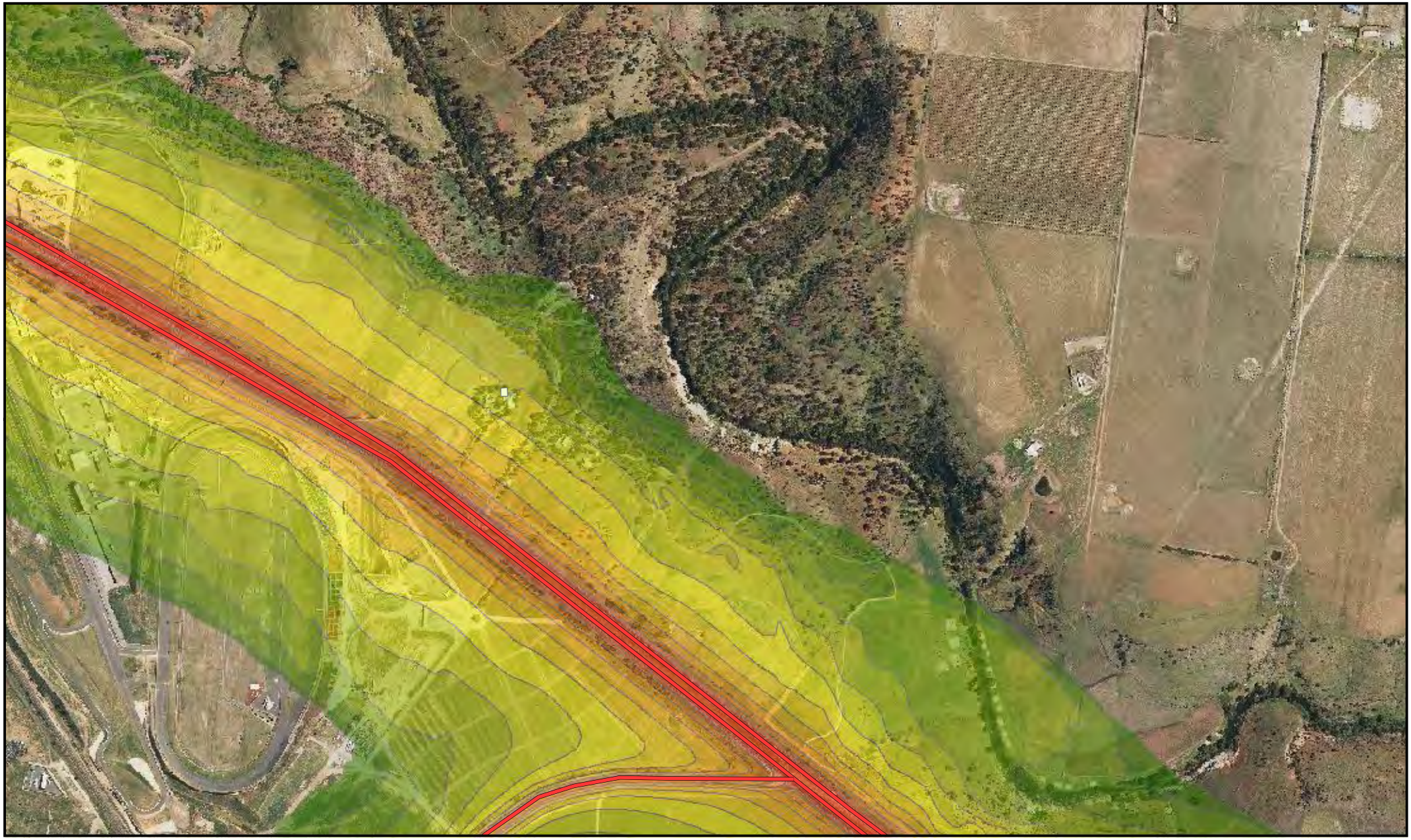
Location	dB(A) $L_{A10\ (18\ hour)}$					
	Modelled existing traffic noise levels with existing 2-lane road without bridge	Modelled existing traffic noise levels with existing 2-lane road with bridge	Modelled 2046 traffic noise levels with 2-lane road without bridge	Modelled 2046 traffic noise levels with 2-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 4-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 6-lane road with bridge
Westwood Drive, 207 Burnside	58	62	62	62	65	67
Westwood Drive, 208 Burnside	61	65	65	65	66	67
Westwood Drive, 209 Burnside	58	62	62	62	66	67
Westwood Drive, 210 Burnside	63	66	66	66	67	68
Westwood Drive, 211 Burnside	57	61	61	61	64	66
Westwood Drive, 212 Burnside	62	66	66	66	67	68
Westwood Drive, 213 Burnside	58	61	61	61	64	66
Westwood Drive, 214a Burnside	63	66	66	66	67	68
Westwood Drive, 214b Burnside	62	66	66	66	67	67
Westwood Drive, 216 Burnside	62	65	65	65	66	67
Westwood Drive, 218 Burnside	62	66	66	66	67	67
Westwood Drive, 220 Burnside	62	66	66	66	67	67
Westwood Drive, 222 Burnside	62	66	66	66	67	67
Westwood Drive, 224 Burnside	62	66	66	66	67	68
Westwood Drive, 226 Burnside	60	64	64	64	65	65
Westwood Drive, 232 Caroline Springs	62	66	66	66	67	68
Westwood Drive, 234 Caroline Springs	62	66	66	66	67	67
Westwood Drive, 236 Caroline Springs	62	65	65	65	66	67
Westwood Drive, 238 Caroline Springs	62	65	65	65	66	67
Westwood Drive, 240 Caroline Springs	62	65	66	66	66	67
Westwood Drive, 242 Caroline Springs	62	65	65	65	66	67
Westwood Drive, 243 Caroline Springs	58	62	62	62	66	67
Westwood Drive, 244 Caroline Springs	62	65	65	65	66	67
Westwood Drive, 245 Caroline Springs	58	62	62	62	66	67
Westwood Drive, 246 Caroline Springs	61	65	65	65	66	67

Location	dB(A) $L_{A10\ (18\ hour)}$					
	Modelled existing traffic noise levels with existing 2-lane road without bridge	Modelled existing traffic noise levels with existing 2-lane road with bridge	Modelled 2046 traffic noise levels with 2-lane road without bridge	Modelled 2046 traffic noise levels with 2-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 4-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 6-lane road with bridge
Westwood Drive, 247 Caroline Springs	59	62	62	62	66	67
Westwood Drive, 248 Caroline Springs	62	65	65	65	66	67
Westwood Drive, 249 Caroline Springs	59	63	62	63	66	67
Westwood Drive, 250 Caroline Springs	61	65	65	65	66	66
Westwood Drive, 251 Caroline Springs	58	62	62	62	65	66
Westwood Drive, 253 Caroline Springs	58	62	62	62	65	66
Westwood Drive, 255 Caroline Springs	57	61	61	61	64	65
Westwood Drive, 256 Caroline Springs	63	66	66	66	67	68
Westwood Drive, 258 Caroline Springs	61	64	64	64	65	66
Westwood Drive, 260 Caroline Springs	61	65	65	65	66	67
Westwood Drive, 261 Caroline Springs	57	61	60	61	64	65
Westwood Drive, 262 Caroline Springs	62	65	65	65	66	67
Westwood Drive, 263 Caroline Springs	58	63	62	62	66	67
Westwood Drive, 264 Caroline Springs	61	65	65	65	66	67
Westwood Drive, 265 Caroline Springs	59	63	62	63	66	67
Westwood Drive, 266 Caroline Springs	62	65	65	65	66	67
Westwood Drive, 267 Caroline Springs	58	62	62	62	66	67
Westwood Drive, 268 Caroline Springs	62	65	65	65	66	67
Westwood Drive, 269 Caroline Springs	58	62	62	62	66	67
Westwood Drive, 270 Caroline Springs	61	65	65	65	66	67
Westwood Drive, 271 Caroline Springs	58	62	62	62	66	67
Westwood Drive, 272 Caroline Springs	61	65	65	65	66	66
Westwood Drive, 273 Caroline Springs	58	62	61	62	66	66
Westwood Drive, 274 Caroline Springs	62	66	65	66	66	67
Westwood Drive, 275 Caroline Springs	57	62	61	62	65	66

