Memorial Avenue Upgrade, Kellyville

Addendum Review of Environmental Factors

July 2019

NSW GOVERNMENT

Roads and Maritime Services

Memorial Avenue Upgrade
Addendum Review of Environmental Factors

July 2019

Prepared by Beca Pty Ltd and Roads and Maritime Services

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Approval and authorisation

Title	Memorial Avenue Upgrade Addendum Review of Environmental Factors
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Dated:	10 July 2019

Document status

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Final	10 July 2019	Peta Brunel (Beca)	Matt Brookes (Beca)

Executive summary

The proposed modification

Roads and Maritime Services (Roads and Maritime) proposes to upgrade approximately 2.2 kilometres of Memorial Avenue (MR642) between Windsor Road and Old Windsor Road, Kellyville. This also includes upgrades to the intersections at Windsor Road and Old Windsor Road.

In 2014, Roads and Maritime determined a Review of Environment Factors (REF) for the Memorial Avenue Upgrade project (the Project REF). Following determination, proposed modifications have been identified during the planning process between concept design to detailed design and are required to support the successful construction and operation of the project corridor. Proposed modifications are outlined below:

- Increasing the posted speed limit along Memorial Avenue from 70km/h to 80km/h
- Inclusion of a bus bay in either direction on Memorial Avenue north of Rutherford Avenue
- Pedestrian crossings have been removed to improve traffic flow along Memorial Avenue and to improve the efficiency for drivers exiting from associated side streets at the following locations:
    - Free Settlers Drive (west side of intersection)
    - Severn Vale Drive (east side of intersection)
    - Windsor Road (south side of intersection)
- Three ancillary facilities located off Memorial Avenue to be used as stockpile sites and compounds (one new compound, one existing compound to be increased)
- Minor modifications to the project boundary at various locations on Memorial Avenue, Old Windsor Road and Windsor Road. These modifications have occurred to factor in the following:
    - Drainage infrastructure and erosion and sediment controls around watercourses on Memorial Avenue
    - Public utility adjustments
    - Existing driveway tie-in works at various locations along Memorial Avenue and Windsor Road, and
    - Tie-in work with existing local roads.

An Addendum REF has been prepared to assess the potential impacts of the proposed modification. This Addendum REF is to be read in conjunction with the Project REF and the Submissions Report for the project.

Proposal objectives

The objectives of the proposed modifications are consistent with the objectives outlined in the Project REF listed below, to:

- Improve road safety in line with the NSW Road Safety Strategy 2012–2021 ‘Safe System Directions’ and ‘Safer Road’ key focus
- Improve liveability and sustainability, support economic growth and productivity by providing road capacity for projected traffic volumes
- Improve travel times
- Improve quality of service, sustainability and liveability by providing facilities for walking and cycling and future public transport needs
- Improve urban design and visual quality, and
- Improve the drainage system.

Statutory and planning framework

The Memorial Avenue Upgrade project was approved under Division 5.1 of the *Environment Planning and Assessment Act 1979* (EP&A Act) in 2014.

Roads and Maritime is the proponent and determining authority for the proposed works. Clause 94 of the State Environmental Planning Policy (Infrastructure) 2007 (ISEPP) permits development on any land for the purpose of a road or road infrastructure facilities to be carried out by, or on behalf of a public authority without consent. As the proposed modification is for a road and is to be carried out on behalf of Roads and Maritime, it can be assessed under Division 5.1 of the EP&A Act. Development consent from council is not required.

Community and stakeholder consultation

A comprehensive consultation strategy was implemented for the Project REF. No submissions were received opposing the initial proposal and several requested priority timing for the delivery of the project. No additional community consultation has been undertaken for the proposed modification.

Environmental impacts

An assessment and review of the Project REF was completed to assess the new potential environmental impacts of the proposed modifications in this Addendum REF. Specific safeguards and management measures to mitigate potential new impacts have been identified and documented in this Addendum REF. The main potential impacts and mitigation measures are addressed in detail in sections 6 and 7 of this Addendum REF, and include:

- Noise and Vibration;
- Biodiversity Impacts; and
- Aboriginal Heritage

Justification and conclusion

The proposed modifications assessed in this Addendum REF are necessary as part of the Memorial Avenue Upgrade project. The potential impact of design modifications on the environment and the surrounding residents have been considered throughout the detailed design process. Refer to Appendix G.

Potential environmental impacts have been identified and the safeguards and mitigation measures documented in the Project REF and this Addendum REF are considered satisfactory in addressing any potential environmental impacts.

The environmental impacts of the proposed modification are not likely to be significant and therefore it is not necessary for an environmental impact statement to be prepared and approval for the proposed modification to be sought from the Minister for Planning under Division 5.2 of the EP&A Act.

In this context, the proposed modifications to the original proposal are considered justified.

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1 Introduction

1.1 Background

An Addendum Review of Environmental Factors (REF) is required to provide a comprehensive environmental assessment specific to the proposed modifications to the Memorial Avenue Upgrade project from concept design to detailed design. The original Memorial Avenue Upgrade REF (referred to in this Addendum REF as the Project REF) was prepared for the concept design by Hyder Consulting in 2014. The Project REF was determined by Roads and Maritime Services (Roads and Maritime) on 4 May 2015.

1.2 Proposed modification overview

Roads and Maritime proposes to upgrade about 2.2 kilometres of Memorial Avenue (MR642) between Windsor Road and Old Windsor Road, Kellyville. The key features of Memorial Avenue Upgrade as described in the Project REF, include:

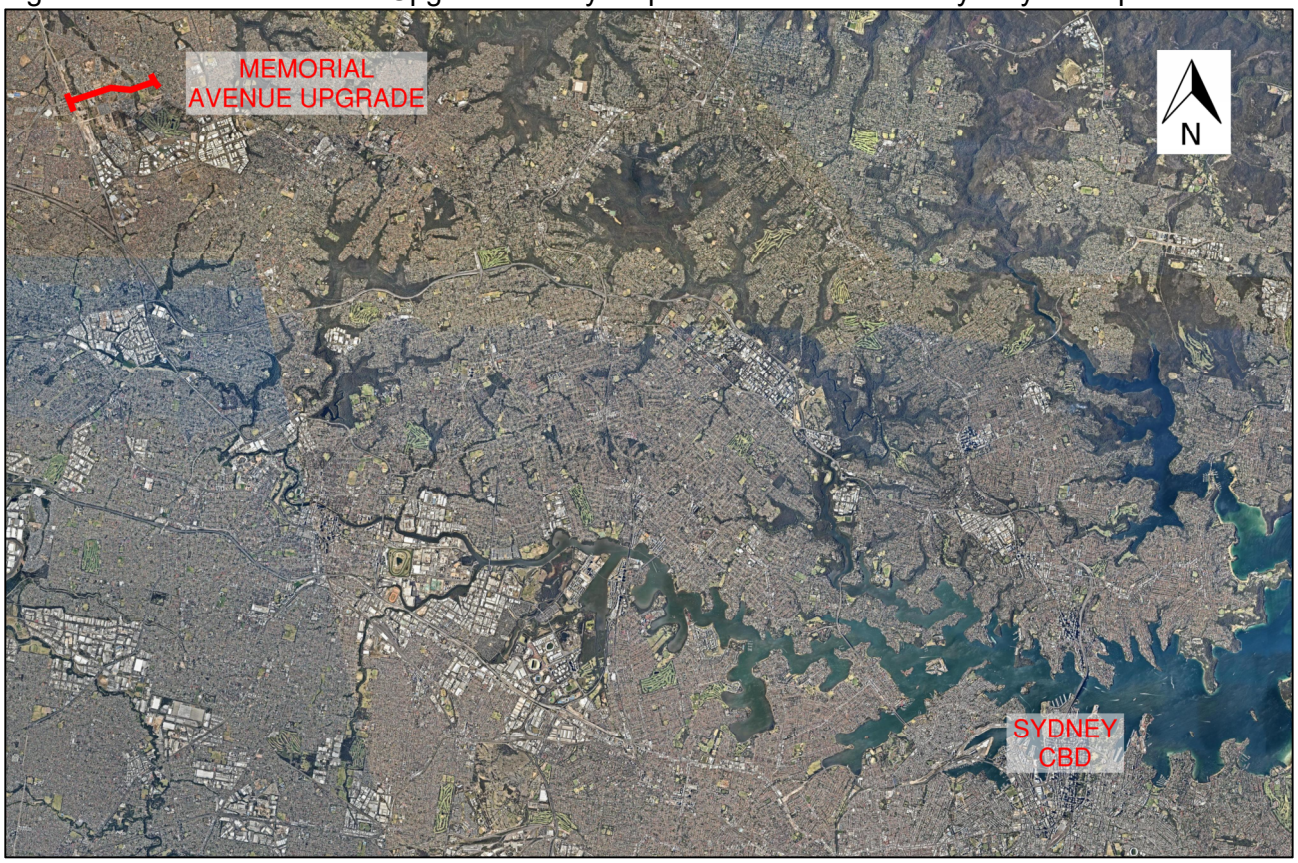
- Widening Memorial Avenue from a two-lane road to a four-lane divided road for a length of approximately 2.2 kilometres.
- Building a wide central median along sections of Memorial Avenue to allow the road to be widened to six lanes, when required.
- Upgrading the intersections of Memorial Avenue with Windsor Road, Arnold Avenue (west), and Old Windsor Road / Sunnyholt Road.
- Closing the intersections of Memorial Avenue with Hector Court, Rutherford Avenue, and Arnold Avenue (east).
- Introduction of traffic lights at the intersections of Memorial Avenue with Arnold Avenue and Severn Vale Drive.
- Providing left-in and left-out access for Burns Road and Stone Mason Drive.
- Widening the alignment of Windsor Road to the west of the existing road between President Road and Wrights Road.
- Slightly widening the alignment of Old Windsor Road for about 300 metres either side of the intersection.
- Construction of a bridge to carry traffic travelling along Memorial Avenue over Strangers Creek.
- Providing a speed limit of 70 kilometres per hour along Memorial Avenue.
- Providing a three-metre-wide shared pedestrian/cyclist path on both sides of Memorial Avenue.
- Providing bus priority capability at traffic lights and creating indented bus bays on both sides of Memorial Avenue.
- Relocating and/or temporarily diverting underground utilities, including water, telecommunications, electricity and gas.

Following the completion of detailed design, Roads and Maritime propose modifications to the Memorial Avenue Upgrade project. Changes are considered necessary to support the successful construction and operation of the project corridor. Proposed modifications are outlined below:

- Increasing the posted speed limit along Memorial Avenue from 70km/h to 80km/h
- Inclusion of a bus bay in either direction on Memorial Avenue north of Rutherford Avenue
- Pedestrian crossings have been removed to improve traffic flow along Memorial Avenue and to improve the efficiency for drivers exiting from associated side streets at the following locations:
    - Free Settlers Drive (west side of intersection)
    - Severn Vale Drive (east side of intersection)
    - Windsor Road (south side of intersection)
- Three ancillary facilities located off Memorial Avenue to be used as stockpile sites and compounds (one new compound, one existing compound to be increased)

- Minor modifications to the project boundary at various locations on Memorial Avenue, Old Windsor Road and Windsor Road. These modifications have occurred between concept design and detailed design and accommodate works such as:
    - Drainage infrastructure and erosion and sediment controls around watercourses on Memorial Avenue
    - Public utility adjustments
    - Existing driveway tie-in works at various locations along Memorial Avenue and Windsor Road, and
    - Tie-in work with existing local roads.
- Clearways to be installed for 2.2km in both directions of Memorial Avenue. The inclusion of the clearways has minimal impact and is an important modification for the following reasons:
    - The project initially included 'No Parking' for the same section of Memorial Avenue.
    - Majority of the signage will be included on existing signposts.
    - The Clearway allows for vehicles to be towed (a 'no stopping' sign does not) apart from buses and taxis which are collecting or alighting passengers.
    - It is considered the clearway require no further assessment in this report as they do no impact on the operations of the road post completion.

Figure 1-1: Memorial Avenue Upgrade locality map in the context of the Sydney metropolitan area



Source: Nearmap

- Early electrical works undertaken by Ausconnex including works associated with:
    - 33Kv transmission cables;
    - 11Kv distribution network;
    - LV street lighting;
    - Potable water main design.

1.3 Purpose of the report

This Addendum REF has been prepared by Beca Pty Ltd (Beca) on behalf of Roads and Maritime Sydney Region. For the purposes of these works, Roads and Maritime is the proponent and the determining authority under Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The purpose of the Addendum REF is to describe the proposed modifications, to document and assess the likely impacts of the proposed modification on the environment, and to detail mitigation and management measures to be implemented. The Addendum REF is to be read in conjunction with the Project REF and the Submissions Report (see Section 5.1).

The description of the proposed work and assessment of associated environmental impacts has been undertaken in context of clause 228 of the Environmental Planning and Assessment Regulation 2000, *Is an EIS Required? Best Practice Guidelines for Part 5 of the Environmental Planning and Assessment Act 1979* (*Is an EIS Required?* guidelines) (DUAP, 1995/1996), *Roads and Road Related Facilities EIS Guideline* (DUAP, 1996), the *Biodiversity Conservation Act 2016* (BC Act), the *Fisheries Management Act 1994* (FM Act), and the Australian Government's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

In doing so, the Addendum REF helps to fulfil the requirements of:

- Section 5.5 of the EP&A Act including that Roads and Maritime examine and take into account to the fullest extent possible, all matters affecting or likely to affect the environment by reason of the activity.

The findings of the Addendum REF would be considered when assessing:

- Whether the proposed modification is likely to result in a significant impact on the environment and therefore the necessity for an environmental impact statement to be prepared and approval to be sought from the Minister for Planning under Division 5.2 of the EP&A Act.
- The significance of any impact on threatened species as defined by the BC Act and/or FM Act, in section 1.7 of the EP&A Act and therefore the requirement for a Species Impact Statement or a Biodiversity Development Assessment Report.
- The significance of any impact on nationally listed biodiversity matters under the EPBC Act, including whether there is a real possibility that the activity may threaten long-term survival of these matters, and whether offsets are required and able to be secured.
- The potential for the proposed modification to significantly impact any other matters of national environmental significance or Commonwealth land and therefore the need to make a referral to the Australian Government Department of the Environment and Energy for a decision by the Australian Minister for the Environment on whether assessment and approval is required under the EPBC Act.

2 Need and options considered

2.1 Strategic need for the proposed modifications

2.1.1 Posted speed

The proposed change in posted speed limit from 70km/h to 80km/h has been proposed in order to meet requirements of the *NSW Speed Zoning Guidelines* (Roads and Traffic Authority NSW, 2011). This modification is consistent with the 80km/h design speed for the proposed Memorial Avenue Upgrade.

An overview of speed limit application in NSW is provided in Table 2-1.

Table 2-1: Overview of speed limit application in NSW

Speed limit km/h	Type of speed limit	Typical application
60	Length	• Significant urban undivided arterial roads (with direct driveway accesses). • Divided road with high volume where the lanes are narrow (less than 3 metres). • Rural residential roads in villages with minimal development.
70	Length	• Locations that do not meet the standard of 80 km/h speed limit.
80	Length	• Urban high standard divided roads (generally without driveway access). • Undivided arterial and sub-arterial roads on the fringes of urban areas. • Lower quality rural roads. • Undivided rural roads with less than 5.6 metres wide sealed pavement or no marked dividing line (refer to note in guideline).

The objectives of the posted speed proposal are to:

- Ensure consistency with the *NSW Speed Zoning Guidelines*.
- Provide road users with speed zones that reflect road conditions.

This is consistent with the project objectives in that the increase in posted speed limit will improve travel times for Memorial Avenue road users.

2.1.2 Bus bays

Bus priority lanes (queue-jump lanes) and indented bus bays were accommodated during concept design at new traffic signals on Memorial Avenue adjacent to the Arnold Avenue and Severn Vale Drive intersections in both the eastbound and westbound direction of travel. Roads and Maritime have since re-assessed vehicle and pedestrian safety and the need for the continuous flow of traffic when considering additional indented bus bays along Memorial Avenue.

During this process, the requirement for an additional pair of bus bays on Memorial Avenue both eastbound and westbound and north of Rutherford Avenue has been identified. The addition of bus bays in this location would support the project's objective to improve quality of service, sustainability and liveability by providing facilities for future public transport needs. The addition of bus bays would facilitate required infrastructure for public transport needs for the new

developments on both sides of Memorial Avenue. The bus bays are located adjacent to the proposed pedestrian bridge to be constructed by The Hills Shire Council over Memorial Avenue. It is expected that the bus bays will provide safe connectivity to the local community together with the proposed pedestrian bridge.

2.1.3 Ancillary facilities

The proposed ancillary facilities are strategically located sites that would support construction activities. Specifically, the ancillary facilities would function as a combination of:

- Site compound – site offices, rest areas, amenities and equipment storage.
- Stockpile site – temporary storage of construction materials.

The ancillary facilities are necessary to complete upgrade works in order to realise the project objectives. The two ancillary facilities selected as the preferred options differ from those outlined in the Project REF as they performed best against the site location criteria set out in the Roads and Maritime Stockpile Management Procedure. The selected sites were considered more adequate for the project for the following reasons:

- Support proposed construction / traffic staging.
- No privately-owned land would be acquired for use as an ancillary facility;
- Due to their strategic location, excessive transportation of materials would be minimised; and
- This enables efficient construction activity across the entire project alignment.

The ancillary facilities are temporary in nature and would be operational during the construction phase only.

2.1.4 Other modifications

Several design changes have occurred since concept design and these changes have resulted in modifications to the project's construction and operation footprint.

The strategic need for these changes relate directly to the original project objectives, such as improving the drainage system and improving travel times.

2.2 Proposal objectives

The objectives of this proposal are consistent with the objectives of the proposal outlined in the Project REF and listed below:

- Improve road safety in line with the NSW Road Safety Strategy 2012–2021 'Safe System Directions' and 'Safer Road' key focus;
- Improve liveability and sustainability, support economic growth and productivity by providing road capacity for projected traffic volumes;
- Improve travel times;
- Improve quality of service, sustainability and liveability by providing facilities for walking and cycling and future public transport needs;
- Improve urban design and visual quality; and
- Improve the drainage system.

2.3 Alternatives and options considered

2.3.1 Posted speed

Do nothing option

This option would involve leaving the posted speed limit at 70 km/h as was identified in Project REF.

Increased speed limit option

This option involves changing the proposed posted speed limit to 80 km/h between Old Windsor Road and Windsor Road.

2.3.2 Bus bays

Do nothing option
No additional indented bus bays other than those provided for at new traffic signals on Memorial Avenue adjacent to Arnold Avenue and Severn Vale Drive in both eastbound and westbound.

Additional bus bays
Additional bus bays on Memorial Avenue, both eastbound and westbound, north of Rutherford Avenue.

2.3.3 Ancillary facilities

This proposal has sought to select the most appropriate location for ancillary facilities with the least impact on the environment and the surrounding sensitive receivers. Potential ancillary facilities identified in the Project REF were reviewed during detailed design. These potential ancillary facilities were located at (see Figure 2-2):

- The northwest corner of the intersection of Memorial Avenue and Windsor Road;
- The southwest corner of the intersection of Memorial Avenue and Windsor Road; and
- The current car park at Kellyville Memorial Park.

Figure 2-2 – Project REF potential ancillary facilities

Source: Project REF

The ancillary facilities (stockpile sites and site compounds) are required to support construction activities associated with the Memorial Avenue Upgrade. This proposal has sought to select the most appropriate location for these ancillary sites with the least impact on the environment and the surrounding sensitive receivers.

The three proposed ancillary facilities were selected from a short list of potential sites. A number of alternatives have been considered in determining the best location for ancillary sites. Figure 2-3 maps some of these sites on a long plot of the project corridor.

- Site 1 – used as a stockpile site and access for work on the Sydney Metro Northwest rail project. It is expected that this site will become available for use during the Memorial Avenue Upgrade.
- Site 2 – used as a stockpile site and access for work on the Sydney Metro Northwest rail project. It is expected that this site will become available for use during the Memorial Avenue Upgrade.
- Site 3 – privately owned land not considered appropriate due to close proximity to sensitive receivers (residential land uses) and associated cost of lease.
- Site 4 – catchment area for water entering Strangers Creek. Not considered appropriate as site is within 30 metres of catchment area and close proximity to sensitive receivers (residential land uses).
- Site 5 – within the Strangers Creek corridor and not considered appropriate due to this sensitive land use.
- Site 6 – increase in the area identified in Project REF. Suitable access, hard stand areas and service connections for use as a contractor's compound. Appropriate buffer from sensitive land uses. Selected as a preferred option.
- Site 7 – privately owned land not suitably located in relation to the project work area and not considered appropriate.
- Site 8 – Roads and Maritime and Transport for New South Wales owned land to the project area works, as well as minimising excessive transportation of materials and enable efficient construction activity across the entire project alignment.

Figure 2-3 – Potential stockpile and contractor compound sites considered

Source: Beca longplot

2.3.4 Other modifications

Throughout detailed design, minor modifications to the concept design have been necessary. These changes do not represent a major diversion from the concept design assessed in the Project REF but do increase the construction footprint of the project. The nature of these minor modifications are generally associated with drainage infrastructure, public utility adjustments, additional turning lanes, pedestrian crossings and tie-in works with existing driveways and existing and future local roads.

The alternative to these modifications is no change to the project's concept design.

Several pedestrian crossings were included within the project corridor as part of concept design. The individual need for each of these crossings was further considered during detailed design.

2.4 Analysis of options selected

2.4.1 Posted speed

Following the speed limit assessment of Memorial Avenue, it was determined that the planned

70 km/h speed limit on Memorial Avenue was not consistent with the *NSW Speed Zoning Guidelines*. The road environment is considered an *urban high standard divided road (generally without driveway access).* As defined in Table 2-1, this road environment is suitable for an 80 km/h posted speed limit. Currently, there are limited properties with driveway access. Any future development is not permitted to incorporate direct access to Memorial Avenue.

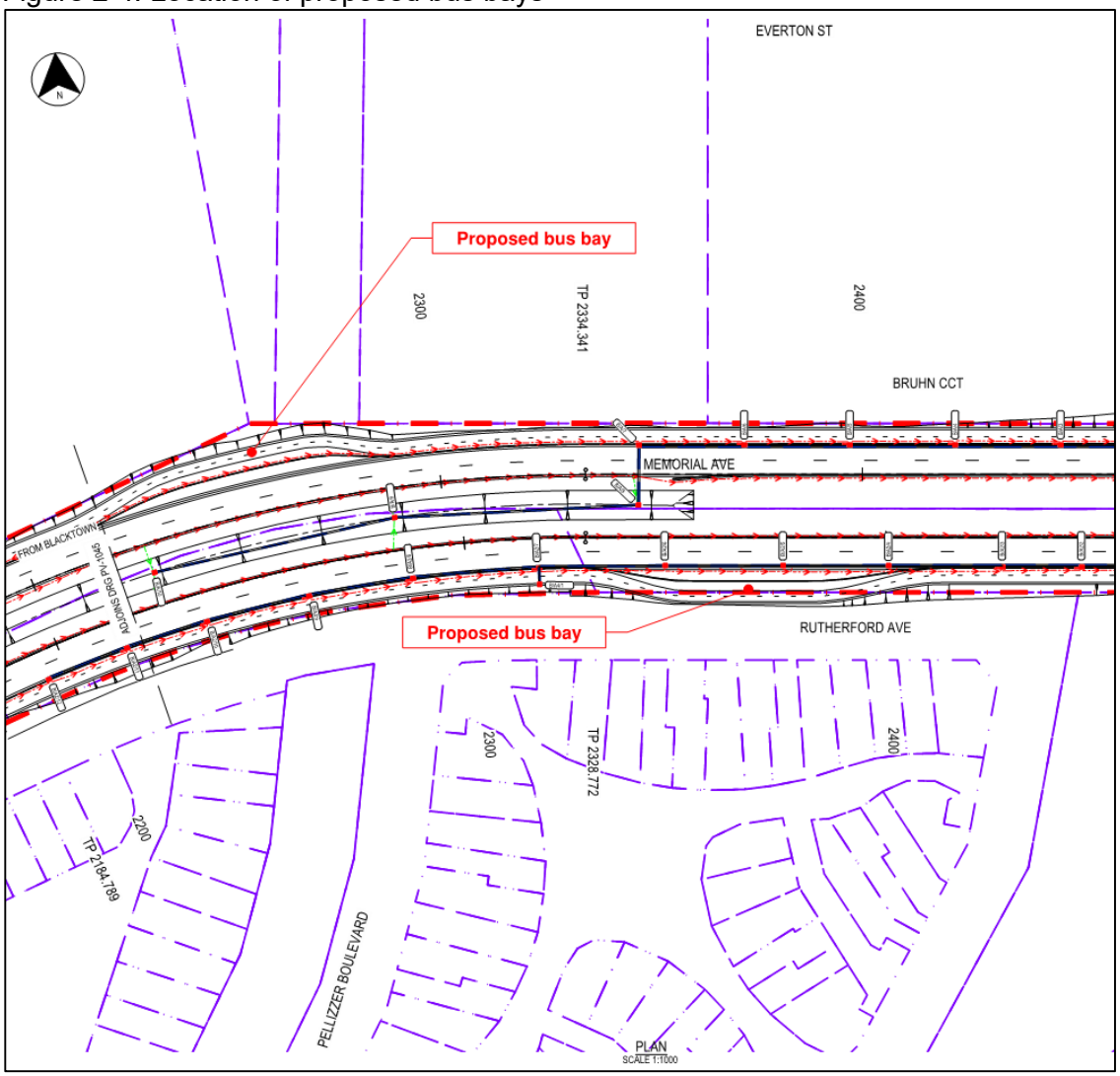
In addition, the length of Memorial Avenue has been designed to facilitate an 80 km/h posted speed. Approaching intersections with Windsor Road and Old Windsor Road, a 60 km/h speed limit would apply.

Increasing the speed limit to 80 km/h would continue to meet all the project objectives stated in the Project REF and based on the outcome of the speed limit assessment, it is proposed as the preferred option. This modification to the determined Project REF will require further assessment of Noise and Vibration impacts to surrounding sensitive receivers.

2.4.2 Bus bays

Additional bus bays on Memorial Avenue in both the eastbound and westbound direction, north of Rutherford Avenue was selected as the preferred option (see Figure 2-4 below). The addition of bus bays in this location would provide infrastructure for future public transport needs. It is expected that these bus bays will service future development in the vicinity of this location and provide a more consistent traffic flow.

Figure 2-4: Location of proposed bus bays



Source: Detailed design drawings

2.4.3 Ancillary facilities

The proposed ancillary facilities were selected based on location, constructability and surrounding sensitive receivers, ultimately being able to support the objectives of the Memorial Avenue Upgrade project. In addition, site location criteria outlined in Section 3.5 of the Project REF (as the Roads and Maritime Stockpile Management Procedure) was also considered.

The three ancillary facilities selected as the preferred option perform best overall against the criteria. No privately-owned land would be acquired for use as an ancillary facility. Both facilities, due to their strategic location, would minimise excessive transportation of materials and enable efficient construction activity across the entire project alignment. The facilities are critical in supporting construction activities and are necessary to achieve the original objectives of the Memorial Avenue Upgrade project.

Ancillary Facility 1
Ancillary Facility 1 combines Site 1 (Lot 10, DP844963) and Site 2 (Lot 30, DP1071715), which are adjacent to each other and owned by Roads and Maritime and Transport for New South Wales, respectively. Located just east of Old Windsor Road, the facility represents an advantageous location during construction due to proximity to the project area and limited impact on sensitive receivers and having been used for a stockpile site previously, does not require any modification to cater for ancillary facilities. Although there is a residential interface to the east (one single dwelling), the current similar use at the site as an ancillary facility for the Sydney Metro Northwest project means that no new environmental impacts are anticipated. The cumulative impact on the residential property associated with the ongoing use of this site as an ancillary facility is outlined in Section 6.5 below.

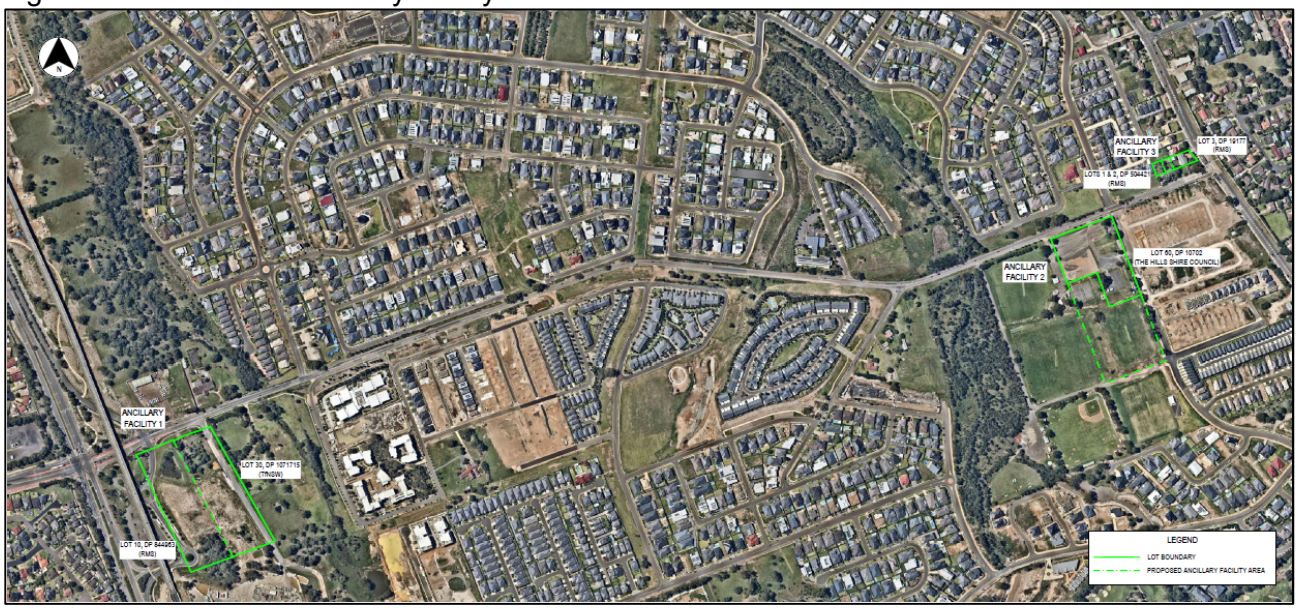
Ancillary Facility 2
Ancillary Facility 2 would utilise part of Site 6 (Lot 60, DP10702) located approximately 200 metres west of Windsor Road. The site, known as Kellyville Memorial Park, is currently owned by The Hills Shire Council and comprises significant existing hard stand (car parking) areas. These hard stand areas are considered suitable for the use of the site as an ancillary facility and it is envisaged that construction materials would be stockpiled at this site.

Ancillary Facility 3
Ancillary Facility 3 combines three properties on the corner of Memorial Avenue and Windsor Road. These include 3 Memorial Avenue, 5 Memorial Avenue, and 4 Windsor Road. The three properties have been fully acquired by Roads and Maritime and Transport for New South Wales. The Site, located at the eastern end of Memorial Avenue, represents an advantageous location during construction due to proximity to the project area works, as well as minimising excessive transportation of materials and enable efficient construction activity across the entire project alignment. The cumulative impact on the residential property to the north associated with the ongoing use of this site as an ancillary facility is outlined in Section 6.5 below.

Vegetation adjacent, if present, to these hard stand areas may need to be removed during the construction phase.

The construction contractor will be responsible for the preparation and reinstatement of the ancillary facilities. Grading of the underlying surface and bunding of stockpile areas may be necessary. At the completion of the project all ancillary facilities will be returned to their previous state.

Figure 2.-4 – Selected ancillary facility sites



Source: Nearmap (29 December 2019)

2.4.4 Other modifications

Three pedestrian crossings that were included in the Project REF have been removed during detailed design. These crossings were initially proposed to be located at the intersection of Memorial Avenue and:

- Free Settlers Drive (west side of intersection)
- Severn Vale Drive (east side of intersection)
- Windsor Road (south side of intersection)

Pedestrian crossings have been removed to improve traffic flow along Memorial Avenue and to improve the efficiency for drivers exiting from associated side streets.

The balance of pedestrian crossings that remain in detailed design at these intersections will adequately and safely facilitate pedestrian movements. If desired in the future, the provision of space at intersection will allow for additional pedestrian crossings.

Other, relatively minor modifications have been adopted in detailed design. These other modifications include:

- Drainage infrastructure and scour protection around watercourses on Memorial Avenue
- Public utility adjustments
- Tie-in works with existing driveways at various locations along Memorial Avenue and Windsor Road
- Tie-in works with existing and future local roads.

2.5 Preferred options

Assessment of the options determined the following preferred options:

- Posted speed limit of 80 km/h. The road environment is considered an *urban high standard divided road (generally without driveway access)*. As defined in Table 2-1, this road environment is suitable for an 80 km/h posted speed limit. A 60 km/h speed limit would apply approaching intersections with Windsor Road and Old Windsor Road.
- Additional bus bays on Memorial Avenue in both the eastbound and westbound direction, north of Rutherford Avenue.

- Ancillary Facility 1 which consists of Site 1 (Lot 10, DP844963) and Site 2 (Lot 30, DP1071715) located at the corner of Memorial Avenue and NW Transitway. These sites are owned by Roads and Maritime and Transport for New South Wales.
- Ancillary Facility 2 would utilise part of Site 6 (Lot 60, DP10702) located approximately 200 metres west of Windsor Road. The site, known as Kellyville Memorial Park, is currently owned by The Hills Shire Council and comprises significant existing hard stand (car parking) areas.
- Ancillary Facility 3 combines three properties on the corner of Memorial Avenue and Windsor Road. These include 3 Memorial Avenue, 5 Memorial Avenue, and 4 Windsor Road. The three properties have been fully acquired by Roads and Maritime and Transport for New South Wales.
- Three pedestrian crossings included in the Project REF removed to improve traffic flow along Memorial Avenue and to improve the efficiency for drivers exiting from associated side streets. These pedestrian crossings were proposed at the intersection of Memorial Avenue and:
    - Free Settlers Drive (west side of intersection);
    - Severn Vale Drive (east side of intersection); and
    - Windsor Road (south side if intersection).
- Additional minor modifications work includes:
    - Drainage infrastructure and scour protection around watercourses on Memorial Avenue;
    - Public utility adjustments; and
    - Tie-in works with existing driveways at various locations along Memorial Avenue and Windsor Road, and with existing and future local roads.

3 Description of the proposed modification

3.1 The proposed modifications

Roads and Maritime proposes to modify the Memorial Avenue Upgrade to improve safety, overcome engineering constraints and more effectively achieve project objectives. Key features of the proposed modifications and their anticipated construction footprint are identified in Table 3-1 and Figure 3-1 to 3-4.

