



Laing O'Rourke

**Main North and North Shore  
Corridor Works Project  
(MNNSCW): Portion 7 - Northern  
Corridor Works (NCW)**



**Construction Noise and Vibration  
Impact Statement (CNVIS)**

0424696RP01

January 2018

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|              |   |
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| Date:        | 12 January 2018   |
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| Position:    | Partner   |
| Signed:      |  |
| Date:        | 12 January 2018   |

## Main North and North Shore Corridor Works Project (MNNSCW): Portion 7 - Northern Corridor Works (NCW)

*Construction Noise and Vibration Impact Statement (CNVIS)*

Laing O'Rourke

January 2018

ERM Reference: 0424696

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Laing O'Rourke

Main North and North  
Shore Corridor Works  
Project (MNNSCW)

Portion 7 - Northern Corridor  
Works (NCW)

*Construction Noise and  
Vibration Impact Statement  
(CNVIS)*

January 2018

Reference: 0424696RP01

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## **EXECUTIVE SUMMARY**

*Environmental Resources Management Australia Pty Ltd (ERM) on behalf of Laing O'Rourke Australia Construction Pty Ltd (LOR) has completed a construction noise and vibration impact statement (CNVIS) for the for construction aspects of the Main North and North Shore Corridor Works Project (MNNSCW), Portion 7 - Northern Corridor Works (NCW).*

*The NCW project and associated construction works are located in the rail corridor between Chatswood train station and Brand Street in Artarmon, near the Artarmon train station and are being undertaken as part of the Sydney Metro City and Southwest project (Sydney Metro).*

*This report has been prepared to document the methodology, findings and recommendations of the assessment conducted for the NCW. The CNVIS has been conducted with due regard to and in accordance with the New South Wales (NSW) policy and guidelines relevant to noise.*

*The CNVIS is technical in nature, a glossary of relevant acoustical concepts and terminology is provided in Annex A of this noise and vibration impact assessment report.*

*ERM has identified 420 sensitive receptors in seven noise catchment areas to be representative of the closest and/or potentially most affected locations situated within the potential area of influence of the NCW project. These locations do not represent all receptors located in the vicinity of the NCW but have been selected for the purposes of this CNVIS; they are considered to be representative of locations that will experience the highest impacts associated with the NCW project.*

*The Sydney Metro - Construction Noise and Vibration Strategy (CNVS) assessment and mitigation approach has been adopted, in conjunction with the requirements of the ICNG, for construction noise and vibration aspects of the NCW project. Where the predicted construction noise levels are above the ICNG noise management levels, the Additional Mitigation Measures Matrix (AMMM) identified in Section 8 of CNS is to be implemented. The approach, guided by the AMMM, is primarily aimed at pro-active engagement with affected sensitive receivers rather than additional noise reducing mitigation.*

*The types of additional mitigation measures include alternative accommodation, monitoring, individual briefings, letter box drops, project specific respite offers, phone calls and specific notifications. These vary depending on the level by which predicted noise values exceed the existing background noise levels, and the time of day as summarised in Section 4.5 of this report.*

*Potential impacts are limited to construction noise and vibration. Brüel & Kjær's Predictor 7810 (Version 11.2) noise modelling software package was utilised to calculate noise levels using the ISO9613:2 noise propagation algorithms (international method for general purpose, 1/1 octaves) for construction aspects of the Project.*

*Predicted levels were then compared to the Project-specific noise criteria established for construction to identify any exceedances and qualify the magnitude and extent of potential impacts. Construction vibration emission sources were reviewed and compared to the applicable safe work distances to determine the potential for impacts to occur.*

*The highest predicted results and findings are presented in Section 5 this CNVIS. The full set of results and findings are presented in Annex D. Although a number of exceedances are identified, these are associated with predicted 15 minute noise values calculated via modelling for the purposes of the assessment, in accordance with the ICNG and the CNVS. These values do not represent a constant noise emission that would be experienced by the community on a daily basis throughout the NCW project.*

*The predicted noise levels will only be experienced for limited periods of time when works are occurring; they will not be experienced over a whole daytime, evening or night time periods. Any impacts associated with these works will be temporary and do not represent a permanent impact on the community and surrounding environment. Some noise from construction sites is inevitable, such that the ICNG focuses on minimising construction noise impacts, rather than only on achieving numeric noise levels.*

*These results and noted exceedances identify that good-practice construction noise management and control techniques will be required to reduce noise levels as far as practicable. To minimise impacts additional noise control, mitigation and management measures are also warranted and a Construction Noise and Vibration Management Plan (CNVMP) should be prepared. These will need to be implemented in conjunction with community and stakeholder consultation and notification processes.*

*Based on the equipment and activities identified for the NCW project, potential sources of vibration are limited the sheet piling activity. With normal construction design development and general vibration management practices in place the potential adverse effects on building contents or adverse effects on structures is minimal. There is however potential for human comfort impacts. The vibration results and findings are presented in Section 5.4 this CNVIS.*

*Based on these findings of this CNVIS recommendations have been made for noise and vibration mitigation, management measures and/or monitoring options suitable to the significance of the predicted impacts and designed to minimise impacts as far as is feasible and reasonable.*

*Construction noise and vibration levels will be reduced and impacts minimised with the successful implementation of the recommendations provided in Section 6 of this report. Impacts may not be reduced to negligible levels for all receptors during all construction activities; however the recommendations presented here will ensure that any residual impacts are minimised as far as is practically achievable. These recommendations will need to be implemented in conjunction with community and stakeholder consultation and notification processes.*



# 1

## **INTRODUCTION**

This Construction Noise and Vibration Impact Statement (CNVIS) document has been prepared by Environmental Resources Management Australia Pty Ltd (ERM) on behalf of Laing O'Rourke Australia Construction Pty Ltd (LOR). It presents the methodology, findings and recommendations of the noise and vibration impact assessment completed for construction aspects of the Main North and North Shore Corridor Works Project (MNNSCW), Portion 7 - Northern Corridor Works (NCW).

### 1.1

#### **PROJECT DESCRIPTION**

The NCW project and associated construction works are located in the rail corridor between Chatswood train station and Brand Street in Artarmon, near the Artarmon train station. They are being undertaken as “enabling works” as part of the Sydney Metro City and Southwest project (Sydney Metro).

The intent of the NCW project is the realignment of the T1 North Shore Line between Chatswood Station and Brand Street, Artarmon to accommodate the new metro tracks and the future construction of the Chatswood tunnelling dive site. This CNVIS relates to Portion 7 of the MNNSCW, referred to herein as NCW. Sydney Metro is a new standalone rail network identified in Sydney's Rail Future. The Sydney Metro network consists of Sydney Metro Northwest (previously known as the North West Rail Link) and Sydney Metro City and Southwest. A core component of Sydney Metro includes the Chatswood to Sydenham project. This involves construction and operation of an underground rail line, about 15.5 kilometres long, and new stations between Chatswood and Sydenham.

Further detail regarding the NCW scope and potential noise and vibration issues associated with the works/activities are outlined in the overall Construction Environment Management Plan (CEMP) and the Construction Noise and Vibration Management Plan (CNVMP) for the project. The latter document was prepared concurrently to this CNVIS and incorporates all recommendations (and further detail) for noise and vibration mitigation, management measures and monitoring that were established by this assessment.

### 1.2

#### **PROJECT SITE SETTING**


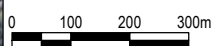
The area surrounding the NCW project is made up of predominantly low and medium density residential land use. High density residential and commercial land use is found to the north, surrounding Chatswood station. Artarmon station is bounded by a neighbourhood centre and more broadly by low to medium density residential land use. The location of the site and other items of importance to this CNVIS are illustrated below in **Figures 1 to 4.5**.



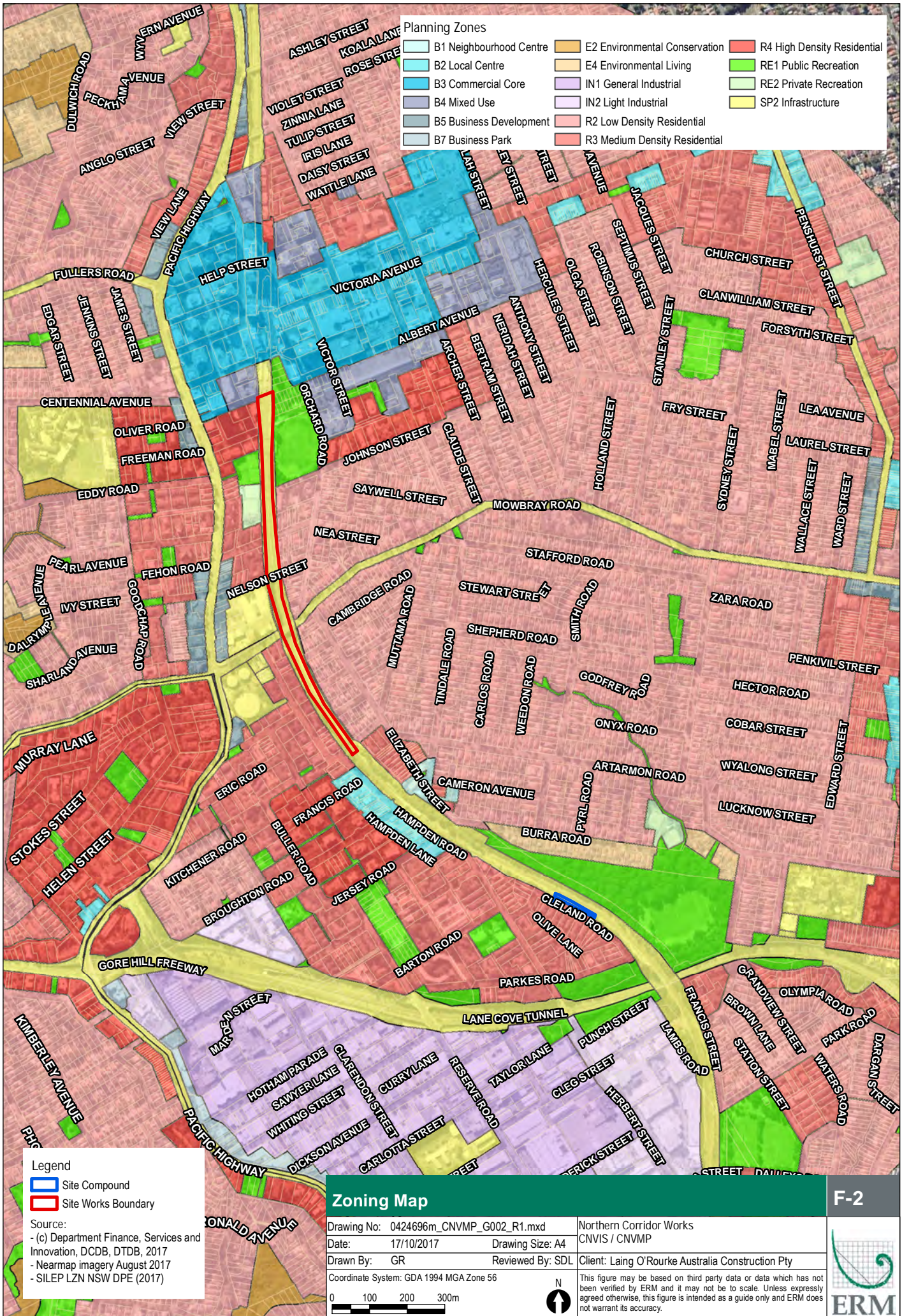
**Legend**

- ▭ Site Compound
- ▭ Site Works Boundary

Source:  
 - (c) Department Finance, Services and Innovation, DCDB, DTDB, 2017  
 - Nearmap imagery August 2017  
 - Inset : ESRI World Maps

| Site Locality   |                  | F-1  |
|---|------------------|--|
| Drawing No: 0424696m_CNVP_G001_R1.mxd   |                  | Northern Corridor Works  |
| Date: 17/10/2017  | Drawing Size: A4 | CNVIS / CNVMP  |
| Drawn By: GR  | Reviewed By: SDL | Client: Laing O'Rourke Australia Construction Pty  |
| Coordinate System: GDA 1994 MGA Zone 56   |                  | <br>This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy. |
|  |                  |  |





**Planning Zones**

|                         |                               |                             |
|-------------------------|-------------------------------|-----------------------------|
| B1 Neighbourhood Centre | E2 Environmental Conservation | R4 High Density Residential |
| B2 Local Centre         | E4 Environmental Living       | RE1 Public Recreation       |
| B3 Commercial Core      | IN1 General Industrial        | RE2 Private Recreation      |
| B4 Mixed Use            | IN2 Light Industrial          | SP2 Infrastructure          |
| B5 Business Development | R2 Low Density Residential    |                             |
| B7 Business Park        | R3 Medium Density Residential |                             |

**Legend**

- Site Compound
- Site Works Boundary

Source:

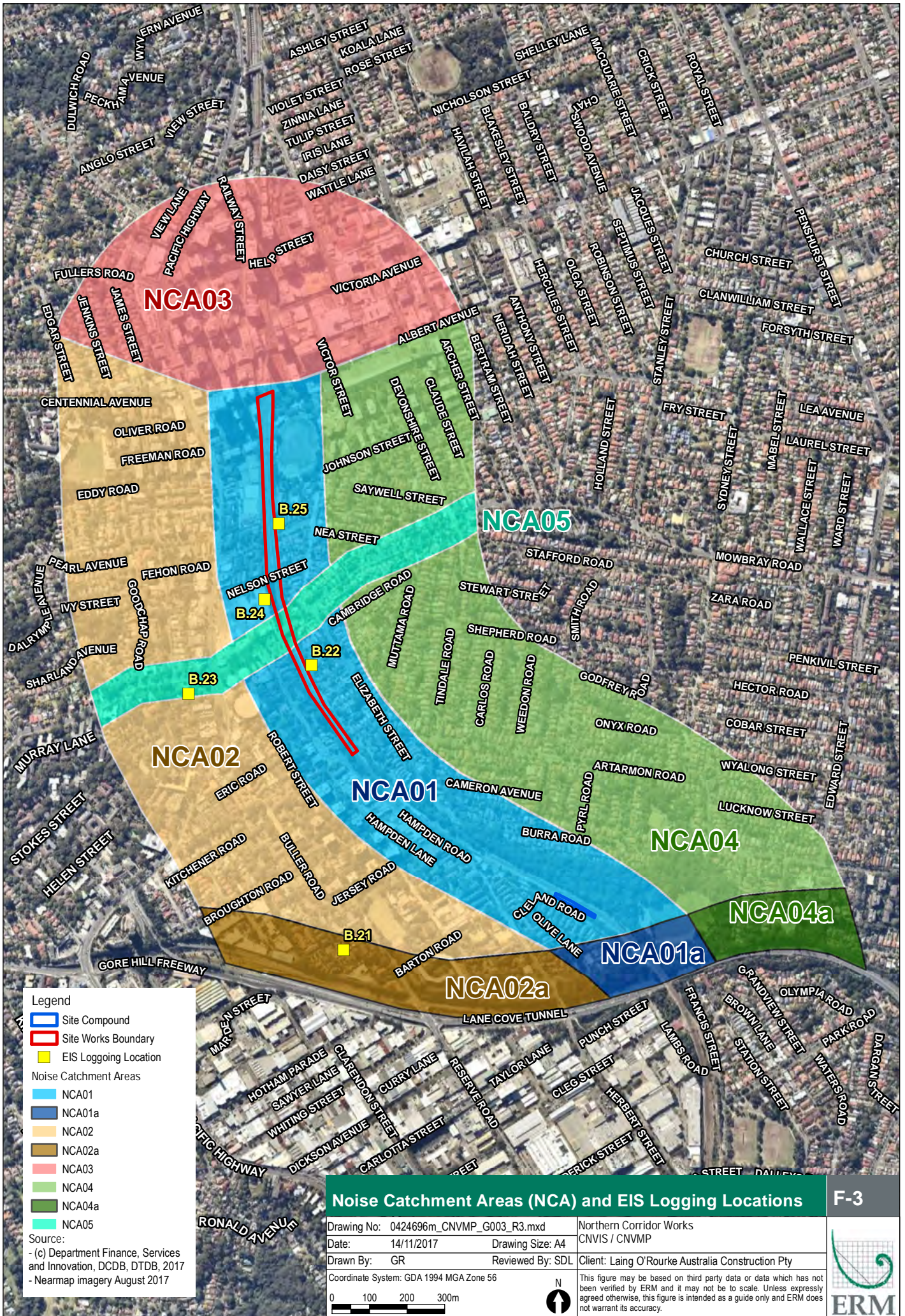
- (c) Department Finance, Services and Innovation, DCDB, DTDB, 2017
- Nearmap imagery August 2017
- SILEP LZN NSW DPE (2017)

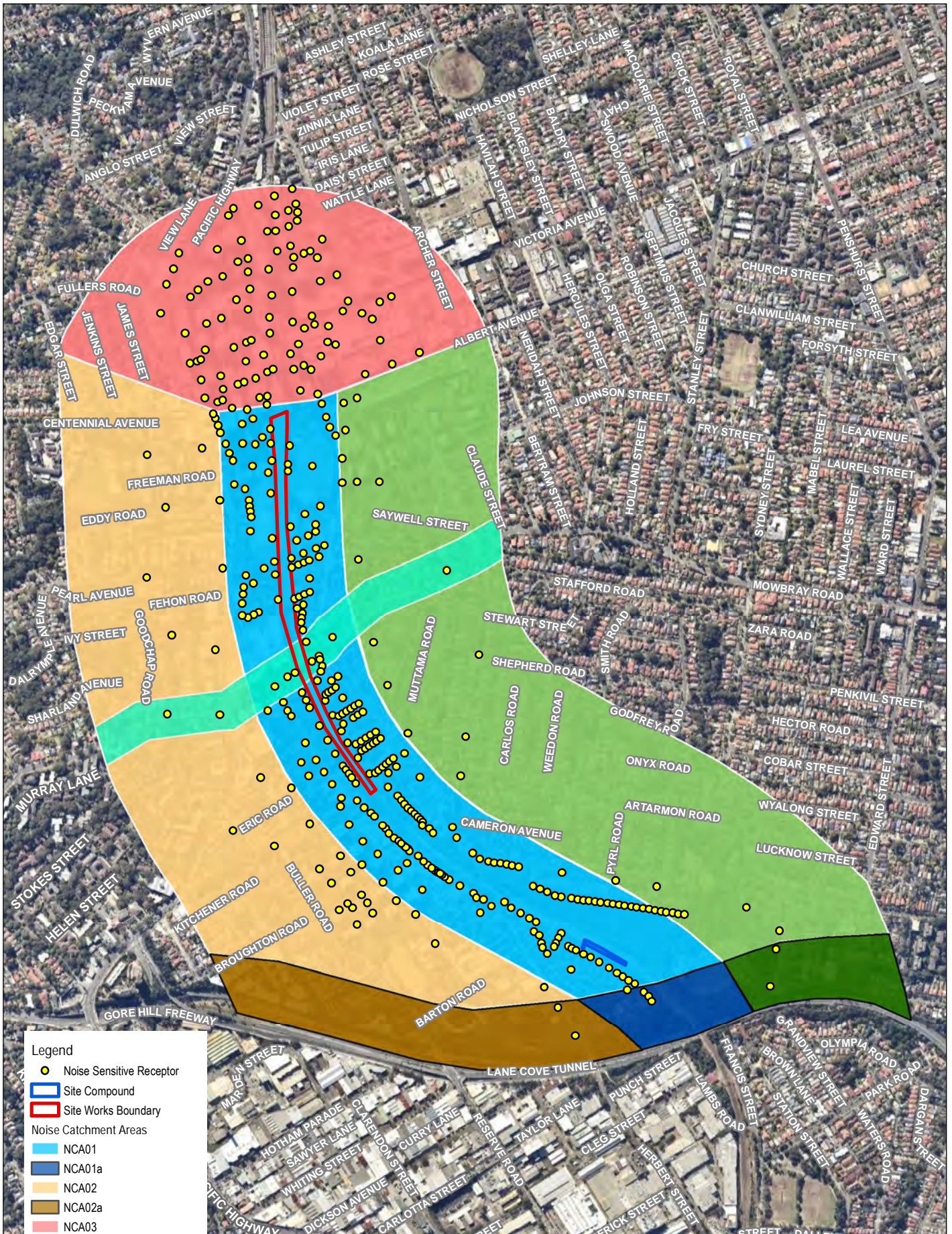
**Zoning Map**

|   |   |
|---|---|
| Drawing No: 0424696m_CNVP_G002_R1.mxd             | Northern Corridor Works<br>CNVIS / CNVP |
| Date: 17/10/2017                                  | Drawing Size: A4                        |
| Drawn By: GR                                      | Reviewed By: SDL                        |
| Client: Laing O'Rourke Australia Construction Pty |   |
| Coordinate System: GDA 1994 MGA Zone 56           |   |

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**F-2**





**Legend**

- Noise Sensitive Receptor
- Site Compound
- Site Works Boundary

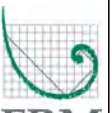

**Noise Catchment Areas**

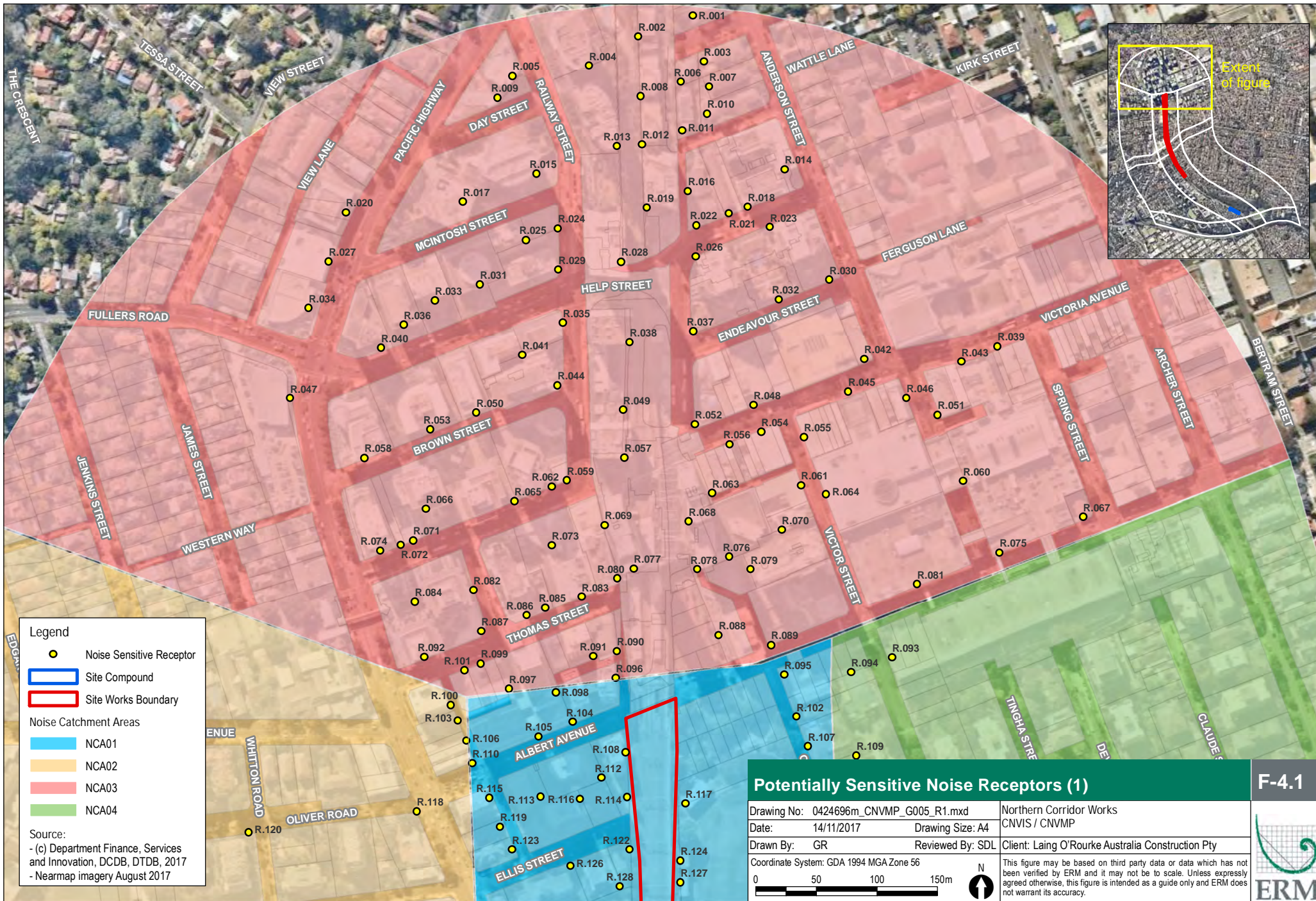
- NCA01
- NCA01a
- NCA02
- NCA02a
- NCA03
- NCA04
- NCA04a
- NCA05

Source:  
 - (c) Department Finance, Services and Innovation, DCDB, DTDB, 2017  
 - Nearmap imagery August 2017

### Potentially Sensitive Noise Receptors - Overview Map

F-4

|   |  |   |
|---|--|---|
| Drawing No: 0424696m_CNVMP_G004_R2.mxd  | Northern Corridor Works<br>CNVIS / CNVMP |    |
| Date: 14/11/2017  | Drawing Size: A4                         |   |
| Drawn By: GR  | Reviewed By: SDL                         | Client: Laing O'Rourke Australia Construction Pty   |
| Coordinate System: GDA 1994 MGA Zone 56   |  | This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy. |
| 0 100 200 300m<br> |  |   |



**Legend**

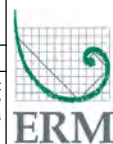
- Noise Sensitive Receptor
  - Site Compound
  - Site Works Boundary
- Noise Catchment Areas
- NCA01
  - NCA02
  - NCA03
  - NCA04

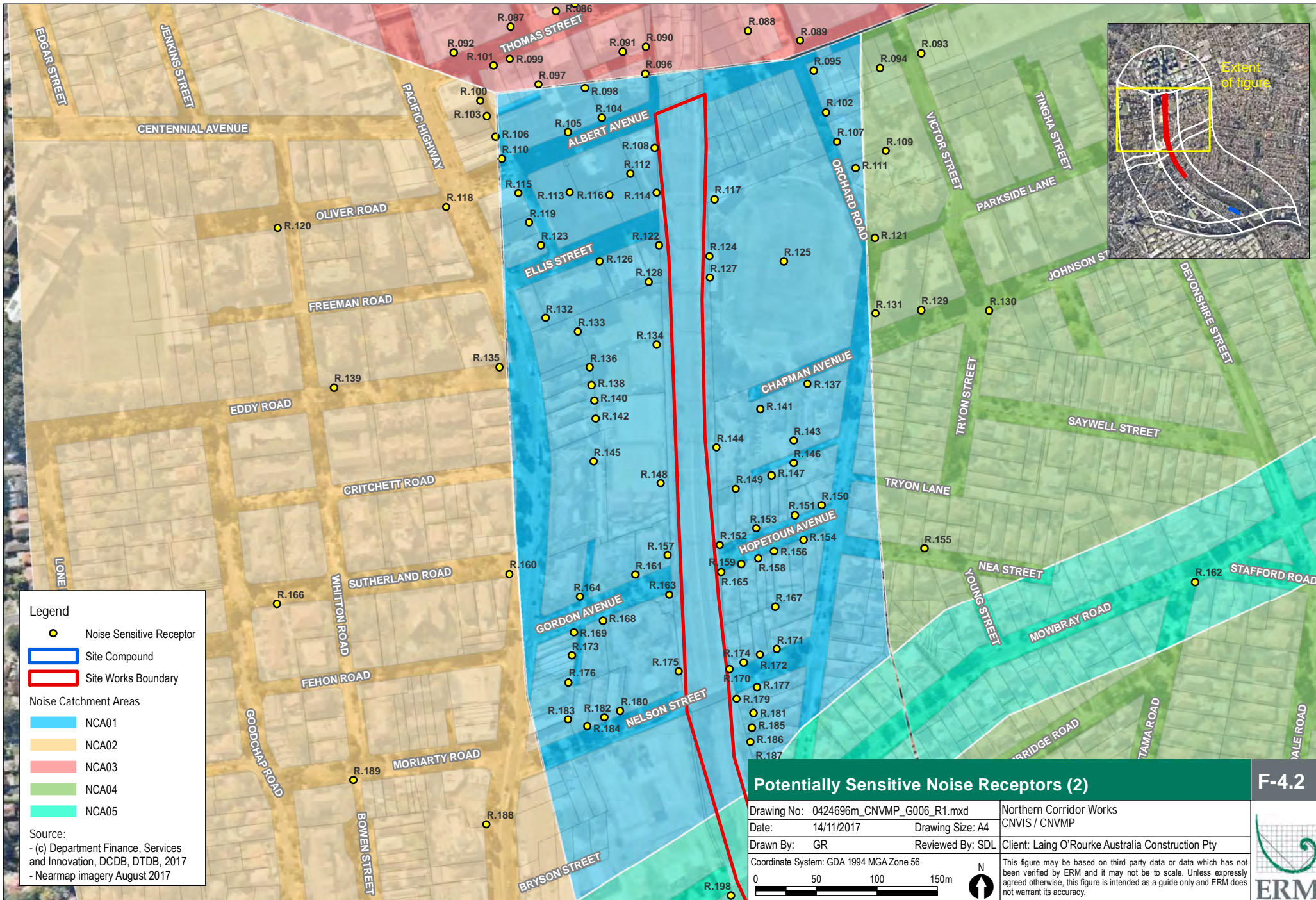
Source:  
 - (c) Department Finance, Services and Innovation, DCDB, DTDB, 2017  
 - Nearmap imagery August 2017

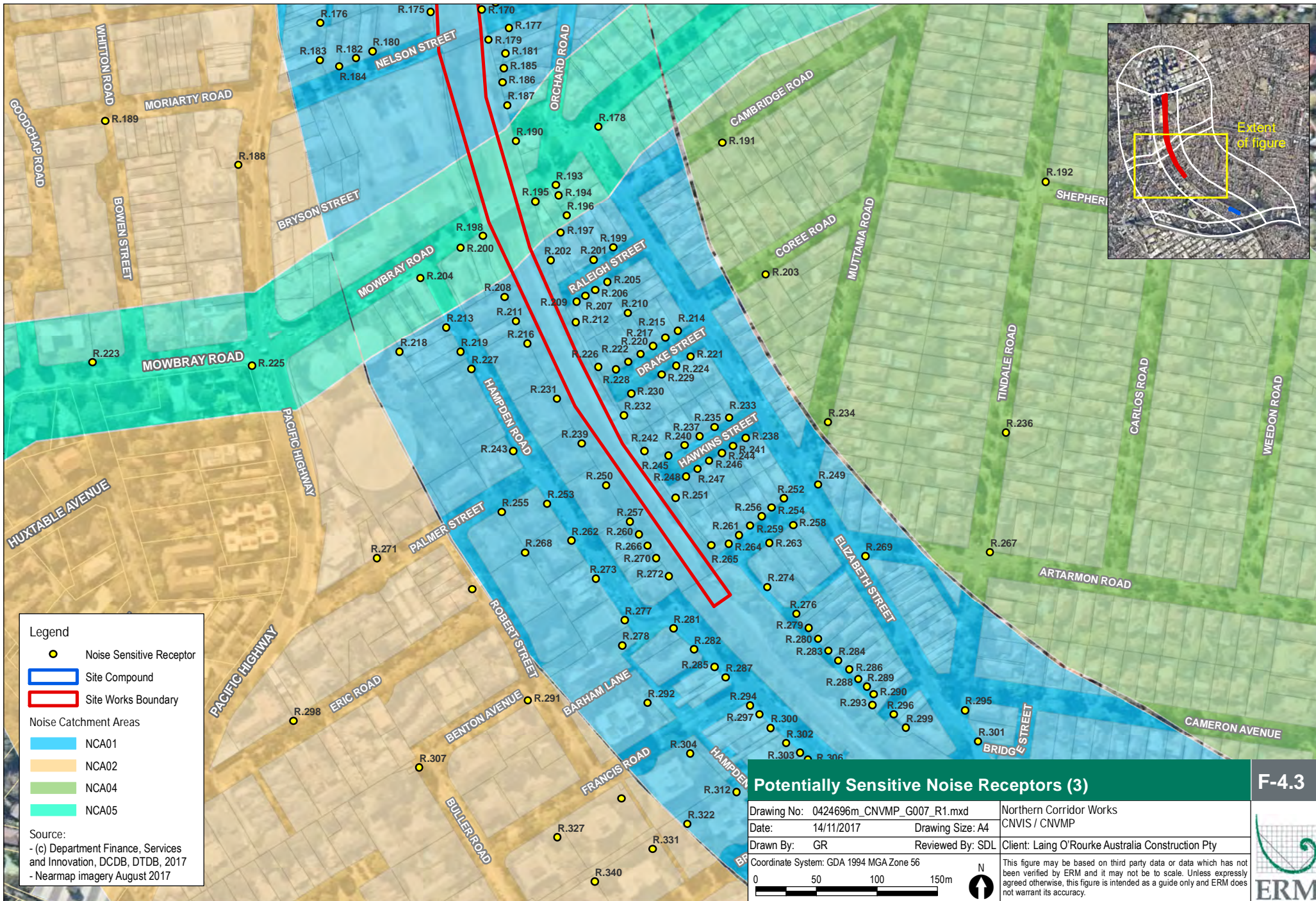
**Potentially Sensitive Noise Receptors (1)**

|  |                         |
|--|-------------------------|
| Drawing No: 0424696m_CNVMP_G005_R1.mxd   | Northern Corridor Works |
| Date: 14/11/2017   | CNVIS / CNVMP           |
| Drawn By: GR   | Reviewed By: SDL        |
| Client: Laing O'Rourke Australia Construction Pty  |                         |
| Coordinate System: GDA 1994 MGA Zone 56  |                         |
| 0 50 100 150m  |                         |
|  |                         |
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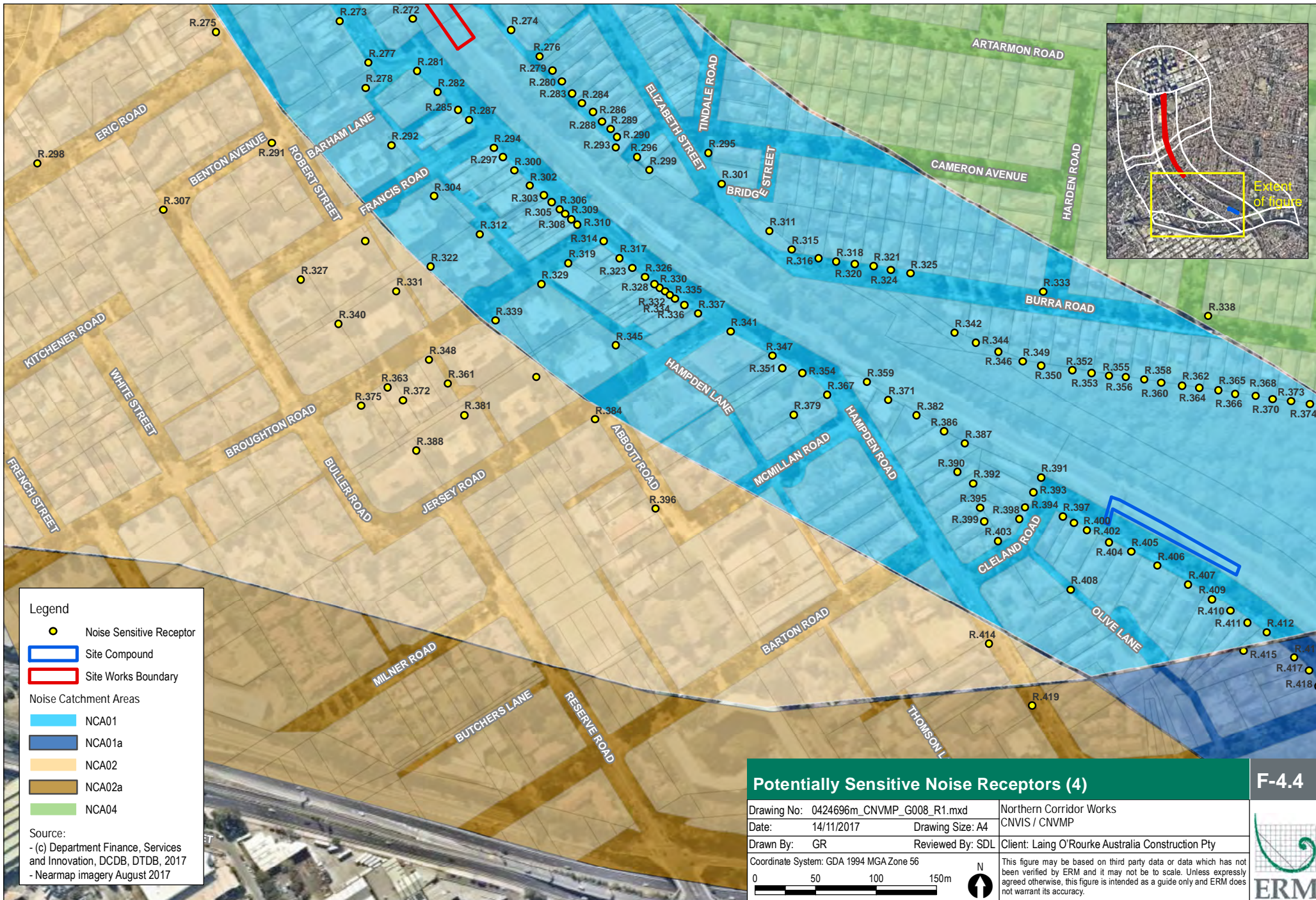
**F-4.1**











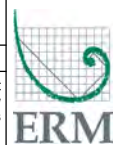
**Legend**

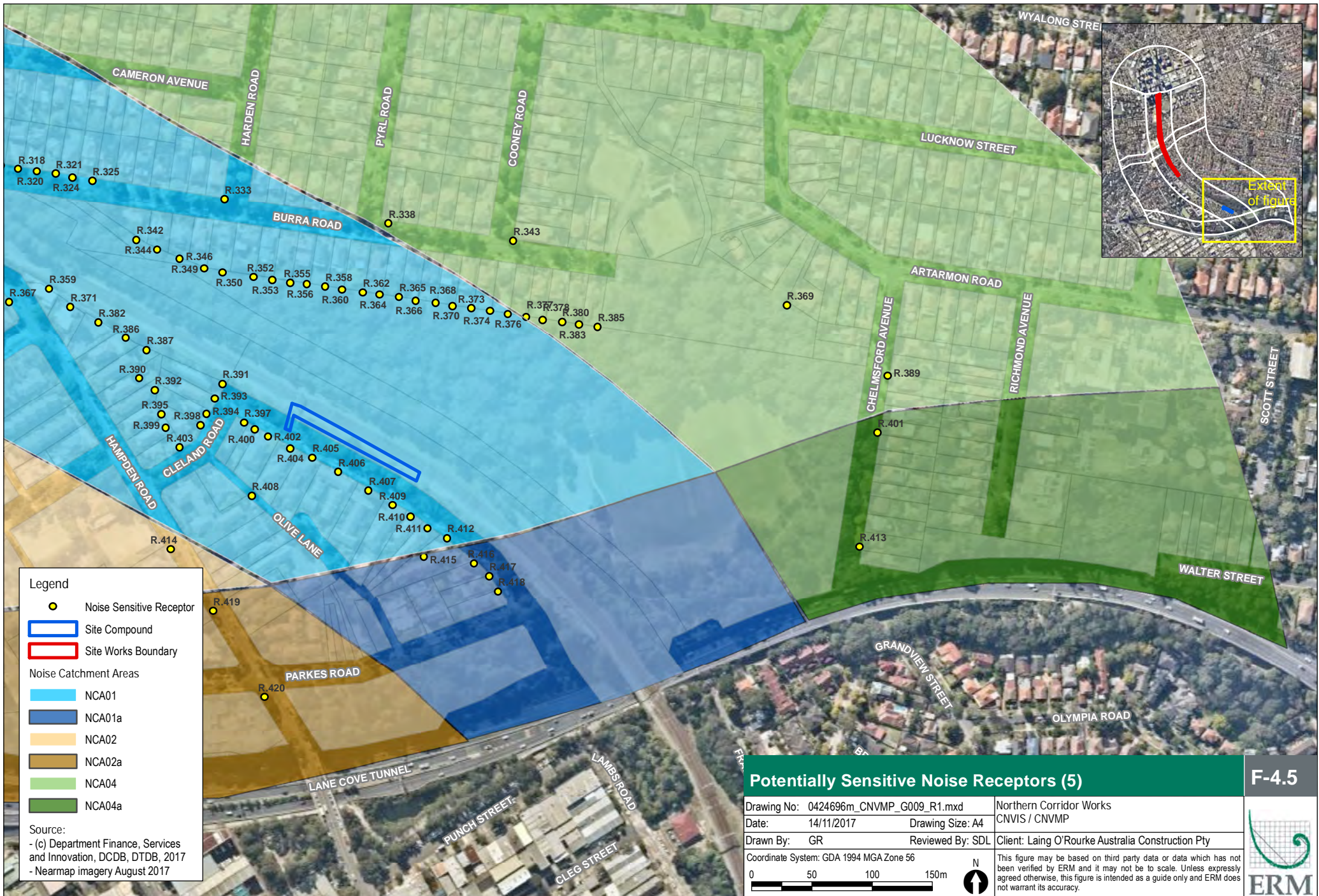
- Noise Sensitive Receptor
  - Site Compound
  - Site Works Boundary
- Noise Catchment Areas
- NCA01
  - NCA01a
  - NCA02
  - NCA02a
  - NCA04

Source:  
 - (c) Department Finance, Services and Innovation, DCDB, DTDB, 2017  
 - Nearmap imagery August 2017

**Potentially Sensitive Noise Receptors (4) F-4.4**

|   |                         |
|---|-------------------------|
| Drawing No: 0424696m_CNVP_G008_R1.mxd   | Northern Corridor Works |
| Date: 14/11/2017  | DNVIS / CNVP            |
| Drawn By: GR  | Reviewed By: SDL        |
| Client: Laing O'Rourke Australia Construction Pty   |                         |
| Coordinate System: GDA 1994 MGA Zone 56   |                         |
| 0 50 100 150m   |                         |
|   |                         |
| This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy. |                         |





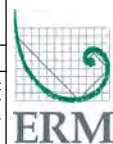
**Legend**

- Noise Sensitive Receptor
- Site Compound
- Site Works Boundary
- Noise Catchment Areas**
- NCA01
- NCA01a
- NCA02
- NCA02a
- NCA04
- NCA04a

Source:  
 - (c) Department Finance, Services and Innovation, DCDB, DTDB, 2017  
 - Nearmap imagery August 2017

**Potentially Sensitive Noise Receptors (5) F-4.5**

|   |  |
|---|--|
| Drawing No: 0424696m_CNVP_G009_R1.mxd   | Northern Corridor Works<br>CNVIS / CNVMP |
| Date: 14/11/2017  | Drawing Size: A4                         |
| Drawn By: GR  | Reviewed By: SDL                         |
| Client: Laing O'Rourke Australia Construction Pty   |  |
| Coordinate System: GDA 1994 MGA Zone 56   |  |
| 0 50 100 150m   |  |
| N<br>↑  |  |
| This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy. |  |



Nuisance, or an unacceptable level of noise and vibration amenity, may arise from construction activities associated with new or existing developments.

These potential environmental issues are common to larger scale construction works and in this case are recognised in the broader Sydney Metro project approval documents requiring the preparation of this CNVIS, and the mitigation and management of potential impacts during the approved works and activities. This CNVIS has been conducted and documented to address these potential issues and applies directly to the NCW construction phase of Sydney Metro. It applies only to construction activities, tasks, products and services on the site over which LOR has control or influence.

On this basis, this CNVIS considers the following acoustical factors:

- Air-borne construction noise;
- Ground-borne construction noise;
- Road traffic noise during construction; and
- Ground-borne construction vibration.

Blasting (a feature of the broader Sydney Metro project) is not required for NCW and is therefore not addressed in this CNVIS.

All sound pressure levels presented in this report (e.g. noise levels predicted at a receptor) are in decibels referenced to  $2 \times 10^{-5}$  Pa. All sound power levels presented in this report (e.g. noise levels assigned to specific sources) are decibels referenced to  $10^{-12}$ W. A glossary of relevant acoustical concepts and terminology is provided in **Annex A**.

## 2.1

### *SCOPE OF WORK*

To assess NCW construction noise and vibration (including road traffic), the following scope of work has been completed:

- Review and validate the available project and third party data and information as considered relevant to the assessment.
- Review aerial photography, zoning data, cadastre data and third party assessments conducted in the area to identify potential residential and other sensitive receptors situated within the potential area of influence of the NCW.
- Identify significant noise and vibration generating plant, equipment and machinery that may be in use or activities that will be undertaken as part of

the NCW and their likely/known emissions to develop applicable assessment scenarios.

- Review third party assessments conducted in the area to establish representative baseline noise levels for the area and then develop project-specific noise and vibration criteria in accordance with recognised NSW policy and guidelines as applicable to project activities.
- Complete a quantitative assessment of key acoustical factors including potential noise and vibration impacts associated with construction aspects. The quantitative assessment was completed by predicting project noise levels (via modelling) for the scenarios developed, with vibration predicted via spreadsheet calculations. Complete a qualitative assessment of low risk acoustical factors.
- Provide a comparison of predicted levels to the project-specific noise and vibration criteria at receptors, identify any levels that exceed criteria and determine the magnitude and extent of any impacts.
- Recommend mitigation, management measures and/or monitoring options suitable to the predicted levels and designed to minimise impacts as far as is feasible, reasonable and practicable to implement. LOR reviewed these recommendations and is committed to implementing the specified measures during the NCW project, as documented in the CNVMP.

## 2.2

### *POLICY SETTING*

In NSW, noise pollution is regulated through the *Protection of the Environment Operations Act 1997* (POEO Act) as the key piece of environment protection legislation. Noise pollution is defined under the POEO Act as:

*'the emission of offensive noise, which means noise that by reason of its level, nature, character or quality, or the time at which it is made, or any other circumstances, is harmful (or is likely to be harmful) to or interferes unreasonably (or is likely to interfere unreasonably) with the comfort or repose of a person outside the premises from which the noise is emitted'.*

Under the POEO Act, the '*POEO (Noise Control) Regulation 2008*' addresses common noisy activities that occur in residential situations; it limits the time of day that noisy articles (such as lawn mowers, stereos and leaf blowers) are permitted to be heard in neighbouring residences, however it does not specify noise limits and an applicable approach for the assessment of existing sites.

Various noise and vibration assessment guidelines endorsed by NSW regulators provide a guideline framework and methodology for deriving acceptable levels and standard methods for assessing and measuring construction impacts with due regard to the POEO Act. The key documents, policy, guidelines and standards relevant to the NCW works are summarised below.

This CNVIS has been developed to address the requirements of the Critical State Significant Infrastructure Conditions of Approval (CoA) (SSI 15\_7400) and the requirements of the Sydney Metro Construction Environmental Management Framework (August 2016). **CoA - E33** outlines the requirement for Construction Noise and Vibration Impact Statements to be prepared for each construction site prior to noise and vibration impacts occurring and include specific mitigation measures identified through consultation with affected sensitive receivers.

### 2.2.1 *Relevant Policy, Guidelines and Standards*

This assessment has been conducted with due regard to and in accordance with the following key policy, guidelines and standards:

- NSW Department of Environment and Climate Change - *NSW Interim Construction Noise Guideline (ICNG)*, July 2009.
- NSW Government - Sydney Metro Construction Noise and Vibration Strategy (CNVS), August 2017.
- NSW Environment Protection Authority - *NSW Environmental Noise Management - Industrial Noise Policy (INP)*, January 2000 and relevant application notes.
- NSW Department of Environment, Climate Change and Water - *NSW Road Noise Policy (RNP)*, March 2011.
- NSW Government - Transport for NSW (TfNSW) Construction Noise Strategy (CNS), April 2013.
- Standards Australia AS 2436-2010™ (AS2436) - Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites;
- Standards Australia AS1055-1997™ (AS1055) - Description and Measurement of Environmental Noise.
- Standards Australia AS IEC 61672.1-2004™ (AS61672) - *Electro Acoustics - Sound Level Meters Specifications Monitoring* or Standards Australia AS1259.2-1990™ (AS1259) - *Acoustics - Sound Level Meters - Integrating/Averaging* as appropriate to the device.
- Standards Australia AS/IEC 60942:2004/IEC 60942:2003 (IEC60942) - Australian Standard™ - *Electroacoustic - Sound Calibrators*.
- German Institute for Standardisation - DIN 4150 (1999-02) Part 3 (DIN4150:3) - *Structural Vibration - Effects of Vibration on Structures*.
- British Standard BS7385: Part 2-1993 (BS 7385) - *Evaluation and Measurement for Vibration in Buildings - Part 2 - Guide to Damage Levels from Ground-borne Vibration*, dated 1993.

- NSW Department of Environment and Conservation – *NSW Environmental Noise Management – Assessing Vibration: a Technical Guideline* (the NSW Vibration Guideline), February 2006.

*NSW Interim Construction Noise Guideline (DECC 2009)*

The ICNG presents an accepted method by which construction noise and vibration impacts may be assessed for a range of receptor types for works completed in NSW. It provides a set of recommended standard hours of construction, as reproduced below:

- Monday to Friday: 7 am to 6 pm;
- Saturday: 8 am to 1pm; and
- No work on Sundays or public holidays.

The ICNG encourages works to occur within the recommended standard hours of construction unless justification is provided. It focuses on minimising construction noise impacts, rather than only on achieving numeric noise levels, and recognises that some noise from construction sites is inevitable.

The ICNG encourages organisations involved with construction, maintenance or upgrading works (e.g. large scale contractors or Government agencies) to develop their own best-practice techniques for managing construction noise and vibration, and implementing feasible and reasonable mitigation measures.

In this case the ICNG is considered the suitable document to quantifiably assess potential noise emissions and impacts associated with project construction.

The ICNG assessment methodology is outlined in more detail in **Annex A** of this report. Baseline noise values are presented in **Section 3** and construction noise criteria are presented in **Section 4** of this report.

*Sydney Metro Construction Noise and Vibration Strategy (CNVS)*

As noted above, the ICNG guideline encourages organisations involved with construction, maintenance or upgrading works (such as Sydney Metro) to develop their own best-practice techniques for managing construction noise.

In line with this recommendation the purpose of this ‘Construction Noise and Vibration Strategy’ is to document how Sydney Metro proposes to manage construction noise and vibration for the Sydney Metro City and Southwest project including any potential extensions.

Generally the strategy is intended to provide a single interface for the large number of policies, guidelines, standards and regulations that apply to a large infrastructure project such as Sydney Metro. Where possible the strategy consolidates these information sources e.g. vibration criteria from numerous

sources are collated into one section of this strategy for ease of reference. Further, the strategy aims to provide interpretation of the reference documents which are specific to the Metro project. Where the reference documents are found to have insufficient detail the strategy provides additional assessment criteria and methodologies.

*NSW Industrial Noise Policy (EPA 2000)*

Responsibility for the control of noise emissions in NSW is typically vested in Local Government and the NSW Environment Protection Authority (EPA). The INP and relevant application notes provide a framework and methodology for deriving limit conditions for consent and licence conditions.

The INP is designed for large and complex industrial sources and outlines processes designed to strike a feasible and reasonable balance between the operations of industrial activities and the protection of the community from noise levels that are intrusive or unpleasant.

The INP measurement and evaluation methodology to quantify existing ambient and background noise levels has been adopted for this CNVIS, with the baseline values utilised to derive construction noise criteria. The INP assessment terminology is outlined in more detail in **Annex A** of this report.

*NSW Road Noise Policy (DECCW 2011)*

The RNP was approved to replace the Environmental Criteria for Road Traffic Noise (ECRTN) with effect from 1 July 2011. The RNP outlines the range of measures needed to minimise road traffic noise and its impacts. It is intended for use by acoustics specialists as well as:

- Road project proponents.
- Determining authorities and regulators involved in the approval and construction of road projects and land use developments that generate additional traffic on existing roads.
- City and transport planners and policymakers dealing with issues such as route corridors, heavy vehicle transport and building codes.

The RNP aims to identify the strategies that address the issue of road traffic noise from existing roads, new road projects, road redevelopment projects and new traffic-generating developments. In this case the RNP is considered the suitable document to qualitatively assess potential noise emissions and impacts associated with construction road traffic.

The RNP vary based on road type and are dependent on the development being assessed (refer **Section 4**). The criteria values from the RNP were considered in the assessment of potential construction impacts, they are used to provide guidance on potential short-term and temporary impacts

associated with heavy vehicle haulage and/or other like vehicles that may be required as part of the construction.

#### *Vibration Guidelines and Standards*

The effects of vibration in buildings can be divided into three main categories: human comfort (annoyance), cosmetic damage and structural damage. An overview of the applicable standards and guidelines is provided below.

**Human Comfort (annoyance):** The NSW Vibration Guideline provides guidance for assessing human exposure (comfort or annoyance issues) to vibration. The publication is based on British Standard (BS 6472-1992) – *Evaluation of Human Exposure to Vibration in Buildings (1 Hz to 80 Hz)*, dated 1992.

**Cosmetic and Structural Damage:** There is currently no Australian policy or guideline for assessing the potential for building damage (cosmetic and structural) from vibration. To achieve the requirements of the CNVS, British Standard BS 7385 Part 2-1993 ‘Evaluation and measurement for vibration in buildings Part 2’ has been considered for NCW works where applicable. BS 7385 provides safe limit guideline values, below which vibration is considered insufficient to cause structural or cosmetic damage to buildings. If a heritage building or structure is found to be structurally unsound a more conservative standard has been adopted i.e. German Standard DIN4150 Part 3-1999 (DIN4150-3) – *Structural Vibration - Effects of Vibration on Structures*, dated 1999. DIN4150-3 presents a set of safe limit values that below which cosmetic or structural damage is unlikely to occur.