Location	dB(A) $L_{A10\ (18\ hour)}$					
	Modelled existing traffic noise levels with existing 2-lane road without bridge	Modelled existing traffic noise levels with existing 2-lane road with bridge	Modelled 2046 traffic noise levels with 2-lane road without bridge	Modelled 2046 traffic noise levels with 2-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 4-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 6-lane road with bridge
Westwood Drive, 276 Caroline Springs	61	65	65	65	66	67
Westwood Drive, 278 Caroline Springs	61	65	65	65	66	67
Westwood Drive, 279 Caroline Springs	58	63	62	63	66	67
Westwood Drive, 280 Caroline Springs	61	66	65	66	67	67
Westwood Drive, 282 Caroline Springs	61	66	65	66	67	67
Westwood Drive, 283 Caroline Springs	57	64	62	64	66	67
Westwood Drive, 285 Caroline Springs	56	64	61	63	66	67
Westwood Drive, 287 Caroline Springs	54	63	59	62	66	67
Westwood Drive, 289 Caroline Springs	53	63	57	61	65	66
Westwood Drive, 291 Caroline Springs	53	63	57	61	65	66
Westwood Drive, 293 Caroline Springs	53	64	56	62	67	67
Westwood Drive, 295 Caroline Springs	52	64	56	62	66	67
Westwood Drive, 303 Caroline Springs	50	63	53	61	65	66
Westwood Drive, 305 Caroline Springs	50	63	53	61	65	66
Westwood Drive, 307 Caroline Springs	50	63	53	61	65	66
Westwood Drive, 309 Caroline Springs	51	63	53	61	66	67
Westwood Drive, 311 (44-45 & 55) Caroline Springs	52	65	54	62	67	68
Westwood Drive, 313 Caroline Springs	49	63	52	61	65	66
Westwood Drive, 315 Caroline Springs	50	63	52	61	65	67
Westwood Drive, 317 Caroline Springs	50	63	52	61	65	67
Westwood Drive, 319 Caroline Springs	49	62	51	60	64	65
Wood Grove, 18 Burnside	52	55	55	55	57	58
Wood Grove, 20 Burnside	52	55	56	56	58	59
Wood Grove, 22 Burnside	53	56	57	57	59	60
Wood Grove, 24 Burnside	54	57	57	57	60	61

Location	dB(A) $L_{A10\ (18\ hour)}$					
	Modelled existing traffic noise levels with existing 2-lane road without bridge	Modelled existing traffic noise levels with existing 2-lane road with bridge	Modelled 2046 traffic noise levels with 2-lane road without bridge	Modelled 2046 traffic noise levels with 2-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 4-lane road with bridge	Modelled 2046 traffic noise levels with upgraded 6-lane road with bridge
Wood Grove, 26 Burnside	57	61	61	61	64	65
Wood Grove, 28 Burnside	58	62	62	62	65	66
Wood Grove, 30 Burnside	58	62	62	62	65	66
Wood Grove, 32 Burnside	58	61	61	61	64	66

Appendix H: Noise Maps - Modelled Existing Palmers Road Corridor, 2015 without Kororoit Creek Bridge



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DATUM GDA 1994, PROJECTION MGA ZONE 55

0 60 120 240
metres

1:0 (when printed at A3)

Traffic Noise Levels LA10 (18hour)

<42	54	69
42	57	72
45	60	>72
48	63	
51	66	

vicroads
keeping victorians connected

Road traffic noise levels have been rounded to the nearest integer. These levels have been predicted from computer noise modelling and are indicative only.

Existing traffic noise levels With Westwood Drive Connection $L_{A10(18\ hour)}$

Client: VicRoads

Report Title: Traffic Noise Impacts of Palmers Road Project

Project Area: Palmers Road Project

Figure

1

I:\DATA\SPEC\4xxx\MAxxxx\MA17xx\MA1704

A3 size

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DATUM GDA 1994, PROJECTION MGA ZONE 55

0 60 120 240
metres
1:0 (when printed at A3)

Traffic Noise Levels LA10 (18hour)

<42	54	69
42	57	72
45	60	>72
48	63	
51	66	

vicroads
keeping victorians connected

Road traffic noise levels have been rounded to the nearest integer. These levels have been predicted from computer noise modelling and are indicative only.

Existing traffic noise levels With Westwood Drive Connection $L_{A10(18\ hour)}$

Client: VicRoads

Report Title: Traffic Noise Impacts of Palmers Road Project

Project Area: Palmers Road Project

Figure

2

I:\DATA\SPEC\4xxx\MAxxxx\MA17xx\MA1704

A3 size

PROJECT ID MA1734
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DATUM GDA 1994, PROJECTION MGA ZONE 55

0 60 120 240
metres
1:0 (when printed at A3)

Traffic Noise Levels LA10 (18hour)

<42	54	69
42	57	72
45	60	>72
48	63	
51	66	

vicroads
keeping victorians connected

Road traffic noise levels have been rounded to the nearest integer. These levels have been predicted from computer noise modelling and are indicative only.

Existing traffic noise levels With Westwood Drive Connection $L_{A10(18\ hour)}$

Client: VicRoads

Report Title: Traffic Noise Impacts of Palmers Road Project

Project Area: Palmers Road Project

Figure

3

I:\DATA\SPEC\4xxx\MAxxxx\MA17xx\MA1704

A3 size

PROJECT ID MA1734
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DATUM GDA 1994, PROJECTION MGA ZONE 55

0 60 120 240
metres
1:0 (when printed at A3)

Traffic Noise Levels LA10 (18hour)

<42	54	69
42	57	72
45	60	>72
48	63	
51	66	

vicroads
keeping victorians connected

Road traffic noise levels have been rounded to the nearest integer. These levels have been predicted from computer noise modelling and are indicative only.

Existing traffic noise levels With Westwood Drive Connection $L_{A10(18\ hour)}$

Client: VicRoads

Report Title: Traffic Noise Impacts of Palmers Road Project

Project Area: Palmers Road Project

Figure

4

I:\DATA\SPEC\4xxx\MAxxxx\MA17xx\MA1704

A3 size

PROJECT ID MA1734
CREATED BY PJW
LAST MODIFIED PJW 22/6/2014

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DATUM GDA 1994, PROJECTION MGA ZONE 55

0 60 120 240
metres

1:0 (when printed at A3)

Traffic Noise Levels LA10 (18hour)

<42	54	69
42	57	72
45	60	>72
48	63	
51	66	

vicroads
keeping victorians connected

Road traffic noise levels have been rounded to the nearest integer. These levels have been predicted from computer noise modelling and are indicative only.

Existing traffic noise levels With Westwood Drive Connection $L_{A10(18\ hour)}$

Client: VicRoads

Report Title: Traffic Noise Impacts of Palmers Road Project

Project Area: Palmers Road Project

Figure

5

I:\DATA\SPEC\4xxx\MAxxxx\MA17xx\MA1704

A3 size

PROJECT ID MA1734
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DATUM GDA 1994, PROJECTION MGA ZONE 55

0 60 120 240
metres

1:0 (when printed at A3)

Traffic Noise Levels LA10 (18hour)

<42	54	69
42	57	72
45	60	>72
48	63	
51	66	

vicroads
keeping victorians connected

Road traffic noise levels have been rounded to the nearest integer. These levels have been predicted from computer noise modelling and are indicative only.

Existing traffic noise levels With Westwood Drive Connection $L_{A10(18\ hour)}$

Client: VicRoads

Report Title: Traffic Noise Impacts of Palmers Road Project

Project Area: Palmers Road Project

Figure

6

I:\DATA\SPEC\4xxx\MAxxxx\MA17xx\MA1704

A3 size

PROJECT ID MA1734
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DATUM GDA 1994, PROJECTION MGA ZONE 55

0 60 120 240
metres
1:0 (when printed at A3)

Traffic Noise Levels LA10 (18hour)

<42	54	69
42	57	72
45	60	>72
48	63	
51	66	

vicroads
keeping victorians connected

Road traffic noise levels have been rounded to the nearest integer. These levels have been predicted from computer noise modelling and are indicative only.

Existing traffic noise levels With Westwood Drive Connection $L_{A10(18\ hour)}$

Client: VicRoads

Report Title: Traffic Noise Impacts of Palmers Road Project

Project Area: Palmers Road Project

Figure

7

I:\DATA\SPEC\4xxx\MAxxxx\MA17xx\MA1704

A3 size

PROJECT ID MA1734
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LAST MODIFIED PJW 22/6/2014

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DATUM GDA 1994, PROJECTION MGA ZONE 55

0 60 120 240
metres
1:0 (when printed at A3)

Traffic Noise Levels LA10 (18hour)

<42	54	69
42	57	72
45	60	>72
48	63	
51	66	

vicroads
keeping victorians connected

Road traffic noise levels have been rounded to the nearest integer. These levels have been predicted from computer noise modelling and are indicative only.

Existing traffic noise levels With Westwood Drive Connection $L_{A10(18\ hour)}$

Client: VicRoads

Report Title: Traffic Noise Impacts of Palmers Road Project

Project Area: Palmers Road Project

Figure

8

I:\DATA\SPEC\4xxx\MAxxxx\MA17xx\MA1704

A3 size

PROJECT ID MA1734
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LAST MODIFIED PJW 22/6/2014

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DATUM GDA 1994, PROJECTION MGA ZONE 55

0 60 120 240
metres
1:0 (when printed at A3)

Traffic Noise Levels LA10 (18hour)

<42	54	69
42	57	72
45	60	>72
48	63	
51	66	

vicroads
keeping victorians connected

Road traffic noise levels have been rounded to the nearest integer. These levels have been predicted from computer noise modelling and are indicative only.