Table 3-1: Memorial Avenue Upgrade project – proposed modifications

Ref.	Activity considered in the Project REF	Modification considered in this Addendum REF	Location	Specific assessment required?
PS1	Posted speed of 70km/h	Posted speed of 80km/h	Memorial Avenue between Old Windsor Road and Windsor Road	Noise and Vibration
BB1	Two pairs (eastbound and westbound) of indented bus bays on Memorial Avenue adjacent to the Arnold Avenue and Severn Vale Drive intersections	An additional pair of bus bays on Memorial Avenue, north of Rutherford Avenue	Eastbound and westbound roadway on Memorial Avenue, north of Rutherford Avenue	Noise and Vibration, Biodiversity
AF1	Potential ancillary facilities located at: • The northwest corner of the intersection of Memorial Avenue and Windsor Road; • The southwest corner of the intersection of Memorial Avenue and Windsor Road; and • The current car park at Kellyville Memorial Park.	New Ancillary Facility 1 (Lot 10, DP844963 and Lot 30, DP1071715)	Just east of the Old Windsor Road and Memorial Avenue intersection on the southern side of Memorial Avenue.	Biodiversity, Aboriginal Heritage
AF2	As above.	Ancillary Facility 2 (part of Lot 60, DP10702). Same location as the Project REF but new boundary to factor in an increased construction footprint. Clearing of vegetation was not considered in Project REF. Prior to the removal of trees at this ancillary facility the RMS Project Team is to be consulted.	Approximately 200 metres west of the Memorial Avenue and Windsor Road intersection.	Biodiversity, Aboriginal Heritage

Ref.	Activity considered in the Project REF	Modification considered in this Addendum REF	Location	Specific assessment required?
AF3	As above.	Ancillary Facility 3 combines three properties on the corner of Memorial Avenue and Windsor Road. These include 3 Memorial Avenue, 5 Memorial Avenue, and 4 Windsor Road. Clearing of vegetation was not considered in Project REF. Prior to the removal of trees at this ancillary facility the RMS Project Team is to be consulted.	The North West corner of Memorial Avenue and Windsor Road intersection at Kellyville.	Biodiversity, Aboriginal Heritage
OM1	N/A	Private driveway tie-in works.	Various locations along Memorial Avenue and Windsor Road.	Biodiversity
OM2	N/A	Tie-in works with existing or future local roads.	Various locations along Memorial Avenue and Windsor Road.	Biodiversity
OM3	Scour protection up to five metres upstream and downstream of the culvert at Elizabeth Macarthur Creek.	Scour protection up to 10 metres upstream and downstream of the culvert at Elizabeth Macarthur Creek, plus additional drainage connections.	Elizabeth Macarthur Creek	Biodiversity
OM4	N/A	Drainage connection to existing watercourse	Existing watercourse immediately east of Rutherford Avenue	Biodiversity
OM5	N/A	Drainage connection to Strangers Creek	Strangers Creek (east of Severn Vale Drive and Memorial Avenue intersection)	Biodiversity
OM6	N/A	Drainage and sediment control infrastructure at other locations	Various locations along Old Windsor Road and Memorial Avenue	Biodiversity
PUA1	Annotation for services running through bus bays eastbound and westbound on Memorial Avenue.	Utilities running through the proposed bus bay locations.	Eastbound and westbound roadway on Memorial Avenue, north of Rutherford Avenue.	Environmental

Ref.	Activity considered in the Project REF	Modification considered in this Addendum REF	Location	Specific assessment required?
PUA2	Service for the extension of Severn Vale Drive to the north and south of Memorial Avenue to connect with existing local roads.	The utilities are not adjusted as part of this project. The diversion of the services along these roads area to be incorporated in the final arrangement to be completed by THSC.	Severn Vale Drive to the north and south of Memorial Avenue.	N/A
PUA3	Service relocation to match road layout following removal of pedestrian crossing along Memorial Avenue.	Locally adjust utilities, where required, to follow the design intent of the previous proposed public utility adjustments. No significant changes.	Pedestrian crossings removed along Memorial Avenue at Free Settlers Drive (west side of intersection), Severn Vale Drive (east side of intersection), and Windsor Road (south side of intersection).	Environmental
PUA4	Service adjustment on the project boundary at various locations to accommodate minor changes to the service providers design of public utility adjustments	Locally adjust utilities, to match the service providers design of the proposed public utility. No significant changes.	Minor modifications to the project boundary at various locations.	N/A
EW1	N/A	Existing overhead 33Kv cables that run along the northern side of Memorial Avenue between the Bus T-Way and Arnold Avenue will be placed underground.	Northern side of Memorial Avenue between the Bus T-Way and Arnold Avenue.	Noise / Environmental
EW2	N/A	Removing the existing overhead cables that run along the length of Memorial Avenue between Old Windsor Road and Windsor Road and replacing them with new cables placed underground	Memorial Avenue between Old Windsor Road and Windsor Road	Noise / Environmental
EW3	N/A	New low voltage street lighting cables will be installed as early works across all four approaches to both the Old Windsor Road and Windsor Road intersections with Memorial Avenue.	All four approaches to both the Old Windsor Road and Windsor Road intersections with Memorial Avenue.	Noise / Environmental

Key: PS – posted speed, BB – bus bays, AF – ancillary facilities, OM – other modifications, PUA – public utility adjustments, EW – early works.

3.2 Main features of the proposed modifications

3.2.1 Bus bays

Two mid-block bus stops (one in each direction) were added to the design almost midway between the Arnold Avenue and Severn Vale Drive intersections to facilitate the increased number of users resulting from surrounding residential development. The Hills Shire Council will be constructing a pedestrian bridge to facilitate the crossing of Memorial Avenue adjacent to the bus stops.

The bus stops are designed as indented bus stops to minimise the impact on traffic flow.

The addition of the bus stops has resulted in an increase in the widening project footprint. The eastbound shared path encroaches into The Hills Shire Council road corridor but has been designed as such that it can be considered as a combined path for both Memorial Avenue and the adjacent local road. The design was developed in close liaison with The Hills Shire Council and the proposed encroachment has been agreed between RMS and the council.

3.2.2 Tie-in works

Tie-in designs to various existing roads were amended during the detailed design process as a result of the availability of additional detailed topographic survey information sourced during this process. Amendments to the tie in design was required at various locations, including Old Windsor Road, Windsor Road, Arnolds Ave. The modifications to the tie-ins include correction to the horizontal and vertical alignment to match the existing cross section of the road. These modifications have increased the length of tie-in works. Major changes include:

A. Old Windsor Road –
   - Extent of modification works at Old Windsor Road (southbound carriageway) approach to Bus T-Way car park reduced with revised tie-in design based on the additional topographic survey
   - Taper location at the northbound carriageway relocated towards north, subsequently reducing the through lane length by 16%. This is to minimise impact on the existing shared path and existing utility assets.
   - Taper location at the southbound carriageway widening was relocated towards south, subsequently reducing the through lane length by 16% which is considered as a minor impact on traffic capacity. The reason for this change was a constructability issue around which would have potentially caused disruption to the operations of the T-way.
   - Old Windsor Road (northbound carriageway) right turn lanes revised to 2 x 3.5m widths plus 0.5m shoulders based on detailed topographic survey received to match with existing lanes and shoulders. Similar with the left turn lane, it was revised to 3.5m lane width. The REF design did not include shoulders.
   - Old Windsor Road (southbound carriageway) left turn lane width revised to 3.5m to cater for the allocation of 0.5m shoulders at the median.

B. Windsor Road
   - Windsor Rd horizontal alignment modified for improvement to tie-in with existing road based on the additional survey. The alignment now simplified with less curves instead of previous numerous curves designed to match with the existing information in absence of detailed survey information.
   - The tie in at the southern end near the Wrights Road intersection was designed in consideration of future widening / upgrade works of Wrights Road and Kennedy Ave intersection works. The carriageway is now proposed to be construction to a full width in terms of future widening but provisioned with a line marking to suit the current Wrights Road intersection.

C. Other Local Roads and driveways

- Various minor adjustments were carried out to the local roads based on the detailed topographic survey information received of the newly developed roads reflecting the current conditions. The designs were adjusted considering the precise location of the existing features and to tie in with a proper horizontal and vertical geometry to meet the required standards. These include Arnolds Road, Severn Vale Drive, Burns Road and Stone Mason Drive.
- Memorial Avenue is proposed to be a controlled assess road and the direct driveway access to the properties were not expected in the brief as it was envisaged that the subdivisions happening on both sides of the road will facilitate them access from new internal council roads. However, there are couple of properties still require direct driveway access from Memorial Ave being no subdivision proposed as well as no possibility of providing access from the council road. They include LOT 2/DP 1159032 (41 Memorial Ave) and LOT 2/DP 241547 (40 Memorial Ave) near the T-Way intersection.
- There are few other driveway accesses required for the properties along west side of the northern leg of Windsor Road intersection.

3.2.3 Drainage and scour protection

- Change of RipRap length at Elizabeth MacArthur Creek Culvert - Concept design shows 5m length of riprap at both ends to cater for the original catchment flows. The detailed design Riprap Summary calculations shows that 100 yr design ARI has been used to calculate riprap protection at upstream and downstream of Culvert C1520, Elizabeth MacArthur Creek. Design development included an additional external catchment located at the eastern side of Memorial Avenue (portion of Rutherford Avenue) be discharged to the abovementioned culvert. Recalculation of the riprap was done which resulted in a larger riprap protection requirement. Connections via pits and pipes were also designed to convey flows from that external catchment towards Elizabeth McArthur Creek.
- Drainage connection to existing watercourse east of the Rutherford Ave - Culvert, discharging into an existing watercourse is designed to convey flows from an additional external catchment, south of Memorial Avenue. Current design shows that the existing basin which receives the flows from the external catchments would be at capacity at 100-year ARI. If the existing basin is filled, flows not managed by this basin in 100-year ARI will be redirected to the new Culvert towards the existing watercourse.
- Modifications of Severn Vale Drive south of memorial Avenue had been included in the design development. Drainage design includes providing a sag pit along the low point of the new road, which captures and conveys flows towards Strangers Creek via a new designed culvert. Current design shows that the amount of flows discharging into Strangers creek is just matching what is in the existing scenario (an existing pit and pipe is discharging into the creek). However, imperviousness of the road pavement somehow increased the flows being discharged into the creek.in current design. Additional catchment flows could be added along design development.
- Stangers Creek and Elizabeth MacArthur Creek are the two major waterway crossings along Memorial Avenue. The drainage connection to these waterways has been designed to improve flood immunity, urban design, landscape and structures so that both waterways can meet the needs of future development. The design changes were made to widen the to accommodate temporary drainage diversion and stormwater quality treatment measures. During detailed design, overland diversion channels were proposed to manage the overland flow of surrounding catchments. Three Bioswales have been added for water quality treatment measures for pavement run-off. This is to mitigate impacts identified in the REF at Strangers Creek.
- Drainage and sediment control infrastructure at various locations. Based on Department of housing's Managing Urban Stormwater-Soils and construction, erosion and sediment controls are required during construction. This is to limit discharge of sediments to the surrounding waterways hence they are designed to suit the construction staging developed during the detailed design stage. These relate the ERSED controls during construction only and are not permanent structures.

3.2.4 Ancillary facilities

The Ancillary facility locations were reviewed during the detailed design stage to confirm the availability and suitability of each location after consultation with the stakeholders associated with each property.

- The New Ancillary Facility 1 (Lot 10, DP844963 and Lot 30, DP1071715) is the RMS and TfNSW land used as an Ancillary facility for the NWRL construction works near the Old Windsor Road and Memorial Avenue intersection and is expected to be made available for the construction of Memorial Avenue.

- Ancillary Facility 2 (part of Lot 60, DP10702) is a part of the Kellyville Park owned by The Hills Shire Council. It is a same location as per the Project REF but is now a revised part of the lot based on the negotiations with the Council after consideration of their continual use of the park during road construction works as well as minimum area requirements for the project.

- Ancillary Facility 3 combines three properties on the corner of Memorial Avenue and Windsor Road. These include 3 Memorial Avenue, 5 Memorial Avenue, and 4 Windsor Road. The three properties have been fully acquired by Roads and Maritime and Transport for New South Wales. The Site, located at the eastern end of Memorial Avenue, represents an advantageous location during construction due to proximity to the project area works, as well as minimising excessive transportation of materials and enable efficient construction activity across the entire project alignment.

3.2.5 Early Works

Early works are proposed to be undertaken by Ausconnex. These works include:

- **33Kv Transmission Cables** - The existing overhead 33Kv cables that run along the northern side of Memorial Avenue between the Bus T-Way and Arnold Avenue will be placed underground. This work will be undertaken using an Underbore to avoid excavating a trench along the existing road. An entry pit and exit pit are required for the underbore. These pits will consist of an open excavation with the entry pit located in Memorial Avenue just east of the Bus T-Way and the exit pit located in Arnold Avenue. The majority of the work will be undertaken as night works as it will be required to close one of the traffic lanes on Memorial Avenue to construct the entry/exit pits.

- **11kv Distribution Network** - The early works involves removing the existing overhead cables that run along the length of Memorial Avenue between Old Windsor Road and Windsor Road and replacing them with new cables placed underground to suit the new road widening. The new cables will be placed underground using both open trench excavation and also under boring under existing intersections, in areas that are too deep to excavate a trench and also creek crossings. Some trees and shrubs may need to be removed to allow the excavation of the open trenches to be undertaken. The majority of this work will be undertaken during normal working hours however there will be areas that will require nightworks. New substations will be installed at the intersections of both the Bus T-Way and Stone mason Drive with Memorial Avenue.

- **LV Street Lighting** - New low voltage street lighting cables will be installed as early works across all four approaches to both the Old Windsor Road and Windsor Road intersections with Memorial Avenue. These cables will be installed in open trench excavation and may require the removal of some trees and shrubs to enable the work to be undertaken. Depending on the space available, some of the new street lights will also be installed.

- **Potable Water Main –** Changes are proposed to the design of the potable water main as outlined in the Renzo Tonin 'Memorial Avenue Upgrade Early Works N&V Assessment (13 June 2019) (Early Works Acoustics Report) provided in Appendix C. Trenching works for the water main changes are in the vicinity of the electrical work trenching locations.

The proposed 33Kv Transmission Cables, 11kv Distribution Network and LV Street Lighting are shown in the attached Electrical drawings (Appendix H) with the following index for highlighted lines:

- Blue – Trenching as early works.
- Pink – Underbore as early works.
- Green, Trenching (not early works) – to be carried out after the award of the main Civil Contract by RMS.
- Purple, Underbore (not early works) – to be carried out after the award of the main Civil Contract by RMS.

The proposed alterations to the potable water main are shown in Appendix C to the Early Works Acoustics Report.

3.3 Construction activities

3.3.1 Work methodology

The work methodology described in Section 3.4.1 of the Project REF is applicable to the modifications detailed in this Addendum REF. Construction activities would be guided by a Construction Environmental Management Plan (CEMP) to facilitate work being carried out within the specified work area and to incorporate all safeguards and management measures contained in this Addendum REF.

3.3.2 Construction hours and duration

The proposed daily hours and duration of all construction activities and the use of ancillary facilities would be aligned with those prescribed within Section 3.4.2 of the Project REF. On this basis, work would be expected to be carried out during the following standard working hours in accordance with the *Interim Construction Noise Guideline* (DECC 2009):

- Monday to Friday: 7am to 6pm
- Saturday: 8am to 1pm (between 7–8am, inaudible work would be permitted)
- Sunday and public holidays: No work.

Work outside these standard work hours would occasionally be necessary for construction activities including but not limited to utility adjustment and tie-in works. This is in order to avoid major delays to commuter traffic and to maintain the safety of the workforce. Night work (between 8pm to 7am) may be required.

Where work is required outside of the standard working hours, the conditions defined on the project's Environmental Protection Licence (EPL) and the procedure contained in *Roads and Maritime's Construction Noise and Vibration Guideline* (RMS April 2016) would be followed, as well as and any safeguards contained in this Addendum REF. This would include notifying the local community prior to work starting.

3.3.3 Plant and equipment

Plant and equipment would be as per section 3.4.3 of the Project REF.

3.3.4 Earthworks

Estimated earthwork volumes are generally consistent with those detailed in Section 3.4.4 of the Project REF.

At ancillary facilities, earthworks would not impact significantly below the ground surface. Some grading and levelling may be required to reinstate stockpile areas once the Memorial Avenue Upgrade project is completed. All stockpiled material would be used during construction or transported off-site for appropriate disposal.

3.3.5 Source and quantity of materials

Source and quantity of materials would be generally consistent with volumes estimated within Section 3.4.5 of the Project REF.

3.3.6 Traffic management and access

A Traffic Management Plan that incorporates access arrangements to ancillary sites would be prepared in accordance with the Traffic Control at Worksites Manual (Version 4) (Roads and Traffic Authority, 2010) and Roads and Maritime Specification G10 - Control of Traffic (RTA, Ed 5, Rev 3, 2006). Refer to section 3.4.6 of the Project REF.

Traffic switches and diversions, and the closing of side streets, would be done so in a manner to ensure traffic flow would be maintained within the vicinity of the works.

The Traffic Management Plan (TMP) would include the guidelines, general requirements and procedures to be used when activities or areas of work have a potential impact on existing traffic arrangements. It would also include the details of any haulage routes, detours and temporary lane closures, in accordance with the Road Occupancy Licence (ROL). It is envisaged that traffic management techniques and measures would be detailed as part of the TMP proposed for the wider Memorial Avenue Upgrade project.

3.3.7 Early Works

The early works described in Section 3.2.5 of this Addendum REF will be undertaken in accordance with the work methodology and work hours and duration outlined on Section 3.4.1 and 3.4.2 of the Project REF, and in accordance with Section 3.3.1 and 3.3.2 of this Addendum REF. This condition also includes the requirement for the contractors of the early works, Ausconnex, to complete a CEMP which covers their works.

3.4 Public utility adjustment

Modifications to previously proposed public utility adjustments within or adjacent to the road corridor will be contained within the Addendum REF project boundary. Across the project alignment, and in sensitive areas such as Strangers Creek, Elizabeth MacArthur Creek and other open drainage networks within the affected catchment area, design has made provision for under boring of utility services. The under boring of water mains, Jemena Gas main, communication lines, and electrical utility services have been included as part of the design at Strangers Creek and Windsor Road. Where this is not possible during construction, trenching may be necessary. The area where this occurs would be appropriately reinstated.

The proposed changes to the project have a minor impact for the public utility adjustment for the areas listed below:

- Inclusion of bus bays in either direction on Memorial Avenue, north of Rutherford Avenue.
- Inclusion of extension of Severn Vale Drive to the north and south of Memorial Avenue to connect with existing local roads.
- Removal of pedestrian crossings along Memorial Avenue at the following locations:
    - Free Settlers Drive (west side of intersection)
    - Severn Vale Drive (east side of intersection)
    - Windsor Road (south side of intersection)
- Minor modifications to the project boundary at various locations to accommodate works such as:
    - Drainage infrastructure and erosion and sediment controls around watercourses on Memorial Avenue
    - Public utility adjustments
    - Existing driveway tie-in, and
    - Tie-in work with existing local roads.

All other utilities have been locally adjusted at the location of the proposed changes, where required, to follow the design intent of the previously proposed public utility adjustments with no significant changes.

The operation of ancillary facilities will not require public utility adjustment. Public utilities that will not require adjustment will be protected by the construction contractor during the upgrade works.

3.5 Property acquisition

Potential acquisition was identified in the Project REF (Section 3.7). During detailed design the full extent of this acquisition was confirmed. All affected landowners have been consulted and acquisition will be finalised prior to construction phase commencing.

The confirmed list of properties to be acquired for the project is provided as Table 3-2. This list is generally consistent with Table 3-9 of the Project REF. Updates to property details consistent with detailed design drawings have been provided where appropriate. Where this is the case, updated details are shown in *italics*.

Table 3-2: Confirmed property acquisition details

Ref No.	Lot	DP No.	Full or partial acquisition?	Current ownership
1	Lot 2	DP241547	Partial	Private
2	Lot 2	DP1159032	Partial	Private
3	Lot 221	DP1121027	Partial	Sydney Water
4	Lot 211	DP1149830	Partial	Sydney Water
5	Lot 20	DP1162522	Partial	Private
6	Lot 101	DP1179289	Full	Private
7	Lot 2016	DP1149043	Partial	Private
8	Lot 2	DP1180837	Full	Private
9	Lot 3	DP1180837	Partial	Private
10	Lot 101	DP1163410	Full	Private
11	Lot 402	DP1125136	Partial	Private
12	Lot 42	DP10702	Partial	Private
13	***Lot 43***	***DP10702***	***Partial***	***Private***
14	Lot 1	DP203813	Partial	Private
15	Lot 11	DP1176789	Partial	Private
16	Lot 10	DP1129346	Full	Private
17	Lot 1	DP1163540	Partial	Private
18	Lot 1003	DP1172742	Full	Private
19	Lot 1001	DP1172742	Partial	Private
20	Lot 2	DP1131540	Partial	Private
21	Lot 2	DP1087781	Partial	Private
22	***Lot 1***	***DP1087781***	***Partial***	***Sydney Water***

Ref No.	Lot	DP No.	Full or partial acquisition?	Current ownership
23	***Lot 1***	***DP1109248***	***Partial***	***Sydney Water***
24	***Lot 35***	***DP1149683***	***Full***	***The Hills Shire Council***
25	***Lot 105***	***DP1154282***	***Full***	***The Hills Shire Council***
26	Lot 1	DP135989	Partial	Private
27	Lot 1	DP504421	Partial	Private
28	Lot 2	DP504421	Partial	*Private*
29	***Lot 1***	***DP261750***	***Full***	***The Hills Shire Council***
30	Lot 3	DP19177	Partial	Private
31	***Lot B***	***DP349914***	***Partial***	***Private***
32	Lot A	DP349914	Partial	Private
33	Lot B	DP393864	Partial	Private
34	Lot A	DP393864	Partial	Private
35	***Lot 6***	***DP19177***	***Partial***	***Private***
36	Lot 7	DP19177	Partial	Private
37	Lot D	DP368901	Partial	Private
38	Lot 2	DP135989	Partial	Private
39	Lot 3	DP135989	Partial	Private

The proposed ancillary facility sites are currently located on land owned by Roads and Maritime, Transport for NSW and The Hills Shire Council. Roads and Maritime will enter into appropriate in-principle lease agreements with these other landowners to facilitate the lawful use of the proposed sites during construction activities.

4 Statutory and planning framework

Chapter 4 of the Project REF provided the statutory and planning framework for the Memorial Avenue Upgrade and considered provisions of the relevant State Environmental Planning Policies (SEPPs), Local Environmental Plans (LEPs) and other NSW legislation. A review of the relevant legislation assessed in the Project REF has been undertaken in consideration of the proposed modification.

4.1 Environmental Planning and Assessment Act 1979

4.1.1 State Environmental Planning Policies

State Environmental Planning Policy (Infrastructure) 2007

State Environmental Planning Policy (Infrastructure) 2007 (ISEPP) aims to facilitate the effective delivery of infrastructure across the State.

Clause 94 of ISEPP permits development on any land for the purpose of a road or road infrastructure facilities to be carried out by or on behalf of a public authority without consent.

As the proposed modification is for road and road infrastructure facilities and is to be carried out by and/or behalf of Roads and Maritime, it can be assessed under Division 5.1 of the *Environmental Planning and Assessment Act 1979*. Development consent from council is not required.

The proposal is not located on land reserved under the *National Parks and Wildlife Act 1974* and does not require development consent or approval under State Environmental Planning Policy (Coastal Management) 2018, State Environmental Planning Policy (State and Regional Development) 2011 or State Environmental Planning Policy (State Significant Precincts) 2005. Part 2 of the ISEPP contains provisions for public authorities to consult with local councils and other public authorities prior to the commencement of certain types of development. Consultation, including consultation as required by ISEPP (where applicable), is discussed in chapter 5 of this Addendum REF.

Sydney Regional Environmental Plan No 19 – Rouse Hill Development Area

Sydney Regional Environmental Plan No 19 – Rouse Hill Development Area (SREP 19) generally aims to accommodate part of the long-term growth of the Sydney Region by providing a mechanism for identifying land suitable for urban purposes and by providing for the orderly and economic development of that land suitable for urban purposes, and by providing for the orderly and economic development of that land.

The proposal area falls within the Balmoral Road Release Area and would improve network efficiencies at this location. The Hills Local Environmental Plan 2012 provides local environmental planning provisions for land in the Balmoral Road Release Area to guide orderly and sustainable development. Section 4.1.2 of this Addendum REF describes the relevance of The Hills Local Environmental Plan 2012.

Sydney Regional Environmental Plan No 20 – Hawkesbury-Nepean River

Sydney Regional Environmental Plan No 20 – Hawkesbury-Nepean River (SREP 20) aims to protect the environment of the Hawkesbury-Nepean River system by ensuring that the impacts of future land uses are considered in a regional context. Clause 4(1)(b) states that a public authority proposing to carry out development which does not require development consent must consider:

- The general planning considerations set out in Clause 5
- Specific planning policies and recommended strategies set out in Clause 6.

The matters outlined in Clause 5 and Clause 6 of the SREP 20 have been considered in the Project REF and the outcomes for the proposed modifications are consistent.

4.1.2 Local Environmental Plans

As outlined in Section 4.1.1, ISEPP removes the requirement for development consent from councils. The upgrade is be assessed under Division 5.1 of the EP&A Act. Nevertheless, an evaluation is provided below of the proposed modification in relation to the objectives of land use zones within which it is located. The implications of zoning on modifications proposed in this Addendum REF has concentrated on the proposed ancillary facilities only as all other modifications are generally within the project corridor previously assessed within the Project REF.

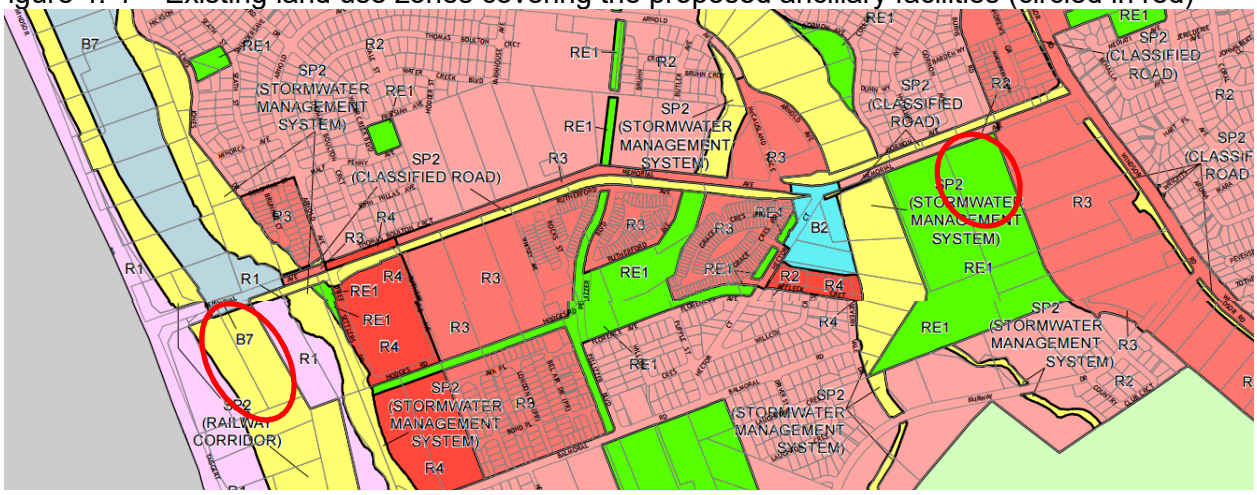
The Hills Local Environmental Plan 2012

The ancillary facilities are proposed for land zoned under The Hills Local Environmental Plan 2012:

- Lot 10, DP844963 – SP2 Infrastructure (Railway Corridor)
- Lot 30, DP1071715 – SP2 Infrastructure (Railway Corridor)
- Lot 60, DP10702 – RE1 Public Recreation

The land zoning within and surrounding the proposal area is presented in Figure 4.-1 below. Table 4.-1 outlines the current zoning objectives for each of the impacted zones and the consistency of the proposal against these objectives.

Figure 4.-1 – Existing land use zones covering the proposed ancillary facilities (circled in red)



Source: The Hills LEP 2012

Table 4-1 – Consistency of the proposal with zoning objectives in The Hills Local Environmental Plan 2012

Zone	Objectives	Consistency of proposal with objectives and permissibility
SP2 (Infrastructure)	To provide for infrastructure and related uses To prevent development that is not compatible with or that may detract from the provision of infrastructure	Permitted without consent, Council consent is not required in accordance with Clause 94 of ISEPP. The proposed modification is consistent with both of these objectives.

Zone	Objectives	Consistency of proposal with objectives and permissibility
RE1 (Public Recreation)	To enable land to be used for public open space or recreational purposes To provide a range of recreational settings and activities and compatible land uses To protect and enhance the natural environment for recreational purposes	Permitted with Development consent, Council consent is not required in accordance with Clause 94 of ISEPP. Although the proposed does not meet any of these objectives, the temporary use of this land represents a best-case scenario in terms of the potential impact on the surrounding environment and sensitive receivers.

As noted in Section 4.1.1, the ISEPP confirms that any development for purpose of roads or road infrastructure facilities may be undertaken without development consent.

4.2 Other relevant NSW legislation

4.2.1 Protection of the Environment Operations Act 1997

Under Part 3.2 of the Act, scheduled development work, as defined in Schedule 1, requires an EPL. Schedule 1, Clause 35 Road construction (meaning the construction, widening or re-routing of roads) is relevant to the upgrade. The clause defines scheduled activities as those that result in the existence of four or more traffic lanes (not including bicycle lanes or lanes used for entry or exit) on a road classified or proposed to be classified as a main road (but not a freeway or tollway) under the *Roads Act 1993* for at least 3 kilometres in the metropolitan area.

The Memorial Avenue Upgrade includes the widening of about 2.2 kilometres of road from two lanes to four lanes between Windsor Road and Old Windsor Road. The upgrade also includes work on Old Windsor Road for about 600 metres and on Windsor Road for about 550 metres. The total distance of work is about 3.3 kilometres. Therefore, the upgrade does fall under *Schedule 1 of the Protection of the Environment Operations Act 1997* and an EPL would be required. Roads and Maritime would ensure the appropriate licence is in place before construction starts.

No further requirements under the *Protection of the Environment Operations Act 1997* are required as a result of the proposed modifications.

4.2.2 Fisheries Management Act 1994

The Fisheries Management Act 1994 provides for the identification, conservation and recovery of threatened fish, aquatic invertebrates and marine vegetation. The Act also covers the identification and management of key threatening processes affecting threatened species or causing other species to become threatened. *Section 220 of the Fisheries Management Act 1994* requires the Minister to issue a permit for causing a barrier to fish passage.

The work covered by the Addendum REF do not alter the passage of fish. The statement within the Project REF remains applicable in that fish passage will be maintained, specifically with the removal of the culverts at Strangers Creek and replacement of culverts at the other waterways during construction. Should it be determined that this is not feasible appropriate permits would be sought.

4.2.3 Heritage Act 1977

The Heritage Act 1977 protects items of environmental heritage (natural and cultural) in NSW. State significant items listed on the NSW State Heritage Register (SHR) are protected under the Heritage Act 1977 against any activities that may damage an item or affect its heritage significance.

The Heritage Act 1977 also protects 'relics', which can include archaeological material, features and deposits.

A search of the Roads and Maritime Services Section 170 register does not return any results for items located within the Addendum REF project boundary. No further requirements are necessary under this Act.

4.2.4 National Parks and Wildlife Act 1974

The National Parks and Wildlife Act 1974 is administered by the Office of Environment and Heritage. It provides statutory protection for all Aboriginal 'objects' (Section 90) and 'places' (Section 84).

The proposed modifications would not impact any known Aboriginal sites. Roads and Maritime will not need to obtain an Aboriginal Heritage Impact Permit (AHIP).

4.2.5 Biodiversity Conservation Act 2016

The *Biodiversity Conservation Act 2016* (BC Act) protects threatened species, populations and ecological communities and their habitats in NSW. Part 7 of the BC Act requires preparation of a Test of Significance (ToS) for assessment of impacts to threatened species, populations or ecological communities. Where a significant impact is likely to occur a species impact assessment (SIS) must be prepared.

Three threatened ecological communities (TECs) listed under the BC Act have been identified in the revised proposal area, namely:

- *River-Flat Eucalypt Forest*
- *Cumberland Plain Woodland*
- *Swamp Oak Floodplain Forest*

No additional threatened flora or fauna species or high-quality habitat were identified in the study area, other than those considered in the Project REF.

As none of the three TECs nor any threatened species under the BC Act are considered likely to be significantly impacted by the proposed works, an SIS is not required.

4.3 Commonwealth legislation

4.3.1 Environment Protection and Biodiversity Conservation Act 1999

Under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) a referral is required to the Australian Government for proposed 'actions that have the potential to significantly impact on matters of national environmental significance or the environment of Commonwealth land.

A referral is not required for proposed road actions that may affect nationally listed threatened species, populations, endangered ecological communities and migratory species. This is because requirements for considering impacts to these biodiversity matters are the subject of a strategic assessment approval granted under the EPBC Act by the Australian Government in September 2015.

Potential impacts to these biodiversity matters are also considered as part of chapter 6 of the Addendum REF.

Findings – matters of national environmental significance (other than biodiversity matters)

The assessment of the proposed modification's impact on matters of national environmental significance, as defined under the EPBC Act, and the environment of Commonwealth land found that there would be no change to the findings of the determined activity and would be unlikely to cause a significant impact on matters of national environmental significance or the environment of Commonwealth land. A referral to the Australian Department of the Environment and Energy is not required.

4.4 Confirmation of statutory position

The proposed modification is categorised as development for the purpose of *a road and/or road infrastructure facilities* being carried out by or on behalf of a public authority. Under clause 94 of the *ISEPP* the proposed modification is permissible without consent. The proposed modification is not State significant infrastructure or State significant development. The proposed modification can be assessed under Division 5.1 of the EP&A Act. Consent from Council is not required.

5 Consultation

5.1 General consultation

A comprehensive consultation strategy was implemented as part of the Project REF. It is deemed unnecessary to repeat the original extensive stakeholder and community consultation strategy implemented. During the initial project consultation period there were no submissions received opposing the proposal.

The Project REF was publicly displayed between 17 November 2014 and 12 December 2014 at The Hills Shire Council and Castle Hill Library. The documents were also available on the Roads and Maritime website. In addition to this, two community information sessions were held at the Wrights Road Community Centre and Sherwood Ridge Public School during this public display period. Submissions were accepted until the 30 January 2015.

Forty-four (44) submissions were received in response to the exhibition of the original environmental assessment, identifying the following topics for consideration:

- Safety
- Local traffic access
- Bus facilities
- Noise impacts on local residents
- Increased traffic.

Following the display period a Submissions Report (April 2015) was prepared to document the issues raised, outline the Roads and Maritime response to those issues and to provide a revised list of safeguards and mitigation measures. Mitigation and management strategies were proposed against each of these issues, as well as other possible environmental impacts identified in the Project REF.

5.2 Consultation with Council

The determined Project REF did not include the proposed ancillary facilities covered in this Addendum REF. Ongoing consultation with The Hills Shire Council has continued during detailed design and an in-principle agreement for the proposed use of Kellyville Memorial Park as an ancillary facility is in place (see Appendix E).

It is anticipated that should consultation with The Hills Shire Council be triggered as per Clause 13 of ISEPP (Infrastructure) 2007, with consideration of the exemptions which may apply under Clause 17 (1) (d), this will be carried out as per the standard requirements.

5.3 ISEPP Consultation

Under the State Environmental Planning Policy (Infrastructure) 2007 (ISEPP), Roads and Maritime Services was required to consult with The Hills Shire Council under Clause 13 of ISEPP due to the potential impacts on council infrastructure, road network and traffic along the nominated project area.

As detailed in this report, several modifications to the Memorial Avenue Upgrade project are proposed to the original scope of the project. As such, the modifications required additional ISEPP consultation.

Detailed design drawings outlining the modified extent of works were provided (7 April 2017) to Council for consultation and review. On 10 April 2017, Council submitted a letter response to Roads and Maritime Services which concluded that The Hills Shire Council confirmed acceptance of the modifications and that the design work can proceed on the basis of those changes.

5.4 Consultation with Sydney Water

Land within the project boundary, directly adjacent to existing waterways, is owned by Sydney Water. Due to the proposed expansion of the project boundary it would be necessary that some of this land is partially acquired or leased to facilitate the construction of the Memorial Avenue Upgrade.

Consultation with Sydney Water has continued throughout detailed design. This has included discussion concerning the design of culverts and drainage infrastructure associated with existing waterways. Short term and long-term access licences, where necessary, will be obtained from Sydney Water prior to construction activities commencing. Sydney Water will also review final plans for drainage discharge into Sydney Water land.

6 Environmental assessment

This section of the addendum REF provides a detailed description of the potential environmental impacts associated with the construction and operation of the proposed modification of the Memorial Avenue Upgrade project. All aspects of the environment potentially impacted upon by the proposed modification are considered. This includes consideration of the factors specified in the guidelines *Roads and Related Facilities* (DUAP 1996) and *Is an EIS required?* (DUAP 1999) as required under clause 228(1) of the *Environmental Planning and Assessment Regulation 2000*. The factors specified in clause 228(2) of the *Environmental Planning and Assessment Regulation 2000* are also considered in Appendix A.

Site-specific safeguards and management measures are provided to ameliorate the identified potential impacts.