The NSW Vibration Guideline, BS7385 and DIN 4150-3 criteria vary based on vibration type, receptor type and are dependent on the component frequency of the vibration event (refer **Section 4**). The criteria values from the NSW Vibration Guideline, BS7385 and DIN 4150-3 were considered in the assessment of potential impacts but are not reproduced here.

## 2.3

### **NOISE MODELLING**

The methodology, inputs and assumptions that have informed the construction and operational noise modelling are outlined below:

- Brüel and Kjær’s Predictor 7810 (Version 112) noise modelling software package was utilised to calculate noise levels using the International Organisation for Standardisation (ISO) 9613-2:1996 (ISO9613:2) - *Acoustics - Attenuation of Sound during Propagation Outdoors - Part 2: General Method of Calculation* noise propagation algorithms (international method for general purpose, 1/1 octaves).



- For sound calculated using ISO9613:2, the indicated accuracy is  $\pm 3$  dBA at source to receiver distances of up to 1000 metres (m) and unknown at distances above 1000m.
- The Predictor software package allowed 3D elevation data to be combined with ground regions, water, foliage, significant building structures etc. and receptor locations, to create a detailed and accurate representation of the site and surrounding area. The noise model allowed for the quantification of noise levels from multiple sources, based on sound power or pressure levels emitted from each source. The model computed the noise propagation in the assessment area of influence to specifically quantify A-weighted decibels ( $L_{eq, 15\text{minute}}$  and  $L_{max}$  in dBA) at identified receptors.
- Sound Power Level ( $L_W$ , dBA) data incorporated into the project-specific noise models was provided by the client, obtained from relevant Australian Standards or adapted from a proprietary source term database available at the time of the assessment. This assessment has considered standard good practice mitigation measures via noise modelling by adopting the midpoint values for all sound power levels.
  - $L_W$  is a measure of the total power radiated by a source; it is a fundamental property of the source and is independent of the surrounding environment.
  - $L_W$  differs from a Sound Pressure Level ( $L_P$ ) which is the level of sound pressure as measured at a distance by a standard sound level meter with a microphone.  $L_P$  is the received sound (e.g.  $L_{eq, 15\text{minute}}$  in dBA) as opposed to  $L_W$  which is the sound 'intensity' at the source.
- 3D elevation data, zoning data and cadastre (spatial data) was obtained from the NSW Government - *Land and Property Information* (LPI).
  - Buildings near the NCW were included in the noise model based on this spatial data or manually digitised from aerial photography.
  - They were modelled as building regions for the broader areas surrounding the NCW but were included as specific buildings for those in close proximity to the site.
- Noise Catchment Areas (NCA, as identified in **Section 3.1**) were utilised to establish receptor areas and locations. These locations were selected to ensure the most affected points were assessed. The NCA and receptor locations adopted for this assessment were presented in **Figures 3 and 4**.
- Noise levels were calculated at 1.5 metres (m) above ground level for all receptors, in accordance with the INP and ICNG. It is noted that ambient, background and project noise levels may be higher at receptor heights above 1.5 m.

- In all cases noise has been assessed at the most-affected point at or within the residential property boundary or, if that is more than 30 metres from the residence, at the most-affected point within 30 metres of the residence.
- The model included a temperature of 13.8°C and humidity of 57%, representative of conservative historic annual mean minimum conditions in the region. Further information is provided below regarding prevailing meteorological conditions. A ground factor of 0.6 was adopted for the modelling area (0.0 is hard, 1.0 is soft).
- Amongst other features noise modelling software offer a range of emission source types to be used to predict levels at receptors, these include but are not limited to “area sources” and “point sources”. These source types were adopted as follows:
  - To accurately represent general construction emissions, capturing the size, layout and number of noise generating plant / equipment, “area sources” were utilised to predict Leq, 15minute noise levels. A separate area source was placed in the model for each phase of works to represent the distribution of noise across the broader project site during each work phase.
  - A “Point source” was included in the noise model for the sheet piling activity at a discrete location directly adjacent to receptor R.242. Therefore should piling occur at other similar locations in close proximity to receptors, similar noise and vibration impacts would be anticipated and would result in the requirement of similar mitigation and management measures.
- The noise assessment scenarios and modelling data are summarised in **Section 4** and presented in detail in **Annex C**. All LW, dBA values have considered and applied the relevant INP modifying factors (penalties) for offensive noise characteristics, prior to modelling.

### 2.3.1 *Prevailing Meteorological Conditions*

Prevailing meteorological conditions have the potential to increase noise levels at receptors influenced by the effects of wind and temperature inversions. Winds blowing between the source and the receptor, and temperature inversions can increase noise levels by between 1 dBA and approximately 7 dBA depending on the distance of the receptor from the source and condition. These noise level increases are normally detectable (or quantifiable via modelling) for receptor distances greater than 100 metres from the source.

For this construction noise model meteorological conditions for prevailing winds were not included in the model however a D-Class temperature inversion was adopted (representing a stable condition) for all scenarios.

Although other receptors are situated at distances further from the site that could be influenced by the effects of other wind and inversion conditions, compliance at the closest receptors and further attenuation provided by intervening building structures and topography will ensure compliance at other receptors.

## 2.4 *CUMULATIVE IMPACTS*

Noise impact assessments are generally based on predicting project-specific levels at the closest and/or most affected receptors and then comparing these to criteria or management levels that apply to the type of emission being considered.

In the case of construction emissions, the noise criteria are derived based on existing noise levels for the area, for road traffic and vibration fixed values apply. To assess potential cumulative impacts a varied approach has therefore been adopted as described below.

The construction noise criteria (ICNG) and management levels are based on existing noise levels measured at locations surrounding the site but focus on the direct impacts from the site under assessment, cumulative impacts are beyond the control of LOR, are temporary in most circumstances and are best managed by local or state consent authorities for significant projects. Therefore, a qualitative assessment of potential cumulative impacts has been conducted but limited discussion regarding cumulative impacts is required.

The noise criteria (RNP) are fixed values but are derived to assess the site noise level contribution (i.e. project vehicles on public roads) and the effects of cumulative road traffic noise impacts. Therefore, the RNP criteria address potential cumulative impacts without further discussion required.

The vibration criteria (the NSW vibration guideline and DIN4150-3) are again fixed values derived to assess the site vibration level contribution, cumulative impacts will unlikely occur in most circumstances due to the lack of existing influential sources. Therefore, a qualitative assessment of potential cumulative impacts has been conducted but limited discussion regarding cumulative impacts is required.

With the above features in mind the focus of any discussion regarding cumulative impacts is associated with construction noise, as presented in **Section 5** of this document.

## 2.5 *VIBRATION ASSESSMENT*

To assess potential vibration impacts a combined approach of guideline reference and predictive methods was adopted.

The guideline reference involved the applicable safe work distances published in the TfNSW CNS. The predictive method adopted the Table E.1 empirical predictors for ground-borne vibration arising from mechanized construction works as presented in British Standard – BS5228-2:2009+A1:2014 (BS5228) – *Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 2: Vibration*.

BS 5228 presents methods to estimate vibration due to percussive piling, which in this case has been selected to best represent the NCW sheet piling. A conservative method has been applied based on the specified calculative inputs and distance offsets to estimate potential vibration levels, PPV in mm/s.

Vibration Dose Values (VDV in m/s<sup>2</sup>) have then been estimated for a conceptual scenario based on a typical range of vibration levels and component frequencies. A total duration of four hours of vibration intensive works was adopted with varying levels of vibration being received during that time. All calculative inputs are summarised in **Equation 5.1, Table 5.16 and Table 5.17**.

In all cases the comparison of predicted values to criteria is focused on the closest and/or potentially most affected vibration receptors being **R.242** (cosmetic/structural damage and human annoyance) situated east and directly adjacent to the site at a distance of ≥8 metres. Should piling occur at other similar locations in close proximity to receptors, similar noise and vibration impacts would be anticipated and would result in the requirement for similar mitigation and management.

All predicted values are estimates only and may vary depending on geotechnical features and intervening structures, amongst other things. In ERM’s experience these predicted values are typically conservative but offer a useful guide for the purpose of assessing impacts, evaluating mitigation and management measures and defining monitoring requirements.

**Table 2.1** *Sheet Piling (Adapted From Percussive Piling)*

| Operation         | Prediction question  | Scaling Factors<br>(and probability of predicted value being exceeded)  | Parameter range  |
|-------------------|--|---|--|
| Percussive Piling | $V_{res} \leq k_p \left[ \frac{\sqrt{W}}{r^{1.3}} \right]$ | For piles at refusal: $k_p = 5$<br><br>For piles not at refusal: $1 \leq k_p \leq 3$ , depending on soil type (Table E.2 of BS5228) | $1 \leq L \leq 27$ m<br><br>$1 \leq x \leq 111$<br>(where $L^2 + x^2 = r^2$ )<br><br>$1.5 \leq W \leq 85$ kJ |

*Source: BS 5228*

To calculate VDV the following formula is used (refer Section 2.4.1 of the NSW vibration guideline).

**Equation 2.1 Vibration Dose Values (VDV) Estimate**

$$VDV = \left[ \int_0^T a^4(t) dt \right]^{0.25}$$

Where VDV is the vibration dose value in  $m/s^{1.75}$ ,  $a(t)$  is the frequency-weighted RMS of acceleration in  $m/s^2$  and T is the total period of the day (in seconds) during which vibration may occur.

**Table 2.2 Calculative Inputs**

| Activity     | Type | Parameter    | Input   |
|--------------|------|--------------|---|
| Sheet Piling | PPV  | mm/s         | Piles at Refusal Factor, $k_p = 5$ , Energy, $W = 85$   |
| Sheet Piling | VDV  | $m/s^{1.75}$ | 120 minutes at 0.6 mm/s (representing soft soil), 90 minutes at 1.9 mm/s (representing hard soil) and 30 minutes at 3.1 mm/s (representing refusal). All events at 40 Hz. |

*Source: BS 5228, NSW Vibration Guideline*

A key element in assessing environmental noise impacts is an understanding of the existing ambient and background noise levels in the vicinity of the closest and/or potentially most affected receptors situated in proximity to a site. This chapter provides a summary of the existing noise conditions as relevant to NCW.

*NOISE CATCHMENT AREAS*

ERM has identified 'Noise Catchment Areas' (NCA) for eight discrete areas surrounding the NCW project. These NCA were established to approximate areas of land that:

- may experience similar existing noise levels;
- may experience similar noise levels to receptor locations where values are predicted via modelling; and
- to inform the extent of any notification area boundary that may be required.

These NCA are an important feature of the assessment as it is not feasible or useful to predict noise levels at every building or dwelling within the potential area of influence of the NCW. These NCAs were designed based on proximity to the rail corridor and other existing noise sources in the area such as the M2 Motorway, the Pacific Highway, Mowbray Road and the Chatswood Central Business District (CBD). These NCA were shown in **Figure 3** and are described below in **Table 2.1**.

**Table 3.1 Noise Catchment Areas (NCA)**

| Noise Catchment Area (NCA) | Description  | Distance (m)               |
|----------------------------|--|----------------------------|
|                            |  | Rail/Road or Train Station |
| NCA01                      | Residential and industrial/commercial receptors within 150m of the rail corridor.  | <150m                      |
| NCA01a                     | The southern portion of NCA01 that falls within 150m of the M2 motorway.   | <150m                      |
| NCA02                      | Residential and commercial receptors beyond 150m and within 550m west of the rail corridor.                              | >150m west                 |
| NCA02a                     | The southern portion of NCA02 that falls within 150m of the M2 motorway.   | >150m west                 |
| NCA03                      | Residential and commercial within a radius of 500m from the Chatswood train station encompassing the Chatswood CBD area. | <500m                      |
| NCA04                      | Residential and commercial receptors beyond 150m and within 550m east of the rail corridor.                              | >150m east                 |
| NCA04a                     | The southern portion of NCA04 that falls within 150m of the M2 motorway.   | >150m east                 |
| NCA05                      | Receptors that fall within 50m of Mowbray road   | <50m                       |

1. NCA presented in **Figure 3**

### 3.2 POTENTIALLY SENSITIVE RECEPTORS

ERM has identified 420 sensitive receptors as the closest and/or potentially most affected locations situated within the potential area of influence of the NCW. The full list sensitive receptors along with the mapped locations from the noise model are provided in **Annex B**.

These locations were established based on review of aerial photography, land use zoning and cadastre data and the results of preliminary noise modelling, where receptor positions were optimised to ensure representative worst-case levels were being predicted.

The selected locations do not represent all receptors located in the vicinity of the NCW but have been selected for the purposes of this noise and vibration impact assessment; they are considered to be representative of locations that will potentially experience the highest impacts associated with the NCW, and will be the most affected during construction activities.

A rail noise barrier is located along the rail corridor between Nelson Street and Albert Avenue. Reduced impacts are therefore anticipated for the receptors where shielding is provided by the rail noise barrier.

The NCA and an overview of all sensitive receptor locations are identified in the **Figure 3 to Figure 4.5**.

Existing conditions have been quantified from the data presented in the EIS. Environmental noise monitoring was conducted by SLR at five locations during August to September 2015 to inform the EIS (TfNSW, SLR 2016). These five monitoring locations are identified in the EIS as B.21, B.22, B.23, B.24 and B.25.

Rating Background Levels (RBL) representative of each of the eight NCAs identified for this CNVIS were adapted based on the RBLs presented in the EIS. The RBLs adopted for this CNVIS (and subsequent CNVMP) are presented in **Table 3.2** below for the day, evening and night-time periods. The following assumptions were used:

- The RBL for NCA01 was determined using the 50th percentile of the RBLs from the monitoring locations B.22, B.24 and B.25. This method was used to provide a median value of the background noise data captured across the NCA01 area. This RBL was adopted due to the close proximity to the T1 North Shore Railway and is representative of the acoustical environment under the influence of the railway.
- RBLs for NCA01a, NCA02a and NCA04a were determined using the RBL for monitoring location B.21. This RBL was adopted due to the close proximity to the M2 Motorway and is representative of the acoustical environment under the influence of the M2 Motorway.
- The RBL for NCA02 was also determined similar to NCA01 using the 50th percentile of the RBLs from the monitoring locations B.22, B.24 and B.25. This RBL was adopted due to the influence of the Pacific highway and Mowbray road traffic within this NCA which, compared to the data recorded at B.23 (see note below) provided a more conservative statistical method for establishing representative data for this acoustical environment.
- For NCA03 the RBL was determined using the 50th percentile of the RBLs from the monitoring locations B.24 and B.25. This RBL was adopted due to the potential influence of the built commercial environment near to the Chatswood CBD and provided a conservative statistical method for establishing representative data for this acoustical environment.
- Lowest RBL values from B.22 and B.25 were adopted for NCA04. This NCA is predominantly residential and situated furthest away from commercial, road and rail noise influences therefore this RBL was adopted to represent the largely residential environment of this area.
- The RBL values from B.23 were adopted for NCA05. This RBL was adopted due to the close proximity to Mowbray road and is representative of the acoustical environment under the influence of Mowbray road.



There is no requirement or benefit for measuring existing vibration levels as they are typically (in the absence of any significant vibration generating source) imperceptible.

Due to the built environment of the area surrounding the NCW and the noise reduction expected from the shielding provided by the first row of buildings to the surrounding buildings and receptors, reduced impacts are anticipated for these additional locations and in the broader community.

**Table 3.2 Rating Background Levels**

| Noise Catchment Area (NCA) | Rating Background Levels (RBL) in dBA |                       |                          |
|----------------------------|---------------------------------------|-----------------------|--------------------------|
|                            | Daytime (7am to 6pm)                  | Evening (6pm to 10pm) | Night-time (10pm to 7am) |
| NCA01                      | 42                                    | 41                    | 35                       |
| NCA01a                     | 49                                    | 46                    | 41                       |
| NCA02                      | 42                                    | 41                    | 35                       |
| NCA02a                     | 49                                    | 46                    | 41                       |
| NCA03                      | 46                                    | 44                    | 37                       |
| NCA04                      | 41                                    | 40                    | 34                       |
| NCA04a                     | 49                                    | 46                    | 41                       |
| NCA05                      | 63                                    | 60                    | 45                       |

*Source: Adapted EIS Data, SLR 2016*

### 3.4 ASSESSMENT SCENARIOS

A summary of the 14 assessment scenarios that were considered is provided below in **Table 3.1**. The full set of data that were considered is provided in **Annex C**.

The sound power level (LW) data identified for individual plant / equipment is presented as relevant to the noise assessment, as well as the quantity of equipment and potential for out-of-hours works (OOHW) to be required.

For vibration, the only activity and/or equipment with potential to generate vibration is sheet piling, it considered and assessed as is described in *Section 5* of this document. Bored and vibratory piling was not assessed due to the general size of equipment and transportation to site. The congested and narrow corridor does not provide adequate space to complete works using equipment of this size. If this equipment was to be used, it would have to be during out of hours or rail possessions when trains are not running to reduce the risk of being struck by a train, as the machines would be sitting within the 3m danger zone. Secondly plant of this size would be difficult to deliver to the site given the narrow access points at Drake St and Hopetoun Ave.

As such an impact piling method was chosen as a smaller excavator can be used to reach the nominal depth that would be able to a) be delivered to site and b) operate during normal construction hours while trains an running.

**Table 3.3 Assessment Scenarios**

| <b>ID</b> | <b>Period</b>   | <b>Equipment</b>         | <b>Sound Power Level (Lw)<br/>LAeq, 15 minute</b> | <b>Equip. Quantity</b> | <b>Potential OOHW Required</b> |
|-----------|---|--------------------------|---|------------------------|--------------------------------|
| SCN01     | Clearing and Grubbing for site establishment                | Whipper snippers         | 102   | 2                      | N                              |
|           |   | Mulchers                 | 105   | 2                      |                                |
|           |   | Chainsaws                | 116   | 2                      |                                |
|           |   | Chipper                  | 105   | 1                      |                                |
| SCN02     | Overhead Wiring Footings, Structures and Wiring             | Excavators               | 100   | 2                      | Y                              |
|           |   | Hydrema Dump Truck       | 117   | 1                      |                                |
|           |   | Hi Rail Crane Truck      | 102   | 1                      |                                |
|           |   | Water Cart Elevated      | 107   | 1                      |                                |
|           |   | Work Platforms Wire      | 99  | 1                      |                                |
|           |   | Drum Trucks              | 107   | 1                      |                                |
|           |   | Utes                     | 106   | 2                      |                                |
| SCN03a    | Construction of Stormwater Detention Basin (with Piling)    | Excavator                | 100   | 1                      | Y                              |
|           |   | Excavator (Sheet Piling) | 130   | 1                      |                                |
|           |   | Hydrema Dump Truck       | 117   | 1                      |                                |
|           |   | Hi Rail Crane Truck      | 102   | 1                      |                                |
|           |   | Water Cart               | 107   | 1                      |                                |
|           |   | Truck and Dog            | 107   | 1                      |                                |
|           |   | Utes                     | 106   | 2                      |                                |
| SCN03b    | Construction of Stormwater Detention Basin (without Piling) | Excavator                | 100   | 1                      | Y                              |
|           |   | Excavator (Sheet Piling) | -   | 1                      |                                |
|           |   | Hydrema Dump Truck       | 117   | 1                      |                                |
|           |   | Hi Rail Crane Truck      | 102   | 1                      |                                |
|           |   | Water Cart               | 107   | 1                      |                                |
|           |   | Truck and Dog            | 107   | 1                      |                                |
|           |   | Utes                     | 106   | 2                      |                                |
| SCN04     | Drainage System Installation Excavators                     | Excavators               | 100   | 2                      | Y                              |
|           |   | Hydrema Dump Truck       | 117   | 1                      |                                |
|           |   | Hi Rail Crane Truck      | 102   | 1                      |                                |
|           |   | Water Cart               | 107   | 1                      |                                |
|           |   | Truck and Dog            | 107   | 1                      |                                |
|           |   | Utes                     | 106   | 2                      |                                |
| SCN05     | Track Slew or Switch  | Excavators               | 100   | 2                      | Y                              |
|           |   | Hydrema Dump Trucks      | 117   | 2                      |                                |
|           |   | Hi Rail Crane Truck      | 102   | 1                      |                                |
|           |   | Water Cart               | 107   | 1                      |                                |
|           |   | Truck and Dog            | 107   | 1                      |                                |
|           |   | Utes                     | 106   | 2                      |                                |
|           |   | Tamper                   | 111   | 1                      |                                |
|           |   | Regulator                | 112   | 1                      |                                |
|           |   | Work Trains              | 110   | 2                      |                                |
|           |   | Welding Rigs             | 110   | 2                      |                                |
|           |   | Grinder                  | 107   | 1                      |                                |

| ID     | Period  | Equipment           | Sound Power Level (Lw)<br>LAeq, 15 minute | Equip. Quantity | Potential OOHW Required |
|--------|---|---------------------|---|-----------------|-------------------------|
| SCN06  | Removal of existing Tracks                                  | Excavators          | 100                                       | 2               | Y                       |
|        |   | Hydrema Dump Trucks | 117                                       | 2               |                         |
|        |   | Hi Rail Crane Truck | 102                                       | 1               |                         |
|        |   | Water Cart          | 107                                       | 1               |                         |
|        |   | Truck and Dog       | 107                                       | 1               |                         |
|        |   | Utes                | 106                                       | 2               |                         |
|        |   | Tamper              | 111                                       | 1               |                         |
|        |   | Regulator           | 112                                       | 1               |                         |
|        |   | Work Trains         | 110                                       | 2               |                         |
|        |   | Welding Rigs        | 110                                       | 2               |                         |
|        |   | Grinder             | 107                                       | 1               |                         |
| SCN07  | High Voltage Electrical Works                               | Hi Rail Crane Truck | 102                                       | 1               | Y                       |
|        |   | Water Cart          | 107                                       | 1               |                         |
|        |   | EWPs                | 99  | 2               |                         |
|        |   | Wire Drum Trucks    | 107                                       | 2               |                         |
|        |   | Utes                | 106                                       | 2               |                         |
| SCN08  | Construction of Combined Services Route (CSR)               | Excavators          | 100                                       | 2               | Y                       |
|        |   | Hydrema Dump Trucks | 117                                       | 2               |                         |
|        |   | Hi Rail Crane Truck | 102                                       | 1               |                         |
|        |   | Water Cart          | 107                                       | 1               |                         |
|        |   | Crane               | 104                                       | 1               |                         |
| SCN09  | Under Line Crossing (ULX) Works                             | Excavators          | 100                                       | 2               | Y                       |
|        |   | Hydrema Dump Trucks | 117                                       | 2               |                         |
|        |   | Hi Rail Crane Truck | 102                                       | 1               |                         |
|        |   | Water Cart          | 107                                       | 1               |                         |
|        |   | Crane               | 104                                       | 1               |                         |
| SCN10  | Relocation and Termination of Utilities in Nelson St Bridge | Excavators          | 100                                       | 2               | Y                       |
|        |   | Concrete Saw        | 122                                       | 1               |                         |
|        |   | Hydrema Dump Trucks | 117                                       | 2               |                         |
|        |   | Hi Rail Crane Truck | 102                                       | 1               |                         |
|        |   | Water Cart          | 107                                       | 1               |                         |
|        |   | Crane               | 104                                       | 1               |                         |
| SCN11a | Bridges and Road Works (Nelson St)                          | Excavators          | 100                                       | 2               | Y                       |
|        |   | Drill Rig           | 118                                       | 1               |                         |
|        |   | Hydrema Dump Trucks | 117                                       | 2               |                         |
|        |   | Hi Rail Crane Truck | 102                                       | 1               |                         |
|        |   | Water Cart          | 107                                       | 1               |                         |
|        |   | Crane               | 104                                       | 1               |                         |
|        |   | Heavy Goods Vehicle | 107                                       | 1               |                         |
| SCN11b | Bridges and Road Works (Mowbray Rd)                         | Excavators          | 100                                       | 2               | Y                       |
|        |   | Drill Rig           | 118                                       | 1               |                         |
|        |   | Hydrema Dump Trucks | 117                                       | 2               |                         |
|        |   | Hi Rail Crane Truck | 102                                       | 1               |                         |
|        |   | Water Cart          | 107                                       | 1               |                         |

| <b>ID</b> | <b>Period</b>                            | <b>Equipment</b>    | <b>Sound Power Level (Lw)<br/>LAeq, 15 minute</b> | <b>Equip. Quantity</b> | <b>Potential OOHW Required</b> |
|-----------|--|---------------------|---|------------------------|--------------------------------|
|           |  | Crane               | 104   | 1                      |                                |
|           |  | Heavy Goods Vehicle | 107   | 1                      |                                |
| SCN12     | Demarcation Fence Installation           | Excavators          | 100   | 2                      | Y                              |
|           |  | Hydrema Dump Trucks | 117   | 2                      |                                |
|           |  | Hi Rail Crane Truck | 102   | 1                      |                                |
|           |  | Water Cart          | 107   | 1                      |                                |
|           |  | Crane               | 104   | 1                      |                                |
|           |  | Heavy Goods Vehicle | 107   | 1                      |                                |
| SCN13     | Placement and replacement of Noise Walls | Crane               | 104   | 1                      | Y                              |
|           |  | Hi Rail Crane Truck | 102   | 1                      |                                |
|           |  | Hydrema Dump Trucks | 117   | 2                      |                                |
| SCN14     | Site Compound                            | Generator           | 99  | 1                      | Y                              |
|           |  | Hand Tool           | 102   | 1                      |                                |
|           |  | Light Vehicle       | 106   | 1                      |                                |

Source: LOR

A key element in assessing environmental noise impacts is an understanding of the existing ambient and background noise levels in the vicinity of the closest and/or potentially most affected receptors situated in proximity to a site. This chapter provides a summary of the existing noise conditions as relevant to NCW.

#### 4.1 AIR-BORNE NOISE MANAGEMENT LEVELS

Based on the ICNG and CNVS methodology the following construction Noise Management Levels (NMLs) for residential receptors in each NCA will apply to the NCW as presented in **Table 4.1**. Predicted noise levels are compared to these “criteria” values in **Section 5** to identify any activities that exceed the applicable management levels and to identify the extent of potential noise impacts.

For other sensitive receptors (i.e. not residential) the internal/external criteria value translated from the ICNG may be adopted as relevant and if other receptors are identified. External NMLs for other sensitive receptors applicable to this assessment have also been included in **Table 4.2** below. These NML values apply to other sensitive receptors when in-use.

**Table 4.1 Background Noise and Management Levels (Residential Receptors)**

| Noise Catchment Area (NCA)/ Receptor type | Noise Management Level - LAeq, 15 minute                    |   |                      |                    |
|---|---|---|----------------------|--------------------|
|   | Standard Construction Hours<br>RBL + 10 in dBA <sup>1</sup> | Outside Standard Construction Hours<br>RBL + 5 in dBA |                      |                    |
|   |   | Daytime <sup>2</sup>                                  | Evening <sup>3</sup> | Night <sup>4</sup> |
| NCA01                                     | 52  | 47  | 46                   | 40                 |
| NCA01a                                    | 59  | 54  | 51                   | 46                 |
| NCA02                                     | 52  | 47  | 46                   | 40                 |
| NCA02a                                    | 59  | 54  | 51                   | 46                 |
| NCA03                                     | 56  | 51  | 49                   | 42                 |
| NCA04                                     | 51  | 46  | 45                   | 39                 |
| NCA04a                                    | 59  | 54  | 51                   | 46                 |
| NCA05                                     | 73  | 68  | 65                   | 50                 |

Source: Adapted EIS Data, TfNSW/SLR 2016

1. Standard (daytime): 7:00am to 6:00pm Mondays to Fridays, inclusive and 8:00am to 1:00pm Saturdays;
2. Outside standard (daytime): 1:00pm to 6:00pm Saturdays, and 8:00am to 6:00pm on Sundays or public holidays;
3. Outside standard (evening): 6:00pm to 10pm Monday to Sunday, inclusive; and
4. Outside standard (night time): 10:00pm to 7:00am Monday to Friday and 10:00pm to 8:00am on Saturdays, Sundays and public holidays.

**Table 4.2 Noise Management Levels (Other Sensitive Receptors)**

| Noise Catchment Area (NCA)/ Receptor type | Noise Management Level - LAeq, 15 minute |                                     |                      |                    |
|---|--|-------------------------------------|----------------------|--------------------|
|   | Standard Construction Hours              | Outside Standard Construction Hours |                      |                    |
|   |  | Daytime <sup>2</sup>                | Evening <sup>3</sup> | Night <sup>4</sup> |
| Commercial                                | 70                                       | 70                                  | 70                   | 70                 |
| Industrial                                | 75                                       | 75                                  | 75                   | 75                 |
| Recreational (Active)                     | 65                                       | 65                                  | 65                   | 65                 |
| Place of Worship                          | 55                                       | 55                                  | 55                   | 55                 |
| Educational                               | 55                                       | 55                                  | 55                   | 55                 |

Source: Adapted EIS Data, TfNSW/SLR 2016

1. Standard (daytime): 7:00am to 6:00pm Mondays to Fridays, inclusive and 8:00am to 1:00pm Saturdays;
2. Outside standard (daytime): 1:00pm to 6:00pm Saturdays, and 8:00am to 6:00pm on Sundays or public holidays;
3. Outside standard (evening): 6:00pm to 10pm Monday to Sunday, inclusive; and
4. Outside standard (night time): 10:00pm to 7:00am Monday to Friday and 10:00pm to 8:00am on Saturdays, Sundays and public holidays.

#### **4.1.1 Highly Noise Affected Management Level**

In accordance with the ICNG, the Highly Noise Affected Management Level (HNML) of 75 dBA will apply to residential (dwelling) receptors during standard construction hours and during the daytime period only. The HNML does not apply outside the recommended standard hours and does not apply to other sensitive receptors.

#### **4.1.2 Sleep Disturbance**

‘Sleep disturbance screening thresholds’ have been developed as per the guidance in the INP and CNVS (RBL + 15dBA). These screening levels (refer **Table 4.3**) will only apply during the night time period. These screening levels will generally apply at residential (dwelling) receptors with other sensitive receptors considered where applicable e.g. at other receptors where habitable sleeping spaces are identified.

**Table 4.3** *Sleep Disturbance Screening Levels*

| Noise Catchment Area (NCA) | Sleep Disturbance Screening Level (LA1,1minute / LAmax) <sup>1</sup> |
|----------------------------|--|
| NCA01                      | 50   |
| NCA01a                     | 56   |
| NCA02                      | 50   |
| NCA02a                     | 56   |
| NCA03                      | 52   |
| NCA04                      | 49   |
| NCA04a                     | 56   |
| NCA05                      | 60   |

Source: Adapted EIS Data, TfNSW/SLR 2016

These sleep disturbance screening levels only apply during the night time defined by the INP as the period from 10:00pm to 07:00am (Monday to Saturday) and 10:00pm to 08:00am (Sundays and Public Holidays).

**4.2** *GROUND-BORNE NOISE MANAGEMENT LEVELS*

Ground-borne noise is noise generated by vibration transmitted through the ground into a structure. The following ground-borne noise levels for residences are nominated in the ICNG and CNVS and indicate when management actions would be implemented. These levels recognise the temporary nature of construction and are only applicable when ground-borne noise levels are higher than airborne noise levels. Ground-borne noise management levels are summarised in **Table 4.4** below.

**Table 4.4** *Ground-Borne Noise Management Levels*

| Receptor Type          | Management Level, Leq, 15 minute dBA |                      |                         |
|------------------------|--------------------------------------|----------------------|-------------------------|
|                        | Daytime <sup>1</sup>                 | Evening <sup>2</sup> | Night time <sup>3</sup> |
| Commercial (internal)  | 50                                   | -                    | -                       |
| Residential (internal) | 45                                   | 40                   | 35                      |

Source: CNVS

1. Daytime means between 7:00am and 6:00pm, Monday to Sunday inclusive;
2. Evening means between 6:00pm and 10:00pm, Monday to Sunday inclusive; and
3. Night time means between 10:00pm to 7:00am, Monday to Sunday inclusive.

#### 4.3 ROAD TRAFFIC NOISE MANAGEMENT LEVELS

The ICNG does not include any criteria to assess off-site traffic noise associated with construction and demolition. Criteria for off-site road traffic noise applicable to 'existing residences affected by additional traffic on existing roads generated by land use developments' are specified in the RNP.

Whilst these criteria do not specifically apply to construction/demolition traffic movements, they have been conservatively adopted here in the CNVIS and are summarised in **Table 4.5** below.

**Table 4.5 Road Traffic Noise Management Levels**

| Category           | Applicable Road                         | Management Level, dBA       |                             |
|--------------------|---|-----------------------------|-----------------------------|
|                    |   | Daytime <sup>1</sup>        | Night time <sup>2</sup>     |
| Sub-arterial roads | e.g. Pacific Highway / Mowbray Road     | LAeq,1 hour ≤ 60 (external) | LAeq,1 hour ≤ 55 (external) |
| Local roads        | e.g. Brand St / Drake St / Hopetoun Ave | LAeq,1 hour ≤ 55 (external) | LAeq,1 hour ≤ 50 (external) |

Source: CNVS, RNP

1. Daytime means between 7:00am and 10:00pm, Monday to Sunday inclusive; and
2. Night time means between 10:00pm to 7:00am, Monday to Sunday inclusive.

#### 4.4 GROUND-BORNE VIBRATION MANAGEMENT LEVELS

Based on the CNVS methodology, impacts from vibration will be considered both in terms of effects on building occupants (human comfort) and the effects on the building structure (structural/cosmetic damage). The following construction vibration management levels / criteria will apply to the NCW as presented below.

##### *Human Comfort*

The NSW Vibration Guideline and the CNVS provides guidance for assessing human exposure to vibration. These documents are based on *British Standard (BS 6472-1992) – Evaluation of Human Exposure to Vibration in Buildings (1 Hz to 80 Hz) dated 1992*. The vibration dose values recommended in BS 6472-1992 for which various levels of adverse comment from occupants may be expected are presented in **Table 4.6**.



**Table 4.6 (Human Comfort) Vibration Dose Value Ranges which Might Result in Various Probabilities of Adverse Comment within Residential Buildings**

| Place and Time                      | Low Probability of Adverse Comment (m/s <sup>1.75</sup> ) | Adverse Comment Possible (m/s <sup>1.75</sup> ) | Adverse Comment Probable (m/s <sup>1.75</sup> ) |
|-------------------------------------|---|---|---|
| Residential buildings<br>16 hr day  | 0.2 to 0.4  | 0.4 to 0.8                                      | 0.8 to 1.6                                      |
| Residential buildings<br>8 hr night | 0.1 to 0.2  | 0.2 to 0.4                                      | 0.4 to 0.8                                      |

Source: CNVS

1. For offices and workshops, multiplying factors of 2 and 4 respectively would be applied to the above vibration dose value ranges for a 16 hr day.

*Building Damage (Structural/Cosmetic Damage)*

To achieve the requirements of the CNVS, *British Standard BS7385: Part 2-1993 (BS 7385) - Evaluation and Measurement for Vibration in Buildings – Part 2 – Guide to Damage Levels from Ground-borne Vibration, dated 1993* is presented in **Table 4.7** and will be considered during works where applicable. BS 7385 provides safe limit guideline values, below which vibration is considered insufficient to cause structural or cosmetic damage to buildings.

**Table 4.7 Building Damage (BS 7385)**

| Line | Type of Building  | Peak Particle Velocity (PPV in mm/s) in the Frequency Range of Predominant Pulse |  |
|------|---|--|--|
|      |   | 4 Hz to 15 Hz  | 15 Hz and Above  |
| 1    | Reinforced or framed structures<br>Industrial and heavy commercial buildings              | 50mm/s at 4 Hz and above   |  |
| 2    | Unreinforced or light framed structures<br>Residential or light commercial type buildings | 15mm/s at 4 Hz<br>increasing to 20mm/s<br>at 15 Hz                               | 20mm/s at 15 Hz<br>increasing to<br>50mm/s at 40 Hz<br>and above |

Source: BS 7385, CNVS

For most construction activities involving intermittent vibration sources such as rock breakers, piling rigs, vibratory rollers, excavators and the like, the predominant vibration energy occurs at frequencies greater than 4 Hz (usually in the 10 Hz to 100 Hz range). On this basis, a conservative vibration damage screening level per receptor type is given below:

- Reinforced or framed structures: **25.0 mm/s**
- Unreinforced or light framed structures: **7.5 mm/s**

At locations where the predicted and/or measured vibration levels are greater than shown above (peak component particle velocity), a more detailed analysis of the building structure, vibration source, dominant frequencies and dynamic characteristics of the structure would be required to determine the applicable safe vibration level.

## Heritage Structures

If a heritage building or structure is found to be structurally unsound (following inspection) a more conservative cosmetic damage criteria of **2.5 mm/s** peak component particle velocity from the *German Institute for Standardisation – DIN 4150 (1999-02) Part 3 (DIN4150:3) – Structural Vibration - Effects of Vibration on Structures, dated 1999* would be considered.

The applicable German Standard DIN 4150:3 management levels are tabulated in **Table 4.8**.

**Table 4.8 Building Damage (DIN4150:3)**

| Line | Type of Structure  | Guideline Values for Velocity (PPV in mm/s) |                |                              |
|------|--|---|----------------|------------------------------|
|      |  | 1 Hz to 10 Hz                               | 10 Hz to 50 Hz | 50 Hz to 100 Hz <sup>1</sup> |
| 3    | Structures that, because of their particular sensitivity to vibration, cannot be classified under either of the other classifications and of great intrinsic value | 3   | 3 to 8         | 8 to 10                      |

Source: DIN4150:3, CNVS

1. At frequencies above 100 Hz, the values given in this column may be used as minimum values; and
2. The 50 Hz values may be applied to assess vibration at the horizontal plane of the highest building floor at all frequencies.
3. As per the CNVS, Heritage criteria are provided. It is noted that line one and line two do not apply to this project. These criteria are only to be applied if a heritage building or structure is found to be structurally unsound.

## 4.5

### THRESHOLDS FOR ADDITIONAL MITIGATION MEASURES

The project-specific mitigation measures are a feature to be outlined in the CNVMP and are defined based on the activities proposed and potential impacts. “Standard” mitigation (and practices) applicable to the NCW are described in Section 7 of the CNVS and the actions set out must be implemented on all Sydney Metro construction projects.

Where the predicted “mitigated” construction noise levels are above the ICNG noise management levels, the Additional Mitigation Measures Matrix (AMMM) identified in Section 8 of the CNVS is to be implemented. The approach, guided by the AMMM, is primarily aimed at pro-active engagement with affected sensitive receptors rather than additional noise reducing mitigation.

The types of additional mitigation measures are listed in **Table 4.9** and described in Appendix C of the CNVS.

**Table 4.9** *Additional Mitigation Measures*

| <b>Measure</b>                 | <b>Abbreviation</b> |
|--------------------------------|---------------------|
| Alternative accommodation      | AA                  |
| Monitoring                     | M                   |
| Individual briefings           | IB                  |
| Letter box drops               | LB                  |
| Project specific respite offer | RO                  |
| Phone calls                    | PC                  |
| Specific notifications         | SN                  |

1. Source: CNVS

The project-specific AMMM for construction (airborne) noise are identified in **Table 4.10**. Any noise level exceedances of the AMMM thresholds are highlighted in red, blue, olive green or purple (as shown in **Table 4.10**) as is applicable to the findings of this assessment. The project-specific AMMM for ground-borne noise and ground-borne vibration are identified in **Table 4.11** and **Table 4.12**.

**Table 4.10 Additional Mitigation Measures Matrix (AMMM) – Construction (Airborne) Noise**

| Period        | Time of Day                            | 0 to 10 dBA | 10 to 20 dBA | 20 to 30 dBA          | >30 dBA                   |
|---------------|--|-------------|--------------|-----------------------|---------------------------|
| Standard      | Mon-Fri<br>(7am - 6pm)                 | -           | -            | M, LB                 | M, LB                     |
|               | Saturdays<br>(8am - 1pm)               |             |              |                       |                           |
|               | Sundays/Public Holidays<br>(No Works)  |             |              |                       |                           |
| OOHW Period 1 | Mon-Fri<br>(6pm - 10pm)                | -           | LB           | M, LB                 | M, IB, LB, PC, RO, SN     |
|               | Saturdays<br>(7am-8am) and (1pm- 10pm) |             |              |                       |                           |
|               | Sundays/Public Holidays<br>(8am-6pm)   |             |              |                       |                           |
| OOHW Period 2 | Mon-Fri<br>(10pm - 7am)                | -           | M, LB        | M, IB, LB, PC, RO, SN | AA, M, IB, LB, PC, RO, SN |
|               | Saturdays<br>(10pm - 8am)              |             |              |                       |                           |
|               | Sundays/Public Holidays<br>(6pm - 7am) |             |              |                       |                           |

1. Source: CNVS

**Table 4.11 Additional Mitigation Measures Matrix (AMMM) – Construction (Ground-borne) Noise**

| Period        | Time of Day                            | 0 to 10 dBA | 10 to 20 dBA                 | 20 to 30 dBA                 |
|---------------|--|-------------|------------------------------|------------------------------|
| Standard      | Mon-Fri<br>(7am - 6pm)                 | LB          | LB                           | M, LB, SN                    |
|               | Saturdays<br>(8am - 1pm)               |             |                              |                              |
|               | Sundays/Public Holidays<br>(No Works)  |             |                              |                              |
| OOHW Period 1 | Mon-Fri<br>(6pm - 10pm)                | LB          | M, LB, SN                    | M, IB, LB, PC,<br>RO, SN     |
|               | Saturdays<br>(7am-8am) and (1pm- 10pm) |             |                              |                              |
|               | Sundays/Public Holidays<br>(8am-6pm)   |             |                              |                              |
| OOHW Period 2 | Mon-Fri<br>(10pm - 7am)                | M, LB, SN,  | AA, M, IB, LB, PC,<br>RO, SN | AA, M, IB, LB, PC,<br>RO, SN |
|               | Saturdays<br>(10pm - 8am)              |             |                              |                              |
|               | Sundays/Public Holidays<br>(6pm - 7am) |             |                              |                              |

1. Source: CNVS

**Table 4.12 Additional Mitigation Measures Matrix (AMMM) – Ground-borne Vibration**

| Time Period   |                               | Mitigation Measures<br>Predicted Vibration Levels Exceed Human Comfort Criteria (BS 6472:1992) |
|---------------|-------------------------------|--|
| Standard      | Mon-Fri (7am-6pm)             | M, LB, RO  |
|               | Sat (8am-1pm)                 |  |
|               | Sun/Pub Hol (Nil)             |  |
| OOHW Period 1 | Mon-Fri (6pm-10pm)            | M, IB, LB, PC, RO, SN  |
|               | Sat (7am-8am and<br>1pm-10pm) |  |
|               | Sun/Pub Hol (8am-6pm)         |  |
| OOHW Period 2 | Mon-Fri (10pm-7am)            | AA, M, IB, LB, PC, RO, SN  |
|               | Sat (10pm-8am)                |  |
|               | Sun/Pub Hol (6pm-7am)         |  |

1. Source: CNVS

## 5 *IMPACT ASSESSMENT*

This chapter presents the findings of the construction noise and vibration impact assessment completed with due regard to the relevant policy, guidelines and standards outlined in **Section 2.2.1**.

### 5.1 *AIR-BORNE CONSTRUCTION NOISE*

Based on the methodology, inputs and assumptions described above, LAeq, 15minute noise levels have been predicted. All noise levels have been rounded to the nearest whole integer. The resultant noise levels and comparison to the daytime and night time NML are presented in **Table 5.1** to **Table 5.14**.

Values that exceed the NML are highlighted in **bold** typeset. Values that exceed the HNML (fixed at 75 dBA for residential receptors) are highlighted in **bold and underlined** typeset.

Due to the large number of receptors only the 30 most affected receptors in each scenario have been displayed in this section of the CNVIS. For the full set of receptor results, refer to **Annex D**.

#### 5.1.1 *Additional Mitigation and Exceedances*

Where the predicted construction noise levels are above the NML, the AMMM identified in Section 8 of the CNVS and **Section 4.5** of this CNVIS should be implemented. Predicted values at select receptors exceed the project-specific NML. The level by which they exceed the NML varies depending on the assessment scenario, the receptor proximity to the activity and the time of day.

A comparison of the predicted construction noise levels to the existing background noise levels (LA90, period) is therefore required (for any receptor where the NML is exceeded) to establish the necessary mitigation AMMM requirements. This comparison is provided in **Table 5.1** to **Table 5.14** below.

Any noise level exceedance of the AMMM thresholds (refer **Table 4.10**) is highlighted in red, blue, olive green or purple to illustrate the extent and level of AMMM required.

The AMMM is only applicable to commercial or other sensitive receptors (i.e. educational / places of worship) when these receptors are in use (**Table 5.1** to **Table 5.14**) it should be noted that these receptors may not be in use during the night time period.

### *Guidance Note*

During construction works, actual noise levels will vary depending on the number of items of equipment, their exact location within the site, their usage and how many items of equipment operate concurrently at any one time. A receptor will therefore experience a range of noise levels.

Construction noise level predictions have been conducted to identify results for representative worst-case scenarios, as the predicted values consider the cumulative emission (and potential impact) of all equipment sources working concurrently.

It is not possible, or warranted to reflect potential impacts, to model every plausible activity, task or usage for each noise generating source and location, hence the conservative approach adopted here has been applied to ensure that representative worst-case noise predictions were conducted.

Furthermore, area sources were utilised to reflect the potential distribution of noise across the project area, and the potential emissions from activities undertaken at various locations within and around the site.

This assessment has considered standard good practice mitigation measures via noise modelling by adopting the midpoint values for all sound power levels. However it should also be noted that the predicted noise levels presented below have not considered the recommended project specific mitigation and management measures outlined in **Section 6** of this CNVIS. With the implementation of the recommended mitigation and management measures outlined in **Section 6** a reduction in the predicted noise levels would be expected.