Existing traffic noise levels With Westwood Drive Connection $L_{A10(18\ hour)}$

Client: VicRoads

Report Title: Traffic Noise Impacts of Palmers Road Project

Project Area: Palmers Road Project

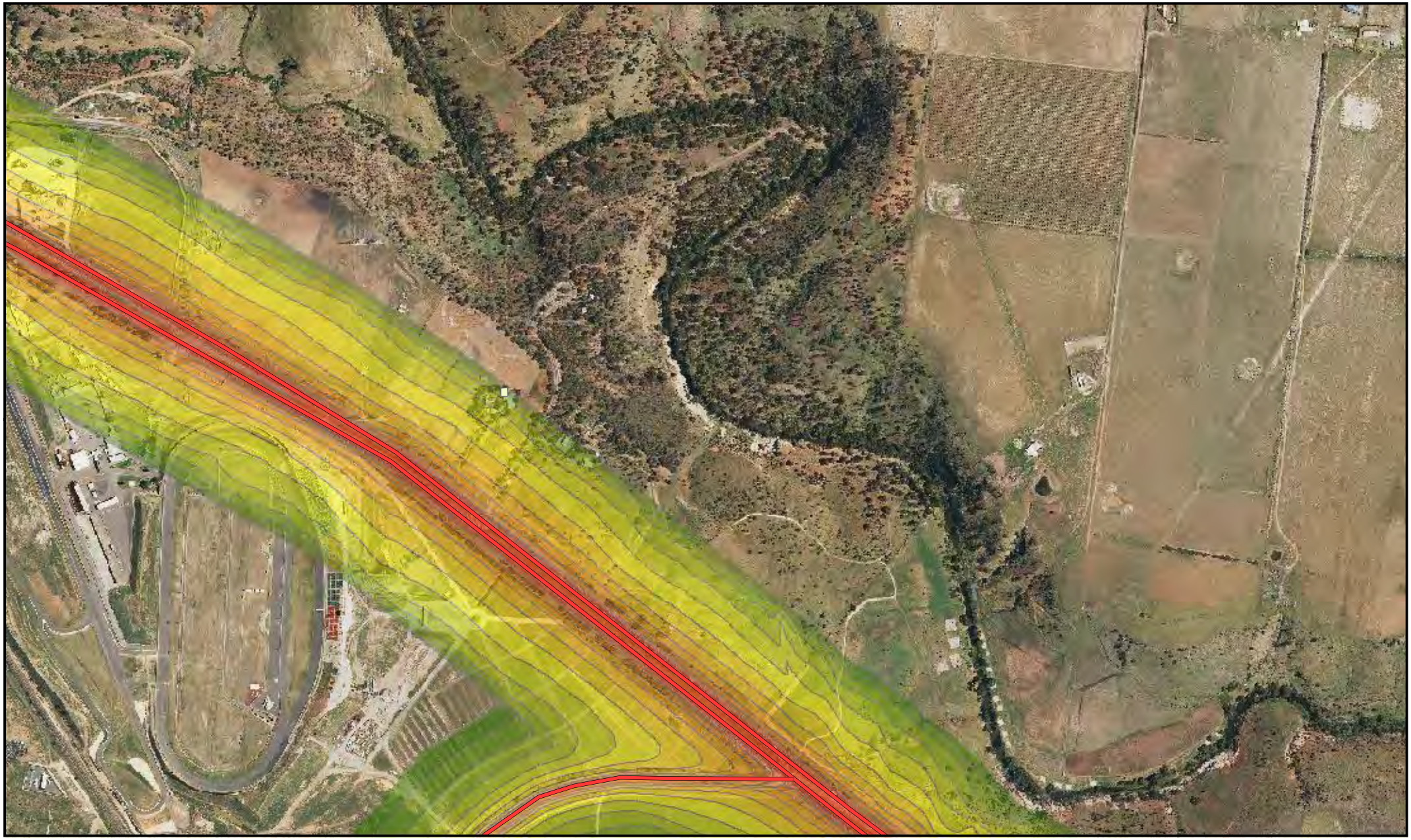
Figure

9

I:\DATA\SPEC\4xxx\MAxxxx\MA17xx\MA1704

A3 size

Appendix I: Noise Maps - Modelled Existing Palmers Road Corridor, 2015 with Kororoit Creek Bridge



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DATUM GDA 1994, PROJECTION MGA ZONE 55

0 60 120 240
metres

1:0 (when printed at A3)

Traffic Noise Levels LA10 (18hour)

<42	54	69
42	57	72
45	60	>72
48	63	
51	66	

vicroads
keeping victorians connected

Road traffic noise levels have been rounded to the nearest integer. These levels have been predicted from computer noise modelling and are indicative only.

Existing traffic noise levels Without Westwood Drive Connection $L_{A10(18\ hour)}$

Client: VicRoads

Report Title: Traffic Noise Impacts of Palmers Road Project

Project Area: Palmers Road Project

Figure

1

I:\DATA\SPEC\4xxx\MAxxxx\MA17xx\MA1704

A3 size

PROJECT ID MA1734
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DATUM GDA 1994, PROJECTION MGA ZONE 55

0 60 120 240
metres
1:0 (when printed at A3)

Traffic Noise Levels LA10 (18hour)

<42	54	69
42	57	72
45	60	>72
48	63	
51	66	

vicroads
keeping victorians connected

Road traffic noise levels have been rounded to the nearest integer. These levels have been predicted from computer noise modelling and are indicative only.

Existing traffic noise levels Without Westwood Drive Connection $L_{A10(18\ hour)}$

Client: VicRoads

Report Title: Traffic Noise Impacts of Palmers Road Project

Project Area: Palmers Road Project

Figure

2

I:\DATA\SPEC\4xxx\MAxxxx\MA17xx\MA1704

A3 size

PROJECT ID MA1734
CREATED BY PJW
LAST MODIFIED PJW 22/6/2014

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DATUM GDA 1994, PROJECTION MGA ZONE 55

0 60 120 240
metres
1:0 (when printed at A3)

Traffic Noise Levels LA10 (18hour)

<42	54	69
42	57	72
45	60	>72
48	63	
51	66	

vicroads
keeping victorians connected

Road traffic noise levels have been rounded to the nearest integer. These levels have been predicted from computer noise modelling and are indicative only.

Existing traffic noise levels Without Westwood Drive Connection $L_{A10(18\ hour)}$

Client: VicRoads

Report Title: Traffic Noise Impacts of Palmers Road Project

Project Area: Palmers Road Project

Figure

3

I:\DATA\SPEC\4xxx\MAxxxx\MA17xx\MA1704

A3 size

PROJECT ID MA1734
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DATUM GDA 1994, PROJECTION MGA ZONE 55

0 60 120 240
metres

1:0 (when printed at A3)

Traffic Noise Levels LA10 (18hour)

<42	54	69
42	57	72
45	60	>72
48	63	
51	66	

vicroads
keeping victorians connected

Road traffic noise levels have been rounded to the nearest integer. These levels have been predicted from computer noise modelling and are indicative only.

Existing traffic noise levels Without Westwood Drive Connection $L_{A10(18\ hour)}$

Client: VicRoads

Report Title: Traffic Noise Impacts of Palmers Road Project

Project Area: Palmers Road Project

Figure

4

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A3 size

PROJECT ID MA1734
CREATED BY PJW
LAST MODIFIED PJW 22/6/2014

AECOM
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DATUM GDA 1994, PROJECTION MGA ZONE 55

0 60 120 240
metres
1:0 (when printed at A3)

Traffic Noise Levels LA10 (18hour)

<42	54	69
42	57	72
45	60	>72
48	63	
51	66	

vicroads
keeping victorians connected

Road traffic noise levels have been rounded to the nearest integer. These levels have been predicted from computer noise modelling and are indicative only.

Existing traffic noise levels Without Westwood Drive Connection $L_{A10(18\ hour)}$

Client: VicRoads

Report Title: Traffic Noise Impacts of Palmers Road Project

Project Area: Palmers Road Project

Figure

5

I:\DATA\SPEC\4xxx\MAxxxx\MA17xx\MA1704

A3 size

PROJECT ID MA1734
CREATED BY PJW
LAST MODIFIED PJW 22/6/2014

AECOM
www.aecom.com

DATUM GDA 1994, PROJECTION MGA ZONE 55

0 60 120 240
metres

1:0 (when printed at A3)

Traffic Noise Levels LA10 (18hour)

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Existing traffic noise levels Without Westwood Drive Connection $L_{A10(18\ hour)}$

Client: VicRoads

Report Title: Traffic Noise Impacts of Palmers Road Project

Project Area: Palmers Road Project

Figure

6

I:\DATA\SPEC\4xxx\MAxxxx\MA17xx\MA1704

A3 size

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PROJECT ID MA1734
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DATUM GDA 1994, PROJECTION MGA ZONE 55

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Existing traffic noise levels Without Westwood Drive Connection $L_{A10(18\ hour)}$

Client: VicRoads

Report Title: Traffic Noise Impacts of Palmers Road Project

Project Area: Palmers Road Project

Figure

7

I:\DATA\SPEC\4xxx\MAxxxx\MA17xx\MA1704

A3 size

PROJECT ID MA1734
CREATED BY PJW
LAST MODIFIED PJW 22/6/2014

AECOM
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DATUM GDA 1994, PROJECTION MGA ZONE 55

0 60 120 240
metres

1:0 (when printed at A3)

Traffic Noise Levels LA10 (18hour)

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keeping victorians connected

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Existing traffic noise levels Without Westwood Drive Connection $L_{A10(18\ hour)}$