6.1 Issue Identification

The project inclusive of the proposed change as covered by the REF Addendum is generally consistent with that considered in the project REF and subsequent Submissions Report. The proposed change has been reviewed in the context of the receiving environment to identify any new issues for assessment. The review is documented below in Table 6-1. The aspects reviewed in general correspond with those presented in Chapter 6 of the project REF and subsequent Submissions Report.

Table 6-1 – Aspect/Impact Summary

Aspect/Impact	Further assessment?	Comment
Noise and vibration	Yes	Extensive noise monitoring and assessment has been undertaken as part of the Project REF process. The relevant environmental safeguards described in the Project REF will apply, including those in relation to hours of construction activity (NV3), noise and vibration generating activities (NV4), operation of plant (NV7) and other potential noise emissions (NV9). Due to the proposed change to posted speed and introduction of bus bays north of Rutherford Avenue, the initial noise assessment has been revised to reflect these modifications. A separate noise assessment has also been prepared for the proposed early works, as set out in section 3.2.5 below.

Aspect/Impact	Further assessment?	Comment
Landform, geology and soils	No	Existing sub-surface conditions are expected to be similar to those described in the Project REF. Impacts would be similar to those described in the Project REF. A search of the NSW Environmental Protection Authority (EPA) contaminated land database identified that there are no records of the proposal area or adjoining properties being registered as contaminated or having been notified to the NSW EPA as potentially contaminated.
Hydrology and water quality	Yes	Impacts would be similar to those described in the Project REF, however due to the additional drainage works and scour protection needed at the creek, potentially affecting water quality, further assessment may be needed.
Biodiversity	Yes	Due to the proposed removal of vegetation within ancillary facility 1, and new construction impacts within sensitive areas (watercourses), an addendum biodiversity assessment has been prepared.
Non-Aboriginal heritage	No	A search of the Roads and Maritime Services Section 170 register does not return any results for items located within the proposal area. Work is occurring on heavily disturbed sites or within road corridors. No further non-Aboriginal heritage investigation would be required.
Aboriginal heritage	Yes	Land beyond that assessed in the Project REF, in particular the proposed ancillary facilities, would increase the l construction footprint. Selected ancillary facilities have been subject to significant historical disturbance. It is considered that the initial ground-truthing, completed as part of the Project REF, and an extensive AHIMS search, is sufficient to understand potential impacts for this proposed modification. The Procedure for Aboriginal Cultural Heritage Consultation and Investigation (PACHCI) would need to be repeated for the modifications proposed in this Addendum REF. PACHCI Stage 1 clearance is required from Roads and Maritime's Aboriginal Cultural Heritage office.

Aspect/Impact	Further assessment?	Comment
Traffic and access	No	Entry and exit of trucks and other construction vehicles to and from the ancillary facilities will be managed by safeguards and mitigation measures detailed in the Project REF, including the construction traffic management plan. No additional assessment required.
Visual amenity and urban design	No	The impacts are consistent with the Project REF and the safeguards and mitigation measures detailed in the Project REF are sufficient and will be applied to address visual amenity.
Socio-economic	No	Impacts would be similar (no additional impacts) to those described in the Project REF. Access to the Kellyville Memorial Park for patrons will not be affected by the proposed modifications.
Air Quality	No	Impacts would be similar to those described in the Project REF.
Climate change and greenhouse gases	No	Impacts would be similar to those described in the Project REF.
Waste management	No	Impacts would be similar to those described in the Project REF.
Resource use	No	Impacts would be similar to those described in the Project REF.
Hazards and risks	No	Impacts would be similar to those described in the Project REF.
Cumulative impacts	No	Impacts would be similar to those described in the Project REF.

6.2 Noise and Vibration

6.2.1 Existing environment

The ambient noise environment in the study area is highly influenced by traffic from Memorial Avenue, Old Windsor Road to the west and Windsor Road to the east which has not changed from the Project REF. However, since the development of the Project REF, additional residential dwellings have been constructed, and some previously existing dwellings have been demolished resulting in altered conditions.

This Addendum REF considers the project area conditions from October 2016. For the purpose of the Addendum REF Acoustic Report (12 December 2016, Appendix C) where dwellings were currently under construction but incomplete, they have been identified and assumptions have been made as to the likely building footprint.

6.2.2 Methodology

In the detailed design phase of the project, modifications to the Project REF design were made. These modifications included minor adjustments to the road alignment, and additional tie in works along Wrights Road. This assessment has used the most current project design from the detailed design phase of works.

Significant modifications that have been given particular consideration in the Addendum REF Acoustic Report were the inclusion of additional bus bays and the change to posted speed on Memorial Avenue between Old Windsor Road and Windsor Road (70km/h to 80km/h). During the preparation of the Addendum REF Acoustic Report, a number of different traffic scenarios were required to be modelled and compared. The conclusions from this report considers both the 'build' (with the project) and 'no build' (without the project) scenarios for the year of opening (2019) and ten years after opening (2029).

To facilitate the assessment of noise impacts from the proposed Memorial Avenue upgrade, eight (8) noise sensitive receiver areas were established along the route, known as Noise Catchment Areas (NCAs). The NCAs are detailed in Table 6.2 below

Table 6-2 – Noise Catchment Areas

NCA	Location	Description
NCA1	Old Windsor Road to Thomas Boulton Cct – Northern side of Memorial Avenue	• Single commercial receiver towards Old Windsor Road • Low to medium density suburban land • Recent subdivision development with current continuation of subdivision construction to the east • Gracelands Early Education Centre
NCA2	Old Windsor Road to 30 Memorial Road – Southern side of Memorial Avenue	• Mixture of low-density rural land and high density residential with commercial ground floor at The Graceland Community • Recent demolition of residential dwellings
NCA3	Thomas Boulton Cct to Arnold Avenue - Northern side of Memorial Avenue	• Low density rural land with residential and community receivers • The Hills Clinic (Hospital)
NCA4	Rocks Street to Hector Court – Southern side of Memorial Avenue	• Medium density suburban land • Recent subdivision development with current continuation of subdivision construction to the west and throughout Grace Cres and surrounding roads
NCA5	Arnold Avenue to Windsor Road – Northern side of Memorial Avenue	• Mixture of medium density new subdivision and existing residential receivers along Memorial Avenue • Current subdivision construction at the intersection of Memorial Avenue and Arnold Avenue • Mixture of residential and commercial receivers along Windsor Road
NCA6	Hector Court to Windsor Road – Southern side of Memorial Avenue	• Low density residential receiver at west near Hector Court • Kellyville Cricket Club near middle of NCA • Commercial receivers along Windsor Road

NCA	Location	Description
NCA7	Windsor Road – Eastern side of Windsor Road from President Road to Wrights Road	• Medium density residential receivers • Commercial receivers including Caltex and Repco towards northern end on eastern side of Windsor Road • Kellyville Preschool Kindergarten at northern end on President Avenue
NCA8	Old Windsor Road – Western side of Old Windsor Road from Kentwell Crescent to Rothwell Cct	• Medium density residential receivers • Fit Kidz Day Care Centre • Outback Steakhouse (commercial receiver at southern end Old Windsor Road

The Project REF assessed construction noise and vibration in accordance with the NSW Interim Construction Noise Guideline 2009 (ICNG). NSW Roads and Maritime Services (RMS) has since released its *Construction Noise and Vibration Guideline 2016* (CNVG) for assessment of construction noise and vibration for Roads and Maritime projects. Since the CVNG still refers to the ICNG for setting Noise Management Levels (NMLs), the NMLs used in the Addendum REF Acoustic Report are the same as those set out in the Project REF, with the exception of NCA6. The construction NMLs used in each NCA for this Addendum REF Acoustic Report are outlined in Table 6-3 below.

Table 6-3: Construction Noise Management Levels at Residential Receivers

NCA	L_{A90} Rating Background Level (RBL)			Noise Management Level $L_{Aeq(15m)}$		
	Day	Evening	Night	Day	Evening	Night
1	49	46	37	59	51	42
2	49	46	37	59	51	42
3	53	50	41	63	55	46
4	53	50	41	63	55	46
5	49	50	44	59	55	49
6	47	45	34	57	50	39
7	55	50	34	65	55	39
8	49	48	38	59	53	43

The Project REF assessed road traffic (operational) noise in accordance with the NSW Road Noise Policy (RNP), 2011. Subsequently, RMS have release the Noise Criteria Guidance (NCG) and Noise Mitigation Guideline (NMG), April 2015. In accordance with current practice the NCG an NMG have been used for the Addendum REF Acoustic Report. Early Works Noise & Vibration

In terms of construction noise, modelling and assessment of airborne noise impacts from activities associated with the early works construction were determined by modelling the noise sources, receiver locations, topographical features, and possible noise mitigation measures using a 'CadnaA' computer noise model developed for this project. The model calculates the contribution

of each noise source at identified sensitive receiver locations and allows for prediction of the total noise from a site for the various stages of the construction works.

The Early Works Acoustic Assessment concludes that the construction noise management levels (NMLs) and sleep disturbance noise management levels will be exceeded at a number of locations.

In terms of construction vibration, the construction plant used for the early works activities such as excavators, trucks and a directional drilling machine for under bore are not considered to be vibration intensive plants. The nearest receiver to any trenching location is approximately 4m, which is the Caltex Service Station within NCA7. All residential buildings are estimated to be at least 5m from any trenching location. The closest distance from any building to an under bore site where the directional drilling machine would be located is estimated to be 14m. At these distances, any vibration generated by the early works are expected to be very low, and there is a low risk of any complaints due to vibration. Trenching activities commonly occur in residential areas and in close proximity to residences without any adverse vibration impacts.

6.2.3 Construction Noise & Vibration

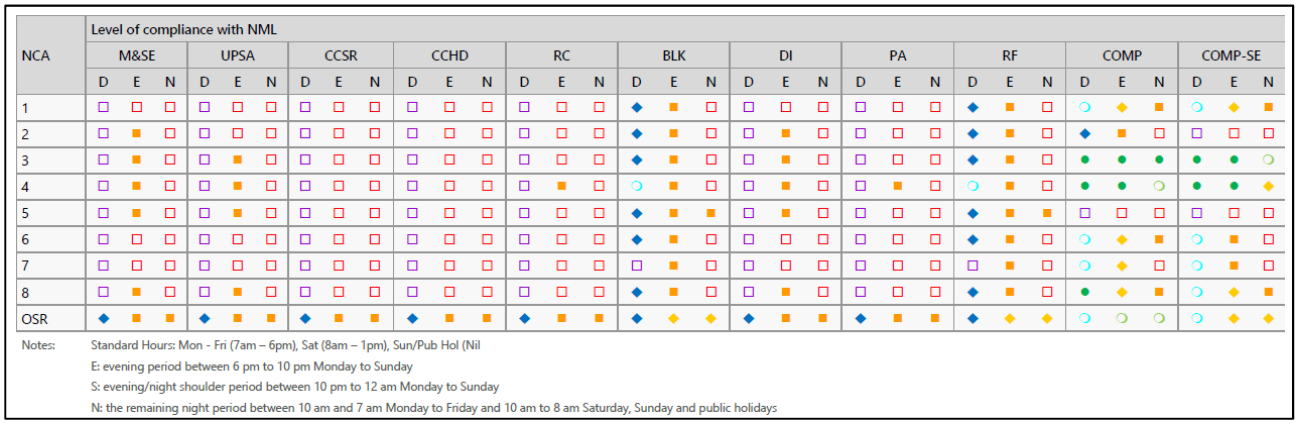
Noise impacts during construction works have been predicted and compared to the noise management levels (NMLs) for standard construction hours detailed in Table 6-3 above. The below extract from the Addendum REF Acoustic Assessment details the perceived impact of anticipated exceedances of the applicable NMLs.

The impacts presented are as follow for **Standard Hours:**

- Complies with NML
- < 10dB(A) above NML - construction noise clearly audible
- > 10dB(A) above NML - construction noise moderately intrusive
- > 75dB(A) - highly noise affected

The impacts presented are as follows for all **OOH periods:**

- Below NML
- < 5dB(A) above NML - construction noise noticeable
- 5 to 15dB(A) above NML - construction noise clearly audible
- > 15 to 25dB(A) above NML - construction noise moderately intrusive
- >25dB(A) above NML - construction noise highly intrusive



The principal activities likely to occur during the evening period are:

- Utility relocation works.
- Road furniture installation / traffic switch works.
- Compound operational works.

All of these work activities are likely to cause sleep disturbance to the nearest receivers if performed during the night-time period. The plant / equipment most likely to cause sleep disturbance are road saws, pneumatic hammers, hydraulic hammers and trucks (both movements and use of air brakes).

In terms of construction vibration, there are 144 buildings within the minimum working distance for structural damage and 461 buildings within the minimum working distance for human response. The Addendum REF Acoustic Report has recommended that if works are occurring within 25 metres of a building vibration monitoring should be conducted to determine site and plant specific working distances. It is also recommended that all buildings within 100m of the site works receive notification about potential disturbance from vibration.

Some noise and vibration impacts are expected from establishment, operation and reinstatement of ancillary facilities during construction. These impacts may result from truck movements, rolling, compacting or excavating activities and have been included in the assessment of construction noise and vibration undertaken in the Addendum REF Acoustic Report. Work occurring at the ancillary sites will be programmed to be carried out during daytime hours whenever practicable. Safeguards to mitigate against disruptions of noise and vibration will be adopted from those outlined in the Project REF.

6.2.4 Operational Noise & Vibration

As a result of the speed change from 70km/h to 80km/h along Memorial Avenue, the predicted traffic noise levels for all scenarios investigated in the Addendum REF Acoustic Report have increased by approximately 1dB, on the predicted noise level impacts identified in the Project REF, for residences where Memorial Avenue is the dominate source of road noise. This does not represent a significant increase from those scenarios considered in the Project REF to warrant noise treatment/attenuation as a result of the speed limit increase.

The Project REF identified 52 properties for consideration of additional noise mitigation, whereas there is now a total of 32 properties, as outlined in Table 6-4 below.

Table 6-4: Receivers that Exceed NCG Criteria and Quality for Consideration of Noise Mitigation

Noise Catchment Area	Receivers Qualifying for Consideration of Noise Mitigation
1	2

Noise Catchment Area	Receivers Qualifying for Consideration of Noise Mitigation
2	0
3	2
4	0
5	10
6	0
7	17
8	0
Total	**31**

The reasons for the reduction in the number of properties considered is as follows:

- The designation of Old Windsor Road from a project road to a non-protect road, removing all properties within NCA8 from requiring consideration of noise mitigation.
- One existing property within NCA2, three within NCA3, one within NCA5 and one within NCA6 have been demolished and are no longer being considered for noise mitigation.
- NCA7 has been extended up to President Avenue, leading to four additional properties being considered for noise mitigation.

Assessment of the bus bays, proposed as part of the modifications assessed in this Addendum REF, have been included in the Addendum REF Acoustic Report. In terms of the expected change in noise level from the existing bus stops, there would be little to no perceived difference for the relocation on the east bound carriage way. Lmax noise levels would likely increase by approximately 5dB(A) for the nearest receivers to the west bound carriage way. Bus movements will be too infrequent to cause any significant increase in the LAeq traffic noise level.

If buses are operating before 7am or after 10pm, the relocation of the bus stops has the potential to cause sleep disturbance at nearby properties. To assess sleep disturbance, a Lmax sound power level of 114dB(A) for a bus drop off/pick up event has been used. The predicted Lmax noise levels at the facades of the nearest affected residences are 74dB(A). At this level, sleep disturbance is possible.

The findings of the bus bay assessment do not change the eligibility for noise mitigation at private property.

6.2.5 Safeguards and mitigation measures

Early Works Safeguards & Mitigation Measures

The following safeguards / mitigation measures have been recommended for the proposed early works:

- The ‘standard mitigation measures’ outlined in the CNVG will be applied during the early works activities. These are detailed further beneath the heading ‘Construction Safeguards & Mitigation Measures’ below.
- Work activities and heavy vehicle movement will be scheduled for standard hours as much as possible to minimise sleep disturbance.
- Out of hours works will not be scheduled for more than two consecutive nights to allow respite to nearby residences.
- Additional noise mitigation measures will be applied where there are still exceedances of

the NMLs after all appropriate 'standard mitigation measures' have been applied. These will be implemented in accordance with the flowchart outlined in Figure 2 and Appendix E of the Early Works Acoustic Assessment.

Construction Safeguards & Mitigation Measures

The CNVG recommends standard actions and mitigation measures for all construction projects. These 'standard mitigation measures' are proposed to be adopted across all stages of construction as set out in Tables 23 to 26 of the Addendum Acoustic Report. As the proposal is currently at the indicative concept stage, project specific mitigation measures cannot be designed, but preferred options have been identified in the Acoustic Addendum Report. These options will be reviewed by the construction team as part of preparation of a Construction Noise and Vibration Management Plan for the Project (CNVMP). Justification should be provided where preferred actions are unable to be adopted.

The CNVG provides details of additional noise mitigation measures to be applied when there are still exceedances of the NMLs after application of the standard mitigation measures. These will be implemented in accordance with Figure 4 and Appendix I of the Acoustic Addendum Report. Prior to the commencement of site establishment all potentially impacted receivers identified in Appendix I will be notified to advise that noise from the works may at times be audible.

Attended vibration monitoring is to be undertaken to determine site specific minimum working distances for structural damage and human response. Further attended vibration monitoring will also be conducted whenever significance vibration generating plant items are operating close to or within the determined minimum working distances. Locations for vibration monitoring during particular works will be determined by the construction contractor.

The additional vibration mitigation measures outlined in Table 27 of the Acoustic Addendum Report will be applied when predicted vibration levels at receivers exceed the criteria for human comfort after the appropriate standard mitigation measures have been applied. All receivers within 100m of works will be notified of potential vibration impacts. Prior to the commencement of work, receivers around the site will also be notified to advise that vibration from the works may be perceptible.

All potentially impacted noise and vibration receivers will be kept informed of the nature of the works to be carried out, the expected noise and vibration levels and duration and well as being given appropriate enquiries and complaints contact details.

A management procedure will be put in place to deal with noise and vibration complaints that may arise from construction works. Each complaint will be investigated, and appropriate noise and/or vibration amelioration measures be put in place to mitigate further occurrences, where the noise and/or vibration in question exceeds allowable limits.

Operational Safeguards & Mitigation

With the increase in traffic speed from 70km/h to 80km/h, consideration has been given to low noise pavement. The application of low noise pavement would not provide a significant noise reduction to the surrounding environment. In addition, low noise pavement is less durable than the standard Dense Graded Asphalt (DGA). Low noise pavement is not considered to be a reasonable noise mitigation measure.

Since the preparation of the Project REF, a noise wall has been constructed adjacent to the Gracewood Community along Memorial Avenue (located within NCA2). The Addendum Acoustic Report did not suggest any additional noise walls to be constructed as a reasonable measure for noise mitigation.

However, some acoustic property treatments are necessary for those properties identified as eligible for mitigation adjacent to the project corridor. Acoustic treatments will vary depending on the noise

level reduction required to be achieved. Treatments recommended in the Addendum REF Acoustic Report include mechanical ventilation, sealing of wall and sub-floor vents, upgraded window and door seals, and upgraded glazing and doors. One property, located at 24 Arnold Avenue, has been considered to also be eligible for treatment of outdoor areas.

As well as those properties identified as eligible for acoustic treatments in the Project REF, the Addendum REF Acoustic Report identifies the properties listed in Table 6-5, which are to be also considered for noise treatments.

Table 6-5 – Properties identified for noise treatments (Addendum REF Acoustic Report)

Address	Receiver Type	Floor	Treatment Category
41 Memorial Avenue	Residential	G	2
24 Arnold Avenue	Childcare Indoor Play	G	4
25 Memorial Avenue	Residential	G	2
25 Memorial Avenue	Residential	1	3
27 Memorial Avenue	Residential	G	2
6 Windsor Road	Residential	G	2
8 Windsor Road	Residential	G	2
8 Windsor Road	Residential	1	3
10 Windsor Road	Residential	G	2
12 Windsor Road	Residential	G	2
18-20 Windsor Road	Residential	G	2
18-20 Windsor Road	Residential	1	3
1 Arnold Avenue	Residential	G	2
22 Windsor Road	Residential	G	2
24 Windsor Road	Residential	G	2
26 Windsor Road	Residential	G	2
26 Windsor Road	Residential	1	3
28 Windsor Road	Residential	G	2
Memorial Avenue	Residential	G	3
Lot 9 Windsor Road	Residential	G	4
18 Benalla Avenue	Residential	G	2
20 Benalla Avenue	Residential	G	3
22 Benalla Avenue	Residential	G	3

Address	Receiver Type	Floor	Treatment Category
24 Benalla Avenue	Residential	G	3
36 Benalla Avenue	Residential	G	3
38 Benalla Avenue	Residential	G	2
40 Benalla Avenue	Residential	G	2
42 Benalla Avenue	Residential	G	3
Lot 1 Windsor Road	Residential	G	2
Lot 1 Windsor Road	Residential	1	3
16 Hart Place	Residential	G	2
18 Hart Place	Residential	G	2
20 Hart Place	Residential	G	3
2 Wrights Road	Residential	G	2
2 Wrights Road	Residential	1	3
3-5 President Road	Childcare Indoor Play	G	2
President Road	School Classroom	G	2
President Road	School Classroom	1	2
President Road	Place of Worship	G	1
24 Arnold Avenue	Childcare Outdoor Play	-	-

No additional safeguards and/or additional mitigation measures to minimise noise have been identified.

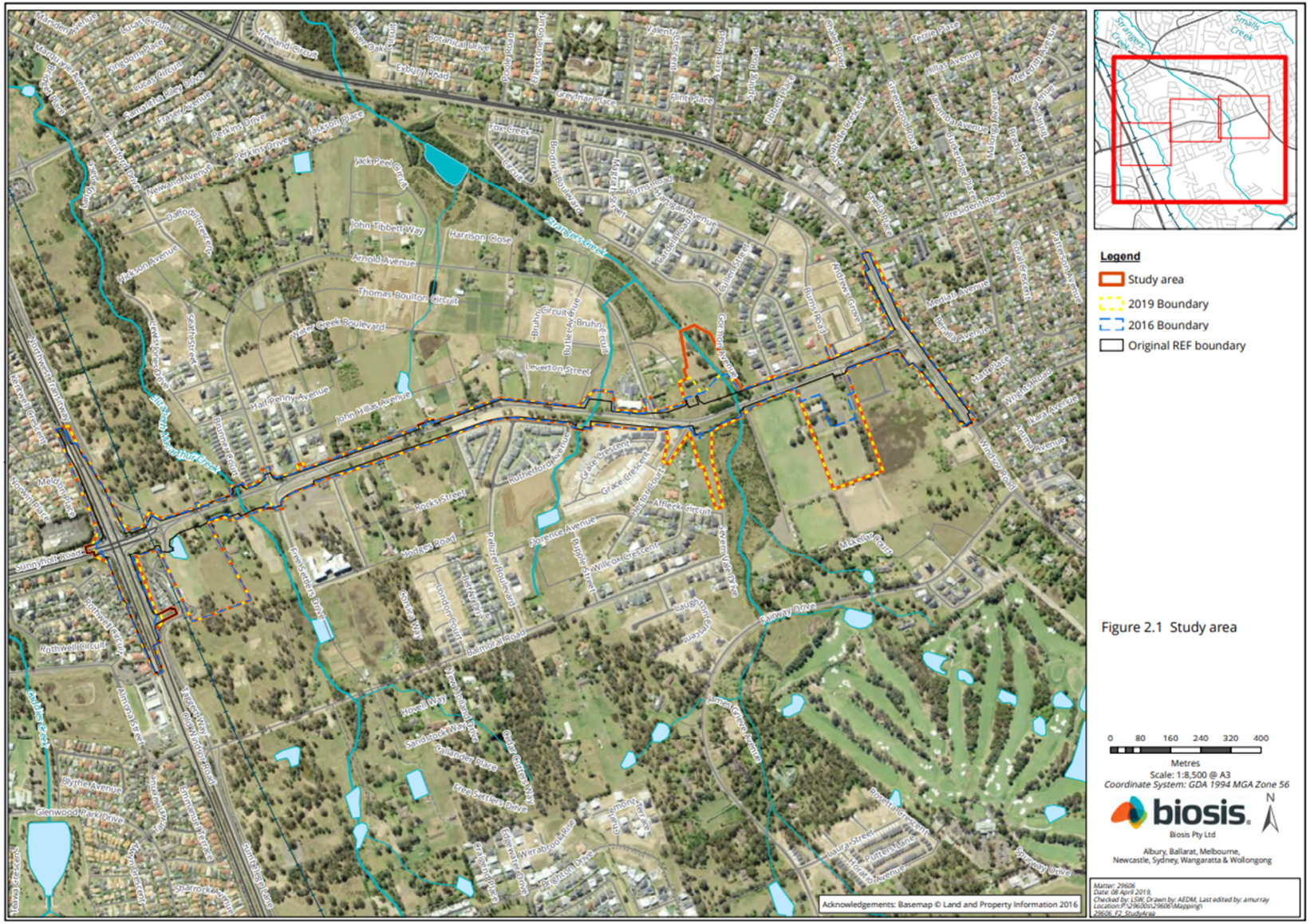
6.3 Biodiversity

Biosis were engaged to assess the potential impacts of proposed modifications that were not assessed as part of the Project REF. An Addendum REF Biodiversity Assessment dated 29 November 2016 was prepared by Biosis and has since been further updated (April 2019). This Updated Addendum REF Biodiversity Assessment (April 2019) is provided as Appendix D and the findings summarised below.

6.3.1 Existing environment

The area to be impacted during construction is largely within the heavily disturbed road corridor previously assessed under the Project REF. Due to the nature of the proposed modifications, such as tie-in works and new drainage infrastructure, construction would extend into potentially sensitive ecological areas. This includes Elizabeth Macarthur Creek, Strangers Creek and other existing watercourses. The revised proposal boundary is shown in Figure 6-1 below.

Figure 6-1: Proposal Boundary (Source: Biosis)



Ancillary Facility 1 is currently used as a stockpile site and access for work on the Sydney Metro Northwest rail project. It is expected that this site will become available for use during the Memorial Avenue Upgrade. The area used for stockpiling is largely cleared and will operate in the same function as is currently operated.

Also, part of Kellyville Memorial Park, currently used as a community recreation park, would be utilised as an ancillary facility during construction with tree removal potentially being required, depending on how this site is to be utilised by the construction contractor.

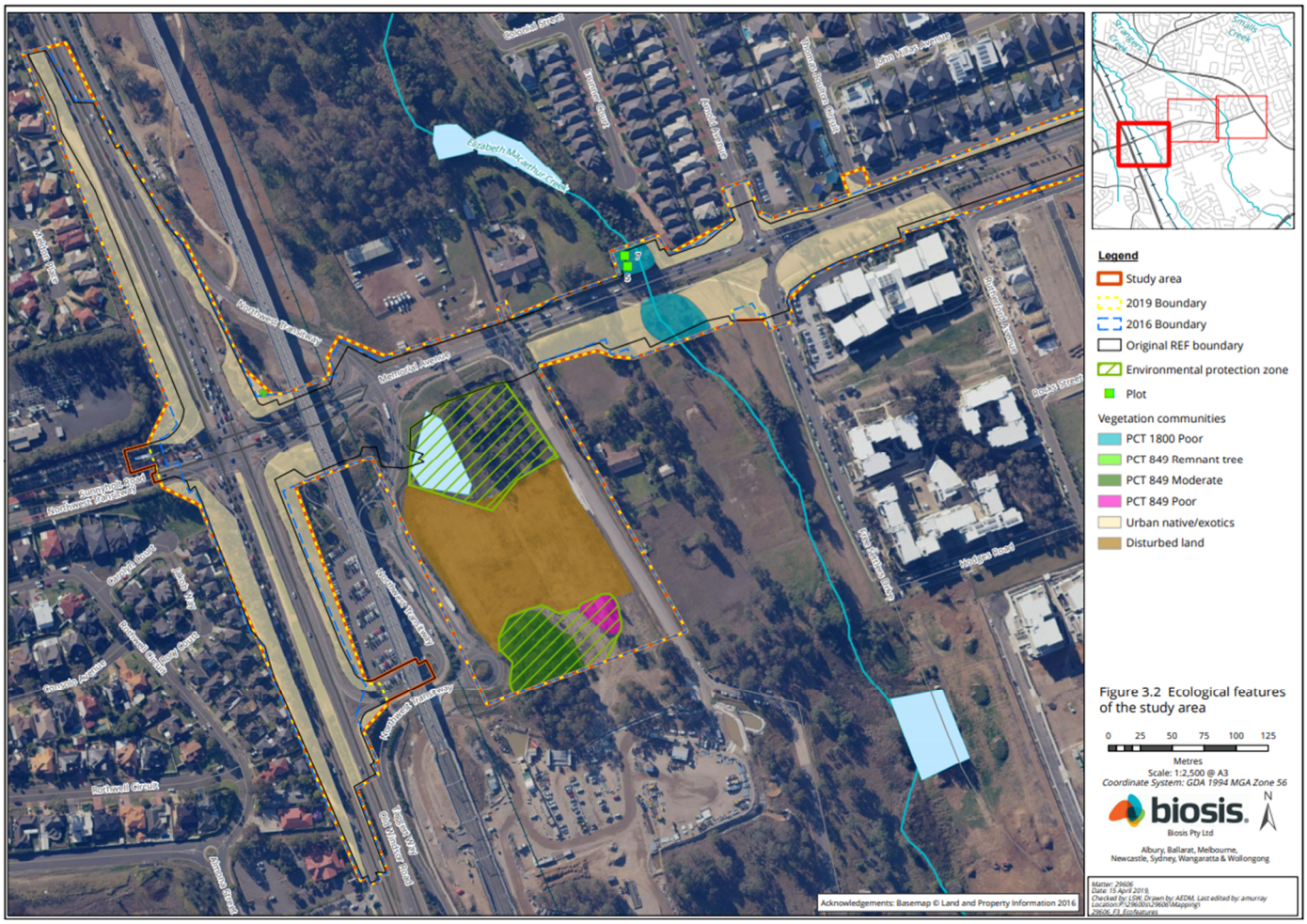
6.3.2 Potential impacts

The study area occurs within a highly disturbed and modified urban environment with some remnant isolated patches of native vegetation. Potential impacts of the proposed modifications that were not assessed as part of the Project REF are considered below.

Clearance of Native Vegetation

Vegetation occupies each of the proposed Ancillary Facility sites. An environmental protection zone will be established at Ancillary Facility 1 (see Figure 6-2) which is located within a public recreation area. Impacts to this vegetation are not permitted.

Figure 6-2: Environmental protection zone within Ancillary Facility 1 (Source: Biosis)



At Ancillary Facility 2, there is some vegetation scattered across the site and along the Addendum REF project boundary. The removal of some of this vegetation for stockpiling and other construction activities may be required. The Updated Addendum REF Biodiversity Assessment has identified that three Threatened Ecological Communities (TECs) under the BC Act outlined in Table 6-4 and one TEC under the EPBC Act are likely to be impacted by this vegetation removal.

Table 6-4: Summary of Impacts on TECs

Threatened Ecological Community (TEC) Impacted	Plant Community Type	Nature of Impact	Extent of Impact	Duration of Impact
Cumberland Plain Woodland (BC Act) *	Grey Box – Forest Red Gum grassy woodlands on flats of the Cumberland Plain	Direct loss of 0.2ha	Local	Long Term
Swamp Oak Riparian Forest (BC Act)	Cumberland Swamp Oak Riparian Forest	Direct loss of 0.22ha	Local	Long Term
River-flat Eucalypt Forest (BC Act)	Forest Red Gum – Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain	Direct loss of 0.54ha	Local	Long Term
Cumberland Plain Shale Woodland & Shale Gravel Transition Forest (EPBC Act) *	Forest Red Gum – Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain	Direct loss of 0.22ha	Local	Long term

*Note: there is no overlap between the area of Cumberland Plain Woodland impacted under the EPBC Act and that impacted under the BC Act (Biosis 2019).

Tests of Significance (ToS) under the BC Act were prepared by Biosis to assess the level of impact to state listed River-Flat Eucalypt Forest, Swamp Oak Riparian Forest and Cumberland Plain Woodland. A SIC Assessment under the EPBC Act was also prepared for impacts on the Cumberland Plain Woodland. The assessments for River-flat Eucalypt Forest and Swamp Oak Riparian Forest concluded that a significant impact was unlikely due to the majority of the local occurrence of the Threatened Ecological Community not being directly or indirectly impacted by the proposal. The assessment for Cumberland Plain Woodland concluded that a significant impact was unlikely to occur as the proposal will avoid impacts to the largest part of the Threatened Ecological Community within the study area.

Removal of Threatened Fauna Habitat

Threatened fauna habitat to be removed in the proposal area comprises low to moderate quality forage habitat for highlight mobile species. The Project REF found that impacts to threatened fauna species would not be significant.

As potential impacts associated with the proposed modifications are of a similar scale to 2014, and the condition of the habitats has remained consistent since that assessment, the conclusions made in the Project REF are supported and no additional impact assessment is considered necessary.

Removal of Threatened Flora

The potential impacts to threatened flora are considered to be negligible. No threatened flora species have been identified in the modified proposal area. Potential habitat was found to be of low quality for species considered to have some potential to occur.

Aquatic Impacts

In addition to the aquatic impacts identified in the Project REF, three additional storm water connections from Memorial Avenue are now proposed. Aquatic habitats within the study area are considered to be in a highly disturbed nature, however they do present habitat value for aquatic species.

Strangers Creek, at the time of the biodiversity survey had a minor stream flow and is considered to be a seasonal waterway dominated by isolated pools during nominal flows. The tributary of Strangers Creek had a poorly defined channel and is not considered to provide aquatic fauna habitat. Large sections of eroded bank were visible, which are indicative of poor bank stability during higher seasonal flow periods, with considered to be a result of the poor riparian vegetation structure.

High abundances of Carp and Gambusia, both listed as noxious were also observed in the Creek. The presence of these species on conjunction with the disturbed nature of the waterway are indicative of low-quality aquatic habitats.

Short term impacts are considered likely to affect Strangers Creek, with localised increases in turbidity, displacement of habitat and noise/vibration associated with civil works. The highly disturbed nature of the Strangers Creek and the prevalence of noxious species indicates these short-term impacts are unlikely to have any residual effects on the existing aquatic ecological community. Long term impacts to Strangers Creek and its tributary are associated with alterations to the existing hydrological and hydraulic characteristics of these waterways. Increased stream flow as a result of stormwater influence will result in the higher flow velocities and volumes during rainfall events which may, to a minor extent. further erode the banks of the Creek.

Therefore, it is recommended to adhere to the *Sydney Water Guide for Stormwater Connections* which will require revegetation and design considerations which are considered likely to result in local improvements in the value of these aquatic habitats and also in the resilience of these aquatic communities.

It is also identified in the Biodiversity report, that the proposed modifications are not considered likely to result in a substantial further reduction in the availability and connectivity of fauna habitats due to the existing low-quality habitat. No additional threatened species or communities, in addition to those identified in the Project REF are considered likely to occur within the study area.

Biodiversity Offsets

The Project has been assessed as unlikely to result in a significant impact to threatened species or ecological communities listed under the BC Act or EPBC Act. However, as outlined in Table 1 of Guidelines for Biodiversity Offsets (Roads and Maritime 2016), biodiversity impacts assessed by a REF are required to consider offsets where there is any clearing of a Critically Endangered Ecological Community (CEEC) in moderate to good condition. Cumberland Plain Woodland – BC Act and Cumberland Plain Woodland – EPBC Act are both present within the study area in condition states that meet the definition for vegetation in moderate to good condition, and therefore offsets are to be considered. Impacts as a result of the project include:

- 0.20 hectares of impact to Cumberland Plain Woodland – BC Act
- 0.22 hectares of impact to Cumberland Plain Woodland – EPBC Act

It should be noted that there is no overlap in these two areas.

There is the potential to avoid impact to the 0.20ha of Cumberland Plain Woodland –BC Act by retaining the patch of CEEC vegetation within the eastern ancillary compound. This is proposed to be retained as set illustrated in Figure 6-2 above.