**Table 5.1 Resultant Noise Level Assessment: Scenario 1 (Clearing and Grubbing For Site Establishment)**

| Receptor ID | Receptor Description | Predicted Noise Levels:<br>LAeq, 15minute | Comparison to NML<br>(predicted - NML): LAeq, 15minute |                        |         |            | If exceedance of NML - Comparison to RBL<br>(predicted - RBL): LAeq, 15minute |                        |         |            |
|-------------|----------------------|---|--|------------------------|---------|------------|---|------------------------|---------|------------|
|             |                      |   | Day Standard Hours                                     | Day non-Standard Hours | Evening | Night time | Day Standard Hours  | Day non-Standard Hours | Evening | Night time |
| R.242_A     | NCA01_Residential    | <b>81</b>                                 | 29   | 34                     | 35      | 41         | 39  | 39                     | 40      | 46         |
| R.251_A     | NCA01_Residential    | <b>80</b>                                 | 28   | 33                     | 34      | 40         | 38  | 38                     | 39      | 45         |
| R.212_A     | NCA01_Residential    | <b>79</b>                                 | 27   | 32                     | 33      | 39         | 37  | 37                     | 38      | 44         |
| R.226_A     | NCA01_Residential    | <b>79</b>                                 | 27   | 32                     | 33      | 39         | 37  | 37                     | 38      | 44         |
| R.232_A     | NCA01_Residential    | <b>79</b>                                 | 27   | 32                     | 33      | 39         | 37  | 37                     | 38      | 44         |
| R.265_A     | NCA01_Residential    | <b>78</b>                                 | 26   | 31                     | 32      | 38         | 36  | 36                     | 37      | 43         |
| R.202_A     | NCA01_Residential    | <b>75</b>                                 | 23   | 28                     | 29      | 35         | 33  | 33                     | 34      | 40         |
| R.231_A     | NCA01_Residential    | <b>74</b>                                 | 22   | 27                     | 28      | 34         | 32  | 32                     | 33      | 39         |
| R.239_A     | NCA01_Residential    | <b>74</b>                                 | 22   | 27                     | 28      | 34         | 32  | 32                     | 33      | 39         |
| R.216_A     | NCA01_Residential    | <b>73</b>                                 | 21   | 26                     | 27      | 33         | 31  | 31                     | 32      | 38         |
| R.245_A     | NCA01_Residential    | <b>73</b>                                 | 21   | 26                     | 27      | 33         | 31  | 31                     | 32      | 38         |
| R.250_A     | NCA01_Residential    | <b>73</b>                                 | 21   | 26                     | 27      | 33         | 31  | 31                     | 32      | 38         |
| R.228_A     | NCA01_Residential    | <b>72</b>                                 | 20   | 25                     | 26      | 32         | 30  | 30                     | 31      | 37         |
| R.230_A     | NCA01_Residential    | <b>72</b>                                 | 20   | 25                     | 26      | 32         | 30  | 30                     | 31      | 37         |
| R.257_A     | NCA01_Residential    | <b>72</b>                                 | 20   | 25                     | 26      | 32         | 30  | 30                     | 31      | 37         |
| R.260_A     | NCA01_Residential    | <b>72</b>                                 | 20   | 25                     | 26      | 32         | 30  | 30                     | 31      | 37         |
| R.266_A     | NCA01_Residential    | <b>72</b>                                 | 20   | 25                     | 26      | 32         | 30  | 30                     | 31      | 37         |
| R.270_A     | NCA01_Residential    | <b>72</b>                                 | 20   | 25                     | 26      | 32         | 30  | 30                     | 31      | 37         |
| R.209_A     | NCA01_Residential    | <b>71</b>                                 | 19   | 24                     | 25      | 31         | 29  | 29                     | 30      | 36         |
| R.211_A     | NCA01_Residential    | <b>71</b>                                 | 19   | 24                     | 25      | 31         | 29  | 29                     | 30      | 36         |

1. Works outside the approved standard construction hours are not envisaged for this scenario.

**Table 5.2 Resultant Noise Level Assessment: Scenario 2 (Overhead Wiring Footings, Structures and Wiring)**

| Receptor ID | Receptor Description | Predicted Noise Levels:<br>LAeq, 15minute | Comparison to NML<br>(predicted - NML): LAeq, 15minute |                        |         |            | If exceedance of NML - Comparison to RBL<br>(predicted - RBL): LAeq, 15minute |                        |         |            |
|-------------|----------------------|---|--|------------------------|---------|------------|---|------------------------|---------|------------|
|             |                      |   | Day Standard Hours                                     | Day non-Standard Hours | Evening | Night time | Day Standard Hours  | Day non-Standard Hours | Evening | Night time |
| R.108_A     | NCA01_Residential    | 66  | 14   | 19                     | 20      | 26         | 24  | 24                     | 25      | 31         |
| R.114_A     | NCA01_Residential    | 66  | 14   | 19                     | 20      | 26         | 24  | 24                     | 25      | 31         |
| R.159_A     | NCA01_Residential    | 65  | 13   | 18                     | 19      | 25         | 23  | 23                     | 24      | 30         |
| R.165_A     | NCA01_Residential    | 65  | 13   | 18                     | 19      | 25         | 23  | 23                     | 24      | 30         |
| R.122_A     | NCA01_Residential    | 64  | 12   | 17                     | 18      | 24         | 22  | 22                     | 23      | 29         |
| R.144_A     | NCA01_Residential    | 64  | 12   | 17                     | 18      | 24         | 22  | 22                     | 23      | 29         |
| R.149_A     | NCA01_Residential    | 64  | 12   | 17                     | 18      | 24         | 22  | 22                     | 23      | 29         |
| R.128_A     | NCA01_Residential    | 63  | 11   | 16                     | 17      | 23         | 21  | 21                     | 22      | 28         |
| R.152_A     | NCA01_Residential    | 63  | 11   | 16                     | 17      | 23         | 21  | 21                     | 22      | 28         |
| R.158_A     | NCA01_Residential    | 63  | 11   | 16                     | 17      | 23         | 21  | 21                     | 22      | 28         |
| R.141_A     | NCA01_Residential    | 62  | 10   | 15                     | 16      | 22         | 20  | 20                     | 21      | 27         |
| R.142_A     | NCA01_Residential    | 62  | 10   | 15                     | 16      | 22         | 20  | 20                     | 21      | 27         |
| R.153_A     | NCA01_Residential    | 62  | 10   | 15                     | 16      | 22         | 20  | 20                     | 21      | 27         |
| R.156_A     | NCA01_Residential    | 62  | 10   | 15                     | 16      | 22         | 20  | 20                     | 21      | 27         |
| R.157_A     | NCA01_Residential    | 62  | 10   | 15                     | 16      | 22         | 20  | 20                     | 21      | 27         |
| R.133_A     | NCA01_Residential    | 61  | 9  | 14                     | 15      | 21         | 19  | 19                     | 20      | 26         |
| R.136_A     | NCA01_Residential    | 61  | 9  | 14                     | 15      | 21         | 19  | 19                     | 20      | 26         |
| R.138_A     | NCA01_Residential    | 61  | 9  | 14                     | 15      | 21         | 19  | 19                     | 20      | 26         |
| R.140_A     | NCA01_Residential    | 61  | 9  | 14                     | 15      | 21         | 19  | 19                     | 20      | 26         |
| R.145_A     | NCA01_Residential    | 61  | 9  | 14                     | 15      | 21         | 19  | 19                     | 20      | 26         |

1. Works for this scenario have potential to occur in OOHW periods.

**Table 5.3a Resultant Noise Level Assessment: Scenario 3 (Construction of Stormwater Detention Basin, with Sheet Piling)**

| Receptor ID | Receptor Description | Predicted Noise Levels:<br>LAeq, 15minute | Comparison to NML<br>(predicted - NML): LAeq, 15minute |                        |         |            | If exceedance of NML - Comparison to RBL<br>(predicted - RBL): LAeq, 15minute |                        |         |            |
|-------------|----------------------|---|--|------------------------|---------|------------|---|------------------------|---------|------------|
|             |                      |   | Day Standard Hours                                     | Day non-Standard Hours | Evening | Night time | Day Standard Hours  | Day non-Standard Hours | Evening | Night time |
| R.242_A     | NCA01_Residential    | <u>105</u>                                | 53   | 58                     | 59      | 65         | 63  | 63                     | 64      | 70         |
| R.232_A     | NCA01_Residential    | <u>90</u>                                 | 38   | 43                     | 44      | 50         | 48  | 48                     | 49      | 55         |
| R.250_A     | NCA01_Residential    | <u>90</u>                                 | 38   | 43                     | 44      | 50         | 48  | 48                     | 49      | 55         |
| R.239_A     | NCA01_Residential    | <u>88</u>                                 | 36   | 41                     | 42      | 48         | 46  | 46                     | 47      | 53         |
| R.251_A     | NCA01_Residential    | <u>88</u>                                 | 36   | 41                     | 42      | 48         | 46  | 46                     | 47      | 53         |
| R.248_A     | NCA01_Residential    | <u>86</u>                                 | 34   | 39                     | 40      | 46         | 44  | 44                     | 45      | 51         |
| R.257_A     | NCA01_Residential    | <u>85</u>                                 | 33   | 38                     | 39      | 45         | 43  | 43                     | 44      | 50         |
| R.260_A     | NCA01_Residential    | <u>85</u>                                 | 33   | 38                     | 39      | 45         | 43  | 43                     | 44      | 50         |
| R.245_A     | NCA01_Residential    | <u>84</u>                                 | 32   | 37                     | 38      | 44         | 42  | 42                     | 43      | 49         |
| R.266_A     | NCA01_Residential    | <u>84</u>                                 | 32   | 37                     | 38      | 44         | 42  | 42                     | 43      | 49         |
| R.226_A     | NCA01_Residential    | <u>82</u>                                 | 30   | 35                     | 36      | 42         | 40  | 40                     | 41      | 47         |
| R.231_A     | NCA01_Residential    | <u>82</u>                                 | 30   | 35                     | 36      | 42         | 40  | 40                     | 41      | 47         |
| R.265_A     | NCA01_Residential    | <u>81</u>                                 | 29   | 34                     | 35      | 41         | 39  | 39                     | 40      | 46         |
| R.270_A     | NCA01_Residential    | <u>81</u>                                 | 29   | 34                     | 35      | 41         | 39  | 39                     | 40      | 46         |
| R.247_A     | NCA01_Residential    | <u>80</u>                                 | 28   | 33                     | 34      | 40         | 38  | 38                     | 39      | 45         |
| R.240_A     | NCA01_Residential    | <u>79</u>                                 | 27   | 32                     | 33      | 39         | 37  | 37                     | 38      | 44         |
| R.246_A     | NCA01_Residential    | <u>79</u>                                 | 27   | 32                     | 33      | 39         | 37  | 37                     | 38      | 44         |
| R.253_A     | NCA01_Residential    | <u>79</u>                                 | 27   | 32                     | 33      | 39         | 37  | 37                     | 38      | 44         |
| R.216_A     | NCA01_Residential    | <u>78</u>                                 | 26   | 31                     | 32      | 38         | 36  | 36                     | 37      | 43         |
| R.228_A     | NCA01_Residential    | <u>78</u>                                 | 26   | 31                     | 32      | 38         | 36  | 36                     | 37      | 43         |

1. Sheet piling works are not envisaged during the evening or night time period.

**Table 5.3b Resultant Noise Level Assessment: Scenario 3 (Construction of Stormwater Detention Basin, without Sheet Piling)**

| Receptor ID | Receptor Description | Predicted Noise Levels:<br>LAeq, 15minute | Comparison to NML<br>(predicted - NML): LAeq, 15minute |                        |         |            | If exceedance of NML - Comparison to RBL<br>(predicted - RBL): LAeq, 15minute |                        |         |            |
|-------------|----------------------|---|--|------------------------|---------|------------|---|------------------------|---------|------------|
|             |                      |   | Day Standard Hours                                     | Day non-Standard Hours | Evening | Night time | Day Standard Hours  | Day non-Standard Hours | Evening | Night time |
| R.242_A     | NCA01_Residential    | <b>83</b>                                 | 31   | 36                     | 37      | 43         | 41  | 41                     | 42      | 48         |
| R.251_A     | NCA01_Residential    | <b>83</b>                                 | 31   | 36                     | 37      | 43         | 41  | 41                     | 42      | 48         |
| R.232_A     | NCA01_Residential    | <b>81</b>                                 | 29   | 34                     | 35      | 41         | 39  | 39                     | 40      | 46         |
| R.250_A     | NCA01_Residential    | <b>76</b>                                 | 24   | 29                     | 30      | 36         | 34  | 34                     | 35      | 41         |
| R.245_A     | NCA01_Residential    | <b>75</b>                                 | 23   | 28                     | 29      | 35         | 33  | 33                     | 34      | 40         |
| R.248_A     | NCA01_Residential    | <b>75</b>                                 | 23   | 28                     | 29      | 35         | 33  | 33                     | 34      | 40         |
| R.239_A     | NCA01_Residential    | <b>74</b>                                 | 22   | 27                     | 28      | 34         | 32  | 32                     | 33      | 39         |
| R.257_A     | NCA01_Residential    | <b>74</b>                                 | 22   | 27                     | 28      | 34         | 32  | 32                     | 33      | 39         |
| R.260_A     | NCA01_Residential    | <b>74</b>                                 | 22   | 27                     | 28      | 34         | 32  | 32                     | 33      | 39         |
| R.265_A     | NCA01_Residential    | <b>74</b>                                 | 22   | 27                     | 28      | 34         | 32  | 32                     | 33      | 39         |
| R.266_A     | NCA01_Residential    | <b>74</b>                                 | 22   | 27                     | 28      | 34         | 32  | 32                     | 33      | 39         |
| R.270_A     | NCA01_Residential    | <b>73</b>                                 | 21   | 26                     | 27      | 33         | 31  | 31                     | 32      | 38         |
| R.240_A     | NCA01_Residential    | <b>72</b>                                 | 20   | 25                     | 26      | 32         | 30  | 30                     | 31      | 37         |
| R.247_A     | NCA01_Residential    | <b>72</b>                                 | 20   | 25                     | 26      | 32         | 30  | 30                     | 31      | 37         |
| R.272_A     | NCA01_Residential    | <b>71</b>                                 | 19   | 24                     | 25      | 31         | 29  | 29                     | 30      | 36         |
| R.226_A     | NCA01_Residential    | <b>70</b>                                 | 18   | 23                     | 24      | 30         | 28  | 28                     | 29      | 35         |
| R.231_A     | NCA01_Residential    | <b>70</b>                                 | 18   | 23                     | 24      | 30         | 28  | 28                     | 29      | 35         |
| R.246_A     | NCA01_Residential    | <b>70</b>                                 | 18   | 23                     | 24      | 30         | 28  | 28                     | 29      | 35         |
| R.228_A     | NCA01_Residential    | <b>69</b>                                 | 17   | 22                     | 23      | 29         | 27  | 27                     | 28      | 34         |
| R.237_A     | NCA01_Residential    | <b>69</b>                                 | 17   | 22                     | 23      | 29         | 27  | 27                     | 28      | 34         |

1. Works for this scenario have potential to occur in OOHW periods.

**Table 5.4 Resultant Noise Level Assessment: Scenario 4 (Drainage System Installation)**

| Receptor ID | Receptor Description | Predicted Noise Levels:<br>LAeq, 15minute | Comparison to NML<br>(predicted - NML): LAeq, 15minute |                        |         |            | If exceedance of NML - Comparison to RBL<br>(predicted - RBL): LAeq, 15minute |                        |         |            |
|-------------|----------------------|---|--|------------------------|---------|------------|---|------------------------|---------|------------|
|             |                      |   | Day Standard Hours                                     | Day non-Standard Hours | Evening | Night time | Day Standard Hours  | Day non-Standard Hours | Evening | Night time |
| R.212_A     | NCA01_Residential    | 80  | 28   | 33                     | 34      | 40         | 38  | 38                     | 39      | 45         |
| R.202_A     | NCA01_Residential    | 78  | 26   | 31                     | 32      | 38         | 36  | 36                     | 37      | 43         |
| R.226_A     | NCA01_Residential    | 78  | 26   | 31                     | 32      | 38         | 36  | 36                     | 37      | 43         |
| R.216_A     | NCA01_Residential    | 74  | 22   | 27                     | 28      | 34         | 32  | 32                     | 33      | 39         |
| R.209_A     | NCA01_Residential    | 73  | 21   | 26                     | 27      | 33         | 31  | 31                     | 32      | 38         |
| R.231_A     | NCA01_Residential    | 73  | 21   | 26                     | 27      | 33         | 31  | 31                     | 32      | 38         |
| R.211_A     | NCA01_Residential    | 72  | 20   | 25                     | 26      | 32         | 30  | 30                     | 31      | 37         |
| R.208_A     | NCA01_Residential    | 71  | 19   | 24                     | 25      | 31         | 29  | 29                     | 30      | 36         |
| R.207_A     | NCA01_Residential    | 70  | 18   | 23                     | 24      | 30         | 28  | 28                     | 29      | 35         |
| R.232_A     | NCA01_Residential    | 70  | 18   | 23                     | 24      | 30         | 28  | 28                     | 29      | 35         |
| R.228_A     | NCA01_Residential    | 69  | 17   | 22                     | 23      | 29         | 27  | 27                     | 28      | 34         |
| R.230_A     | NCA01_Residential    | 69  | 17   | 22                     | 23      | 29         | 27  | 27                     | 28      | 34         |
| R.239_A     | NCA01_Residential    | 68  | 16   | 21                     | 22      | 28         | 26  | 26                     | 27      | 33         |
| R.206_A     | NCA01_Residential    | 66  | 14   | 19                     | 20      | 26         | 24  | 24                     | 25      | 31         |
| R.210_A     | NCA01_Residential    | 66  | 14   | 19                     | 20      | 26         | 24  | 24                     | 25      | 31         |
| R.222_A     | NCA01_Residential    | 65  | 13   | 18                     | 19      | 25         | 23  | 23                     | 24      | 30         |
| R.250_A     | NCA01_Residential    | 65  | 13   | 18                     | 19      | 25         | 23  | 23                     | 24      | 30         |
| R.197_A     | NCA01_Residential    | 64  | 12   | 17                     | 18      | 24         | 22  | 22                     | 23      | 29         |
| R.242_A     | NCA01_Residential    | 64  | 12   | 17                     | 18      | 24         | 22  | 22                     | 23      | 29         |
| R.201_A     | NCA01_Residential    | 63  | 11   | 16                     | 17      | 23         | 21  | 21                     | 22      | 28         |

1. Works for this scenario have potential to occur in OOHW periods.

**Table 5.5 Resultant Noise Level Assessment: Scenario 5 (Track Slew or Switch)**

| Receptor ID | Receptor Description | Predicted Noise Levels:<br>LAeq, 15minute | Comparison to NML<br>(predicted - NML): LAeq, 15minute |                        |         |            | If exceedance of NML - Comparison to RBL<br>(predicted - RBL): LAeq, 15minute |                        |         |            |
|-------------|----------------------|---|--|------------------------|---------|------------|---|------------------------|---------|------------|
|             |                      |   | Day Standard Hours                                     | Day non-Standard Hours | Evening | Night time | Day Standard Hours  | Day non-Standard Hours | Evening | Night time |
| R.179_A     | NCA01_Residential    | <u>77</u>                                 | 25   | 30                     | 31      | 37         | 35  | 35                     | 36      | 42         |
| R.186_A     | NCA01_Residential    | <u>75</u>                                 | 23   | 28                     | 29      | 35         | 33  | 33                     | 34      | 40         |
| R.187_A     | NCA01_Residential    | <u>74</u>                                 | 22   | 27                     | 28      | 34         | 32  | 32                     | 33      | 39         |
| R.202_A     | NCA01_Residential    | <u>74</u>                                 | 22   | 27                     | 28      | 34         | 32  | 32                     | 33      | 39         |
| R.185_A     | NCA01_Residential    | <u>73</u>                                 | 21   | 26                     | 27      | 33         | 31  | 31                     | 32      | 38         |
| R.170_A     | NCA01_Residential    | <u>72</u>                                 | 20   | 25                     | 26      | 32         | 30  | 30                     | 31      | 37         |
| R.181_A     | NCA01_Residential    | <u>71</u>                                 | 19   | 24                     | 25      | 31         | 29  | 29                     | 30      | 36         |
| R.165_A     | NCA01_Residential    | <u>68</u>                                 | 16   | 21                     | 22      | 28         | 26  | 26                     | 27      | 33         |
| R.108_A     | NCA01_Residential    | <u>67</u>                                 | 15   | 20                     | 21      | 27         | 25  | 25                     | 26      | 32         |
| R.122_A     | NCA01_Residential    | <u>67</u>                                 | 15   | 20                     | 21      | 27         | 25  | 25                     | 26      | 32         |
| R.152_A     | NCA01_Residential    | <u>67</u>                                 | 15   | 20                     | 21      | 27         | 25  | 25                     | 26      | 32         |
| R.159_A     | NCA01_Residential    | <u>67</u>                                 | 15   | 20                     | 21      | 27         | 25  | 25                     | 26      | 32         |
| R.177_A     | NCA01_Residential    | <u>67</u>                                 | 15   | 20                     | 21      | 27         | 25  | 25                     | 26      | 32         |
| R.114_A     | NCA01_Residential    | <u>66</u>                                 | 14   | 19                     | 20      | 26         | 24  | 24                     | 25      | 31         |
| R.128_A     | NCA01_Residential    | <u>66</u>                                 | 14   | 19                     | 20      | 26         | 24  | 24                     | 25      | 31         |
| R.144_A     | NCA01_Residential    | <u>66</u>                                 | 14   | 19                     | 20      | 26         | 24  | 24                     | 25      | 31         |
| R.149_A     | NCA01_Residential    | <u>66</u>                                 | 14   | 19                     | 20      | 26         | 24  | 24                     | 25      | 31         |
| R.158_A     | NCA01_Residential    | <u>66</u>                                 | 14   | 19                     | 20      | 26         | 24  | 24                     | 25      | 31         |
| R.174_A     | NCA01_Residential    | <u>66</u>                                 | 14   | 19                     | 20      | 26         | 24  | 24                     | 25      | 31         |
| R.175_A     | NCA01_Residential    | <u>66</u>                                 | 14   | 19                     | 20      | 26         | 24  | 24                     | 25      | 31         |

1. Works for this scenario have potential to occur in OOHW periods.

**Table 5.6 Resultant Noise Level Assessment: Scenario 6 (Removal of Existing Tracks)**

| Receptor ID | Receptor Description | Predicted Noise Levels:<br>LAeq, 15minute | Comparison to NML<br>(predicted - NML): LAeq, 15minute |                        |         |            | If exceedance of NML - Comparison to RBL<br>(predicted - RBL): LAeq, 15minute |                        |         |            |
|-------------|----------------------|---|--|------------------------|---------|------------|---|------------------------|---------|------------|
|             |                      |   | Day Standard Hours                                     | Day non-Standard Hours | Evening | Night time | Day Standard Hours  | Day non-Standard Hours | Evening | Night time |
| R.179_A     | NCA01_Residential    | 75  | 23   | 28                     | 29      | 35         | 33  | 33                     | 34      | 40         |
| R.242_A     | NCA01_Residential    | 74  | 22   | 27                     | 28      | 34         | 32  | 32                     | 33      | 39         |
| R.251_A     | NCA01_Residential    | 74  | 22   | 27                     | 28      | 34         | 32  | 32                     | 33      | 39         |
| R.212_A     | NCA01_Residential    | 73  | 21   | 26                     | 27      | 33         | 31  | 31                     | 32      | 38         |
| R.226_A     | NCA01_Residential    | 73  | 21   | 26                     | 27      | 33         | 31  | 31                     | 32      | 38         |
| R.231_A     | NCA01_Residential    | 73  | 21   | 26                     | 27      | 33         | 31  | 31                     | 32      | 38         |
| R.232_A     | NCA01_Residential    | 73  | 21   | 26                     | 27      | 33         | 31  | 31                     | 32      | 38         |
| R.239_A     | NCA01_Residential    | 73  | 21   | 26                     | 27      | 33         | 31  | 31                     | 32      | 38         |
| R.250_A     | NCA01_Residential    | 73  | 21   | 26                     | 27      | 33         | 31  | 31                     | 32      | 38         |
| R.186_A     | NCA01_Residential    | 72  | 20   | 25                     | 26      | 32         | 30  | 30                     | 31      | 37         |
| R.187_A     | NCA01_Residential    | 72  | 20   | 25                     | 26      | 32         | 30  | 30                     | 31      | 37         |
| R.202_A     | NCA01_Residential    | 72  | 20   | 25                     | 26      | 32         | 30  | 30                     | 31      | 37         |
| R.170_A     | NCA01_Residential    | 71  | 19   | 24                     | 25      | 31         | 29  | 29                     | 30      | 36         |
| R.257_A     | NCA01_Residential    | 71  | 19   | 24                     | 25      | 31         | 29  | 29                     | 30      | 36         |
| R.260_A     | NCA01_Residential    | 71  | 19   | 24                     | 25      | 31         | 29  | 29                     | 30      | 36         |
| R.265_A     | NCA01_Residential    | 71  | 19   | 24                     | 25      | 31         | 29  | 29                     | 30      | 36         |
| R.266_A     | NCA01_Residential    | 71  | 19   | 24                     | 25      | 31         | 29  | 29                     | 30      | 36         |
| R.270_A     | NCA01_Residential    | 71  | 19   | 24                     | 25      | 31         | 29  | 29                     | 30      | 36         |
| R.185_A     | NCA01_Residential    | 70  | 18   | 23                     | 24      | 30         | 28  | 28                     | 29      | 35         |
| R.216_A     | NCA01_Residential    | 70  | 18   | 23                     | 24      | 30         | 28  | 28                     | 29      | 35         |

1. Works for this scenario have potential to occur in OOHW periods.

**Table 5.7 Resultant Noise Level Assessment: Scenario 7 (High Voltage Electrical Works)**

| Receptor ID | Receptor Description | Predicted Noise Levels:<br>LAeq, 15minute | Comparison to NML<br>(predicted - NML): LAeq, 15minute |                        |         |            | If exceedance of NML - Comparison to RBL<br>(predicted - RBL): LAeq, 15minute |                        |         |            |
|-------------|----------------------|---|--|------------------------|---------|------------|---|------------------------|---------|------------|
|             |                      |   | Day Standard Hours                                     | Day non-Standard Hours | Evening | Night time | Day Standard Hours  | Day non-Standard Hours | Evening | Night time |
| R.179_A     | NCA01_Residential    | 68  | 16   | 21                     | 22      | 28         | 26  | 26                     | 27      | 33         |
| R.251_A     | NCA01_Residential    | 66  | 14   | 19                     | 20      | 26         | 24  | 24                     | 25      | 31         |
| R.226_A     | NCA01_Residential    | 65  | 13   | 18                     | 19      | 25         | 23  | 23                     | 24      | 30         |
| R.231_A     | NCA01_Residential    | 65  | 13   | 18                     | 19      | 25         | 23  | 23                     | 24      | 30         |
| R.232_A     | NCA01_Residential    | 65  | 13   | 18                     | 19      | 25         | 23  | 23                     | 24      | 30         |
| R.239_A     | NCA01_Residential    | 65  | 13   | 18                     | 19      | 25         | 23  | 23                     | 24      | 30         |
| R.242_A     | NCA01_Residential    | 65  | 13   | 18                     | 19      | 25         | 23  | 23                     | 24      | 30         |
| R.250_A     | NCA01_Residential    | 65  | 13   | 18                     | 19      | 25         | 23  | 23                     | 24      | 30         |
| R.186_A     | NCA01_Residential    | 64  | 12   | 17                     | 18      | 24         | 22  | 22                     | 23      | 29         |
| R.187_A     | NCA01_Residential    | 64  | 12   | 17                     | 18      | 24         | 22  | 22                     | 23      | 29         |
| R.212_A     | NCA01_Residential    | 64  | 12   | 17                     | 18      | 24         | 22  | 22                     | 23      | 29         |
| R.170_A     | NCA01_Residential    | 63  | 11   | 16                     | 17      | 23         | 21  | 21                     | 22      | 28         |
| R.202_A     | NCA01_Residential    | 63  | 11   | 16                     | 17      | 23         | 21  | 21                     | 22      | 28         |
| R.257_A     | NCA01_Residential    | 63  | 11   | 16                     | 17      | 23         | 21  | 21                     | 22      | 28         |
| R.260_A     | NCA01_Residential    | 63  | 11   | 16                     | 17      | 23         | 21  | 21                     | 22      | 28         |
| R.265_A     | NCA01_Residential    | 63  | 11   | 16                     | 17      | 23         | 21  | 21                     | 22      | 28         |
| R.266_A     | NCA01_Residential    | 63  | 11   | 16                     | 17      | 23         | 21  | 21                     | 22      | 28         |
| R.270_A     | NCA01_Residential    | 63  | 11   | 16                     | 17      | 23         | 21  | 21                     | 22      | 28         |
| R.185_A     | NCA01_Residential    | 62  | 10   | 15                     | 16      | 22         | 20  | 20                     | 21      | 27         |
| R.272_A     | NCA01_Residential    | 62  | 10   | 15                     | 16      | 22         | 20  | 20                     | 21      | 27         |

1. Works for this scenario have potential to occur in OOHW periods.



**Table 5.8 Resultant Noise Level Assessment: Scenario 8 (Construction of Combined Services Route (CSR))**

| Receptor ID | Receptor Description | Predicted Noise Levels:<br>LAeq, 15minute | Comparison to NML<br>(predicted - NML): LAeq, 15minute |                        |         |            | If exceedance of NML - Comparison to RBL<br>(predicted - RBL): LAeq, 15minute |                        |         |            |
|-------------|----------------------|---|--|------------------------|---------|------------|---|------------------------|---------|------------|
|             |                      |   | Day Standard Hours                                     | Day non-Standard Hours | Evening | Night time | Day Standard Hours  | Day non-Standard Hours | Evening | Night time |
| R.152_A     | NCA01_Residential    | 70  | 18   | 23                     | 24      | 30         | 28  | 28                     | 29      | 35         |
| R.165_A     | NCA01_Residential    | 70  | 18   | 23                     | 24      | 30         | 28  | 28                     | 29      | 35         |
| R.144_A     | NCA01_Residential    | 69  | 17   | 22                     | 23      | 29         | 27  | 27                     | 28      | 34         |
| R.149_A     | NCA01_Residential    | 69  | 17   | 22                     | 23      | 29         | 27  | 27                     | 28      | 34         |
| R.159_A     | NCA01_Residential    | 69  | 17   | 22                     | 23      | 29         | 27  | 27                     | 28      | 34         |
| R.158_A     | NCA01_Residential    | 67  | 15   | 20                     | 21      | 27         | 25  | 25                     | 26      | 32         |
| R.179_A     | NCA01_Residential    | 67  | 15   | 20                     | 21      | 27         | 25  | 25                     | 26      | 32         |
| R.153_A     | NCA01_Residential    | 66  | 14   | 19                     | 20      | 26         | 24  | 24                     | 25      | 31         |
| R.156_A     | NCA01_Residential    | 66  | 14   | 19                     | 20      | 26         | 24  | 24                     | 25      | 31         |
| R.157_A     | NCA01_Residential    | 66  | 14   | 19                     | 20      | 26         | 24  | 24                     | 25      | 31         |
| R.163_A     | NCA01_Residential    | 66  | 14   | 19                     | 20      | 26         | 24  | 24                     | 25      | 31         |
| R.145_A     | NCA01_Residential    | 65  | 13   | 18                     | 19      | 25         | 23  | 23                     | 24      | 30         |
| R.170_A     | NCA01_Residential    | 65  | 13   | 18                     | 19      | 25         | 23  | 23                     | 24      | 30         |
| R.140_A     | NCA01_Residential    | 64  | 12   | 17                     | 18      | 24         | 22  | 22                     | 23      | 29         |
| R.142_A     | NCA01_Residential    | 64  | 12   | 17                     | 18      | 24         | 22  | 22                     | 23      | 29         |
| R.167_A     | NCA01_Residential    | 64  | 12   | 17                     | 18      | 24         | 22  | 22                     | 23      | 29         |
| R.174_A     | NCA01_Residential    | 64  | 12   | 17                     | 18      | 24         | 22  | 22                     | 23      | 29         |
| R.175_A     | NCA01_Residential    | 64  | 12   | 17                     | 18      | 24         | 22  | 22                     | 23      | 29         |
| R.177_A     | NCA01_Residential    | 64  | 12   | 17                     | 18      | 24         | 22  | 22                     | 23      | 29         |
| R.136_A     | NCA01_Residential    | 63  | 11   | 16                     | 17      | 23         | 21  | 21                     | 22      | 28         |

1. Works for this scenario have potential to occur in OOHW periods.

**Table 5.9 Resultant Noise Level Assessment: Scenario 9 (Under Line Crossing (ULX) Works)**

| Receptor ID | Receptor Description | Predicted Noise Levels:<br>LAeq, 15minute | Comparison to NML<br>(predicted - NML): LAeq, 15minute |                        |         |            | If exceedance of NML - Comparison to RBL<br>(predicted - RBL): LAeq, 15minute |                        |         |            |
|-------------|----------------------|---|--|------------------------|---------|------------|---|------------------------|---------|------------|
|             |                      |   | Day Standard Hours                                     | Day non-Standard Hours | Evening | Night time | Day Standard Hours  | Day non-Standard Hours | Evening | Night time |
| R.226_A     | NCA01_Residential    | 73  | 21   | 26                     | 27      | 33         | 31  | 31                     | 32      | 38         |
| R.232_A     | NCA01_Residential    | 73  | 21   | 26                     | 27      | 33         | 31  | 31                     | 32      | 38         |
| R.242_A     | NCA01_Residential    | 73  | 21   | 26                     | 27      | 33         | 31  | 31                     | 32      | 38         |
| R.202_A     | NCA01_Residential    | 72  | 20   | 25                     | 26      | 32         | 30  | 30                     | 31      | 37         |
| R.212_A     | NCA01_Residential    | 72  | 20   | 25                     | 26      | 32         | 30  | 30                     | 31      | 37         |
| R.239_A     | NCA01_Residential    | 72  | 20   | 25                     | 26      | 32         | 30  | 30                     | 31      | 37         |
| R.251_A     | NCA01_Residential    | 72  | 20   | 25                     | 26      | 32         | 30  | 30                     | 31      | 37         |
| R.179_A     | NCA01_Residential    | 71  | 19   | 24                     | 25      | 31         | 29  | 29                     | 30      | 36         |
| R.231_A     | NCA01_Residential    | 71  | 19   | 24                     | 25      | 31         | 29  | 29                     | 30      | 36         |
| R.250_A     | NCA01_Residential    | 71  | 19   | 24                     | 25      | 31         | 29  | 29                     | 30      | 36         |
| R.257_A     | NCA01_Residential    | 70  | 18   | 23                     | 24      | 30         | 28  | 28                     | 29      | 35         |
| R.260_A     | NCA01_Residential    | 70  | 18   | 23                     | 24      | 30         | 28  | 28                     | 29      | 35         |
| R.265_A     | NCA01_Residential    | 70  | 18   | 23                     | 24      | 30         | 28  | 28                     | 29      | 35         |
| R.266_A     | NCA01_Residential    | 70  | 18   | 23                     | 24      | 30         | 28  | 28                     | 29      | 35         |
| R.270_A     | NCA01_Residential    | 70  | 18   | 23                     | 24      | 30         | 28  | 28                     | 29      | 35         |
| R.216_A     | NCA01_Residential    | 69  | 17   | 22                     | 23      | 29         | 27  | 27                     | 28      | 34         |
| R.186_A     | NCA01_Residential    | 68  | 16   | 21                     | 22      | 28         | 26  | 26                     | 27      | 33         |
| R.187_A     | NCA01_Residential    | 68  | 16   | 21                     | 22      | 28         | 26  | 26                     | 27      | 33         |
| R.272_A     | NCA01_Residential    | 68  | 16   | 21                     | 22      | 28         | 26  | 26                     | 27      | 33         |
| R.170_A     | NCA01_Residential    | 67  | 15   | 20                     | 21      | 27         | 25  | 25                     | 26      | 32         |

1. Works for this scenario have potential to occur in OOHW periods.

**Table 5.10 Resultant Noise Level Assessment: Scenario 10 (Relocation and Termination of Utilities in Nelson St Bridge)**

| Receptor ID | Receptor Description | Predicted Noise Levels:<br>LAeq, 15minute | Comparison to NML<br>(predicted - NML): LAeq, 15minute |                        |         |            | If exceedance of NML - Comparison to RBL<br>(predicted - RBL): LAeq, 15minute |                        |         |            |
|-------------|----------------------|---|--|------------------------|---------|------------|---|------------------------|---------|------------|
|             |                      |   | Day Standard Hours                                     | Day non-Standard Hours | Evening | Night time | Day Standard Hours  | Day non-Standard Hours | Evening | Night time |
| R.179_A     | NCA01_Residential    | <u>87</u>                                 | 35   | 40                     | 41      | 47         | 45  | 45                     | 46      | 52         |
| R.170_A     | NCA01_Residential    | <u>82</u>                                 | 30   | 35                     | 36      | 42         | 40  | 40                     | 41      | 47         |
| R.174_A     | NCA01_Residential    | <u>78</u>                                 | 26   | 31                     | 32      | 38         | 36  | 36                     | 37      | 43         |
| R.177_A     | NCA01_Residential    | <u>78</u>                                 | 26   | 31                     | 32      | 38         | 36  | 36                     | 37      | 43         |
| R.185_A     | NCA01_Residential    | <u>78</u>                                 | 26   | 31                     | 32      | 38         | 36  | 36                     | 37      | 43         |
| R.181_A     | NCA01_Residential    | <u>77</u>                                 | 25   | 30                     | 31      | 37         | 35  | 35                     | 36      | 42         |
| R.186_A     | NCA01_Residential    | <u>77</u>                                 | 25   | 30                     | 31      | 37         | 35  | 35                     | 36      | 42         |
| R.187_A     | NCA01_Residential    | <u>74</u>                                 | 22   | 27                     | 28      | 34         | 32  | 32                     | 33      | 39         |
| R.172_A     | NCA01_Residential    | <u>73</u>                                 | 21   | 26                     | 27      | 33         | 31  | 31                     | 32      | 38         |
| R.171_A     | NCA01_Residential    | <u>71</u>                                 | 19   | 24                     | 25      | 31         | 29  | 29                     | 30      | 36         |
| R.175_A     | NCA01_Residential    | <u>71</u>                                 | 19   | 24                     | 25      | 31         | 29  | 29                     | 30      | 36         |
| R.152_A     | NCA01_Residential    | <u>68</u>                                 | 16   | 21                     | 22      | 28         | 26  | 26                     | 27      | 33         |
| R.163_A     | NCA01_Residential    | <u>67</u>                                 | 15   | 20                     | 21      | 27         | 25  | 25                     | 26      | 32         |
| R.180_A     | NCA01_Residential    | <u>67</u>                                 | 15   | 20                     | 21      | 27         | 25  | 25                     | 26      | 32         |
| R.165_A     | NCA01_Residential    | <u>65</u>                                 | 13   | 18                     | 19      | 25         | 23  | 23                     | 24      | 30         |
| R.184_A     | NCA01_Residential    | <u>65</u>                                 | 13   | 18                     | 19      | 25         | 23  | 23                     | 24      | 30         |
| R.167_A     | NCA01_Residential    | <u>64</u>                                 | 12   | 17                     | 18      | 24         | 22  | 22                     | 23      | 29         |
| R.182_A     | NCA01_Residential    | <u>64</u>                                 | 12   | 17                     | 18      | 24         | 22  | 22                     | 23      | 29         |
| R.157_A     | NCA01_Residential    | <u>63</u>                                 | 11   | 16                     | 17      | 23         | 21  | 21                     | 22      | 28         |
| R.153_A     | NCA01_Residential    | <u>62</u>                                 | 10   | 15                     | 16      | 22         | 20  | 20                     | 21      | 27         |

1. Works for this scenario have potential to occur in OOHW periods.

Table 5.11a Resultant Noise Level Assessment: Scenario 11 (Bridges and Road Works - Nelson St)

| Receptor ID | Receptor Description | Predicted Noise Levels:<br>LAeq, 15minute | Comparison to NML<br>(predicted - NML): LAeq, 15minute |                        |         |            | If exceedance of NML - Comparison to RBL<br>(predicted - RBL): LAeq, 15minute |                        |         |            |
|-------------|----------------------|---|--|------------------------|---------|------------|---|------------------------|---------|------------|
|             |                      |   | Day Standard Hours                                     | Day non-Standard Hours | Evening | Night time | Day Standard Hours  | Day non-Standard Hours | Evening | Night time |
| R.179_A     | NCA01_Residential    | 85  | 33   | 38                     | 39      | 45         | 43  | 43                     | 44      | 50         |
| R.170_A     | NCA01_Residential    | 80  | 28   | 33                     | 34      | 40         | 38  | 38                     | 39      | 45         |
| R.185_A     | NCA01_Residential    | 77  | 25   | 30                     | 31      | 37         | 35  | 35                     | 36      | 42         |
| R.186_A     | NCA01_Residential    | 76  | 24   | 29                     | 30      | 36         | 34  | 34                     | 35      | 41         |
| R.174_A     | NCA01_Residential    | 75  | 23   | 28                     | 29      | 35         | 33  | 33                     | 34      | 40         |
| R.177_A     | NCA01_Residential    | 75  | 23   | 28                     | 29      | 35         | 33  | 33                     | 34      | 40         |
| R.181_A     | NCA01_Residential    | 75  | 23   | 28                     | 29      | 35         | 33  | 33                     | 34      | 40         |
| R.187_A     | NCA01_Residential    | 73  | 21   | 26                     | 27      | 33         | 31  | 31                     | 32      | 38         |
| R.172_A     | NCA01_Residential    | 70  | 18   | 23                     | 24      | 30         | 28  | 28                     | 29      | 35         |
| R.175_A     | NCA01_Residential    | 68  | 16   | 21                     | 22      | 28         | 26  | 26                     | 27      | 33         |
| R.171_A     | NCA01_Residential    | 67  | 15   | 20                     | 21      | 27         | 25  | 25                     | 26      | 32         |
| R.152_A     | NCA01_Residential    | 66  | 14   | 19                     | 20      | 26         | 24  | 24                     | 25      | 31         |
| R.163_A     | NCA01_Residential    | 65  | 13   | 18                     | 19      | 25         | 23  | 23                     | 24      | 30         |
| R.180_A     | NCA01_Residential    | 65  | 13   | 18                     | 19      | 25         | 23  | 23                     | 24      | 30         |
| R.165_A     | NCA01_Residential    | 63  | 11   | 16                     | 17      | 23         | 21  | 21                     | 22      | 28         |
| R.184_A     | NCA01_Residential    | 63  | 11   | 16                     | 17      | 23         | 21  | 21                     | 22      | 28         |
| R.167_A     | NCA01_Residential    | 62  | 10   | 15                     | 16      | 22         | 20  | 20                     | 21      | 27         |
| R.182_A     | NCA01_Residential    | 62  | 10   | 15                     | 16      | 22         | 20  | 20                     | 21      | 27         |
| R.157_A     | NCA01_Residential    | 61  | 9  | 14                     | 15      | 21         | 19  | 19                     | 20      | 26         |
| R.153_A     | NCA01_Residential    | 60  | 8  | 13                     | 14      | 20         | 18  | 18                     | 19      | 25         |

1. Works for this scenario have potential to occur in OOHW periods.

**Table 5.11b Resultant Noise Level Assessment: Scenario 11 (Bridges and Road Works – Mowbray Rd)**

| Receptor ID | Receptor Description | Predicted Noise Levels:<br>LAeq, 15minute | Comparison to NML<br>(predicted – NML): LAeq, 15minute |                        |         |            | If exceedance of NML - Comparison to RBL<br>(predicted – RBL): LAeq, 15minute |                        |         |            |
|-------------|----------------------|---|--|------------------------|---------|------------|---|------------------------|---------|------------|
|             |                      |   | Day Standard Hours                                     | Day non-Standard Hours | Evening | Night time | Day Standard Hours  | Day non-Standard Hours | Evening | Night time |
| R.202_A     | NCA01_Residential    | 74  | 22   | 27                     | 28      | 34         | 32  | 32                     | 33      | 39         |
| R.187_A     | NCA01_Residential    | 70  | 18   | 23                     | 24      | 30         | 28  | 28                     | 29      | 35         |
| R.186_A     | NCA01_Residential    | 69  | 17   | 22                     | 23      | 29         | 27  | 27                     | 28      | 34         |
| R.179_A     | NCA01_Residential    | 67  | 15   | 20                     | 21      | 27         | 25  | 25                     | 26      | 32         |
| R.197_A     | NCA01_Residential    | 67  | 15   | 20                     | 21      | 27         | 25  | 25                     | 26      | 32         |
| R.208_A     | NCA01_Residential    | 67  | 15   | 20                     | 21      | 27         | 25  | 25                     | 26      | 32         |
| R.185_A     | NCA01_Residential    | 66  | 14   | 19                     | 20      | 26         | 24  | 24                     | 25      | 31         |
| R.209_A     | NCA01_Residential    | 66  | 14   | 19                     | 20      | 26         | 24  | 24                     | 25      | 31         |
| R.170_A     | NCA01_Residential    | 65  | 13   | 18                     | 19      | 25         | 23  | 23                     | 24      | 30         |
| R.212_A     | NCA01_Residential    | 65  | 13   | 18                     | 19      | 25         | 23  | 23                     | 24      | 30         |
| R.181_A     | NCA01_Residential    | 64  | 12   | 17                     | 18      | 24         | 22  | 22                     | 23      | 29         |
| R.216_A     | NCA01_Residential    | 64  | 12   | 17                     | 18      | 24         | 22  | 22                     | 23      | 29         |
| R.175_A     | NCA01_Residential    | 63  | 11   | 16                     | 17      | 23         | 21  | 21                     | 22      | 28         |
| R.211_A     | NCA01_Residential    | 63  | 11   | 16                     | 17      | 23         | 21  | 21                     | 22      | 28         |
| R.207_A     | NCA01_Residential    | 62  | 10   | 15                     | 16      | 22         | 20  | 20                     | 21      | 27         |
| R.231_A     | NCA01_Residential    | 62  | 10   | 15                     | 16      | 22         | 20  | 20                     | 21      | 27         |
| R.239_A     | NCA01_Residential    | 61  | 9  | 14                     | 15      | 21         | 19  | 19                     | 20      | 26         |
| R.250_A     | NCA01_Residential    | 61  | 9  | 14                     | 15      | 21         | 19  | 19                     | 20      | 26         |
| R.177_A     | NCA01_Residential    | 60  | 8  | 13                     | 14      | 20         | 18  | 18                     | 19      | 25         |
| R.172_A     | NCA01_Residential    | 59  | 7  | 12                     | 13      | 19         | 17  | 17                     | 18      | 24         |

1. Works for this scenario have potential to occur in OOHW periods.

**Table 5.12 Resultant Noise Level Assessment: Scenario 12 (Demarcation Fence Installation)**

| Receptor ID | Receptor Description | Predicted Noise Levels:<br>LAeq, 15minute | Comparison to NML<br>(predicted - NML): LAeq, 15minute |                        |         |            | If exceedance of NML - Comparison to RBL<br>(predicted - RBL): LAeq, 15minute |                        |         |            |
|-------------|----------------------|---|--|------------------------|---------|------------|---|------------------------|---------|------------|
|             |                      |   | Day Standard Hours                                     | Day non-Standard Hours | Evening | Night time | Day Standard Hours  | Day non-Standard Hours | Evening | Night time |
| R.226_A     | NCA01_Residential    | 74  | 22   | 27                     | 28      | 34         | 32  | 32                     | 33      | 39         |
| R.242_A     | NCA01_Residential    | 74  | 22   | 27                     | 28      | 34         | 32  | 32                     | 33      | 39         |
| R.232_A     | NCA01_Residential    | 73  | 21   | 26                     | 27      | 33         | 31  | 31                     | 32      | 38         |
| R.251_A     | NCA01_Residential    | 73  | 21   | 26                     | 27      | 33         | 31  | 31                     | 32      | 38         |
| R.179_A     | NCA01_Residential    | 72  | 20   | 25                     | 26      | 32         | 30  | 30                     | 31      | 37         |
| R.212_A     | NCA01_Residential    | 72  | 20   | 25                     | 26      | 32         | 30  | 30                     | 31      | 37         |
| R.239_A     | NCA01_Residential    | 72  | 20   | 25                     | 26      | 32         | 30  | 30                     | 31      | 37         |
| R.231_A     | NCA01_Residential    | 71  | 19   | 24                     | 25      | 31         | 29  | 29                     | 30      | 36         |
| R.250_A     | NCA01_Residential    | 71  | 19   | 24                     | 25      | 31         | 29  | 29                     | 30      | 36         |
| R.260_A     | NCA01_Residential    | 71  | 19   | 24                     | 25      | 31         | 29  | 29                     | 30      | 36         |
| R.265_A     | NCA01_Residential    | 71  | 19   | 24                     | 25      | 31         | 29  | 29                     | 30      | 36         |
| R.270_A     | NCA01_Residential    | 71  | 19   | 24                     | 25      | 31         | 29  | 29                     | 30      | 36         |
| R.257_A     | NCA01_Residential    | 70  | 18   | 23                     | 24      | 30         | 28  | 28                     | 29      | 35         |
| R.266_A     | NCA01_Residential    | 70  | 18   | 23                     | 24      | 30         | 28  | 28                     | 29      | 35         |
| R.186_A     | NCA01_Residential    | 69  | 17   | 22                     | 23      | 29         | 27  | 27                     | 28      | 34         |
| R.202_A     | NCA01_Residential    | 69  | 17   | 22                     | 23      | 29         | 27  | 27                     | 28      | 34         |
| R.272_A     | NCA01_Residential    | 69  | 17   | 22                     | 23      | 29         | 27  | 27                     | 28      | 34         |
| R.170_A     | NCA01_Residential    | 68  | 16   | 21                     | 22      | 28         | 26  | 26                     | 27      | 33         |
| R.187_A     | NCA01_Residential    | 68  | 16   | 21                     | 22      | 28         | 26  | 26                     | 27      | 33         |
| R.216_A     | NCA01_Residential    | 68  | 16   | 21                     | 22      | 28         | 26  | 26                     | 27      | 33         |

1. Works for this scenario have potential to occur in OOHW periods.

**Table 5.13 Resultant Noise Level Assessment: Scenario 13 (Placement and Replacement of Noise Walls)**

| Receptor ID | Receptor Description | Predicted Noise Levels:<br>LAeq, 15minute | Comparison to NML<br>(predicted - NML): LAeq, 15minute |                        |         |            | If exceedance of NML - Comparison to RBL<br>(predicted - RBL): LAeq, 15minute |                        |         |            |
|-------------|----------------------|---|--|------------------------|---------|------------|---|------------------------|---------|------------|
|             |                      |   | Day Standard Hours                                     | Day non-Standard Hours | Evening | Night time | Day Standard Hours  | Day non-Standard Hours | Evening | Night time |
| R.179_A     | NCA01_Residential    | 76  | 24   | 29                     | 30      | 36         | 34  | 34                     | 35      | 41         |
| R.186_A     | NCA01_Residential    | 72  | 20   | 25                     | 26      | 32         | 30  | 30                     | 31      | 37         |
| R.187_A     | NCA01_Residential    | 72  | 20   | 25                     | 26      | 32         | 30  | 30                     | 31      | 37         |
| R.185_A     | NCA01_Residential    | 71  | 19   | 24                     | 25      | 31         | 29  | 29                     | 30      | 36         |
| R.170_A     | NCA01_Residential    | 69  | 17   | 22                     | 23      | 29         | 27  | 27                     | 28      | 34         |
| R.181_A     | NCA01_Residential    | 68  | 16   | 21                     | 22      | 28         | 26  | 26                     | 27      | 33         |
| R.144_A     | NCA01_Residential    | 67  | 15   | 20                     | 21      | 27         | 25  | 25                     | 26      | 32         |
| R.165_A     | NCA01_Residential    | 66  | 14   | 19                     | 20      | 26         | 24  | 24                     | 25      | 31         |
| R.124_A     | NCA01_Recreational   | 66  | 1  | 1                      | 1       | 1          | 24  | 24                     | 25      | 31         |
| R.127_A     | NCA01_Recreational   | 66  | 1  | 1                      | 1       | 1          | 24  | 24                     | 25      | 31         |
| R.149_A     | NCA01_Residential    | 65  | 13   | 18                     | 19      | 25         | 23  | 23                     | 24      | 30         |
| R.152_A     | NCA01_Residential    | 65  | 13   | 18                     | 19      | 25         | 23  | 23                     | 24      | 30         |
| R.159_A     | NCA01_Residential    | 65  | 13   | 18                     | 19      | 25         | 23  | 23                     | 24      | 30         |
| R.177_A     | NCA01_Residential    | 65  | 13   | 18                     | 19      | 25         | 23  | 23                     | 24      | 30         |
| R.108_A     | NCA01_Residential    | 64  | 12   | 17                     | 18      | 24         | 22  | 22                     | 23      | 29         |
| R.122_A     | NCA01_Residential    | 64  | 12   | 17                     | 18      | 24         | 22  | 22                     | 23      | 29         |
| R.128_A     | NCA01_Residential    | 64  | 12   | 17                     | 18      | 24         | 22  | 22                     | 23      | 29         |
| R.174_A     | NCA01_Residential    | 64  | 12   | 17                     | 18      | 24         | 22  | 22                     | 23      | 29         |
| R.114_A     | NCA01_Residential    | 63  | 11   | 16                     | 17      | 23         | 21  | 21                     | 22      | 28         |
| R.158_A     | NCA01_Residential    | 63  | 11   | 16                     | 17      | 23         | 21  | 21                     | 22      | 28         |

1. Works for this scenario have potential to occur in OOHW periods.

**Table 5.14 Resultant Noise Level Assessment: Scenario 14 (Site Compound)**

| Receptor ID | Receptor Description | Predicted Noise Levels:<br>LAeq, 15minute | Comparison to NML<br>(predicted - NML): LAeq, 15minute |                        |         |            | If exceedance of NML - Comparison to RBL<br>(predicted - RBL): LAeq, 15minute |                        |         |            |
|-------------|----------------------|---|--|------------------------|---------|------------|---|------------------------|---------|------------|
|             |                      |   | Day Standard Hours                                     | Day non-Standard Hours | Evening | Night time | Day Standard Hours  | Day non-Standard Hours | Evening | Night time |
| R.406_A     | NCA01_Residential    | 67  | 15   | 20                     | 21      | 27         | 25  | 25                     | 26      | 32         |
| R.405_A     | NCA01_Residential    | 66  | 14   | 19                     | 20      | 26         | 24  | 24                     | 25      | 31         |
| R.407_A     | NCA01_Residential    | 65  | 13   | 18                     | 19      | 25         | 23  | 23                     | 24      | 30         |
| R.409_A     | NCA01_Residential    | 64  | 12   | 17                     | 18      | 24         | 22  | 22                     | 23      | 29         |
| R.404_A     | NCA01_Residential    | 63  | 11   | 16                     | 17      | 23         | 21  | 21                     | 22      | 28         |
| R.402_A     | NCA01_Residential    | 62  | 10   | 15                     | 16      | 22         | 20  | 20                     | 21      | 27         |
| R.410_A     | NCA01_Residential    | 61  | 9  | 14                     | 15      | 21         | 19  | 19                     | 20      | 26         |
| R.400_A     | NCA01_Residential    | 60  | 8  | 13                     | 14      | 20         | 18  | 18                     | 19      | 25         |
| R.397_A     | NCA01_Residential    | 59  | 7  | 12                     | 13      | 19         | 17  | 17                     | 18      | 24         |
| R.411_A     | NCA01_Residential    | 58  | 6  | 11                     | 12      | 18         | 16  | 16                     | 17      | 23         |
| R.391_A     | NCA01_Residential    | 56  | 4  | 9                      | 10      | 16         | 14  | 14                     | 15      | 21         |
| R.394_A     | NCA01_Residential    | 56  | 4  | 9                      | 10      | 16         | 14  | 14                     | 15      | 21         |
| R.393_A     | NCA01_Residential    | 55  | 3  | 8                      | 9       | 15         | 13  | 13                     | 14      | 20         |
| R.412_A     | NCA01_Residential    | 51  | -1   | 4                      | 5       | 11         | -   | 9                      | 10      | 16         |
| R.382_A     | NCA01_Residential    | 50  | -2   | 3                      | 4       | 10         | -   | 8                      | 9       | 15         |
| R.386_A     | NCA01_Residential    | 49  | -3   | 2                      | 3       | 9          | -   | 7                      | 8       | 14         |
| R.338_A     | NCA04_Residential    | 48  | -3   | 2                      | 3       | 9          | -   | 7                      | 8       | 14         |
| R.358_A     | NCA01_Residential    | 48  | -4   | 1                      | 2       | 8          | -   | 6                      | 7       | 13         |
| R.360_A     | NCA01_Residential    | 48  | -4   | 1                      | 2       | 8          | -   | 6                      | 7       | 13         |
| R.362_A     | NCA01_Residential    | 48  | -4   | 1                      | 2       | 8          | -   | 6                      | 7       | 13         |

1. Works for this scenario have potential to occur in OOHW periods.



## 5.1.2

### *Summary of Findings*

The resultant noise levels are summarised below:

- The highest predicted noise levels range between 78 and 105 dBA associated with the sheet piling activities occurring in SCN03a. For activities associated with all other scenarios the highest predicted noise levels range between 48 and 87 dBA. These noise levels are predicted at the nearest receptors located in generally the first row of buildings with direct line of sight to NCW works.
- The daytime NML applicable at residential (occupied dwellings) receptors for works within the recommended standard hours for construction is exceeded by up to 53 dBA at the most affected locations in SCN03a.
- For other key scenarios, SCN03b, SCN10 and SCN11a the daytime NML applicable at residential (occupied dwellings) receptors for works within the recommended standard hours for construction is exceeded by between 31 and 35 dBA at the most affected locations.
- The magnitude and extent that predicted noise levels exceed the daytime NML applicable at commercial and other sensitive receptors for works within the recommended standard hours for construction are much less than that identified for residential receptors and exceed the NML at non-residential receptors by up to 19 dBA.
- The extent that noise levels are predicted to exceed the NML at residential receptors, for works outside the recommended hours for construction, varies depending on the assessment scenario and period i.e. daytime, evening and night time. Predicted noise levels exceed the NML to a larger extent during the evening and night time (when compared to the daytime) as the NML are more stringent during those periods. The highest exceedances are predicted for the night time, when the most stringent NML apply.
- For commercial and other sensitive receptors the extent that noise levels are predicted to exceed the NML is the same for each period, as the NML are fixed values for all times of the day and days of the week.
- It is noted that the HNML (75 dBA) applicable at residential (dwelling) receptors during the daytime is exceeded for at least one receptor in the first row of buildings in the following scenarios: SCN01, SCN03a, SCN03b, SCN04, SCN05, SCN06, SCN10, SCN11 and SCN13.
- It is possible to estimate internal noise levels based on the predicted values presented above for each scenario by deducting 10 dBA from these external values to represent windows being partially open and by deducting 20 dBA to represent windows being closed. This method for example, results in estimated noise levels between 67 dBA and approximately 77 dBA

(internal) for R.179 in SCN10 (which is the highest predicted noise level that will potentially occur during the night time period). Comparing the estimated internal noise levels to the **CoA - E42** requirements (i.e. additional mitigation must be offered to residents that experience internal noise levels of LAeq, 15 minute, 45 dBA or greater between 8pm and 7am) identifies that noise levels will generally be in compliance for the broader community but levels are likely to exceed the **CoA - E42** threshold at the first row of buildings around the works. This trend is likely to occur during all scenarios.

- All scenarios except SCN02, SCN07, SCN08 and SCN14 are predicted to generate noise levels >30dBA (as per the AMMM at the closest and most affected receptors for works within the recommended standard hours of construction).
- All scenarios are predicted to generate noise levels >30dBA (as per the AMMM) at the closest and most affected receptors for works outside the recommended standard hours of construction.
- Predicted noise levels exceed the existing background noise level to a larger extent during the evening and night time period (when compared to the daytime) as the existing background noise levels are lower during those periods.
- For works within the recommended standard hours for construction, letterbox drops and noise monitoring will be required at the most affected locations during select construction activities associated with NCW works.
- For works outside the recommended standard hours for construction, a combination of the following mitigation will be triggered from the AMMM: alternative accommodation, monitoring, individual briefings, letter box drops, project specific respite offer, phone calls and specific notifications. These measures will be required at the most affected locations during select construction activities associated with NCW works.

### 5.1.3 *Working Outside Standard Hours*

Based on the noise levels predicted to exceed criteria identified in **Table 5.1** to **Table 5.14** it is also considered that the sleep disturbance screening criteria will be exceeded at the nearest and most sensitive residential receptors during OOHW.

With due regard to the AMMM, the extent of additional mitigation required will increase for out-of-hours work (refer **Table 5.1** to **Table 5.14**) compared to that assessed for works within the standard hours. More mitigation is necessary in accordance with the CNVS for works undertaken outside the recommended standard hours for construction.

This feature is a well-accepted element of good industry practice construction noise management; high noise generating activities should be avoided in the evening, at night and on the weekends as receptors are generally more sensitive during those periods.

In accordance with the requirements of the ICNG and the CNVS suitable recommendations, which can be practically implemented on site, should be provided in the CNVMP. Construction noise levels will be reduced and impacts minimised with the successful implementation of these recommendations. Impacts may not be reduced to negligible levels for all receptors during all construction activities; however the recommendations are designed to ensure that any residual impacts are minimised as far as is practically achievable.

## 5.2 *GROUND-BORNE CONSTRUCTION NOISE*

Ground-borne construction noise impacts from NCW works are not anticipated as vibration generating source/s with the potential to generate perceptible ground-borne noise, does not form part of the overall construction design. Ground-borne construction noise is usually present on tunnelling projects when significant tunnel boring equipment is operated underground.