Client: VicRoads

Report Title: Traffic Noise Impacts of Palmers Road Project

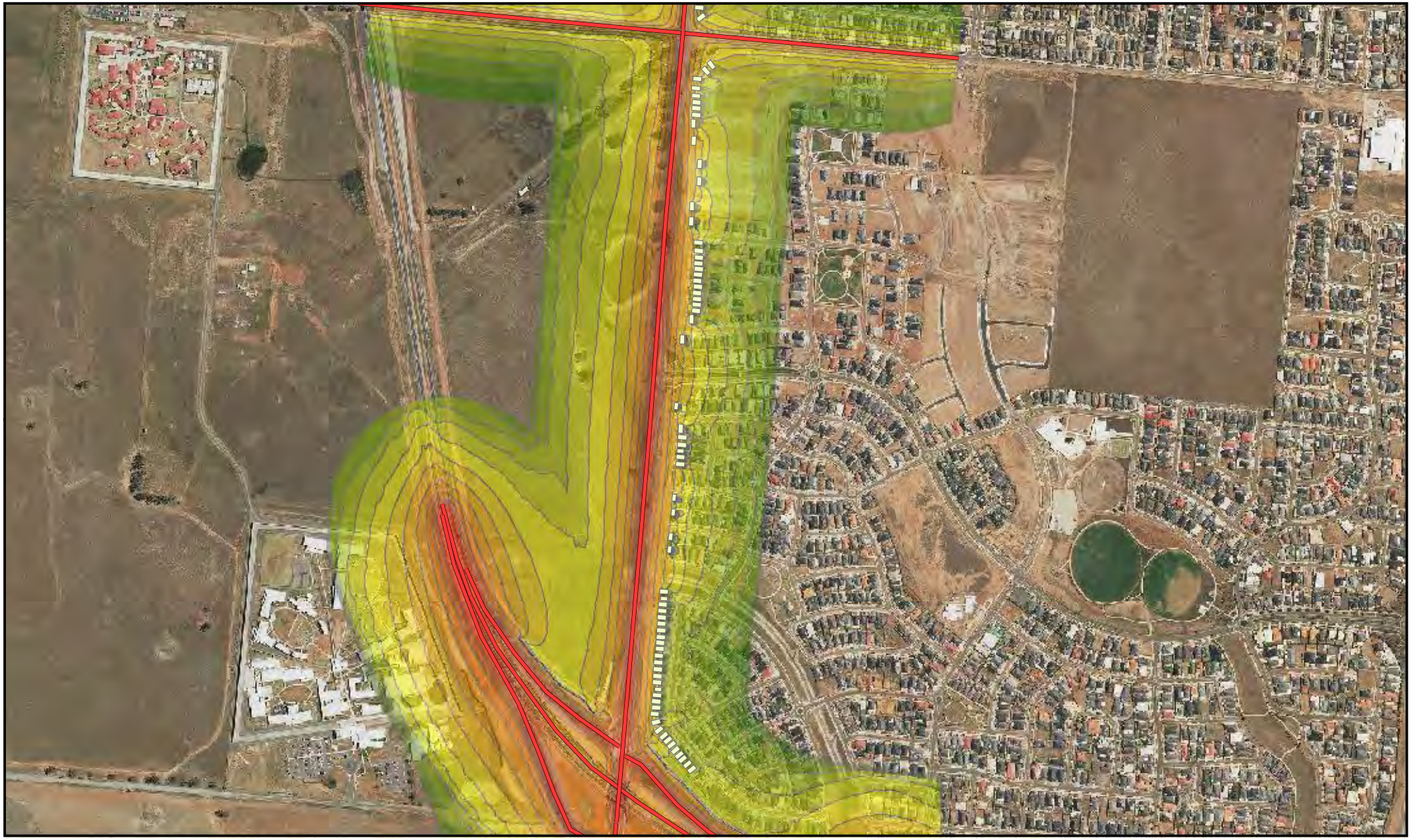
Project Area: Palmers Road Project

Figure

8

I:\DATA\SPEC\4xxx\MAxxxx\MA17xx\MA1704

A3 size



PROJECT ID MA1734
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DATUM GDA 1994, PROJECTION MGA ZONE 55

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Existing traffic noise levels Without Westwood Drive Connection $L_{A10(18\ hour)}$

Client: VicRoads

Report Title: Traffic Noise Impacts of Palmers Road Project

Project Area: Palmers Road Project

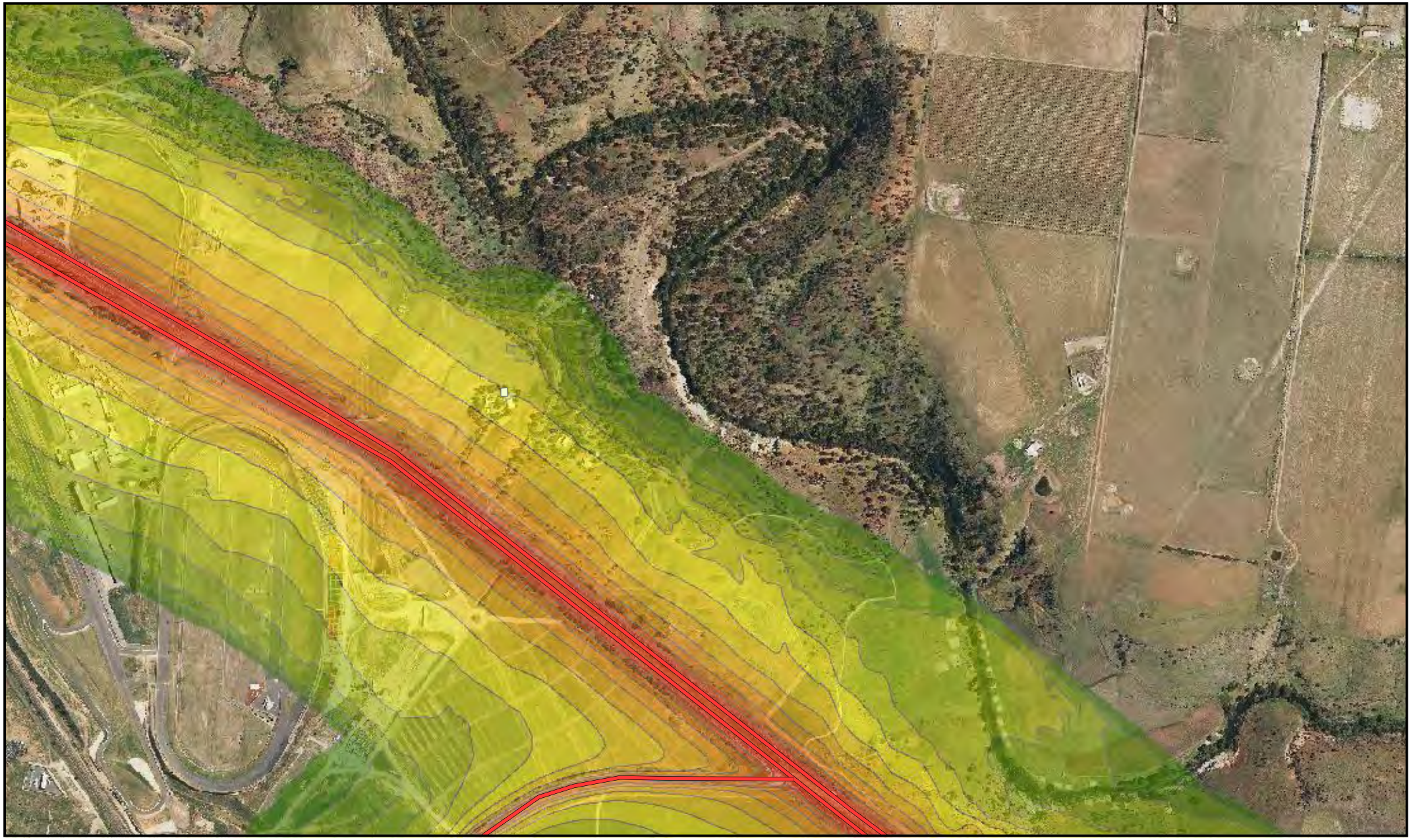
Figure

9

I:\DATA\SPEC\4xxx\MAxxxx\MA17xx\MA1704

A3 size

Appendix J: Noise Maps - Modelled Palmers Road Corridor, 2046, 2-lanes, without Kororoit Creek bridge



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51	66	

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keeping victorians connected

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2046 2-lanes traffic noise levels Without Westwood Drive Connection $L_{A10(18\ hour)}$

Client: VicRoads

Report Title: Traffic Noise Impacts of Palmers Road Project

Project Area: Palmers Road Project

Figure

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A3 size

PROJECT ID MA1734
CREATED BY PJW
LAST MODIFIED PJW 22/6/2014

AECOM
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DATUM GDA 1994, PROJECTION MGA ZONE 55

0 60 120 240
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1:0 (when printed at A3)

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keeping victorians connected

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2046 2-lanes traffic noise levels Without Westwood Drive Connection $L_{A10(18\ hour)}$