Conclusion on significance of impacts

The modification is not likely to significantly impact threatened species, populations or ecological communities or their habitats, within the meaning of the BC Act *or* FM Act and therefore a Species Impact Statement is not required.

The modification is not likely to significantly impact threatened species, populations, ecological communities or migratory species, within the meaning of the EPBC Act.

6.3.3 Safeguards and mitigation measures

The Updated Addendum REF Biodiversity Assessment has identified that there are limited opportunities for avoidance of impact to biodiversity values, however the following the following additional safeguards and management measures are proposed to be implemented:

- Disturbance to native vegetation within and/or adjacent to the study area will be minimised to the greatest extent practicable.
- Exclusion fencing will be established outside the tree protection zones and appropriate signage will identify the area as an 'Environmental No Go Area'.
- Areas adjacent to the CEEC and EECs will be revegetated to provide a vegetated buffer between the development and the TECs.
- Topsoil transportation within, into or out of the study area will be minimised to reduce the spread of weeds.
- Appropriate measures will be implemented to minimise the spread of four weeds of national significance and five priority weeds identified in the study area.
- The Sydney Water Policy *Stormwater connections to natural waterways* will be implemented and adhered to when connecting to Sydney water assets to minimise impacts to aquatic ecological values and water infrastructure.
- Stockpiling or storage of construction materials will occur in areas already cleared (such as the footpath) where possible.
- Appropriate erosion and sediment control measures will be installed at all sites to avoid sedimentation of receiving water bodies or other indirect impacts to surrounding biodiversity values.
- The removal of any substantial fallen hollow logs, if encountered, would not be permitted without pre-clearance checks by a qualified ecologist. Alternatives to avoid their removal would be promoted in the first instance, which may include relocating the excavations where possible.

6.4 Aboriginal Heritage

6.4.1 Existing environment

PACHCI Stage 1 clearance has been obtained and is included as Appendix B. As part of this assessment, an extensive search of the Aboriginal Heritage Information Management System (AHIMS) was conducted on - 15 January 2019. An area with a 1km buffer, centred on the area of the proposed work, was searched in order to gain information on the archaeological context of the area, and to ascertain whether there are any previously recorded Aboriginal sites within the Addendum REF Project Boundary. A total of 72 sites were identified within the vicinity of the project's construction footprint, although no registered sites are likely to be impacted as a result of the proposed modifications. In addition, no Aboriginal places, listed under the *National Parks and Wildlife Act*, are identified in the surrounding area by an Office of Environment and Heritage search.

6.4.2 Potential impacts

The Stage 1 assessment determined that the project is unlikely to harm known Aboriginal objects or places. Findings of the assessment conducted on 15 January 2019 are as follows:

- The AHIMS search did not indicate any known Aboriginal objects or places in the immediate study area.
- The study area does not contain landscape features that indicate the presence of Aboriginal objects, based on the Office of Environment and Heritage's *Due diligence Code of Practice for the Protection of Aboriginal objects in NSW* and the Roads and Maritime Services' procedure.
- The Aboriginal cultural heritage potential of the study area appears to be severely reduced due to past disturbance.
- The proposed ancillary sites, like the road corridor, are contained within areas having high levels of disturbance.

6.4.3 Safeguards and mitigation measures

- No additional safeguards or mitigation measures have been identified.

6.5 Cumulative Impacts

The interaction of individual elements of the proposal and the impact of the proposal being delivered concurrently with other projects in the region may result in cumulative impact on the surrounding environment.

6.5.1 Potential impacts

The project forms part of a series of planned road upgrades and under-construction upgrades in Sydney's north-west. The concurrent development of the proposal may result in adverse cumulative impact associated with:

- Traffic delays and access
- Construction noise & vibration
- Visual amenity
- Biodiversity

Traffic Delays & Access

The construction of the proposed new bus bays, and the tie-in works may also give rise to cumulative traffic delays with the road widening project due to additional works and time required.

Construction Noise, Vibration & Visual Amenity

It is acknowledged that the Ancillary Facility 1 location is currently being used as an Ancillary Facility site for the Sydney Metro Northwest project. As a result, the residents located within NCA 1, NCA 2 and NCA 8 are likely to be subject to the cumulative impact of this site being used as an Ancillary Facility including construction fatigue from prolonged noise, as well as ongoing visual amenity impacts.

With respect to the Ancillary Facility, bus bays, or tie-in works, it is critical that coordination between design and development is required to minimise negative cumulative impacts on the sensitive receptors.

Biodiversity

In terms of potential cumulative impacts, the Biosis report has identified that potential impacts to threatened fauna habitat associated with the proposed modifications are of a similar scale to 2014, and the condition of the habitats has remained consistent since that assessment such that no additional impact assessment is considered necessary.

The potential for cumulative impacts to threatened flora are considered to be negligible. No threatened flora species have been identified in the modified proposal area. Potential habitat was found to be of low quality for species considered to have some potential to occur.

While some addition vegetation will be removed, this is not anticipated to result in potential for significant cumulative impacts over and above those associated with the Project REF.

6.5.2 Safeguards and Mitigation Measures

Several measures can be considered to manage the potential cumulative impacts. These are outlined in *Table 6-50: Safeguards and management measures for cumulative impact* of the project REF and would remain constant after considering the proposed modification outlined in this Addendum REF.

Once the road upgrades, tie-in works, and new bus bays are operational, there would be a positive cumulative impact on road safety and travel times.

7 Environmental management

7.1 Environmental management

A number of safeguards and management measures have been identified in order to minimise adverse environmental impacts, including social impacts, which could potentially arise as a result of the proposed modification. Should the proposed modification proceed, these management measures would be addressed during detailed design and incorporated into the Project Environmental Management Plan (PEMP) and Contractors Environmental Management Plan (CEMP) and applied during the construction and operation of the proposal.

7.2 Summary of safeguards and management measures

Environmental safeguards and management measures for the Memorial Avenue Upgrade are summarised in Table 7-1. Additional safeguards identified in this addendum REF are included in **bold text.** The safeguards and management measures will be incorporated into the detailed design phase of the proposed modification, the CEMP and the PEMP and implemented during construction and operation of the proposed modification, should it proceed. These safeguards and management measures will minimise any potential adverse impacts arising from the proposed works on the surrounding environment.

Table 7-1: Summary of safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing
Early works noise & vibration	• The *NSW Roads and Maritime Services Construction Noise and Vibration Guideline (April 2016)* 'standard mitigation measures' will be adopted for all proposed construction works. • Work activities and heavy vehicle movement will be scheduled for standard hours as much as possible to minimise sleep disturbance. • Out of hours works will not be scheduled for more than two consecutive nights to allow respite to nearby residences. • Additional noise mitigation measures will be applied where there are still exceedances of the NMLs after the 'standard mitigation measures' have been applied. These will be implemented in accordance with the flowchart outlined in Figure 2 and Appendix E of the Early Works Acoustic Assessment.		

Construction noise and vibration	• The *NSW Roads and Maritime Services Construction Noise and Vibration Guideline (April 2016)* 'standard mitigation measures' will be adopted for all proposed construction works. • Additional noise mitigation measures will be implemented in accordance with Figure 4 and Appendix I of the Acoustic Addendum Report if there are still exceedances of the NMLs after application of the standard mitigation measures. • Prior to the commencement of site establishment all potentially impacted receivers identified in Appendix I of the Acoustic Addendum Report will be notified to advise that noise from the works may at times be audible. • Attended vibration monitoring will be undertaken to determine site specific minimum working distances for structural damage and human response. • Further attended vibration monitoring will be conducted whenever significant vibration generating plant items are operating close to or within the determined minimum working distances. Locations for vibration monitoring during particular works will be determined by the construction contractor. • The additional vibration mitigation measures outlined in Table 27 of the Acoustic Addendum Report will be applied when predicted vibration levels at receivers exceed the criteria for human comfort after the appropriate standard mitigation measures have been applied. • All receivers within 100m of works will be notified of potential vibration impacts. Prior to the commencement of work, receivers around the site will also be notified to advise that vibration from the works may be perceptible. • All potentially impacted noise and vibration receivers will be kept informed of the nature of the works to be carried out, the expected noise and vibration levels and duration and well as being given appropriate enquiries and complaints contact details. • A management procedure will be put in place to deal with noise and vibration complaints that may arise from construction works. Each complaint will be investigated and appropriate noise and/or vibration amelioration measures be put in place to mitigate further occurrences, where the noise and/or vibration in question exceeds allowable limits. • A Construction Noise and Vibration Management Plan (CNVMP) in accordance with OEH/EPA's *Interim Construction Noise Guideline* (DECCW 2009) would be prepared as part of the Construction Environmental Management Plan (CEMP) • Potentially affected receivers would be notified of any start of work via a letterbox	Contractor	Pre-construction and construction

Impact	Environmental safeguards	Responsibility	Timing
	drop. The notification would include details of the proposed work, location, type of work, days and dates of work and hours involved. A contact phone number would be provided to manage complaints. • Work hours will be generally carried out during standard construction hours (i.e. 7.00am to 6.00pm Monday – Friday; 8.00am to 1.00pm on Saturdays; no work to be carried out during Sundays or public holidays) where it is possible to carry out work without major impacts on the local road network. Any work that is performed outside normal working hours or on Sundays and public holiday, will be carried out in accordance with Practice Note 7 in the Roads and Maritime's Environmental Noise Management Manual (RTA, 2001) and Roads and Maritime's Environmental Fact Sheet No. 2 – Noise Management and Night Work (RTA, undated) • Where predicted and/or measured construction noise levels exceed the Noise Management Level (NML), all feasible and reasonable work practices will be applied to meet the management levels. • Carrying out the noisiest activities during standard construction hours. • Allowing adequate respite periods during noise intensive work. • Using alternatives to reversing alarms, such as ambient noise sensitive or 'quacker' type reversing alarms. • Turning off equipment when not in use. • Ensuring equipment is regularly maintained and repair/replace equipment that becomes noisy. • Throughout each construction activity, locating stationary plant items as far from receivers as possible. • Choosing mobile equipment that includes exhaust silencers or residential class mufflers. • Communicating with construction workers via toolbox talks about minimising noise, including the use of equipment, avoidance of shouting, loud talking and door slamming.		
Operation noise and vibration	• Acoustic property treatments, as outlined in Section 6.2.6.	Roads and Maritime Services	Pre-operation

Impact	Environmental safeguards	Responsibility	Timing
Terrestrial and Aquatic Biodiversity	• Disturbance to native vegetation within and/or adjacent to the study area will be minimised to the greatest extent practicable. • Exclusion fencing will be established outside the tree protection zones and appropriate signage will identify the area as an 'Environmental No Go Area'. • Areas adjacent to the CEEC and EECs will be revegetated to provide a vegetated buffer between the development and the TECs. • Topsoil transportation within, into or out of the study area will be minimised to reduce the spread of weeds. • Appropriate measures will be implemented to minimise the spread of four weeds of national significance and five priority weeds identified in the study area. • The Sydney Water Policy *Stormwater connections to natural waterways* will be implemented and adhered to when connecting to Sydney water assets to minimise impacts to aquatic ecological values and water infrastructure. • Stockpiling or storage of construction materials will occur in areas already cleared (such as the footpath) where possible. • Appropriate erosion and sediment control measures will be installed at all sites to avoid sedimentation of receiving water bodies or other indirect impacts to surrounding biodiversity values. • The removal of any substantial fallen hollow logs, if encountered, would not be permitted without pre-clearance checks by a qualified ecologist. Alternatives to avoid their removal would be promoted in the first instance, which may include relocating the excavations where possible.	Construction Contractor	Pre-construction and construction

Impact	Environmental safeguards	Responsibility	Timing
Impacts on threatened species	• **Minimise to the fullest extent practicable disturbance to native vegetation within and/or adjacent to the study area.** • **Establish exclusion fencing in areas containing critically endangered and endangered ecological communities, particularly the area adjacent to Strangers Creek south of Memorial Avenue and display appropriate signage for 'Environmental Protection Zones' where identified on Figure 3-1 to 3-4 of the Biodiversity Assessment (Appendix F).** • **Revegetation of areas adjacent to Critically Endangered Ecological Communities (CEECs) and Endangered Ecological Communities (EECs), namely the area adjacent to Strangers Creek south of Memorial Avenue, to provide a vegetated buffer between development and Threatened Ecological Communities (TECs).** • **Minimise top soil transportation within, into or out of the study area to reduce the spread of weeds.** • **Adherence to the Sydney Water Policy Stormwater connections to natural waterways, which provides guidance and management measures to be implemented when connecting to Sydney Water assets to minimise impacts to aquatic ecological values and water infrastructure.** • **Where possible, stockpiling or storage of construction materials should occur in areas already cleared, such as the footpath, to avoid unnecessary ground disturbance.** • **Appropriate erosion and sediment control measures should be installed at all sites to minimise sedimentation of receiving water bodies or other indirect impacts to surrounding biodiversity values.** • If unexpected threatened fauna or flora species are discovered, stop works immediately and follow the Roads and Maritime's *Unexpected Threatened Species Find Procedure* in the *Biodiversity Guidelines 2011* - Guide I (Pre-clearing process) (RTA, 2011). Personnel performing work would be informed of the requirements of the Roads and Maritime Services' Vegetation Trimming and Removal Procedure. • **The removal of any substantial fallen hollow logs, if encountered, would not be permitted without pre-clearance checks by a qualified ecologist. Alternatives to avoid their removal would be promoted in the first instance, which may include relocating the excavations where possible.**	Construction contractor	Pre-construction and construction

Impact	Environmental safeguards	Responsibility	Timing
Impacts to known Aboriginal heritage sites	• In the event of an unexpected find of an Aboriginal heritage item (or suspected item), work would cease in the affected area and Roads and Maritime's Environmental Officer, Sydney Region and the Roads and Maritime Senior Environmental Specialist for Aboriginal Heritage would be contacted on advice on how to proceed. The Unexpected Archaeological Finds Procedure (Roads and Maritime, 2012) would be followed in the event of the uncovering of a potential item. • **No work would be permitted within environmental no-go zones. This would include vehicle access.** • **All staff would be made aware of the no-go zones and their requirements and their legislative obligations.** • **A site induction register would be maintained with the areas demarked in the field.** • **The site induction is to include the requirements of Roads and Maritime's unexpected finds procedure.**	Construction contractor	Pre-construction and construction

7.3 Licensing and approvals

All relevant licenses, permits, notifications and approvals needed for the Memorial Avenue Upgrade project and when they need to be obtained are listed in Table 7-2. No additional licenses and approval requirements are required by this Addendum REF.

Table 7-2: Summary of licensing and approval required

Requirement	Timing
The proposal would be a scheduled activity under the *Protection of the Environment Operations Act 1997*. An environment protection licence (EPL) would be required under Section 48 of this Act to authorise the carrying out of scheduled development work. For the purposes of section 48, any activity that is declared by this Part to be a scheduled activity is taken to be an activity for which a licence is required for the premises at which it is carried out (the activity is premises based').	An EPL would be required prior to carrying out the proposed work. Each period of 12 months (starting from the issue of a licence) is a licence fee period for a licence. The administrative fee for any licence fee period of a licence must be paid not later than 60 days after the beginning of that licence fee period. The construction contractor will hold the EPL licence.

8 Conclusion

8.1 Justification

The proposed modifications assessed in this Addendum REF are necessary as part of the Memorial Avenue Upgrade project. The potential impact of design modifications on the environment and the surrounding sensitive receivers have been considered throughout the detailed design process.

Potential environmental impacts have been identified and the safeguards and mitigation measures documented in the Project REF and this Addendum REF are considered satisfactory in addressing any potential environmental impacts.

In this context, the proposed modifications to the original proposal are considered justified.

8.2 Objects of the EP&A Act

This section demonstrates how the proposed modification is consistent with the objectives of the EP&A Act. Table 8-1 explains how the proposed modification performs against the objects of the Act and references earlier sections of this Addendum REF where greater detail is provided.

Table 8-1 – How the proposal is consistent with the objectives of the EP&A Act

Object	Comment
1.3(a) To promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources.	The proposed modifications would contribute to the continued management of traffic and facilitation of development of the Balmoral Road Release Area, and other local developments, by ensuring that Memorial Avenue and connections to Old Windsor Road and Windsor Road provide an acceptable level of service.
1.3(b) To facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment.	Ecologically sustainable development is considered in Sections 8.2.1 below.
1.3(c) To promote the orderly and economic use and development of land.	The proposed modifications would further facilitate more efficient transport along Windsor Road and connections to Old Windsor Road and Memorial Avenue. Benefits would include faster travel times and less accidents. The upgraded road corridor would reflect its function as a transit arterial, consistent with The Hills Shire Council's planning for the area, including the Balmoral Road Release Area.
1.3(d) To promote the delivery and maintenance of affordable housing.	Not relevant to the proposed modifications.

Object	Comment
1.3(e) To protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats.	The proposed modifications have been assessed against relevant environmental legislation that protects and conserves native flora and fauna, including threatened species, populations and ecological communities, and their habitats (refer to Section 6.3).
1.3(f) To promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage).	The Project REF has included consultation with the Aboriginal community with respect to Aboriginal heritage. The initial consultation tasks performed have been deemed as adequate to support modifications proposed in this Addendum REF.
1.3(g) To promote good design and amenity of the built environment.	A strategic assessment of utilities within the proposal area, including: Sydney Water, Telstra, Endeavour Energy, optic fibre and Stormwater, has been completed during detailed design. Potential impacts on these utilities have been identified, including relocations, adjustments and protection work.
1.3(h) To promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants.	Not relevant to the proposed modifications.
1.3(i) To promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State.	Not relevant to the proposed modifications.
1.3(j) To provide increased opportunity for community participation in environmental planning and assessment.	The Project REF has included consultation with the public, and with The Hills Shire Council with respect to ISEPP and development of the concept design. The initial consultation tasks performed have been deemed as adequate to support modifications proposed in this Addendum REF.

8.2.1 The precautionary principle

The precautionary principle requires evaluation of the threat of serious or irreversible harm to biodiversity. As part of the assessment process, options were considered and assessed with the purpose of reducing the risk of serious and permanent impacts on the environment. The best available technical information, environmental standards and measures were used to minimise environmental risks.

8.2.2 Intergenerational equity

The intergenerational equity principle is concerned with ensuring that the current generation preserves natural and built assets so that wellbeing and productivity are not compromised for future generations. Should the Memorial Avenue Upgrade not proceed, the principle of intergenerational equity may be compromised as future generations would inherit a road with a lower level of service, and a lower level of safety.

8.2.3 Conservation of biological diversity and ecological integrity

This principle requires that the diversity of genes, species and communities, as well as the ecosystems and habitats to which they belong, be maintained and improved to ensure their survival. There is confidence that the proposal, if delivered with implementation of all relevant safeguards, would not significantly impact biological diversity or ecological integrity.

8.3 Conclusion

This addendum REF has examined and taken into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the proposed activity.

This has included consideration where relevant, of conservation agreements and plans of management under the NPW Act, biodiversity stewardship sites under the BC Act, wilderness areas, areas of outstanding value, impacts on threatened species, populations and ecological communities and their habitats and other protected fauna and native plants. It has also considered potential impacts to matters of national environmental significance listed under the Federal EPBC Act.

A number of potential environmental impacts from the proposed modification have been avoided or reduced during the design development and options assessment. The proposed modification as described in the addendum REF best meets the project objectives but would still result in some additional impacts on biodiversity and noise. Safeguards and management measures as detailed in this addendum REF would ameliorate or minimise these expected impacts. The proposed modification would also improve safety, improved driving conditions, reduce travel times on balance the proposed modification is considered justified and the following conclusions are made.

Significance of impact under NSW legislation

The proposed modification would not result in a change to the findings of the project REF, Submission Report or Addendum REF 2015 and would be unlikely to cause a significant impact on the environment. Therefore, it is not necessary for an environmental impact statement to be prepared and approval to be sought from the Minister for Planning under Division 5.2 of the EP&A Act. A Biodiversity Development Assessment Report or Species Impact Statement is not required. The proposed modification is subject to assessment under Division 5.1 of the EP&A Act. Consent from Council is not required.

Significance of impact under Australian legislation

The proposed modification would not likely cause a significant impact on matters of national environmental significance or the environment of Commonwealth land within the meaning of the EPBC Act. A referral to the Australian Government Department of the Environment and Energy is not required.

9 Certification

This addendum review of environmental factors provides a true and fair review of the proposed modification in relation to its potential effects on the environment. It addresses to the fullest extent possible all matters affecting or likely to affect the environment as a result of the proposed modification.

Corbin Stevic
Planner
Beca Pty Ltd
Date: 14 March 2017

Mike Simons
Senior Planner
Beca Pty Ltd
Date: 1 July 2019

I have examined this addendum review of environmental factors and accept it on behalf of Roads and Maritime Services.

Mark Jajou
Project Manager
Program office: Western Sydney Project Office
Date: 10/07/2019

10 References

As this is an addendum to the Project REF for the Memorial Avenue Upgrade, those items referenced within this document can be found in the Section 10 of the Project REF.

11 Terms and acronyms used in this Addendum REF

Provide a list of the technical terms and acronyms used in the REF and their definitions. The below are examples only and should only be included if relevant. Refer to the EIAG Abbreviations and glossary of terms (EIA-F04).

Term / Acronym	Description
AusLink	Mechanism to facilitate cooperative transport planning and funding by Commonwealth and state and territory jurisdictions
CEMP	Construction environmental management plan
EIA	Environmental impact assessment
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW). Provides the legislative framework for land use planning and development assessment in NSW
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth). Provides for the protection of the environment, especially matters of national environmental significance, and provides a national assessment and approvals process.
ESD	Ecologically sustainable development. Development which uses, conserves and enhances the resources of the community so that ecological processes on which life depends, are maintained and the total quality of life, now and in the future, can be increased
FM Act	*Fisheries Management Act 1994* (NSW)
Heritage Act	*Heritage Act 1977* (NSW)
ISEPP	State Environmental Planning Policy (Infrastructure) 2007
LALC	Local Aboriginal Land Council
LEP	Local Environmental Plan. A type of planning instrument made under Part 3 of the EP&A Act.
LoS	Level of Service. A qualitative measure describing operational conditions within a traffic stream and their perception by motorists and/or passengers.
NES	Matters of national environmental significance under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999.*
Noxious Weeds Act	*Noxious Weeds Act 1993* (NSW)
NPW Act	*National Parks and Wildlife Act 1974* (NSW)

Term / Acronym	Description
SEPP	State Environmental Planning Policy. A type of planning instrument made under Part 3 of the EP&A Act.
SEPP 14	*State Environmental Planning Policy No.14 – Coastal Wetlands*
BC Act	*Biodiversity Conservation Act 2016* (NSW)
QA Specifications	Specifications developed by Roads and Maritime Services for use with roadworks and bridgeworks contracts let by Roads and Maritime Services

Appendix A

Consideration of clause 228(2) factors and matters of national environmental significance

Clause 228(2) Checklist

In addition to the requirements of the *Is an EIS required?* guideline as detailed in the REF, the following factors, listed in clause 228(2) of the *Environmental Planning and Assessment Regulation 2000*, have also been considered to assess the likely impacts of the proposal on the natural and built environment.

Factor	Impact
a. Any environmental impact on a community? The safeguards and mitigation measures detailed in the Submissions Report, Project REF and this Addendum are sufficient to address this aspect, including construction traffic management.	Short-term negative
b. Any transformation of a locality? The proposed change would not transform the locality.	Nil
c. Any environmental impact on the ecosystems of the locality? The proposed change would have negligible impact on ecosystems.	Nil
d. Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality? Impacts on environmental quality or values are not expected.	Nil
e. Any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations? Impacts on significant localities, places or buildings are not expected.	Nil
f. Any impact on the habitat of protected fauna (within the meaning of the *National Parks and Wildlife Act 1974*)? The nature, location and scope of the proposed change are such that impacts are not expected.	Nil
g. Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air? The proposed change would not endanger any species of animal, plant or other form of life, whether living on land, in water or in the air.	Nil
h. Any long-term effects on the environment? The proposed changes would result in long-term benefits for the community by supporting the delivery of the Memorial Avenue Upgrade project. No adverse long term impacts have been identified.	Nil

Factor	Impact
i. Any degradation of the quality of the environment? The impact of the proposed change has been discussed. It would not result in any degradation of the quality of the environment provided safeguards and mitigation measures are implemented.	Nil
j. Any risk to the safety of the environment? Providing safeguards and mitigation measures are implemented the proposed changes would not represent a risk to the safety of the environment.	Nil
k. Any reduction in the range of beneficial uses of the environment? The proposed change would not reduce the range of beneficial uses of the environment.	Nil
l. Any pollution of the environment? It is not expected that the proposed change would result in any pollution of the environment provided the project safeguards and mitigation measures are properly implemented.	Nil
m. Any environmental problems associated with the disposal of waste? Waste generated by the proposed change would be reused and recycled where possible and disposed of in an appropriate manner. There would be no environmental problems associated with the disposal of waste.	Nil
n. Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply? There would be negligible increased demand on resources, natural or otherwise, which are, or are likely to become in short supply as a result of the proposed change.	Nil
o. Any cumulative environmental effect with other existing or likely future activities? Adverse cumulative impacts are not expected.	Nil
p. Any impact on coastal processes and coastal hazards, including those under projected climate change conditions? The proposed change would not impact on coastal processes or hazards.	Nil

Matters of National Environmental Significance

Under the environmental assessment provisions of the *Environment Protection and Biodiversity Conservation Act 1999*, the following matters of national environmental significance and impacts on Commonwealth land are required to be considered to assist in determining whether the proposal should be referred to the Australian Government Department of the Environment.

Factor	Impact
a. Any impact on a World Heritage property? The proposed change will not have an impact on a World Heritage property.	Nil
b. Any impact on a National Heritage place? The proposed change will not have an impact on a National Heritage place.	Nil
c. Any impact on a wetland of international importance? The proposed change will not have an impact on a wetland of international importance.	Nil
d. Any impact on a listed threatened species or communities? The proposed change will not have an impact on a listed threatened species or community.	Nil
e. Any impacts on listed migratory species? The proposed change I will not have an impact on a listed migratory species.	Nil
f. Any impact on a Commonwealth marine area? The proposed change will not have an impact on a Commonwealth marine area.	Nil
g. Does the proposal involve a nuclear action (including uranium mining)? The proposed change does not involve a nuclear action.	Nil
Additionally, any impact (direct or indirect) on Commonwealth land? The proposed change will not have an impact (either direct or indirect) on Commonwealth Land.	Nil

Appendix B

Statutory Consultation Checklist

ISEPP

Council related infrastructure or services

Issue	Potential impact	Yes / No	If 'yes' consult with the relevant local council(s).	ISEPP clause
Stormwater	Are the works likely to have a *substantial* impact on the stormwater management services which are provided by council?	No		ISEPP cl.13(1)(a)
Traffic	Are the works likely to generate traffic to an extent that will *strain* the capacity of the existing road system in a local government area?	No		ISEPP cl.13(1)(b)
Sewerage system	Will the works involve connection to a council owned sewerage system? If so, will this connection have a *substantial* impact on the capacity of any part of the system?	Yes	Consultation with THSC covered under the REF. No new demand. Staging of the works involves diverting/replacing sewers.	ISEPP cl.13(1)(c)
Water usage	Will the works involve connection to a council owned water supply system? If so, will this require the use of a *substantial* volume of water?	Yes	As above. No new demand. Staging of the works involves diverting/replacing watermains.	ISEPP cl.13(1)(d)
Temporary structures	Will the works involve the installation of a temporary structure on, or the enclosing of, a public place which is under local council management or control? If so, will this cause more than a *minor* or *inconsequential* disruption to pedestrian or vehicular flow?	No		ISEPP cl.13(1)(e)
Road & footpath excavation	Will the works involve more than *minor* or *inconsequential* excavation of a road or adjacent footpath for which council is the roads authority and responsible for maintenance?	Yes	Consultation with THSC covered under the REF. Widening will involve staging construction up wo the boundary on both sides and constructing a new shared path	ISEPP cl.13(1)(f)

Issue	Potential impact	Yes / No	If 'yes' consult with the relevant local council(s).	ISEPP clause
			along Memorial Avenue. A temporary footpath will replace the existing footpath during construction.	

Local heritage items

Issue	Potential impact	Yes / No	If 'yes' consult with the relevant local council(s)	ISEPP clause
Local heritage	Is there is a local heritage item (that is not also a State heritage item) or a heritage conservation area in the study area for the works? If yes, does a heritage assessment indicate that the potential impacts to the heritage significance of the item/area are more than *minor* or *inconsequential*?	No	]	ISEPP cl.14

Flood liable land

Issue	Potential impact	Yes / No	If 'yes' consult with local Council(s)	ISEPP clause
Flood liable land	Are the works located on flood liable land? If so, will the works change flood patterns to more than a *minor* extent?	No		ISEPP cl.15

Public authorities other than councils

Issue	Potential impact	Yes / No	If 'yes' consult with	ISEPP clause
National parks and reserves	Are the works adjacent to a national park or nature reserve, or other area reserved under the *National Parks and Wildlife Act 1974*, or on land acquired under that Act?	No		ISEPP cl.16(2)(a)

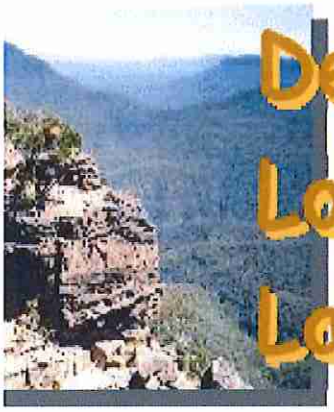
Issue	Potential impact	Yes / No	If 'yes' consult with	ISEPP clause
National parks and reserves	Are the works on land in Zone E1 National Parks and Nature Reserves or in a land use zone equivalent to that zone?	No		ISEPP cl. 16(2)(b)
Aquatic reserves and marine parks	Are the works adjacent to an aquatic reserve or a marine park declared under the *Marine Estate Management Act 2014*?	No		ISEPP cl.16(2)(c)
Sydney Harbour foreshore	Are the works in the Sydney Harbour Foreshore Area as defined by the *Sydney Harbour Foreshore Authority Act 1998*?	No		ISEPP cl.16(2)(d)
Bush fire prone land	Are the works for the purpose of residential development, an educational establishment, a health services facility, a correctional centre or group home in bush fire prone land?	No		ISEPP cl.16(2)(f)
Artificial light	Would the works increase the amount of artificial light in the night sky and that is on land within the dark sky region as identified on the dark sky region map? (Note: the dark sky region is within 200 kilometres of the Siding Spring Observatory)	No		ISEPP cl. 16(2)(g)
Defence communications buffer land	Are the works on buffer land around the defence communications facility near Morundah? (Note: refer to Defence Communications Facility Buffer Map referred to in clause 5.15 of Lockhardt LEP 2012, Narrandera LEP 2013 and Urana LEP 2011).	No		ISEPP cl. 16(2)(h)
Mine subsidence land	Are the works on land in a mine subsidence district within the meaning of the *Mine Subsidence Compensation Act 1961*?	No		ISEPP cl. 16(2)(i)

Growth Centres SEPP

Issue	Potential impact	Yes / No	If 'yes' consult with	SEPP clause
Clearing native vegetation	Do the works involve clearing native vegetation (as defined in the *Local Land Services Act 2013)* on land that is not ***subject land*** (as defined in cl 17 of schedule 7 of the *Threatened Species Conservation Act 1995*)?	No		SEPP 18A

Appendix C

PACHCI Stage 1 Clearance Letter



Deerubbin Local Aboriginal Land Council

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Roads and Marine Services

27-31 Argyle Street

PARRAMATTA NSW 2150

Our Ref: 2414

11 April 2014

PROTECTION OF ABORIGINAL CULTURAL HERITAGE

Proposed Road Upgrade Stage 2

Memorial Avenue, Kellyville

Attention: Mark Lester

A representative of Deerubbin Local Aboriginal Land Council inspected the proposed Memorial Avenue Upgrade Stage 2 on Wednesday, 19 March & Thursday 20 March 2014. An Aboriginal cultural heritage assessment was undertaken to evaluate the likely impact the proposed upgrade has on the cultural heritage of the land.

Due to the high ground surface disturbance from previous road construction & utilities laid in the easement & inside the property boundaries, no Aboriginal cultural materials (in the form of stone artefacts, for example) were found along the study area.

Deerubbin Local Aboriginal Land Council therefore, has no objection for the proposed Memorial Avenue upgrade Stage 2, however protection of Potential Archaeological Deposit # 45-5-3063 on Elizabeth McArthur Creek be protected during construction.

Yours Faithfully,

SRandall

Steven Randall

(Senior Aboriginal Cultural Heritage Officer)

C.c. Miranda Morton – Office of Environment & Heritage

C.c. Josh Madden – Artefact Heritage

Appendix D

Addendum Acoustic Report

RENZO TONIN & ASSOCIATES
inspired to achieve

Acoustics
Vibration
Structural Dynamics

MEMORIAL AVENUE UPGRADE

Noise and vibration addendum

20 June 2019

Roads and Maritime Services

TH310-03F02 Noise and vibration addendum r1

35 1982-2017 ACOUSTIC ENGINEERING EXCELLENCE

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Document details

Detail	Reference
Doc reference:	TH310-03F02 Noise and vibration addendum r1
Prepared for:	Roads and Maritime Services
Attention:	Matthew Brookes (BECA)

Document control

Date	Revision history	Non-issued revision	Issued revision	Prepared	Instructed	Authorised
14.05.2019	draft		0	M Nguyen	M Gange	M Gange
20.06.2019	final		1	A Morris	M Gange	M Gange

Important Disclaimer:

The work presented in this document was carried out in accordance with the Renzo Tonin & Associates Quality Assurance System, which is based on Australian Standard / NZS ISO 9001.

This document is issued subject to review and authorisation by the Team Leader noted by the initials printed in the last column above. If no initials appear, this document shall be considered as preliminary or draft only and no reliance shall be placed upon it other than for information to be verified later.

This document is prepared for the particular requirements of our Client referred to above in the 'Document details' which are based on a specific brief with limitations as agreed to with the Client. It is not intended for and should not be relied upon by a third party and no responsibility is undertaken to any third party without prior consent provided by Renzo Tonin & Associates. The information herein should not be reproduced, presented or reviewed except in full. Prior to passing on to a third party, the Client is to fully inform the third party of the specific brief and limitations associated with the commission.

In preparing this report, we have relied upon, and presumed accurate, any information (or confirmation of the absence thereof) provided by the Client and/or from other sources. Except as otherwise stated in the report, we have not attempted to verify the accuracy or completeness of any such information. If the information is subsequently determined to be false, inaccurate or incomplete then it is possible that our observations and conclusions as expressed in this report may change.

We have derived data in this report from information sourced from the Client (if any) and/or available in the public domain at the time or times outlined in this report. The passage of time, manifestation of latent conditions or impacts of future events may require further examination and re-evaluation of the data, findings, observations and conclusions expressed in this report.

We have prepared this report in accordance with the usual care and thoroughness of the consulting profession, for the sole purpose described above and by reference to applicable standards, guidelines, procedures and practices at the date of issue of this report. For the reasons outlined above, however, no other warranty or guarantee, whether expressed or implied, is made as to the data, observations and findings expressed in this report, to the extent permitted by law.

The information contained herein is for the purpose of acoustics only. No claims are made and no liability is accepted in respect of design and construction issues falling outside of the specialist field of acoustics engineering including and not limited to structural integrity, fire rating, architectural buildability and fit-for-purpose, waterproofing and the like. Supplementary professional advice should be sought in respect of these issues.

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1 Introduction

1.1 Proposal overview

The Memorial Avenue Upgrade (the Project) is a Roads and Maritime Services (RMS) road project approximately 2.2 kilometres long and connects Old Windsor Road in the west with Windsor Road in the east. It bisects the new Balmoral Road development and provides access to Blacktown, Glenwood, Stanhope Gardens, Parklea, Baulkham Hills, Castle Hill and Kellyville.

1.2 Purpose of this report

Renzo Tonin & Associates completed a noise and vibration assessment in October 2014 which formed part of the project Review of Environmental Factors (REF), and was put on public display in November 2014. Since that time Renzo Tonin & Associates have also assisted BECA with the detailed design phase of the project.