Sheet piling is the highest vibration generating activity anticipated for the NCW works. While ground-borne noise is not expected from this activity the potential has been considered. Due to the attention given to the airborne noise for this activity it has been determined that the mitigation and management measures recommended for airborne noise from the sheet piling activity will also be sufficient in managing impacts from potential ground-borne noise.

## 5.3 *ROAD TRAFFIC NOISE AND VIBRATION*

Construction road traffic (noise and vibration) impacts from NCW works are not anticipated (i.e. from additional vehicles on the public road network). Additional traffic from the project will be limited to the delivery of supplies and the arrival/departure of equipment and personnel.

In accordance with the *NSW Department of Environment, Climate Change and Water – NSW Road Noise Policy (RNP), March 2011* and the CNVS, construction traffic NMLs are set at 2 dBA above the existing road traffic noise levels during the daytime and night-time periods and are considered appropriate to identify the onset of potential noise impacts. Where the road traffic noise levels are predicted to increase by more than 2 dBA as a result of construction traffic, consideration would be given to applying feasible and reasonable noise mitigation measures to reduce the potential noise impacts and preserve acoustic amenity.

When considering feasible and reasonable mitigation measures where the relevant noise increase is greater than 2 dBA, consideration should also be given to the actual noise levels associated with construction traffic and whether or not these levels comply with the road traffic noise criteria in the RNP and CNVS (refer **Section 4.3**).

It is assumed that the noise generated from heavy vehicles due to the size of the construction works and type of works will have minimal impact to developments along their routes. For arterial and sub-arterial roads the project will not generate a significant increase in vehicles when compared to that of the existing vehicle flows and mixes on the surrounding road network.

On local roads the noise generated from construction traffic (i.e. at site access and egress points), may result in complaints from the community due to proximity to residential (dwelling) receptors. It is therefore recommended that the construction road traffic noise mitigation measures identified in this CNVIS and the CNVMP are implemented to ensure that any residual impacts are minimised as far as is practically achievable.

#### 5.4 *GROUND-BORNE CONSTRUCTION VIBRATION*

With respect to the construction plant identified in the assessment scenarios presented in **Table 3.3**, the highest levels of vibration would be expected to occur due to the use of an excavator (sheet piling) during SCN03a (Construction of Stormwater Detention Basin). The resultant vibration levels and comparison to guidelines are summarised below:

##### *Resultant Levels*

The resultant vibration levels are presented below, as follows:

- Predicted PPV values for sheet piling presented in **Table 5.15**.
- Predicted VDV values for sheet piling presented in **Table 5.16**.
- The applicable safe work distance offset assessment based on the values from the TfNSW CNS is provided in **Table 5.17**.

**Table 5.5** *Predicted PPV (mm/s) Vibration Levels (Sheet Piling)*

| Distance, m | Predicted PPV, mm/s |
|-------------|---------------------|
| 1.0         | 46.1                |
| 2.0         | 18.7                |
| 3.0         | 11.1                |
| 4.0         | 7.6                 |
| 5.0         | 5.7                 |
| 6.0         | 4.5                 |
| 7.0         | 3.7                 |
| 8.0         | 3.1                 |

| Distance, m | Predicted PPV, mm/s |
|-------------|---------------------|
| 9.0         | 2.6                 |
| 10.0        | 2.3                 |
| 11.0        | 2.0                 |
| 12.0        | 1.8                 |
| 13.0        | 1.6                 |
| 14.0        | 1.5                 |
| 15.0        | 1.4                 |
| 16.0        | 1.3                 |
| 17.0        | 1.2                 |
| 18.0        | 1.1                 |
| 19.0        | 1.0                 |
| 20.0        | 0.9                 |
| 21.0        | 0.9                 |
| 22.0        | 0.8                 |
| 23.0        | 0.8                 |
| 24.0        | 0.7                 |
| 25.0        | 0.7                 |
| 50.0        | 0.3                 |
| 75.0        | 0.2                 |
| 100.0       | 0.1                 |
| 200.0       | 0.0                 |

Source: BS 5228

**Discussion:** Predicted values comply with the most stringent BS 7385 criteria (15 mm/s) at distances of 3 metres and beyond. Predicted values comply with the most stringent heritage structure criteria (2.5 to 3 mm/s) at distances of 9 metres and beyond. Based on this compliant levels of vibration are anticipated at receptor **R.242** and cosmetic or structural damage impacts are unlikely to occur.

**Table 5.6** *Predicted VDV (m/s<sup>2</sup>) Vibration Levels (Demolition)*

| Distance, m | Receptor | Predicted VDV, mm/s <sup>1.75</sup> | Adverse Comment Probable (m/s <sup>1.75</sup> ) |
|-------------|----------|-------------------------------------|---|
| 8           | R.242    | 2.31                                | ≤ 1.6   |

Source: CNVS, NSW Vibration Guideline

**Discussion:** Predicted values exceed the VDV criteria defined in the CNVS for “Adverse Comment Probable” at distances of 8 metres i.e. at the **R.242**. The predicted values exceed criteria for sheet piling works. This exceedance is associated with the component frequency adopted for the assessment of these works, which recognises that higher frequency vibration events are typically more annoying.

As is evident in the data presented in **Table 5.15** vibration dissipates rapidly with distance (e.g. between 5 and 10 metres vibration reduces by 3 to 5 mm/s) so impacts to the broader community are not anticipated, only the closest receptors will be affected.

**Table 5.17 Safe Work Distance Offset Vibration Assessment**

| Scenario ID | Work Phase Description                     | Vibration Generating Equipment / Plant Utilised | Applicable Safe work distance (Cosmetic) | Applicable Safe work distance (Human Comfort) | Vibration Assessment (nearest) distance (m) | Vibration Assessment (furthest) distance (m) | Works Required within applicable Safe work distances (Cosmetic) | Works Required within applicable Safe work distances (Human Comfort) | Potential OOHW Required? |
|-------------|--|---|--|---|---|--|---|--|--------------------------|
| SCN03       | Construction of Stormwater Detention Basin | Excavator with Sheet Piling Rig                 | 2 - 20 m                                 | 20 m  | 8   | 30   | Y (Partial)   | Y  | Y                        |

1. Partial means that the equipment will operate within some of the applicable range of safe work distances for the works
2. Potential OOHW may occur during Period 1 (day non-standard), however piling is not envisaged to occur during Period 2 (night time).

*Guidance Note*

The highest risk for vibration impacts based on the CNS safe work distances is associated with SCN03a (sheet piling) works. These works will be undertaken between 8 and 30 m from the nearest sensitive receptors utilising an excavator (fitted with sheet piling rig). Complying, with the recommended safe working distances for vibration intensive plant presented **Table 5.17** may not be possible in all cases.

This assessment has utilised the safe work distances for vibration generating construction activities and equipment established with due regard to the CNS. The CNS safe work distances were derived from BS7385 as relevant to cosmetic damage to buildings. BS7385 is a frequency (Hz) dependant criterion (less stringent at higher frequencies) and as such, works and activities may be able to occur at distances closer than those nominated in **Table 5.17** without any cosmetic or structural damage impacts occurring. This is typical of construction and demolition works in close proximity to other buildings and highlights the need to monitor and establish compliant levels during the early stages of vibration significant activities.

## 5.4.2

### *Summary Of Findings*

Based on the combined approach to assessing potential vibration impacts it can be seen that complying with the recommended safe working distances for vibration intensive plant may not be possible in all cases, however the predicted values comply with the most stringent BS 7385 criteria (15 mm/s) at distances of 3 metres and beyond for sheet piling. Based on this, compliant levels of vibration are anticipated at the **R.242** and cosmetic or structural damage impacts are unlikely to occur. Should piling occur at other similar locations in close proximity to receptors, similar noise and vibration impacts would be anticipated and would result in the requirement of similar mitigation and management measures.

Regardless, best-practice construction vibration management and control techniques should be implemented to reduce vibration levels as far as practicable. To minimise impacts to human comfort, additional mitigation and management measures may also be warranted. These will need to be implemented in conjunction with community and stakeholder consultation and notification processes outlined in the AMMM for Ground-borne Vibration in **Section 4.3**.

For works outside the recommended standard hours for construction, letterbox drops, monitoring and a range of other additional mitigation measures from the AMMM will be required at the most affected locations during select construction activities associated with NCW.

This chapter presents any recommendations for construction noise and/or vibration mitigation, community consultation, management measures or monitoring options.

The focus of this section is construction noise and vibration associated with the NCW project that have the potential to generate impacts at the closest and/or potentially most affected sensitive receptors or structures. Recommendations implemented to minimise impacts that these receptors will also assist to minimise impacts on the broader community.

The project-specific mitigation measures (refer **Section 6.3**) have been defined based on the activities proposed and potential impacts. "Standard" mitigation (and practices) applicable to the NCW project are described in Section 7 of the CNVS (the actions set out must be implemented on all Sydney Metro construction projects).

## 6.1 COMMUNITY CONSULTATION

In accordance with **CoA - E33**, community consultation has commenced with the intention of identifying specific mitigation measures. Community engagement has been undertaken with select businesses in the area and residential receivers in and around Frank Channon Walk (FCW). This consultation is outlined in **Table 6.1** below. It should be noted that consultation around FCW has been undertaken first as this is where works are commencing.

**Table 6.1** *Community Consultation undertaken to date*

| Date      | Receptor             | Summary   |
|-----------|----------------------|---|
| 6/09/2016 | Various              | Chatswood Information Session - Northern surface track works - Chatswood Bowling Club 655 Pacific Highway, Chatswood. 40 community members attended |
| 9/11/2017 | 7 Drake Street       | Business survey phone call - Artarmon Family Day Care - 7 Drake Street, Artarmon  |
| 9/11/2017 | 12 Drake Street      | Business survey phone call - SIPE Day care - 12 Drake Street, Artarmon  |
| 9/11/2017 | 134-136 Hampden Road | Business survey phone call - Bella Babes child care centre - 134-136 Hampden Road, Artarmon   |

*Source: LOR, Sydney Metro*

Additional consultation surrounding other areas of work has not yet been undertaken (e.g. Detention Basin), further consultation will need to be undertaken with potentially affected receptors prior to commencement of these works.



In accordance with the CNVS, where noise levels have been predicted above the noise management levels, the AMMM identified in **Section 4.5** is to be implemented. This will involve various methods of community consultation which are outlined in **Table 4.9**. All community consultation will be in accordance with Sydney Metro Stakeholder and Community Strategies. Consultation with businesses will be in accordance with the Sydney Metro Business Management Plan (BMP) and the small business owners support program.

Further consultation with sensitive receptors will be undertaken as the project progresses where sensitive periods can be refined based on the type of activities, expected impacts and the particular circumstances of the receptor at that time. Mitigation measures can then be tailored based on the consultation feedback.

A full suite of Sydney Metro's communication tools are outlined in the Overarching Community Communications Strategy. The stakeholder and community engagement tools to be used during the NCW project will include (refer Sydney Metro - Community Consultation Strategy - Early Works):

- **Place Managers** to be the single point of contact for affected stakeholder and the community and the project team, who will proactively doorknock properties and also respond quickly to any issues or complaints raised;
- **Notifications, signage, newsletters** including maps to keep stakeholders and the community informed, explaining the purpose of the works, what they can expect, and any potential impacts (delivered in paper or electronic format);
- **Newsletter** to provide a three month look-ahead to properties within 500 metres of the construction site on a quarterly basis;
- **Fact sheets** (as required) to provide detail on aspects of the work and the project;
- **Newspaper advertising** to advise of work starting, the community contact facilities and road closures for example;
- **Mobile community information centre**;
- **Communications Management Control Group**, Sydney Metro will establish a new group or attend existing forums to discuss project activities with neighbouring infrastructure projects;
- **Briefings** to strata managers, council officers, SCO, government agencies, and local groups;
- **Mitigation measures** to respond to impacts; and

- **Stakeholder database** to record interactions with stakeholders and the community.

In addition to these tools, the business engagement tools to be used during the NCW project will also include (refer Sydney Metro – Business Management – Early Works):

- **Business surveys** to understand their business requirements including operating hours, main delivery times, reliance on foot traffic, any signage or advertising that may be impacted, customer origin, and other information specific to the business that will need to be considered in early works planning; and
- **Business Consultation Forum** Contractors will establish a new forum or attend existing business forums to discuss project activities. This will be augmented by stakeholder engagement activities outlined in the Community Communications Strategy and the Overarching Community Communications Strategy.

Mitigation Consultation will be undertaken at receptors to which it applies prior to the activity commencing which has triggered it. Nearby sensitive receptors for the project are primarily residential, therefore the time of least impact of work is during day-time standard hours and no specific “sensitive periods” have been identified at this early stage.

**Annex E** of this CNVIS provides an overview of the stakeholders and community groups that will require consultation for the NCW project.

## 6.2

### *STANDARD MITIGATION MEASURES*

The overall objective of construction noise and vibration management is to limit impacts on nearby receptors. This can be achieved by implementing the requirements of the CNVS which reflects the intent and purpose of the ICNG. Therefore, the following hierarchical approach should be used as far as practicable:

- Where site noise levels are above goals or criteria, implement reasonable and feasible good practice environmental controls to minimise noise and vibration emissions and/or exposure duration at affected receptors.
- Where the use of best practice environmental control mitigation measures do not adequately address exceedances of goals or criteria, adopt alternative measures to minimise impacts on the community.
- Liaise with the local community regarding scheduled works which are predicted to have increased impacts.

It is recommended that the standard noise mitigation measures presented in Section 7 of the CNVS be adopted for all works undertaken as part of the

NCW project. The management, source control and path control measures applicable to air-borne noise should be implemented.

Prior to commencement of works, a Construction Noise and Vibration Management Plan (CNVMP) should be prepared and implemented in accordance with the requirements of the CNVS and this CNVIS. The CNVMP should take into consideration measures for reducing the source noise levels of construction equipment by construction planning and equipment selection where reasonable and feasible. At the time this CNVIS was prepared the CNVMP was also being developed to incorporate the recommendations of this assessment.

Sydney Metro have also developed principles for managing construction noise and vibration. These principles will apply to the NCW project and are listed below:

- All personnel and community will be informed of the effort and methods undertaken to reduce noise and vibration for the works undertaken.
- Good engagement with the community will be maintained to facilitate effective project delivery with balanced community impacts.
- Construction noise and vibration levels at sensitive receivers will be minimised where feasible and reasonable.
- Feasible and reasonable mitigation will reflect the time of day, and the degree and duration of the impact.
- The community will be informed of the dates for the intended works, sequencing and timing of noisy events. Where possible this will include an indicative schedule over a 24 hour period.
- Minimising construction noise and vibration will be viewed as a continuous improvement exercise that is inclusive of stakeholders where no idea is too small to be considered.
- Any operational noise and vibration improvements resulting from the works will be promoted to the community.

### 6.3

#### *PROJECT-SPECIFIC MITIGATION MEASURES*

In addition to the measures set out in Section 7 of the CNVS, any specific mitigation measures are to be identified in the CNVMP.

The following project-specific mitigation measures should be implemented to minimise impacts as far as is feasible and reasonable. It is recommended that:

- Extended periods of high noise level generating plant, equipment or machinery (excavators, hand tools, grinders etc.) should be avoided.

- Any site buildings, equipment or other useful obstacles/objects should be positioned to act as a temporary barrier to minimise noise emissions towards the residential receptors situated in the first row of buildings surrounding the NCW project (NCA01). Other barriers such as hoardings or temporary enclosures should be used.
- A temporary acoustic barrier/material should be fitted to the site access gates. This barrier may comprise of a “material/curtain/blanket” that can be hung or attached to the gate. Site emissions may be reduced by the barrier by approximately 5-8 dBA. The gate would then need to remain closed as far as practical during works, with particular focus on the night time.
- Works should utilise the existing rail corridor noise barriers, particularly those near the Hopetoun Ave entrance. For example, equipment/plant should be positioned on the rail corridor level behind the barrier (at Hopetoun Ave) rather than on the ramp.
- The site should be orientated to minimise the need for reversing of equipment or vehicles, particularly during any out-of-hours work. Furthermore, less noisy movement/reversing warning systems for equipment and vehicles should be considered, especially if they will operate for extended periods or in close proximity to the most affected receptors (NCA01). Occupational health and safety requirements for use of warning systems must be followed.
- The site be proactively managed to avoid plant, equipment or machinery being clustered together near receptors.
- All mechanical plant and equipment is to be selected to provide quieter and less vibration emitting construction methods where feasible and reasonable.
- All mechanical plant and equipment 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.
- All plant, equipment or machinery (and heavy vehicles, trucks etc.) should be turned off when not being used.
- To manage the impacts of construction road traffic noise on local roads the following best practice mitigation and management measures should be implemented: keep truck drivers informed of the designated vehicle routes, parking locations, acceptable delivery hours; instruct truck drivers to travel through local roads without stopping unless absolutely necessary. If for whatever reason, truck drivers need to stop on local roads they should position the vehicle away from residential houses and limit extended

periods of engine idling; and instruct truck drivers to limit engine revving and use of exhaust brakes when travelling to and from site, especially whilst travelling on local roads.

- Attended monitoring should be conducted across all shifts during track possession work, including the night time period where sleep disturbance impacts are to be monitored.

## 6.4 CONSTRUCTION HOURS

### *Works within the Recommended Standard Hours*

Confining construction activities (including the delivery of plant and equipment) to the recommended standard hours for construction wherever feasible and reasonable helps reduce impacts by limiting potentially noisy construction activities to the daytime, when background noise levels are higher, and by providing respite from construction noise during the evening, overnight and on weekends.

It is recommended that construction works should be limited as far as possible to the recommended standards hours for construction, these are Monday to Friday 7am to 6pm; Saturday 8am to 1pm; and no work on Sundays or public holidays.

It is recommended that respite periods (especially for high noise generating works or activities such as sheet piling) should be considered during the detailed design of the construction methodology as per the requirements of the CNVS.

Despite this limitation and respite works within the standard hours will require additional mitigation measures, refer **Section 6.5**.

### *Works outside the Recommended Standard Hours*

Works outside the recommended hours for construction will be required due to the NCW project's proximity to an operational rail network; to maintain a safe working environment and minimise disruption to commuters.

Any works that become necessary outside the standard hours should be justified and additional mitigation measures (refer **Section 6.5**) implemented to reduce noise impacts to acceptable levels.

In addition, an out-of-hours work application should be completed for all applicable works and activities in accordance Section 5.2 of the CNVS.

It is recommended that respite periods (especially for high noise generating works or activities during the night time) should be considered during the detailed design of the construction methodology as per the requirements of the CNVS.

The assessment has identified that works undertaken inside the recommended standard hours for construction will generate potentially intrusive noise emissions with the potential to exceed the Noise Affected Management Levels.

Section 8 of the CNVS identifies a method by which additional mitigation measures may be considered and developed depending on the extent of the exceedance and comparison to existing background LA90 noise levels, as summarised in **Section 4.5** and reproduced in **Table 4.10** of this CNVIS. This method is the basis of the construction noise assessment and the recommendations provided here.

It is recommended that additional mitigation measures be developed for works within the recommended standard hours for construction as per the requirements of the CNVS and informed by the results presented in **Table 5.1** to **Table 5.14** and **Annex D**.

It is recommended that additional measures should be developed for works outside the recommended standard hours for construction as per the requirements of the CNVS and informed by the results presented in **Table 5.1** to **Table 5.14** and **Annex D**. These measures should consider the potential for sleep disturbance impacts that could occur during the night time period due to peak or maximum noise level events.

Any additional measures deemed necessary should be considered, evaluated and addressed during the preparation of the CNVMP required for the NCW project, prior to works commencing and in any subsequent out-of-hours work applications.

#### *Extent of Additional Mitigation*

The locations at which additional mitigation measures should be implemented will vary within for each phase of work. Not all receptors will qualify for the same level of mitigation, and some receptors do not require further consideration for any additional mitigation measures.

The additional mitigation is generally limited to the closest buildings (e.g. NCA01) situated in the vicinity of the NCW project, as identified in the results presented in **Table 5.1** to **Table 5.14** and **Annex D**. Furthermore, the additional mitigation established in this circumstance is only required for residential receptors.

Therefore, it is recommended that the type and extent of any additional mitigation measures be established in accordance with the requirements of the CNVS but evaluated in the context of the broader community consultation program i.e. in conjunction with community and stakeholder consultation and notification processes. Furthermore, these measures should be validated

during the preparation of the CNVMP (and any subsequent out-of-hours work applications) and confirmed to be suitable and effective during works.

## 6.6 *MAXIMUM LEVELS FOR PLANT AND EQUIPMENT*

It is recommended that plant, equipment and machinery noise levels should not exceed the maximum allowable noise levels for construction equipment presented in Table 11 of the CNVS or those presented in this report, whichever is the lowest value. This will insure that noise levels above those predicted here do not occur.

Where values lower than those modelled are achieved a noise level reduction to the predicted values presented in this report will occur. For example, if equipment is selected so that an overall reduction of 10 dBA is achieved, then noise levels at nearby receptors will also reduce by approximately 10 dBA.

### *Safe Working Distances for Vibration*

It is recommended that the safe working distances for vibration intensive activities be applied to all works undertaken as part of the project, as far as practicable.

Importantly, where vibration intensive works are undertaken within 25m of a residential (dwelling) receptor, monitoring of off-site vibration should be conducted to determine if vibration levels are perceptible. If they are not perceptible, then no further action is required. If they are perceptible, then the management, source control and path control measures applicable to ground-borne vibration, or respite periods, should be implemented.

## 6.7 *NOISE AND VIBRATION MONITORING REQUIREMENTS*

A noise monitoring program is to be carried out for the duration of the works in accordance with the requirements specified in the CNVMP prepared for the NCW project, and any approval and licence conditions.

The methodology for any construction monitoring should be determined by a suitably qualified acoustics engineer, the findings of this CNVIS should inform the monitoring locations and frequency, amongst other key features.

Monitoring for NCW works should be implemented at the commencement of works and at regular intervals throughout the project (i.e. when new construction activities commence) to quantify the airborne noise, ground-borne noise and vibration levels associated with construction activities. Monitoring would also be required in the event of a complaint being received and should be conducted at the most affected receptor in accordance with Appendix A of the CNVS.

Attended measurements should be the focus of all noise monitoring however unattended noise (and vibration) monitoring may be undertaken where specific circumstances warrant. Any noise monitoring that is undertaken should compare the measured site noise level contributions, determined in the absence of any influential source not associated with the NCW project to the predicted noise levels presented in this CNVIS. Operator attended noise measurements are preferred (due to the influence of existing ambient noise sources) and are to be undertaken to confirm that the actual measured noise levels are consistent with the predictions in this CNVIS.

Attended noise measurements are recommended at the potentially most affected receptor(s) from the commencement of construction activities to confirm that the noise levels in the adjacent community are consistent with the predictions this CNVIS. Other potentially affected receptors should also be considered as part of the monitoring regime depending on the phase of works.

At this stage noise monitoring should be targeted at the commencement of each new construction activity/phase of work to verify the predicted noise levels. Continued monitoring of work phases and activities would then be considered on a case by case basis.

Vibration monitoring is recommended at the commencement of vibration generating activities to confirm that vibration levels satisfy the criteria for that vibration generating activity. Where there is potential for exceedances of the criteria, further vibration site law investigations would be undertaken to determine the site-specific safe working distances for that vibration generating activity.

Continuous vibration monitoring (attended or unattended with audible and visible alarms) should be conducted at the nearest sensitive receivers whenever vibration generating activities need to take place inside the calculated safe-working distances. At this stage vibration monitoring should be targeted to SCN03a with monitoring of other work phases and activities being considered on a case by case basis (i.e. if vibration generating activities are required).



## CONCLUSION

ERM was engaged by LOR to complete a CNIVS for construction aspects of the project as part of the Main North and North Shore Corridor Works Project (MNNSCW), Portion 7 - Northern Corridor Works (NCW). The assessment was conducted to achieve a scope of works that allowed for the successful identification of potential receptors situated in the vicinity of site emission sources and identification of significant noise and vibration generating plant, equipment and/or activities associated with the NCW and their likely/known emissions.

ERM quantified existing ambient and background noise levels in the area and developed noise and vibration criteria in accordance with recognised NSW standards and guidelines as applicable to the NCW activities, and developed applicable assessment scenarios.

ERM qualitatively assessed potential impacts associated with construction road traffic noise, vibration and ground-borne noise; no impacts are anticipated. A quantitative construction noise and vibration impact assessment was then conducted by predicting noise levels via modelling and by estimating vibration levels. The predictions were conducted for applicable assessment scenarios. Resultant noise and vibration levels were then compared to project-specific criteria or management levels at each receptor location and any exceedances identified.

The highest predicted results and findings are presented in **Section 5** of this CNVIS. The full set of results and findings are presented in **Annex D**. Although a number of exceedances are identified, these are associated with predicted 15 minute noise values calculated via modelling for the purposes of the assessment, in accordance with the ICNG and the CNVS. These values do not represent a constant noise emission that would be experienced by the community on a daily basis throughout the NCW project.

Based on these findings ERM has recommended noise and vibration mitigation, management measures and/or monitoring options suitable to the significance of the predicted impacts and designed to minimise impacts as far as is feasible and reasonable.

Construction noise and vibration levels will be reduced and impacts minimised with the successful implementation of the recommendations provided in **Section 6** of this report. Impacts may not be reduced to negligible levels for all receptors during all construction activities; however the recommendations presented here will ensure that any residual impacts are minimised as far as is practically achievable. These recommendations will need to be implemented in conjunction with community and stakeholder consultation and notification processes. ERM makes no additional recommendations to those established by the findings of this noise and vibration assessment, and documented in this report.

## **REFERENCES**

British Standard - BS5228-2:2009+A1:2014 (BS5228) - **Code of Practice for Noise and Vibration Control on Construction and Open Sites - Part 2: Vibration**;

British Standard (BS 6472-1992) - **Evaluation of Human Exposure to Vibration in Buildings (1 Hz to 80 Hz)** dated 1992;

British Standard BS7385: Part 2-1993 (BS 7385) - **Evaluation and Measurement for Vibration in Buildings – Part 2 - Guide to Damage Levels from Ground-borne Vibration**, dated 1993;

German Institute for Standardisation - DIN 4150 (1999-02) Part 3 (DIN4150:3) - **Structural Vibration - Effects of Vibration on Structures**, dated 1999;

International Organisation for Standardisation (ISO) 9613-2:1996 (ISO9613:2) - **Acoustics - Attenuation of Sound during Propagation Outdoors - Part 2: General Method of Calculation**;

NSW Department of Environment and Climate Change - **NSW Interim Construction Noise Guideline (ICNG)**, July 2009;

NSW Department of Environment and Conservation - **NSW Environmental Noise Management - Assessing Vibration: a Technical Guideline** (the NSW Vibration Guideline), February 2006;

NSW Department of Environment, Climate Change and Water - **NSW Road Noise Policy (RNP)**, March 2011;

NSW Environment Protection Authority - **NSW Environmental Noise Management - Industrial Noise Policy (INP)**, January 2000 and relevant application notes;

NSW Government - **Sydney Metro Construction Noise and Vibration Strategy (CNVS)**, August 2017;

NSW Government - Transport for NSW (TfNSW) **Construction Noise Strategy (7TP-ST-157/3.0 or CNS)**, dated July 2016;

Standards Australia AS1055-1997<sup>TM</sup> (AS1055) - **Description and Measurement of Environmental Noise**;

Standards Australia AS 2436-2010<sup>TM</sup> (AS2436) - **Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites**;

TfNSW - Sydney Metro - Chatswood to Sydenham **Business Management Plan - Early Works**, dated November 2017;

TfNSW - Sydney Metro - Chatswood to Sydenham **Community Communications Strategy** - Early Works, dated October 2017;

TfNSW - Sydney Metro - Chatswood to Sydenham **Construction Environmental Management Framework (CEMF)** - Appendix B of SPIR, dated August 2016;

TfNSW - Sydney Metro - Chatswood to Sydenham **Environmental Impact Statement (EIS) - Chapter 10: Construction Noise and Vibration**, dated May 2016;

TfNSW - Sydney Metro - Chatswood to Sydenham **Environmental Impact Statement (EIS) - Technical Paper 2 Noise and Vibration**, Prepared by SLR, dated April 2016;

TfNSW - Sydney Metro - Chatswood to Sydenham **Overarching Community Communications Strategy**, dated September 2017; and

TfNSW - Sydney Metro - Chatswood to Sydenham **Small Business Owners Support Program**, dated September 2017.

Annex A

## Acoustics Glossary

## **A.1**            **GLOSSARY – ACOUSTICAL CONCEPTS AND TERMINOLOGY**

### **A.1.1**           ***What Is Noise And Vibration?***

#### *Noise*

Noise is often defined as a sound, especially one that is loud or unpleasant or that causes disturbance<sup>1</sup> or simply as unwanted sound, but technically, noise is the perception of a series of compressions and rarefactions above and below normal atmospheric pressure.

#### *Vibration*

Vibration refers to the oscillating movement of any object. In a sense noise is the movement of air particles and is essentially vibration, though in regards to an environmental assessment vibration is typically taken to refer to the oscillation of a solid object(s). The impact of noise on objects can lead to vibration of the object, or vibration can be experienced by direct transmission through the ground, this is known as ground-borne vibration.

Essentially, noise can be described as what a person hears, and vibration as what they feel.

### **A.1.1**           ***What Factors Contribute To Environmental Noise?***

The noise from an activity, like construction works, at any location can be affected by a number of factors, the most significant being:

- how loud the activity is;
- how far away the activity is from the receiver;
- what type of ground is between the activity and the receiver location e.g. concrete, grass, water or sand;
- how the ground topography varies between the activity and the receiver (is it flat, hilly, mountainous) as blocking the line of sight to a noise source will generally reduce the level of noise; and
- any other obstacles that block the line of sight between the source to receiver e.g. buildings or purpose built noise walls.

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<sup>1</sup> Copyright © 2011 Oxford University Press

### **A.1.2**      *How to Measure and Describe Noise?*

Noise is measured using a specially designed 'sound level' meter which must meet internationally recognised performance standards. Audible sound pressure levels vary across a range of  $10^7$  Pascals (Pa), from the threshold of hearing at  $20\mu\text{Pa}$  to the threshold of pain at  $200\text{Pa}$ . Scientists have defined a statistically described logarithmic scale called Decibels (dB) to more manageably describe noise.

To demonstrate how this scale works, the following points give an indication of how the noise levels and differences are perceived by an average person:

- 0 dB - represents the threshold of human hearing (for a young person with ears in good condition).
- 50 dB - represents average conversation.
- 70 dB - represents average street noise, local traffic etc.
- 90 dB - represents the noise inside an industrial premises or factory.
- 140 dB - represents the threshold of pain - the point at which permanent hearing damage may occur.

### **A.1.3**      *Human Response to Changes in Noise Levels*

The following concepts offer qualitative guidance in respect of the average response to changes in noise levels:

- Differences in noise levels of less than approximately 2 dBA are generally imperceptible in practice. An increase of 2 dB is hardly perceivable.
- Differences in noise levels of around 5 dBA are considered to be significant.
- Differences in noise levels of around 10 dBA are generally perceived to be a doubling (or halving) of the perceived loudness of the noise. An increase of 10 dB is perceived as twice as loud. Therefore an increase of 20 dB is four times as loud and an increase of 30 dB is eight times as loud etc.
- The addition of two identical noise levels will increase the dB level by about 3 dB. For example, if one car is idling at 40 dB and then another identical car starts idling next to it, the total dB level will be about 43 dB.
- The addition of a second noise level of similar character which is at least 8 dB lower than the existing noise level will not add significantly to the overall dB level.
- A doubling of the distance between a noise source and a receiver results approximately in a 3 dB decrease for a line source (for example, vehicles

travelling on a road); and a 6 dB decrease for a point source (for example, the idling car discussed above). A doubling of traffic volume for a line source results approximately in a 3 dB increase in noise, halving the traffic volume for a line source results approximately in a 3 dB decrease in noise.

#### **A.1.4** *Terms to Describe the Perception of Noise*

The following terms offer quantitative and qualitative guidance in respect of the audibility of a noise source:

- **Inaudible / Not Audible** - the noise source and/or event could not be heard by the operator, masked by extraneous noise sources not associated with the source. If a noise source is 'inaudible' its noise level may be quantified as being less than the measured LA90 background noise level, potentially by 10 dB or greater.
- **Barely Audible** - the noise source and/or event are difficult to define by the operator, typically masked by extraneous noise sources not associated with the source. If a source is 'barely audible' its noise level may be quantified as being 5 - 7 dB below the measured LA90 or LAeq noise level, depending on the nature of the source e.g. constant or intermittent.
- **Just Audible** - the noise source and/or event may be defined by the operator. However there are a number of extraneous noise sources contributing to the measurement. The noise level should be quantified based on instantaneous noise level contributions, noted by the operator.
- **Audible** - the noise source and/or event may be easily defined by the operator. There may be a number of extraneous noise sources contributing to the measurement. The noise level should be quantified based on instantaneous noise level contributions, noted by the operator.
- **Dominant** - the noise source and/or event are noted by the operator to be significantly 'louder' than all other noise sources. The noise level should be quantified based on instantaneous noise level contributions, noted by the operator.

The following terms offer qualitative guidance in respect of acoustic terms used to describe the frequency of occurrence of a noise source during an operator attended environmental noise measurements:

- **Constant** - this indicates that the operator has noted the noise source(s) and/or event to be constantly audible for the duration of the noise measurement e.g. an air-conditioner that runs constantly during the measurement.
- **Intermittent** - this indicates that the operator has noted the noise source(s) and/or event to be audible, stopping and starting intervals for the duration of the noise measurement e.g. car pass-bys.

- **Infrequent** – this indicates that the operator has noted the noise source(s) and/or event to be constantly audible, however; not occurring regularly or at intervals for the duration of the noise measurement e.g. a small number of aircraft are noted during the measurement.

#### **A.1.5**      *How to Calculate or Model Noise Levels?*

There are two recognised methods which are commonly adopted to determine the noise at particular location from a proposed activity. The first is to undertake noise measurements whilst the activity is in progress and measure the noise, the second is to calculate the noise based on known noise emission data for the activity in question.

The second option is preferred as the first option is largely impractical in terms of cost and time constraints, notwithstanding the meteorological factors that may also influence its quantification. Furthermore, it is also generally considered unacceptable to create an environmental impact simply to measure it. In addition, the most effective mitigation measures are determined and implemented during the design phase and often cannot be readily applied during or after the implementation phase of a project.

Because a number of factors can affect how ‘loud’ a noise is at a certain location, the calculations can be very complex. The influence of other ambient sources and the contribution from a particular source in question can be difficult to ascertain. To avoid these issues, and to quantify the direct noise contribution from a source/site in question, the noise level is often calculated using noise modelling software packages. The noise emission data used in may be obtained from the manufacturer or from ERM’s database of measured noise emissions.

#### **A.1.6**      *Acoustic Terminology & Statistical Noise Descriptors*

Environmental noise levels such as noise generated by industry, construction and road traffic are commonly expressed in dBA. The A-weighting scale follows the average human hearing response and enables comparison of the intensity of noise with different frequency characteristics. Time varying noise sources are often described in terms of statistical noise descriptors. The following descriptors are commonly used when assessing noise and are referred to throughout this acoustic assessment:

- **Decibel (dB is the adopted abbreviation for the decibel)** – The unit used to describe sound levels and noise exposure. It is equivalent to 10 times the logarithm (to base 10) of the ratio of a given sound pressure to a reference pressure.
- **dBA** - unit used to measure ‘A-weighted’ sound pressure levels. A-weighting is an adjustment made to sound-level measurement to approximate the response of the human ear.
- **dBC** - unit used to measure ‘C-weighted’ sound pressure levels. C-weighting is an adjustment made to sound-level measurements



which takes account of low-frequency components of noise within the audibility range of humans.

- **dBZ or dBL** - unit used to measure 'Z-weighted' sound pressure levels with no weighting applied, linear.
- **Hertz (Hz)** - the measure of frequency of sound wave oscillations per second. 1 oscillation per second equals 1 hertz.
- **Octave** - a division of the frequency range into bands, the upper frequency limit.
- **1/3 Octave** - single octave bands divided into three parts.
- **Leq** - this level represents the equivalent or average noise energy during a measurement period. The  $L_{eq, 15min}$  noise descriptor simply refers to the  $L_{eq}$  noise level calculated over a 15 minute period. Indeed, any of the below noise descriptors may be defined in this way, with an accompanying time period (e.g.  $L_{10, 15\text{ minute}}$ ) as required.
- **Lmax** - the absolute maximum noise level in a noise sample.
- **LN** - the percentile sound pressure level exceeded for N% of the measurement period calculated by statistical analysis.
- **L10** - the noise level exceeded for 10 per cent of the time and is approximately the average of the maximum noise levels.
- **L90** - the noise level exceeded for 90 per cent of the time and is approximately the average of the minimum noise levels. The L90 level is often referred to as the "background" noise level and is commonly used as a basis for determining noise criteria for assessment purposes.
- **Sound Power Level (Lw)** - this is a measure of the total power radiated by a source. The Sound Power of a source is a fundamental property of the source and is independent of the surrounding environment.
- **Sound Pressure Level (Lp)** - the level of sound pressure; as measured at a distance by a standard sound level meter with a microphone. This differs from  $L_w$  in that this is the received sound as opposed to the sound 'intensity' at the source.
- **Background noise** - the underlying level of noise present in the ambient noise, excluding the noise source under investigation, when extraneous noise is removed. This is described using the  $L_{A90}$  descriptor.
- **Ambient noise** - the all-encompassing noise associated within a given environment. It is the composite of sounds from many sources, both near and far. This is described using the  $L_{Aeq}$  descriptor.

- **Cognitive noise** - noise in which the source is recognised as being annoying.
- **Masking** - the phenomenon of one sound interfering with the perception of another sound. For example, the interference of traffic noise with use of a public telephone on a busy street.

*Industrial Noise Policy (INP) Terminology*

The following terminology is from the NSW Environment Protection Authority - *NSW Environmental Noise Management - Industrial Noise Policy (INP)*, January 2000 and relevant application notes:

- **Assessment Background Level (ABL)** - is defined in the INP as a single figure background level representing each assessment period (day, evening and night). Its determination is by the tenth percentile method (of the measured LA90 statistical noise levels) described in Appendix B on the INP.
- **Rating Background Level (RBL)** - is defined in the INP as the overall single figure background level representing each assessment period (day, evening and night) over the whole monitoring period (as opposed to over each 24 hour period used for the ABL). This is the level used for assessment purposes. It is defined as the median value of:
  - all the day assessment background levels over the monitoring period for the day;
  - all the evening assessment background levels over the monitoring period for the evening; or
  - all the night assessment background levels over the monitoring period for the night.
- **Extraneous noise** - noise resulting from activities that are not typical of the area. Atypical INP activities may include construction, and traffic generated by holiday periods and by special events such as concerts or sporting events. Normal daily traffic is not considered to be extraneous.
- **Most affected location(s)** - locations that experience (or will experience) the greatest noise impact from the noise source under consideration. In determining these locations, one needs to consider existing background levels, exact noise source location(s), distance from source (or proposed source) to receiver, and any shielding between source and receiver.
- **Noise criteria** - the general set of non-mandatory noise level targets for protecting against intrusive noise (for example, background noise plus 5 dB) and loss of amenity (for example, noise levels for various land uses).
- **Noise limits** - enforceable noise levels that appear in conditions on consents and licences. The noise limits are based on achievable noise levels which the proponent has predicted can be met during the environmental

assessment. Exceedance of the noise limits can result in the requirement for either the development of noise management plans or legal action.

- **Project Specific Noise Levels** – target noise levels for a particular noise generating facility. They are based on the most stringent of the intrusive criteria or amenity criteria. Which of the two criteria is the most stringent is determined by measuring the level and nature of existing noise in the area surrounding the actual or propose noise generating facility.
- **Compliance** – the process of checking that source noise levels meet with the noise limits in a statutory context.
- **Non-compliance** – development is deemed to be in non-compliance with its noise consent/ licence conditions if the monitored noise levels exceed its statutory noise limit by more than 2 dB.
- **Feasible and Reasonable measures** – feasibility relates to engineering considerations and what is practical to build; reasonableness relates to the application of judgement in arriving at a decision, taking into account the following factors:
  - noise mitigation benefits (amount of noise reduction provided, number of people protected);
  - cost of mitigation (cost of mitigation versus benefit provided);
  - community views (aesthetic impacts and community wishes); and
  - noise levels for affected land uses (existing and future levels, and changes in noise levels).
- **Meteorological Conditions** – wind and temperature inversion conditions.
- **Temperature Inversion** – an atmospheric condition in which temperature increases with height above the ground.
- **Adverse Weather** – weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).

## *A.1 VIBRATION - GLOSSARY OF TERMS, DEFINITIONS AND METHODOLOGY*

### *A.1.1 How to Measure and Control Vibration*

Vibration refers to the oscillating movement of any object. In relation to construction projects, ground-borne vibration is the most likely outcome of works and potentially has three (3) effects on vibration sensitive receivers, these are:

- Ground-borne vibration that may cause annoyance;
- Ground-borne vibration that may have adverse effect on a structure e.g. a building; and
- Regenerated noise due to ground-borne vibration.

Each of these potential effects can be assessed in accordance with the relevant standard. Perceptible levels of vibration often create concern for the surrounding community at levels well below structural damage guideline values; this issue needs to be managed as part of the vibration monitoring program.

Vibration is typically measured using specific devices that record the velocity or acceleration at a designated receiver location – usually being the closest premises to works. Modern vibration monitoring devices will typically capture amplitude data for the three (3) orthogonal axes being, the transverse, longitudinal and vertical and also the frequency at which the measured vibration event occurs.

Monitoring of this level of detail enables analysis of significant vibration events to determine compliance with relevant guidelines such as the NSW Department of Environment and Conservation – NSW Environmental Noise Management – *Assessing Vibration: a Technical Guideline* (the NSW vibration guideline), February 2006 and the German Institute for Standardisation – DIN 4150 (1999-02) Part 3 (DIN4150-3) – *Structural Vibration - Effects of Vibration on Structures*.

Vibration propagates in a different manner to noise and can be difficult to control depending on the frequency of the source in question, although identifying the strategy best suited to controlling vibration follows a similar approach to that of noise. This includes elimination, control at the source, control along the propagation path and control at the receiver and/or a combination of these, such as no work/respite periods.

### **A.1.2**      *Vibration Descriptors*

The following terms are often used to describe measured vibration levels.

- **Parameter** – an attribute with a value - for example, weighting;
- **Particle Velocity** – the instantaneous value of the distance travelled by a particle per unit time in a medium that is displaced from its equilibrium state by the passage of a sound or vibration wave;
- **Peak Component Particle Velocity (PCPV)** – is the highest (maximum or peak) particle velocity which is recorded during a particular vibration event over the three (3) axes. PCPV is measured in the unit, mm/s;
- **Phase** – the relative position of a sound wave to some reference point, the phase of a wave is given in radians, degrees, or fractions of a wavelength;

- **Acceleration** - the change in velocity over time. Acceleration is dependent on the velocity and the frequency of the vibration event (velocity is a vector), as such acceleration changes in two ways - magnitude and/or direction. Acceleration is measured in the unit; m/s<sup>2</sup>;
- **Perceptible** - vibration levels that a receiver of building occupant may 'feel'. 0.2mm/s is typically considered to be the human threshold for perception of vibration;
- **Geophone or accelerometer** - the transducer/device typically used to measure vibration;
- **Damage** - is defined in DIN 4150-3 to include minor non-structural effects such as cosmetic damage or superficial cracking in paint or cement render, the enlargement of cracks already present, and the separation of partitions or intermediate walls from load bearing walls;
- **Vibration Dose Value (VDV)** - a concept outlined in the NSW vibration guideline, which is a calculative approach to assessing the impact of intermittent vibration or extended periods of impulsive vibration. VDV require the measurement of the overall weighted RMS (Root Mean Square) acceleration levels over the frequency range 1Hz to 80Hz. To calculate VDV the following formula (refer Section 2.4.1 of the guideline) is used:

$$VDV = \left[ \int_0^T a^4(t) dt \right]^{0.25}$$

Where VDV is the vibration dose value in m/s<sup>1.75</sup>,  $a(t)$  is the frequency-weighted RMS of acceleration in m/s<sup>2</sup> and  $T$  is the total period of the day (in seconds) during which vibration may occur;

- **MIC** - Maximum Instantaneous Charge or explosive charge mass (kg) detonated per delay (any 8ms interval); and
- **SD (m)** - The scaled distance for air-blast and ground vibration from the charge to the receiver.

Annex B

## Potentially Sensitive Receptors

**Table B.1 Potentially Sensitive Receptors**

| ID    | Description       | GPS Co-ordinates (Zone 56H) |            |
|-------|-------------------|-----------------------------|------------|
|       |                   | Easting                     | Northing   |
| R.001 | NCA03_Residential | 331644.72                   | 6259245.97 |
| R.002 | NCA03_Residential | 331599.74                   | 6259228.51 |
| R.003 | NCA03_Residential | 331654.12                   | 6259207.94 |
| R.004 | NCA03_Residential | 331559.12                   | 6259204.51 |
| R.005 | NCA03_Commercial  | 331495.91                   | 6259196.2  |
| R.006 | NCA03_Residential | 331634.95                   | 6259191.33 |
| R.007 | NCA03_Residential | 331658.52                   | 6259187.5  |
| R.008 | NCA03_Residential | 331601.91                   | 6259179.71 |
| R.009 | NCA03_Commercial  | 331483.78                   | 6259178.3  |
| R.010 | NCA03_Residential | 331656.7                    | 6259165.07 |
| R.011 | NCA03_Residential | 331636                      | 6259151.18 |
| R.012 | NCA03_Residential | 331602.99                   | 6259139.6  |
| R.013 | NCA03_Residential | 331582.34                   | 6259138.14 |
| R.014 | NCA03_Residential | 331720.83                   | 6259119.06 |
| R.015 | NCA03_Commercial  | 331515.71                   | 6259115.61 |
| R.016 | NCA03_Residential | 331640.94                   | 6259101.11 |
| R.017 | NCA03_Commercial  | 331454.73                   | 6259092.41 |
| R.018 | NCA03_Residential | 331690.32                   | 6259088.03 |
| R.019 | NCA03_Commercial  | 331606.85                   | 6259087.61 |
| R.020 | NCA03_Commercial  | 331358.49                   | 6259083.51 |
| R.021 | NCA03_Residential | 331674.51                   | 6259082.69 |
| R.022 | NCA03_Residential | 331647.99                   | 6259072.91 |
| R.023 | NCA03_Residential | 331708.52                   | 6259071.4  |
| R.024 | NCA03_Commercial  | 331533.54                   | 6259070.19 |
| R.025 | NCA03_Commercial  | 331507.14                   | 6259060.67 |
| R.026 | NCA03_Residential | 331647.38                   | 6259047.11 |
| R.027 | NCA03_Commercial  | 331343.96                   | 6259043.22 |
| R.028 | NCA03_Residential | 331585.63                   | 6259042.83 |
| R.029 | NCA03_Commercial  | 331533.78                   | 6259036.41 |
| R.030 | NCA03_Commercial  | 331757.71                   | 6259028.11 |
| R.031 | NCA03_Commercial  | 331469.22                   | 6259023.95 |
| R.032 | NCA03_Commercial  | 331715.9                    | 6259011.59 |
| R.033 | NCA03_Commercial  | 331431.76                   | 6259010.89 |
| R.034 | NCA03_Commercial  | 331327.36                   | 6259004.7  |
| R.035 | NCA03_Commercial  | 331537.34                   | 6258992.47 |
| R.036 | NCA03_Commercial  | 331406.21                   | 6258990.76 |
| R.037 | NCA03_Commercial  | 331645.14                   | 6258985.6  |
| R.038 | NCA03_Commercial  | 331592.73                   | 6258976.43 |
| R.039 | NCA03_Commercial  | 331896.52                   | 6258973.09 |
| R.040 | NCA03_Commercial  | 331387.53                   | 6258971.9  |
| R.041 | NCA03_Commercial  | 331503.89                   | 6258965.85 |
| R.042 | NCA03_Commercial  | 331786.57                   | 6258962.5  |
| R.043 | NCA03_Commercial  | 331866.66                   | 6258960.29 |
| R.044 | NCA03_Commercial  | 331533.01                   | 6258940.84 |
| R.045 | NCA03_Commercial  | 331773.23                   | 6258935.76 |
| R.046 | NCA03_Commercial  | 331821.3                    | 6258930.38 |

**GPS Co-ordinates (Zone 56H)**

| <b>ID</b> | <b>Description</b> | <b>Easting</b> | <b>Northing</b> |
|-----------|--------------------|----------------|-----------------|
| R.047     | NCA03_Commercial   | 331312.16      | 6258930.23      |
| R.048     | NCA03_Commercial   | 331695.13      | 6258924.53      |
| R.049     | NCA03_Commercial   | 331587.35      | 6258920.72      |
| R.050     | NCA03_Commercial   | 331466.04      | 6258918.36      |
| R.051     | NCA03_Commercial   | 331847.09      | 6258916.54      |
| R.052     | NCA03_Commercial   | 331646.4       | 6258908.67      |
| R.053     | NCA03_Commercial   | 331427.99      | 6258904.46      |
| R.054     | NCA03_Commercial   | 331701.28      | 6258902.45      |
| R.055     | NCA03_Commercial   | 331736.56      | 6258898         |
| R.056     | NCA03_Commercial   | 331675.29      | 6258892.18      |
| R.057     | NCA03_Commercial   | 331588.3       | 6258881.16      |
| R.058     | NCA03_Commercial   | 331373.52      | 6258881.01      |
| R.059     | NCA03_Commercial   | 331540.75      | 6258862.45      |
| R.060     | NCA03_Commercial   | 331868.1       | 6258861.83      |
| R.061     | NCA03_Commercial   | 331734.25      | 6258858.25      |
| R.062     | NCA03_Commercial   | 331528.5       | 6258857.31      |
| R.063     | NCA03_Commercial   | 331660.8       | 6258851.98      |
| R.064     | NCA03_Commercial   | 331754.98      | 6258851.07      |
| R.065     | NCA03_Commercial   | 331497.52      | 6258845.22      |
| R.066     | NCA03_Commercial   | 331424.53      | 6258838.85      |
| R.067     | NCA03_Commercial   | 331967.16      | 6258832.36      |
| R.068     | NCA03_Commercial   | 331641.32      | 6258828.65      |
| R.069     | NCA03_Commercial   | 331572.06      | 6258825.33      |
| R.070     | NCA03_Commercial   | 331718.19      | 6258821.53      |
| R.071     | NCA03_Commercial   | 331413.76      | 6258812.87      |
| R.072     | NCA03_Commercial   | 331403.75      | 6258809.18      |
| R.073     | NCA03_Commercial   | 331528.33      | 6258808.82      |
| R.074     | NCA03_Commercial   | 331386.85      | 6258804.38      |
| R.075     | NCA03_Commercial   | 331898.3       | 6258802.73      |
| R.076     | NCA03_Commercial   | 331674.98      | 6258799.42      |
| R.077     | NCA03_Commercial   | 331596.01      | 6258789.4       |
| R.078     | NCA03_Commercial   | 331648.51      | 6258789.04      |
| R.079     | NCA03_Commercial   | 331692.47      | 6258788.9       |
| R.080     | NCA03_Commercial   | 331582.63      | 6258781.57      |
| R.081     | NCA03_Commercial   | 331830.23      | 6258776.77      |
| R.082     | NCA03_Commercial   | 331463.81      | 6258771.73      |
| R.083     | NCA03_Commercial   | 331552.91      | 6258766.25      |
| R.084     | NCA03_Commercial   | 331415.2       | 6258762.38      |
| R.085     | NCA03_Commercial   | 331523.1       | 6258757.3       |
| R.086     | NCA03_Commercial   | 331507.6       | 6258751         |
| R.087     | NCA03_Commercial   | 331470.12      | 6258738.04      |
| R.088     | NCA03_Commercial   | 331666.32      | 6258734.68      |
| R.089     | NCA03_Commercial   | 331709.5       | 6258726.57      |
| R.090     | NCA03_Commercial   | 331582.06      | 6258721.42      |
| R.091     | NCA03_Commercial   | 331562.57      | 6258717.42      |
| R.092     | NCA03_Commercial   | 331423.17      | 6258716.7       |