Client: VicRoads

Report Title: Traffic Noise Impacts of Palmers Road Project

Project Area: Palmers Road Project

Figure

2

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A3 size

PROJECT ID MA1734
CREATED BY PJW
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AECOM
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DATUM GDA 1994, PROJECTION MGA ZONE 55

0 60 120 240
metres
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keeping victorians connected

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2046 2-lanes traffic noise levels Without Westwood Drive Connection $L_{A10(18\ hour)}$

Client: VicRoads

Report Title: Traffic Noise Impacts of Palmers Road Project

Project Area: Palmers Road Project

Figure

3

I:\DATA\SPEC\4xxx\MAxxxx\MA17xx\MA1704

A3 size

PROJECT ID MA1734
CREATED BY PJW
LAST MODIFIED PJW 22/6/2014

AECOM
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DATUM GDA 1994, PROJECTION MGA ZONE 55

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2046 2-lanes traffic noise levels Without Westwood Drive Connection $L_{A10(18\ hour)}$

Client: VicRoads

Report Title: Traffic Noise Impacts of Palmers Road Project

Project Area: Palmers Road Project

Figure

4

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A3 size

PROJECT ID MA1734
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LAST MODIFIED PJW 22/6/2014

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2046 2-lanes traffic noise levels Without Westwood Drive Connection $L_{A10(18\ hour)}$

Client: VicRoads

Report Title: Traffic Noise Impacts of Palmers Road Project

Project Area: Palmers Road Project

Figure

5

I:\DATA\SPEC\4xxx\MAxxxx\MA17xx\MA1704

A3 size

PROJECT ID MA1734
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LAST MODIFIED PJW 22/6/2014

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2046 2-lanes traffic noise levels Without Westwood Drive Connection $L_{A10(18\ hour)}$

Client: VicRoads

Report Title: Traffic Noise Impacts of Palmers Road Project

Project Area: Palmers Road Project

Figure

6

I:\DATA\SPEC\4xxx\MAxxxx\MA17xx\MA1704

A3 size

PROJECT ID MA1734
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2046 2-lanes traffic noise levels Without Westwood Drive Connection $L_{A10(18\ hour)}$

Client: VicRoads

Report Title: Traffic Noise Impacts of Palmers Road Project

Project Area: Palmers Road Project

Figure

7

I:\DATA\SPEC\4xxx\MAxxxx\MA17xx\MA1704

A3 size

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2046 2-lanes traffic noise levels Without Westwood Drive Connection $L_{A10(18\ hour)}$

Client: VicRoads

Report Title: Traffic Noise Impacts of Palmers Road Project

Project Area: Palmers Road Project

Figure

8

I:\DATA\SPEC\4xxx\MAxxxx\MA17xx\MA1704

A3 size

PROJECT ID MA1734
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2046 2-lanes traffic noise levels Without Westwood Drive Connection $L_{A10(18\ hour)}$

Client: VicRoads

Report Title: Traffic Noise Impacts of Palmers Road Project

Project Area: Palmers Road Project

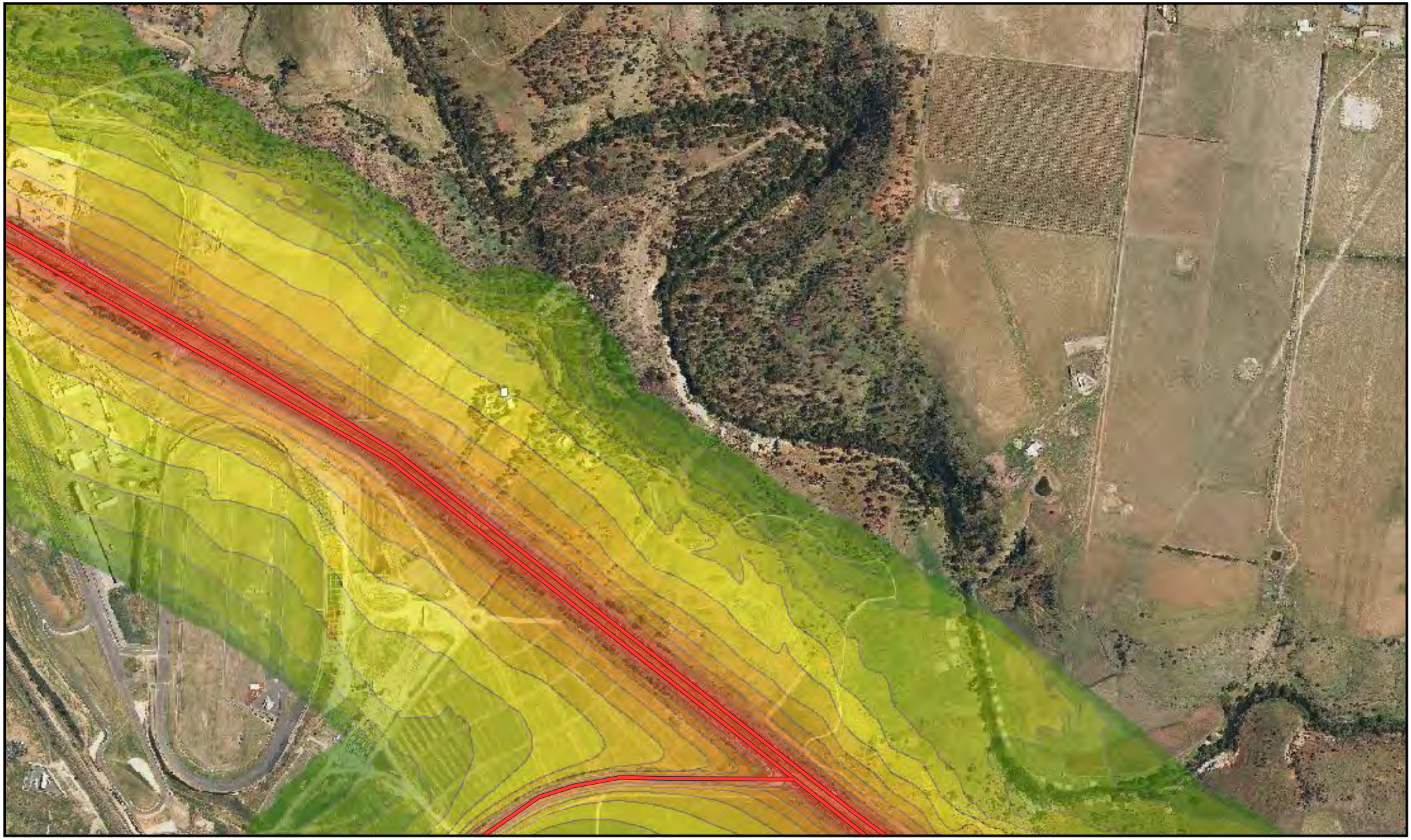
Figure

9

I:\DATA\SPEC\4xxx\MAxxxx\MA17xx\MA1704

A3 size

Appendix K: Noise Maps - Modelled Palmers Road Corridor, 2046, 2-lanes, with Kororoit Creek bridge



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DATUM GDA 1994, PROJECTION MGA ZONE 55

0 60 120 240
metres

1:0 (when printed at A3)

Traffic Noise Levels LA10 (18hour)

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42	57	72
45	60	>72
48	63	
51	66	

vicroads
keeping victorians connected

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2046 2-lanes traffic noise levels With Westwood Drive Connection $L_{A10(18\ hour)}$

Client: VicRoads

Report Title: Traffic Noise Impacts of Palmers Road Project

Project Area: Palmers Road Project

Figure

1

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A3 size

PROJECT ID MA1734
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LAST MODIFIED PJW 22/6/2014

AECOM
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DATUM GDA 1994, PROJECTION MGA ZONE 55

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metres

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Traffic Noise Levels LA10 (18hour)

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45	60	>72
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51	66	

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Road traffic noise levels have been rounded to the nearest integer. These levels have been predicted from computer noise modelling and are indicative only.

2046 2-lanes traffic noise levels With Westwood Drive Connection

$L_{A10(18\ hour)}$

Client: VicRoads

Report Title: Traffic Noise Impacts of Palmers Road Project

Project Area: Palmers Road Project

Figure

2

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A3 size

PROJECT ID MA1734
CREATED BY PJW
LAST MODIFIED PJW 22/6/2014

AECOM
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DATUM GDA 1994, PROJECTION MGA ZONE 55

0 60 120 240
metres
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2046 2-lanes traffic noise levels With Westwood Drive Connection

$L_{A10(18\ hour)}$

Client: VicRoads

Report Title: Traffic Noise Impacts of Palmers Road Project

Project Area: Palmers Road Project

Figure

3

I:\DATA\SPEC\4xxx\MAxxxx\MA17xx\MA1704

A3 size

PROJECT ID MA1734
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2046 2-lanes traffic noise levels With Westwood Drive Connection $L_{A10(18\ hour)}$

Client: VicRoads

Report Title: Traffic Noise Impacts of Palmers Road Project

Project Area: Palmers Road Project

Figure

4

I:\DATA\SPEC\4xxx\MAxxxx\MA17xx\MA1704

A3 size

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51	66	

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2046 2-lanes traffic noise levels With Westwood Drive Connection $L_{A10(18\ hour)}$