RMS have requested that this Addendum report be prepared in order to assess project changes since the display of the REF.

1.3 Key differences to the Project REF noise assessment

There are several key differences between the REF noise and vibration assessment and this addendum assessment. Some of the differences are due to design changes, and some are due to the release of updated assessment guidelines from RMS. There has also been additional urbanisation of the project area since the project REF was completed in 2014 which means additional sensitive receivers have been constructed within the Project area.

The key differences that have been assessed in this addendum are:

- Newly built (or substantially complete) sensitive receivers have been added into the noise model and assessed.
- The posted speed of the future upgraded Memorial Avenue has been increased from 70km/h to 80km/h (70km/h was adopted for the REF assessment).
- Potential noise impacts from bus bays is addressed,
- The construction noise and vibration assessment is updated to match current RMS requirements, including use of the Construction Noise and Vibration Guideline (CNVG),
- Construction ancillary facilities have been included in the construction assessment.

Further information on these changes is provided below.

1.3.1 Project design

In the detailed design phase of the project, modifications to the Project REF design were made. These modifications included minor adjustments to the road alignment, and additional tie in works along Wrights Road. This assessment has used to most current project design from the detailed design phase of works.

1.3.2 Project road design traffic speed change

The design traffic speed on Memorial Avenue between Old Windsor Road and Windsor has been increased from 70km/h to 80km/h.

1.3.1 Project area urbanisation

The project area is currently being urbanised with new residential developments under construction. Since the Project REF, additional residential dwellings have been constructed, and some previously existing dwellings have been demolished.

This addendum REF considers the project area as it exists in April 2019. Where dwellings were currently under construction but incomplete, they have also been identified and assumptions have been made as to the likely building footprint.

1.3.1 Operational noise assessment

The Project REF assessed road traffic noise in accordance with the NSW Road Noise Policy (RNP), 2011. Subsequently, RMS have released the Noise Criteria Guideline (NCG) and Noise Mitigation Guideline (NMG), April 2015.

The NCG was issued by RMS to provide guidance on the application of the RNP. The NMG outlines the approach RMS takes for the evaluation, selection and design of feasible and reasonable noise mitigation measures. It supersedes Practice Note (iv), (iv-a) and (iv-c) of the Environmental Noise Management Manual (2001). In accordance with current practice, the NCG and NMG have been used for this assessment.

1.3.2 Construction noise and vibration assessment

The CNVG was issued in August 2016 for the assessment of construction noise and vibration for Roads and Maritime projects. A revised assessment of construction noise has been conducted based upon the construction phases as presented in the proposal's Review of Environmental Factors (REF). The type and number of plant and equipment associated with the proposed works that have been used for this assessment are based upon experience with similar noise assessments, and noise level data contained in the CNVG.

1.3.3 Project roads

Road upgrade projects will typically require additional minor works at intersections for roads that connect to the project road which is being upgraded. Roads and Maritime have provided further guidance on what constitutes a 'project road' and what is considered 'tie-in' works to facilitate the road upgrade. The REF noise assessment assessed Old Windsor Road as project road, whereas under the new guidelines, Old Windsor Road is now considered to be minor 'tie-in' works and is a non-project road. Windsor Road between President Avenue and Wrights Road has still been assessed as a project road due to the substantial road corridor widening and property acquisition required.

1.3.4 Bus bay assessment

It is proposed to construct two new bus bays on Memorial Ave as part of the project. This assessment now considers noise impact from the proposed bus bays in terms L_{Amax} events during the night period.

2 Existing noise environment

To facilitate the assessment of noise impacts from the proposed Memorial Avenue Upgrade, noise sensitive receiver areas along the route have been divided into Noise Catchment Areas (NCAs). The NCAs are detailed in the table below and shown in Figure 1. Details of noise monitoring locations and ambient noise conditions are provided in the Project REF noise assessment.

While the boundaries of the catchment areas remain the same as those in the REF, additional sensitive receivers have been added due to recent construction of residential housing, particularly in NCA2, NCA 3, NCA 5 and NCA6.

Table 1 Noise Catchment Areas

NCA	Location	Description
NCA 1	Old Windsor Rd to Thomas Boulton Cct Northern side of Memorial Ave	• Single commercial receiver towards Old Windsor Rd • Low to medium density suburban land • Recent subdivision development with current continuation of subdivision construction to the east • Gracelands Early Education Centre
NCA 2	Old Windsor Road to 30 Memorial Ave Southern side of Memorial Ave	• Mixture of low density rural land & high density residential with commercial ground floor at The Gracewood Community • Recent demolition of residential dwellings • Current subdivision construction
NCA 3	Thomas Boulton Cct to Arnold Ave Northern side of Memorial Ave	• Low density rural land with residential & commercial receivers • The Hills Clinic (Hospital)
NCA 4	Rocks St to Hector Ct Southern side of Memorial Ave	• Medium density suburban land • Recent subdivision development with current continuation of subdivision construction to the west and throughout Grace Cres and surrounding roads
NCA 5	Arnold Ave to Windsor Rd Northern side of Memorial Ave	• Mixture of medium density new subdivision and existing residential receivers along Memorial Ave • Current subdivision construction at the intersection of Memorial Ave & Arnold Ave • Mixture of residential & commercial receivers along Windsor Rd
NCA 6	Hector Ct to Windsor Rd Southern side of Memorial Ave	• Current subdivision construction along Windsor Rd • Kellyville Cricket Club near middle of NCA • Commercial receivers along Windsor Rd
NCA 7	Windsor Road Eastern side of Windsor Rd from President Rd to Wrights Rd	• Medium density residential receivers • Commercial receivers including Caltex & Repco towards northern end on eastern side of Windsor Road • Kellyville Preschool Kindergarten at northern end on President Avenue
NCA 8	Old Windsor Road Western side of Old Windsor Rd from Kentwell Cr to Rothwell Cct	• Medium density residential receivers • Fit Kidz Day Care Centre • Outback Steakhouse (commercial receiver at southern end Old Windsor Road

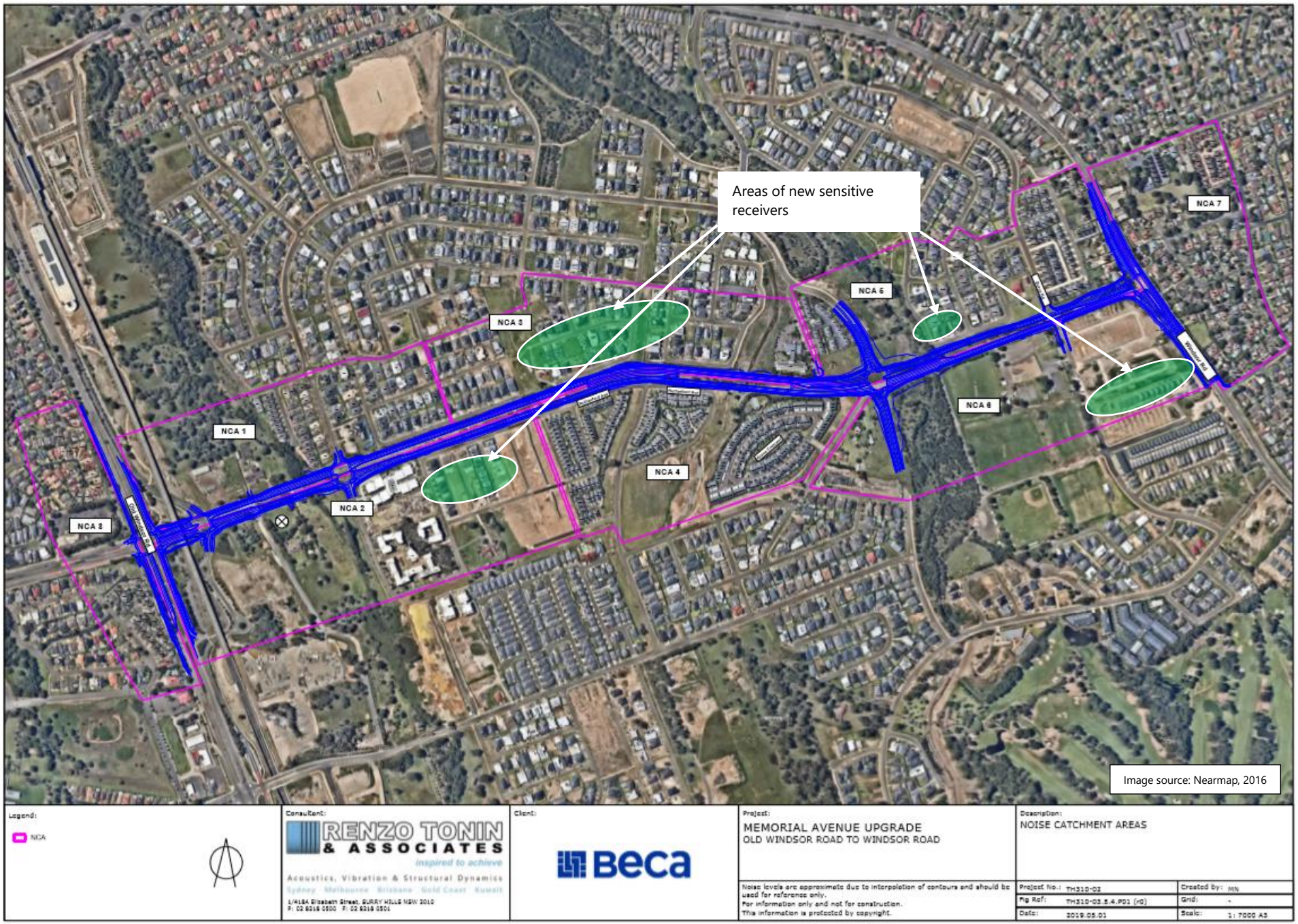


Figure 1 Noise Catchment Areas and new receivers

Part A Operational traffic noise assessment

3 Operational traffic noise criteria

In the project REF, operational traffic noise criteria was based on the NSW Road Noise Policy 2011 (RNP) and the RTA Environmental Noise Management Manual 2001 (ENMM). RMS has released new noise guidelines and noise criteria are now assigned to sensitive receivers using RMS' Noise Criteria Guideline (NCG) 2015. The NCG provides guidance on how to apply the NSW Road Noise Policy. The assessment timeframe for the criteria are in the year of opening and 10 years after opening.

The project assessment area extends to where noise levels are dominated by other roads that are not being assessed as part of this project as defined in NCG. This is up to a maximum distance of 600 metres from the project works for urban areas.

Residences may be assigned new, redeveloped, transition zone or relative increase criteria depending on how the project will influence noise levels. For each facade of the residence the most stringent applicable criteria will be used in the assessment. Criteria are based on the road development type a residence is affected by. In some instances, residences may be exposed to noise from new and redeveloped roads or different functional classes. In this instance the proportion of noise from each road is used to establish transition zone criteria and provides a smooth change in noise criteria between adjacent residences. A further check is made to prevent large increases in noise level using the relative increase criteria.

The project will involve widening of the existing road corridor, however will not be substantially realigned as defined by the NCG. We have also been advised by RMS that the functional class of Memorial Avenue is currently 'sub-arterial', and the road upgrade will not change the functional class of the road, thus the project is considered to be a road redevelopment, and 'redeveloped road' criteria will be applied to all residential receivers.

The NCG defines two types of transition zones for establishing project noise goals at residential receivers. These are:

1. A junction between a new road and a redeveloped road
2. An intersection between the road project and an existing road

This noise assessment defines project roads to be the following;

- Memorial Avenue, from Old Windsor Road to Windsor Road,
- Windsor Road, from President Road to Wrights Road

For all other associated road works, including works along Old Windsor Road, Wrights Road, Windsor Road south of Wrights road and internal roads connecting to Memorial Avenue, this assessment considers these to be minor tie-in road works, and are therefore non-project roads.

As there are no new roads for this project, type 1 transition zones do not apply. There is a type 2 transition zone at the junction of Memorial Avenue and Old Windsor Road.

The criteria for residences are summarised in Table 2. The criteria for other sensitive receivers are presented in Table 3.

Table 2 NCG criteria - residential

Road Category	Type of Project/Land Use	Assessment Criteria (dB)	
		Daytime (7 am - 10 pm)	Night-time (10 pm - 7 am)
Freeway/ arterial/ sub-arterial roads	1. Existing residences affected by noise from new freeway/arterial/sub-arterial road corridors	$L_{Aeq(15hour)}$ 55 (external)	$L_{Aeq(9hour)}$ 50 (external)
	2. Existing residences affected by noise from redevelopment of existing freeway/arterial/sub-arterial roads 3. Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	$L_{Aeq(15hour)}$ 60 (external)	$L_{Aeq(9hour)}$ 55 (external)
	4. Existing residences affected by both new roads and the redevelopment of existing freeway/arterial/sub-arterial roads in a Transition Zone[1]	Between $L_{Aeq(15hour)}$ 55-60 (external)	Between $L_{Aeq(9hour)}$ 50-55 (external)
	5. Existing residences affected by increases in traffic noise of 12dBA or more from new freeway/arterial/sub-arterial roads[2]	Between $L_{Aeq(15hour)}$ 42-55 (external)	Between $L_{Aeq(9hour)}$ 42-50 (external)
	6. Existing residences affected by increases in traffic noise of 12dBA or more from redevelopment of existing freeway/arterial/sub-arterial roads[2]	Between $L_{Aeq(15hour)}$ 42-60 (external)	Between $L_{Aeq(9hour)}$ 42-55 (external)

Notes

1. The criteria assigned to the entire residence depend on the proportion of noise from the new and redeveloped road. See RMS' Noise Criteria Guideline for further information.
2. The criteria at each facade are determined from the existing traffic noise level plus 12dBA.

Table 3 NCG criteria – other sensitive land uses

Existing sensitive land use	Assessment criteria, dB(A)		Additional considerations
	Day (7am-10pm)	Night (10pm-7am)	
School classrooms	LAeq,1hour 40 (internal) when in use	–	In the case of buildings used for education or health care, noise level criteria for spaces other than classrooms and wards may be obtained by interpolation from the 'maximum' levels shown in Australian Standard 2107:2000 (Standards Australia 2000).
Hospital wards	LAeq,1hour 35 (internal)	LAeq,1 hour 35 (internal)	

Existing sensitive land use	Assessment criteria, dB(A)		Additional considerations
	Day (7am-10pm)	Night (10pm-7am)	
Places of worship	LAeq,1hour 40 (internal)	LAeq,1 hour 40 (internal)	The criteria are internal, i.e. the inside of a church. Areas outside the place of worship, such as a churchyard or cemetery, may also be a place of worship. Therefore, in determining appropriate criteria for such external areas, it should be established what in these areas may be affected by road traffic noise. For example, if there is a church car park between a church and the road, compliance with the internal criteria inside the church may be sufficient. If, however, there are areas between the church and the road where outdoor services may take place such as weddings and funerals, external criteria for these areas are appropriate. As issues such as speech intelligibility may be a consideration in these cases, the passive recreation criteria (see point 5) may be applied.
Open space (active use)	LAeq,15hour 60 (external) when in use		Active recreation is characterised by sporting activities and activities which generate their own noise or focus for participants, making them less sensitive to external noise intrusion. Passive recreation is characterised by contemplative activities that generate little noise and where benefits are compromised by external noise intrusion, e.g. playing chess, reading. In determining whether areas are used for active or passive recreation, the type of activity that occurs in that area and its sensitivity to noise intrusion should be established. For areas where there may be a mix of passive and active recreation, e.g. school playgrounds, the more stringent criteria apply. Open space may also be used as a buffer zone for more sensitive land uses.
Open space (passive use)	LAeq,15hour 55 (external) when in use		
Childcare facilities	Sleeping rooms LAeq,1hour 35 (internal) Indoor play areas LAeq,1hour 40 (internal) Outdoor play areas LAeq,1hour 55 (external)		Multi-purpose spaces, e.g. shared indoor play/sleeping rooms should meet the lower of the respective criteria. Measurements for sleeping rooms should be taken during designated sleeping times for the facility, or if these are not known, during the highest hourly traffic noise level during the opening hours of the facility.
Aged care facilities	–	–	Residential land use noise assessment criteria should be applied to these facilities

Notes: Land use developers must meet internal noise goals in the Infrastructure SEPP (Department of Planning NSW 2007) for sensitive developments near busy roads.

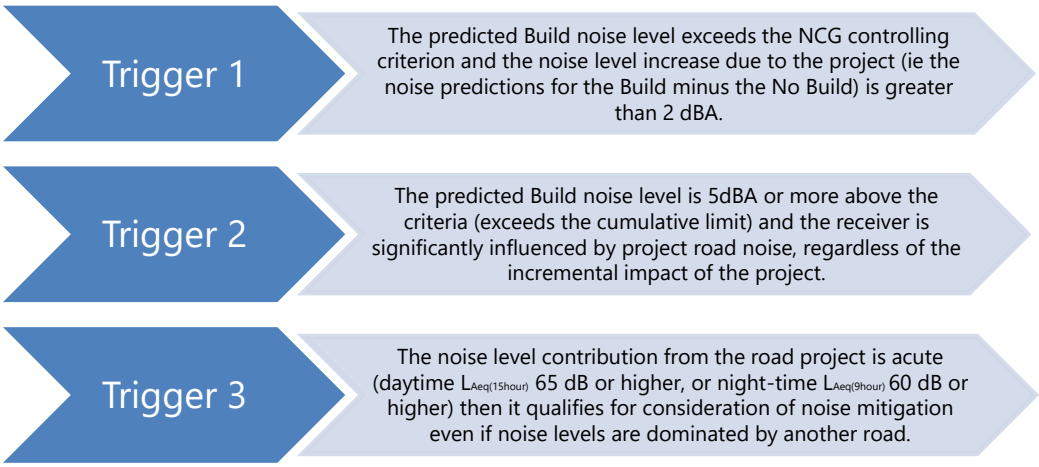
It is generally accepted that most buildings provide a noise reduction of at least 10dB(A) when windows are left 20% open. Therefore, where the noise goals are internal, a 10dB(A) reduction from external to internal noise levels has been adopted to allow an external assessment.

4 Guidance on the evaluation of noise mitigation measures

The Roads and Maritime Noise Mitigation Guideline (NMG) provides guidance in managing and controlling road traffic generated noise and describes the principles to be applied when reviewing noise mitigation. The NMG recognises that the criteria recommended by the NCG are not always practicable and that it is not always feasible or reasonable to expect that they should be achieved.

The NMG notes that the most effective way of minimising noise from vehicles and traffic is to control vehicle noise at the source. Where source measures are not practical, or do not provide sufficient noise reduction, additional methods are required to reduce levels to within acceptable margins. Such additional methods may include the use of noise barriers and/or consideration for architectural treatment of residences.

The NMG provides three triggers where a receiver may qualify for consideration of noise mitigation (beyond the adoption of road design and traffic management measures). These are:



The eligibility of receivers for consideration of additional noise mitigation is determined before the benefit of additional noise mitigation (quieter pavement and noise barriers) is included. The requirement for the project is to provide reasonable and feasible additional mitigation for these eligible receivers to meet the NCG controlling criterion. If the NCG criterion cannot be satisfied with quieter pavement and noise barriers, then the receiver is eligible for consideration of at-property treatment.

5 Operational noise assessment

5.1 Road traffic noise modelling

5.1.1 Building heights

Residential buildings were input into the noise model as either 3m or 6m high building blocks, representing single and double storey dwellings respectively. This is a conservative approach as it ignores noise shielding from the roof pitch.

5.1.2 Road pavement

When pavement surfaces are not dense graded asphalt or similar, corrections are included in the noise model, typically reflecting a noise increase for concrete pavements, and a noise decrease for quiet pavements such as open graded asphalt (OGAC) or stone mastic asphalt (SMA). Consistent with the Noise Mitigation Guideline, dense graded asphalt (DGA) pavement with a correction of 0dB(A) has been used to determine properties that initially qualify for consideration of noise mitigation prior to the assessment of reasonable and feasible mitigation measures.

5.1.3 Existing noise walls and boundary fences

Boundary fences have generally not been included in the noise model unless they have particular acoustic properties such as being masonry or similar construction. There is also an existing noise wall which has recently been constructed at the Gracewood Community. These acoustic walls have been incorporated into the noise model and used in all noise modelling scenarios. The walls are detailed in the following table and displayed in APPENDIX D.

Table 4 Existing noise walls and fences

NCA	Location	Height (m)
1	Memorial Avenue. Northern side of road corridor, corner of Arnold Avenue	1.8m
2	Memorial Avenue. Southern side of road corridor in front of The Gracewood Community	4.2m
3	Memorial Avenue. Northern side of road corridor in front of The Hills Clinic	2m
5	Memorial Avenue. Northern side of road corridor Adjacent to Burns Road	2m
8	Old Windsor Road south of Memorial Avenue. Western side of road corridor along rear residential boundary	1.8m

5.1.4 Noise modelling scenarios

To conduct the noise assessment, a number of different traffic scenarios were required to be modelled and compared. The assessment considers both the 'build' (with the project) and 'no build' (without the project) scenarios for the year of opening (2019) and ten years after opening (2029). Table 5 summarises the scenarios that were modelled.

Table 5 Modelled scenarios

Modelled Scenario	Label	Description
1a	2019 No build - day	Day time based on 2016 'no build' scenario
1b	2019 No build - night	Night-time based on 2016 'no build' scenario
2a	2029 No build - day	Day time based on 2026 'no build' scenario
2b	2029 No build - night	Night-time based on 2026 'no build' scenario
3a	2019 Build - no mitigation - day	Day time based on 2016 'with build' scenario - no mitigation
3b	2019 Build - no mitigation -night	Night-time based on 2016 'with build' scenario - no mitigation
4a	2029 Build - no mitigation - day	Day time based on 2026 'with build' scenario - no mitigation
4b	2029 Build - no mitigation -night	Night-time based on 2026 'with build' scenario - no mitigation

5.1.5 Traffic flow and composition summary

The forecasted traffic flow information used in this assessment is the same as that used for the Project REF, with the exception that the traffic speed on Memorial Avenue has increased from 70km/h to 80km/h. The traffic data is shown in Table 6 below.

Table 6 Forecasted traffic volumes and speeds

Road	AADT	Day time (7:00 – 22:00)			Night time (22:00 – 7:00)		
		Volume	HV%	Speed km/h	Volume	HV%	Speed km/h
2019 Forecast							
Memorial Avenue at Stranglers Creek	32,200	28,000	6.8	80	4,200	7.6	80
Memorial Avenue at Elizabeth Macarthur Creek	33,500	29,100	6.9	80	4,400	7.0	80
Old Windsor Rd - North of Memorial Ave	40800	35500	5.9	80	5300	6.6	80
Old Windsor Rd - South of Memorial Ave	51200	44500	6.1	80	6700	5.5	80
Windsor Rd - North of Memorial Ave	41400	36000	6.1	60	5400	5.2	60
Windsor Rd - South of Memorial Ave	56600	49200	6.1	60	7400	5.4	60
2029 Forecast							
Memorial Avenue at Stranglers Creek	38000	33200	6.7	80	4800	8.3	80
Memorial Avenue at Elizabeth Macarthur Creek	41600	36200	5.4	80	5400	5.9	80
Old Windsor Rd - North of Memorial Ave	44000	38300	6.0	80	5700	6.0	80
Old Windsor Rd - South of Memorial Ave	55000	47900	6.1	80	7100	5.6	80
Windsor Rd - North of Memorial Ave	44500	38700	5.9	60	5800	6.4	60
Windsor Rd - South of Memorial Ave	62800	54600	6.0	60	8200	5.7	60

It is assumed that the growth in traffic on Memorial Avenue would occur regardless of the road upgrade, therefore the noise models for both the 'build' and 'no build' options utilise the same traffic data. For the 'no build' options, Memorial Avenue has been modelled at the posted speed, which varies between 60km/h and 70km/h depending on the location.

5.1.6 Noise modelling methodology

Noise predictions are based on a method developed by the United Kingdom Department of Environment entitled "Calculation of Road Traffic Noise (1988)" known as the CoRTN (1988) method. This method has been adapted to Australian conditions and extensively tested by the Australian Road Research Board and as a result it is recognised and accepted by the NSW Environment Protection Authority. The model predicts noise levels for steady flowing traffic and noise from high truck exhausts is also taken into account.

The CoRTN algorithms are contained within the 'CadnaA' noise modelling software which has been used to calculate traffic noise levels at receivers. The noise prediction model takes into account the following inputs.

Table 7 Road traffic modelling inputs and assumptions

Input Parameters	Data Acquired From
Ground elevation geometry	Ground contours obtained from Hyder Consulting & NSW Land & Property Information (LPI)
Road alignment	Existing: Current 2D Cadastral and aerial photo Future: Proposed design alignment
Traffic volumes	Refer to Table 6
Vehicle speed	Memorial Avenue: 'No Build' Model: Sections of 60km/h and 70km/h as per posted speeds 'Build' Model: Upgraded posted speed of 80km/h Old Windsor Road: 80km/h as per posted speed Windsor Road: 60km/h as per posted speed
Road Surface	Dense graded asphalt +0dB(A) for all roads
Ground Absorption	Soft ground, consistent with REF validated noise model
Source height	0.5 metre for car exhaust, 1.5 metres for car and truck engines and 3.6 metres for truck exhaust and detailed within CORTN88
Receiver Heights	1.5 metre above ground level for ground floor and 4.5 metre above ground level for 1st floor
Existing noise barriers	As per Appendix D
LA10 to LAeq conversion	LAeq,1hr = LA10,1hr - 3 dB(A)
Facade correction	+2.5dB(A)
Correction for Australian conditions	LAeq,15h: -1.7 dB(A) for 'at facade' conditions from Australian Road Research Board (ARRB) Transport Research (Saunders et al 1983), consistent with REF noise model LAeq,9h: no Australian Conditions correction applied, consistent with REF noise model

5.1.7 Model validation

The noise model setup for the REF noise assessment was the basis of the model used in this Addendum REF. The noise model validation results presented in the REF noise and vibration assessment show that the noise model predicts results that are in good agreement with the noise monitoring and there is a reasonable level of confidence that can be placed on the noise model for predicting future traffic noise levels. As this is the case, no corrections have been applied to the model when generating the operational noise predictions for future traffic noise scenarios.

5.2 Noise modelling results overview

5.2.1 Project area urbanisation

The project area is currently being urbanised with new residential developments under construction. The Hills Shire Council Development Control Plan (DCP) requires new developments to provide noise mitigation to achieve the noise goals outlined in the NSW State Environmental Planning Policy (Infrastructure) 2007. Responsibility for noise mitigation for these recent developments lies with the developer.

Consistent with Council DCP and the REF for the project, whilst all receivers within the study area have been assessed, post 2008 developments have not been considered for noise mitigation. Where dwellings were currently under construction but incomplete, they have also been identified and an assumption has been made as to the building footprint and whether the dwelling is single or double storey.

5.2.2 Summary of exceedances

The results of the operational road traffic noise modelling are presented in detail in APPENDIX E. Table 8 summarises the number of receivers that exceed the NCG traffic noise criteria and qualify for consideration of noise mitigation.

Table 8 Receivers that exceed NCG criteria and qualify for consideration of noise mitigation

Noise Catchment Area	Receivers qualifying for consideration of noise mitigation
NCA 1	2
NCA 2	0
NCA 3	2
NCA 4	0
NCA 5	10
NCA 6	0
NCA 7	17
NCA 8	0
Total	**31**

5.2.3 Discussion of results

As a result of the speed change from 70km/h to 80km/h along Memorial Avenue, the predicted traffic noise levels for all 'Build' scenarios have increased by approximately 1dB compared to the REF results, for residences where Memorial Avenue is the dominate source of road noise.

The Project REF identified 52 properties for consideration of additional noise mitigation, whereas there is now a total of 31 properties. The reasons for this change are the following:

- the designation of Old Windsor Road from a project road to a non-project road, removing all properties within NCA 8 from requiring consideration of noise mitigation,
- One existing property within NCA2, three within NCA 3, one within NCA 5 and one within NCA 6 have been demolished and are no longer being considered for noise mitigation,
- The existing building within the north-east corner of Ancillary Facility 2, although currently existing, will be demolished,
- NCA 7 boundary has been extended to President Avenue, leading to four additional properties being considered for noise mitigation.

5.2.4 Reclassification of Old Windsor Road

In the Project REF, properties in NCA 8 were identified for noise mitigation. Under the new NCG assessment procedure, with the reclassification of Old Windsor Road from a project road to a non-project road, all properties within NCA 8 are no longer considered for additional noise mitigation. Noise levels at these properties are predicted to increase by less than 1dB(A) as a result of the works.

It is understood the residences within NCA 8 that were previously identified for consideration of additional noise mitigation have already been notified as part of the community consultation procedure, and commitment has been made by RMS to consider noise mitigation at these properties. These properties are identified in the project REF, and are listed in Table 9 below for ease of reference should RMS still wish to proceed with the treatments. We reiterate that these properties do not require treatment under the new NCG assessment procedure.

Table 9 NCA 8 property treatments no longer required

NCA	NCA ID	Address	Receiver type	Floor	Treatment category
8	8_016	45 Kentwell Crescent	Residential	1	3
8	8_017	47 Kentwell Crescent	Residential	1	3
8	8_030	15 Meldon Place	Residential	1	2
8	8_037	27 Meldon Place	Residential	1	2
8	8_038	29 Meldon Place	Residential	1	2
8	8_041	15 Carolyn Court	Residential	1	3
8	8_043	3 Jakob Way	Residential	1	2
8	8_045	5 Jakob Way	Residential	1	2
8	8_046	7 Jakob Way	Residential	1	2
8	8_050	8 Rory Court	Residential	1	3
8	8_051	10 Rory Court	Residential	1	3
8	8_052	12 Rory Court	Residential	1	3
8	8_055	10 Rothwell Circuit	Residential	1	2
8	8_056	12 Rothwell Circuit	Residential	1	4
8	8_059	16A Rothwell Circuit	Residential	G	1

NCA	NCA ID	Address	Receiver type	Floor	Treatment category
8	8_059	16A Rothwell Circuit	Residential	1	3
8	8_061	18A Rothwell Circuit	Residential	1	3
8	8_063	22 Rothwell Circuit	Residential	G	1
8	8_063	22 Rothwell Circuit	Residential	1	3
8	8_064	24 Rothwell Circuit	Residential	1	3

5.2.5 DA approved property developments

The Project REF identified several properties which have since been demolished and new residential subdivisions have been built. It is understood that there are further properties that have been identified for consideration of additional mitigation in this assessment which are currently set to be developed with new residential subdivisions. For any property with an approved DA where the existing dwelling is to be demolished, these existing dwellings would not be treated. For any new residential developments yet to be approved, noise mitigation would be the responsibility of the developer.

5.2.6 Low noise pavement and noise barriers

It was determined during the Project REF that noise mitigation measures such as low noise pavement and road side noise barriers were not reasonable or feasible measures for this project. The following is from Section 4.6.3 of the Project REF Noise and Vibration Assessment:

"At the time of announcement of Memorial Avenue Upgrade the residences along the road corridor were largely semi-rural in nature, isolated on large lots or in small groups. The RTA's ENMM notes that noise barriers are not cost effective where residences are isolated or in small groups, rather architectural treatments to dwellings are a more cost effective solution. Subsequently roadside noise barriers are not recommended for this project. Even though in recent years there have been low density residential developments constructed along the corridor, noise mitigation for these new residences is the responsibility of the developer."

With the increase in traffic speed from 70km/h to 80km.h, further consideration has been given to low noise pavement. Current research suggests that low noise pavement such as Stone Mastic Asphalt (SMA) or Open Graded Asphaltic Concrete (OGAC) provides an overall noise reduction of 2dB(A) compared to standard Dense Graded Asphalt (DGA). If a 2dB noise reduction was achieved by applying low noise pavement to the road surface, this would not change the number of properties to be considered for treatment. This is because all properties being considered for treatment along Memorial Avenue have noise levels above the 'cumulative limit' (i.e. more than 5dB above the NCG criteria). A 2dB noise reduction is not enough to reduce noise to comply with the NCG criteria at any property.

Furthermore, there are several proposed signalised intersections along Memorial Avenue. Low noise pavements are generally less durable than DGA pavement, which would lead degradation and lowering the performance of the low noise pavements around the intersections. Low noise pavement is therefore still not considered to be a reasonable noise mitigation measure.

5.2.7 Property treatments

Property treatment would be considered for dwellings that remain above the NCG criteria after all other noise mitigation measures are exhausted. Property treatment is generally limited to the acoustic treatment of building elements and the installation of acoustic screen walls close to the receiver where they also protect outdoor living spaces. Identified sensitive receivers adjacent to the road corridor that remain above the NCG criteria will be assessed against existing development consent conditions when considering property treatments.

According to the Roads and Maritime's 'Noise Mitigation Guideline' and 'Environmental Noise Management Manual' (ENMM), building treatments (in no particular order) may comprise of the following:

- the installation of courtyard screen walls
- fresh air ventilation systems that draw air into a building, and meet Building Code of Australia requirements with the windows and doors shut
- Upgraded windows and glazing and solid core doors on the exposed facades of masonry or insulated weather board structures (not for light framed structures)
- Upgrading window and door seals and appropriate treatment of sub-floor ventilation
- Sealing wall vents
- Sealing of the underfloor below the bearers
- Sealing of eaves

Table 10 provides guidance on the level of treatment required in relation to the exceedance above the NCG external assessment criteria.

Table 10 Typical property treatments options

Treatment	Predicted exceedance of NCG external criteria, dB(A)	Property Acoustic Treatment
1	<5	Install fresh air mechanical ventilation to affected rooms (see Notes 1 & 2)
2	6-10	As above + replace weather seals with acoustic seals on windows and doors
3	11-15	As above + replace existing glazing with thicker laminated glazing (see Note 3)
4	16-20	Treatments 1 + 2 + install supplementary windows, fitted with acoustic seals, to inner side of existing windows and install roof-ceiling cavity insulation, if none present (see Note 3)

Notes:
1. If internal noise goals can only be achieved with windows closed, then mechanical ventilation should be considered to ensure fresh airflow inside the dwelling so to meet the requirements of the Building Code of Australia.
2. It is important to ensure that mechanical ventilation does not provide a new noise leakage path into the dwelling and does not create a noise nuisance to neighbouring residential premises.
3. These upgrades are only suitable for masonry type buildings. It is unlikely that this degree of upgrade would provide noticeable benefits to light framed structures with no acoustic insulation in the walls.

Table 11 refers to the project NCAs, lists the properties within each catchment that are to be considered for treatment, and advises the appropriate treatment category. Where a property is double storey and requires consideration at both floors, the treatment category is provided for each floor. Maps that identify each property are shown in APPENDIX F.

This property treatment advice is in-principle only. Site inspections of individual properties should be carried out to confirm the current state of dwellings prior to implementation of any treatments, such as existing noise treatments or constraints on the implementation of property treatment.