**GPS Co-ordinates (Zone 56H)**

| <b>ID</b> | <b>Description</b> | <b>Easting</b> | <b>Northing</b> |
|-----------|--------------------|----------------|-----------------|
| R.093     | NCA04_Commercial   | 331809.33      | 6258716.2       |
| R.094     | NCA04_Commercial   | 331775.54      | 6258703.98      |
| R.095     | NCA01_Commercial   | 331720.48      | 6258702.01      |
| R.096     | NCA03_Commercial   | 331581.25      | 6258699.32      |
| R.097     | NCA03_Commercial   | 331493.27      | 6258690.44      |
| R.098     | NCA01_Commercial   | 331531.6       | 6258687.45      |
| R.099     | NCA03_Commercial   | 331469.67      | 6258711.33      |
| R.100     | NCA02_Commercial   | 331445.17      | 6258676.95      |
| R.101     | NCA03_Commercial   | 331456.13      | 6258705.92      |
| R.102     | NCA01_Residential  | 331730.63      | 6258667.45      |
| R.103     | NCA02_Commercial   | 331450.64      | 6258664.22      |
| R.104     | NCA01_Commercial   | 331545.59      | 6258662.97      |
| R.105     | NCA01_Commercial   | 331517.61      | 6258650.98      |
| R.106     | NCA02_Commercial   | 331457.8       | 6258647.48      |
| R.107     | NCA01_Educational  | 331739.97      | 6258642.97      |
| R.108     | NCA01_Residential  | 331589.3       | 6258638.02      |
| R.109     | NCA04_Residential  | 331780.12      | 6258635.48      |
| R.110     | NCA01_Commercial   | 331462.66      | 6258629         |
| R.111     | NCA01_Residential  | 331755.07      | 6258621.35      |
| R.112     | NCA01_Residential  | 331569.19      | 6258616.97      |
| R.113     | NCA01_Residential  | 331519.17      | 6258601.32      |
| R.114     | NCA01_Residential  | 331590.8       | 6258601.1       |
| R.115     | NCA01_Residential  | 331476.71      | 6258600.56      |
| R.116     | NCA01_Residential  | 331551.86      | 6258599.28      |
| R.117     | NCA01_Recreational | 331638.65      | 6258595.71      |
| R.118     | NCA02_Commercial   | 331417.04      | 6258589.24      |
| R.119     | NCA01_Residential  | 331485.57      | 6258576.55      |
| R.120     | NCA02_Residential  | 331278.01      | 6258572.03      |
| R.121     | NCA04_Residential  | 331770.88      | 6258563.76      |
| R.122     | NCA01_Residential  | 331592.85      | 6258557.68      |
| R.123     | NCA01_Residential  | 331495.48      | 6258557.64      |
| R.124     | NCA01_Recreational | 331634.66      | 6258548.49      |
| R.125     | NCA01_Recreational | 331695.82      | 6258544.37      |
| R.126     | NCA01_Residential  | 331543.83      | 6258544.34      |
| R.127     | NCA01_Recreational | 331634.84      | 6258530.73      |
| R.128     | NCA01_Residential  | 331584.56      | 6258527.4       |
| R.129     | NCA04_Residential  | 331809.21      | 6258504.14      |
| R.130     | NCA04_Residential  | 331865.42      | 6258503.8       |
| R.131     | NCA04_Residential  | 331771.53      | 6258501.29      |
| R.132     | NCA01_Residential  | 331499.02      | 6258497.55      |
| R.133     | NCA01_Residential  | 331525.93      | 6258486.46      |
| R.134     | NCA01_Recreational | 331590.78      | 6258475.52      |
| R.135     | NCA02_Residential  | 331461.22      | 6258457.11      |
| R.136     | NCA01_Residential  | 331535.48      | 6258457.02      |
| R.137     | NCA01_Residential  | 331715.56      | 6258443.03      |
| R.138     | NCA01_Residential  | 331537.04      | 6258442.07      |

**GPS Co-ordinates (Zone 56H)**

| <b>ID</b> | <b>Description</b> | <b>Easting</b> | <b>Northing</b> |
|-----------|--------------------|----------------|-----------------|
| R.139     | NCA02_Residential  | 331324.35      | 6258440.28      |
| R.140     | NCA01_Residential  | 331539.22      | 6258429.29      |
| R.141     | NCA01_Residential  | 331676.45      | 6258422.61      |
| R.142     | NCA01_Residential  | 331540.46      | 6258414.33      |
| R.143     | NCA01_Residential  | 331703.87      | 6258396.53      |
| R.144     | NCA01_Residential  | 331640.39      | 6258390.65      |
| R.145     | NCA01_Residential  | 331538.59      | 6258379.12      |
| R.146     | NCA01_Residential  | 331703.9       | 6258377.92      |
| R.147     | NCA01_Residential  | 331685.79      | 6258367.65      |
| R.148     | NCA01_Commercial   | 331594.26      | 6258361.09      |
| R.149     | NCA01_Residential  | 331656.33      | 6258356.57      |
| R.150     | NCA01_Residential  | 331727.15      | 6258342.78      |
| R.151     | NCA01_Residential  | 331704.99      | 6258334.94      |
| R.152     | NCA01_Residential  | 331642.99      | 6258310.06      |
| R.153     | NCA01_Residential  | 331673.09      | 6258323.86      |
| R.154     | NCA01_Residential  | 331712.01      | 6258314.4       |
| R.155     | NCA04_Residential  | 331812.1       | 6258307.23      |
| R.156     | NCA01_Residential  | 331687.69      | 6258304.94      |
| R.157     | NCA01_Residential  | 331599.87      | 6258301.85      |
| R.158     | NCA01_Residential  | 331674.98      | 6258299.26      |
| R.159     | NCA01_Residential  | 331660.66      | 6258294.4       |
| R.160     | NCA02_Residential  | 331469.34      | 6258286.02      |
| R.161     | NCA01_Residential  | 331573.16      | 6258285.57      |
| R.162     | NCA05_Residential  | 332035.65      | 6258279.61      |
| R.163     | NCA01_Residential  | 331601.36      | 6258269.11      |
| R.164     | NCA01_Residential  | 331527.58      | 6258267.33      |
| R.165     | NCA01_Residential  | 331644.18      | 6258287.82      |
| R.166     | NCA02_Residential  | 331277.34      | 6258261.52      |
| R.167     | NCA01_Residential  | 331688.66      | 6258259.21      |
| R.168     | NCA01_Residential  | 331546.35      | 6258247.75      |
| R.169     | NCA01_Commercial   | 331522.35      | 6258238.02      |
| R.170     | NCA01_Residential  | 331651.16      | 6258207.95      |
| R.171     | NCA01_Residential  | 331690.13      | 6258224.3       |
| R.172     | NCA01_Residential  | 331676.07      | 6258219.6       |
| R.173     | NCA01_Commercial   | 331520.62      | 6258218.83      |
| R.174     | NCA01_Residential  | 331662.47      | 6258213.22      |
| R.175     | NCA01_Residential  | 331608.98      | 6258205.77      |
| R.176     | NCA01_Residential  | 331517.87      | 6258196.66      |
| R.177     | NCA01_Residential  | 331673.74      | 6258192.79      |
| R.178     | NCA05_Mixed Use    | 331747.75      | 6258110.89      |
| R.179     | NCA01_Residential  | 331656.94      | 6258182.91      |
| R.180     | NCA01_Residential  | 331560.87      | 6258173.24      |
| R.181     | NCA01_Residential  | 331670.89      | 6258171.66      |
| R.182     | NCA01_Residential  | 331547.37      | 6258167.7       |
| R.183     | NCA01_Commercial   | 331517.6       | 6258165.97      |
| R.184     | NCA01_Residential  | 331533.53      | 6258160.78      |

**GPS Co-ordinates (Zone 56H)**

| <b>ID</b> | <b>Description</b>     | <b>Easting</b> | <b>Northing</b> |
|-----------|------------------------|----------------|-----------------|
| R.185     | NCA01_Residential      | 331669.46      | 6258159.38      |
| R.186     | NCA01_Residential      | 331668.32      | 6258147.67      |
| R.187     | NCA01_Residential      | 331672.49      | 6258128.69      |
| R.188     | NCA02_Mixed Use        | 331450.25      | 6258079.47      |
| R.189     | NCA02_Residential      | 331340.24      | 6258115.87      |
| R.190     | NCA05_Residential      | 331679.64      | 6258099.2       |
| R.191     | NCA04_Residential      | 331850         | 6258097.81      |
| R.192     | NCA04_Residential      | 332117.22      | 6258065.8       |
| R.193     | NCA05_Residential      | 331712.47      | 6258062.88      |
| R.194     | NCA05_Residential      | 331714.8       | 6258054.58      |
| R.195     | NCA05_Residential      | 331695.6       | 6258049.39      |
| R.196     | NCA05_Residential      | 331721.55      | 6258037.97      |
| R.197     | NCA01_Residential      | 331716.52      | 6258023.59      |
| R.198     | NCA05_Residential      | 331652.01      | 6258020.79      |
| R.199     | NCA01_Residential      | 331759.95      | 6258011.51      |
| R.200     | NCA05_Residential      | 331633.73      | 6258011.15      |
| R.201     | NCA01_Residential      | 331743.61      | 6258001.39      |
| R.202     | NCA01_Residential      | 331708.22      | 6258001.01      |
| R.203     | NCA04_Residential      | 331885.98      | 6257989.24      |
| R.204     | NCA05_Industrial       | 331600.49      | 6257986.22      |
| R.205     | NCA01_Residential      | 331755.1       | 6257983.08      |
| R.206     | NCA01_Residential      | 331744.84      | 6257976.33      |
| R.207     | NCA01_Residential      | 331736.92      | 6257971.52      |
| R.208     | NCA01_Residential      | 331669.95      | 6257970.6       |
| R.209     | NCA01_Residential      | 331729.65      | 6257966.72      |
| R.210     | NCA01_Residential      | 331771.85      | 6257957.37      |
| R.211     | NCA01_Residential      | 331679.59      | 6257950.66      |
| R.212     | NCA01_Residential      | 331728.87      | 6257949.97      |
| R.213     | NCA01_Industrial       | 331622.09      | 6257945.34      |
| R.214     | NCA01_Residential      | 331813.16      | 6257942.85      |
| R.215     | NCA01_Residential      | 331802.8       | 6257936.81      |
| R.216     | NCA01_Residential      | 331688.9       | 6257932.05      |
| R.217     | NCA01_Residential      | 331792.6       | 6257930.07      |
| R.218     | NCA01_Industrial       | 331583.54      | 6257925.4       |
| R.219     | NCA01_Industrial       | 331633.73      | 6257925.4       |
| R.220     | NCA01_Residential      | 331782.58      | 6257923.33      |
| R.221     | NCA01_Residential      | 331823.72      | 6257921.36      |
| R.222     | NCA01_Residential      | 331772.21      | 6257917.11      |
| R.223     | NCA05_Residential      | 331329.65      | 6257916.59      |
| R.224     | NCA01_Residential      | 331811.83      | 6257914.08      |
| R.225     | NCA05_Place of Worship | 331461.4       | 6257913.94      |
| R.226     | NCA01_Residential      | 331747.5       | 6257912.79      |
| R.227     | NCA01_Residential      | 331642.7       | 6257911.11      |
| R.228     | NCA01_Residential      | 331762.36      | 6257910.71      |
| R.229     | NCA01_Residential      | 331799.64      | 6257906.35      |
| R.230     | NCA01_Residential      | 331774.67      | 6257890.75      |

**GPS Co-ordinates (Zone 56H)**

| <b>ID</b> | <b>Description</b> | <b>Easting</b> | <b>Northing</b> |
|-----------|--------------------|----------------|-----------------|
| R.231     | NCA01_Residential  | 331713.49      | 6257886.51      |
| R.232     | NCA01_Residential  | 331768.71      | 6257872.94      |
| R.233     | NCA01_Residential  | 331855.55      | 6257870.82      |
| R.234     | NCA04_Residential  | 331937.37      | 6257867.19      |
| R.235     | NCA01_Residential  | 331843.34      | 6257863.26      |
| R.236     | NCA04_Residential  | 332084.42      | 6257858.56      |
| R.237     | NCA01_Residential  | 331831.13      | 6257855.7       |
| R.238     | NCA01_Residential  | 331869.21      | 6257854.17      |
| R.239     | NCA01_Residential  | 331733.77      | 6257849.62      |
| R.240     | NCA01_Residential  | 331818.91      | 6257848.14      |
| R.241     | NCA01_Residential  | 331858.6       | 6257847.47      |
| R.242     | NCA01_Residential  | 331785.57      | 6257843.48      |
| R.243     | NCA01_Residential  | 331677.26      | 6257843.31      |
| R.244     | NCA01_Residential  | 331849.66      | 6257841.88      |
| R.245     | NCA01_Residential  | 331805.53      | 6257839.8       |
| R.246     | NCA01_Residential  | 331839.23      | 6257835.18      |
| R.247     | NCA01_Residential  | 331829.54      | 6257828.47      |
| R.248     | NCA01_Residential  | 331820.23      | 6257822.33      |
| R.249     | NCA01_Residential  | 331929.02      | 6257815.8       |
| R.250     | NCA01_Residential  | 331754.04      | 6257815.06      |
| R.251     | NCA01_Residential  | 331811.29      | 6257805.01      |
| R.252     | NCA01_Residential  | 331900.82      | 6257804.42      |
| R.253     | NCA01_Residential  | 331705.18      | 6257799.77      |
| R.254     | NCA01_Residential  | 331890.67      | 6257796.84      |
| R.255     | NCA01_Residential  | 331667.63      | 6257793.12      |
| R.256     | NCA01_Residential  | 331882.33      | 6257789.57      |
| R.257     | NCA01_Residential  | 331773.6       | 6257785.12      |
| R.258     | NCA01_Residential  | 331908.4       | 6257782.19      |
| R.259     | NCA01_Residential  | 331873.08      | 6257781.84      |
| R.260     | NCA01_Residential  | 331781.08      | 6257774.75      |
| R.261     | NCA01_Residential  | 331863.68      | 6257773.95      |
| R.262     | NCA01_Residential  | 331725.12      | 6257769.52      |
| R.263     | NCA01_Residential  | 331888.8       | 6257767.65      |
| R.264     | NCA01_Residential  | 331855.2       | 6257766.98      |
| R.265     | NCA01_Residential  | 331840.76      | 6257765.61      |
| R.266     | NCA01_Residential  | 331788.31      | 6257765.1       |
| R.267     | NCA04_Residential  | 332070.98      | 6257759.91      |
| R.268     | NCA01_Residential  | 331686.9       | 6257759.55      |
| R.269     | NCA01_Residential  | 331968.2       | 6257756.7       |
| R.270     | NCA01_Residential  | 331795.55      | 6257754.97      |
| R.271     | NCA02_Residential  | 331564.72      | 6257755.15      |
| R.272     | NCA01_Residential  | 331805.92      | 6257740.02      |
| R.273     | NCA01_Residential  | 331745.73      | 6257738.28      |
| R.274     | NCA01_Residential  | 331887.32      | 6257731.14      |
| R.275     | NCA02_Residential  | 331643.46      | 6257729.23      |
| R.276     | NCA01_Residential  | 331911.07      | 6257709.17      |

**GPS Co-ordinates (Zone 56H)**

| <b>ID</b> | <b>Description</b> | <b>Easting</b> | <b>Northing</b> |
|-----------|--------------------|----------------|-----------------|
| R.277     | NCA01_Residential  | 331769.33      | 6257703.82      |
| R.278     | NCA01_Residential  | 331767.14      | 6257682.99      |
| R.279     | NCA01_Residential  | 331921.46      | 6257697.6       |
| R.280     | NCA01_Residential  | 331929.17      | 6257688.4       |
| R.281     | NCA01_Residential  | 331809.7       | 6257697.04      |
| R.282     | NCA01_Residential  | 331826.49      | 6257679.79      |
| R.283     | NCA01_Residential  | 331937.78      | 6257678.6       |
| R.284     | NCA01_Residential  | 331945.8       | 6257670.29      |
| R.285     | NCA01_Mixed Use    | 331843.44      | 6257665.16      |
| R.286     | NCA01_Residential  | 331955         | 6257663.16      |
| R.287     | NCA01_Mixed Use    | 331852.75      | 6257656.52      |
| R.288     | NCA01_Residential  | 331962.42      | 6257655.15      |
| R.289     | NCA01_Residential  | 331969.54      | 6257648.92      |
| R.290     | NCA01_Residential  | 331974.88      | 6257642.68      |
| R.291     | NCA02_Residential  | 331689.33      | 6257637.73      |
| R.292     | NCA01_Residential  | 331788.27      | 6257635.58      |
| R.293     | NCA01_Residential  | 331973.99      | 6257633.78      |
| R.294     | NCA01_Mixed Use    | 331872.97      | 6257633.59      |
| R.295     | NCA01_Residential  | 332050.43      | 6257629.51      |
| R.296     | NCA01_Residential  | 331991.38      | 6257626.16      |
| R.297     | NCA01_Mixed Use    | 331880.56      | 6257626.12      |
| R.298     | NCA02_Residential  | 331495.82      | 6257620.65      |
| R.299     | NCA01_Residential  | 332001.6       | 6257615.08      |
| R.300     | NCA01_Mixed Use    | 331889.94      | 6257614.72      |
| R.301     | NCA01_Residential  | 332061.32      | 6257603.73      |
| R.302     | NCA01_Mixed Use    | 331902.86      | 6257602.22      |
| R.303     | NCA01_Mixed Use    | 331914.39      | 6257594.69      |
| R.304     | NCA01_Residential  | 331823.39      | 6257593.85      |
| R.305     | NCA01_Mixed Use    | 331920.83      | 6257588.71      |
| R.306     | NCA01_Mixed Use    | 331927.49      | 6257582.72      |
| R.307     | NCA02_Residential  | 331599.77      | 6257582.25      |
| R.308     | NCA01_Mixed Use    | 331932.1       | 6257578.85      |
| R.309     | NCA01_Mixed Use    | 331937.04      | 6257574.68      |
| R.310     | NCA01_Mixed Use    | 331942.24      | 6257570.3       |
| R.311     | NCA01_Residential  | 332101.08      | 6257564.76      |
| R.312     | NCA01_Residential  | 331861.6       | 6257562.08      |
| R.313     | NCA02_Residential  | 331766.52      | 6257556.62      |
| R.314     | NCA01_Commercial   | 331963.61      | 6257556.66      |
| R.315     | NCA01_Residential  | 332119.38      | 6257549.65      |
| R.316     | NCA01_Residential  | 332141.65      | 6257542.49      |
| R.317     | NCA01_Mixed Use    | 331977.1       | 6257542.4       |
| R.318     | NCA01_Residential  | 332156.02      | 6257539.63      |
| R.319     | NCA01_Commercial   | 331934.69      | 6257538.47      |
| R.320     | NCA01_Residential  | 332171.51      | 6257537.75      |
| R.321     | NCA01_Residential  | 332187.01      | 6257535.87      |
| R.322     | NCA01_Residential  | 331820.98      | 6257535.53      |

**GPS Co-ordinates (Zone 56H)**

| <b>ID</b> | <b>Description</b>     | <b>Easting</b> | <b>Northing</b> |
|-----------|------------------------|----------------|-----------------|
| R.323     | NCA01_Mixed Use        | 331987.46      | 6257534.44      |
| R.324     | NCA01_Residential      | 332201.1       | 6257532.58      |
| R.325     | NCA01_Residential      | 332217.54      | 6257529.77      |
| R.326     | NCA01_Mixed Use        | 331997.86      | 6257526.7       |
| R.327     | NCA02_Residential      | 331713.6       | 6257524.67      |
| R.328     | NCA01_Mixed Use        | 332005.72      | 6257521.11      |
| R.329     | NCA01_Residential      | 331912.15      | 6257520.91      |
| R.330     | NCA01_Mixed Use        | 332010.22      | 6257517.91      |
| R.331     | NCA02_Residential      | 331792.43      | 6257515.02      |
| R.332     | NCA01_Mixed Use        | 332014.46      | 6257514.89      |
| R.333     | NCA01_Residential      | 332327.3       | 6257514.52      |
| R.334     | NCA01_Mixed Use        | 332018.68      | 6257511.91      |
| R.335     | NCA01_Mixed Use        | 332022.86      | 6257508.95      |
| R.336     | NCA01_Mixed Use        | 332030.62      | 6257503.87      |
| R.337     | NCA01_Mixed Use        | 332041.98      | 6257496.69      |
| R.338     | NCA04_Residential      | 332463.49      | 6257494.6       |
| R.339     | NCA01_Residential      | 331874.49      | 6257490.79      |
| R.340     | NCA02_Residential      | 331744.57      | 6257488.08      |
| R.341     | NCA01_Mixed Use        | 332068.64      | 6257481.77      |
| R.342     | NCA01_Residential      | 332254.17      | 6257480.92      |
| R.343     | NCA04_Residential      | 332567.19      | 6257480.15      |
| R.344     | NCA01_Residential      | 332271.5       | 6257472.69      |
| R.345     | NCA01_Residential      | 331973.9       | 6257470.46      |
| R.346     | NCA01_Residential      | 332290.19      | 6257465.21      |
| R.347     | NCA01_Residential      | 332103.42      | 6257461.87      |
| R.348     | NCA02_Residential      | 331819.52      | 6257458.41      |
| R.349     | NCA01_Residential      | 332310.37      | 6257456.98      |
| R.350     | NCA01_Residential      | 332325.55      | 6257453.72      |
| R.351     | NCA01_Residential      | 332111.33      | 6257451.73      |
| R.352     | NCA01_Residential      | 332351.35      | 6257449.81      |
| R.353     | NCA01_Residential      | 332366.98      | 6257447.47      |
| R.354     | NCA01_Residential      | 332128.12      | 6257447.43      |
| R.355     | NCA01_Residential      | 332381.83      | 6257445.12      |
| R.356     | NCA01_Residential      | 332395.61      | 6257444.27      |
| R.357     | NCA02_Residential      | 331908.38      | 6257444.1       |
| R.358     | NCA01_Residential      | 332410.94      | 6257442.03      |
| R.359     | NCA01_Place of Worship | 332181.59      | 6257440.19      |
| R.360     | NCA01_Residential      | 332424.77      | 6257439.41      |
| R.361     | NCA02_Residential      | 331834.96      | 6257438.83      |
| R.362     | NCA01_Residential      | 332441.97      | 6257437.17      |
| R.363     | NCA02_Residential      | 331785.26      | 6257435.82      |
| R.364     | NCA01_Residential      | 332456.17      | 6257435.3       |
| R.365     | NCA01_Residential      | 332472.25      | 6257433.43      |
| R.366     | NCA01_Residential      | 332486.08      | 6257430.44      |
| R.367     | NCA01_Residential      | 332148.66      | 6257429.46      |
| R.368     | NCA01_Residential      | 332502.9       | 6257428.57      |

**GPS Co-ordinates (Zone 56H)**

| <b>ID</b> | <b>Description</b> | <b>Easting</b> | <b>Northing</b> |
|-----------|--------------------|----------------|-----------------|
| R.369     | NCA04_Residential  | 332794.43      | 6257426.48      |
| R.370     | NCA01_Residential  | 332516.73      | 6257425.96      |
| R.371     | NCA01_Residential  | 332199.23      | 6257425.17      |
| R.372     | NCA02_Residential  | 331797.68      | 6257424.9       |
| R.373     | NCA01_Residential  | 332532.06      | 6257424.09      |
| R.374     | NCA01_Residential  | 332547.76      | 6257421.84      |
| R.375     | NCA02_Residential  | 331763.42      | 6257420.38      |
| R.376     | NCA01_Residential  | 332562.72      | 6257419.23      |
| R.377     | NCA04_Residential  | 332578.04      | 6257416.61      |
| R.378     | NCA04_Residential  | 332591.5       | 6257414.37      |
| R.379     | NCA01_Residential  | 332121.07      | 6257413.1       |
| R.380     | NCA04_Residential  | 332607.58      | 6257412.87      |
| R.381     | NCA02_Residential  | 331848.51      | 6257412.85      |
| R.382     | NCA01_Residential  | 332222.53      | 6257412.53      |
| R.383     | NCA04_Residential  | 332621.78      | 6257410.63      |
| R.384     | NCA02_Residential  | 331956.56      | 6257409.21      |
| R.385     | NCA04_Residential  | 332637.11      | 6257408.76      |
| R.386     | NCA01_Residential  | 332245.22      | 6257399.35      |
| R.387     | NCA01_Residential  | 332262.63      | 6257389.35      |
| R.388     | NCA02_Residential  | 331808.98      | 6257383.48      |
| R.389     | NCA04_Residential  | 332877.83      | 6257368.05      |
| R.390     | NCA01_Residential  | 332256.5       | 6257365.82      |
| R.391     | NCA01_Residential  | 332325.49      | 6257361.31      |
| R.392     | NCA01_Residential  | 332269.4       | 6257356.15      |
| R.393     | NCA01_Residential  | 332319.05      | 6257349.06      |
| R.394     | NCA01_Residential  | 332312.28      | 6257336.48      |
| R.395     | NCA01_Residential  | 332274.88      | 6257336.16      |
| R.396     | NCA02_Educational  | 332006.82      | 6257335.4       |
| R.397     | NCA01_Residential  | 332343.4       | 6257329.13      |
| R.398     | NCA01_Residential  | 332307.44      | 6257327.13      |
| R.399     | NCA01_Residential  | 332278.43      | 6257324.88      |
| R.400     | NCA01_Residential  | 332352.5       | 6257323.63      |
| R.401     | NCA04a_Residential | 332869.44      | 6257321.05      |
| R.402     | NCA01_Residential  | 332363.5       | 6257317.49      |
| R.403     | NCA01_Residential  | 332290.03      | 6257308.76      |
| R.404     | NCA01_Residential  | 332381.69      | 6257307.76      |
| R.405     | NCA01_Residential  | 332400.09      | 6257299.94      |
| R.406     | NCA01_Residential  | 332421.74      | 6257288.32      |
| R.407     | NCA01_Residential  | 332447.03      | 6257272.97      |
| R.408     | NCA01_Residential  | 332350.02      | 6257268.42      |
| R.409     | NCA01_Residential  | 332466.7       | 6257260.72      |
| R.410     | NCA01_Residential  | 332481.85      | 6257251.05      |
| R.411     | NCA01_Residential  | 332496.03      | 6257241.38      |
| R.412     | NCA01_Residential  | 332512.15      | 6257233.32      |
| R.413     | NCA04a_Residential | 332854.5       | 6257226.19      |
| R.414     | NCA02_Residential  | 332282.48      | 6257223.95      |

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| <b>GPS Co-ordinates (Zone 56H)</b> |                    |                |                 |
|------------------------------------|--------------------|----------------|-----------------|
| <b>ID</b>                          | <b>Description</b> | <b>Easting</b> | <b>Northing</b> |
| R.415                              | NCA01a_Residential | 332492.81      | 6257217.85      |
| R.416                              | NCA01a_Residential | 332534.72      | 6257212.37      |
| R.417                              | NCA01a_Residential | 332546.97      | 6257201.73      |
| R.418                              | NCA01a_Residential | 332554.71      | 6257188.83      |
| R.419                              | NCA02a_Residential | 332317.97      | 6257172.83      |
| R.420                              | NCA02a_Residential | 332360.64      | 6257101.41      |

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*All GPS coordinates are in UTM, Zone 56H*

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Image B1 – NCW Noise Model (North to South)

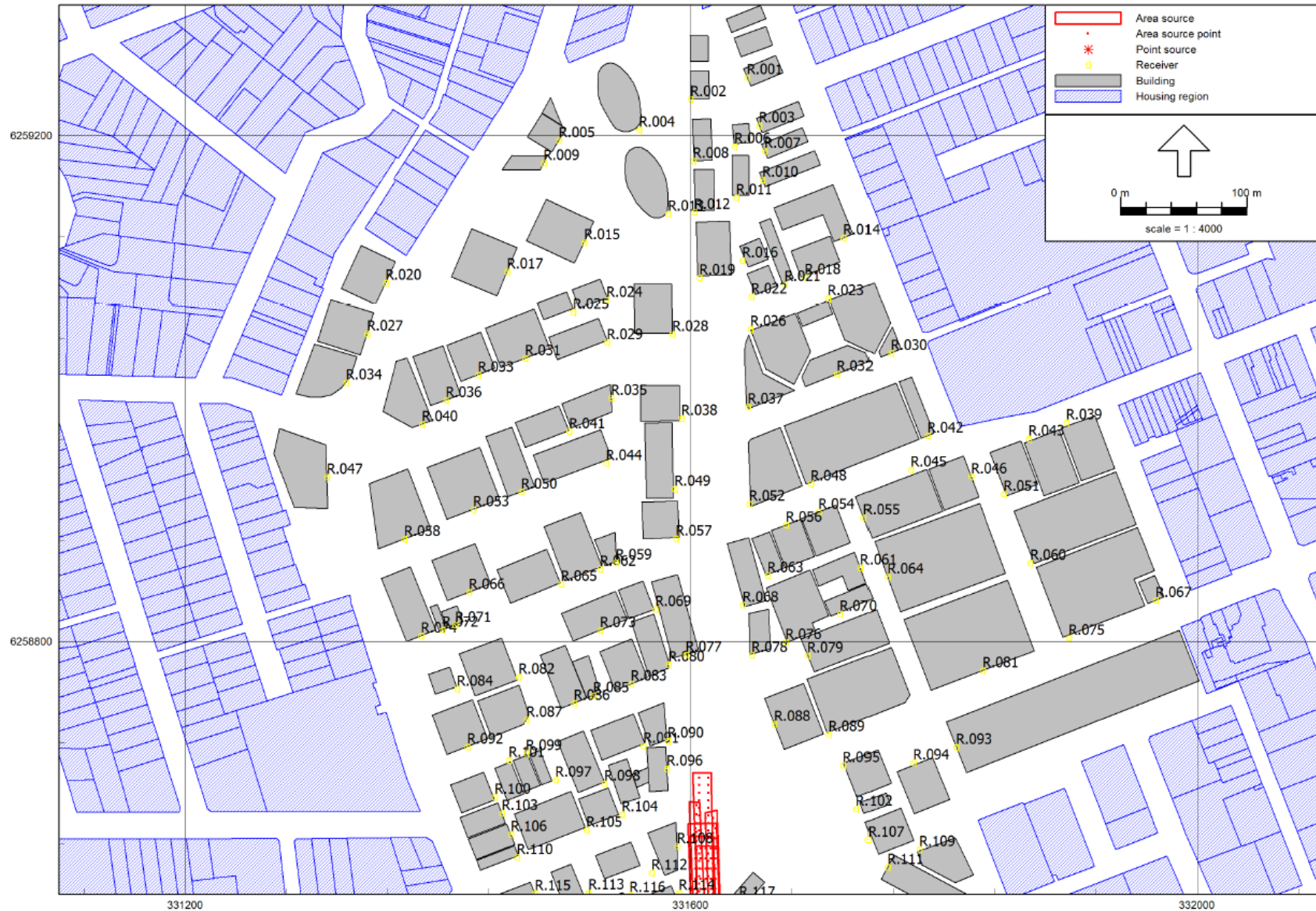


Image B2 – NCW Noise Model (North to South)

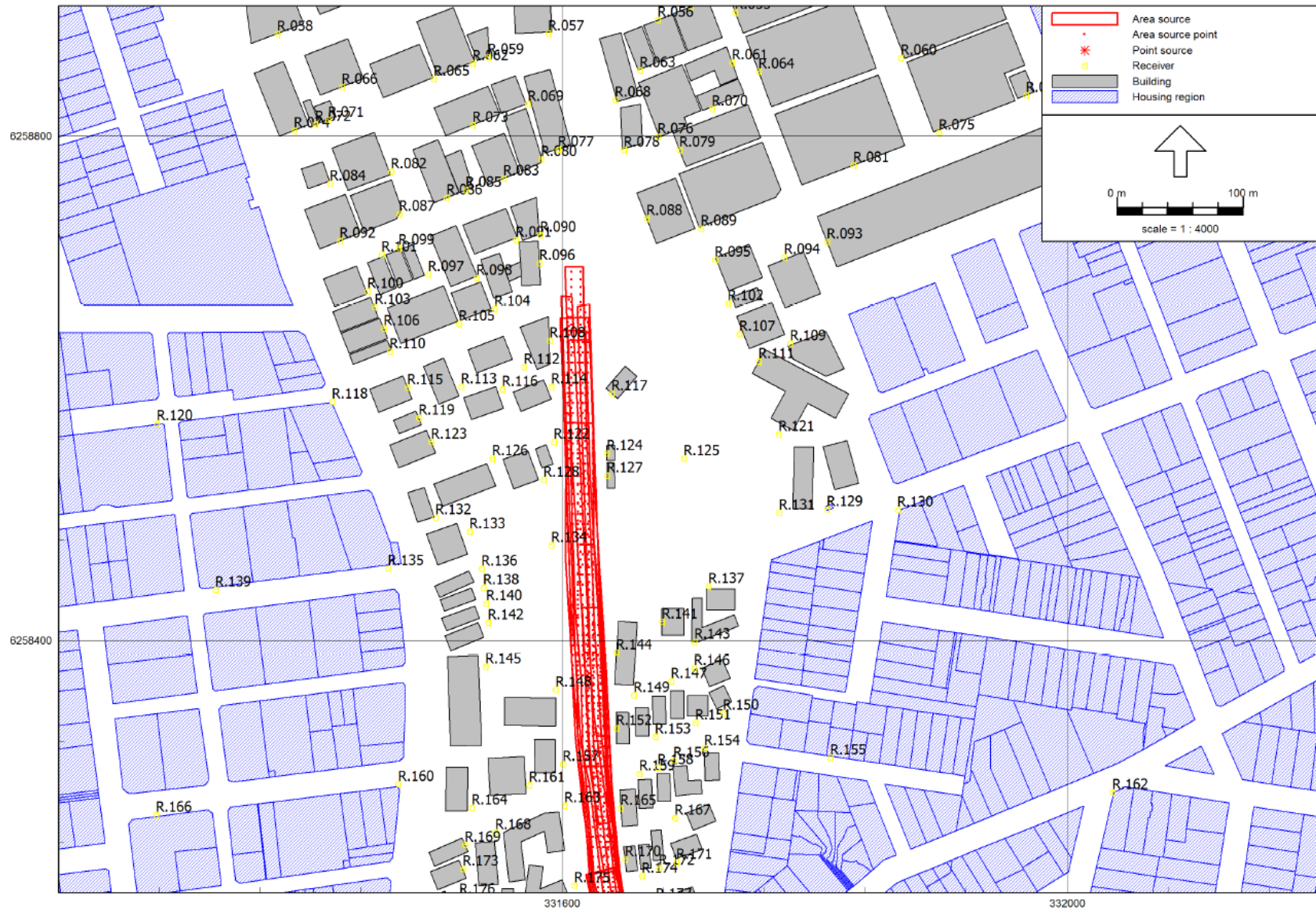


Image B3 – NCW Noise Model (North to South)

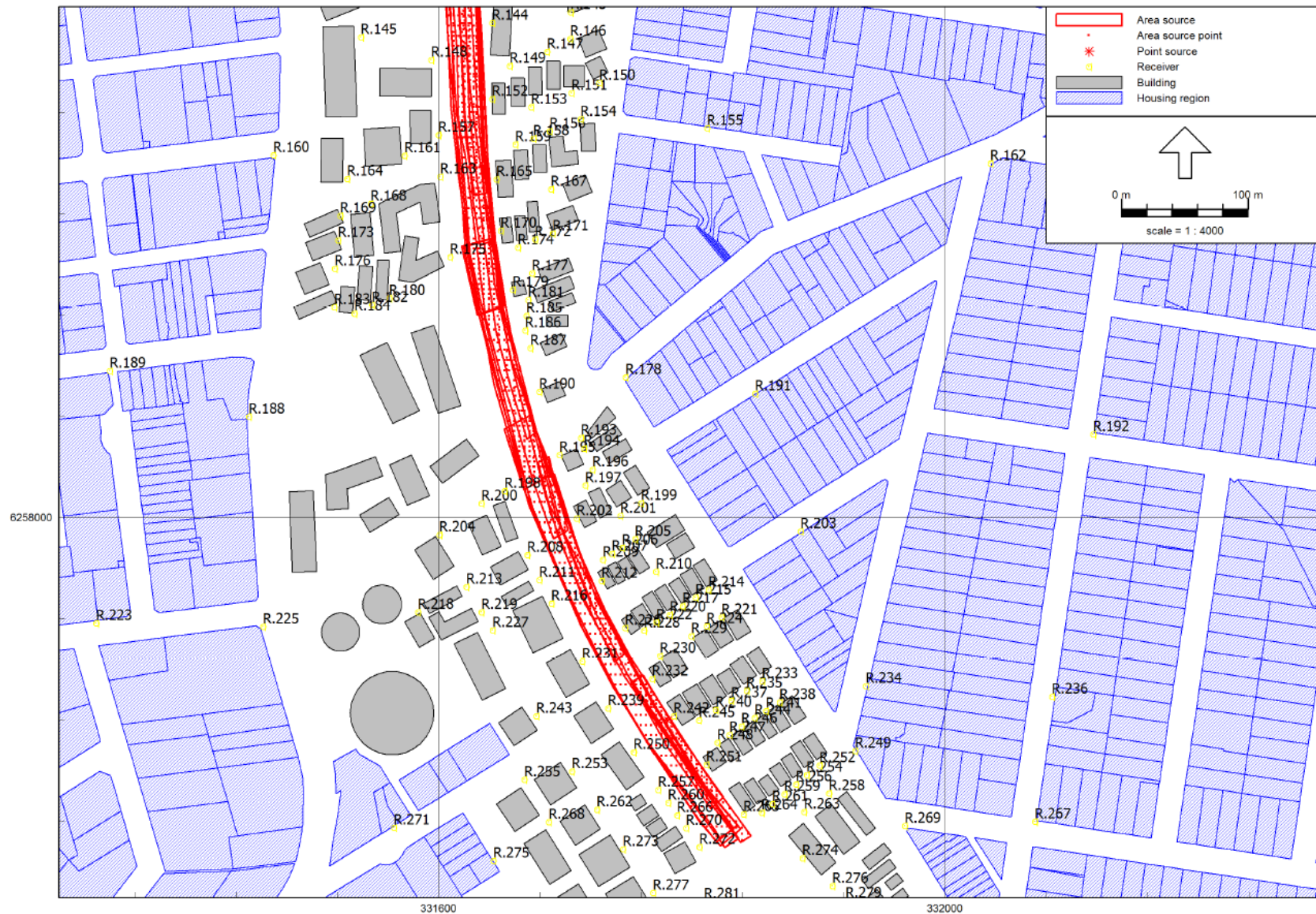


Image B4 – NCW Noise Model (North to South)

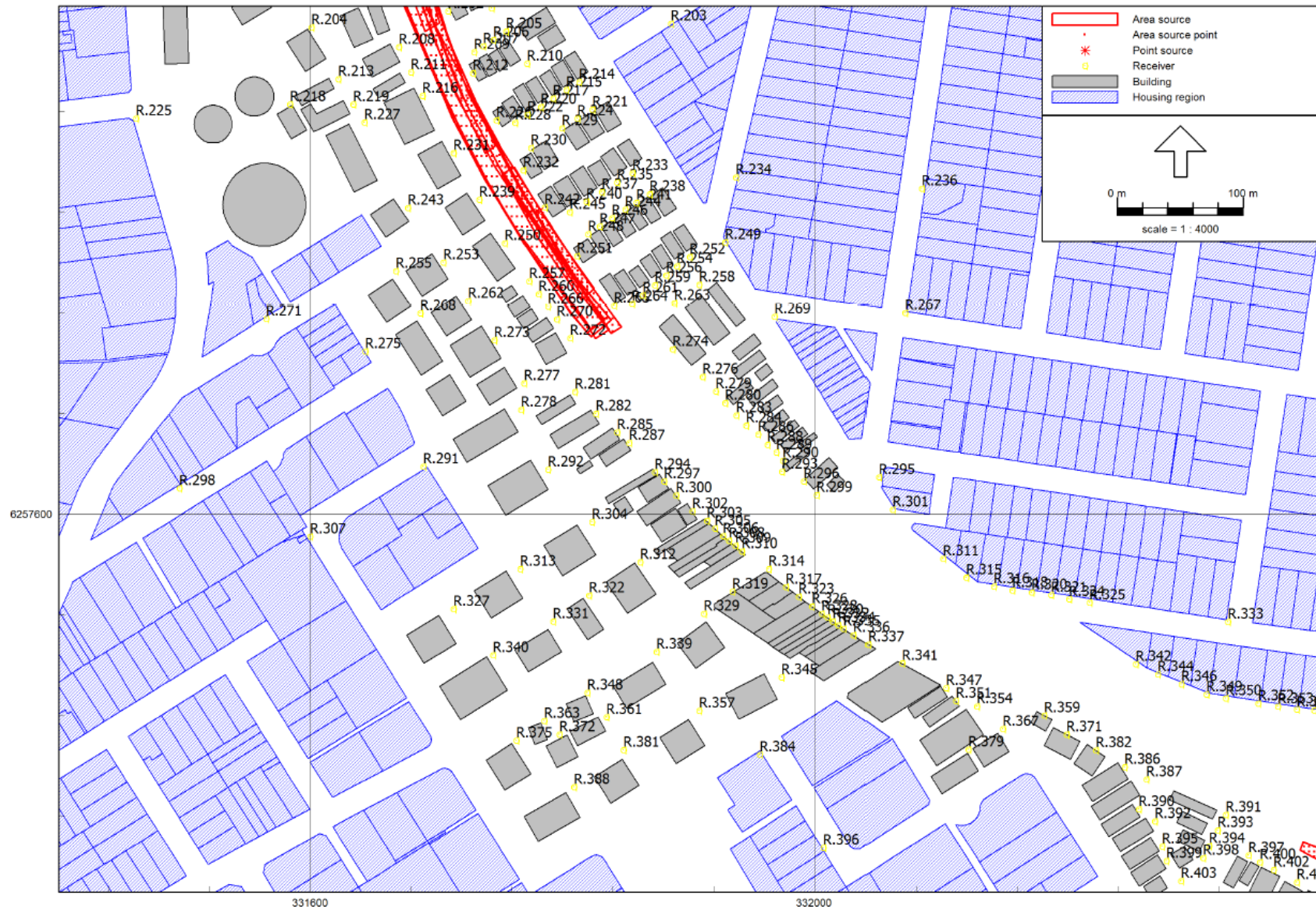


Image B5 – NCW Noise Model (North to South)

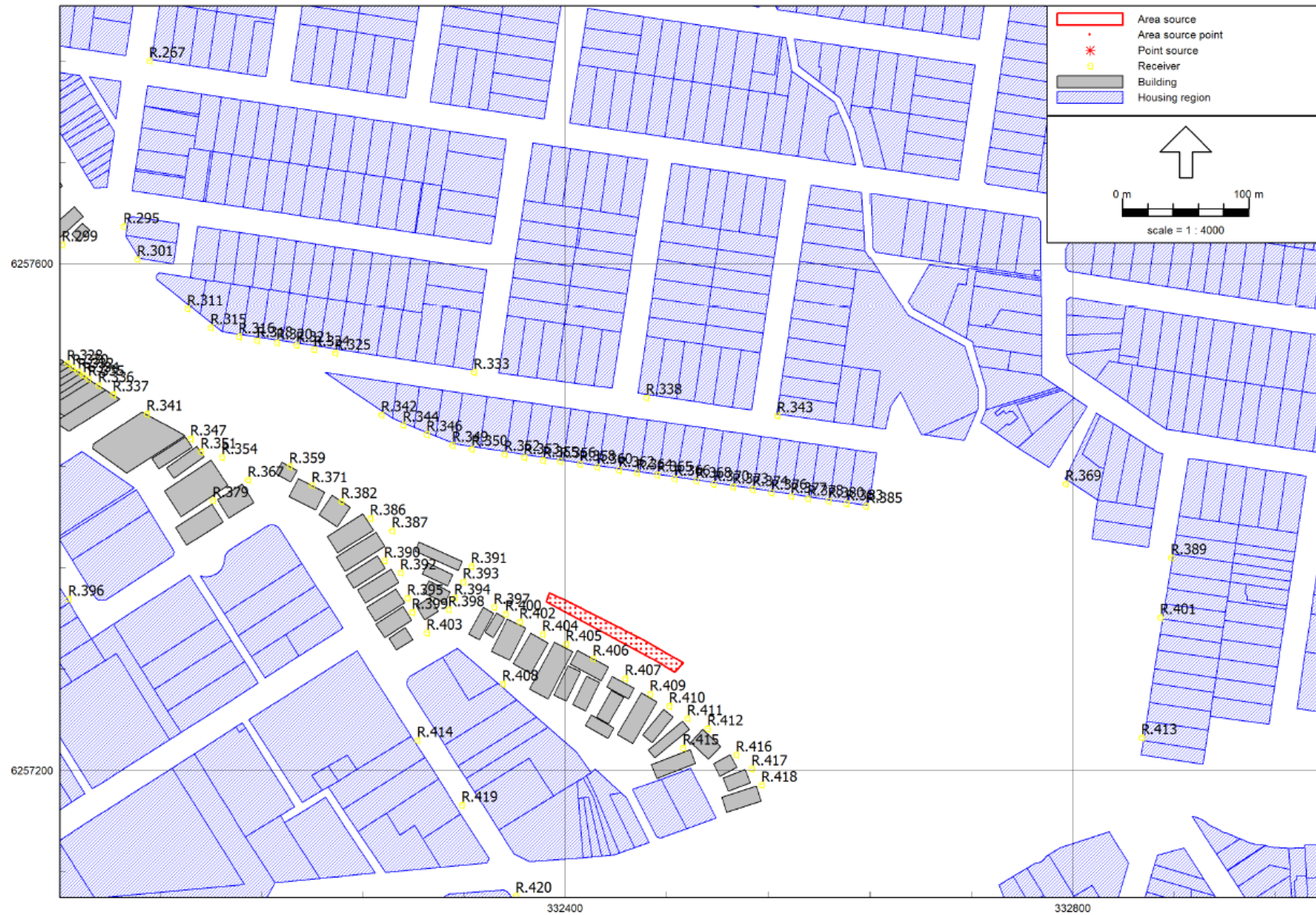
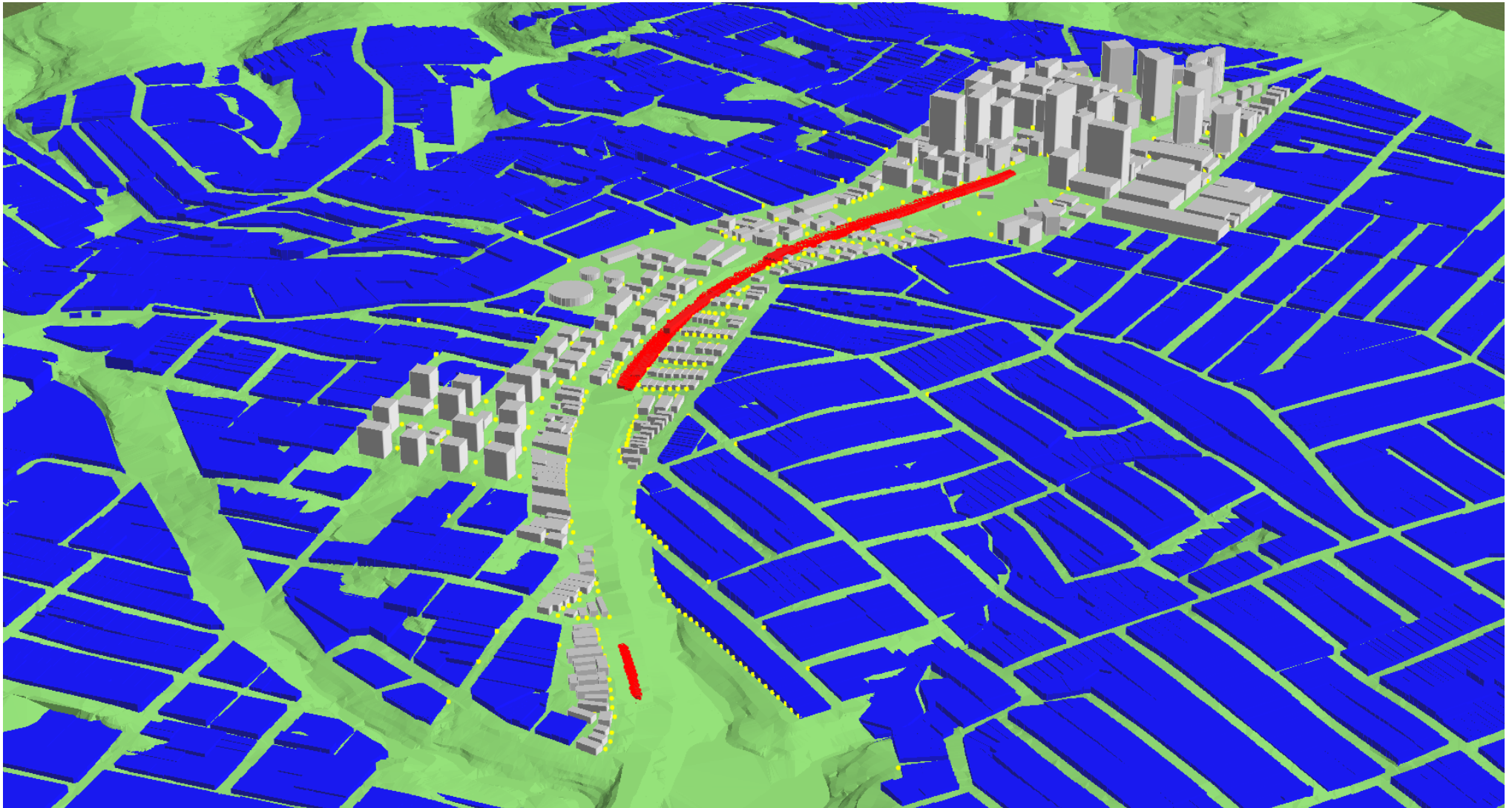


Image B6 – NCW Noise Model (3D view)



Annex C

## Noise Modelling Data





Annex D

## Noise Modelling Results







**Table D.1 SCN01 Results**

| Name    | Description        | Predicted Noise Level | Comparison to NML |                  |         |       | If NML Exceeded - Comparison to RBL |                  |         |       | Mitigation / Management (AMMM) |                  |         |       |
|---------|--------------------|-----------------------|-------------------|------------------|---------|-------|-------------------------------------|------------------|---------|-------|--------------------------------|------------------|---------|-------|
|         |                    |                       | Day Standard      | Day Non-Standard | Evening | Night | Day Standard                        | Day Non-Standard | Evening | Night | Day Standard                   | Day Non-Standard | Evening | Night |
| R.400_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | -10   | -                              | -                | -       | M, LB |
| R.401_A | NCA04a_Residential | 37                    | -22               | -17              | -14     | -9    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.402_A | NCA01_Residential  | 46                    | -6                | -1               | 0       | 6     | -                                   | -                | -       | 11    | -                              | -                | -       | M, LB |
| R.403_A | NCA01_Residential  | 46                    | -6                | -1               | 0       | 6     | -                                   | -                | -       | 11    | -                              | -                | -       | M, LB |
| R.404_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | M, LB |
| R.405_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | M, LB |
| R.406_A | NCA01_Residential  | 46                    | -6                | -1               | 0       | 6     | -                                   | -                | -       | 11    | -                              | -                | -       | M, LB |
| R.407_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | 9     | -                              | -                | -       | -     |
| R.408_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | M, LB |
| R.409_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | 9     | -                              | -                | -       | -     |
| R.410_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | M, LB |
| R.411_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | 9     | -                              | -                | -       | -     |
| R.412_A | NCA01_Residential  | 42                    | -10               | -5               | -4      | 2     | -                                   | -                | -       | 7     | -                              | -                | -       | -     |
| R.413_A | NCA04a_Residential | 33                    | -26               | -21              | -18     | -13   | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.414_A | NCA02_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | 8     | -                              | -                | -       | -     |
| R.415_A | NCA01a_Residential | 36                    | -23               | -18              | -15     | -10   | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.416_A | NCA01a_Residential | 42                    | -17               | -12              | -9      | -4    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.417_A | NCA01a_Residential | 42                    | -17               | -12              | -9      | -4    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.418_A | NCA01a_Residential | 39                    | -20               | -15              | -12     | -7    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.419_A | NCA02a_Residential | 42                    | -17               | -12              | -9      | -4    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.420_A | NCA02a_Residential | 41                    | -18               | -13              | -10     | -5    | -                                   | -                | -       | -     | -                              | -                | -       | -     |