Client: VicRoads

Report Title: Traffic Noise Impacts of Palmers Road Project

Project Area: Palmers Road Project

Figure

5

I:\DATA\SPEC\4xxx\MAxxxx\MA17xx\MA1704

A3 size

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48	63	
51	66	

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keeping victorians connected

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2046 2-lanes traffic noise levels With Westwood Drive Connection $L_{A10(18\ hour)}$

Client: VicRoads

Report Title: Traffic Noise Impacts of Palmers Road Project

Project Area: Palmers Road Project

Figure

6

I:\DATA\SPEC\4xxx\MAxxxx\MA17xx\MA1704

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2046 2-lanes traffic noise levels With Westwood Drive Connection $L_{A10(18\ hour)}$

Client: VicRoads

Report Title: Traffic Noise Impacts of Palmers Road Project

Project Area: Palmers Road Project

Figure

7

I:\DATA\SPEC\4xxx\MAxxxx\MA17xx\MA1704

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51	66	

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2046 2-lanes traffic noise levels With Westwood Drive Connection $L_{A10(18\ hour)}$

Client: VicRoads

Report Title: Traffic Noise Impacts of Palmers Road Project

Project Area: Palmers Road Project

Figure

8

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48	63	
51	66	

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2046 2-lanes traffic noise levels With Westwood Drive Connection $L_{A10(18\ hour)}$

Client: VicRoads

Report Title: Traffic Noise Impacts of Palmers Road Project

Project Area: Palmers Road Project

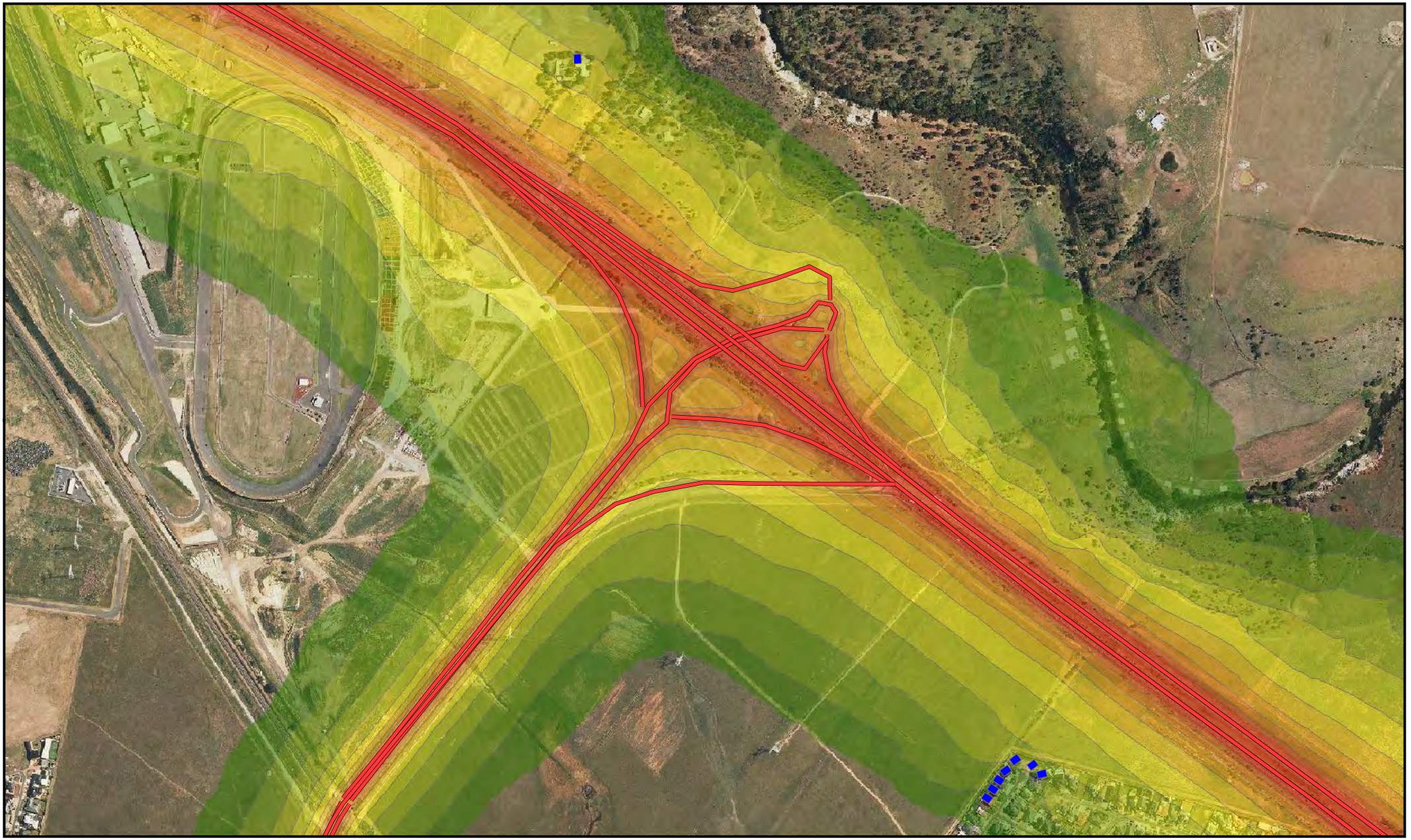
Figure

9

I:\DATA\SPEC\4xxx\MAxxxx\MA17xx\MA1704

A3 size

Appendix L: Noise Maps - Modelled Palmers Road Corridor, 2046, 4-lanes, with Kororoit Creek bridge



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DATUM GDA 1994, PROJECTION MGA ZONE 55

0 60 120 240
metres

1:0 (when printed at A3)

Legend $L_{A10(18\ hour)}$

<48	57	69
48	60	72
51	63	>72
54	66	Buildings

vicroads
keeping victorians connected

Road traffic noise levels have been rounded to the nearest integer. These levels have been predicted from computer noise modelling and are indicative only.

2046 4-lanes traffic noise levels With Westwood Drive Connection

$L_{A10(18\ hour)}$

Client: VicRoads

Report Title: Traffic Noise Impacts of Palmers Road Project

Project Area: Palmers Road Project

Figure

1

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DATUM GDA 1994, PROJECTION MGA ZONE 55

0 60 120 240
metres

1:0 (when printed at A3)

Legend $L_{A10(18\ hour)}$

<48	57	69
48	60	72
51	63	>72
54	66	Buildings

vicroads
keeping victorians connected

Road traffic noise levels have been rounded to the nearest integer. These levels have been predicted from computer noise modelling and are indicative only.

2046 4-lanes traffic noise levels With Westwood Drive Connection

$L_{A10(18\ hour)}$

Client: VicRoads

Report Title: Traffic Noise Impacts of Palmers Road Project

Project Area: Palmers Road Project

Figure

2

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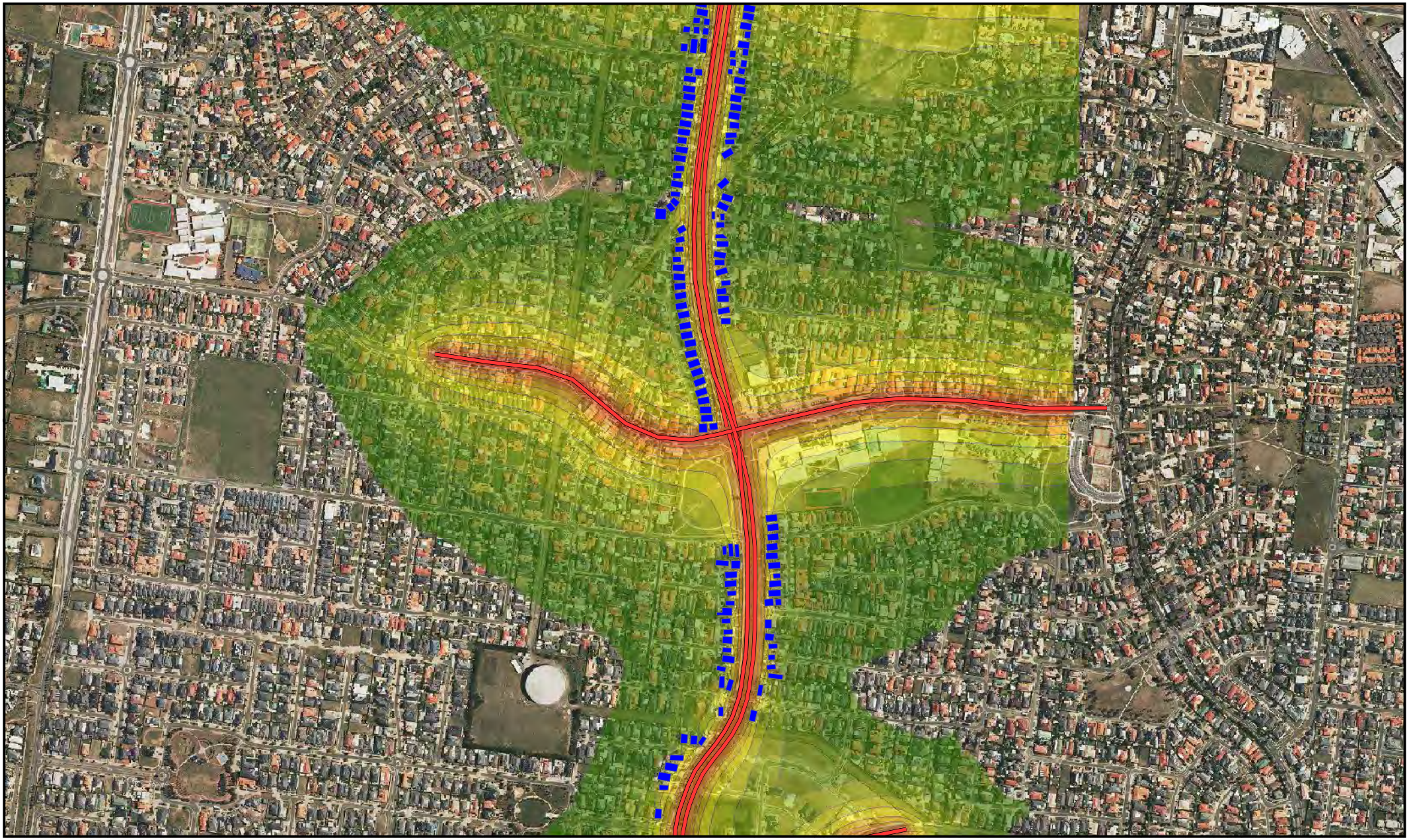
A3 size