Table 12 identifies that the outdoor area for one non-residential receiver exceeds the NCG criteria, and provides the predicted noise level exceedance

Table 11 Property treatments

NCA	NCA ID	Address	Receiver type	Floor	Treatment category
1	1_002	41 Memorial Avenue	Residential	G	2
1	1_061b	7 Arnold Avenue	Childcare Indoor Play	G	4
3	3_003	25 Memorial Avenue	Residential	G	2
3	3_003	25 Memorial Avenue	Residential	1	3
3	3_005	27 Memorial Avenue	Residential	G	2
5	5_057	6 Windsor Road	Residential	G	2
5	5_058	8 Windsor Road	Residential	G	2
5	5_058	8 Windsor Road	Residential	1	3
5	5_059	10 Windsor Road	Residential	G	2
5	5_060	12 Windsor Road	Residential	G	2
5	5_062	18-20 Windsor Road	Residential	G	2
5	5_062	18-20 Windsor Road	Residential	1	3
5	5_063	1 Arnold Avenue	Residential	G	2
5	5_064	22 Windsor Road	Residential	G	2
5	5_065	24 Windsor Road	Residential	G	2
5	5_066	26 Windsor Road	Residential	G	2
5	5_066	26 Windsor Road	Residential	1	3
5	5_067	28 Windsor Road	Residential	G	2
7	7_011	Lot 9 Windsor Road	Residential	G	3
7	7_017	18 Benalla Ave	Residential	G	2
7	7_018	20 Benalla Ave	Residential	G	3
7	7_019	22 Benalla Ave	Residential	G	3
7	7_020	24 Benalla Ave	Residential	G	3
7	7_026	36 Benalla Ave	Residential	G	3
7	7_027	38 Benalla Ave	Residential	G	2
7	7_028	40 Benalla Ave	Residential	G	2
7	7_029	42 Benalla Ave	Residential	G	3

NCA	NCA ID	Address	Receiver type	Floor	Treatment category
7	7_034	Lot 1 Windsor Road	Residential	G	2
7	7_034	Lot 1 Windsor Road	Residential	1	3
7	7_037	16 Hart Place	Residential	G	2
7	7_039	18 Hart Place	Residential	G	2
7	7_040	20 Hart Place	Residential	G	3
7	7_042	2 Wrights Road	Residential	G	2
7	7_042	2 Wrights Road	Residential	1	3
7	7_045b	3-5 President Road	Childcare Indoor Play	G	2
7	7_060	President Road	School Classroom	G	2
7	7_060	President Road	School Classroom	1	2
7	7_061	President Road	Places of worship	G	1

Notes: 1. The childcare centre at 7 Arnold Avenue (receiver 1_061) was previously labelled as 24 Arnold Avenue in the REF noise and vibration assessment.

Table 12 Outdoor areas

NCA	NCA ID	Address	Receiver type	Exceedance, dB(A)
1	1_061a	7 Arnold Avenue	Childcare Outdoor Play	13

6 Bus bay assessment

The project involves the construction of two bus bays which are proposed at the following locations:

- On the east bound carriage way, adjacent to the newly constructed Bruhn Circuit
- On the west bound carriage way, adjacent to eastern end of Rutherford Avenue.

There are already two existing bus stops in these areas. For the east bound carriageway, the nearest affected residence is currently 25m from the existing bus stop, and the distance to the new bus bay will remain at 25m. For the westbound carriageway, the nearest affected residence is currently 45m, which will be reduced to 25m for the new bus bay.

Figure 2 displays the location of the proposed bus bays, existing bus stops and identifies the nearest affected residential receivers on Bruhn Circuit and Rutherford Avenue.

In terms of LAeq, the noise from a bus stopping or accelerating away from the new bus bay is considered unlikely to be louder than a typical heavy vehicle passby on Memorial Avenue and will form part of the overall LAeq road traffic noise level which has been considered and appropriately mitigated in the previous sections of this report. Bus movements will be too infrequent to cause any significant increase in the LAeq traffic noise level.

If buses are operating before 7am or after 10pm, the relocation of the bus stops has the potential to cause sleep disturbance at nearby properties.

To assess sleep disturbance, an L_{Amax} sound power level of 114dB(A) for a bus drop off/pickup event has been used. The predicted L_{Amax} noise levels at the facades of the nearest affected residences are 74dB(A), which equates to 64dB(A) inside a bedroom assuming windows remain open and a 10dB noise reduction from outside to inside through an open window. At this level sleep disturbance is possible.

With windows closed, internal L_{Amax} noise levels would be less than 55dB(A) assuming 20dB noise reduction from outside to inside through a closed window. 55dB(A) internally is considered a complying level for traffic L_{Amax} events and therefore with windows closed sleep disturbance is not predicted to be an issue.

In terms of the expected change in noise level from the existing bus stops, there would be little to no perceived difference for the relocation on the east bound carriage way. L_{Amax} noise levels would likely increase by approximately 5dB(A) for the nearest receivers to the west bound carriage way. These findings do not change the eligibility for noise mitigation as presented in APPENDIX F of this report.

Figure 2 Existing and proposed bus bays

Part B Construction noise and vibration assessment

7 Construction noise and vibration objectives

7.1 Construction noise management levels

In the Project REF, construction noise objectives were set in accordance with the NSW Interim Construction Nosie Guideline 2009 (ICNG). RMS has since released their Construction Noise and Vibration Guideline 2016 (CNVG) for assessment of construction noise and vibration for Roads and Maritime projects. This guideline refers to the ICNG for the setting of noise management levels (NMLs).

Since the CNVG still refers to the ICNG for setting NMLs, the NMLs used for this construction assessment are the same as those set out in the REF, with the exception of NCA 6.

Since there is new residential development in NCA 6 and the existing noise monitoring did not suitably capture the background noise levels near the new receivers, additional noise monitoring was conducted. Long-term noise monitoring was conducted on currently vacant land near Kellyville Park as shown in Figure 3.

This location is set back from Memorial Avenue and represents the noise environment of the new receivers on the eastern side of Stone Mason Drive. Unattended noise monitoring was conducted from Wednesday 27 March 2019 to Tuesday 09 April 2019 to re-establish the NMLs at NCA 6.

Figure 3 Additional noise monitoring location for NCA 6

Table 13 shows the construction noise management levels used for residences in each NCA for this addendum assessment. Nosie management levels for other sensitive receivers (non-residential) are as per the Project REF.

Table 13 Construction noise management levels at residential receivers

NCA	L_{A90} Rating Background Level (RBL)			Noise Management Level $L_{Aeq(15min)}$[1]		
	Day	Evening	Night	Day	Evening	Night
1	49	46	37	59	51	42
2	49	46	37	59	51	42
3	53	50	41	63	55	46
4	53	50	41	63	55	46
5	49	50	44	59	55	49
6	47	45	34	57	50	39
7	55	50	34	65	55	39
8	49	48	38	59	53	43

7.2 Sleep disturbance

In the project REF, the sleep disturbance management level was set at L_{AMAX} 65dB(A) externally as an upper limit. Based on recent research, current RMS guidelines and EPA policy, it is accepted that internal noise levels of 45 dB(A) and up to 55 dB(A) are unlikely to cause awakenings. On the assumption that there is a 10 dB(A) outside-to-inside noise loss through an open window (see NSW Industrial Noise Policy (INP), p17), external noise levels of L_{Amax} 55 to 65 dB(A) are unlikely to cause awakening reactions.

However, whilst external L_{Amax} noise levels of up to 55 dB(A) are unlikely to cause awakening reactions, a sleep disturbance criterion of (L_{Amax} or $L_{A1(1min))} \leq L_{A90(15min)}$ + 15 dB(A) has been used for this addendum assessment. This criterion is seen as an initial screening test, and is consistent with the EPA's current policy on sleep disturbance.

Table 14 presents the sleep disturbance noise management levels established for the NCAs based upon the results of noise monitoring conducted in the study area.

Table 14 Sleep disturbance noise management level

NCA	Sleep disturbance criteria, 10pm to 7am, $L_{A1,1min}$ (or L_{Amax}), dB(A)
	$L_{A90(15min)}$ + 15 dB
1	52
2	52
3	56
4	56
5	59
6	49
7	49
8	53

7.3 Construction vibration objectives

7.3.1 Disturbance to building occupants

Assessment of potential disturbance from vibration on human occupants of buildings is in accordance with the NSW *'Assessing Vibration; a technical guideline'*, as per the Project REF.

The preferred and maximum values for continuous and impulsive vibration are defined in Table 2.2 of the guideline and are reproduced in Table 15.

Table 15 Preferred and maximum levels for human comfort

Location	Assessment period[1]	Preferred values		Maximum values	
		z-axis	x- and y-axis	z-axis	x- and y-axis
Continuous vibration (weighted RMS acceleration, m/s^2, 1-80Hz)					
Critical areas[2]	Day or night-time	0.005	0.0036	0.010	0.0072
Residences	Daytime	0.010	0.0071	0.020	0.014
	Night-time	0.007	0.005	0.014	0.010
Offices, schools, educational institutions and places of worship	Day or night-time	0.020	0.014	0.040	0.028
Workshops	Day or night-time	0.04	0.029	0.080	0.058
Impulsive vibration (weighted RMS acceleration, m/s^2, 1-80Hz)					
Critical areas[2]	Day or night-time	0.005	0.0036	0.010	0.0072
Residences	Daytime	0.30	0.21	0.60	0.42
	Night-time	0.10	0.071	0.20	0.14
Offices, schools, educational institutions and places of worship	Day or night-time	0.64	0.46	1.28	0.92
Workshops	Day or night-time	0.64	0.46	1.28	0.92

Notes:
1. Daytime is 7am to 10pm and night-time is 10pm to 7am
2. Examples include hospital operating theatres and precision laboratories where sensitive operations are occurring. There may be cases where sensitive equipment or delicate tasks require more stringent criteria than the human comfort criteria specify above. Stipulation of such criteria is outside the scope of their policy and other guidance documents (e.g. relevant standards) should be referred to (BS 6472-1992).

The acceptable vibration dose values (VDV) for intermittent vibration are defined in Table 2.4 of the guideline and are reproduced in Table 16.

Table 16 Acceptable vibration dose values for intermittent vibration ($m/s^{1.75}$)

Location	Daytime[1]		Night-time[1]	
	Preferred value	Maximum value	Preferred value	Maximum value
Critical areas[2]	0.10	0.20	0.10	0.20
Residences	0.20	0.40	0.13	0.26
Offices, schools, educational institutions and places of worship	0.40	0.80	0.40	0.80
Workshops	0.80	1.60	0.80	1.60

Location	Daytime[1]		Night-time[1]	
	Preferred value	Maximum value	Preferred value	Maximum value

Notes: 1. Daytime is 7am to 10pm and night-time is 10pm to 7am

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

7.3.2 Structural damage

Potential structural damage of buildings due to vibration is typically managed by ensuring vibration induced into the structure does not exceed certain limits and standards, such as British Standard 7385 Part 2 and German Standard DIN4150-3. Currently there is no existing Australian Standard for assessment of structural building damage caused by vibration energy.

Within British Standard 7385 Part 1: 1990, different levels of structural damage are defined:

- *Cosmetic - The formation of hairline cracks on drywall surfaces, or the growth of existing cracks in plaster or drywall surfaces; in addition the formation of hairline cracks in mortar joints of brick/concrete block construction.*
- *Minor - The formation of large cracks or loosening of plaster or drywall surfaces, or cracks through bricks/concrete blocks.*
- *Major - Damage to structural elements of the building, cracks in supporting columns, loosening of joints, splaying of masonry cracks, etc.*

The vibration limits in Table 1 of British Standard 7385 Part 2 (1993) are for protection against cosmetic damage, however guidance on limits for minor and major damage is provided in Section 7.4.2 of the Standard:

> *7.4.2 Guide values for transient vibration relating to cosmetic damage*
>
> *Limits for transient vibration, above which cosmetic damage could occur are given numerically in Table and graphically in Figure 1. In the lower frequency region where strains associated with a given vibration velocity magnitude are higher, the guide values for the building types corresponding to line 2 are reduced. Below a frequency of 4 Hz, where a high displacement is associated with a relatively low peak component particle velocity a maximum displacement of 0.6 mm (zero to peak) should be used.*
>
> *Minor damage is possible at vibration magnitudes which are greater than twice those given in Table 1, and major damage to a building structure may occur at values greater than four times the tabulated values.*

Within DIN4150-3, damage is defined as "*any permanent effect of vibration that reduces the serviceability of a structure or one of its components*" (p.2). The Standard also outlines:

that for structures as in lines 2 and 3 of Table 1, the serviceability is considered to have been reduced if

- *Cracks form in plastered surfaces of walls;*
- *Existing cracks in the building are enlarged;*
- *Partitions become detached from loadbearing walls or floors;*
- *These effects are deemed 'minor damage.'" (DIN4150.3, 1990, p.3).*

While the DIN Standard defines the above damage as 'minor', based on the definitions provided in BS7385, the DIN Standard is considered to deal with cosmetic issues rather than major structural failures.

7.3.2.1 British standard

British Standard 7385: Part 2 '*Evaluation and measurement of vibration in buildings*', can be used as a guide to assess the likelihood of building damage from ground vibration. BS7385 suggests levels at which 'cosmetic', 'minor' and 'major' categories of damage might occur.

The cosmetic damage levels set by BS 7385 are considered 'safe limits' up to which no damage due to vibration effects has been observed for certain particular building types. Damage comprises minor non-structural effects such as hairline cracks on drywall surfaces, hairline cracks in mortar joints and cement render, enlargement of existing cracks and separation of partitions or intermediate walls from load bearing walls. 'Minor' damage is considered possible at vibration magnitudes which are twice those given and 'major' damage to a building structure may occur at levels greater than four times those values.

BS7385 is based on peak particle velocity and specifies damage criteria for frequencies within the range 4Hz to 250Hz, being the range usually encountered in buildings. At frequencies below 4Hz, a maximum displacement value is recommended. The values set in the Standard relate to transient vibrations and to low-rise buildings. Continuous vibration can give rise to dynamic magnifications due to resonances and may need to be reduced by up to 50%. Table 17 sets out the BS7385 criteria for cosmetic, minor and major damage.

Table 17 BS 7385 structural damage criteria

Group	Type of structure	Damage level	Peak component particle velocity, mm/s		
			4Hz to 15Hz	15Hz to 40Hz	40Hz and above
1	Reinforced or framed structures Industrial and heavy commercial buildings	Cosmetic	50		
		Minor*	100		
		Major*	200		
2	Un-reinforced or light framed structures Residential or light commercial type buildings	Cosmetic	15 to 20	20 to 50	50
		Minor*	30 to 40	40 to 100	100
		Major*	60 to 80	80 to 200	200

Group	Type of structure	Damage level	Peak component particle velocity, mm/s		
			4Hz to 15Hz	15Hz to 40Hz	40Hz and above

Notes: Peak Component Particle Velocity is the maximum Peak Particle Velocity in any one direction (x, y, z) as measured by a tri-axial vibration transducer.

* Minor and major damage criteria established based on BS 7385 Part 2 (1993) Section 7.4.2

7.3.2.2 German standard

German Standard DIN 4150 - Part 3 '*Structural vibration in buildings - Effects on Structure*' (DIN 4150-3), also provides recommended maximum levels of vibration that reduce the likelihood of building damage caused by vibration and are generally recognised to be conservative.

DIN 4150-3 presents the recommended maximum limits over a range of frequencies (Hz), measured in any direction, and at the foundation or in the plane of the uppermost floor of a building or structure. The vibration limits increase as the frequency content of the vibration increases. The criteria are presented in Table 18.

Table 18 DIN 4150-3 structural damage criteria

Group	Type of structure	Vibration velocity, mm/s			
		At foundation at frequency of			Plane of floor uppermost storey
		1Hz to 10Hz	10Hz to 50Hz	50Hz to 100Hz	All frequencies
1	Buildings used for commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40
2	Dwellings and buildings of similar design and/or use	5	5 to 15	15 to 20	15
3	Structures that because of their particular sensitivity to vibration, do not correspond to those listed in Group 1 or 2 and have intrinsic value (e.g. buildings under a preservation order)	3	3 to 8	8 to 10	8

8 Construction noise assessment

8.1 Noise assessment methodology

An assessment on the potential level of construction noise impact has been carried out to determine whether mitigation would be required, and to determine appropriate management controls.

Modelling and assessment of airborne noise impacts from activities associated with the construction works were determined by modelling the noise sources, receiver locations, topographical features, and possible noise mitigation measures using a 'CadnaA' computer noise model developed for this project. Calculation standard ISO9613-2 with ISO/TR17534-3 was used for construction noise prediction. The model calculates the contribution of each noise source at identified sensitive receiver locations and allows for the prediction of the total noise from a site for the various stages of the construction works.

The noise prediction models take into account:

- Location of noise sources and sensitive receiver locations
- Height of sources and receivers referenced to one metre digital ground contours for the site area and surrounding area
- Sound Power Levels of plant and equipment likely to be used during the various construction activities
- Separation distances between sources and receivers
- Ground type between sources and receivers
- Attenuation from barriers (natural and purpose built).

8.2 Construction activities and noise sources

The project REF construction noise assessment assumed plant and equipment based on typical road projects and library data. However within the RMS Construction Noise and Vibration Guideline now contains maximum allowable noise levels for construction equipment, and these noise levels have been used for this addendum assessment.

Table 19 presents a list of the construction activities and respective sound power levels of plant and equipment. The listed plant and equipment are considered to be representative of those likely to be used by the contractor to carry out the necessary construction work for this project. To identify the potential level of impact associated with the construction works, the assessment assumes the "activity total L_{Aeq}" sound power level in the last column of the table.

Table 19 Noise modelling assumptions for road construction - activities and equipment

Activity	Description of Activity	Plant/ Equipment	Sound power level L_{Aeq}	No. Units	Activity total Sound power level L_{Aeq}
Mobilisation & Site Establishment (M&SE)	Installing construction boundary hoardings/ fences and traffic barriers	Truck (medium rigid)	103	4 per hour	115
		Road truck	108	4 per hour	
		Scissor Lift	98	1	
		Franna crane	98	1	
Utility, property, service adjustment (UPSA)	Adjustment of property boundaries (where required); relocation of services	Excavator (tracked) 35t	110	1	116
		Dump truck	110	4 per hour	
		Franna crane 20t	98	1	
		Pneumatic hammer	113	-	
		Concrete saw	118	1	
		Vacuum truck	109	-	
		Backhoe	111	-	
		Power generator	103	1	
Corridor Clearing	General land clearing, tree and stump removal, topsoil stripping, loading (CCSR)	Bulldozer D9	116	1	121
		Excavator (tracked) 35t	110	1	
		Chainsaw 4-5hp	114	2	
		Tub grinder/ mulcher 40-50hp	116	1	
		Dump truck	110	4 per hour	
	House/ building demolition (CCHD)	Excavator (tracked) 35t	110	1	122
		Excavator (tracked) 35t with hydraulic hammer	122	1	
		Front end loader 23t	112	1	
		Dump truck	108	4 per hour	
Rock crushing (RC)	Crushing and screening of building waste/ rock material for re-use on site	Rock crusher	118	1	118
		Bulldozer D9	116	1	
		Excavator (tracked) 35t	110	1	
		Dump truck	110	4 per hour	
Bulk earthworks (BLK)	Formation of road alignment. Excavation of soil and rock, drilling, loading, haulage, compaction of fill areas, grading. (rock hammering likely not required for bulk earthworks)	Bulldozer D9	116	1	110
		Scraper 651	110	1	
		Excavator (tracked) 35t	110	1	
		Grader	113	1	
		Dump truck	110	8 per hour	
		Compactor	106	1	

Activity	Description of Activity	Plant/ Equipment	Sound power level L_{Aeq}	No. Units	Activity total Sound power level L_{Aeq}
		Roller (large pad foot)	109	-	
		Water cart	107	-	
Drainage infrastructure (DI)	Excavation of trenches and pits; Delivery and placement of precast pipes and pits; filling and compacting.	Backhoe	110	-	115
		Franna crane 20t	98	1	
		Excavator (tracked) 35t	110	1	
		Concrete truck	109	4 per hour	
		Truck compressor	75	1	
		Vibratory roller	109	1	
		Road truck	108	4 per hour	
Paving/ asphalting (inc concrete sawing) (PA)	Delivery of raw materials. Placement of surface material. Saw cutting.	Pavement laying machine	114	1	118
		Dump truck	110	4 per hour	
		Asphalt truck & sprayer	103	1	
		Concrete truck	109	1	
		Smooth drum roller	107	1	
		Concrete saw	118	1	
Road furniture installation (RF)	Signposting and line marking	Road truck	108	4 per hour	110
		Scissor lift	98	1	
		Franna crane 20t	98	1	
		Line marking truck	108	1	
Compounds (COMP)	Deliveries. Plant and equipment. Maintenance. Office areas. Storage areas.	Front end loader	91	1	114
		Excavator (tracked) 35t	110	-	
		Road truck	108	4 per hour	
		Compressor	109	1	
		Welding equipment	105	1	
		Light vehicles	88	12 per hour	
		Power generator	103	1	
Construction Compound Site Establishment (COMP-SE)		Chainsaw 4-5hp	114	2	119
		Pneumatic hammer	113	-	
		Fixed crane	113	1	
		Front end loader	112	1	
		Excavator (tracked) 35t	110	-	
		Grader	113	1	
		Vibratory roller	109	-	

Activity	Description of Activity	Plant/ Equipment	Sound power level L_{Aeq}	No. Units	Activity total Sound power level L_{Aeq}
		Concrete truck	109	4 per hour	
		Dump truck	110	4 per hour	
		Water cart	107	-	
		Concrete vibrator	113	1	
		Concrete pump	109	1	
		Power generator	103	1	
		Light vehicles (eg 4WD)	103	-	

8.3 Ancillary construction sites

At the time of the Project REF it was not known where construction ancillary facilities would be located. It is now proposed to establish up to three ancillary sites, as shown in APPENDIX G. The locations of the ancillary facilities are:

- Ancillary Facility 1 - corner of Old Winsor Road and Memorial Ave
- Ancillary Facility 2 - disused recreation area near Kellyville Park
- Ancillary Facility 3 - acquired residential properties at 5 Memorial Avenue, 3 Memorial Avenue and 4 Windsor Road.

This addendum construction assessment has been updated to include consideration of noise generated from these ancillary facilities, both in terms of their establishment and ongoing operation during the construction phase.

9 Predicted construction noise levels

9.1 Predicted L_{Aeq} noise levels

Noise impacts during construction works have been predicted and compared to the noise management levels (NMLs). Detailed results of predicted construction noise levels are presented in APPENDIX H.

Table 20presents a summary of the predicted noise impacts during construction along the road corridor, and also from noise generated at the ancillary facilities (compounds) in terms of compliance with the NMLs. The colours in the table indicate whether receivers in the NCA comply with the NML and, where exceedance of the NML occurs, the perceived impact of the exceedance. These summary results represent the impacts at the nearest receivers to the road works.

The impacts presented are as follow for **Standard Hours:**

- Complies with NML
- < 10dB(A) above NML - construction noise clearly audible
- > 10dB(A) above NML - construction noise moderately intrusive
- > 75dB(A) - highly noise affected

The impacts presented are as follows for all **OOH periods:**

- Below NML
- < 5dB(A) above NML - construction noise noticeable
- 5 to 15dB(A) above NML - construction noise clearly audible
- > 15 to 25dB(A) above NML - construction noise moderately intrusive
- >25dB(A) above NML - construction noise highly intrusive

Table 20 Compliance with NMLs at nearest sensitive receivers

NCA	Level of compliance with NML																												
	M&SE			UPSA			CCSR			CCHD			RC			BLK			DI			PA			RF			COMP			COMP-SE		
	D	E	N	D	E	N	D	E	N	D	E	N	D	E	N	D	E	N	D	E	N	D	E	N	D	E	N	D	E	N	D	E	N
1	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	◆	■	□	□	□	□	□	□	□	◆	■	□	◔	◆	■	◔	◆	■
2	□	■	□	□	□	□	□	□	□	□	□	□	□	□	□	◆	■	□	□	■	□	□	□	□	◆	■	□	◆	■	□	□	□	□
3	□	■	□	□	■	□	□	□	□	□	□	□	□	□	□	◆	■	□	□	■	□	□	□	□	◆	■	□	●	●	●	●	●	◔
4	□	■	□	□	■	□	□	□	□	□	□	□	□	■	□	◔	■	□	□	■	□	□	■	□	◔	■	□	●	●	◔	●	●	◆
5	□	■	□	□	■	□	□	□	□	□	□	□	□	□	□	◆	■	■	□	■	□	□	□	□	◆	■	■	□	□	□	□	□	□
6	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	◆	■	□	□	□	□	□	□	□	◆	■	□	◔	◆	■	◔	■	□
7	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	■	□	□	□	□	□	□	□	□	■	□	◔	◆	□	◔	■	□
8	□	■	□	□	■	□	□	□	□	□	□	□	□	□	□	◆	■	□	□	■	□	□	□	□	◆	■	□	●	◆	■	◔	◆	■
OSR	◆	■	■	◆	■	■	◆	■	■	◆	■	■	◆	■	■	◆	◆	◆	◆	■	■	◆	■	■	◆	◆	◆	◔	◔	◔	◔	◆	◆

Notes: Standard Hours: Mon - Fri (7am – 6pm), Sat (8am – 1pm), Sun/Pub Hol (Nil

E: evening period between 6 pm to 10 pm Monday to Sunday

S: evening/night shoulder period between 10 pm to 12 am Monday to Sunday

N: the remaining night period between 10 am and 7 am Monday to Friday and 10 am to 8 am Saturday, Sunday and public holidays

9.2 Sleep disturbance

The principal activities likely to occur during the night period are:

- Utility relocation works (UTL)
- Road furniture installation/ traffic switch works (FAL)
- Compound operational works (CMPD)

The predicted L_{Amax} noise levels from these activities are as per the results in the project REF. In summary all of these work activities are likely to cause sleep disturbance at the nearest receivers if performed during the night-time period. The plant/equipment most likely to cause sleep disturbance are road saws, pneumatic hammers, hydraulic hammers, and trucks (both movements and use of air-brakes).

To mitigate the potential for sleep disturbance, work activities should be scheduled for standard hours as much as possible, and high impact activities such as saw cutting, use of jackhammers, or use of hydraulic hammers should be scheduled to finish before 11pm wherever practicable. Engineering controls to minimise noise impacts have been presented in Section 11.1. Heavy vehicle movements should also be limited as much as practicable. Out-of-hours works should not be scheduled for more than two consecutive nights to allow respite to nearby residences.

Further noise mitigation and management measures are presented Section 11.

10 Construction vibration assessment

10.1 Minimum working distances for vibration intensive plant

From the plant and equipment likely to be used on this project, the dominant vibration generating plant and equipment include:

- Excavator (35 tonne)
- Pneumatic hammer
- Bulldozer (D9)
- Excavator (35 tonne) with hydraulic hammer attachment
- Front-end loader
- Compactor
- Roller (large pad foot)
- Roller (smooth drum)

Potential vibration generated to receivers is dependent on separation distances, the intervening soil and rock strata, dominant frequencies of vibration, and the receiver structure. The CNVG recommends minimum working distances for vibration intensive plant, which are presented in Table 21. The minimum working distances must be complied with at all times, unless otherwise approved by Roads and Maritime or under the environmental licence as relevant.

Table 21 Recommended minimum working distances for vibration intensive plant

Plant item	Rating/ description	Minimum working distance to building	
		Cosmetic damage (BS 7385)	Human response (OH&E Vibration guideline)
Vibratory roller	< 50kN (typically 1-2 tonnes)	5m	15m to 20m
	< 100kN (typically 2-4 tonnes)	6m	20m
	< 200kN (typically 4-6 tonnes)	12m	40m
	< 300kN (typically 7-13 tonnes)	15m	100m
	> 300kN (typically 13-18 tonnes)	20m	100m
	> 300kN (> 18 tonnes)	25m	100m
Small hydraulic hammer	300kg (5 to 12 tonne excavator)	2m	7m
Medium hydraulic hammer	900kg (12 to 18 tonne excavator)	7m	23m
Large hydraulic hammer	1600kg (18 to 34 tonne excavator)	22m	73m
Vibratory pile driver	Sheet piles	2m to 20m	20m
Pile boring	≤ 800mm	2m (nominal)	4m

Plant item	Rating/ description	Minimum working distance to building	
		Cosmetic damage (BS 7385)	Human response (OH&E Vibration guideline)
Jackhammer	Handheld	1m (nominal)	2m

Note: More stringent conditions may apply to heritage or other sensitive receivers (such as cinemas, recording studios, or high technology facilities with sensitive equipment). Specific assessment is required for these receivers.

Unlike noise, vibration cannot be readily predicted. There are many variables from site to site, for example soil type and conditions, sub surface rock, building types and foundations, and actual plant on site. The minimum working distances relied upon in this assessment (Table 21) are taken from the CNVG. They are not specific to this project as final vibration levels are dependent on the factors listed above. Site-specific minimum working distances for vibration significant plant items must be measured on site where plant and equipment is likely to operate close to or within the minimum working distances for cosmetic damage.

10.2 Vibration assessment

Table 22 below presents the number of buildings per NCA within the minimum working distances for structural damage and human response, using the distances listed in Table 21 above. The assessment is based on the most vibration intensive piece of equipment that could potentially be used on the works (large vibratory roller with a minimum working distance of 25 metres). To be conservative, it is assumed that the roller could operate anywhere within the work area.

Table 22 Number of buildings within minimum working distances

NCA	Number of buildings within minimum working distances	
	Structural damage (25m)	Human response (100m)
NCA1	7	31
NCA2	6	30
NCA3	18	44
NCA4	40	139
NCA5	33	95
NCA6	5	12
NCA7	14	52
NCA8	18	52
OSR	3	6
Total	**144**	**461**

As shown in Table 22 there are 144 buildings within the minimum working distance for structural damage, and 461 buildings within the minimum working distance for human response.

If works are occurring close to or within 25 metres of a building it is recommended that vibration monitoring be conducted to determine site and plant specific working distances. It is recommended that all buildings within 100 metres of the works receive notification about of the works receive notification about potential disturbance from vibration.

Vibration monitoring at a representative residence should be conducted to determine site specific buffer distances at this location. Further vibration mitigation measures are discussed in Section 11.1 and Section 11.3. Vibration monitoring is described in Section 11.4.

11 Construction mitigation and management measures

The following recommendations provide in-principle noise control solutions in accordance with the CNVG to reduce construction noise and vibration impacts to receivers. Where actual construction activities differ from those assessed in this report, more detailed design of control measures may be required. The construction contractor would need to conduct a detailed design assessment subject to confirmed construction methodology and plant selection.

11.1 Standard noise and vibration mitigation measures

The CNVG recommends standard actions and mitigation measures that should be implemented on all construction projects. These measures are presented in Table 23 to Table 26, along with project specific application details. It is noted that as the proposal is currently at indicative concept stage, project specific mitigation measures cannot be designed, but preferred options for mitigation are identified herein. The preferred options should be reviewed by the construction team as part of the preparation of the CNVMP for the project. Justification should be provided where preferred actions are unable to be adopted by the project.

Table 23 Noise and vibration management measures

Action required	Applies to	Details	Estimated noise benefit	Comments on feasibility/ reasonableness	Preferred action?
Construction Environmental Management Plan update	Prior to construction	The CEMP including construction noise and vibration management plan must be prepared prior to the commencement of construction and regularly updated to account for changes in noise management issues and strategies.	-	-	Yes
Implement community consultation or notification measures	All construction activities	Notification detailing work activities, dates and hours, impacts and mitigation measures, indication of work schedule over the night period, any operational noise benefits from the works (where applicable) and contact telephone number. Notification should be a minimum of seven calendar days prior to the start of works. For this project, more advanced consultation or notification should be adopted, including: • Website (if required) • Contact telephone number for community • Email distribution list (if required) • Community drop in session (if required by approval conditions) More detail regarding community consultation and notifications is provided in Section 11.2 and Section 11.3.	0 dB reduction Keeps stakeholders informed of the likely impact. Community may identify solution to assist in managing impacts.	Reasonable cost, limited noise reduction, reduced overall impact.	Yes
Site inductions	All construction activities	All employees, contractors and subcontractors are to receive an environmental induction. The induction must at least include: • all project specific and relevant standard noise and vibration mitigation measures • relevant licence and approval conditions • permissible hours of work • any limitations on high noise generating activities • location of nearest sensitive receivers • construction employee parking areas • designated loading/unloading areas and procedures • site opening/closing times (including deliveries) • environmental incident procedures.	0 dB reduction Keeps construction workforce informed of actions required to minimise noise and vibration impact.	Reasonable cost, limited noise reduction, reduced overall impact.	Yes
Behavioural practices	All construction activities (especially OOHW)	No swearing or unnecessary shouting or loud stereos/radios on site. No dropping of materials from height where practicable, throwing of metal items and slamming of doors.	0-20 dB reduction Reduce annoyance + sleep disturbance.	Reasonable cost, limited noise reduction, reduced overall impact.	Yes
Verification	All construction activities	Where specified in Section 11.2, a noise verification program is to be carried out for the duration of the works in accordance with the CNVMP and any approval and licence conditions.	0 dB reduction Minimises noise and vibration impact.	Reasonable cost, limited noise/vibration reduction, reduced overall impact.	Yes

Action required	Applies to	Details	Estimated noise benefit	Comments on feasibility/ reasonableness	Preferred action?
Attended vibration measurements	All construction activities with vibration significant plant (notably EWRK, DRNG, PAVE, BRDG)	Site-specific minimum working distances must be determined by the construction contractor prior to the use of plant close to or within the CNVG minimum working distances listed in Table 21. Where specified in Section 11.4, attended vibration measurements should be undertaken at the commencement of vibration generating activities to confirm that vibration levels are within the acceptable range to prevent cosmetic building damage.	Reduces vibration impact + risk of building damage.	Reasonable cost, limited noise/vibration reduction, reduced overall impact.	Yes

Table 24 Noise and vibration source controls

Action required	Applies to	Details	Estimated noise benefit	Comments on feasibility/ reasonableness	Preferred action?
Construction hours and scheduling	All construction activities	Where feasible and reasonable, construction should be carried out during the standard daytime working hours.	Minimise noise and vibration impact and reduce risk of annoyance.	Reasonable cost, limited noise/vibration reduction, reduced overall impact.	Yes
	High noise works	Work generating high noise levels should be scheduled during less sensitive time periods, such as after 8am and before 6pm. If the work cannot be undertaken during the day, it should be completed before 11pm.	Minimise high noise impact and reduce risk of annoyance.	Reasonable cost, limited noise reduction, reduced overall impact.	Yes
Construction respite period during normal hours and out-of-hours work	All construction activities	As a guide, high noise generating activities near receivers should be carried out in blocks that do not exceed three hours each, with a minimum respite period of one hour between each block. The duration of each block of work and respite should be flexible to accommodate the usage and amenity at nearby receivers. Unless negotiated with the community with consultation documented and approved by RMS project manager or permitted under the licence there should be no more than: • two consecutive evenings or nights per week; and • three evenings or nights per week; and • six evenings or nights per month. For night work these periods of work should be separated by not less than one week.	Minimise noise and vibration impact and reduce risk of annoyance.	Reasonable cost, limited noise/vibration reduction, reduced overall impact.	Yes
Plan worksites and activities to minimise noise	Compounds and work areas	Locate compounds away from sensitive receivers and discourage access from local roads. Plan traffic flow, parking, and loading/unloading areas to minimise reversing movements within the site.	Reduce noise/ vibration impact + risk of annoyance.	Reasonable cost, variable noise/vibration reduction, reduced overall impact.	Yes
	Plan staging of high noise work	Where additional activities or plant may only result in a marginal noise increase and speed up works, consider limiting duration of impact by concentrating noisy activities at one location and move to another as quickly as possible.	Provide respite, reduce noise + risk of annoyance.	Reasonable cost, variable noise/vibration reduction, reduced overall impact.	Yes