Table D.2 SCN02 Results

| Name    | Description        | Predicted Noise Level | Comparison to NML |                  |         | If NML Exceeded - Comparison to RBL |              |                  |         | Mitigation / Management (AMMM) |              |                  |         |       |
|---------|--------------------|-----------------------|-------------------|------------------|---------|-------------------------------------|--------------|------------------|---------|--------------------------------|--------------|------------------|---------|-------|
|         |                    |                       | Day Standard      | Day Non-Standard | Evening | Night                               | Day Standard | Day Non-Standard | Evening | Night                          | Day Standard | Day Non-Standard | Evening | Night |
| R.373_A | NCA01_Residential  | 38                    | -14               | -9               | -8      | -2                                  | -            | -                | -       | -                              | -            | -                | -       | -     |
| R.374_A | NCA01_Residential  | 38                    | -14               | -9               | -8      | -2                                  | -            | -                | -       | -                              | -            | -                | -       | -     |
| R.375_A | NCA02_Residential  | 35                    | -17               | -12              | -11     | -5                                  | -            | -                | -       | -                              | -            | -                | -       | -     |
| R.376_A | NCA01_Residential  | 38                    | -14               | -9               | -8      | -2                                  | -            | -                | -       | -                              | -            | -                | -       | -     |
| R.377_A | NCA04_Residential  | 38                    | -13               | -8               | -7      | -1                                  | -            | -                | -       | -                              | -            | -                | -       | -     |
| R.378_A | NCA04_Residential  | 38                    | -13               | -8               | -7      | -1                                  | -            | -                | -       | -                              | -            | -                | -       | -     |
| R.379_A | NCA01_Residential  | 29                    | -23               | -18              | -17     | -11                                 | -            | -                | -       | -                              | -            | -                | -       | -     |
| R.380_A | NCA04_Residential  | 38                    | -13               | -8               | -7      | -1                                  | -            | -                | -       | -                              | -            | -                | -       | -     |
| R.381_A | NCA02_Residential  | 36                    | -16               | -11              | -10     | -4                                  | -            | -                | -       | -                              | -            | -                | -       | -     |
| R.382_A | NCA01_Residential  | 42                    | -10               | -5               | -4      | 2                                   | -            | -                | -       | 7                              | -            | -                | -       | -     |
| R.383_A | NCA04_Residential  | 38                    | -13               | -8               | -7      | -1                                  | -            | -                | -       | -                              | -            | -                | -       | -     |
| R.384_A | NCA02_Residential  | 32                    | -20               | -15              | -14     | -8                                  | -            | -                | -       | -                              | -            | -                | -       | -     |
| R.385_A | NCA04_Residential  | 38                    | -13               | -8               | -7      | -1                                  | -            | -                | -       | -                              | -            | -                | -       | -     |
| R.386_A | NCA01_Residential  | 42                    | -10               | -5               | -4      | 2                                   | -            | -                | -       | 7                              | -            | -                | -       | -     |
| R.387_A | NCA01_Residential  | 41                    | -11               | -6               | -5      | 1                                   | -            | -                | -       | 6                              | -            | -                | -       | -     |
| R.388_A | NCA02_Residential  | 33                    | -19               | -14              | -13     | -7                                  | -            | -                | -       | -                              | -            | -                | -       | -     |
| R.389_A | NCA04_Residential  | 36                    | -15               | -10              | -9      | -3                                  | -            | -                | -       | -                              | -            | -                | -       | -     |
| R.390_A | NCA01_Residential  | 38                    | -14               | -9               | -8      | -2                                  | -            | -                | -       | -                              | -            | -                | -       | -     |
| R.391_A | NCA01_Residential  | 41                    | -11               | -6               | -5      | 1                                   | -            | -                | -       | 6                              | -            | -                | -       | -     |
| R.392_A | NCA01_Residential  | 41                    | -11               | -6               | -5      | 1                                   | -            | -                | -       | 6                              | -            | -                | -       | -     |
| R.393_A | NCA01_Residential  | 39                    | -13               | -8               | -7      | -1                                  | -            | -                | -       | -                              | -            | -                | -       | -     |
| R.394_A | NCA01_Residential  | 38                    | -14               | -9               | -8      | -2                                  | -            | -                | -       | -                              | -            | -                | -       | -     |
| R.395_A | NCA01_Residential  | 39                    | -13               | -8               | -7      | -1                                  | -            | -                | -       | -                              | -            | -                | -       | -     |
| R.396_A | NCA02_Educational  | 37                    | -18               | -18              | -18     | -18                                 | -            | -                | -       | -                              | -            | -                | -       | -     |
| R.397_A | NCA01_Residential  | 40                    | -12               | -7               | -6      | 0                                   | -            | -                | -       | -                              | -            | -                | -       | -     |
| R.398_A | NCA01_Residential  | 41                    | -11               | -6               | -5      | 1                                   | -            | -                | -       | 6                              | -            | -                | -       | -     |
| R.399_A | NCA01_Residential  | 41                    | -11               | -6               | -5      | 1                                   | -            | -                | -       | 6                              | -            | -                | -       | -     |
| R.400_A | NCA01_Residential  | 41                    | -11               | -6               | -5      | 1                                   | -            | -                | -       | 6                              | -            | -                | -       | -     |
| R.401_A | NCA04a_Residential | 33                    | -26               | -21              | -18     | -13                                 | -            | -                | -       | -                              | -            | -                | -       | -     |
| R.402_A | NCA01_Residential  | 41                    | -11               | -6               | -5      | 1                                   | -            | -                | -       | 6                              | -            | -                | -       | -     |
| R.403_A | NCA01_Residential  | 42                    | -10               | -5               | -4      | 2                                   | -            | -                | -       | 7                              | -            | -                | -       | -     |
| R.404_A | NCA01_Residential  | 40                    | -12               | -7               | -6      | 0                                   | -            | -                | -       | -                              | -            | -                | -       | -     |
| R.405_A | NCA01_Residential  | 41                    | -11               | -6               | -5      | 1                                   | -            | -                | -       | 6                              | -            | -                | -       | -     |
| R.406_A | NCA01_Residential  | 40                    | -12               | -7               | -6      | 0                                   | -            | -                | -       | -                              | -            | -                | -       | -     |
| R.407_A | NCA01_Residential  | 40                    | -12               | -7               | -6      | 0                                   | -            | -                | -       | -                              | -            | -                | -       | -     |
| R.408_A | NCA01_Residential  | 40                    | -12               | -7               | -6      | 0                                   | -            | -                | -       | -                              | -            | -                | -       | -     |
| R.409_A | NCA01_Residential  | 40                    | -12               | -7               | -6      | 0                                   | -            | -                | -       | -                              | -            | -                | -       | -     |
| R.410_A | NCA01_Residential  | 39                    | -13               | -8               | -7      | -1                                  | -            | -                | -       | -                              | -            | -                | -       | -     |
| R.411_A | NCA01_Residential  | 39                    | -13               | -8               | -7      | -1                                  | -            | -                | -       | -                              | -            | -                | -       | -     |
| R.412_A | NCA01_Residential  | 38                    | -14               | -9               | -8      | -2                                  | -            | -                | -       | -                              | -            | -                | -       | -     |
| R.413_A | NCA04a_Residential | 29                    | -30               | -25              | -22     | -17                                 | -            | -                | -       | -                              | -            | -                | -       | -     |
| R.414_A | NCA02_Residential  | 39                    | -13               | -8               | -7      | -1                                  | -            | -                | -       | -                              | -            | -                | -       | -     |
| R.415_A | NCA01a_Residential | 33                    | -26               | -21              | -18     | -13                                 | -            | -                | -       | -                              | -            | -                | -       | -     |
| R.416_A | NCA01a_Residential | 38                    | -21               | -16              | -13     | -8                                  | -            | -                | -       | -                              | -            | -                | -       | -     |
| R.417_A | NCA01a_Residential | 38                    | -21               | -16              | -13     | -8                                  | -            | -                | -       | -                              | -            | -                | -       | -     |
| R.418_A | NCA01a_Residential | 37                    | -22               | -17              | -14     | -9                                  | -            | -                | -       | -                              | -            | -                | -       | -     |
| R.419_A | NCA02a_Residential | 39                    | -20               | -15              | -12     | -7                                  | -            | -                | -       | -                              | -            | -                | -       | -     |
| R.420_A | NCA02a_Residential | 38                    | -21               | -16              | -13     | -8                                  | -            | -                | -       | -                              | -            | -                | -       | -     |







Table D.3a SCN03a Results

| Name    | Description        | Predicted Noise Level | Comparison to NML |                  |         |       | If NML Exceeded - Comparison to RBL |                  |         |       | Mitigation / Management (AMMM) |                  |         |       |                       |
|---------|--------------------|-----------------------|-------------------|------------------|---------|-------|-------------------------------------|------------------|---------|-------|--------------------------------|------------------|---------|-------|-----------------------|
|         |                    |                       | Day Standard      | Day Non-Standard | Evening | Night | Day Standard                        | Day Non-Standard | Evening | Night | Day Standard                   | Day Non-Standard | Evening | Night |                       |
| R.382_A | NCA01_Residential  | 60                    | 8                 | 13               | 14      | 20    | 18                                  | 18               | 19      | 25    | -                              | -                | -       | LB    | M, IB, LB, PC, RO, SN |
| R.383_A | NCA04_Residential  | 54                    | 3                 | 8                | 9       | 15    | 13                                  | 13               | 14      | 20    | -                              | -                | -       | LB    | M, IB, LB, PC, RO, SN |
| R.384_A | NCA02_Residential  | 51                    | -1                | 4                | 5       | 11    | -                                   | 9                | 10      | 16    | -                              | -                | -       | LB    | M, LB                 |
| R.385_A | NCA04_Residential  | 54                    | 3                 | 8                | 9       | 15    | 13                                  | 13               | 14      | 20    | -                              | -                | -       | LB    | M, IB, LB, PC, RO, SN |
| R.386_A | NCA01_Residential  | 57                    | 5                 | 10               | 11      | 17    | 15                                  | 15               | 16      | 22    | -                              | -                | -       | LB    | M, IB, LB, PC, RO, SN |
| R.387_A | NCA01_Residential  | 56                    | 4                 | 9                | 10      | 16    | 14                                  | 14               | 15      | 21    | -                              | -                | -       | LB    | M, IB, LB, PC, RO, SN |
| R.388_A | NCA02_Residential  | 54                    | 2                 | 7                | 8       | 14    | 12                                  | 12               | 13      | 19    | -                              | -                | -       | LB    | M, LB                 |
| R.389_A | NCA04_Residential  | 51                    | 0                 | 5                | 6       | 12    | -                                   | 10               | 11      | 17    | -                              | -                | -       | LB    | M, LB                 |
| R.390_A | NCA01_Residential  | 56                    | 4                 | 9                | 10      | 16    | 14                                  | 14               | 15      | 21    | -                              | -                | -       | LB    | M, IB, LB, PC, RO, SN |
| R.391_A | NCA01_Residential  | 56                    | 4                 | 9                | 10      | 16    | 14                                  | 14               | 15      | 21    | -                              | -                | -       | LB    | M, IB, LB, PC, RO, SN |
| R.392_A | NCA01_Residential  | 54                    | 2                 | 7                | 8       | 14    | 12                                  | 12               | 13      | 19    | -                              | -                | -       | LB    | M, LB                 |
| R.393_A | NCA01_Residential  | 55                    | 3                 | 8                | 9       | 15    | 13                                  | 13               | 14      | 20    | -                              | -                | -       | LB    | M, IB, LB, PC, RO, SN |
| R.394_A | NCA01_Residential  | 50                    | -2                | 3                | 4       | 10    | -                                   | 8                | 9       | 15    | -                              | -                | -       | LB    | M, LB                 |
| R.395_A | NCA01_Residential  | 56                    | 4                 | 9                | 10      | 16    | 14                                  | 14               | 15      | 21    | -                              | -                | -       | LB    | M, IB, LB, PC, RO, SN |
| R.396_A | NCA02_Educational  | 55                    | 0                 | 0                | 0       | 0     | -                                   | -                | -       | -     | -                              | -                | -       | -     | -                     |
| R.397_A | NCA01_Residential  | 55                    | 3                 | 8                | 9       | 15    | 13                                  | 13               | 14      | 20    | -                              | -                | -       | LB    | M, IB, LB, PC, RO, SN |
| R.398_A | NCA01_Residential  | 58                    | 6                 | 11               | 12      | 18    | 16                                  | 16               | 17      | 23    | -                              | -                | -       | LB    | M, IB, LB, PC, RO, SN |
| R.399_A | NCA01_Residential  | 57                    | 5                 | 10               | 11      | 17    | 15                                  | 15               | 16      | 22    | -                              | -                | -       | LB    | M, IB, LB, PC, RO, SN |
| R.400_A | NCA01_Residential  | 55                    | 3                 | 8                | 9       | 15    | 13                                  | 13               | 14      | 20    | -                              | -                | -       | LB    | M, IB, LB, PC, RO, SN |
| R.401_A | NCA04a_Residential | 47                    | -12               | -7               | -4      | 1     | -                                   | -                | -       | 6     | -                              | -                | -       | -     | -                     |
| R.402_A | NCA01_Residential  | 57                    | 5                 | 10               | 11      | 17    | 15                                  | 15               | 16      | 22    | -                              | -                | -       | LB    | M, IB, LB, PC, RO, SN |
| R.403_A | NCA01_Residential  | 57                    | 5                 | 10               | 11      | 17    | 15                                  | 15               | 16      | 22    | -                              | -                | -       | LB    | M, IB, LB, PC, RO, SN |
| R.404_A | NCA01_Residential  | 55                    | 3                 | 8                | 9       | 15    | 13                                  | 13               | 14      | 20    | -                              | -                | -       | LB    | M, IB, LB, PC, RO, SN |
| R.405_A | NCA01_Residential  | 55                    | 3                 | 8                | 9       | 15    | 13                                  | 13               | 14      | 20    | -                              | -                | -       | LB    | M, IB, LB, PC, RO, SN |
| R.406_A | NCA01_Residential  | 56                    | 4                 | 9                | 10      | 16    | 14                                  | 14               | 15      | 21    | -                              | -                | -       | LB    | M, IB, LB, PC, RO, SN |
| R.407_A | NCA01_Residential  | 54                    | 2                 | 7                | 8       | 14    | 12                                  | 12               | 13      | 19    | -                              | -                | -       | LB    | M, LB                 |
| R.408_A | NCA01_Residential  | 54                    | 2                 | 7                | 8       | 14    | 12                                  | 12               | 13      | 19    | -                              | -                | -       | LB    | M, LB                 |
| R.409_A | NCA01_Residential  | 54                    | 2                 | 7                | 8       | 14    | 12                                  | 12               | 13      | 19    | -                              | -                | -       | LB    | M, LB                 |
| R.410_A | NCA01_Residential  | 56                    | 4                 | 9                | 10      | 16    | 14                                  | 14               | 15      | 21    | -                              | -                | -       | LB    | M, IB, LB, PC, RO, SN |
| R.411_A | NCA01_Residential  | 54                    | 2                 | 7                | 8       | 14    | 12                                  | 12               | 13      | 19    | -                              | -                | -       | LB    | M, LB                 |
| R.412_A | NCA01_Residential  | 52                    | 0                 | 5                | 6       | 12    | -                                   | 10               | 11      | 17    | -                              | -                | -       | LB    | M, LB                 |
| R.413_A | NCA04a_Residential | 42                    | -17               | -12              | -9      | -4    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -                     |
| R.414_A | NCA02_Residential  | 53                    | 1                 | 6                | 7       | 13    | 11                                  | 11               | 12      | 18    | -                              | -                | -       | LB    | M, LB                 |
| R.415_A | NCA01a_Residential | 47                    | -12               | -7               | -4      | 1     | -                                   | -                | -       | 6     | -                              | -                | -       | -     | -                     |
| R.416_A | NCA01a_Residential | 51                    | -8                | -3               | 0       | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | -     | M, LB                 |
| R.417_A | NCA01a_Residential | 51                    | -8                | -3               | 0       | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | -     | M, LB                 |
| R.418_A | NCA01a_Residential | 48                    | -11               | -6               | -3      | 2     | -                                   | -                | -       | 7     | -                              | -                | -       | -     | -                     |
| R.419_A | NCA02a_Residential | 53                    | -6                | -1               | 2       | 7     | -                                   | -                | -       | 7     | -                              | -                | -       | -     | M, LB                 |
| R.420_A | NCA02a_Residential | 52                    | -7                | -2               | 1       | 6     | -                                   | -                | -       | 6     | -                              | -                | -       | -     | M, LB                 |









Table D.3b SCN03b Results

| Name    | Description        | Predicted Noise Level | Comparison to NML |                  |         |       | If NML Exceeded - Comparison to RBL |                  |         |       | Mitigation / Management (AMMM) |                  |         |       |
|---------|--------------------|-----------------------|-------------------|------------------|---------|-------|-------------------------------------|------------------|---------|-------|--------------------------------|------------------|---------|-------|
|         |                    |                       | Day Standard      | Day Non-Standard | Evening | Night | Day Standard                        | Day Non-Standard | Evening | Night | Day Standard                   | Day Non-Standard | Evening | Night |
| R.382_A | NCA01_Residential  | 49                    | -3                | 2                | 3       | 9     | -                                   | -                | 7       | 8     | 14                             | -                | -       | M, LB |
| R.383_A | NCA04_Residential  | 43                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | -     | 9                              | -                | -       | -     |
| R.384_A | NCA02_Residential  | 39                    | -13               | -8               | -7      | -1    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.385_A | NCA04_Residential  | 43                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | -     | 9                              | -                | -       | -     |
| R.386_A | NCA01_Residential  | 46                    | -6                | -1               | 0       | 6     | -                                   | -                | -       | -     | 11                             | -                | -       | M, LB |
| R.387_A | NCA01_Residential  | 46                    | -6                | -1               | 0       | 6     | -                                   | -                | -       | -     | 11                             | -                | -       | M, LB |
| R.388_A | NCA02_Residential  | 40                    | -12               | -7               | -6      | 0     | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.389_A | NCA04_Residential  | 41                    | -10               | -5               | -4      | 2     | -                                   | -                | -       | -     | 7                              | -                | -       | -     |
| R.390_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | -     | 10                             | -                | -       | M, LB |
| R.391_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | -     | 10                             | -                | -       | M, LB |
| R.392_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | -     | 8                              | -                | -       | -     |
| R.393_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | -     | 8                              | -                | -       | -     |
| R.394_A | NCA01_Residential  | 41                    | -11               | -6               | -5      | 1     | -                                   | -                | -       | -     | 6                              | -                | -       | -     |
| R.395_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | -     | 10                             | -                | -       | M, LB |
| R.396_A | NCA02_Educational  | 43                    | -12               | -12              | -12     | -12   | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.397_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | -     | 9                              | -                | -       | -     |
| R.398_A | NCA01_Residential  | 47                    | -5                | 0                | 1       | 7     | -                                   | -                | 6       | 12    | -                              | -                | -       | M, LB |
| R.399_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | -     | 10                             | -                | -       | M, LB |
| R.400_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | -     | 9                              | -                | -       | -     |
| R.401_A | NCA04a_Residential | 37                    | -22               | -17              | -14     | -9    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.402_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | -     | 10                             | -                | -       | M, LB |
| R.403_A | NCA01_Residential  | 46                    | -6                | -1               | 0       | 6     | -                                   | -                | -       | -     | 11                             | -                | -       | M, LB |
| R.404_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | -     | 9                              | -                | -       | -     |
| R.405_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | -     | 9                              | -                | -       | -     |
| R.406_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | -     | 10                             | -                | -       | M, LB |
| R.407_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | -     | 8                              | -                | -       | -     |
| R.408_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | -     | 8                              | -                | -       | -     |
| R.409_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | -     | 8                              | -                | -       | -     |
| R.410_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | -     | 9                              | -                | -       | -     |
| R.411_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | -     | 8                              | -                | -       | -     |
| R.412_A | NCA01_Residential  | 41                    | -11               | -6               | -5      | 1     | -                                   | -                | -       | -     | 6                              | -                | -       | -     |
| R.413_A | NCA04a_Residential | 32                    | -27               | -22              | -19     | -14   | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.414_A | NCA02_Residential  | 42                    | -10               | -5               | -4      | 2     | -                                   | -                | -       | -     | 7                              | -                | -       | -     |
| R.415_A | NCA01a_Residential | 34                    | -25               | -20              | -17     | -12   | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.416_A | NCA01a_Residential | 41                    | -18               | -13              | -10     | -5    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.417_A | NCA01a_Residential | 40                    | -19               | -14              | -11     | -6    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.418_A | NCA01a_Residential | 37                    | -22               | -17              | -14     | -9    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.419_A | NCA02a_Residential | 41                    | -18               | -13              | -10     | -5    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.420_A | NCA02a_Residential | 40                    | -19               | -14              | -11     | -6    | -                                   | -                | -       | -     | -                              | -                | -       | -     |







Table D.4 SCN04 Results

| Name    | Description        | Predicted Noise Level | Comparison to NML |                  |         |       | If NML Exceeded - Comparison to RBL |                  |         |       | Mitigation / Management (AMMM) |                  |         |       |
|---------|--------------------|-----------------------|-------------------|------------------|---------|-------|-------------------------------------|------------------|---------|-------|--------------------------------|------------------|---------|-------|
|         |                    |                       | Day Standard      | Day Non-Standard | Evening | Night | Day Standard                        | Day Non-Standard | Evening | Night | Day Standard                   | Day Non-Standard | Evening | Night |
| R.382_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | -     |
| R.383_A | NCA04_Residential  | 40                    | -11               | -6               | -5      | 1     | -                                   | -                | -       | 6     | -                              | -                | -       | -     |
| R.384_A | NCA02_Residential  | 37                    | -15               | -10              | -9      | -3    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.385_A | NCA04_Residential  | 39                    | -12               | -7               | -6      | 0     | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.386_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | 9     | -                              | -                | -       | -     |
| R.387_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | 9     | -                              | -                | -       | -     |
| R.388_A | NCA02_Residential  | 36                    | -16               | -11              | -10     | -4    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.389_A | NCA04_Residential  | 38                    | -13               | -8               | -7      | 1     | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.390_A | NCA01_Residential  | 42                    | -10               | -5               | -4      | 2     | -                                   | -                | -       | 7     | -                              | -                | -       | -     |
| R.391_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | 8     | -                              | -                | -       | -     |
| R.392_A | NCA01_Residential  | 41                    | -11               | -6               | -5      | 1     | -                                   | -                | -       | 6     | -                              | -                | -       | -     |
| R.393_A | NCA01_Residential  | 41                    | -11               | -6               | -5      | 1     | -                                   | -                | -       | 6     | -                              | -                | -       | -     |
| R.394_A | NCA01_Residential  | 36                    | -16               | -11              | -10     | -4    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.395_A | NCA01_Residential  | 41                    | -11               | -6               | -5      | 1     | -                                   | -                | -       | 6     | -                              | -                | -       | -     |
| R.396_A | NCA02_Educational  | 36                    | -19               | -19              | -19     | -     | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.397_A | NCA01_Residential  | 42                    | -10               | -5               | -4      | 2     | -                                   | -                | -       | 7     | -                              | -                | -       | -     |
| R.398_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | 9     | -                              | -                | -       | -     |
| R.399_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | 8     | -                              | -                | -       | -     |
| R.400_A | NCA01_Residential  | 42                    | -10               | -5               | -4      | 2     | -                                   | -                | -       | 7     | -                              | -                | -       | -     |
| R.401_A | NCA04a_Residential | 34                    | -25               | -20              | -17     | -12   | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.402_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | 8     | -                              | -                | -       | -     |
| R.403_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | 8     | -                              | -                | -       | -     |
| R.404_A | NCA01_Residential  | 42                    | -10               | -5               | -4      | 2     | -                                   | -                | -       | 7     | -                              | -                | -       | -     |
| R.405_A | NCA01_Residential  | 42                    | -10               | -5               | -4      | 2     | -                                   | -                | -       | 7     | -                              | -                | -       | -     |
| R.406_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | 8     | -                              | -                | -       | -     |
| R.407_A | NCA01_Residential  | 41                    | -11               | -6               | -5      | 1     | -                                   | -                | -       | 6     | -                              | -                | -       | -     |
| R.408_A | NCA01_Residential  | 42                    | -10               | -5               | -4      | 2     | -                                   | -                | -       | 7     | -                              | -                | -       | -     |
| R.409_A | NCA01_Residential  | 42                    | -10               | -5               | -4      | 2     | -                                   | -                | -       | 7     | -                              | -                | -       | -     |
| R.410_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | 8     | -                              | -                | -       | -     |
| R.411_A | NCA01_Residential  | 41                    | -11               | -6               | -5      | 1     | -                                   | -                | -       | 6     | -                              | -                | -       | -     |
| R.412_A | NCA01_Residential  | 40                    | -12               | -7               | -6      | 0     | -                                   | -                | -       | 6     | -                              | -                | -       | -     |
| R.413_A | NCA04a_Residential | 30                    | -29               | -24              | -21     | -16   | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.414_A | NCA02_Residential  | 40                    | -12               | -7               | -6      | 0     | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.415_A | NCA01a_Residential | 34                    | -25               | -20              | -17     | -12   | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.416_A | NCA01a_Residential | 39                    | -20               | -15              | -12     | -7    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.417_A | NCA01a_Residential | 39                    | -20               | -15              | -12     | -7    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.418_A | NCA01a_Residential | 38                    | -21               | -16              | -13     | -8    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.419_A | NCA02a_Residential | 39                    | -20               | -15              | -12     | -7    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.420_A | NCA02a_Residential | 38                    | -21               | -16              | -13     | -8    | -                                   | -                | -       | -     | -                              | -                | -       | -     |









Table D.5 SCN05 Results

| Name    | Description        | Predicted Noise Level | Comparison to NML |                  |         |       | If NML Exceeded - Comparison to RBL |                  |         |       | Mitigation / Management (AMMM) |                  |         |       |
|---------|--------------------|-----------------------|-------------------|------------------|---------|-------|-------------------------------------|------------------|---------|-------|--------------------------------|------------------|---------|-------|
|         |                    |                       | Day Standard      | Day Non-Standard | Evening | Night | Day Standard                        | Day Non-Standard | Evening | Night | Day Standard                   | Day Non-Standard | Evening | Night |
| R.382_A | NCA01_Residential  | 47                    | -5                | 0                | 1       | 7     | -                                   | -                | 6       | 12    | -                              | -                | -       | M, LB |
| R.383_A | NCA04_Residential  | 42                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | 8     | -                              | -                | -       | -     |
| R.384_A | NCA02_Residential  | 39                    | -13               | -8               | -7      | -1    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.385_A | NCA04_Residential  | 42                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | 8     | -                              | -                | -       | -     |
| R.386_A | NCA01_Residential  | 46                    | -6                | -1               | 0       | 6     | -                                   | -                | -       | 11    | -                              | -                | -       | M, LB |
| R.387_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | M, LB |
| R.388_A | NCA02_Residential  | 39                    | -13               | -8               | -7      | -1    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.389_A | NCA04_Residential  | 40                    | -11               | -6               | -5      | 1     | -                                   | -                | -       | 6     | -                              | -                | -       | -     |
| R.390_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | 8     | -                              | -                | -       | -     |
| R.391_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | M, LB |
| R.392_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | M, LB |
| R.393_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | 8     | -                              | -                | -       | -     |
| R.394_A | NCA01_Residential  | 41                    | -11               | -6               | -5      | 1     | -                                   | -                | -       | 6     | -                              | -                | -       | -     |
| R.395_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | 8     | -                              | -                | -       | -     |
| R.396_A | NCA02_Educational  | 41                    | -14               | -14              | -14     | -14   | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.397_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | 9     | -                              | -                | -       | -     |
| R.398_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | M, LB |
| R.399_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | M, LB |
| R.400_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | 9     | -                              | -                | -       | -     |
| R.401_A | NCA04a_Residential | 37                    | -22               | -17              | -14     | -9    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.402_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | M, LB |
| R.403_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | M, LB |
| R.404_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | 9     | -                              | -                | -       | -     |
| R.405_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | M, LB |
| R.406_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | M, LB |
| R.407_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | 9     | -                              | -                | -       | -     |
| R.408_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | 9     | -                              | -                | -       | -     |
| R.409_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | 9     | -                              | -                | -       | -     |
| R.410_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | 9     | -                              | -                | -       | -     |
| R.411_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | 8     | -                              | -                | -       | -     |
| R.412_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | 8     | -                              | -                | -       | -     |
| R.413_A | NCA04a_Residential | 34                    | -25               | -20              | -17     | -12   | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.414_A | NCA02_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | 8     | -                              | -                | -       | -     |
| R.415_A | NCA01a_Residential | 38                    | -21               | -16              | -13     | -8    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.416_A | NCA01a_Residential | 42                    | -17               | -12              | -9      | -4    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.417_A | NCA01a_Residential | 42                    | -17               | -12              | -9      | -4    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.418_A | NCA01a_Residential | 41                    | -18               | -13              | -10     | -5    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.419_A | NCA02a_Residential | 42                    | -17               | -12              | -9      | -4    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.420_A | NCA02a_Residential | 42                    | -17               | -12              | -9      | -4    | -                                   | -                | -       | -     | -                              | -                | -       | -     |





Table D.6 SCN06 Results

Table with columns: Name, Description, Predicted Noise Level, Comparison to NML (Day Standard, Day Non-Standard, Evening, Night), If NML Exceeded - Comparison to RBL (Day Standard, Day Non-Standard, Evening, Night), and Mitigation / Management (AMMM) (Day Standard, Day Non-Standard, Evening, Night). Rows list various noise sources (e.g., R.255\_A to R.381\_A) with their predicted noise levels and comparison details.

Table D.6 SCN06 Results

| Name    | Description        | Predicted Noise Level | Comparison to NML |                  |         |       | If NML Exceeded - Comparison to RBL |                  |         |       | Mitigation / Management (AMMM) |                  |         |       |
|---------|--------------------|-----------------------|-------------------|------------------|---------|-------|-------------------------------------|------------------|---------|-------|--------------------------------|------------------|---------|-------|
|         |                    |                       | Day Standard      | Day Non-Standard | Evening | Night | Day Standard                        | Day Non-Standard | Evening | Night | Day Standard                   | Day Non-Standard | Evening | Night |
| R.382_A | NCA01_Residential  | 49                    | -3                | 2                | 3       | 9     | -                                   | -                | -       | -     | -                              | -                | -       | M, LB |
| R.383_A | NCA04_Residential  | 43                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.384_A | NCA02_Residential  | 40                    | -12               | -7               | -6      | 0     | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.385_A | NCA04_Residential  | 43                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.386_A | NCA01_Residential  | 47                    | -5                | 0                | 1       | 7     | -                                   | -                | 6       | 12    | -                              | -                | -       | M, LB |
| R.387_A | NCA01_Residential  | 47                    | -5                | 0                | 1       | 7     | -                                   | -                | 6       | 12    | -                              | -                | -       | M, LB |
| R.388_A | NCA02_Residential  | 41                    | -11               | -6               | -5      | 1     | -                                   | -                | -       | 6     | -                              | -                | -       | -     |
| R.389_A | NCA04_Residential  | 41                    | -10               | -5               | -4      | 2     | -                                   | -                | -       | 7     | -                              | -                | -       | -     |
| R.390_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | M, LB |
| R.391_A | NCA01_Residential  | 46                    | -6                | -1               | 0       | 6     | -                                   | -                | -       | 11    | -                              | -                | -       | M, LB |
| R.392_A | NCA01_Residential  | 46                    | -6                | -1               | 0       | 6     | -                                   | -                | -       | 11    | -                              | -                | -       | M, LB |
| R.393_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | 9     | -                              | -                | -       | -     |
| R.394_A | NCA01_Residential  | 42                    | -10               | -5               | -4      | 2     | -                                   | -                | -       | 7     | -                              | -                | -       | -     |
| R.395_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | M, LB |
| R.396_A | NCA02_Educational  | 42                    | -13               | -13              | -13     | -13   | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.397_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | M, LB |
| R.398_A | NCA01_Residential  | 47                    | -5                | 0                | 1       | 7     | -                                   | -                | 6       | 12    | -                              | -                | -       | M, LB |
| R.399_A | NCA01_Residential  | 46                    | -6                | -1               | 0       | 6     | -                                   | -                | -       | 11    | -                              | -                | -       | M, LB |
| R.400_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | M, LB |
| R.401_A | NCA04a_Residential | 38                    | -21               | -16              | -13     | -8    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.402_A | NCA01_Residential  | 46                    | -6                | -1               | 0       | 6     | -                                   | -                | -       | 11    | -                              | -                | -       | M, LB |
| R.403_A | NCA01_Residential  | 47                    | -5                | 0                | 1       | 7     | -                                   | -                | 6       | 12    | -                              | -                | -       | M, LB |
| R.404_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | M, LB |
| R.405_A | NCA01_Residential  | 46                    | -6                | -1               | 0       | 6     | -                                   | -                | -       | 11    | -                              | -                | -       | M, LB |
| R.406_A | NCA01_Residential  | 46                    | -6                | -1               | 0       | 6     | -                                   | -                | -       | 11    | -                              | -                | -       | M, LB |
| R.407_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | M, LB |
| R.408_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | M, LB |
| R.409_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | M, LB |
| R.410_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | M, LB |
| R.411_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | 9     | -                              | -                | -       | -     |
| R.412_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | 8     | -                              | -                | -       | -     |
| R.413_A | NCA04a_Residential | 35                    | -24               | -19              | -16     | -11   | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.414_A | NCA02_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | 9     | -                              | -                | -       | -     |
| R.415_A | NCA01a_Residential | 38                    | -21               | -16              | -13     | -8    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.416_A | NCA01a_Residential | 43                    | -16               | -11              | -8      | -3    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.417_A | NCA01a_Residential | 43                    | -16               | -11              | -8      | -3    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.418_A | NCA01a_Residential | 41                    | -18               | -13              | -10     | -5    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.419_A | NCA02a_Residential | 43                    | -16               | -11              | -8      | -3    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.420_A | NCA02a_Residential | 42                    | -17               | -12              | -9      | -4    | -                                   | -                | -       | -     | -                              | -                | -       | -     |

















Table D.8 SCN08 Results

| Name    | Description        | Predicted Noise Level | Comparison to NML |                  |         |       | If NML Exceeded - Comparison to RBL |                  |         |       | Mitigation / Management (AMMM) |                  |         |       |
|---------|--------------------|-----------------------|-------------------|------------------|---------|-------|-------------------------------------|------------------|---------|-------|--------------------------------|------------------|---------|-------|
|         |                    |                       | Day Standard      | Day Non-Standard | Evening | Night | Day Standard                        | Day Non-Standard | Evening | Night | Day Standard                   | Day Non-Standard | Evening | Night |
| R.382_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | M, LB |
| R.383_A | NCA04_Residential  | 40                    | -11               | -6               | -5      | 1     | -                                   | -                | -       | 6     | -                              | -                | -       | -     |
| R.384_A | NCA02_Residential  | 34                    | -18               | -13              | -12     | -6    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.385_A | NCA04_Residential  | 40                    | -11               | -6               | -5      | 1     | -                                   | -                | -       | 6     | -                              | -                | -       | -     |
| R.386_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | M, LB |
| R.387_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | M, LB |
| R.388_A | NCA02_Residential  | 36                    | -16               | -11              | -10     | -4    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.389_A | NCA04_Residential  | 39                    | -12               | -7               | -6      | 0     | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.390_A | NCA01_Residential  | 40                    | -12               | -7               | -6      | 0     | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.391_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | 9     | -                              | -                | -       | -     |
| R.392_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | 9     | -                              | -                | -       | -     |
| R.393_A | NCA01_Residential  | 42                    | -10               | -5               | -4      | 2     | -                                   | -                | -       | 7     | -                              | -                | -       | -     |
| R.394_A | NCA01_Residential  | 40                    | -12               | -7               | -6      | 0     | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.395_A | NCA01_Residential  | 42                    | -10               | -5               | -4      | 2     | -                                   | -                | -       | 7     | -                              | -                | -       | -     |
| R.396_A | NCA02_Educational  | 37                    | -18               | -18              | -18     | -18   | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.397_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | 9     | -                              | -                | -       | -     |
| R.398_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | 9     | -                              | -                | -       | -     |
| R.399_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | 8     | -                              | -                | -       | -     |
| R.400_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | 9     | -                              | -                | -       | -     |
| R.401_A | NCA04a_Residential | 36                    | -23               | -18              | -15     | -10   | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.402_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | 9     | -                              | -                | -       | -     |
| R.403_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | 9     | -                              | -                | -       | -     |
| R.404_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | 9     | -                              | -                | -       | -     |
| R.405_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | 9     | -                              | -                | -       | -     |
| R.406_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | 9     | -                              | -                | -       | -     |
| R.407_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | 9     | -                              | -                | -       | -     |
| R.408_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | 8     | -                              | -                | -       | -     |
| R.409_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | 8     | -                              | -                | -       | -     |
| R.410_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | 8     | -                              | -                | -       | -     |
| R.411_A | NCA01_Residential  | 42                    | -10               | -5               | -4      | 2     | -                                   | -                | -       | 7     | -                              | -                | -       | -     |
| R.412_A | NCA01_Residential  | 42                    | -10               | -5               | -4      | 2     | -                                   | -                | -       | 7     | -                              | -                | -       | -     |
| R.413_A | NCA04a_Residential | 32                    | -27               | -22              | -19     | -14   | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.414_A | NCA02_Residential  | 42                    | -10               | -5               | -4      | 2     | -                                   | -                | -       | 7     | -                              | -                | -       | -     |
| R.415_A | NCA01a_Residential | 36                    | -23               | -18              | -15     | -10   | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.416_A | NCA01a_Residential | 42                    | -17               | -12              | -9      | -4    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.417_A | NCA01a_Residential | 41                    | -18               | -13              | -10     | -5    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.418_A | NCA01a_Residential | 41                    | -18               | -13              | -10     | -5    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.419_A | NCA02a_Residential | 41                    | -18               | -13              | -10     | -5    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.420_A | NCA02a_Residential | 40                    | -19               | -14              | -11     | -6    | -                                   | -                | -       | -     | -                              | -                | -       | -     |









Table D.9 SCN09 Results

| Name    | Description        | Predicted Noise Level | Comparison to NML |                  |         |       | If NML Exceeded - Comparison to RBL |                  |         |       | Mitigation / Management (AMMM) |                  |         |       |
|---------|--------------------|-----------------------|-------------------|------------------|---------|-------|-------------------------------------|------------------|---------|-------|--------------------------------|------------------|---------|-------|
|         |                    |                       | Day Standard      | Day Non-Standard | Evening | Night | Day Standard                        | Day Non-Standard | Evening | Night | Day Standard                   | Day Non-Standard | Evening | Night |
| R.382_A | NCA01_Residential  | 47                    | -5                | 0                | 1       | 7     | -                                   | -                | 6       | 12    | -                              | -                | -       | M, LB |
| R.383_A | NCA04_Residential  | 41                    | -10               | -5               | -4      | 2     | -                                   | -                | -       | 7     | -                              | -                | -       | -     |
| R.384_A | NCA02_Residential  | 38                    | -14               | -9               | -8      | -2    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.385_A | NCA04_Residential  | 41                    | -10               | -5               | -4      | 2     | -                                   | -                | -       | 7     | -                              | -                | -       | -     |
| R.386_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | M, LB |
| R.387_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | M, LB |
| R.388_A | NCA02_Residential  | 38                    | -14               | -9               | -8      | -2    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.389_A | NCA04_Residential  | 39                    | -12               | -7               | -6      | 0     | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.390_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | 8     | -                              | -                | -       | -     |
| R.391_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | M, LB |
| R.392_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | 9     | -                              | -                | -       | -     |
| R.393_A | NCA01_Residential  | 42                    | -10               | -5               | -4      | 2     | -                                   | -                | -       | 7     | -                              | -                | -       | -     |
| R.394_A | NCA01_Residential  | 40                    | -12               | -7               | -6      | 0     | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.395_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | 8     | -                              | -                | -       | -     |
| R.396_A | NCA02_Educational  | 40                    | -15               | -15              | -15     | -15   | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.397_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | 8     | -                              | -                | -       | -     |
| R.398_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | M, LB |
| R.399_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | M, LB |
| R.400_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | 8     | -                              | -                | -       | -     |
| R.401_A | NCA04a_Residential | 36                    | -23               | -18              | -15     | -10   | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.402_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | 9     | -                              | -                | -       | -     |
| R.403_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | M, LB |
| R.404_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | 8     | -                              | -                | -       | -     |
| R.405_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | 9     | -                              | -                | -       | -     |
| R.406_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | 9     | -                              | -                | -       | -     |
| R.407_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | 8     | -                              | -                | -       | -     |
| R.408_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | 8     | -                              | -                | -       | -     |
| R.409_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | 8     | -                              | -                | -       | -     |
| R.410_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | 9     | -                              | -                | -       | -     |
| R.411_A | NCA01_Residential  | 42                    | -10               | -5               | -4      | 2     | -                                   | -                | -       | 7     | -                              | -                | -       | -     |
| R.412_A | NCA01_Residential  | 41                    | -11               | -6               | -5      | 1     | -                                   | -                | -       | 6     | -                              | -                | -       | -     |
| R.413_A | NCA04a_Residential | 32                    | -27               | -22              | -19     | -14   | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.414_A | NCA02_Residential  | 42                    | -10               | -5               | -4      | 2     | -                                   | -                | -       | 7     | -                              | -                | -       | -     |
| R.415_A | NCA01a_Residential | 35                    | -24               | -19              | -16     | -11   | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.416_A | NCA01a_Residential | 41                    | -18               | -13              | -10     | -5    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.417_A | NCA01a_Residential | 41                    | -18               | -13              | -10     | -5    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.418_A | NCA01a_Residential | 39                    | -20               | -15              | -12     | -7    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.419_A | NCA02a_Residential | 41                    | -18               | -13              | -10     | -5    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.420_A | NCA02a_Residential | 40                    | -19               | -14              | -11     | -6    | -                                   | -                | -       | -     | -                              | -                | -       | -     |







Table D.10 SCN10 Results

| Name    | Description        | Predicted Noise Level | Comparison to NML |                  |         |       | If NML Exceeded - Comparison to RBL |                  |         |       | Mitigation / Management (AMMM) |                  |         |       |
|---------|--------------------|-----------------------|-------------------|------------------|---------|-------|-------------------------------------|------------------|---------|-------|--------------------------------|------------------|---------|-------|
|         |                    |                       | Day Standard      | Day Non-Standard | Evening | Night | Day Standard                        | Day Non-Standard | Evening | Night | Day Standard                   | Day Non-Standard | Evening | Night |
| R.382_A | NCA01_Residential  | 47                    | -5                | 0                | 1       | 7     | -                                   | -                | 6       | 12    | -                              | -                | -       | M, LB |
| R.383_A | NCA04_Residential  | 42                    | -9                | -4               | -3      | 3     | -                                   | -                | 8       | -     | -                              | -                | -       | -     |
| R.384_A | NCA02_Residential  | 41                    | -11               | -6               | -5      | 1     | -                                   | -                | 6       | -     | -                              | -                | -       | -     |
| R.385_A | NCA04_Residential  | 42                    | -9                | -4               | -3      | 3     | -                                   | -                | 8       | -     | -                              | -                | -       | -     |
| R.386_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | 10      | -     | -                              | -                | -       | M, LB |
| R.387_A | NCA01_Residential  | 46                    | -6                | -1               | 0       | 6     | -                                   | -                | 11      | -     | -                              | -                | -       | M, LB |
| R.388_A | NCA02_Residential  | 39                    | -13               | -8               | -7      | -1    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.389_A | NCA04_Residential  | 41                    | -10               | -5               | -4      | 2     | -                                   | -                | 7       | -     | -                              | -                | -       | -     |
| R.390_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | 8       | -     | -                              | -                | -       | -     |
| R.391_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | 10      | -     | -                              | -                | -       | M, LB |
| R.392_A | NCA01_Residential  | 47                    | -5                | 0                | 1       | 7     | -                                   | -                | 6       | 12    | -                              | -                | -       | M, LB |
| R.393_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | 8       | -     | -                              | -                | -       | -     |
| R.394_A | NCA01_Residential  | 38                    | -14               | -9               | -8      | -2    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.395_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | 8       | -     | -                              | -                | -       | -     |
| R.396_A | NCA02_Educational  | 41                    | -14               | -14              | -14     | -14   | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.397_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | 9       | -     | -                              | -                | -       | -     |
| R.398_A | NCA01_Residential  | 46                    | -6                | -1               | 0       | 6     | -                                   | -                | 11      | -     | -                              | -                | -       | M, LB |
| R.399_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | 10      | -     | -                              | -                | -       | M, LB |
| R.400_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | 10      | -     | -                              | -                | -       | M, LB |
| R.401_A | NCA04a_Residential | 38                    | -21               | -16              | -13     | -8    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.402_A | NCA01_Residential  | 46                    | -6                | -1               | 0       | 6     | -                                   | -                | 11      | -     | -                              | -                | -       | M, LB |
| R.403_A | NCA01_Residential  | 46                    | -6                | -1               | 0       | 6     | -                                   | -                | 11      | -     | -                              | -                | -       | M, LB |
| R.404_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | 9       | -     | -                              | -                | -       | -     |
| R.405_A | NCA01_Residential  | 46                    | -6                | -1               | 0       | 6     | -                                   | -                | 11      | -     | -                              | -                | -       | M, LB |
| R.406_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | 10      | -     | -                              | -                | -       | M, LB |
| R.407_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | 9       | -     | -                              | -                | -       | -     |
| R.408_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | 10      | -     | -                              | -                | -       | M, LB |
| R.409_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | 9       | -     | -                              | -                | -       | -     |
| R.410_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | 10      | -     | -                              | -                | -       | M, LB |
| R.411_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | 9       | -     | -                              | -                | -       | -     |
| R.412_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | 8       | -     | -                              | -                | -       | -     |
| R.413_A | NCA04a_Residential | 34                    | -25               | -20              | -17     | -12   | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.414_A | NCA02_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | 9       | -     | -                              | -                | -       | -     |
| R.415_A | NCA01a_Residential | 38                    | -21               | -16              | -13     | -8    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.416_A | NCA01a_Residential | 43                    | -16               | -11              | -8      | -3    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.417_A | NCA01a_Residential | 43                    | -16               | -11              | -8      | -3    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.418_A | NCA01a_Residential | 42                    | -17               | -12              | -9      | -4    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.419_A | NCA02a_Residential | 43                    | -16               | -11              | -8      | -3    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.420_A | NCA02a_Residential | 42                    | -17               | -12              | -9      | -4    | -                                   | -                | -       | -     | -                              | -                | -       | -     |









Table D.11a SCN11a Results

| Name    | Description        | Predicted Noise Level | Comparison to NML |                  |         |       | If NML Exceeded - Comparison to RBL |                  |         |       | Mitigation / Management (AMMM) |                  |         |       |
|---------|--------------------|-----------------------|-------------------|------------------|---------|-------|-------------------------------------|------------------|---------|-------|--------------------------------|------------------|---------|-------|
|         |                    |                       | Day Standard      | Day Non-Standard | Evening | Night | Day Standard                        | Day Non-Standard | Evening | Night | Day Standard                   | Day Non-Standard | Evening | Night |
| R.382_A | NCA01_Residential  | 46                    | -6                | -1               | 0       | 6     | -                                   | -                | 11      | -     | -                              | -                | M, LB   |       |
| R.383_A | NCA04_Residential  | 40                    | -11               | -6               | -5      | 1     | -                                   | -                | 6       | -     | -                              | -                | -       |       |
| R.384_A | NCA02_Residential  | 39                    | -13               | -8               | -7      | -1    | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.385_A | NCA04_Residential  | 40                    | -11               | -6               | -5      | 1     | -                                   | -                | 6       | -     | -                              | -                | -       |       |
| R.386_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | 9       | -     | -                              | -                | -       |       |
| R.387_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | 10      | -     | -                              | -                | M, LB   |       |
| R.388_A | NCA02_Residential  | 37                    | -15               | -10              | -9      | -3    | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.389_A | NCA04_Residential  | 40                    | -11               | -6               | -5      | 1     | -                                   | -                | 6       | -     | -                              | -                | -       |       |
| R.390_A | NCA01_Residential  | 42                    | -10               | -5               | -4      | 2     | -                                   | -                | 7       | -     | -                              | -                | -       |       |
| R.391_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | 9       | -     | -                              | -                | -       |       |
| R.392_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | 10      | -     | -                              | -                | M, LB   |       |
| R.393_A | NCA01_Residential  | 42                    | -10               | -5               | -4      | 2     | -                                   | -                | 7       | -     | -                              | -                | -       |       |
| R.394_A | NCA01_Residential  | 36                    | -16               | -11              | -10     | -4    | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.395_A | NCA01_Residential  | 41                    | -11               | -6               | -5      | 1     | -                                   | -                | 6       | -     | -                              | -                | -       |       |
| R.396_A | NCA02_Educational  | 40                    | -15               | -15              | -15     | -     | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.397_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | 8       | -     | -                              | -                | -       |       |
| R.398_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | 9       | -     | -                              | -                | -       |       |
| R.399_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | 8       | -     | -                              | -                | -       |       |
| R.400_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | 8       | -     | -                              | -                | -       |       |
| R.401_A | NCA04a_Residential | 36                    | -23               | -18              | -15     | -10   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.402_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | 9       | -     | -                              | -                | -       |       |
| R.403_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | 10      | -     | -                              | -                | M, LB   |       |
| R.404_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | 8       | -     | -                              | -                | -       |       |
| R.405_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | 9       | -     | -                              | -                | -       |       |
| R.406_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | 8       | -     | -                              | -                | -       |       |
| R.407_A | NCA01_Residential  | 42                    | -10               | -5               | -4      | 2     | -                                   | -                | 7       | -     | -                              | -                | -       |       |
| R.408_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | 8       | -     | -                              | -                | -       |       |
| R.409_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | 8       | -     | -                              | -                | -       |       |
| R.410_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | 9       | -     | -                              | -                | -       |       |
| R.411_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | 8       | -     | -                              | -                | -       |       |
| R.412_A | NCA01_Residential  | 41                    | -11               | -6               | -5      | 1     | -                                   | -                | 6       | -     | -                              | -                | -       |       |
| R.413_A | NCA04a_Residential | 32                    | -27               | -22              | -19     | -14   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.414_A | NCA02_Residential  | 42                    | -10               | -5               | -4      | 2     | -                                   | -                | 7       | -     | -                              | -                | -       |       |
| R.415_A | NCA01a_Residential | 36                    | -23               | -18              | -15     | -10   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.416_A | NCA01a_Residential | 41                    | -18               | -13              | -10     | -5    | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.417_A | NCA01a_Residential | 42                    | -17               | -12              | -9      | -4    | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.418_A | NCA01a_Residential | 40                    | -19               | -14              | -11     | -6    | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.419_A | NCA02a_Residential | 42                    | -17               | -12              | -9      | -4    | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.420_A | NCA02a_Residential | 41                    | -18               | -13              | -10     | -5    | -                                   | -                | -       | -     | -                              | -                | -       |       |







Table D.11b SCN11b Results

| Name    | Description        | Predicted Noise Level | Comparison to NML |                  |         |       | If NML Exceeded - Comparison to RBL |                  |         |       | Mitigation / Management (AMMM) |                  |         |       |
|---------|--------------------|-----------------------|-------------------|------------------|---------|-------|-------------------------------------|------------------|---------|-------|--------------------------------|------------------|---------|-------|
|         |                    |                       | Day Standard      | Day Non-Standard | Evening | Night | Day Standard                        | Day Non-Standard | Evening | Night | Day Standard                   | Day Non-Standard | Evening | Night |
| R.382_A | NCA01_Residential  | 46                    | -6                | -1               | 0       | 6     | -                                   | -                | -       | 11    | -                              | -                | -       | M, LB |
| R.383_A | NCA04_Residential  | 42                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | 8     | -                              | -                | -       | -     |
| R.384_A | NCA02_Residential  | 40                    | -12               | -7               | -6      | 0     | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.385_A | NCA04_Residential  | 42                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | 8     | -                              | -                | -       | -     |
| R.386_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | M, LB |
| R.387_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | M, LB |
| R.388_A | NCA02_Residential  | 39                    | -13               | -8               | -7      | -1    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.389_A | NCA04_Residential  | 40                    | -11               | -6               | -5      | 1     | -                                   | -                | -       | 6     | -                              | -                | -       | -     |
| R.390_A | NCA01_Residential  | 42                    | -10               | -5               | -4      | 2     | -                                   | -                | -       | 7     | -                              | -                | -       | -     |
| R.391_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | 8     | -                              | -                | -       | -     |
| R.392_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | 9     | -                              | -                | -       | -     |
| R.393_A | NCA01_Residential  | 41                    | -11               | -6               | -5      | 1     | -                                   | -                | -       | 6     | -                              | -                | -       | -     |
| R.394_A | NCA01_Residential  | 38                    | -14               | -9               | -8      | -2    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.395_A | NCA01_Residential  | 42                    | -10               | -5               | -4      | 2     | -                                   | -                | -       | 7     | -                              | -                | -       | -     |
| R.396_A | NCA02_Educational  | 40                    | -15               | -15              | -15     | -15   | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.397_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | 8     | -                              | -                | -       | -     |
| R.398_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | 9     | -                              | -                | -       | -     |
| R.399_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | M, LB |
| R.400_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | 8     | -                              | -                | -       | -     |
| R.401_A | NCA04a_Residential | 38                    | -21               | -16              | -13     | -8    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.402_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | 9     | -                              | -                | -       | -     |
| R.403_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | M, LB |
| R.404_A | NCA01_Residential  | 42                    | -10               | -5               | -4      | 2     | -                                   | -                | -       | 7     | -                              | -                | -       | -     |
| R.405_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | 8     | -                              | -                | -       | -     |
| R.406_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | 8     | -                              | -                | -       | -     |
| R.407_A | NCA01_Residential  | 42                    | -10               | -5               | -4      | 2     | -                                   | -                | -       | 7     | -                              | -                | -       | -     |
| R.408_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | 8     | -                              | -                | -       | -     |
| R.409_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | 8     | -                              | -                | -       | -     |
| R.410_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | 9     | -                              | -                | -       | -     |
| R.411_A | NCA01_Residential  | 42                    | -10               | -5               | -4      | 2     | -                                   | -                | -       | 7     | -                              | -                | -       | -     |
| R.412_A | NCA01_Residential  | 41                    | -11               | -6               | -5      | 1     | -                                   | -                | -       | 6     | -                              | -                | -       | -     |
| R.413_A | NCA04a_Residential | 35                    | -24               | -19              | -16     | -11   | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.414_A | NCA02_Residential  | 42                    | -10               | -5               | -4      | 2     | -                                   | -                | -       | 7     | -                              | -                | -       | -     |
| R.415_A | NCA01a_Residential | 36                    | -23               | -18              | -15     | -10   | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.416_A | NCA01a_Residential | 40                    | -19               | -14              | -11     | -6    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.417_A | NCA01a_Residential | 40                    | -19               | -14              | -11     | -6    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.418_A | NCA01a_Residential | 39                    | -20               | -15              | -12     | -7    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.419_A | NCA02a_Residential | 40                    | -19               | -14              | -11     | -6    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.420_A | NCA02a_Residential | 39                    | -20               | -15              | -12     | -7    | -                                   | -                | -       | -     | -                              | -                | -       | -     |