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0 60 120 240
metres

1:0 (when printed at A3)

Legend $L_{A10(18\ hour)}$

<48	57	69
48	60	72
51	63	>72
54	66	Buildings

vicroads
keeping victorians connected

Road traffic noise levels have been rounded to the nearest integer. These levels have been predicted from computer noise modelling and are indicative only.

2046 4-lanes traffic noise levels With Westwood Drive Connection

$L_{A10(18\ hour)}$

Client: VicRoads

Report Title: Traffic Noise Impacts of Palmers Road Project

Project Area: Palmers Road Project

Figure

3

I:\DATA\SPEC\4xxx\MAxxxx\MA17xx\MA1704

A3 size

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Legend $L_{A10(18\ hour)}$

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54	66	Buildings

vicroads
keeping victorians connected

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2046 4-lanes traffic noise levels With Westwood Drive Connection $L_{A10(18\ hour)}$

Client: VicRoads

Report Title: Traffic Noise Impacts of Palmers Road Project

Project Area: Palmers Road Project

Figure

4

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A3 size

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54	66	Buildings

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keeping victorians connected

Road traffic noise levels have been rounded to the nearest integer. These levels have been predicted from computer noise modelling and are indicative only.

2046 4-lanes traffic noise levels With Westwood Drive Connection

$L_{A10(18\ hour)}$

Client: VicRoads

Report Title: Traffic Noise Impacts of Palmers Road Project

Project Area: Palmers Road Project

Figure

5

I:\DATA\SPEC\4xxx\MAxxxx\MA17xx\MA1704

A3 size

PROJECT ID MA1734
CREATED BY PJW
LAST MODIFIED PJW 2/7/2013

AECOM
www.aecom.com

DATUM GDA 1994, PROJECTION MGA ZONE 55

0 60 120 240
metres

1:0 (when printed at A3)

Legend $L_{A10(18\ hour)}$

<48	57	69
48	60	72
51	63	>72
54	66	Buildings

vicroads
keeping victorians connected

Road traffic noise levels have been rounded to the nearest integer. These levels have been predicted from computer noise modelling and are indicative only.

2046 4-lanes traffic noise levels With Westwood Drive Connection $L_{A10(18\ hour)}$

Client: VicRoads

Report Title: Traffic Noise Impacts of Palmers Road Project

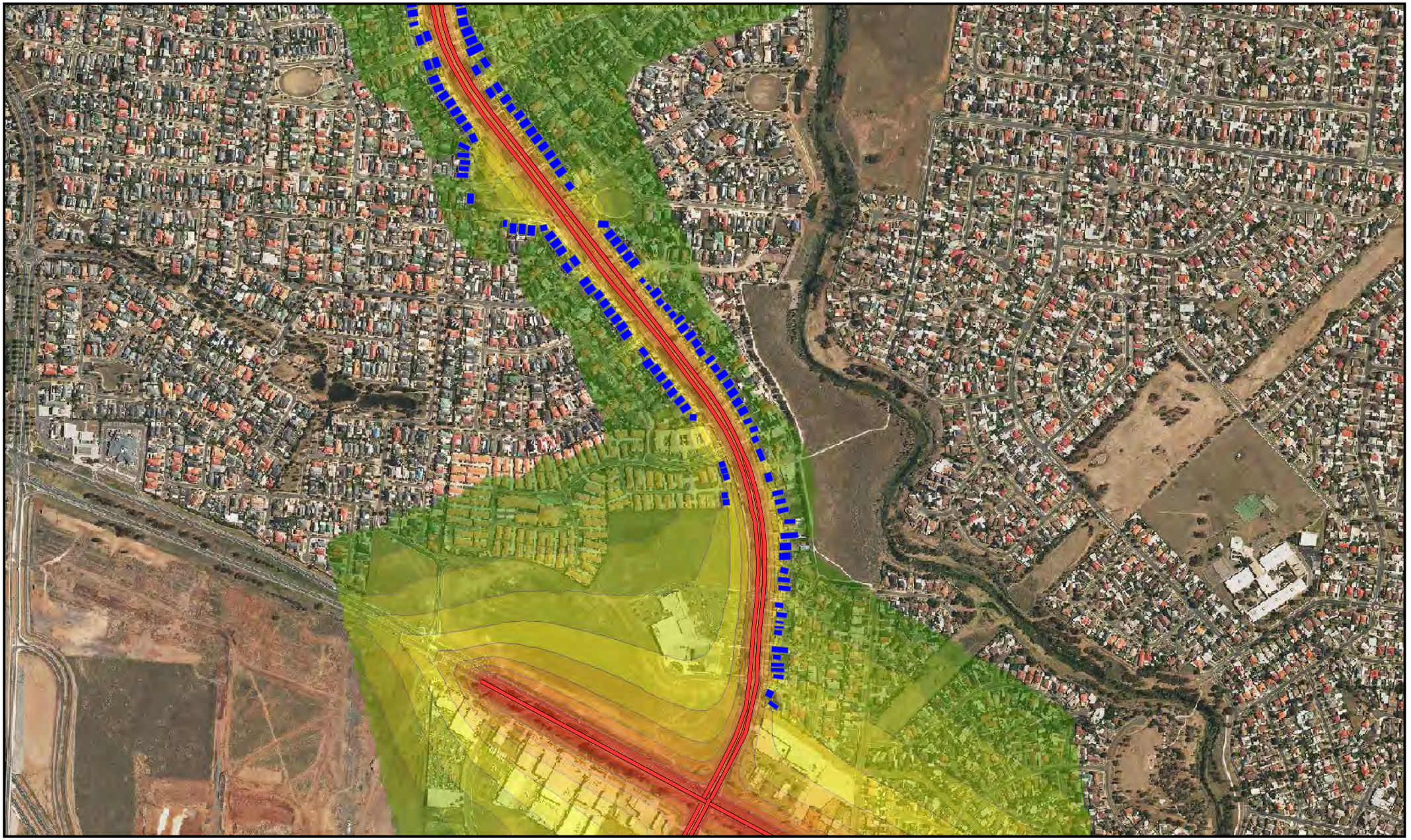
Project Area: Palmers Road Project

Figure

6

I:\DATA\SPEC\4xxx\MAxxxx\MA17xx\MA1704

A3 size



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2046 4-lanes traffic noise levels With Westwood Drive Connection $L_{A10(18\ hour)}$

Client: VicRoads

Report Title: Traffic Noise Impacts of Palmers Road Project

Project Area: Palmers Road Project

Figure

7

I:\DATA\SPEC\4xxx\MAxxxx\MA17xx\MA1704

A3 size

PROJECT ID MA1734
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DATUM GDA 1994, PROJECTION MGA ZONE 55

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2046 4-lanes traffic noise levels With Westwood Drive Connection $L_{A10(18\ hour)}$

Client: VicRoads

Report Title: Traffic Noise Impacts of Palmers Road Project

Project Area: Palmers Road Project

Figure

8

I:\DATA\SPEC\4xxx\MAxxxx\MA17xx\MA1704

A3 size

PROJECT ID MA1734
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AECOM
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DATUM GDA 1994, PROJECTION MGA ZONE 55
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2046 4-lanes traffic noise levels With Westwood Drive Connection