Action required	Applies to	Details	Estimated noise benefit	Comments on feasibility/ reasonableness	Preferred action?
Minimise disturbance arising from delivery of goods to construction sites	All construction activities (CMPD)	Loading and unloading of material/deliveries is to occur as far as possible from sensitive receivers. Select site access points and roads as far as possible away from sensitive receivers. Dedicated loading/unloading areas to be shielded if close to sensitive receivers. Delivery vehicles to be fitted with straps rather than chains for unloading, wherever possible. Avoid or minimise these out-of-hours movements where practicable.	Minimise noise impact and reduce risk of annoyance.	Reasonable cost, medium to high noise reduction (depending on timing), reduced overall impact.	Yes
Equipment selection/ Plant noise levels	All construction activities	The noise levels of plant and equipment must have operating Sound Power or Sound Pressure Levels compliant with the criteria in Appendix F of the CNVG. Implement a noise monitoring audit program to ensure equipment remains within the more stringent of the manufacturers specifications or Appendix F of the CNVG.	Minimise noise impact and reduce risk of annoyance.	Reasonable cost, limited noise reduction, reduced overall impact.	Yes
Construction methodology	All construction activities, notably high noise impact works	Use quieter and less noise emitting construction methods where feasible and reasonable, especially where they can replace high noise or vibration impact works.	Reduce noise/ vibration impact + risk of annoyance.	Variable noise/vibration reduction, reduced overall impact.	Yes
	UTL, DEMO BRAP, PAVE, FAL	Limit use of vibratory mode on roller, where practicable.	0-5 dB reduction + reduce vibration	Reasonable cost, noise/ vibration reduction, feasibility TBC	Where feasible
	SE	Use electric chainsaws in place of petrol chainsaws, where practicable.	5-10 dB reduction	Reasonable cost, moderate to high noise reduction, feasibility TBC	Where feasible
	EWRK	Replace hydraulic hammer with rock saw, omni-saw or other alternative method where hammering works required within minimum working distances.	5-10 dB reduction + reduce vibration risk of building damage.	High cost, moderate to high noise/ vibration reduction, feasibility TBC	Where feasible
	BRAP, BRDG	Adopt bored piling in place of driven piling, where practicable.	10-15 dB reduction	Reasonable cost, high noise reduction, feasibility TBC	Where feasible
Engine silencing	All construction activities with high noise plant	Use residential class mufflers on plant and equipment. Ensure plant including the silencer is well maintained.	0-20 dB reduction Reduce annoyance + sleep disturbance.	Medium cost of install, moderate to high noise reduction, feasibility TBC.	Where feasible
Reduced equipment power	All construction activities	Use only the necessary size and power.	5-15 dB reduction + reduce vibration	Reasonable cost and noise reduction; may increase project program timing	Yes
Rental plant and equipment	All construction activities	The noise levels of plant and equipment items are to be considered in rental decisions and in any case cannot be used on site unless compliant with the criteria in the CNVG.	0-20 dB reduction	Reasonable cost, high noise reduction	Yes
Use and siting of plant	All construction activities	The offset distance between noisy plant and adjacent sensitive receivers is to be maximised. In addition: • Plant used intermittently to be throttled down or shut down • Noise-emitting plant to be directed away from sensitive receivers • Only have necessary equipment on site.	Up to 40 dB reduction + reduce vibration	Reasonable cost, high noise reduction, best practice management	Yes

Action required	Applies to	Details	Estimated noise benefit	Comments on feasibility/ reasonableness	Preferred action?
Non-tonal and ambient sensitive reversing alarms	All construction activities	Non-tonal reversing beepers (or an equivalent mechanism) must be fitted and used on all construction vehicles and mobile plant regularly used on site and for out-of-hours work. Consider the use of ambient sensitive alarms that adjust output relative to the ambient noise level.	5-10 dB reduction + reduce vibration	Reasonable cost, medium noise reduction	Yes
Engine compression brakes	All construction vehicles	Limit the use of engine compression brakes at night and in residential areas. Ensure vehicles are fitted with a maintained Original Equipment Manufacturer exhaust silencer or a silencer that complies with the National Transport Commission's 'In-service test procedure' and standard.	5-20 dB reduction	Reasonable cost, medium noise reduction	Yes

Table 25 Noise and vibration path controls

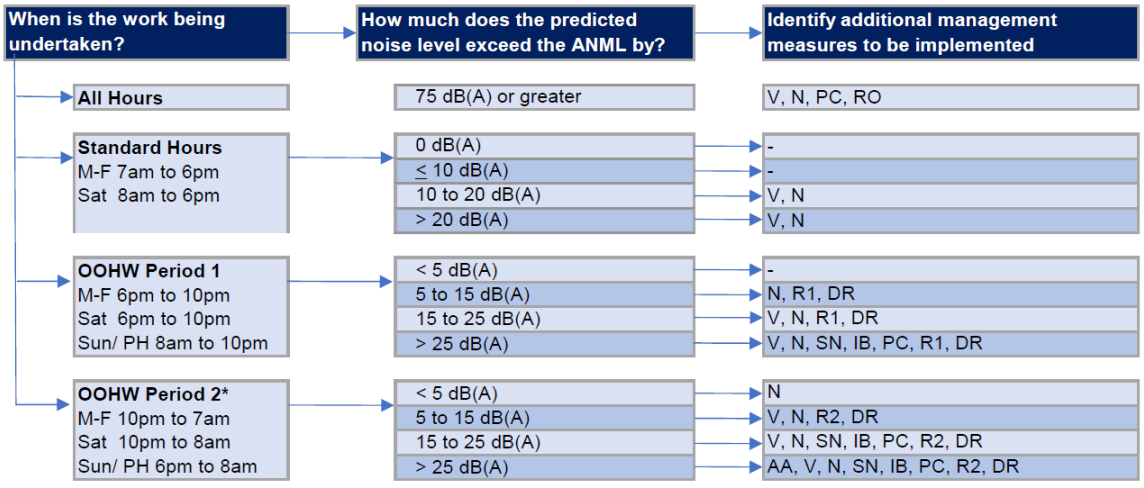
Action required	Applies to	Details	Estimated noise benefit	Comments on feasibility/ reasonableness	Preferred action?
Shield stationary and small foot print equipment noise sources such as pumps, compressors, fans, chain saws, jack hammers etc.	All construction activities	Noise sources that are stationary or operate within a small footprint should be enclosed or shielded where feasible and reasonable whilst ensuring that the occupational health and safety of workers is maintained. Appendix D of AS 2436:2010 lists materials suitable for shielding.	5-10 dB reduction	Reasonable cost, medium noise reduction, reduced overall impact.	Yes
Shield sensitive receivers from noisy activities	All construction activities, notably CMPD	Use structures to shield residential receivers from noise such as site shed placement; earth bunds; fencing; erection of operational stage noise barriers (where practicable) and consideration of site topography when situating plant.	5-10 dB reduction	Reasonable cost, medium noise reduction, reduced overall impact.	Yes

Table 26 Noise and vibration receptor controls

Action required	Applies to	Details	Estimated noise benefit	Comments on feasibility/ reasonableness	Preferred action?
Building condition surveys	Prior to commencement of construction using vibration significant plant	Undertake building dilapidation surveys on all buildings located within the site-specific minimum working distances prior to commencement of activities with the potential to cause property damage. It is recommended that building dilapidation surveys be performed on all buildings within 25 metres of the works unless site-specific minimum working distances are determined.	Limits building damage.	Reasonable cost, limited vibration reduction, reduced overall impact.	Yes
Structural surveys and vibration monitoring	Prior to using vibration significant plant near highly sensitive buildings	Pre-construction surveys of the structural integrity of vibration sensitive buildings may be warranted. At locations where there are high-risk receptors such as the heritage buildings, vibration monitoring should be conducted during the activities causing vibration.	Limits building damage and risk of annoyance to receivers.	Reasonable cost, limited vibration reduction, reduced overall impact.	Yes

11.2 Additional noise mitigation measures

The CNVG provides details of additional noise mitigation measures to be applied when there are still exceedances of the NMLs after all the appropriate standard mitigation measures from Section 11.1 have been applied. The flow chart in Figure 4 describes the process of applying particular mitigation measures according to the time period when the works are being undertaken and the exceedance of the NML.



Notes: Use the abbreviation codes in the table above to confirm management measures required
* Where OOHW occur in the evening/night shoulder period (10pm to 12am) or the night/morning shoulder period (5am to 7am) apply additional airborne mitigation measures from the OOHW Period 2, excluding AA.
N = Notification (should be issued a minimum of five working days prior to the start of works)
SN = Specific notifications (issued no later than seven calendar days ahead of construction activities)
IB = Individual briefing PC = Phone Call
AA = Alternative accommodation** RO = Project specific respite offer R1 = Respite period 1
V = Verification of predicted noise DR = Duration respite R2 = Respite period 2
** Where construction activity impacts receiver for more than two consecutive nights. AA is not applicable to shoulder periods.

Figure 4 Additional airborne noise mitigation measures

APPENDIX I presents a summary of the additional noise mitigation measures applicable for each receiver where, after application of all reasonable and feasible mitigation options, construction noise levels still exceed the NMLs.

Prior to the commencement of site establishment, receivers identified in APPENDIX I will be notified to advise that noise from the works may at times be audible. All potentially impacted receivers will be kept informed of the nature of works to be carried out, the expected noise levels and duration, as well as be given appropriate enquiries and complaints contact details.

11.3 Additional vibration mitigation measures

The CNVG also provides details of additional vibration mitigation measures to be applied when predicted vibration levels at receivers exceed the criteria for human comfort after all the appropriate standard mitigation measures from Section 11.1 have been applied. The additional mitigation measures are shown in Table 27.

Table 27 Additional vibration mitigation measures

Predicted vibration level VDV, $m/s^{1.75}$ at receiver	Additional mitigation measures
Standard hours: Mon - Fri (7am - 6pm), Sat (8am - 1pm), Sun/Public Holiday (Nil)	
Predicted vibration exceeds maximum levels	V, N, RO
OOHW Period 1: Mon - Fri (6pm - 10pm), Sat (7am - 8am & 1pm - 10pm), Sun/Public Holiday (8am - 6pm)	
Predicted vibration exceeds maximum levels	V, N, RO, SN
OOHW Period 2: Mon - Fri (10pm - 7am) Sat (10pm - 8am), Sun/Public Holiday (6pm - 7am)	
Predicted vibration exceeds maximum levels	V, N, RO, SN, AA

Notes: N = Notification (letterbox drop or equivalent); V = Verification of predicted vibration level; SN = Specific Notification, Individual Briefings, or Phone Call; RO = Respite Offers; AA = Alternative Accommodation

The additional mitigation measures shown above apply to all affected receivers. It is recommended that all receivers within 100 metres of the works be notified of potential vibration impacts.

Prior to the commencement of work, receivers around the site would be notified to advise that vibration from the works may at times be perceptible. All potentially impacted receivers would be kept informed of the nature of works to be carried out, the expected vibration levels and duration, and be given contact details for enquiries and noise complaints.

11.4 Attended vibration monitoring

Attended vibration monitoring is to be undertaken to determine site-specific minimum working distances for structural damage and human response. Site-specific minimum working distances should be determined whenever significant vibration generating plant will be working close to or within the CNVG recommended minimum working distances listed in Table 21. The structural damage site-specific minimum working distances should be determined based on the DIN4150-3 criteria listed in Table 18.

Further attended vibration monitoring should be conducted whenever significant vibration generating plant items are operating close to or within the determined minimum working distances. Locations for vibration monitoring during particular works would be determined by the construction contractor.

11.5 Complaints handling

In addition to the noise and vibration mitigation measures outlined above, it is recommended that a management procedure be put in place to deal with noise and vibration complaints that may arise from the construction works. Each complaint would need to be investigated and appropriate noise and/or vibration amelioration measures be put in place to mitigate future occurrences, where the noise and/or vibration in question exceeds allowable limits.

References

1. NSW Department of Environment and Climate Change 2011 Road Noise Policy (RNP)
2. NSW Roads and Maritime Services April 2015 Noise Criteria Guideline (NCG)
3. NSW Roads and Maritime Services April 2015 Noise Mitigation Guideline (NMG)
4. NSW Roads & Traffic Authority 2001 Environmental Noise Management Manual (ENMM)
5. Memorial Avenue Upgrade Noise and Vibration Assessment (Renzo Tonin & Associates, October 2014)
6. NSW Department of Environment and Climate Change 2009 Interim Construction Noise Guideline (ICNG)
7. NSW Roads and Maritime Services April 2016 Construction Noise and Vibration Guideline (CNVG)
8. NSW Department of Environment and Conservation Assessing Vibration – A Technical Guideline (AVATG)
9. NSW Transport for NSW 2012 Construction Noise Strategy 7TP-ST-157/2.0
10. British Standard BS 6472-2008, 'Evaluation of human exposure to vibration in buildings (1-80Hz)
11. German Standard DIN 4150-3: 1999-02 - 'Structural vibration - Effects of vibration on structures'

APPENDIX A Glossary of terminology

The following is a brief description of the technical terms used to describe noise to assist in understanding the technical issues presented.

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).
Ambient noise	The all-encompassing noise associated within a given environment at a given time, usually composed of sound from all sources near and far.
Assessment period	The period in a day over which assessments are made.
Assessment point	A point at which noise measurements are taken or estimated. A point at which noise measurements are taken or estimated.
Background noise	Background noise is the term used to describe the underlying level of noise present in the ambient noise, measured in the absence of the noise under investigation, when extraneous noise is removed. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period. This is represented as the L90 noise level (see below).
Decibel [dB]	The units that sound is measured in. The following are examples of the decibel readings of every day sounds: 0dB The faintest sound we can hear 30dB A quiet library or in a quiet location in the country 45dB Typical office space. Ambience in the city at night 60dB CBD mall at lunch time 70dB The sound of a car passing on the street 80dB Loud music played at home 90dB The sound of a truck passing on the street 100dB The sound of a rock band 115dB Limit of sound permitted in industry 120dB Deafening
dB(A)	A-weighted decibels. The A- weighting noise filter simulates the response of the human ear at relatively low levels, where the ear is not as effective in hearing low frequency sounds as it is in hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the "A" filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter.
dB(C)	C-weighted decibels. The C-weighting noise filter simulates the response of the human ear at relatively high levels, where the human ear is nearly equally effective at hearing from mid-low frequency (63Hz) to mid-high frequency (4kHz), but is less effective outside these frequencies.
Frequency	Frequency is synonymous to pitch. Sounds have a pitch which is peculiar to the nature of the sound generator. For example, the sound of a tiny bell has a high pitch and the sound of a bass drum has a low pitch. Frequency or pitch can be measured on a scale in units of Hertz or Hz.
Impulsive noise	Having a high peak of short duration or a sequence of such peaks. A sequence of impulses in rapid succession is termed repetitive impulsive noise.
Intermittent noise	The level suddenly drops to that of the background noise several times during the period of observation. The time during which the noise remains at levels different from that of the ambient is one second or more.
L_{Max}	The maximum sound pressure level measured over a given period.
L_{Min}	The minimum sound pressure level measured over a given period.

L_1	The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
L_{10}	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
L_{90}	The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L90 noise level expressed in units of dB(A).
L_{eq}	The "equivalent noise level" is the summation of noise events and integrated over a selected period of time.
Reflection	Sound wave changed in direction of propagation due to a solid object obscuring its path.
SEL	Sound Exposure Level (SEL) is the constant sound level which, if maintained for a period of 1 second would have the same acoustic energy as the measured noise event. SEL noise measurements are useful as they can be converted to obtain Leq sound levels over any period of time and can be used for predicting noise at various locations.
Sound	A fluctuation of air pressure which is propagated as a wave through air.
Sound absorption	The ability of a material to absorb sound energy through its conversion into thermal energy.
Sound level meter	An instrument consisting of a microphone, amplifier and indicating device, having a declared performance and designed to measure sound pressure levels.
Sound pressure level	The level of noise, usually expressed in decibels, as measured by a standard sound level meter with a microphone.
Sound power level	Ten times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power.
Tonal noise	Containing a prominent frequency and characterised by a definite pitch.

APPENDIX B Noise monitoring methodology

B.1 Noise monitoring equipment

A noise monitor consists of a sound level meter housed inside a weather resistant enclosure. Noise levels are monitored continuously with statistical data stored in memory for every 15-minute period.

Long term noise monitoring was conducted using the following instrumentation:

Description	Type	Octave Band Data
RTA06 (NTi Audio XL2, with low noise microphone)	Type 1	1/1 octaves

Notes: All meters comply with AS IEC 61672.1 2004 "Electroacoustics - Sound Level Meters" and are suitable for field use.

The equipment was calibrated prior and subsequent to the measurement period using a Bruel & Kjaer Type 4230 or 4231 calibrator. No significant drift in calibration was observed.

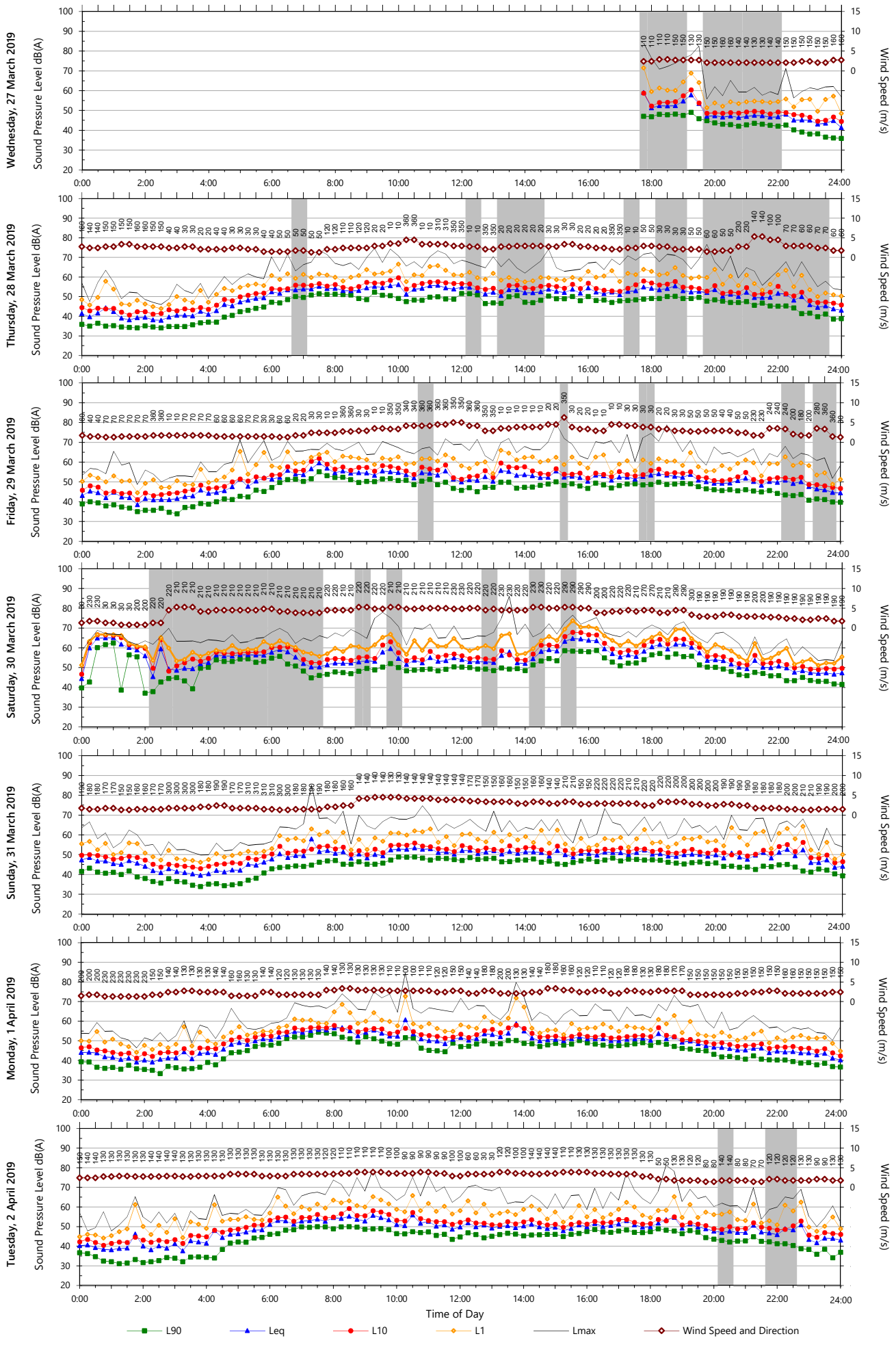
B.2 Meteorology during monitoring

Measurements affected by extraneous noise, wind (greater than 5m/s) or rain were excluded from the recorded data in accordance with the INP. The Bureau of Meteorology (BOM) provided meteorological data, which is considered representative of the site, for the duration of the noise monitoring period. The data was modified to allow for the height difference between the BOM weather station, where wind speed and direction is recorded at a height of 10 metres above ground level, and the microphone location, which is typically 1.5 metres above ground level (and less than 3 metres). The correction factor applied to the data was taken from Australian Standard AS1170.2 1989 Section 4.2.5.1.

B.3 Noise vs time graphs

Noise almost always varies with time. Noise environments can be described using various descriptors to show how a noise ranges about a level. In this report, noise values measured or referred to include the L_{10}, L_{90}, and L_{eq} levels. The statistical descriptors L_{10} and L_{90} measure the noise level exceeded for 10% and 90% of the sample measurement time. The L_{eq} level is the equivalent continuous noise level or the level averaged on an equal energy basis. The measurement sample periods are 15 minutes. The Noise - vs- Time graphs representing measured noise levels, as presented in this report, illustrate these concepts for the broadband results.

APPENDIX C Noise monitoring graphs



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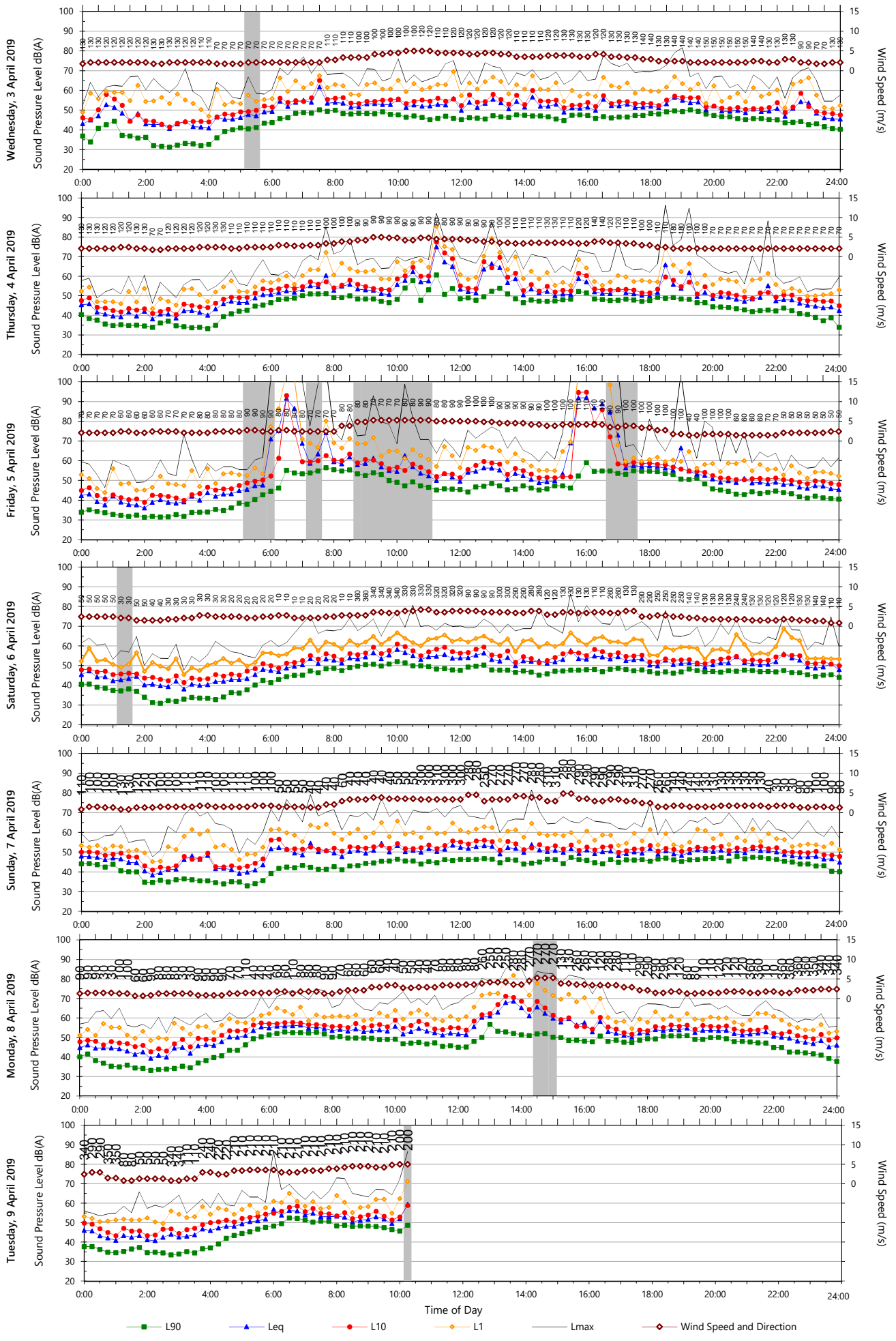
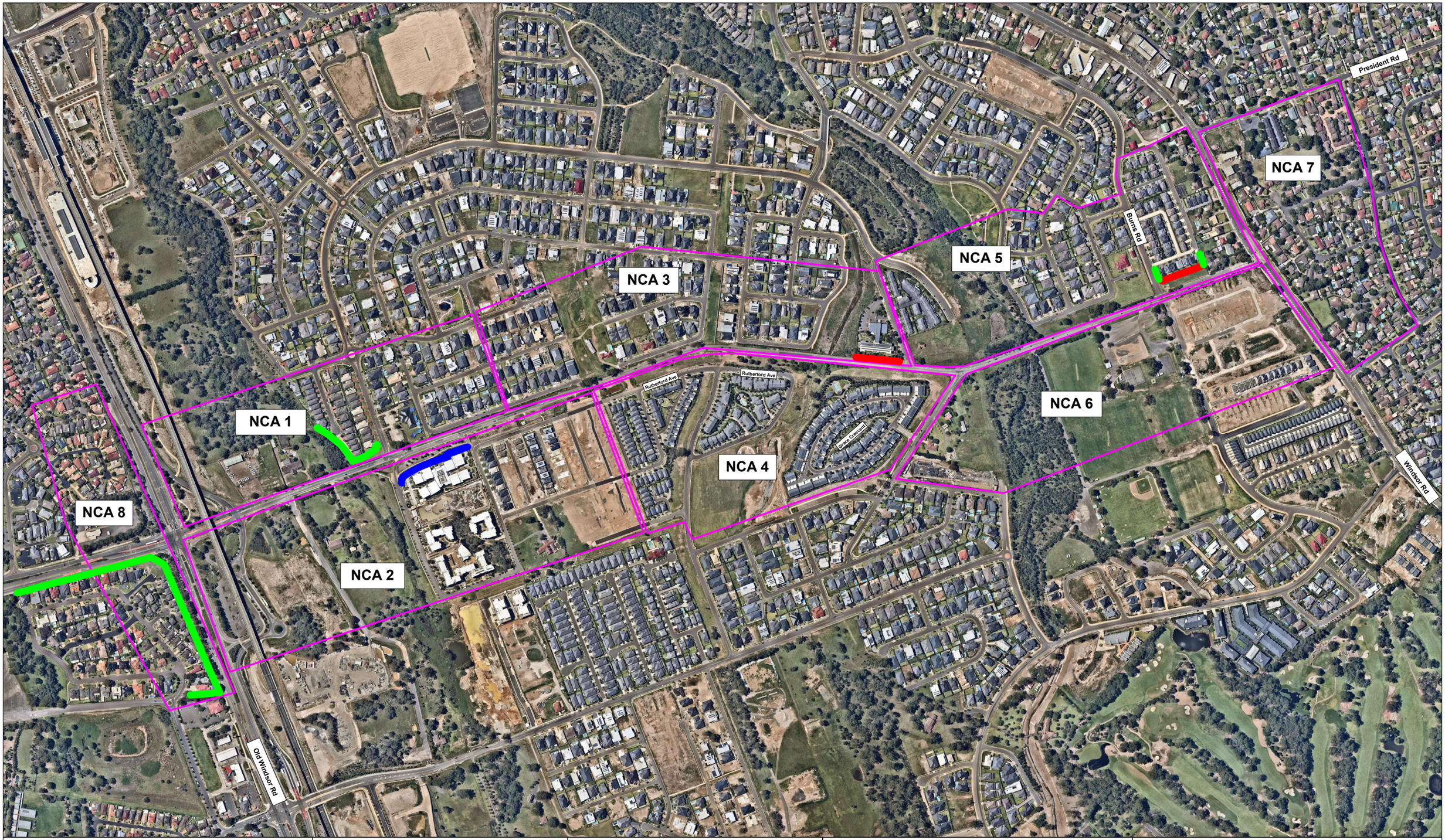
Template: QTE-26 Logger Graphs Program (r28)



Data File: 2019-03-27_SLM_000_123_Rpt_Report.txt

Template: QTE-26 Logger Graphs Program (r28)

APPENDIX D Existing noise wall and fence plan



Legend:

- 1.8m fence
- 2m fence
- 4.2m noise wall
- NCA

Consultant:

RENZO TONIN & ASSOCIATES

inspired to achieve

Acoustics, Vibration & Structural Dynamics

Sydney Melbourne Brisbane Gold Coast Kuwait

1/418A Elizabeth Street, SURRY HILLS NSW 2010
P: 02 8218 0500 F: 02 8218 0501

Client:

Beca

Project:

MEMORIAL AVENUE UPGRADE
OLD WINDSOR ROAD TO WINDSOR ROAD

Description:

EXISTING NOISE WALLS & SOLID FENCES

Noise levels are approximate due to interpolation of contours and should be used for reference only.
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This information is protected by copyright.

Project No.:	TH310-03	Created by:	MN
Fig Ref:	TH310-03.05.04.P05(r0)	Grid:	-
Date:	2019.05.03	Scale:	1: 7000 A3

APPENDIX E Predicted operational traffic noise levels

Memorial Avenue

REF Addendum - Operational traffic noise assessment

Predicted LAeq traffic noise results

19/06/2019

NCA	NCA ID	Receiver Address	Receiver Type	Facade		Opening Year				Design Year				Trigger 1 Increase (Build - No Build)				NCG noise criteria		Trigger 2 Do noise levels exceed the cumlative limit with project roads adding ≥2dB to the total noise levels?		Trigger 3 Is the contribution from the road project Acute?		Consider additional noise mitigation?
						No Build		Build		No Build		Build		Opening Year		Design Year						Day	Night	
				Floor	Orientation	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night			≥ 65dB LAeq,15h	≥ 60dB LAeq,9h	
						dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	Day	Night			
1	1_002	41 Memorial Avenue	Residential	G	4	67	63	66	62	68	63	67	63	-0.8	-0.8	-0.8	-0.8	60	55	YES	YES	YES	YES	YES
1	1_003	2 Colonial Street	Residential	G	4	53	49	54	49	53	49	54	50	0.9	0.9	1	1	60	55	NO	NO	NO	NO	NO
1	1_003	2 Colonial Street	Residential	1	1	57	53	58	53	57	53	58	54	0.7	0.7	0.8	0.8	60	55	NO	NO	NO	NO	NO
1	1_004	4 Colonial Street	Residential	G	1	54	50	54	50	54	50	55	51	0.7	0.7	0.8	0.8	60	55	NO	NO	NO	NO	NO
1	1_004	4 Colonial Street	Residential	1	1	57	53	58	54	58	53	59	54	0.8	0.9	0.9	0.9	60	55	NO	NO	NO	NO	NO
1	1_005	10 Colonial Street	Residential	G	3	56	51	56	52	56	52	57	53	0.7	0.7	0.8	0.7	60	55	NO	NO	NO	NO	NO
1	1_005	10 Colonial Street	Residential	1	3	57	53	58	53	58	53	58	54	0.7	0.7	0.7	0.8	60	55	NO	NO	NO	NO	NO
1	1_006	1 Brunner Count	Residential	G	4	53	49	54	50	54	49	55	50	0.8	0.8	0.9	0.9	60	55	NO	NO	NO	NO	NO
1	1_006	1 Brunner Count	Residential	1	4	57	53	57	53	57	53	58	54	0.5	0.5	0.6	0.6	60	55	NO	NO	NO	NO	NO
1	1_007	2 Brunner Count	Residential	G	4	54	50	55	50	54	50	55	51	0.6	0.5	0.6	0.6	60	55	NO	NO	NO	NO	NO
1	1_007	2 Brunner Count	Residential	1	1	57	53	58	54	58	53	58	54	0.9	0.9	0.9	0.9	60	55	NO	NO	NO	NO	NO
1	1_008	3 Brunner Count	Residential	G	4	55	50	55	51	55	51	56	52	0.7	0.7	0.7	0.7	60	55	NO	NO	NO	NO	NO
1	1_008	3 Brunner Count	Residential	1	4	57	53	58	53	58	53	58	54	0.5	0.5	0.5	0.5	60	55	NO	NO	NO	NO	NO
1	1_009	4 Brunner Count	Residential	G	3	55	51	56	52	56	52	57	52	0.7	0.7	0.7	0.7	60	55	NO	NO	NO	NO	NO
1	1_010	5 Brunner Count	Residential	G	4	55	51	56	52	56	52	57	52	0.5	0.6	0.6	0.6	60	55	NO	NO	NO	NO	NO
1	1_010	5 Brunner Count	Residential	1	4	57	53	58	53	58	53	58	54	0.5	0.4	0.5	0.5	60	55	NO	NO	NO	NO	NO
1	1_011	6 Brunner Count	Residential	G	3	56	51	56	52	56	52	57	53	0.7	0.8	0.8	0.8	60	55	NO	NO	NO	NO	NO
1	1_012	7 Brunner Count	Residential	G	3	56	52	57	53	57	53	58	53	0.6	0.6	0.7	0.7	60	55	NO	NO	NO	NO	NO
1	1_012	7 Brunner Count	Residential	1	3	58	54	58	54	58	54	59	55	0.5	0.5	0.5	0.5	60	55	NO	NO	NO	NO	NO
1	1_013	8 Brunner Count	Residential	G	3	56	52	57	53	57	52	58	53	0.8	0.8	0.9	0.8	60	55	NO	NO	NO	NO	NO
1	1_014	9 Brunner Count	Residential	G	3	57	53	58	53	57	53	58	54	0.6	0.7	0.7	0.7	60	55	NO	NO	NO	NO	NO
1	1_014	9 Brunner Count	Residential	1	3	58	54	59	55	59	54	59	55	0.6	0.6	0.6	0.6	60	55	NO	NO	NO	NO	NO
1	1_015	10 Brunner Count	Residential	G	3	58	53	58	54	58	54	59	55	0.7	0.8	0.8	0.8	60	55	NO	NO	NO	NO	NO
1	1_016	11 Brunner Count	Residential	G	3	57	53	58	53	57	53	58	54	0.6	0.6	0.7	0.6	60	55	NO	NO	NO	NO	NO
1	1_016	11 Brunner Count	Residential	1	3	58	54	59	55	59	55	59	55	0.6	0.6	0.6	0.6	60	55	NO	NO	NO	NO	NO
1	1_017	12 Brunner Count	Residential	G	3	59	54	59	55	59	55	60	55	0.6	0.6	0.7	0.6	60	55	NO	NO	NO	NO	NO
1	1_018	13 Brunner Count	Residential	G	4	57	53	58	54	58	53	58	54	0.7	0.6	0.7	0.8	60	55	NO	NO	NO	NO	NO
1	1_018	13 Brunner Count	Residential	1	4	59	54	59	55	59	55	60	55	0.6	0.5	0.6	0.5	60	55	NO	NO	NO	NO	NO
1	1_019	14 Brunner Count	Residential	G	3	59	55	59	55	60	55	60	56	0.4	0.4	0.5	0.5	60	55	NO	NO	NO	NO	NO
1	1_019	14 Brunner Count	Residential	1	3	61	56	61	57	61	57	61	57	0.3	0.3	0.4	0.4	60	55	NO	NO	NO	NO	NO
1	1_020	15 Brunner Count	Residential	G	3	58	53	58	54	58	54	59	55	0.7	0.7	0.7	0.8	60	55	NO	NO	NO	NO	NO
1	1_020	15 Brunner Count	Residential	1	3	59	55	60	55	60	55	60	56	0.6	0.5	0.6	0.6	60	55	NO	NO	NO	NO	NO
1	1_021	16 Brunner Count	Residential	G	3	60	55	60	56	60	56	60	56	0.3	0.3	0.3	0.3	60	55	NO	NO	NO	NO	NO
1	1_021	16 Brunner Count	Residential	1	3	61	57	61	57	62	57	62	58	0.2	0.2	0.3	0.2	60	55	NO	NO	NO	NO	NO
1	1_022	17 Brunner Count	Residential	G	4	59	54	60	55	59	55	60	56	0.9	0.9	0.9	0.9	60	55	NO	NO	NO	NO	NO
1	1_022	17 Brunner Count	Residential	1	4	60	56	61	57	61	57	62	57	0.6	0.6	0.7	0.6	60	55	NO	NO	NO	NO	NO
1	1_023	18 Brunner Count	Residential	G	3	61	57	61	57	61	57	62	58	0.5	0.5	0.6	0.5	60	55	NO	NO	NO	NO	NO
1	1_023	18 Brunner Count	Residential	1	3	63	58	63	59	63	59	63	59	0.2	0.2	0.3	0.2	60	55	NO	NO	NO	NO	NO
1	1_024	20 Brunner Count	Residential	G	3	62	58	62	58	62	58	63	59	0.4	0.4	0.5	0.4	60	55	NO	NO	NO	NO	NO
1	1_024	20 Brunner Count	Residential	1	3	64	60	64	60	64	60	64	60	0	0	0.1	0	60	55	NO	YES	NO	YES	NO
1	1_025	22 Brunner Count	Residential	G	4	64	60	64	60	64	60	64	60	0	-0.1	0	0.1	60	55	NO	YES	NO	YES	NO
1	1_025	22 Brunner Count	Residential	1	4	66	61	65	61	66	62	66	62	-0.4	-0.4	-0.3	-0.3	60	55	YES	YES	YES	YES	NO
1	1_026	24 Brunner Count	Residential	G	4	68	64	68	64	69	65	69	65	0.1	0.1	0.1	0.1	60	55	YES	YES	YES	YES	NO
1	1_026	24 Brunner Count	Residential	1	4	71	67	70	66	72	68	71	67	-0.8	-0.7	-0.7	-0.7	60	55	YES	YES	YES	YES	NO
1	1_027	2 Arnold Avenue	Residential	G	4	65	61	66	62	65	61	67	63	1.4	1.4	1.4	1.4	60	55	YES	YES	YES	YES	NO
1	1_027	2 Arnold Avenue	Residential	1	4	69	65	69	65	70	65	69	65	-0.1	-0.2	-0.1	-0.1	60	55	YES	YES	YES	YES	NO
1	1_028	4 Arnold Avenue	Residential	G	1	61	57	62	57	61	57	62	58	0.9	0.9	1	1	60	55	NO	NO	NO	NO	NO
1	1_029	6 Arnold Avenue	Residential	G	1	59	54	60	56	59	55	60	56	1.1	1.1	1.1	1.1	60	55	NO	NO	NO	NO	NO
1	1_030	8 Arnold Avenue	Residential	G	1	57	53	59	54	58	54	59	55	1.2	1.2	1.3	1.2	60	55	NO	NO	NO	NO	NO
1	1_031	10 Arnold Avenue	Residential	G	2	56	52	57	53	56	52	58	53	1.3	1.2	1.3	1.3	60	55	NO	NO	NO	NO	NO
1	1_032	12 Arnold Avenue	Residential	G	3	56	52	57	53	57	52	58	53	0.7	0.7	0.8	0.8	60	55	NO	NO	NO	NO	NO
1	1_033	14 Arnold Avenue	Residential	G	3	57	53	58	53	57	53	58	54	0.7	0.6	0.7	0.8	60	55	NO	NO	NO	NO	NO
1	1_034	16 Arnold Avenue	Residential	G	3	57	52	58	53	57	53	58	54	0.8	0.8	0.8	0.9	60	55	NO	NO	NO	NO	NO