Table D.12 SCN12 Results

| Name    | Description        | Predicted Noise Level | Comparison to NML |                  |         |       | If NML Exceeded - Comparison to RBL |                  |         |       | Mitigation / Management (AMMM) |                  |         |       |
|---------|--------------------|-----------------------|-------------------|------------------|---------|-------|-------------------------------------|------------------|---------|-------|--------------------------------|------------------|---------|-------|
|         |                    |                       | Day Standard      | Day Non-Standard | Evening | Night | Day Standard                        | Day Non-Standard | Evening | Night | Day Standard                   | Day Non-Standard | Evening | Night |
| R.382_A | NCA01_Residential  | 48                    | -4                | 1                | 2       | 8     | -                                   | -                | -       | 13    | -                              | -                | -       | M, LB |
| R.383_A | NCA04_Residential  | 42                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | 8     | -                              | -                | -       | -     |
| R.384_A | NCA02_Residential  | 38                    | -14               | -9               | -8      | -2    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.385_A | NCA04_Residential  | 41                    | -10               | -5               | -4      | 2     | -                                   | -                | -       | 7     | -                              | -                | -       | -     |
| R.386_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | M, LB |
| R.387_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | M, LB |
| R.388_A | NCA02_Residential  | 39                    | -13               | -8               | -7      | -1    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.389_A | NCA04_Residential  | 40                    | -11               | -6               | -5      | 1     | -                                   | -                | -       | 6     | -                              | -                | -       | -     |
| R.390_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | 8     | -                              | -                | -       | -     |
| R.391_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | M, LB |
| R.392_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | 9     | -                              | -                | -       | -     |
| R.393_A | NCA01_Residential  | 42                    | -10               | -5               | -4      | 2     | -                                   | -                | -       | 7     | -                              | -                | -       | -     |
| R.394_A | NCA01_Residential  | 40                    | -12               | -7               | -6      | 0     | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.395_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | 8     | -                              | -                | -       | -     |
| R.396_A | NCA02_Educational  | 41                    | -14               | -14              | -14     | -14   | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.397_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | 9     | -                              | -                | -       | -     |
| R.398_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | M, LB |
| R.399_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | M, LB |
| R.400_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | 9     | -                              | -                | -       | -     |
| R.401_A | NCA04a_Residential | 36                    | -23               | -18              | -15     | -10   | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.402_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | 9     | -                              | -                | -       | -     |
| R.403_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | M, LB |
| R.404_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | 8     | -                              | -                | -       | -     |
| R.405_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | 9     | -                              | -                | -       | -     |
| R.406_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | 9     | -                              | -                | -       | -     |
| R.407_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | 8     | -                              | -                | -       | -     |
| R.408_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | 8     | -                              | -                | -       | -     |
| R.409_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | 8     | -                              | -                | -       | -     |
| R.410_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | 9     | -                              | -                | -       | -     |
| R.411_A | NCA01_Residential  | 42                    | -10               | -5               | -4      | 2     | -                                   | -                | -       | 7     | -                              | -                | -       | -     |
| R.412_A | NCA01_Residential  | 41                    | -11               | -6               | -5      | 1     | -                                   | -                | -       | 6     | -                              | -                | -       | -     |
| R.413_A | NCA04a_Residential | 32                    | -27               | -22              | -19     | -14   | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.414_A | NCA02_Residential  | 42                    | -10               | -5               | -4      | 2     | -                                   | -                | -       | 7     | -                              | -                | -       | -     |
| R.415_A | NCA01a_Residential | 35                    | -24               | -19              | -16     | -11   | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.416_A | NCA01a_Residential | 41                    | -18               | -13              | -10     | -5    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.417_A | NCA01a_Residential | 41                    | -18               | -13              | -10     | -5    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.418_A | NCA01a_Residential | 39                    | -20               | -15              | -12     | -7    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.419_A | NCA02a_Residential | 41                    | -18               | -13              | -10     | -5    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.420_A | NCA02a_Residential | 40                    | -19               | -14              | -11     | -6    | -                                   | -                | -       | -     | -                              | -                | -       | -     |

**Table D.13 SCN13 Results**

| Name    | Description        | Predicted Noise Level | Comparison to NML |                  |         |       | If NML Exceeded - Comparison to RBL |                  |         |       | Mitigation / Management (AMMM) |                  |                       |       |
|---------|--------------------|-----------------------|-------------------|------------------|---------|-------|-------------------------------------|------------------|---------|-------|--------------------------------|------------------|-----------------------|-------|
|         |                    |                       | Day Standard      | Day Non-Standard | Evening | Night | Day Standard                        | Day Non-Standard | Evening | Night | Day Standard                   | Day Non-Standard | Evening               | Night |
| R.001_A | NCA03_Residential  | 41                    | -15               | -10              | -8      | -1    | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.002_A | NCA03_Residential  | 46                    | -10               | -5               | -3      | -     | -                                   | -                | -       | 9     | -                              | -                | -                     | -     |
| R.003_A | NCA03_Residential  | 40                    | -16               | -11              | -9      | -2    | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.004_A | NCA03_Residential  | 32                    | -24               | -19              | -17     | -10   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.005_A | NCA03_Commercial   | 33                    | -37               | -37              | -37     | -37   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.006_A | NCA03_Residential  | 40                    | -16               | -11              | -9      | -2    | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.007_A | NCA03_Residential  | 39                    | -17               | -12              | -10     | -3    | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.008_A | NCA03_Residential  | 47                    | -9                | -4               | -2      | -5    | -                                   | -                | -       | 10    | -                              | -                | -                     | M, LB |
| R.009_A | NCA03_Commercial   | 31                    | -39               | -39              | -39     | -39   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.010_A | NCA03_Residential  | 39                    | -17               | -12              | -10     | -3    | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.011_A | NCA03_Residential  | 45                    | -11               | -6               | -4      | -3    | -                                   | -                | -       | 8     | -                              | -                | -                     | -     |
| R.012_A | NCA03_Residential  | 48                    | -8                | -3               | -1      | -6    | -                                   | -                | -       | 11    | -                              | -                | -                     | M, LB |
| R.013_A | NCA03_Residential  | 44                    | -12               | -7               | -5      | -2    | -                                   | -                | -       | 7     | -                              | -                | -                     | -     |
| R.014_A | NCA03_Residential  | 40                    | -16               | -11              | -9      | -2    | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.015_A | NCA03_Commercial   | 41                    | -29               | -29              | -29     | -29   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.016_A | NCA03_Residential  | 44                    | -12               | -7               | -5      | -2    | -                                   | -                | -       | 7     | -                              | -                | -                     | -     |
| R.017_A | NCA03_Commercial   | 35                    | -35               | -35              | -35     | -35   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.018_A | NCA03_Residential  | 36                    | -20               | -15              | -13     | -6    | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.019_A | NCA03_Commercial   | 50                    | -20               | -20              | -20     | -20   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.020_A | NCA03_Commercial   | 37                    | -33               | -33              | -33     | -33   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.021_A | NCA03_Residential  | 37                    | -19               | -14              | -12     | -5    | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.022_A | NCA03_Residential  | 40                    | -16               | -11              | -9      | -2    | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.023_A | NCA03_Residential  | 33                    | -23               | -18              | -16     | -9    | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.024_A | NCA03_Commercial   | 44                    | -26               | -26              | -26     | -26   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.025_A | NCA03_Commercial   | 31                    | -39               | -39              | -39     | -39   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.026_A | NCA03_Residential  | 39                    | -17               | -12              | -10     | -3    | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.027_A | NCA03_Commercial   | 39                    | -31               | -31              | -31     | -31   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.028_A | NCA03_Residential  | 45                    | -11               | -6               | -4      | -3    | -                                   | -                | -       | 8     | -                              | -                | -                     | -     |
| R.029_A | NCA03_Commercial   | 45                    | -25               | -25              | -25     | -25   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.030_A | NCA03_Commercial   | 34                    | -36               | -36              | -36     | -36   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.031_A | NCA03_Commercial   | 34                    | -36               | -36              | -36     | -36   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.032_A | NCA03_Commercial   | 33                    | -37               | -37              | -37     | -37   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.033_A | NCA03_Commercial   | 38                    | -32               | -32              | -32     | -32   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.034_A | NCA03_Commercial   | 39                    | -31               | -31              | -31     | -31   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.035_A | NCA03_Commercial   | 45                    | -25               | -25              | -25     | -25   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.036_A | NCA03_Commercial   | 37                    | -33               | -33              | -33     | -33   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.037_A | NCA03_Commercial   | 43                    | -27               | -27              | -27     | -27   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.038_A | NCA03_Commercial   | 47                    | -23               | -23              | -23     | -23   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.039_A | NCA03_Commercial   | 32                    | -38               | -38              | -38     | -38   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.040_A | NCA03_Commercial   | 36                    | -34               | -34              | -34     | -34   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.041_A | NCA03_Commercial   | 30                    | -40               | -40              | -40     | -40   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.042_A | NCA03_Commercial   | 34                    | -36               | -36              | -36     | -36   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.043_A | NCA03_Commercial   | 31                    | -39               | -39              | -39     | -39   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.044_A | NCA03_Commercial   | 45                    | -25               | -25              | -25     | -25   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.045_A | NCA03_Commercial   | 33                    | -37               | -37              | -37     | -37   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.046_A | NCA03_Commercial   | 30                    | -40               | -40              | -40     | -40   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.047_A | NCA03_Commercial   | 41                    | -29               | -29              | -29     | -29   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.048_A | NCA03_Commercial   | 39                    | -31               | -31              | -31     | -31   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.049_A | NCA03_Commercial   | 51                    | -19               | -19              | -19     | -19   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.050_A | NCA03_Commercial   | 41                    | -29               | -29              | -29     | -29   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.051_A | NCA03_Commercial   | 34                    | -36               | -36              | -36     | -36   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.052_A | NCA03_Commercial   | 42                    | -28               | -28              | -28     | -28   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.053_A | NCA03_Commercial   | 43                    | -27               | -27              | -27     | -27   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.054_A | NCA03_Commercial   | 37                    | -33               | -33              | -33     | -33   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.055_A | NCA03_Commercial   | 38                    | -32               | -32              | -32     | -32   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.056_A | NCA03_Commercial   | 33                    | -37               | -37              | -37     | -37   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.057_A | NCA03_Commercial   | 43                    | -27               | -27              | -27     | -27   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.058_A | NCA03_Commercial   | 40                    | -30               | -30              | -30     | -30   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.059_A | NCA03_Commercial   | 46                    | -24               | -24              | -24     | -24   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.060_A | NCA03_Commercial   | 34                    | -36               | -36              | -36     | -36   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.061_A | NCA03_Commercial   | 34                    | -36               | -36              | -36     | -36   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.062_A | NCA03_Commercial   | 44                    | -26               | -26              | -26     | -26   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.063_A | NCA03_Commercial   | 44                    | -26               | -26              | -26     | -26   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.064_A | NCA03_Commercial   | 37                    | -33               | -33              | -33     | -33   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.065_A | NCA03_Commercial   | 43                    | -27               | -27              | -27     | -27   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.066_A | NCA03_Commercial   | 42                    | -28               | -28              | -28     | -28   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.067_A | NCA03_Commercial   | 43                    | -27               | -27              | -27     | -27   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.068_A | NCA03_Commercial   | 56                    | -14               | -14              | -14     | -14   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.069_A | NCA03_Commercial   | 53                    | -17               | -17              | -17     | -17   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.070_A | NCA03_Commercial   | 35                    | -35               | -35              | -35     | -35   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.071_A | NCA03_Commercial   | 38                    | -32               | -32              | -32     | -32   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.072_A | NCA03_Commercial   | 41                    | -29               | -29              | -29     | -29   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.073_A | NCA03_Commercial   | 42                    | -28               | -28              | -28     | -28   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.074_A | NCA03_Commercial   | 40                    | -30               | -30              | -30     | -30   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.075_A | NCA03_Commercial   | 45                    | -25               | -25              | -25     | -25   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.076_A | NCA03_Commercial   | 54                    | -16               | -16              | -16     | -16   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.077_A | NCA03_Commercial   | 60                    | -10               | -10              | -10     | -10   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.078_A | NCA03_Commercial   | 58                    | -12               | -12              | -12     | -12   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.079_A | NCA03_Commercial   | 43                    | -27               | -27              | -27     | -27   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.080_A | NCA03_Commercial   | 59                    | -11               | -11              | -11     | -11   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.081_A | NCA03_Commercial   | 52                    | -18               | -18              | -18     | -18   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.082_A | NCA03_Commercial   | 43                    | -27               | -27              | -27     | -27   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.083_A | NCA03_Commercial   | 49                    | -21               | -21              | -21     | -21   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.084_A | NCA03_Commercial   | 40                    | -30               | -30              | -30     | -30   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.085_A | NCA03_Commercial   | 43                    | -27               | -27              | -27     | -27   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.086_A | NCA03_Commercial   | 46                    | -24               | -24              | -24     | -24   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.087_A | NCA03_Commercial   | 43                    | -27               | -27              | -27     | -27   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.088_A | NCA03_Commercial   | 59                    | -11               | -11              | -11     | -11   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.089_A | NCA03_Commercial   | 57                    | -13               | -13              | -13     | -13   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.090_A | NCA03_Commercial   | 61                    | -9                | -9               | -9      | -9    | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.091_A | NCA03_Commercial   | 48                    | -22               | -22              | -22     | -22   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.092_A | NCA03_Commercial   | 44                    | -26               | -26              | -26     | -26   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.093_A | NCA04_Commercial   | 53                    | -17               | -17              | -17     | -17   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.094_A | NCA04_Commercial   | 52                    | -18               | -18              | -18     | -18   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.095_A | NCA01_Commercial   | 59                    | -11               | -11              | -11     | -11   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.096_A | NCA03_Commercial   | 64                    | -6                | -6               | -6      | -6    | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.097_A | NCA03_Commercial   | 43                    | -27               | -27              | -27     | -27   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.098_A | NCA01_Commercial   | 49                    | -21               | -21              | -21     | -21   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.099_A | NCA03_Commercial   | 41                    | -29               | -29              | -29     | -29   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.100_A | NCA02_Commercial   | 44                    | -26               | -26              | -26     | -26   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.101_A | NCA03_Commercial   | 41                    | -29               | -29              | -29     | -29   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.102_A | NCA01_Residential  | 59                    | 7                 | 12               | 13      | 19    | 17                                  | 17               | 18      | 24    | LB                             | LB               | M, IB, LB, PC, RO, SN | -     |
| R.103_A | NCA02_Commercial   | 46                    | -24               | -24              | -24     | -24   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.104_A | NCA01_Commercial   | 56                    | -14               | -14              | -14     | -14   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.105_A | NCA01_Commercial   | 50                    | -20               | -20              | -20     | -20   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.106_A | NCA02_Commercial   | 47                    | -23               | -23              | -23     | -23   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.107_A | NCA01_Educational  | 59                    | 4                 | 4                | 4       | 4     | 17                                  | 17               | 18      | 24    | LB                             | LB               | M, IB, LB, PC, RO, SN | -     |
| R.108_A | NCA01_Residential  | 64                    | 12                | 17               | 18      | 24    | 22                                  | 22               | 23      | 29    | M, LB                          | M, LB            | M, IB, LB, PC, RO, SN | -     |
| R.109_A | NCA01_Residential  | 51                    | 0                 | 5                | 6       | 12    | -                                   | 10               | 11      | 17    | LB                             | LB               | M, LB                 | -     |
| R.110_A | NCA01_Commercial   | 48                    | -22               | -22              | -22     | -22   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.111_A | NCA01_Residential  | 58                    | -6                | 11               | 12      | 18    | 16                                  | 16               | 17      | 23    | LB                             | LB               | M, IB, LB, PC, RO, SN | -     |
| R.112_A | NCA01_Residential  | 56                    | 4                 | 9                | 10      | 16    | 14                                  | 14               | 15      | 21    | LB                             | LB               | M, IB, LB, PC, RO, SN | -     |
| R.113_A | NCA01_Residential  | 52                    | 0                 | 5                | 6       | 12    | -                                   | 10               | 11      | 17    | LB                             | LB               | M, LB                 | -     |
| R.114_A | NCA01_Residential  | 63                    | 11                | 16               | 17      | 23    | 21                                  | 21               | 22      | 28    | M, LB                          | M, LB            | M, IB, LB, PC, RO, SN | -     |
| R.115_A | NCA01_Residential  | 50                    | -2                | 3                | 4       | 10    | -                                   | 8                | 9       | 15    | -                              | -                | M, LB                 | -     |
| R.116_A | NCA01_Residential  | 59                    | 7                 | 12               | 13      | 19    | 17                                  | 17               | 18      | 24    | LB                             | LB               | M, IB, LB, PC, RO, SN | -     |
| R.117_A | NCA01_Recreational | 64                    | -1                | -1               | -1      | -1    | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.118_A | NCA02_Commercial   | 51                    | -19               | -19              | -19     | -19   | -                                   | -                | -       | -     | -                              | -                | -                     | -     |
| R.119_A | NCA01_Residential  | 54                    | 2                 | 7                | 8       | 14    | 12                                  | 12               | 13      | 19    | LB                             | LB               | M, LB                 | -     |
| R.120_A | NCA02_Residential  | 48                    | -4                | 1                | 2       | 8     | -                                   | 6                | 7       | 1     |                                |                  |                       |       |

Table D.13 SCN13 Results

| Name    | Description            | Predicted Noise Level | Comparison to NML |                  |         |       | If NML Exceeded - Comparison to RBL |                  |         |       | Mitigation / Management (AMMM) |                  |         |                           |
|---------|------------------------|-----------------------|-------------------|------------------|---------|-------|-------------------------------------|------------------|---------|-------|--------------------------------|------------------|---------|---------------------------|
|         |                        |                       | Day Standard      | Day Non-Standard | Evening | Night | Day Standard                        | Day Non-Standard | Evening | Night | Day Standard                   | Day Non-Standard | Evening | Night                     |
| R.128_A | NCA01_Residential      | 64                    | 12                | 17               | 18      | 24    | 22                                  | 22               | 23      | 29    | M, LB                          | M, LB            | M, LB   | M, LB, PC, RO, SN         |
| R.129_A | NCA04_Residential      | 53                    | 2                 | 7                | 8       | 14    | 12                                  | 12               | 13      | 19    | LB                             | LB               | LB      | M, LB                     |
| R.130_A | NCA04_Residential      | 51                    | 0                 | 5                | 6       | 12    | 11                                  | 11               | 17      | LB    | LB                             | LB               | M, LB   |                           |
| R.131_A | NCA04_Residential      | 58                    | 7                 | 12               | 13      | 19    | 17                                  | 17               | 18      | 24    | LB                             | LB               | LB      | M, IB, LB, PC, RO, SN     |
| R.132_A | NCA01_Residential      | 56                    | 4                 | 9                | 10      | 16    | 14                                  | 14               | 15      | 21    | LB                             | LB               | LB      | M, IB, LB, PC, RO, SN     |
| R.133_A | NCA01_Residential      | 62                    | 10                | 15               | 16      | 22    | 20                                  | 20               | 21      | 27    | M, LB                          | M, LB            | M, LB   | M, IB, LB, PC, RO, SN     |
| R.134_A | NCA01_Recreational     | 63                    | -2                | -2               | -2      | -2    | -2                                  | -2               | -2      | -2    | -                              | -                | -       | -                         |
| R.135_A | NCA02_Residential      | 54                    | 2                 | 7                | 8       | 14    | 12                                  | 12               | 13      | 19    | LB                             | LB               | LB      | M, LB                     |
| R.136_A | NCA01_Residential      | 62                    | 10                | 15               | 16      | 22    | 20                                  | 20               | 21      | 27    | M, LB                          | M, LB            | M, LB   | M, IB, LB, PC, RO, SN     |
| R.137_A | NCA01_Residential      | 60                    | 8                 | 13               | 14      | 20    | 18                                  | 18               | 19      | 25    | LB                             | LB               | LB      | M, IB, LB, PC, RO, SN     |
| R.138_A | NCA01_Residential      | 62                    | 10                | 15               | 16      | 22    | 20                                  | 20               | 21      | 27    | M, LB                          | M, LB            | M, LB   | M, IB, LB, PC, RO, SN     |
| R.139_A | NCA02_Residential      | 50                    | -2                | 3                | 4       | 10    | 8                                   | 8                | 9       | 15    | -                              | -                | -       | M, LB                     |
| R.140_A | NCA01_Residential      | 62                    | 10                | 15               | 16      | 22    | 20                                  | 20               | 21      | 27    | M, LB                          | M, LB            | M, LB   | M, IB, LB, PC, RO, SN     |
| R.141_A | NCA01_Residential      | 62                    | 10                | 15               | 16      | 22    | 20                                  | 20               | 21      | 27    | M, LB                          | M, LB            | M, LB   | M, IB, LB, PC, RO, SN     |
| R.142_A | NCA01_Residential      | 62                    | 10                | 15               | 16      | 22    | 20                                  | 20               | 21      | 27    | M, LB                          | M, LB            | M, LB   | M, IB, LB, PC, RO, SN     |
| R.143_A | NCA01_Residential      | 59                    | 7                 | 12               | 13      | 19    | 17                                  | 17               | 18      | 24    | LB                             | LB               | LB      | M, IB, LB, PC, RO, SN     |
| R.144_A | NCA01_Residential      | 67                    | 15                | 20               | 21      | 27    | 25                                  | 25               | 26      | 32    | M, LB                          | M, LB            | M, LB   | AA, M, IB, LB, PC, RO, SN |
| R.145_A | NCA01_Residential      | 62                    | 10                | 15               | 16      | 22    | 20                                  | 20               | 21      | 27    | M, LB                          | M, LB            | M, LB   | M, IB, LB, PC, RO, SN     |
| R.146_A | NCA01_Residential      | 59                    | 7                 | 12               | 13      | 19    | 17                                  | 17               | 18      | 24    | LB                             | LB               | LB      | M, IB, LB, PC, RO, SN     |
| R.147_A | NCA01_Residential      | 60                    | 8                 | 13               | 14      | 20    | 18                                  | 18               | 19      | 25    | LB                             | LB               | LB      | M, IB, LB, PC, RO, SN     |
| R.148_A | NCA01_Commercial       | 64                    | -6                | -6               | -6      | -6    | -6                                  | -6               | -6      | -6    | -                              | -                | -       | -                         |
| R.149_A | NCA01_Residential      | 65                    | 13                | 18               | 19      | 25    | 23                                  | 23               | 24      | 30    | M, LB                          | M, LB            | M, LB   | AA, M, IB, LB, PC, RO, SN |
| R.150_A | NCA01_Residential      | 56                    | 4                 | 9                | 10      | 16    | 14                                  | 14               | 15      | 21    | LB                             | LB               | LB      | M, IB, LB, PC, RO, SN     |
| R.151_A | NCA01_Residential      | 59                    | 7                 | 12               | 13      | 19    | 17                                  | 17               | 18      | 24    | LB                             | LB               | LB      | M, IB, LB, PC, RO, SN     |
| R.152_A | NCA01_Residential      | 65                    | 13                | 18               | 19      | 25    | 23                                  | 23               | 24      | 30    | M, LB                          | M, LB            | M, LB   | AA, M, IB, LB, PC, RO, SN |
| R.153_A | NCA01_Residential      | 62                    | 10                | 15               | 16      | 22    | 20                                  | 20               | 21      | 27    | M, LB                          | M, LB            | M, LB   | M, IB, LB, PC, RO, SN     |
| R.154_A | NCA01_Residential      | 59                    | 7                 | 12               | 13      | 19    | 17                                  | 17               | 18      | 24    | LB                             | LB               | LB      | M, IB, LB, PC, RO, SN     |
| R.155_A | NCA04_Residential      | 55                    | 4                 | 9                | 10      | 16    | 14                                  | 14               | 15      | 21    | LB                             | LB               | LB      | M, IB, LB, PC, RO, SN     |
| R.156_A | NCA01_Residential      | 62                    | 10                | 15               | 16      | 22    | 20                                  | 20               | 21      | 27    | M, LB                          | M, LB            | M, LB   | M, IB, LB, PC, RO, SN     |
| R.157_A | NCA01_Residential      | 62                    | 10                | 15               | 16      | 22    | 20                                  | 20               | 21      | 27    | M, LB                          | M, LB            | M, LB   | M, IB, LB, PC, RO, SN     |
| R.158_A | NCA01_Residential      | 63                    | 11                | 16               | 17      | 23    | 21                                  | 21               | 22      | 28    | M, LB                          | M, LB            | M, LB   | M, IB, LB, PC, RO, SN     |
| R.159_A | NCA01_Residential      | 65                    | 13                | 18               | 19      | 25    | 23                                  | 23               | 24      | 30    | M, LB                          | M, LB            | M, LB   | AA, M, IB, LB, PC, RO, SN |
| R.160_A | NCA02_Residential      | 53                    | 1                 | 6                | 7       | 13    | 11                                  | 11               | 12      | 18    | LB                             | LB               | LB      | M, LB                     |
| R.161_A | NCA01_Residential      | 59                    | 7                 | 12               | 13      | 19    | 17                                  | 17               | 18      | 24    | LB                             | LB               | LB      | M, IB, LB, PC, RO, SN     |
| R.162_A | NCA05_Residential      | 49                    | -24               | -19              | -16     | -1    | -                                   | -                | -       | -     | -                              | -                | -       | -                         |
| R.163_A | NCA01_Residential      | 62                    | 10                | 15               | 16      | 22    | 20                                  | 20               | 21      | 27    | M, LB                          | M, LB            | M, LB   | M, IB, LB, PC, RO, SN     |
| R.164_A | NCA01_Residential      | 56                    | 4                 | 9                | 10      | 16    | 14                                  | 14               | 15      | 21    | LB                             | LB               | LB      | M, IB, LB, PC, RO, SN     |
| R.165_A | NCA01_Residential      | 66                    | 14                | 19               | 20      | 26    | 24                                  | 24               | 25      | 31    | M, LB                          | M, LB            | M, LB   | AA, M, IB, LB, PC, RO, SN |
| R.166_A | NCA02_Residential      | 50                    | -2                | 3                | 4       | 10    | 8                                   | 8                | 9       | 15    | -                              | -                | -       | M, LB                     |
| R.167_A | NCA01_Residential      | 60                    | 8                 | 13               | 14      | 20    | 18                                  | 18               | 19      | 25    | LB                             | LB               | LB      | M, IB, LB, PC, RO, SN     |
| R.168_A | NCA01_Residential      | 55                    | 3                 | 8                | 9       | 15    | 13                                  | 13               | 14      | 20    | LB                             | LB               | LB      | M, IB, LB, PC, RO, SN     |
| R.169_A | NCA01_Commercial       | 54                    | -16               | -16              | -16     | -16   | -16                                 | -16              | -16     | -16   | -                              | -                | -       | -                         |
| R.170_A | NCA01_Residential      | 69                    | 17                | 22               | 23      | 29    | 27                                  | 27               | 28      | 34    | M, LB                          | M, LB            | M, LB   | AA, M, IB, LB, PC, RO, SN |
| R.171_A | NCA01_Residential      | 59                    | 7                 | 12               | 13      | 19    | 17                                  | 17               | 18      | 24    | LB                             | LB               | LB      | M, IB, LB, PC, RO, SN     |
| R.172_A | NCA01_Residential      | 61                    | 9                 | 14               | 15      | 21    | 19                                  | 19               | 20      | 26    | LB                             | LB               | LB      | M, IB, LB, PC, RO, SN     |
| R.173_A | NCA01_Commercial       | 51                    | -19               | -19              | -19     | -19   | -19                                 | -19              | -19     | -19   | -                              | -                | -       | -                         |
| R.174_A | NCA01_Residential      | 64                    | 12                | 17               | 18      | 24    | 22                                  | 22               | 23      | 29    | M, LB                          | M, LB            | M, LB   | M, IB, LB, PC, RO, SN     |
| R.175_A | NCA01_Residential      | 63                    | 11                | 16               | 17      | 23    | 21                                  | 21               | 22      | 28    | M, LB                          | M, LB            | M, LB   | M, IB, LB, PC, RO, SN     |
| R.176_A | NCA01_Residential      | 50                    | -2                | 3                | 4       | 10    | 8                                   | 8                | 9       | 15    | -                              | -                | -       | M, LB                     |
| R.177_A | NCA01_Residential      | 65                    | 13                | 18               | 19      | 25    | 23                                  | 23               | 24      | 30    | M, LB                          | M, LB            | M, LB   | AA, M, IB, LB, PC, RO, SN |
| R.178_A | NCA05_Mixed Use        | 55                    | -18               | -13              | -10     | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | M, LB                     |
| R.179_A | NCA01_Residential      | 76                    | 24                | 29               | 30      | 36    | 34                                  | 34               | 35      | 41    | M, LB                          | M, LB            | M, LB   | AA, M, IB, LB, PC, RO, SN |
| R.180_A | NCA01_Residential      | 58                    | 6                 | 11               | 12      | 18    | 16                                  | 16               | 17      | 23    | LB                             | LB               | LB      | M, IB, LB, PC, RO, SN     |
| R.181_A | NCA01_Residential      | 68                    | 16                | 21               | 22      | 28    | 26                                  | 26               | 27      | 33    | M, LB                          | M, LB            | M, LB   | AA, M, IB, LB, PC, RO, SN |
| R.182_A | NCA01_Residential      | 55                    | 3                 | 8                | 9       | 15    | 13                                  | 13               | 14      | 20    | LB                             | LB               | LB      | M, IB, LB, PC, RO, SN     |
| R.183_A | NCA01_Commercial       | 49                    | -21               | -21              | -21     | -21   | -21                                 | -21              | -21     | -21   | -                              | -                | -       | -                         |
| R.184_A | NCA01_Residential      | 54                    | 2                 | 7                | 8       | 14    | 12                                  | 12               | 13      | 19    | LB                             | LB               | LB      | M, LB                     |
| R.185_A | NCA01_Residential      | 71                    | 19                | 24               | 25      | 31    | 29                                  | 29               | 30      | 36    | M, LB                          | M, LB            | M, LB   | AA, M, IB, LB, PC, RO, SN |
| R.186_A | NCA01_Residential      | 72                    | 20                | 25               | 26      | 32    | 30                                  | 30               | 31      | 37    | M, LB                          | M, LB            | M, LB   | AA, M, IB, LB, PC, RO, SN |
| R.187_A | NCA01_Residential      | 72                    | 20                | 25               | 26      | 32    | 30                                  | 30               | 31      | 37    | M, LB                          | M, LB            | M, LB   | AA, M, IB, LB, PC, RO, SN |
| R.188_A | NCA02_Mixed Use        | 52                    | 0                 | 5                | 6       | 12    | 10                                  | 10               | 11      | 17    | LB                             | LB               | LB      | M, LB                     |
| R.189_A | NCA02_Residential      | 51                    | -1                | 4                | 5       | 11    | 9                                   | 9                | 10      | 16    | -                              | -                | -       | M, LB                     |
| R.190_A | NCA05_Residential      | 70                    | -3                | 2                | 3       | 9     | 7                                   | 7                | 8       | 14    | -                              | -                | -       | M, IB, LB, PC, RO, SN     |
| R.191_A | NCA04_Residential      | 49                    | -2                | 3                | 4       | 10    | 8                                   | 8                | 9       | 15    | -                              | -                | -       | M, LB                     |
| R.192_A | NCA04_Residential      | 45                    | -6                | -1               | 0       | 6     | -                                   | -                | -       | 11    | -                              | -                | -       | M, LB                     |
| R.193_A | NCA05_Residential      | 58                    | -15               | -10              | -7      | 8     | -                                   | -                | -       | 13    | -                              | -                | -       | M, LB                     |
| R.194_A | NCA05_Residential      | 58                    | -15               | -10              | -7      | 8     | -                                   | -                | -       | 13    | -                              | -                | -       | M, LB                     |
| R.195_A | NCA05_Residential      | 65                    | -8                | -3               | 0       | 15    | -                                   | -                | -       | 20    | -                              | -                | -       | M, IB, LB, PC, RO, SN     |
| R.196_A | NCA05_Residential      | 56                    | -17               | -12              | -9      | 6     | -                                   | -                | -       | 11    | -                              | -                | -       | M, LB                     |
| R.197_A | NCA01_Residential      | 56                    | 4                 | 9                | 10      | 16    | 14                                  | 14               | 15      | 21    | LB                             | LB               | LB      | M, IB, LB, PC, RO, SN     |
| R.198_A | NCA05_Residential      | 62                    | -11               | -6               | -3      | 12    | -                                   | -                | -       | 17    | -                              | -                | -       | M, LB                     |
| R.199_A | NCA01_Residential      | 49                    | -3                | 2                | 3       | 9     | 7                                   | 7                | 8       | 14    | -                              | -                | -       | M, LB                     |
| R.200_A | NCA05_Residential      | 57                    | -16               | -11              | -8      | 7     | -                                   | -                | -       | 12    | -                              | -                | -       | M, LB                     |
| R.201_A | NCA01_Residential      | 51                    | -1                | 4                | 5       | 11    | 9                                   | 9                | 10      | 16    | -                              | -                | -       | M, LB                     |
| R.202_A | NCA01_Residential      | 57                    | 5                 | 10               | 11      | 17    | 15                                  | 15               | 16      | 22    | LB                             | LB               | LB      | M, IB, LB, PC, RO, SN     |
| R.203_A | NCA04_Residential      | 49                    | -2                | 3                | 4       | 10    | 8                                   | 8                | 9       | 15    | -                              | -                | -       | M, LB                     |
| R.204_A | NCA05_Industrial       | 50                    | -25               | -25              | -25     | -25   | -25                                 | -25              | -25     | -25   | -                              | -                | -       | -                         |
| R.205_A | NCA01_Residential      | 50                    | -2                | 3                | 4       | 10    | 8                                   | 8                | 9       | 15    | -                              | -                | -       | M, LB                     |
| R.206_A | NCA01_Residential      | 51                    | -1                | 4                | 5       | 11    | 9                                   | 9                | 10      | 16    | -                              | -                | -       | M, LB                     |
| R.207_A | NCA01_Residential      | 51                    | -1                | 4                | 5       | 11    | 9                                   | 9                | 10      | 16    | -                              | -                | -       | M, LB                     |
| R.208_A | NCA01_Residential      | 56                    | 4                 | 9                | 10      | 16    | 14                                  | 14               | 15      | 21    | LB                             | LB               | LB      | M, IB, LB, PC, RO, SN     |
| R.209_A | NCA01_Residential      | 52                    | 0                 | 5                | 6       | 12    | 10                                  | 10               | 11      | 17    | LB                             | LB               | LB      | M, LB                     |
| R.210_A | NCA01_Residential      | 49                    | -3                | 2                | 3       | 9     | 7                                   | 7                | 8       | 14    | -                              | -                | -       | M, LB                     |
| R.211_A | NCA01_Residential      | 53                    | 1                 | 6                | 7       | 13    | 11                                  | 11               | 12      | 18    | LB                             | LB               | LB      | M, LB                     |
| R.212_A | NCA01_Residential      | 50                    | -2                | 3                | 4       | 10    | 8                                   | 8                | 9       | 15    | -                              | -                | -       | M, LB                     |
| R.213_A | NCA01_Industrial       | 48                    | -27               | -27              | -27     | -27   | -27                                 | -27              | -27     | -27   | -                              | -                | -       | -                         |
| R.214_A | NCA01_Residential      | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | M, LB                     |
| R.215_A | NCA01_Residential      | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | M, LB                     |
| R.216_A | NCA01_Residential      | 54                    | 2                 | 7                | 8       | 14    | 12                                  | 12               | 13      | 19    | LB                             | LB               | LB      | M, LB                     |
| R.217_A | NCA01_Residential      | 46                    | -6                | -1               | 0       | 6     | -                                   | -                | -       | 11    | -                              | -                | -       | M, LB                     |
| R.218_A | NCA01_Industrial       | 47                    | -28               | -28              | -28     | -28   | -28                                 | -28              | -28     | -28   | -                              | -                | -       | -                         |
| R.219_A | NCA01_Industrial       | 45                    | -30               | -30              | -30     | -30   | -30                                 | -30              | -30     | -30   | -                              | -                | -       | -                         |
| R.220_A | NCA01_Residential      | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | M, LB                     |
| R.221_A | NCA01_Residential      | 47                    | -5                | 0                | 1       | 7     | -                                   | -                | -       | 12    | -                              | -                | -       | M, LB                     |
| R.222_A | NCA01_Residential      | 46                    | -6                | -1               | 0       | 6     | -                                   | -                | -       | 11    | -                              | -                | -       | M, LB                     |
| R.223_A | NCA05_Residential      | 46                    | -27               | -22              | -19     | -4    | -                                   | -                | -       | -     | -                              | -                | -       | -                         |
| R.224_A | NCA01_Residential      | 48                    | -4                | 1                | 2       | 8     | 6                                   | 6                | 7       | 13    | -                              | -                | -       | M, LB                     |
| R.225_A | NCA05_Place of Worship | 46                    | -9                | -9               | -9      | -9    | -9                                  | -9               | -9      | -9    | -                              | -                | -       | -                         |
| R.226_A | NCA01_Residential      | 47                    | -5                | 0                | 1       | 7     | -                                   | -                | -       | 12    | -                              | -                | -       | M, LB                     |
| R.227_A | NCA01_Residential      | 47                    | -5                | 0                | 1       | 7     | -                                   | -                | -       | 12    | -                              | -                | -       | M, LB                     |
| R.228_A | NCA01_Residential      | 46                    | -6                | -1               | 0       | 6     | -                                   | -                | -       | 11    | -                              | -                | -       | M, LB                     |
| R.229_A | NCA01_Residential      | 48                    | -4                | 1                | 2       | 8     | 6                                   | 6                | 7       | 13    | -                              | -                | -       | M, LB                     |
| R.230_A | NCA01_Residential      | 47                    | -5                | 0                | 1       | 7     | -                                   | -                | -       | 12    | -                              | -                | -       | M, LB                     |
| R.231_A | NCA01_Residential      | 53                    | 1                 | 6                | 7       | 13    | 11                                  | 11               | 12      | 18    | LB                             | LB               | LB      | M, LB                     |
| R.232_A | NCA01_Residential      | 46                    | -6                | -1               | 0       | 6     | -                                   | -                | -       | 11    | -                              | -                | -       | M, LB                     |
| R.233_A | NCA01_Residential      | 46                    | -6                | -1               | 0       | 6     | -                                   | -                | -       | 11    | -                              | -                | -       | M, LB                     |
| R.234_A | NCA04_Residential      | 48                    | -3                | 2                | 3       | 9     | 7                                   | 7                | 8       | 14    | -                              | -                | -       | M, LB                     |
| R.235_A | NCA01_Residential      | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | M, LB                     |
| R.236_A | NCA01_Residential      | 46                    | -5                | 0                | 1       | 7     | -                                   | -                | -       | 12    | -                              | -                | -       | M, LB                     |
| R.      |                        |                       |                   |                  |         |       |                                     |                  |         |       |                                |                  |         |                           |

Table D.13 SCN13 Results

| Name    | Description            | Predicted Noise Level | Comparison to NML |                  |         |       | If NML Exceeded - Comparison to RBL |                  |         |       | Mitigation / Management (AMMM) |                  |         |       |
|---------|------------------------|-----------------------|-------------------|------------------|---------|-------|-------------------------------------|------------------|---------|-------|--------------------------------|------------------|---------|-------|
|         |                        |                       | Day Standard      | Day Non-Standard | Evening | Night | Day Standard                        | Day Non-Standard | Evening | Night | Day Standard                   | Day Non-Standard | Evening | Night |
| R.255_A | NCA01_Residential      | 40                    | -12               | -7               | -6      | 0     | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.256_A | NCA01_Residential      | 48                    | -4                | 1                | 2       | 8     |                                     | 6                | 7       | 13    |                                |                  |         | M, LB |
| R.257_A | NCA01_Residential      | 49                    | -3                | 2                | 3       | 9     |                                     | 7                | 8       | 14    |                                |                  |         | M, LB |
| R.258_A | NCA01_Residential      | 47                    | -5                | 0                | 1       | 7     |                                     |                  | 6       | 12    |                                |                  |         | M, LB |
| R.259_A | NCA01_Residential      | 46                    | -6                | -1               | 0       | 6     |                                     |                  |         | 11    |                                |                  |         | M, LB |
| R.260_A | NCA01_Residential      | 49                    | -3                | 2                | 3       | 9     |                                     | 7                | 8       | 14    |                                |                  |         | M, LB |
| R.261_A | NCA01_Residential      | 45                    | -7                | -2               | -1      | 5     |                                     |                  |         | 10    |                                |                  |         | M, LB |
| R.262_A | NCA01_Residential      | 45                    | -7                | -2               | -1      | 5     |                                     |                  |         | 10    |                                |                  |         | M, LB |
| R.263_A | NCA01_Residential      | 47                    | -5                | 0                | 1       | 7     |                                     |                  | 6       | 12    |                                |                  |         | M, LB |
| R.264_A | NCA01_Residential      | 44                    | -8                | -3               | -2      | 4     |                                     |                  |         | 9     |                                |                  |         | -     |
| R.265_A | NCA01_Residential      | 49                    | -3                | 2                | 3       | 9     |                                     | 7                | 8       | 14    |                                |                  |         | M, LB |
| R.266_A | NCA01_Residential      | 49                    | -3                | 2                | 3       | 9     |                                     | 7                | 8       | 14    |                                |                  |         | M, LB |
| R.267_A | NCA01_Residential      | 45                    | -6                | -1               | 0       | 6     |                                     |                  |         | 11    |                                |                  |         | M, LB |
| R.268_A | NCA01_Residential      | 42                    | -10               | -5               | -4      | 2     |                                     |                  |         | 7     |                                |                  |         | -     |
| R.269_A | NCA01_Residential      | 46                    | -6                | -1               | 0       | 6     |                                     |                  |         | 11    |                                |                  |         | M, LB |
| R.270_A | NCA01_Residential      | 48                    | -4                | 1                | 2       | 8     |                                     | 6                | 7       | 13    |                                |                  |         | M, LB |
| R.271_A | NCA02_Residential      | 45                    | -7                | -2               | -1      | 5     |                                     |                  |         | 10    |                                |                  |         | M, LB |
| R.272_A | NCA01_Residential      | 49                    | -3                | 2                | 3       | 9     |                                     | 7                | 8       | 14    |                                |                  |         | M, LB |
| R.273_A | NCA01_Residential      | 48                    | -4                | 1                | 2       | 8     |                                     | 6                | 7       | 13    |                                |                  |         | M, LB |
| R.274_A | NCA01_Residential      | 47                    | -5                | 0                | 1       | 7     |                                     |                  | 6       | 12    |                                |                  |         | M, LB |
| R.275_A | NCA02_Residential      | 46                    | -6                | -1               | 0       | 6     |                                     |                  |         | 11    |                                |                  |         | M, LB |
| R.276_A | NCA01_Residential      | 45                    | -7                | -2               | -1      | 5     |                                     |                  |         | 10    |                                |                  |         | M, LB |
| R.277_A | NCA01_Residential      | 49                    | -3                | 2                | 3       | 9     |                                     | 7                | 8       | 14    |                                |                  |         | M, LB |
| R.278_A | NCA01_Residential      | 46                    | -6                | -1               | 0       | 6     |                                     |                  |         | 11    |                                |                  |         | M, LB |
| R.279_A | NCA01_Residential      | 46                    | -6                | -1               | 0       | 6     |                                     |                  |         | 11    |                                |                  |         | M, LB |
| R.280_A | NCA01_Residential      | 47                    | -5                | 0                | 1       | 7     |                                     |                  | 6       | 12    |                                |                  |         | M, LB |
| R.281_A | NCA01_Residential      | 49                    | -3                | 2                | 3       | 9     |                                     | 7                | 8       | 14    |                                |                  |         | M, LB |
| R.282_A | NCA01_Residential      | 49                    | -3                | 2                | 3       | 9     |                                     | 7                | 8       | 14    |                                |                  |         | M, LB |
| R.283_A | NCA01_Residential      | 47                    | -5                | 0                | 1       | 7     |                                     |                  |         | 11    |                                |                  |         | M, LB |
| R.284_A | NCA01_Residential      | 47                    | -5                | 0                | 1       | 7     |                                     |                  |         | 11    |                                |                  |         | M, LB |
| R.285_A | NCA01_Mixed Use        | 50                    | -2                | 3                | 4       | 10    |                                     | 8                | 9       | 15    |                                |                  |         | M, LB |
| R.286_A | NCA01_Residential      | 46                    | -6                | -1               | 0       | 6     |                                     |                  |         | 11    |                                |                  |         | M, LB |
| R.287_A | NCA01_Mixed Use        | 50                    | -2                | 3                | 4       | 10    |                                     | 8                | 9       | 15    |                                |                  |         | M, LB |
| R.288_A | NCA01_Residential      | 46                    | -6                | -1               | 0       | 6     |                                     |                  |         | 11    |                                |                  |         | M, LB |
| R.289_A | NCA01_Residential      | 46                    | -6                | -1               | 0       | 6     |                                     |                  |         | 11    |                                |                  |         | M, LB |
| R.290_A | NCA01_Residential      | 45                    | -7                | -2               | -1      | 5     |                                     |                  |         | 10    |                                |                  |         | M, LB |
| R.291_A | NCA02_Residential      | 41                    | -11               | -6               | -5      | 1     |                                     |                  |         | 6     |                                |                  |         | -     |
| R.292_A | NCA01_Residential      | 46                    | -6                | -1               | 0       | 6     |                                     |                  |         | 11    |                                |                  |         | M, LB |
| R.293_A | NCA01_Residential      | 46                    | -6                | -1               | 0       | 6     |                                     |                  |         | 11    |                                |                  |         | M, LB |
| R.294_A | NCA01_Mixed Use        | 49                    | -3                | 2                | 3       | 9     |                                     | 7                | 8       | 14    |                                |                  |         | M, LB |
| R.295_A | NCA01_Residential      | 45                    | -7                | -2               | -1      | 5     |                                     |                  |         | 10    |                                |                  |         | M, LB |
| R.296_A | NCA01_Residential      | 44                    | -8                | -3               | -2      | 4     |                                     |                  |         | 9     |                                |                  |         | -     |
| R.297_A | NCA01_Mixed Use        | 49                    | -3                | 2                | 3       | 9     |                                     | 7                | 8       | 14    |                                |                  |         | M, LB |
| R.298_A | NCA02_Residential      | 45                    | -7                | -2               | -1      | 5     |                                     |                  |         | 10    |                                |                  |         | M, LB |
| R.299_A | NCA01_Residential      | 44                    | -8                | -3               | -2      | 4     |                                     |                  |         | 9     |                                |                  |         | -     |
| R.300_A | NCA01_Mixed Use        | 48                    | -4                | 1                | 2       | 8     |                                     | 6                | 7       | 13    |                                |                  |         | M, LB |
| R.301_A | NCA01_Residential      | 45                    | -7                | -2               | -1      | 5     |                                     |                  |         | 10    |                                |                  |         | M, LB |
| R.302_A | NCA01_Mixed Use        | 48                    | -4                | 1                | 2       | 8     |                                     | 6                | 7       | 13    |                                |                  |         | M, LB |
| R.303_A | NCA01_Mixed Use        | 48                    | -4                | 1                | 2       | 8     |                                     | 6                | 7       | 13    |                                |                  |         | M, LB |
| R.304_A | NCA01_Residential      | 47                    | -5                | 0                | 1       | 7     |                                     |                  |         | 12    |                                |                  |         | M, LB |
| R.305_A | NCA01_Mixed Use        | 47                    | -5                | 0                | 1       | 7     |                                     |                  |         | 12    |                                |                  |         | M, LB |
| R.306_A | NCA01_Mixed Use        | 47                    | -5                | 0                | 1       | 7     |                                     |                  |         | 12    |                                |                  |         | M, LB |
| R.307_A | NCA02_Residential      | 45                    | -7                | -2               | -1      | 5     |                                     |                  |         | 10    |                                |                  |         | M, LB |
| R.308_A | NCA01_Mixed Use        | 47                    | -5                | 0                | 1       | 7     |                                     |                  |         | 12    |                                |                  |         | M, LB |
| R.309_A | NCA01_Mixed Use        | 47                    | -5                | 0                | 1       | 7     |                                     |                  |         | 12    |                                |                  |         | M, LB |
| R.310_A | NCA01_Mixed Use        | 46                    | -6                | -1               | 0       | 6     |                                     |                  |         | 11    |                                |                  |         | M, LB |
| R.311_A | NCA01_Residential      | 46                    | -6                | -1               | 0       | 6     |                                     |                  |         | 11    |                                |                  |         | M, LB |
| R.312_A | NCA01_Residential      | 46                    | -6                | -1               | 0       | 6     |                                     |                  |         | 11    |                                |                  |         | M, LB |
| R.313_A | NCA02_Residential      | 39                    | -13               | -8               | -7      | -1    |                                     |                  |         | -     |                                |                  |         | -     |
| R.314_A | NCA01_Commercial       | 46                    | -24               | -24              | -24     | -24   |                                     |                  |         |       |                                |                  |         | -     |
| R.315_A | NCA01_Residential      | 45                    | -7                | -2               | -1      | 5     |                                     |                  |         | 10    |                                |                  |         | M, LB |
| R.316_A | NCA01_Residential      | 45                    | -7                | -2               | -1      | 5     |                                     |                  |         | 10    |                                |                  |         | M, LB |
| R.317_A | NCA01_Mixed Use        | 45                    | -7                | -2               | -1      | 5     |                                     |                  |         | 10    |                                |                  |         | M, LB |
| R.318_A | NCA01_Residential      | 44                    | -8                | -3               | -2      | 4     |                                     |                  |         | 9     |                                |                  |         | -     |
| R.319_A | NCA01_Commercial       | 43                    | -27               | -27              | -27     | -27   |                                     |                  |         |       |                                |                  |         | -     |
| R.320_A | NCA01_Residential      | 44                    | -8                | -3               | -2      | 4     |                                     |                  |         | 9     |                                |                  |         | -     |
| R.321_A | NCA01_Residential      | 43                    | -9                | -4               | -3      | 3     |                                     |                  |         | 8     |                                |                  |         | -     |
| R.322_A | NCA01_Residential      | 32                    | -20               | -15              | -14     | -8    |                                     |                  |         | -     |                                |                  |         | -     |
| R.323_A | NCA01_Mixed Use        | 45                    | -7                | -2               | -1      | 5     |                                     |                  |         | 10    |                                |                  |         | M, LB |
| R.324_A | NCA01_Residential      | 43                    | -9                | -4               | -3      | 3     |                                     |                  |         | 8     |                                |                  |         | -     |
| R.325_A | NCA01_Residential      | 43                    | -9                | -4               | -3      | 3     |                                     |                  |         | 8     |                                |                  |         | -     |
| R.326_A | NCA01_Mixed Use        | 45                    | -7                | -2               | -1      | 5     |                                     |                  |         | 10    |                                |                  |         | M, LB |
| R.327_A | NCA02_Residential      | 44                    | -8                | -3               | -2      | 4     |                                     |                  |         | 9     |                                |                  |         | -     |
| R.328_A | NCA01_Mixed Use        | 45                    | -7                | -2               | -1      | 5     |                                     |                  |         | 10    |                                |                  |         | M, LB |
| R.329_A | NCA01_Residential      | 46                    | -6                | -1               | 0       | 6     |                                     |                  |         | 11    |                                |                  |         | M, LB |
| R.330_A | NCA01_Mixed Use        | 45                    | -7                | -2               | -1      | 5     |                                     |                  |         | 10    |                                |                  |         | M, LB |
| R.331_A | NCA02_Residential      | 40                    | -12               | -7               | -6      | 0     |                                     |                  |         | -     |                                |                  |         | -     |
| R.332_A | NCA01_Mixed Use        | 45                    | -7                | -2               | -1      | 5     |                                     |                  |         | 10    |                                |                  |         | M, LB |
| R.333_A | NCA01_Residential      | 42                    | -10               | -5               | -4      | 2     |                                     |                  |         | 7     |                                |                  |         | -     |
| R.334_A | NCA01_Mixed Use        | 45                    | -7                | -2               | -1      | 5     |                                     |                  |         | 10    |                                |                  |         | M, LB |
| R.335_A | NCA01_Mixed Use        | 45                    | -7                | -2               | -1      | 5     |                                     |                  |         | 10    |                                |                  |         | M, LB |
| R.336_A | NCA01_Mixed Use        | 45                    | -7                | -2               | -1      | 5     |                                     |                  |         | 10    |                                |                  |         | M, LB |
| R.337_A | NCA01_Mixed Use        | 45                    | -7                | -2               | -1      | 5     |                                     |                  |         | 10    |                                |                  |         | M, LB |
| R.338_A | NCA04_Residential      | 41                    | -10               | -5               | -4      | 2     |                                     |                  |         | 7     |                                |                  |         | -     |
| R.339_A | NCA01_Residential      | 33                    | -19               | -14              | -13     | -7    |                                     |                  |         | -     |                                |                  |         | -     |
| R.340_A | NCA02_Residential      | 43                    | -9                | -4               | -3      | 3     |                                     |                  |         | 8     |                                |                  |         | -     |
| R.341_A | NCA01_Mixed Use        | 44                    | -8                | -3               | -2      | 4     |                                     |                  |         | 9     |                                |                  |         | -     |
| R.342_A | NCA01_Residential      | 43                    | -9                | -4               | -3      | 3     |                                     |                  |         | 8     |                                |                  |         | -     |
| R.343_A | NCA04_Residential      | 39                    | -12               | -7               | -6      | 0     |                                     |                  |         | -     |                                |                  |         | -     |
| R.344_A | NCA01_Residential      | 42                    | -10               | -5               | -4      | 2     |                                     |                  |         | 7     |                                |                  |         | -     |
| R.345_A | NCA01_Residential      | 44                    | -8                | -3               | -2      | 4     |                                     |                  |         | 9     |                                |                  |         | -     |
| R.346_A | NCA01_Residential      | 42                    | -10               | -5               | -4      | 2     |                                     |                  |         | 7     |                                |                  |         | -     |
| R.347_A | NCA01_Residential      | 44                    | -8                | -3               | -2      | 4     |                                     |                  |         | 9     |                                |                  |         | -     |
| R.348_A | NCA02_Residential      | 39                    | -13               | -8               | -7      | -1    |                                     |                  |         | -     |                                |                  |         | -     |
| R.349_A | NCA01_Residential      | 42                    | -10               | -5               | -4      | 2     |                                     |                  |         | 7     |                                |                  |         | -     |
| R.350_A | NCA01_Residential      | 41                    | -11               | -6               | -5      | 1     |                                     |                  |         | 6     |                                |                  |         | -     |
| R.351_A | NCA01_Residential      | 44                    | -8                | -3               | -2      | 4     |                                     |                  |         | 9     |                                |                  |         | -     |
| R.352_A | NCA01_Residential      | 41                    | -11               | -6               | -5      | 1     |                                     |                  |         | 6     |                                |                  |         | -     |
| R.353_A | NCA01_Residential      | 41                    | -11               | -6               | -5      | 1     |                                     |                  |         | 6     |                                |                  |         | -     |
| R.354_A | NCA01_Residential      | 44                    | -8                | -3               | -2      | 4     |                                     |                  |         | 9     |                                |                  |         | -     |
| R.355_A | NCA01_Residential      | 41                    | -11               | -6               | -5      | 1     |                                     |                  |         | 6     |                                |                  |         | -     |
| R.356_A | NCA01_Residential      | 41                    | -11               | -6               | -5      | 1     |                                     |                  |         | 6     |                                |                  |         | -     |
| R.357_A | NCA02_Residential      | 43                    | -9                | -4               | -3      | 3     |                                     |                  |         | 8     |                                |                  |         | -     |
| R.358_A | NCA01_Residential      | 41                    | -11               | -6               | -5      | 1     |                                     |                  |         | 6     |                                |                  |         | -     |
| R.359_A | NCA01_Place of Worship | 44                    | -11               | -11              | -11     | -11   |                                     |                  |         | -     |                                |                  |         | -     |
| R.360_A | NCA01_Residential      | 41                    | -11               | -6               | -5      | 1     |                                     |                  |         | 6     |                                |                  |         | -     |
| R.361_A | NCA02_Residential      | 38                    | -14               | -9               | -8      | -2    |                                     |                  |         | -     |                                |                  |         | -     |
| R.362_A | NCA01_Residential      | 40                    | -12               | -7               | -6      | 0     |                                     |                  |         | -     |                                |                  |         | -     |
| R.363_A | NCA01_Residential      | 38                    | -14               | -9               | -8      | -2    |                                     |                  |         | -     |                                |                  |         | -     |
| R.364_A | NCA02_Residential      | 40                    | -12               | -7               | -6      | 0     |                                     |                  |         | -     |                                |                  |         | -     |
| R.365_A | NCA01_Residential      | 40                    | -12               | -7               | -6      | 0     |                                     |                  |         | -     |                                |                  |         | -     |
| R.366_A | NCA01_Residential      | 40                    | -12               | -7               | -6      | 0     |                                     |                  |         | -     |                                |                  |         | -     |
| R.367_A | NCA01_Residential      | 43                    | -9                | -4               | -3      | 3     |                                     |                  |         | 8     |                                |                  |         | -     |
| R.368_A | NCA01_Residential      | 40                    | -12               | -7               | -6      | 0     |                                     |                  |         | -     |                                |                  |         | -     |
| R.369_A | NCA04_Residential      | 38                    | -13               | -8               | -7      | -1    |                                     |                  |         | -     |                                |                  |         | -     |
| R.370_A | NCA01_Residential      | 40                    | -12               | -7               | -6      | 0     |                                     |                  |         | -     |                                |                  |         | -     |
| R.371_A | NCA01_Residential      | 44                    | -8                | -3               | -2      | 4     |                                     |                  |         | 9     |                                |                  |         | -     |
| R.372_A | NCA02_Residential      | 35                    | -17               | -12              | -11     | -5    |                                     |                  |         | -     |                                |                  |         | -     |
| R.373_A | NCA01_Residential      | 40                    | -12               | -7               | -6      | 0     |                                     |                  |         | -     |                                |                  |         | -     |
| R.374_A | NCA01_Residential      | 40                    | -12               | -7               | -6      | 0     |                                     |                  |         | -     |                                |                  |         | -     |
| R.375_A | NCA02_Residential      | 37                    | -15               | -10              | -9      | -3    |                                     |                  |         | -     |                                |                  |         | -     |
| R.376_A | NCA01_Residential      | 39                    | -13               | -8               | -7      | -1    |                                     |                  |         | -     |                                |                  |         | -     |
| R.377_A | NCA04_Residential      | 39                    | -12               | -7               | -6      | 0     |                                     |                  |         | -     |                                |                  |         | -     |
| R.378_A | NCA04_Residential      | 39                    | -12               | -7               | -6      | 0     |                                     |                  |         | -     |                                |                  |         | -     |
| R.379_A | NCA01_Residential      | 30                    | -22               | -17              | -16     | -10   |                                     |                  |         | -     |                                |                  |         | -     |
| R.380_A | NCA04_Residential      | 39                    | -12               | -7               | -6      | 0     |                                     |                  |         | -     |                                |                  |         | -     |
| R.381_A | NCA02_Residential      | 39                    | -13               | -8               | -7      | -1    |                                     |                  |         | -     |                                |                  |         | -     |