$L_{A10(18\ hour)}$

Client: VicRoads

Report Title: Traffic Noise Impacts of Palmers Road Project

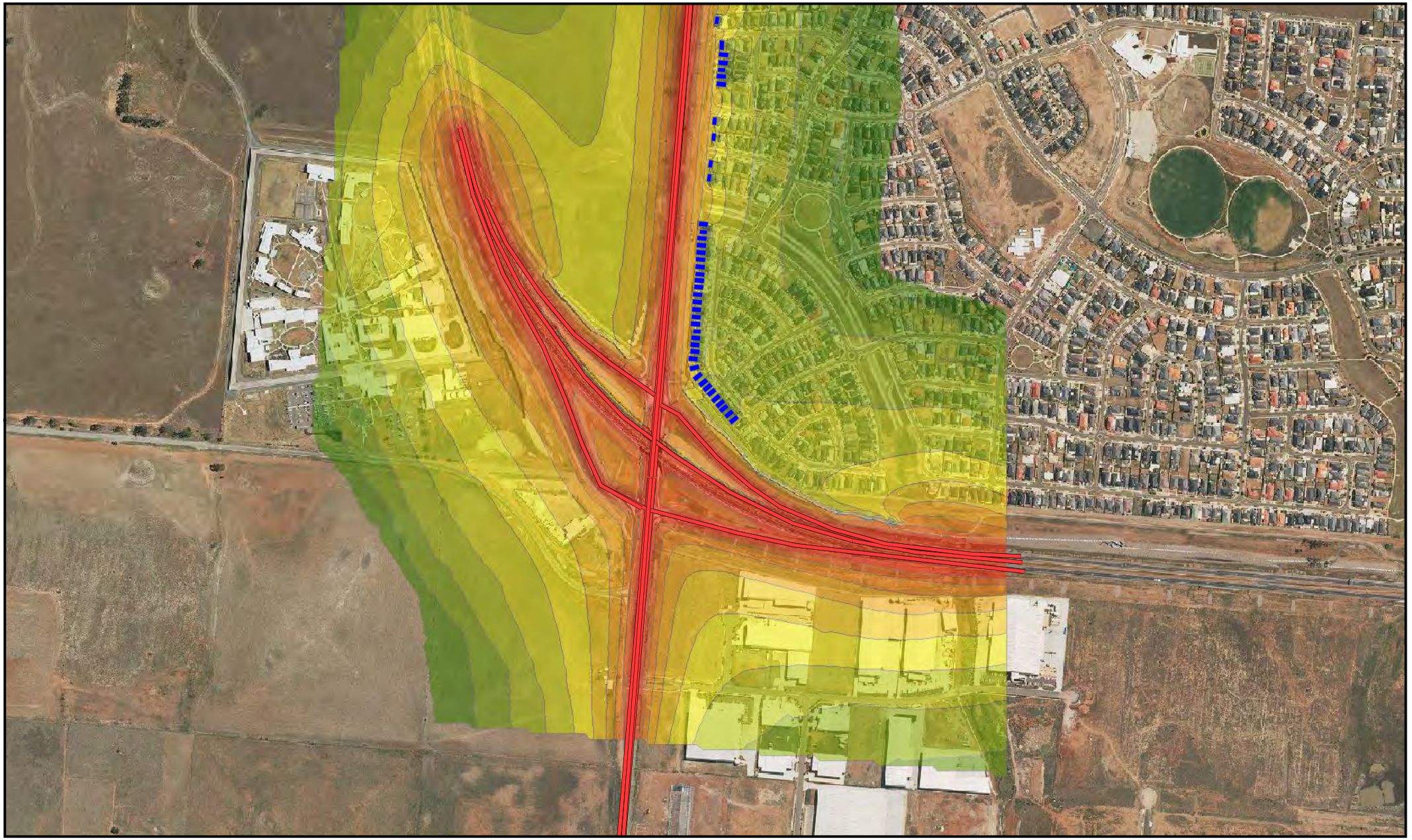
Project Area: Palmers Road Project

Figure

9

I:\DATA\SPEC\4xxx\MAxxxx\MA17xx\MA1704

A3 size



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$L_{A10(18\ hour)}$

Client: VicRoads

Report Title: Traffic Noise Impacts of Palmers Road Project

Project Area: Palmers Road Project

Figure

10

I:\DATA\SPEC\4xxx\MAxxxx\MA17xx\MA1704

A3 size

Appendix M: Noise Maps - Modelled Palmers Road Corridor, 2046, 6-lanes, with Kororoit Creek bridge

PROJECT ID MA1734
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LAST MODIFIED PJW 22/6/2014

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DATUM GDA 1994, PROJECTION MGA ZONE 55

0 60 120 240
metres

1:0 (when printed at A3)

Traffic Noise Levels LA10 (18hour)

<42	54	69
42	57	72
45	60	>72
48	63	
51	66	

vicroads
keeping victorians connected

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2046 6-lanes traffic noise levels With Westwood Drive Connection

$L_{A10(18\ hour)}$

Client: VicRoads

Report Title: Traffic Noise Impacts of Palmers Road Project

Project Area: Palmers Road Project

Figure

1

I:\DATA\SPEC\4xxx\MAxxxx\MA17xx\MA1704

A3 size

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Report Title: Traffic Noise Impacts of Palmers Road Project

Project Area: Palmers Road Project

Figure

2

I:\DATA\SPEC\4xxx\MAxxxx\MA17xx\MA1704

A3 size

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Report Title: Traffic Noise Impacts of Palmers Road Project

Project Area: Palmers Road Project

Figure

3

I:\DATA\SPEC\4xxx\MAxxxx\MA17xx\MA1704

A3 size

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Client: VicRoads

Report Title: Traffic Noise Impacts of Palmers Road Project

Project Area: Palmers Road Project

Figure

4

I:\DATA\SPEC\4xxx\MAxxxx\MA17xx\MA1704

A3 size

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Project Area: Palmers Road Project

Figure

5

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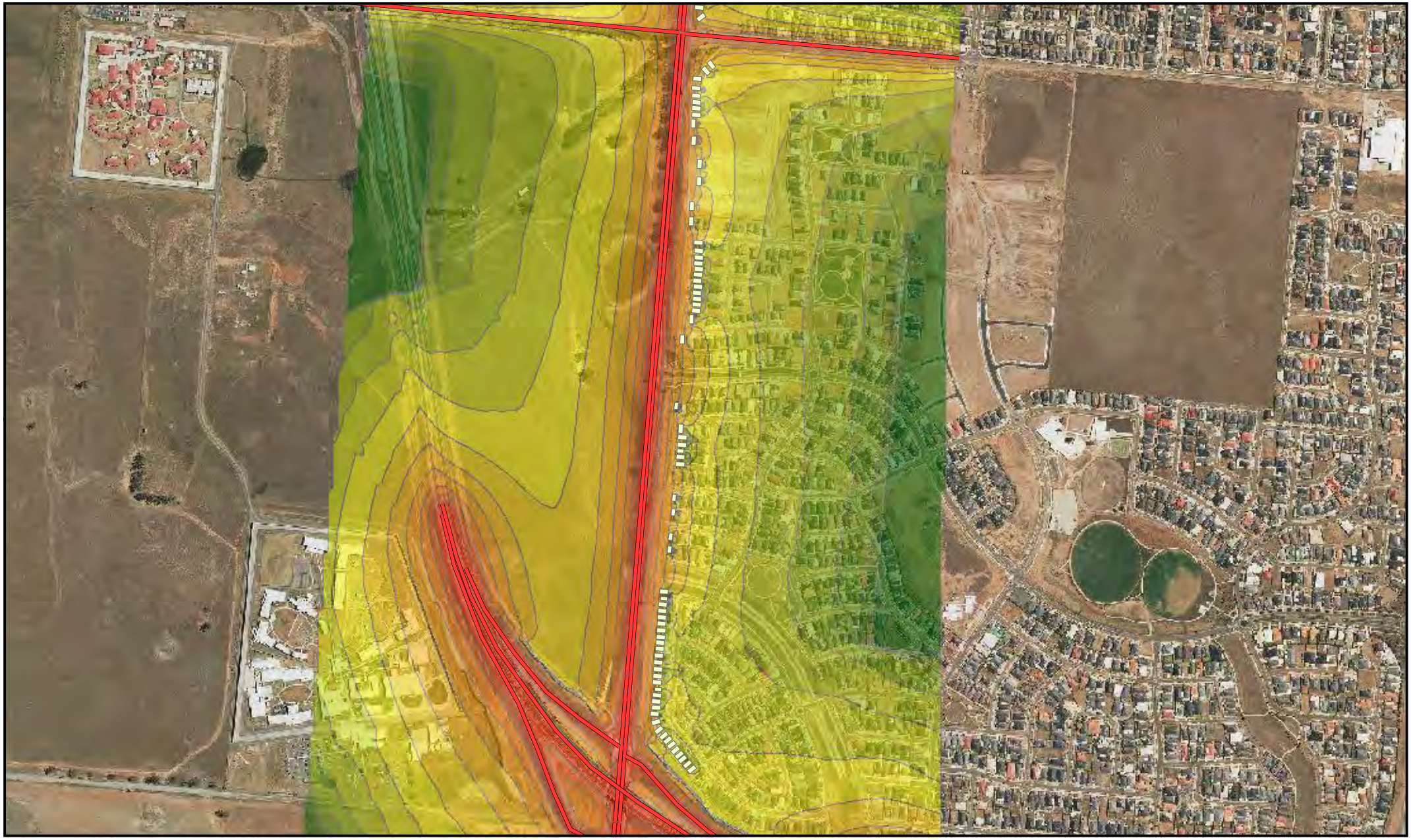

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Figure

9

I:\DATA\SPEC\4xxx\MAxxxx\MA17xx\MA1704

A3 size