Table D.13 SCN13 Results

| Name    | Description        | Predicted Noise Level | Comparison to NML |                  |         |       | If NML Exceeded - Comparison to RBL |                  |         |       | Mitigation / Management (AMMM) |                  |         |       |
|---------|--------------------|-----------------------|-------------------|------------------|---------|-------|-------------------------------------|------------------|---------|-------|--------------------------------|------------------|---------|-------|
|         |                    |                       | Day Standard      | Day Non-Standard | Evening | Night | Day Standard                        | Day Non-Standard | Evening | Night | Day Standard                   | Day Non-Standard | Evening | Night |
| R.382_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | 9     | -                              | -                | -       | -     |
| R.383_A | NCA04_Residential  | 39                    | -12               | -7               | -6      | 0     | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.384_A | NCA02_Residential  | 34                    | -18               | -13              | -12     | -6    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.385_A | NCA04_Residential  | 39                    | -12               | -7               | -6      | 0     | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.386_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | 8     | -                              | -                | -       | -     |
| R.387_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | 8     | -                              | -                | -       | -     |
| R.388_A | NCA02_Residential  | 36                    | -16               | -11              | -10     | -4    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.389_A | NCA04_Residential  | 37                    | -14               | -9               | -8      | -2    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.390_A | NCA01_Residential  | 39                    | -13               | -8               | -7      | -1    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.391_A | NCA01_Residential  | 42                    | -10               | -5               | -4      | 2     | -                                   | -                | -       | 7     | -                              | -                | -       | -     |
| R.392_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | 8     | -                              | -                | -       | -     |
| R.393_A | NCA01_Residential  | 40                    | -12               | -7               | -6      | 0     | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.394_A | NCA01_Residential  | 39                    | -13               | -8               | -7      | -1    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.395_A | NCA01_Residential  | 40                    | -12               | -7               | -6      | 0     | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.396_A | NCA02_Educational  | 38                    | -17               | -17              | -17     | -     | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.397_A | NCA01_Residential  | 42                    | -10               | -5               | -4      | 2     | -                                   | -                | -       | 7     | -                              | -                | -       | -     |
| R.398_A | NCA01_Residential  | 42                    | -10               | -5               | -4      | 2     | -                                   | -                | -       | 7     | -                              | -                | -       | -     |
| R.399_A | NCA01_Residential  | 42                    | -10               | -5               | -4      | 2     | -                                   | -                | -       | 7     | -                              | -                | -       | -     |
| R.400_A | NCA01_Residential  | 42                    | -10               | -5               | -4      | 2     | -                                   | -                | -       | 7     | -                              | -                | -       | -     |
| R.401_A | NCA04a_Residential | 34                    | -25               | -20              | -17     | -12   | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.402_A | NCA01_Residential  | 42                    | -10               | -5               | -4      | 2     | -                                   | -                | -       | 7     | -                              | -                | -       | -     |
| R.403_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | 8     | -                              | -                | -       | -     |
| R.404_A | NCA01_Residential  | 42                    | -10               | -5               | -4      | 2     | -                                   | -                | -       | 7     | -                              | -                | -       | -     |
| R.405_A | NCA01_Residential  | 42                    | -10               | -5               | -4      | 2     | -                                   | -                | -       | 7     | -                              | -                | -       | -     |
| R.406_A | NCA01_Residential  | 42                    | -10               | -5               | -4      | 2     | -                                   | -                | -       | 7     | -                              | -                | -       | -     |
| R.407_A | NCA01_Residential  | 42                    | -10               | -5               | -4      | 2     | -                                   | -                | -       | 7     | -                              | -                | -       | -     |
| R.408_A | NCA01_Residential  | 42                    | -10               | -5               | -4      | 2     | -                                   | -                | -       | 7     | -                              | -                | -       | -     |
| R.409_A | NCA01_Residential  | 41                    | -11               | -6               | -5      | 1     | -                                   | -                | -       | 6     | -                              | -                | -       | -     |
| R.410_A | NCA01_Residential  | 41                    | -11               | -6               | -5      | 1     | -                                   | -                | -       | 6     | -                              | -                | -       | -     |
| R.411_A | NCA01_Residential  | 41                    | -11               | -6               | -5      | 1     | -                                   | -                | -       | 6     | -                              | -                | -       | -     |
| R.412_A | NCA01_Residential  | 40                    | -12               | -7               | -6      | 0     | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.413_A | NCA04a_Residential | 31                    | -28               | -23              | -20     | -15   | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.414_A | NCA02_Residential  | 41                    | -11               | -6               | -5      | 1     | -                                   | -                | -       | 6     | -                              | -                | -       | -     |
| R.415_A | NCA01a_Residential | 35                    | -24               | -19              | -16     | -11   | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.416_A | NCA01a_Residential | 40                    | -19               | -14              | -11     | -6    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.417_A | NCA01a_Residential | 39                    | -20               | -15              | -12     | -7    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.418_A | NCA01a_Residential | 38                    | -21               | -16              | -13     | -8    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.419_A | NCA02a_Residential | 40                    | -19               | -14              | -11     | -6    | -                                   | -                | -       | -     | -                              | -                | -       | -     |
| R.420_A | NCA02a_Residential | 39                    | -20               | -15              | -12     | -7    | -                                   | -                | -       | -     | -                              | -                | -       | -     |

**Table D.14 SCN14 Results**

| Name    | Description        | Predicted Noise Level | Comparison to NML |                  |         |       | If NML Exceeded - Comparison to RBL |                  |         |       | Mitigation / Management (AMMM) |                  |         |       |
|---------|--------------------|-----------------------|-------------------|------------------|---------|-------|-------------------------------------|------------------|---------|-------|--------------------------------|------------------|---------|-------|
|         |                    |                       | Day Standard      | Day Non-Standard | Evening | Night | Day Standard                        | Day Non-Standard | Evening | Night | Day Standard                   | Day Non-Standard | Evening | Night |
| R.001_A | NCA03_Residential  | 18                    | -38               | -33              | -31     | -24   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.002_A | NCA03_Residential  | 11                    | -45               | -40              | -38     | -31   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.003_A | NCA03_Residential  | 11                    | -45               | -40              | -38     | -31   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.004_A | NCA03_Residential  | 15                    | -41               | -36              | -34     | -27   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.005_A | NCA03_Commercial   | 16                    | -54               | -54              | -54     | -54   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.006_A | NCA03_Residential  | 16                    | -40               | -35              | -33     | -26   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.007_A | NCA03_Residential  | 18                    | -38               | -33              | -31     | -24   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.008_A | NCA03_Residential  | 7                     | -49               | -44              | -42     | -35   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.009_A | NCA03_Commercial   | 12                    | -58               | -58              | -58     | -58   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.010_A | NCA03_Residential  | 20                    | -36               | -31              | -29     | -22   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.011_A | NCA03_Residential  | 19                    | -37               | -32              | -30     | -23   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.012_A | NCA03_Residential  | 15                    | -41               | -36              | -34     | -27   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.013_A | NCA03_Residential  | 18                    | -38               | -33              | -31     | -24   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.014_A | NCA03_Residential  | 14                    | -42               | -37              | -35     | -28   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.015_A | NCA03_Commercial   | 18                    | -52               | -52              | -52     | -52   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.016_A | NCA03_Residential  | 14                    | -42               | -37              | -35     | -28   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.017_A | NCA03_Commercial   | 19                    | -51               | -51              | -51     | -51   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.018_A | NCA03_Residential  | 22                    | -34               | -29              | -27     | -20   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.019_A | NCA03_Commercial   | 18                    | -52               | -52              | -52     | -52   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.020_A | NCA03_Commercial   | 16                    | -54               | -54              | -54     | -54   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.021_A | NCA03_Residential  | 22                    | -34               | -29              | -27     | -20   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.022_A | NCA03_Residential  | 9                     | -47               | -42              | -40     | -33   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.023_A | NCA03_Residential  | 20                    | -36               | -31              | -29     | -22   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.024_A | NCA03_Commercial   | 15                    | -55               | -55              | -55     | -55   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.025_A | NCA03_Commercial   | 11                    | -59               | -59              | -59     | -59   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.026_A | NCA03_Residential  | 18                    | -38               | -33              | -31     | -24   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.027_A | NCA03_Commercial   | 12                    | -58               | -58              | -58     | -58   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.028_A | NCA03_Residential  | 16                    | -40               | -35              | -33     | -26   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.029_A | NCA03_Commercial   | 19                    | -51               | -51              | -51     | -51   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.030_A | NCA03_Commercial   | 17                    | -53               | -53              | -53     | -53   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.031_A | NCA03_Commercial   | 11                    | -59               | -59              | -59     | -59   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.032_A | NCA03_Commercial   | 14                    | -56               | -56              | -56     | -56   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.033_A | NCA03_Commercial   | 18                    | -52               | -52              | -52     | -52   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.034_A | NCA03_Commercial   | 18                    | -52               | -52              | -52     | -52   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.035_A | NCA03_Commercial   | 20                    | -50               | -50              | -50     | -50   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.036_A | NCA03_Commercial   | 18                    | -52               | -52              | -52     | -52   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.037_A | NCA03_Commercial   | 14                    | -56               | -56              | -56     | -56   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.038_A | NCA03_Commercial   | 20                    | -50               | -50              | -50     | -50   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.039_A | NCA03_Commercial   | 8                     | -62               | -62              | -62     | -62   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.040_A | NCA03_Commercial   | 12                    | -58               | -58              | -58     | -58   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.041_A | NCA03_Commercial   | 9                     | -61               | -61              | -61     | -61   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.042_A | NCA03_Commercial   | 18                    | -52               | -52              | -52     | -52   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.043_A | NCA03_Commercial   | 6                     | -64               | -64              | -64     | -64   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.044_A | NCA03_Commercial   | 18                    | -52               | -52              | -52     | -52   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.045_A | NCA03_Commercial   | 12                    | -58               | -58              | -58     | -58   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.046_A | NCA03_Commercial   | 21                    | -49               | -49              | -49     | -49   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.047_A | NCA03_Commercial   | 17                    | -53               | -53              | -53     | -53   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.048_A | NCA03_Commercial   | 19                    | -51               | -51              | -51     | -51   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.049_A | NCA03_Commercial   | 19                    | -51               | -51              | -51     | -51   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.050_A | NCA03_Commercial   | 17                    | -53               | -53              | -53     | -53   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.051_A | NCA03_Commercial   | 22                    | -48               | -48              | -48     | -48   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.052_A | NCA03_Commercial   | 17                    | -53               | -53              | -53     | -53   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.053_A | NCA03_Commercial   | 15                    | -55               | -55              | -55     | -55   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.054_A | NCA03_Commercial   | 3                     | -67               | -67              | -67     | -67   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.055_A | NCA03_Commercial   | 21                    | -49               | -49              | -49     | -49   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.056_A | NCA03_Commercial   | 3                     | -67               | -67              | -67     | -67   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.057_A | NCA03_Commercial   | 23                    | -47               | -47              | -47     | -47   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.058_A | NCA03_Commercial   | 15                    | -55               | -55              | -55     | -55   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.059_A | NCA03_Commercial   | 18                    | -52               | -52              | -52     | -52   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.060_A | NCA03_Commercial   | 20                    | -50               | -50              | -50     | -50   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.061_A | NCA03_Commercial   | 25                    | -45               | -45              | -45     | -45   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.062_A | NCA03_Commercial   | 20                    | -50               | -50              | -50     | -50   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.063_A | NCA03_Commercial   | 15                    | -55               | -55              | -55     | -55   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.064_A | NCA03_Commercial   | 18                    | -52               | -52              | -52     | -52   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.065_A | NCA03_Commercial   | 22                    | -48               | -48              | -48     | -48   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.066_A | NCA03_Commercial   | 19                    | -51               | -51              | -51     | -51   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.067_A | NCA03_Commercial   | 17                    | -53               | -53              | -53     | -53   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.068_A | NCA03_Commercial   | 19                    | -51               | -51              | -51     | -51   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.069_A | NCA03_Commercial   | 14                    | -56               | -56              | -56     | -56   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.070_A | NCA03_Commercial   | 8                     | -62               | -62              | -62     | -62   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.071_A | NCA03_Commercial   | 13                    | -57               | -57              | -57     | -57   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.072_A | NCA03_Commercial   | 16                    | -54               | -54              | -54     | -54   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.073_A | NCA03_Commercial   | 19                    | -51               | -51              | -51     | -51   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.074_A | NCA03_Commercial   | 16                    | -54               | -54              | -54     | -54   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.075_A | NCA03_Commercial   | 14                    | -56               | -56              | -56     | -56   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.076_A | NCA03_Commercial   | 23                    | -47               | -47              | -47     | -47   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.077_A | NCA03_Commercial   | 25                    | -45               | -45              | -45     | -45   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.078_A | NCA03_Commercial   | 18                    | -52               | -52              | -52     | -52   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.079_A | NCA03_Commercial   | 10                    | -60               | -60              | -60     | -60   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.080_A | NCA03_Commercial   | 24                    | -46               | -46              | -46     | -46   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.081_A | NCA03_Commercial   | 18                    | -52               | -52              | -52     | -52   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.082_A | NCA03_Commercial   | 17                    | -53               | -53              | -53     | -53   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.083_A | NCA03_Commercial   | 20                    | -50               | -50              | -50     | -50   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.084_A | NCA03_Commercial   | 13                    | -57               | -57              | -57     | -57   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.085_A | NCA03_Commercial   | 15                    | -55               | -55              | -55     | -55   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.086_A | NCA03_Commercial   | 17                    | -53               | -53              | -53     | -53   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.087_A | NCA03_Commercial   | 23                    | -47               | -47              | -47     | -47   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.088_A | NCA03_Commercial   | 21                    | -49               | -49              | -49     | -49   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.089_A | NCA03_Commercial   | 23                    | -47               | -47              | -47     | -47   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.090_A | NCA03_Commercial   | 23                    | -47               | -47              | -47     | -47   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.091_A | NCA03_Commercial   | 17                    | -53               | -53              | -53     | -53   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.092_A | NCA03_Commercial   | 17                    | -53               | -53              | -53     | -53   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.093_A | NCA04_Commercial   | 24                    | -46               | -46              | -46     | -46   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.094_A | NCA04_Commercial   | 22                    | -48               | -48              | -48     | -48   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.095_A | NCA01_Commercial   | 23                    | -47               | -47              | -47     | -47   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.096_A | NCA03_Commercial   | 25                    | -45               | -45              | -45     | -45   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.097_A | NCA03_Commercial   | 18                    | -52               | -52              | -52     | -52   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.098_A | NCA01_Commercial   | 23                    | -47               | -47              | -47     | -47   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.099_A | NCA03_Commercial   | 17                    | -53               | -53              | -53     | -53   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.100_A | NCA02_Commercial   | 18                    | -52               | -52              | -52     | -52   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.101_A | NCA03_Commercial   | 20                    | -50               | -50              | -50     | -50   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.102_A | NCA01_Residential  | 24                    | -28               | -23              | -22     | -16   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.103_A | NCA02_Commercial   | 23                    | -47               | -47              | -47     | -47   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.104_A | NCA01_Commercial   | 24                    | -46               | -46              | -46     | -46   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.105_A | NCA01_Commercial   | 17                    | -53               | -53              | -53     | -53   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.106_A | NCA02_Commercial   | 25                    | -45               | -45              | -45     | -45   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.107_A | NCA01_Educational  | 25                    | -30               | -30              | -30     | -30   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.108_A | NCA01_Residential  | 24                    | -28               | -23              | -22     | -16   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.109_A | NCA04_Residential  | 23                    | -28               | -23              | -22     | -16   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.110_A | NCA01_Commercial   | 23                    | -47               | -47              | -47     | -47   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.111_A | NCA01_Residential  | 22                    | -30               | -25              | -24     | -18   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.112_A | NCA01_Residential  | 17                    | -35               | -30              | -29     | -23   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.113_A | NCA01_Residential  | 18                    | -34               | -29              | -28     | -22   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.114_A | NCA01_Residential  | 25                    | -27               | -22              | -21     | -15   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.115_A | NCA01_Residential  | 21                    | -31               | -26              | -25     | -19   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.116_A | NCA01_Residential  | 25                    | -27               | -22              | -21     | -15   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.117_A | NCA01_Recreational | 26                    | -39               | -39              | -39     | -39   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.118_A | NCA02_Commercial   | 23                    | -47               | -47              | -47     | -47   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.119_A | NCA01_Residential  | 19                    | -33               | -28              | -27     | -21   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.120_A | NCA02_Residential  | 21                    | -31               | -26              | -25     | -19   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.121_A | NCA04_Residential  | 25                    | -26               | -21              | -20     | -14   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.122_A | NCA01_Residential  | 25                    | -27               | -22              | -21     | -15   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.123_A | NCA01_Residential  | 19                    | -33               | -28              | -27     | -21   | -                                   | -                | -       | -     | -                              | -                | -       |       |
| R.124_A | NCA01_Recreational | 23                    | -42               | -42              | -42     | -42   | -                                   | -                | -       | -     | -                              | -                | -       |       |



Table D.14 SCN14 Results

| Name    | Description            | Predicted Noise Level | Comparison to NML |                  |         |       | If NML Exceeded - Comparison to RBL |                  |         |       | Mitigation / Management (AMMM) |                  |         |       |       |
|---------|------------------------|-----------------------|-------------------|------------------|---------|-------|-------------------------------------|------------------|---------|-------|--------------------------------|------------------|---------|-------|-------|
|         |                        |                       | Day Standard      | Day Non-Standard | Evening | Night | Day Standard                        | Day Non-Standard | Evening | Night | Day Standard                   | Day Non-Standard | Evening | Night |       |
| R.249_A | NCA01_Residential      | 36                    | -16               | -11              | -10     | -4    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.250_A | NCA01_Residential      | 33                    | -19               | -14              | -13     | -7    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.251_A | NCA01_Residential      | 32                    | -20               | -15              | -14     | -8    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.252_A | NCA01_Residential      | 38                    | -14               | -9               | -8      | -2    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.253_A | NCA01_Residential      | 32                    | -20               | -15              | -14     | -8    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.254_A | NCA01_Residential      | 32                    | -20               | -15              | -14     | -8    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.255_A | NCA01_Residential      | 29                    | -23               | -18              | -17     | -11   | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.256_A | NCA01_Residential      | 32                    | -20               | -15              | -14     | -8    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.257_A | NCA01_Residential      | 32                    | -20               | -15              | -14     | -8    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.258_A | NCA01_Residential      | 33                    | -19               | -14              | -13     | -7    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.259_A | NCA01_Residential      | 31                    | -21               | -16              | -15     | -9    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.260_A | NCA01_Residential      | 34                    | -18               | -13              | -12     | -6    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.261_A | NCA01_Residential      | 32                    | -20               | -15              | -14     | -8    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.262_A | NCA01_Residential      | 35                    | -17               | -12              | -11     | -5    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.263_A | NCA01_Residential      | 31                    | -21               | -16              | -15     | -9    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.264_A | NCA01_Residential      | 32                    | -20               | -15              | -14     | -8    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.265_A | NCA01_Residential      | 33                    | -19               | -14              | -13     | -7    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.266_A | NCA01_Residential      | 36                    | -16               | -11              | -10     | -4    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.267_A | NCA01_Residential      | 39                    | -12               | -7               | -6      | 0     | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.268_A | NCA01_Residential      | 29                    | -23               | -18              | -17     | -11   | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.269_A | NCA01_Residential      | 37                    | -15               | -10              | -9      | -3    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.270_A | NCA01_Residential      | 37                    | -15               | -10              | -9      | -3    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.271_A | NCA02_Residential      | 30                    | -22               | -17              | -16     | -10   | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.272_A | NCA01_Residential      | 35                    | -17               | -12              | -11     | -5    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.273_A | NCA01_Residential      | 37                    | -15               | -10              | -9      | -3    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.274_A | NCA01_Residential      | 31                    | -21               | -16              | -15     | -9    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.275_A | NCA02_Residential      | 30                    | -22               | -17              | -16     | -10   | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.276_A | NCA01_Residential      | 33                    | -19               | -14              | -13     | -7    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.277_A | NCA01_Residential      | 31                    | -21               | -16              | -15     | -9    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.278_A | NCA01_Residential      | 28                    | -24               | -19              | -18     | -12   | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.279_A | NCA01_Residential      | 34                    | -18               | -13              | -12     | -6    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.280_A | NCA01_Residential      | 35                    | -17               | -12              | -11     | -5    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.281_A | NCA01_Residential      | 35                    | -17               | -12              | -11     | -5    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.282_A | NCA01_Residential      | 36                    | -16               | -11              | -10     | -4    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.283_A | NCA01_Residential      | 35                    | -17               | -12              | -11     | -5    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.284_A | NCA01_Residential      | 35                    | -17               | -12              | -11     | -5    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.285_A | NCA01_Mixed Use        | 37                    | -15               | -10              | -9      | -3    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.286_A | NCA01_Residential      | 34                    | -18               | -13              | -12     | -6    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.287_A | NCA01_Mixed Use        | 39                    | -13               | -8               | -7      | -1    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.288_A | NCA01_Residential      | 33                    | -19               | -14              | -13     | -7    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.289_A | NCA01_Residential      | 32                    | -20               | -15              | -14     | -8    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.290_A | NCA01_Residential      | 34                    | -18               | -13              | -12     | -6    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.291_A | NCA02_Residential      | 25                    | -27               | -22              | -21     | -15   | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.292_A | NCA01_Residential      | 34                    | -18               | -13              | -12     | -6    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.293_A | NCA01_Residential      | 39                    | -13               | -8               | -7      | -1    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.294_A | NCA01_Mixed Use        | 34                    | -18               | -13              | -12     | -6    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.295_A | NCA01_Residential      | 40                    | -12               | -7               | -6      | 0     | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.296_A | NCA01_Residential      | 36                    | -16               | -11              | -10     | -4    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.297_A | NCA01_Mixed Use        | 39                    | -13               | -8               | -7      | -1    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.298_A | NCA02_Residential      | 26                    | -26               | -21              | -20     | -14   | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.299_A | NCA01_Residential      | 40                    | -12               | -7               | -6      | 0     | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.300_A | NCA01_Mixed Use        | 40                    | -12               | -7               | -6      | 0     | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.301_A | NCA01_Residential      | 40                    | -12               | -7               | -6      | 0     | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.302_A | NCA01_Mixed Use        | 40                    | -12               | -7               | -6      | 0     | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.303_A | NCA01_Mixed Use        | 40                    | -12               | -7               | -6      | 0     | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.304_A | NCA01_Residential      | 35                    | -17               | -12              | -11     | -5    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.305_A | NCA01_Mixed Use        | 40                    | -12               | -7               | -6      | 0     | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.306_A | NCA01_Mixed Use        | 40                    | -12               | -7               | -6      | 0     | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.307_A | NCA02_Residential      | 26                    | -26               | -21              | -20     | -14   | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.308_A | NCA01_Mixed Use        | 40                    | -12               | -7               | -6      | 0     | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.309_A | NCA01_Mixed Use        | 41                    | -11               | -6               | -5      | 1     | -                                   | -                | -       | -     | 6                              | -                | -       | -     | -     |
| R.310_A | NCA01_Mixed Use        | 41                    | -11               | -6               | -5      | 1     | -                                   | -                | -       | -     | 6                              | -                | -       | -     | -     |
| R.311_A | NCA01_Residential      | 41                    | -11               | -6               | -5      | 1     | -                                   | -                | -       | -     | 6                              | -                | -       | -     | -     |
| R.312_A | NCA01_Residential      | 35                    | -17               | -12              | -11     | -5    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.313_A | NCA02_Residential      | 31                    | -21               | -16              | -15     | -9    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.314_A | NCA01_Commercial       | 39                    | -13               | -8               | -7      | -1    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.315_A | NCA01_Residential      | 40                    | -12               | -7               | -6      | 0     | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.316_A | NCA01_Residential      | 38                    | -14               | -9               | -8      | -2    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.317_A | NCA01_Mixed Use        | 41                    | -11               | -6               | -5      | 1     | -                                   | -                | -       | -     | 6                              | -                | -       | -     | -     |
| R.318_A | NCA01_Residential      | 37                    | -15               | -10              | -9      | -3    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.319_A | NCA01_Commercial       | 34                    | -18               | -13              | -12     | -6    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.320_A | NCA01_Residential      | 38                    | -14               | -9               | -8      | -2    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.321_A | NCA01_Residential      | 38                    | -14               | -9               | -8      | -2    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.322_A | NCA01_Residential      | 28                    | -24               | -19              | -18     | -12   | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.323_A | NCA01_Mixed Use        | 40                    | -12               | -7               | -6      | 0     | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.324_A | NCA01_Residential      | 39                    | -13               | -8               | -7      | -1    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.325_A | NCA01_Residential      | 40                    | -12               | -7               | -6      | 0     | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.326_A | NCA01_Mixed Use        | 40                    | -12               | -7               | -6      | 0     | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.327_A | NCA02_Residential      | 32                    | -20               | -15              | -14     | -8    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.328_A | NCA01_Mixed Use        | 39                    | -13               | -8               | -7      | -1    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.329_A | NCA01_Residential      | 36                    | -16               | -11              | -10     | -4    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.330_A | NCA01_Mixed Use        | 39                    | -13               | -8               | -7      | -1    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.331_A | NCA02_Residential      | 28                    | -24               | -19              | -18     | -12   | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.332_A | NCA01_Mixed Use        | 39                    | -13               | -8               | -7      | -1    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.333_A | NCA01_Residential      | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | -     | 9                              | -                | -       | -     | -     |
| R.334_A | NCA01_Mixed Use        | 40                    | -12               | -7               | -6      | 0     | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.335_A | NCA01_Mixed Use        | 40                    | -12               | -7               | -6      | 0     | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.336_A | NCA01_Mixed Use        | 41                    | -11               | -6               | -5      | 1     | -                                   | -                | -       | -     | 6                              | -                | -       | -     | -     |
| R.337_A | NCA01_Mixed Use        | 41                    | -11               | -6               | -5      | 1     | -                                   | -                | -       | -     | 6                              | -                | -       | -     | -     |
| R.338_A | NCA01_Residential      | 48                    | -3                | 2                | 3       | 9     | -                                   | 7                | 8       | 14    | -                              | -                | -       | -     | M, LB |
| R.339_A | NCA01_Residential      | 31                    | -21               | -16              | -15     | -9    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.340_A | NCA02_Residential      | 29                    | -23               | -18              | -17     | -11   | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.341_A | NCA01_Mixed Use        | 40                    | -12               | -7               | -6      | 0     | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.342_A | NCA01_Residential      | 40                    | -12               | -7               | -6      | 0     | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.343_A | NCA04_Residential      | 43                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | -     | 9                              | -                | -       | -     | -     |
| R.344_A | NCA01_Residential      | 41                    | -11               | -6               | -5      | 1     | -                                   | -                | -       | -     | 6                              | -                | -       | -     | -     |
| R.345_A | NCA01_Residential      | 37                    | -15               | -10              | -9      | -3    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.346_A | NCA01_Residential      | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | -     | 8                              | -                | -       | -     | -     |
| R.347_A | NCA01_Residential      | 40                    | -12               | -7               | -6      | 0     | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.348_A | NCA02_Residential      | 29                    | -23               | -18              | -17     | -11   | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.349_A | NCA01_Residential      | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | -     | 9                              | -                | -       | -     | -     |
| R.350_A | NCA01_Residential      | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | -     | 10                             | -                | -       | -     | M, LB |
| R.351_A | NCA01_Residential      | 41                    | -11               | -6               | -5      | 1     | -                                   | -                | -       | -     | 6                              | -                | -       | -     | -     |
| R.352_A | NCA01_Residential      | 46                    | -6                | -1               | 0       | 6     | -                                   | -                | -       | -     | 11                             | -                | -       | -     | M, LB |
| R.353_A | NCA01_Residential      | 46                    | -6                | -1               | 0       | 6     | -                                   | -                | -       | -     | 11                             | -                | -       | -     | M, LB |
| R.354_A | NCA01_Residential      | 41                    | -11               | -6               | -5      | 1     | -                                   | -                | -       | -     | 6                              | -                | -       | -     | -     |
| R.355_A | NCA01_Residential      | 47                    | -5                | 0                | 1       | 7     | -                                   | 6                | 6       | 12    | -                              | -                | -       | -     | M, LB |
| R.356_A | NCA01_Residential      | 47                    | -5                | 0                | 1       | 7     | -                                   | 6                | 6       | 12    | -                              | -                | -       | -     | M, LB |
| R.357_A | NCA02_Residential      | 36                    | -16               | -11              | -10     | -4    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.358_A | NCA01_Residential      | 48                    | -4                | 1                | 2       | 8     | -                                   | 6                | 7       | 13    | -                              | -                | -       | -     | M, LB |
| R.359_A | NCA01_Place of Worship | 46                    | -9                | -9               | -9      | -9    | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.360_A | NCA01_Residential      | 48                    | -4                | 1                | 2       | 8     | -                                   | 6                | 7       | 13    | -                              | -                | -       | -     | M, LB |
| R.361_A | NCA02_Residential      | 28                    | -24               | -19              | -18     | -12   | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.362_A | NCA01_Residential      | 48                    | -4                | 1                | 2       | 8     | -                                   | 6                | 7       | 13    | -                              | -                | -       | -     | M, LB |
| R.363_A | NCA02_Residential      | 29                    | -23               | -18              | -17     | -11   | -                                   | -                | -       | -     | -                              | -                | -       | -     | -     |
| R.364_A | NCA01_Residential      | 48                    | -4                | 1                | 2       | 8     | -                                   | 6                | 7       | 13    | -                              | -                | -       | -     | M, LB |
| R.365_A | NCA01_Residential      | 47                    | -5                | 0                | 1       | 7     | -                                   | 6                | 6       | 12    | -                              | -                | -       | -     | M, LB |
| R.366_A | NCA01_Residential      | 47                    | -5                | 0                | 1       | 7     | -                                   | 6                | 6       | 12    | -                              | -                | -       | -     | M, LB |
| R       |                        |                       |                   |                  |         |       |                                     |                  |         |       |                                |                  |         |       |       |



Table D.14 SCN14 Results

| Name    | Description        | Predicted Noise Level | Comparison to NML |                  |         |       | If NML Exceeded - Comparison to RBL |                  |         |       | Mitigation / Management (AMMM) |                  |         |                           |
|---------|--------------------|-----------------------|-------------------|------------------|---------|-------|-------------------------------------|------------------|---------|-------|--------------------------------|------------------|---------|---------------------------|
|         |                    |                       | Day Standard      | Day Non-Standard | Evening | Night | Day Standard                        | Day Non-Standard | Evening | Night | Day Standard                   | Day Non-Standard | Evening | Night                     |
| R.373_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | M, LB                     |
| R.374_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | 9     | -                              | -                | -       | -                         |
| R.375_A | NCA02_Residential  | 30                    | -22               | -17              | -16     | -10   | -                                   | -                | -       | -     | -                              | -                | -       | -                         |
| R.376_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | 8     | -                              | -                | -       | -                         |
| R.377_A | NCA04_Residential  | 43                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | 9     | -                              | -                | -       | -                         |
| R.378_A | NCA04_Residential  | 42                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | 8     | -                              | -                | -       | -                         |
| R.379_A | NCA01_Residential  | 34                    | -18               | -13              | -12     | -6    | -                                   | -                | -       | -     | -                              | -                | -       | -                         |
| R.380_A | NCA04_Residential  | 41                    | -10               | -5               | -4      | 2     | -                                   | -                | -       | 7     | -                              | -                | -       | -                         |
| R.381_A | NCA02_Residential  | 34                    | -18               | -13              | -12     | -6    | -                                   | -                | -       | -     | -                              | -                | -       | -                         |
| R.382_A | NCA01_Residential  | 50                    | -2                | 3                | 4       | 10    | -                                   | 8                | 9       | 15    | -                              | -                | -       | M, LB                     |
| R.383_A | NCA04_Residential  | 40                    | -11               | -6               | -5      | 1     | -                                   | -                | -       | 6     | -                              | -                | -       | -                         |
| R.384_A | NCA02_Residential  | 36                    | -16               | -11              | -10     | -4    | -                                   | -                | -       | -     | -                              | -                | -       | -                         |
| R.385_A | NCA04_Residential  | 39                    | -12               | -7               | -6      | 0     | -                                   | -                | -       | -     | -                              | -                | -       | -                         |
| R.386_A | NCA01_Residential  | 49                    | -3                | 2                | 3       | 9     | -                                   | 7                | 8       | 14    | -                              | -                | -       | M, LB                     |
| R.387_A | NCA01_Residential  | 47                    | -5                | 0                | 1       | 7     | -                                   | -                | 6       | 12    | -                              | -                | -       | M, LB                     |
| R.388_A | NCA02_Residential  | 31                    | -21               | -16              | -15     | -9    | -                                   | -                | -       | -     | -                              | -                | -       | -                         |
| R.389_A | NCA04_Residential  | 40                    | -11               | -6               | -5      | 1     | -                                   | -                | -       | 6     | -                              | -                | -       | -                         |
| R.390_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | M, LB                     |
| R.391_A | NCA01_Residential  | 56                    | 4                 | 9                | 10      | 16    | 14                                  | 14               | 15      | 21    | LB                             | LB               | -       | M, LB, PC, RO, SN         |
| R.392_A | NCA01_Residential  | 47                    | -5                | 0                | 1       | 7     | -                                   | -                | 6       | 12    | -                              | -                | -       | M, LB                     |
| R.393_A | NCA01_Residential  | 55                    | 3                 | 8                | 9       | 15    | 13                                  | 13               | 14      | 20    | LB                             | LB               | -       | M, LB, PC, RO, SN         |
| R.394_A | NCA01_Residential  | 56                    | 4                 | 9                | 10      | 16    | 14                                  | 14               | 15      | 21    | LB                             | LB               | -       | M, LB, PC, RO, SN         |
| R.395_A | NCA01_Residential  | 45                    | -7                | -2               | -1      | 5     | -                                   | -                | -       | 10    | -                              | -                | -       | M, LB                     |
| R.396_A | NCA02_Educational  | 36                    | -19               | -19              | -19     | -19   | -                                   | -                | -       | -     | -                              | -                | -       | -                         |
| R.397_A | NCA01_Residential  | 59                    | 7                 | 12               | 13      | 19    | 17                                  | 17               | 18      | 24    | LB                             | LB               | -       | M, LB, PC, RO, SN         |
| R.398_A | NCA01_Residential  | 47                    | -5                | 0                | 1       | 7     | -                                   | -                | 6       | 12    | -                              | -                | -       | M, LB                     |
| R.399_A | NCA01_Residential  | 44                    | -8                | -3               | -2      | 4     | -                                   | -                | -       | 9     | -                              | -                | -       | -                         |
| R.400_A | NCA01_Residential  | 60                    | 8                 | 13               | 14      | 20    | 18                                  | 18               | 19      | 25    | LB                             | LB               | -       | M, LB, PC, RO, SN         |
| R.401_A | NCA04a_Residential | 37                    | -22               | -17              | -14     | -9    | -                                   | -                | -       | -     | -                              | -                | -       | -                         |
| R.402_A | NCA01_Residential  | 62                    | 10                | 15               | 16      | 22    | 20                                  | 20               | 21      | 27    | M, LB                          | M, LB            | -       | M, LB, PC, RO, SN         |
| R.403_A | NCA01_Residential  | 39                    | -13               | -8               | -7      | -1    | -                                   | -                | -       | -     | -                              | -                | -       | -                         |
| R.404_A | NCA01_Residential  | 63                    | 11                | 16               | 17      | 23    | 21                                  | 21               | 22      | 28    | M, LB                          | M, LB            | -       | M, LB, PC, RO, SN         |
| R.405_A | NCA01_Residential  | 66                    | 14                | 19               | 20      | 26    | 24                                  | 24               | 25      | 31    | M, LB                          | M, LB            | -       | AA, M, IB, LB, PC, RO, SN |
| R.406_A | NCA01_Residential  | 67                    | 15                | 20               | 21      | 27    | 25                                  | 25               | 26      | 32    | M, LB                          | M, LB            | -       | AA, M, IB, LB, PC, RO, SN |
| R.407_A | NCA01_Residential  | 65                    | 13                | 18               | 19      | 25    | 23                                  | 23               | 24      | 30    | M, LB                          | M, LB            | -       | AA, M, IB, LB, PC, RO, SN |
| R.408_A | NCA01_Residential  | 43                    | -9                | -4               | -3      | 3     | -                                   | -                | -       | 8     | -                              | -                | -       | -                         |
| R.409_A | NCA01_Residential  | 64                    | 12                | 17               | 18      | 24    | 22                                  | 22               | 23      | 29    | M, LB                          | M, LB            | -       | M, LB, PC, RO, SN         |
| R.410_A | NCA01_Residential  | 61                    | 9                 | 14               | 15      | 21    | 19                                  | 19               | 20      | 26    | LB                             | M, LB            | -       | M, LB, PC, RO, SN         |
| R.411_A | NCA01_Residential  | 58                    | 6                 | 11               | 12      | 18    | 16                                  | 16               | 17      | 23    | LB                             | LB               | -       | M, LB, PC, RO, SN         |
| R.412_A | NCA01_Residential  | 51                    | -1                | 4                | 5       | 11    | -                                   | 9                | 10      | 16    | -                              | LB               | -       | M, LB                     |
| R.413_A | NCA04a_Residential | 34                    | -25               | -20              | -17     | -12   | -                                   | -                | -       | -     | -                              | -                | -       | -                         |
| R.414_A | NCA02_Residential  | 38                    | -14               | -9               | -8      | -2    | -                                   | -                | -       | -     | -                              | -                | -       | -                         |
| R.415_A | NCA01a_Residential | 41                    | -18               | -13              | -10     | -5    | -                                   | -                | -       | -     | -                              | -                | -       | -                         |
| R.416_A | NCA01a_Residential | 48                    | -11               | -6               | -3      | 2     | -                                   | -                | -       | 7     | -                              | -                | -       | -                         |
| R.417_A | NCA01a_Residential | 45                    | -14               | -9               | -6      | -1    | -                                   | -                | -       | -     | -                              | -                | -       | -                         |
| R.418_A | NCA01a_Residential | 44                    | -15               | -10              | -7      | -2    | -                                   | -                | -       | -     | -                              | -                | -       | -                         |
| R.419_A | NCA02a_Residential | 38                    | -21               | -16              | -13     | -8    | -                                   | -                | -       | -     | -                              | -                | -       | -                         |
| R.420_A | NCA02a_Residential | 36                    | -23               | -18              | -15     | -10   | -                                   | -                | -       | -     | -                              | -                | -       | -                         |

Annex E

## Stakeholders and Community Consultation Overview

**Table E.1** Stakeholders and community overview

| Stakeholders        | Detail   |   |
|---------------------|--|---|
| Local council       | City of Willoughby   |   |
| Local member        | The Hon. Gladys Berejiklian MP, Premier of NSW and Member for Willoughby   |   |
| Local groups        | <ul style="list-style-type: none"> <li>• Chatswood East Progress Association</li> <li>• Chatswood West Progress Association</li> <li>• Chatswood Chamber of Commerce</li> <li>• Artarmon Progress Association</li> </ul>   | <ul style="list-style-type: none"> <li>• Artarmon Village Chamber of Commerce</li> <li>• Artarmon Bush Care</li> <li>• Bike North</li> </ul>                      |
| Government agencies | <ul style="list-style-type: none"> <li>• Sydney Coordination Office</li> <li>• Roads and Maritime Services</li> <li>• Department of Planning and Environment</li> <li>• Office of Environment and Heritage</li> <li>• Transport for NSW</li> <li>• NSW Trains</li> </ul> | <ul style="list-style-type: none"> <li>• NSW TrainLink</li> <li>• Sydney Trains</li> <li>• Sydney Water</li> <li>• Ausgrid</li> <li>• Heritage Council</li> </ul> |

| Stakeholders                    | Detail  |   |
|---------------------------------|---|---|
| Senior Stakeholders             | <ul style="list-style-type: none"> <li>• Federation of Willoughby Progress Associations</li> <li>• District Commissioner - North, Greater Sydney Commission</li> </ul>  | <ul style="list-style-type: none"> <li>• Mayor, Willoughby City Council</li> <li>• Willoughby District Historical Society Inc.</li> </ul>   |
| Road users                      | <ul style="list-style-type: none"> <li>• Road users on Mowbray Road, Pacific Highway, Hampden Road, Orchard Road, Nelson Street and Gordon Avenue</li> </ul>  |   |
| Religious                       | <ul style="list-style-type: none"> <li>• 35 Hampden Road – Artarmon Mosque</li> </ul>   |   |
| <b>Residents and businesses</b> |   |   |
| Thomas Street                   | <ul style="list-style-type: none"> <li>• 18 – 543 residential apartments + strata manager</li> <li>• 12 – 18 Commercial office suites + Strata Title Management</li> </ul>  | <ul style="list-style-type: none"> <li>• 8 – 7 storey commercial office building + strata manager</li> <li>• 2 – Guide Dogs Association</li> </ul>  |
| Albert Avenue                   | <ul style="list-style-type: none"> <li>• 65 – Mandarin Centre (rooftop sports club, cinema, food court and 26 retail shops) + Centre Management</li> <li>• 73-77 – 329 Student apartments + Building Manager</li> <li>• 100 – 42 Residential apartments + strata manager</li> </ul> | <ul style="list-style-type: none"> <li>• 67 – 15 Storey commercial tower + Managing Agent (CBRE). Mix of finance and Government tenancies</li> <li>• 84-86 – 32 Residential apartments + strata manager</li> <li>• 88 – 36 Residential apartments + strata manager</li> </ul> |
| Victor Street                   | <ul style="list-style-type: none"> <li>• 31-37 – Sebel Apartments, 112 residential apartments and 52 serviced apartments + strata management</li> </ul>   |   |
| Victoria Avenue                 | <ul style="list-style-type: none"> <li>• 436 – Chatswood Interchange Management</li> </ul>  |   |
| Ellis Street                    | <ul style="list-style-type: none"> <li>• 2 – Digital Evolution Design</li> <li>• 3 – 12 Residential apartments + strata manager</li> <li>• 4-6 – 18 Residential Apartments + strata manager</li> </ul>  | <ul style="list-style-type: none"> <li>• 7-13 – 48 Residential apartments + strata manager</li> <li>• 8 – 40 Residential apartments + strata manager</li> </ul>   |
| Chapman Avenue                  | <ul style="list-style-type: none"> <li>• 2 – Keenagers Day Centre</li> <li>• 6 – Uniting Chapman Close, 12 unit retirement village and Uniting Northern Sydney Regional Office</li> </ul>   |   |
| Hopetoun Avenue                 | <ul style="list-style-type: none"> <li>• 1A-13 – 7 residential homes</li> </ul>   | <ul style="list-style-type: none"> <li>• 2-12 – 6 residential homes</li> </ul>  |
| Mowbray Road                    | <ul style="list-style-type: none"> <li>• 340 – 2 double storey residences (duplex)</li> <li>• 342 - 6 residential units + NSW Strata Management</li> </ul>  | <ul style="list-style-type: none"> <li>• 344-346 - 9 residential units + strata manager</li> <li>• 348 – Ausgrid, heritage substation</li> </ul>  |
| Pacific Highway                 | <ul style="list-style-type: none"> <li>• 655 – Chatswood Bowling Club</li> </ul>  |   |

| Stakeholders     | Detail   |  |
|------------------|--|--|
| Orchard Road     | <ul style="list-style-type: none"> <li>• 2-22 - 9 residential homes</li> </ul>   |  |
| Gordon Avenue    | <ul style="list-style-type: none"> <li>• 5-9 - Louder Minds (home based business) and 15 residential units + strata manager</li> <li>• 1-3 - 12 residential units (Frank Knight Property Management)</li> <li>• 10 - 10 residential apartments + strata manager</li> </ul>   |  |
| Nelson Street    | <ul style="list-style-type: none"> <li>• 2 - 2 Home based businesses and residential home</li> <li>• 1-5 – 3 residential homes</li> <li>• 9-11 - 45 residential units (Dunns Strata Management, Property Manager – Oasis Property Management)</li> </ul>   | <ul style="list-style-type: none"> <li>• 15 - 7 residential units + strata manager</li> <li>• 17 - 6 residential units + strata manager</li> <li>• 19 - 1 residential home</li> </ul>  |
| Elizabeth Street | <ul style="list-style-type: none"> <li>• 1-3 – 2 residential homes</li> </ul>  | <ul style="list-style-type: none"> <li>• 40-52 – 9 residential homes</li> </ul>  |
| Raleigh Street   | <ul style="list-style-type: none"> <li>• 1-7 – 4 residential homes</li> </ul>  | <ul style="list-style-type: none"> <li>• 8-14 – 4 residential homes</li> </ul>   |
| Drake Street     | <ul style="list-style-type: none"> <li>• 1-13 – 13 residential homes</li> </ul>  | <ul style="list-style-type: none"> <li>• 12 – Family Day Care</li> <li>• 7 – Family Day Care</li> </ul>  |
| Hawkins Street   | <ul style="list-style-type: none"> <li>• 1-11 – 6 residential homes</li> </ul>   | <ul style="list-style-type: none"> <li>• 2-14 – 7 residential homes</li> </ul>   |
| Brand Street     | <ul style="list-style-type: none"> <li>• 1-13 – 7 residential homes</li> <li>• 2 – 8 residential apartments + strata manager</li> </ul>  | <ul style="list-style-type: none"> <li>• 4 - 10 residential apartments + strata manager</li> <li>• 8-10 – 16 residential apartments + strata manager</li> </ul>  |
| Hampden Road     | <ul style="list-style-type: none"> <li>• 9 – 12 residential apartments + strata manager</li> <li>• 11 – 16 residential apartments + strata manager</li> <li>• 13 – 24 residential apartments + strata manager</li> <li>• 15 – 8 residential apartments + strata manager</li> <li>• 17 – 16 residential apartments + strata manager</li> <li>• 19 - 4 residential apartments + strata manager</li> <li>• 21- 4 residential apartments + strata manager</li> <li>• 24 - 10 residential apartments + strata manager</li> <li>• 25 – 13 residential apartments + strata manager</li> </ul> | <ul style="list-style-type: none"> <li>• 67 – 9 residential apartments + strata manager</li> <li>• 77-83 – 4 residential homes</li> <li>• 85-91 – 10 residential apartments + strata manager</li> <li>• 97 – 12 residential apartments + strata manager</li> <li>• 99 – 16 residential apartments + strata manager</li> <li>• 107 – 18 residential apartments + strata manager</li> <li>• 115 – 10 residential apartments + strata manager</li> <li>• 117-119 – 12 residential apartments + strata manager</li> <li>• 130 – The Thai Artarmon, restaurant</li> </ul> |

| Stakeholders  | Detail   |   |
|---------------|--|---|
|               | <ul style="list-style-type: none"> <li>• 26 - 5 residential apartments + strata manager</li> <li>• 27 – 4 residential apartments + strata manager</li> <li>• 28-32 - 8 residential apartments + strata manager</li> <li>• 29 – 4 residential apartments + strata manager</li> <li>• 31 – 4 residential apartments + strata manager</li> <li>• 33 – 8 residential apartments + strata manager</li> <li>• 36 – 6 residential apartments + strata manager</li> <li>• 38 -- 10 residential apartments + strata manager</li> <li>• 40 – 6 residential apartments + strata manager</li> <li>• 42 - 4 residential apartments + strata manager</li> <li>• 44 - 12 residential apartments + strata manager and ground floor retail (Pizza Luna, Laing &amp; Simmons)</li> </ul> | <ul style="list-style-type: none"> <li>• 2/130 – Inter Deserts</li> <li>• 132 – Artarmon Mowers, retail</li> <li>• 134-136 – Bella Babes Day Care Centre</li> <li>• 136 – Artarmon Medical Centre</li> <li>• 142 - 16 residential apartments + strata manager</li> <li>• 148 – 10 residential apartments + strata manager</li> <li>• 152-156 – 20 residential apartments + strata manager</li> <li>• 158-162 – 20 residential apartments + strata manager</li> <li>• 164 – 18 residential apartments + strata manager</li> <li>• 170-174 – 12 residential apartments + strata manager</li> <li>• 176 – 8 residential apartments + strata manager</li> <li>• 182-190 – 32 residential apartments + strata manager</li> </ul> |
| McMillan Road | <ul style="list-style-type: none"> <li>• 1 – 9 residential apartments + strata manager</li> </ul>  | <ul style="list-style-type: none"> <li>• 2 – 32 residential apartments +strata manager</li> </ul>   |
| Cleland Road  | <ul style="list-style-type: none"> <li>• 1 – 4 residential apartments + strata manager</li> <li>• 2 – 4 residential units + strata manager</li> <li>• 4-6 – 2 residential homes</li> <li>• 3 – 4 residential apartments + strata manager</li> <li>• 5-7A – 2 residential homes</li> <li>• 8-12 – 4 residential units + strata manager</li> <li>• 14-16 – 2 residential homes</li> <li>• 18 – 4 residential apartments + strata manager</li> </ul>  | <ul style="list-style-type: none"> <li>• 20 – 4 residential units + strata manager</li> <li>• 24-28 – 6 residential units + strata manager</li> <li>• 30 – 10 residential apartments + strata manager</li> <li>• 32 – 6 residential apartments + strata manager</li> <li>• 34 – 8 residential apartments + strata manager</li> <li>• 36 – residential home</li> <li>• 38 - 10 residential apartments + strata manager</li> </ul>  |
| Parkes Road   | <ul style="list-style-type: none"> <li>• 1-3 – 8 residential apartments + strata manager</li> <li>• 5 – 12 residential apartments + strata manager</li> </ul>  | <ul style="list-style-type: none"> <li>• 9-15 – 4 residential homes</li> </ul>  |
| Burra Road    | <ul style="list-style-type: none"> <li>• 17-53 – 19 residential homes</li> </ul>   | <ul style="list-style-type: none"> <li>• 28-52 – 12 residential homes</li> </ul>  |

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