NCA	NCA ID	Receiver Address	Receiver Type	Facade		Opening Year				Design Year				Trigger 1 Increase (Build - No Build)				NCG noise criteria		Trigger 2 Do noise levels exceed the cumlative limit with project roads adding ≥2dB to the total noise levels?		Trigger 3 Is the contribution from the road project Acute?		Consider additional noise mitigation?
						No Build		Build		No Build		Build		Opening Year		Design Year						Day	Night	
				Floor	Orientation	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night					
						dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	Day	Night	≥ 65dB LAeq,15h	≥ 60dB LAeq,9h	
1	1_035	18 Arnold Avenue	Residential	G	3	56	52	57	53	57	53	58	54	0.8	0.9	0.9	0.9	60	55	NO	NO	NO	NO	NO
1	1_036	20 Arnold Avenue	Residential	G	3	56	52	57	53	56	52	57	53	0.9	0.9	1	1	60	55	NO	NO	NO	NO	NO
1	1_037	22 Arnold Avenue	Residential	G	3	56	51	56	52	56	52	57	53	0.8	0.8	0.9	0.9	60	55	NO	NO	NO	NO	NO
1	1_038	9 Arnold Avenue	Residential	G	4	58	54	59	55	59	55	60	56	1.1	1.1	1.2	1.1	60	55	NO	NO	NO	NO	NO
1	1_038	9 Arnold Avenue	Residential	1	4	60	56	61	57	61	57	62	58	0.9	0.9	0.9	0.9	60	55	NO	NO	NO	NO	NO
1	1_039	Arnold Avenue	Residential	G	4	56	52	57	53	57	53	58	54	0.8	0.8	0.9	0.9	60	55	NO	NO	NO	NO	NO
1	1_039	Arnold Avenue	Residential	1	4	58	54	59	55	59	54	59	55	0.9	0.8	0.9	0.9	60	55	NO	NO	NO	NO	NO
1	1_040	13 Arnold Avenue	Residential	G	4	56	51	56	52	56	52	57	53	0.7	0.7	0.7	0.7	60	55	NO	NO	NO	NO	NO
1	1_040	13 Arnold Avenue	Residential	1	4	57	53	58	54	58	53	58	54	0.8	0.8	0.8	0.8	60	55	NO	NO	NO	NO	NO
1	1_041	15 Arnold Avenue	Residential	G	3	56	51	56	52	56	52	57	53	0.7	0.7	0.7	0.7	60	55	NO	NO	NO	NO	NO
1	1_041	15 Arnold Avenue	Residential	1	3	57	53	58	53	57	53	58	54	0.7	0.7	0.8	0.8	60	55	NO	NO	NO	NO	NO
1	1_042	3 Half Penny Avenue	Residential	G	4	50	46	51	47	51	47	52	47	0.8	0.8	0.8	0.9	60	55	NO	NO	NO	NO	NO
1	1_042	3 Half Penny Avenue	Residential	1	4	54	50	55	51	55	50	56	51	0.8	0.9	0.9	0.9	60	55	NO	NO	NO	NO	NO
1	1_043	5 Half Penny Avenue	Residential	G	4	51	47	52	47	52	47	52	48	0.7	0.7	0.7	0.7	60	55	NO	NO	NO	NO	NO
1	1_043	5 Half Penny Avenue	Residential	1	4	55	51	56	52	56	51	56	52	0.7	0.7	0.8	0.8	60	55	NO	NO	NO	NO	NO
1	1_044	7 Half Penny Avenue	Residential	G	3	54	49	54	50	54	50	55	51	0.7	0.7	0.7	0.7	60	55	NO	NO	NO	NO	NO
1	1_044	7 Half Penny Avenue	Residential	1	3	56	52	57	52	56	52	57	53	0.7	0.7	0.8	0.8	60	55	NO	NO	NO	NO	NO
1	1_045	9 Half Penny Avenue	Residential	G	4	52	48	53	48	52	48	53	49	0.7	0.8	0.8	0.8	60	55	NO	NO	NO	NO	NO
1	1_045	9 Half Penny Avenue	Residential	1	4	55	51	56	52	56	52	57	53	0.9	0.9	0.9	0.9	60	55	NO	NO	NO	NO	NO
1	1_046	11 Half Penny Avenue	Residential	G	4	53	49	54	49	53	49	54	50	0.8	0.8	0.8	0.8	60	55	NO	NO	NO	NO	NO
1	1_047	Thomas Boulton Circuit	Residential	G	4	68	64	68	63	69	64	68	64	-0.3	-0.4	-0.3	-0.4	60	55	YES	YES	YES	YES	NO
1	1_048	Thomas Boulton Circuit	Residential	G	4	68	63	68	63	68	64	68	64	-0.2	-0.2	-0.2	-0.2	60	55	YES	YES	YES	YES	NO
1	1_049	Thomas Boulton Circuit	Residential	G	4	58	53	58	54	58	54	59	55	0.8	0.8	0.9	0.8	60	55	NO	NO	NO	NO	NO
1	1_049	Thomas Boulton Circuit	Residential	1	4	60	55	60	56	60	56	61	57	0.9	0.9	1	0.9	60	55	NO	NO	NO	NO	NO
1	1_050	Thomas Boulton Circuit	Residential	G	3	53	49	55	50	54	50	55	51	1.2	1.2	1.3	1.2	60	55	NO	NO	NO	NO	NO
1	1_050	Thomas Boulton Circuit	Residential	1	3	57	53	58	54	58	53	59	54	0.9	1	1	1	60	55	NO	NO	NO	NO	NO
1	1_051	Thomas Boulton Circuit	Residential	G	4	53	48	53	49	53	49	54	50	0.8	0.8	0.9	0.8	60	55	NO	NO	NO	NO	NO
1	1_051	Thomas Boulton Circuit	Residential	1	4	56	52	57	53	57	53	58	53	0.7	0.7	0.8	0.8	60	55	NO	NO	NO	NO	NO
1	1_052	Thomas Boulton Circuit	Residential	G	3	50	45	50	46	50	46	51	46	0.6	0.6	0.7	0.6	60	55	NO	NO	NO	NO	NO
1	1_052	Thomas Boulton Circuit	Residential	1	3	55	51	56	51	55	51	56	52	0.6	0.6	0.7	0.7	60	55	NO	NO	NO	NO	NO
1	1_053	Thomas Boulton Circuit	Residential	G	3	60	55	60	56	60	56	61	56	0.6	0.5	0.6	0.6	60	55	NO	NO	NO	NO	NO
1	1_053	Thomas Boulton Circuit	Residential	1	3	62	58	63	58	63	58	63	59	0.6	0.6	0.6	0.6	60	55	NO	NO	NO	NO	NO
1	1_054	Thomas Boulton Circuit	Residential	G	3	58	54	59	54	58	54	59	55	0.8	0.8	0.8	0.8	60	55	NO	NO	NO	NO	NO
1	1_054	Thomas Boulton Circuit	Residential	1	3	60	56	61	57	61	56	61	57	0.8	0.9	0.9	0.9	60	55	NO	NO	NO	NO	NO
1	1_055	Thomas Boulton Circuit	Residential	G	4	54	50	55	51	55	50	56	51	1.1	1.1	1.2	1.2	60	55	NO	NO	NO	NO	NO
1	1_055	Thomas Boulton Circuit	Residential	1	3	57	53	58	54	57	53	58	54	0.9	0.9	0.9	1	60	55	NO	NO	NO	NO	NO
1	1_056	Thomas Boulton Circuit	Residential	G	3	53	49	54	50	54	49	55	50	0.9	0.9	0.9	0.9	60	55	NO	NO	NO	NO	NO
1	1_056	Thomas Boulton Circuit	Residential	1	3	56	52	57	53	57	53	58	53	0.8	0.8	0.8	0.9	60	55	NO	NO	NO	NO	NO
1	1_057	Thomas Boulton Circuit	Residential	G	3	53	49	54	50	54	49	54	50	0.8	0.8	0.8	0.8	60	55	NO	NO	NO	NO	NO
1	1_057	Thomas Boulton Circuit	Residential	1	3	56	52	57	52	56	52	57	53	0.8	0.7	0.8	0.8	60	55	NO	NO	NO	NO	NO
1	1_058	3 John Hillas Avenue	Residential	G	4	56	51	56	52	56	52	57	53	0.7	0.7	0.8	0.7	60	55	NO	NO	NO	NO	NO
1	1_058	3 John Hillas Avenue	Residential	1	4	59	55	60	56	60	56	61	56	0.8	0.8	0.9	0.8	60	55	NO	NO	NO	NO	NO
1	1_059	5 John Hillas Avenue	Residential	G	4	56	51	56	52	56	52	57	53	0.8	0.8	0.9	0.8	60	55	NO	NO	NO	NO	NO
1	1_059	5 John Hillas Avenue	Residential	1	4	59	55	60	56	60	55	61	56	0.9	0.9	1	0.9	60	55	NO	NO	NO	NO	NO
1	1_060	6 John Hillas Avenue	Residential	G	4	55	51	56	51	56	51	56	52	0.6	0.6	0.6	0.6	60	55	NO	NO	NO	NO	NO
1	1_060	6 John Hillas Avenue	Residential	1	4	57	53	58	54	58	53	58	54	0.7	0.7	0.7	0.8	60	55	NO	NO	NO	NO	NO
1	1_061a	7 Arnold Avenue	Childcare Outdoor Play	G	1	69	63	67	62	69	64	68	62	-1.5	-1.4	-1.5	-1.5	55	-	YES	NO	YES	YES	YES
1	1_061b	7 Arnold Avenue	Childcare Indoor Play	G	12	67	63	67	62	68	63	67	63	-0.2	-0.2	-0.2	-0.2	50	-	YES	NO	YES	YES	YES
1	1_062	1 Half Penny Avenue	Residential	G	3	55	51	56	51	56	51	56	52	0.6	0.6	0.6	0.5	60	55	NO	NO	NO	NO	NO
1	1_062	1 Half Penny Avenue	Residential	1	3	56	52	57	53	57	52	57	53	0.5	0.6	0.5	0.5	60	55	NO	NO	NO	NO	NO
1	1_063	Thomas Boulton Circuit	Residential	G	4	68	64	68	64	69	65	69	64	-0.2	-0.2	-0.2	-0.2	60	55	YES	YES	YES	YES	NO
1	1_063	Thomas Boulton Circuit	Residential	1	4	70	66	70	65	70	66	70	66	-0.1	-0.1	-0.1	-0.2	60	55	YES	YES	YES	YES	NO
1	1_064	4 JOHN HILLAS AVENUE	Residential	G	4	55	50	55	51	55	51	56	52	0.6	0.6	0.6	0.7	60	55	NO	NO	NO	NO	NO
1	1_065	7 John Hillas Avenue	Residential	G	4	55	51	55	51	55	51	56	52	0.6	0.7	0.7	0.7	60	55	NO	NO	NO	NO	NO
1	1_065	7 John Hillas Avenue	Residential	1	4	58	54	59	55	59	55	60	55	0.8	0.9	0.9	0.9	60	55	NO	NO	NO	NO	NO
1	1_066	13 Half Penny Avenue	Residential	G	3	53	49	53	49	53	49	54	50	0.5	0.5	0.5	0.5	60	55	NO	NO	NO	NO	NO
1	1_066	13 Half Penny Avenue	Residential	1	3	56	52	57	53	57	53	58	53	0.7	0.7	0.8	0.7	60	55	NO	NO	NO	NO	NO

NCA	NCA ID	Receiver Address	Receiver Type	Facade		Opening Year				Design Year				Trigger 1 Increase (Build - No Build)				NCG noise criteria		Trigger 2 Do noise levels exceed the cumlative limit with project roads adding ≥2dB to the total noise levels?		Trigger 3 Is the contribution from the road project Acute?		Consider additional noise mitigation?
						No Build		Build		No Build		Build		Opening Year		Design Year						Day	Night	
				Floor	Orientation	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night					
						dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	Day	Night	≥ 65dB LAeq,15h	≥ 60dB LAeq,9h	
1	1_067	17 Half Penny Avenue	Residential	G	3	53	49	53	49	53	49	54	50	0.6	0.6	0.7	0.6	60	55	NO	NO	NO	NO	NO
1	1_067	17 Half Penny Avenue	Residential	1	3	56	52	57	53	57	52	57	53	0.9	0.8	0.9	0.9	60	55	NO	NO	NO	NO	NO
1	1_068	14 John Hillas Avenue	Residential	G	4	56	52	57	53	57	52	57	53	0.8	0.8	0.8	0.9	60	55	NO	NO	NO	NO	NO
1	1_069	Thomas Boulton Circuit	Residential	G	1	67	63	67	62	68	64	67	63	-0.6	-0.6	-0.7	-0.6	60	55	YES	YES	YES	YES	NO
1	1_069	Thomas Boulton Circuit	Residential	1	1	69	65	69	65	70	66	69	65	-0.3	-0.4	-0.3	-0.3	60	55	YES	YES	YES	YES	NO
1	1_070	Thomas Boulton Circuit	Residential	G	1	67	63	66	62	68	63	67	62	-1	-1	-1	-1	60	55	YES	YES	YES	YES	NO
1	1_070	Thomas Boulton Circuit	Residential	1	1	69	65	69	65	70	66	69	65	-0.5	-0.4	-0.4	-0.5	60	55	YES	YES	YES	YES	NO
1	1_071	Thomas Boulton Circuit	Residential	G	1	67	63	66	62	68	64	67	63	-0.9	-0.9	-0.9	-0.9	60	55	YES	YES	YES	YES	NO
1	1_071	Thomas Boulton Circuit	Residential	1	1	69	65	69	65	70	66	70	65	-0.4	-0.4	-0.4	-0.5	60	55	YES	YES	YES	YES	NO
1	1_072	Thomas Boulton Circuit	Residential	G	4	68	64	67	63	68	64	68	64	-0.5	-0.6	-0.5	-0.5	60	55	YES	YES	YES	YES	NO
1	1_072	Thomas Boulton Circuit	Residential	1	4	70	65	69	65	70	66	70	66	-0.2	-0.2	-0.2	-0.2	60	55	YES	YES	YES	YES	NO
1	1_073	11A John Hillas Avenue	Residential	G	3	55	50	55	51	55	51	56	51	0.3	0.3	0.4	0.3	60	55	NO	NO	NO	NO	NO
1	1_073	11A John Hillas Avenue	Residential	1	3	59	55	59	55	59	55	60	56	0.5	0.5	0.4	0.5	60	55	NO	NO	NO	NO	NO
1	1_074	10 John Hillas Avenue	Residential	G	4	56	51	56	52	56	52	57	52	0.4	0.4	0.5	0.4	60	55	NO	NO	NO	NO	NO
1	1_074	10 John Hillas Avenue	Residential	1	4	58	53	58	54	58	54	59	55	0.8	0.7	0.7	0.8	60	55	NO	NO	NO	NO	NO
1	1_075	9 John Hillas Avenue	Residential	G	4	54	49	54	50	54	50	55	51	0.5	0.6	0.6	0.6	60	55	NO	NO	NO	NO	NO
1	1_075	9 John Hillas Avenue	Residential	1	4	58	54	58	54	58	54	59	55	0.5	0.5	0.6	0.5	60	55	NO	NO	NO	NO	NO
1	1_076	11 John Hillas Avenue	Residential	G	4	54	50	54	50	55	50	55	51	0.4	0.4	0.5	0.4	60	55	NO	NO	NO	NO	NO
1	1_076	11 John Hillas Avenue	Residential	1	4	58	54	59	54	59	54	59	55	0.4	0.5	0.4	0.5	60	55	NO	NO	NO	NO	NO
1	1_077	15 Half Penny Avenue	Residential	G	4	53	49	54	49	53	49	54	50	0.7	0.7	0.7	0.7	60	55	NO	NO	NO	NO	NO
1	NEW_001		Residential	G	1	55	51	56	51	56	52	56	52	0.4	0.4	0.5	0.5	60	55	NO	NO	NO	NO	NO
1	NEW_001		Residential	1	1	57	53	58	54	58	53	58	54	0.7	0.6	0.7	0.7	60	55	NO	NO	NO	NO	NO
1	NEW_002		Residential	G	1	51	47	52	47	51	47	52	48	0.6	0.6	0.7	0.6	60	55	NO	NO	NO	NO	NO
1	NEW_002		Residential	1	1	54	50	55	51	55	51	56	51	0.7	0.6	0.7	0.7	60	55	NO	NO	NO	NO	NO
2	2_002	32 Memorial Avenue	Residential	G	5	50	46	51	46	51	47	51	47	0.3	0.3	0.3	0.3	60	55	NO	NO	NO	NO	NO
2	2_003	40 Memorial Avenue	Residential	G	4	60	55	61	57	60	56	62	57	1.5	1.4	1.5	1.5	60	55	NO	NO	NO	NO	NO
2	2_004	8 Free Settlers Dr	Residential	2	3	69	65	71	67	70	65	72	67	2	2	2	2.1	60	55	YES	YES	YES	YES	NO
2	2_004	8 Free Settlers Dr	Residential	3	2	69	65	71	67	70	66	72	68	2	2	2	2	60	55	YES	YES	YES	YES	NO
2	2_004	8 Free Settlers Dr	Residential	4	2	70	65	71	67	70	66	72	68	1.9	1.9	1.9	1.9	60	55	YES	YES	YES	YES	NO
2	2_004	8 Free Settlers Dr	Residential	5	2	70	65	71	67	70	66	72	68	1.8	1.8	1.8	1.9	60	55	YES	YES	YES	YES	NO
2	2_004	8 Free Settlers Dr	Residential	G	3	66	62	66	61	66	62	66	62	-0.2	-0.3	-0.2	-0.3	60	55	YES	YES	YES	YES	NO
2	2_004	8 Free Settlers Dr	Residential	1	3	68	64	70	66	69	65	71	67	1.9	1.8	1.9	1.9	60	55	YES	YES	YES	YES	NO
2	2_005	8 Free Settlers Dr	Residential	2	2	57	53	58	53	57	53	58	54	0.8	0.8	0.8	0.8	60	55	NO	NO	NO	NO	NO
2	2_005	8 Free Settlers Dr	Residential	3	2	58	53	58	54	58	54	59	55	0.8	0.8	0.8	0.8	60	55	NO	NO	NO	NO	NO
2	2_005	8 Free Settlers Dr	Residential	4	2	58	54	59	55	59	54	59	55	0.7	0.7	0.7	0.8	60	55	NO	NO	NO	NO	NO
2	2_005	8 Free Settlers Dr	Residential	G	2	55	50	56	52	55	51	56	52	1.2	1.1	1.2	1.2	60	55	NO	NO	NO	NO	NO
2	2_005	8 Free Settlers Dr	Residential	1	2	56	52	57	53	57	52	57	53	0.9	0.9	0.9	0.9	60	55	NO	NO	NO	NO	NO
2	2_006	8 Free Settlers Dr	Residential	2	3	55	51	56	51	55	51	56	52	0.9	0.9	1	0.9	60	55	NO	NO	NO	NO	NO
2	2_006	8 Free Settlers Dr	Residential	3	3	56	51	57	52	56	52	57	53	0.8	0.8	0.9	0.9	60	55	NO	NO	NO	NO	NO
2	2_006	8 Free Settlers Dr	Residential	4	3	57	52	57	53	57	53	58	54	0.7	0.7	0.8	0.7	60	55	NO	NO	NO	NO	NO
2	2_006	8 Free Settlers Dr	Residential	5	3	57	53	58	54	58	54	59	54	0.7	0.6	0.7	0.7	60	55	NO	NO	NO	NO	NO
2	2_006	8 Free Settlers Dr	Residential	6	3	58	54	59	54	59	54	59	55	0.6	0.6	0.6	0.6	60	55	NO	NO	NO	NO	NO
2	2_006	8 Free Settlers Dr	Residential	7	3	59	54	59	55	59	55	60	56	0.6	0.6	0.6	0.6	60	55	NO	NO	NO	NO	NO
2	2_006	8 Free Settlers Dr	Residential	G	2	48	43	49	44	48	44	49	45	1	1	1.1	1.1	60	55	NO	NO	NO	NO	NO
2	2_006	8 Free Settlers Dr	Residential	1	3	54	50	55	51	54	50	55	51	1	1	1.1	1	60	55	NO	NO	NO	NO	NO
2	2_007	8 Free Settlers Dr	Residential	2	6	49	45	49	45	50	45	50	46	0.2	0.3	0.3	0.3	60	55	NO	NO	NO	NO	NO
2	2_007	8 Free Settlers Dr	Residential	G	6	46	42	46	42	47	42	47	42	0.2	0.2	0.2	0.2	59	54	NO	NO	NO	NO	NO
2	2_007	8 Free Settlers Dr	Residential	1	6	48	43	48	43	48	44	48	44	0.2	0.3	0.3	0.2	60	55	NO	NO	NO	NO	NO
2	2_008	8 Free Settlers Dr	Residential	2	9	57	52	57	53	57	53	58	54	0.6	0.6	0.7	0.7	60	55	NO	NO	NO	NO	NO
2	2_008	8 Free Settlers Dr	Residential	3	9	57	53	58	53	58	53	58	54	0.6	0.6	0.7	0.6	60	55	NO	NO	NO	NO	NO
2	2_008	8 Free Settlers Dr	Residential	4	10	58	54	58	54	58	54	59	55	0.6	0.6	0.6	0.6	60	55	NO	NO	NO	NO	NO
2	2_008	8 Free Settlers Dr	Residential	G	9	55	51	56	52	56	52	57	52	0.7	0.7	0.7	0.7	60	55	NO	NO	NO	NO	NO
2	2_008	8 Free Settlers Dr	Residential	1	9	56	52	57	52	57	52	57	53	0.6	0.6	0.6	0.6	60	55	NO	NO	NO	NO	NO
2	NEW_079		Residential	G	2	63	59	65	61	64	59	66	62	2.4	2.4	2.5	2.5	60	55	YES	YES	YES	YES	NO
2	NEW_079		Residential	1	2	66	61	68	64	66	62	69	64	2.5	2.6	2.7	2.6	60	55	YES	YES	YES	YES	NO
2	NEW_080		Residential	G	1	57	52	58	54	57	53	59	54	1.5	1.5	1.5	1.5	60	55	NO	NO	NO	NO	NO
2	NEW_080		Residential	1	1	59	55	60	56	60	55	61	57	1.5	1.5	1.5	1.4	60	55	NO	NO	NO	NO	NO

NCA	NCA ID	Receiver Address	Receiver Type	Facade		Opening Year				Design Year				Trigger 1 Increase (Build - No Build)				NCG noise criteria		Trigger 2 Do noise levels exceed the cumlative limit with project roads adding ≥2dB to the total noise levels?		Trigger 3 Is the contribution from the road project Acute?		Consider additional noise mitigation?
						No Build		Build		No Build		Build		Opening Year		Design Year						Day	Night	
				Floor	Orientation	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night					
						dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	Day	Night	≥ 65dB LAeq,15h	≥ 60dB LAeq,9h	
2	NEW_081		Residential	G	1	55	51	56	52	56	51	57	53	1.2	1.2	1.2	1.2	60	55	NO	NO	NO	NO	NO
2	NEW_081		Residential	1	1	57	53	58	54	58	54	59	55	1.1	1.2	1.2	1.2	60	55	NO	NO	NO	NO	NO
2	NEW_082		Residential	G	1	54	50	55	51	55	50	55	51	0.9	0.9	0.9	1	60	55	NO	NO	NO	NO	NO
2	NEW_082		Residential	1	1	56	52	57	53	57	52	58	53	0.9	0.9	1	0.9	60	55	NO	NO	NO	NO	NO
2	NEW_083		Residential	G	1	53	49	54	49	53	49	54	50	0.7	0.7	0.7	0.6	60	55	NO	NO	NO	NO	NO
2	NEW_083		Residential	1	1	55	51	56	51	56	51	56	52	0.7	0.7	0.7	0.7	60	55	NO	NO	NO	NO	NO
2	NEW_084		Residential	G	1	52	48	53	48	53	48	53	49	0.5	0.5	0.5	0.5	60	55	NO	NO	NO	NO	NO
2	NEW_084		Residential	1	1	54	50	55	50	55	50	55	51	0.6	0.6	0.6	0.6	60	55	NO	NO	NO	NO	NO
2	NEW_085		Residential	G	1	52	48	52	48	52	48	53	49	0.4	0.5	0.6	0.5	60	55	NO	NO	NO	NO	NO
2	NEW_085		Residential	1	1	54	50	54	50	54	50	55	51	0.5	0.6	0.6	0.6	60	55	NO	NO	NO	NO	NO
2	NEW_086		Residential	G	1	52	48	53	49	53	48	53	49	0.8	0.8	0.9	0.8	60	55	NO	NO	NO	NO	NO
2	NEW_086		Residential	1	1	54	49	55	50	54	50	55	51	0.8	0.8	0.8	0.8	60	55	NO	NO	NO	NO	NO
2	NEW_087		Residential	G	1	52	48	53	49	53	48	54	49	0.8	0.8	0.9	0.9	60	55	NO	NO	NO	NO	NO
2	NEW_087		Residential	1	1	54	49	54	50	54	50	55	51	0.8	0.8	0.9	0.8	60	55	NO	NO	NO	NO	NO
2	NEW_088		Residential	G	1	52	48	53	49	52	48	53	49	0.9	0.9	0.9	1	60	55	NO	NO	NO	NO	NO
2	NEW_088		Residential	1	1	53	49	54	50	54	50	55	51	0.8	0.9	0.9	0.9	60	55	NO	NO	NO	NO	NO
2	NEW_089		Residential	G	3	54	50	55	51	54	50	55	51	1.1	1	1	1	60	55	NO	NO	NO	NO	NO
2	NEW_089		Residential	1	1	57	53	58	54	58	53	58	54	0.9	0.9	0.9	0.9	60	55	NO	NO	NO	NO	NO
2	NEW_090		Residential	G	1	55	51	57	53	56	52	57	53	1.5	1.4	1.5	1.5	60	55	NO	NO	NO	NO	NO
2	NEW_090		Residential	1	1	59	54	60	56	59	55	60	56	1.3	1.3	1.3	1.4	60	55	NO	NO	NO	NO	NO
2	NEW_091		Residential	G	2	64	59	66	62	64	60	66	62	2.2	2.1	2.1	2.2	60	55	YES	YES	YES	YES	NO
2	NEW_091		Residential	1	2	66	62	69	64	67	62	69	65	2.5	2.5	2.6	2.6	60	55	YES	YES	YES	YES	NO
2	NEW_092		Residential	G	1	53	48	53	49	53	49	54	50	0.9	0.9	0.8	0.9	60	55	NO	NO	NO	NO	NO
2	NEW_092		Residential	1	1	56	51	56	52	56	52	57	53	0.7	0.7	0.7	0.7	60	55	NO	NO	NO	NO	NO
2	NEW_093		Residential	G	1	56	52	57	52	56	52	57	53	0.8	0.8	0.8	0.8	60	55	NO	NO	NO	NO	NO
2	NEW_093		Residential	1	1	58	54	59	55	59	55	60	56	0.8	0.8	0.9	0.8	60	55	NO	NO	NO	NO	NO
2	NEW_094		Residential	G	1	58	53	58	54	58	54	59	55	0.9	0.9	0.9	0.9	60	55	NO	NO	NO	NO	NO
2	NEW_094		Residential	1	1	60	56	61	57	61	56	62	58	1	1	1.1	1.1	60	55	NO	NO	NO	NO	NO
2	NEW_095		Residential	G	2	63	59	64	60	64	59	65	61	1.3	1.2	1.2	1.2	60	55	YES	YES	YES	YES	NO
2	NEW_095		Residential	1	2	66	61	68	64	66	62	68	64	2.3	2.2	2.3	2.2	60	55	YES	YES	YES	YES	NO
2	NEW_096		Residential	G	2	64	59	65	61	64	60	66	62	1.8	1.8	1.8	1.8	60	55	YES	YES	YES	YES	NO
2	NEW_096		Residential	1	2	66	62	69	64	67	62	69	65	2.6	2.6	2.6	2.7	60	55	YES	YES	YES	YES	NO
2	NEW_097		Residential	G	3	56	51	57	53	56	52	57	53	1.1	1.2	1.1	1.2	60	55	NO	NO	NO	NO	NO
2	NEW_097		Residential	1	1	59	55	60	56	60	56	61	57	0.9	0.8	0.9	0.8	60	55	NO	NO	NO	NO	NO
2	NEW_098		Residential	G	3	54	49	55	50	54	50	55	51	1.1	1.1	1.1	1.1	60	55	NO	NO	NO	NO	NO
2	NEW_098		Residential	1	1	58	53	58	54	58	54	59	55	0.6	0.6	0.6	0.6	60	55	NO	NO	NO	NO	NO
2	NEW_099		Residential	G	1	53	49	54	49	53	49	54	50	0.7	0.8	0.7	0.8	60	55	NO	NO	NO	NO	NO
2	NEW_099		Residential	1	1	57	52	57	53	57	53	58	53	0.4	0.4	0.4	0.4	60	55	NO	NO	NO	NO	NO
2	NEW_100		Residential	G	1	52	48	53	49	53	49	54	49	0.6	0.6	0.6	0.6	60	55	NO	NO	NO	NO	NO
2	NEW_100		Residential	1	1	56	52	56	52	56	52	57	52	0.3	0.3	0.3	0.3	60	55	NO	NO	NO	NO	NO
2	NEW_101		Residential	G	1	52	47	52	48	52	48	53	48	0.4	0.4	0.5	0.5	60	55	NO	NO	NO	NO	NO
2	NEW_101		Residential	1	1	55	50	55	51	55	51	55	51	0.2	0.3	0.3	0.2	60	55	NO	NO	NO	NO	NO
2	NEW_102		Residential	G	1	52	48	52	48	53	48	53	49	0.4	0.4	0.5	0.4	60	55	NO	NO	NO	NO	NO
2	NEW_102		Residential	1	1	54	50	55	50	55	51	55	51	0.2	0.2	0.2	0.2	60	55	NO	NO	NO	NO	NO
2	NEW_103		Residential	G	1	51	47	52	47	52	47	52	48	0.4	0.4	0.4	0.4	60	55	NO	NO	NO	NO	NO
2	NEW_103		Residential	1	1	53	49	54	49	54	50	54	50	0.3	0.3	0.3	0.2	60	55	NO	NO	NO	NO	NO
2	NEW_104		Residential	G	1	52	47	52	48	52	48	53	48	0.2	0.2	0.4	0.4	60	55	NO	NO	NO	NO	NO
2	NEW_104		Residential	1	1	54	49	54	50	54	50	54	50	0.1	0.2	0.3	0.2	60	55	NO	NO	NO	NO	NO
2	NEW_105		Residential	G	1	51	47	52	48	52	48	52	48	0.4	0.4	0.3	0.3	60	55	NO	NO	NO	NO	NO
2	NEW_105		Residential	1	1	53	49	54	49	54	50	54	50	0.3	0.3	0.3	0.4	60	55	NO	NO	NO	NO	NO
2	NEW_106		Residential	G	1	51	47	52	47	52	48	52	48	0.4	0.4	0.4	0.3	60	55	NO	NO	NO	NO	NO
2	NEW_106		Residential	1	1	53	49	54	49	54	50	54	50	0.4	0.4	0.5	0.4	60	55	NO	NO	NO	NO	NO
2	NEW_107		Residential	G	2	53	48	53	49	53	49	54	50	0.8	0.8	0.8	0.8	60	55	NO	NO	NO	NO	NO
2	NEW_107		Residential	1	2	55	51	56	52	56	51	56	52	0.8	0.8	0.7	0.8	60	55	NO	NO	NO	NO	NO
2	NEW_108		Residential	G	3	54	49	55	50	54	50	55	51	1.1	1.1	1.1	1.1	60	55	NO	NO	NO	NO	NO
2	NEW_108		Residential	1	3	56	51	57	53	56	52	57	53	1.2	1.2	1.2	1.2	60	55	NO	NO	NO	NO	NO
2	NEW_109		Residential	G	3	54	50	56	51	55	51	56	52	1.1	1.2	1.2	1.1	60	55	NO	NO	NO	NO	NO

NCA	NCA ID	Receiver Address	Receiver Type	Facade		Opening Year				Design Year				Trigger 1 Increase (Build - No Build)				NCG noise criteria		Trigger 2 Do noise levels exceed the cumlative limit with project roads adding ≥2dB to the total noise levels?		Trigger 3 Is the contribution from the road project Acute?		Consider additional noise mitigation?
						No Build		Build		No Build		Build		Opening Year		Design Year						Day	Night	
				Floor	Orientation	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night					
						dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	Day	Night	≥ 65dB LAeq,15h	≥ 60dB LAeq,9h	
2	NEW_109		Residential	1	3	57	52	58	54	57	53	58	54	1.2	1.2	1.3	1.2	60	55	NO	NO	NO	NO	NO
2	NEW_110		Residential	G	3	56	51	57	52	56	52	57	53	1.1	1.2	1.1	1.2	60	55	NO	NO	NO	NO	NO
2	NEW_110		Residential	1	3	58	54	59	55	58	54	60	55	1.3	1.2	1.3	1.2	60	55	NO	NO	NO	NO	NO
2	NEW_111		Residential	G	3	57	52	58	54	57	53	58	54	1.3	1.3	1.3	1.3	60	55	NO	NO	NO	NO	NO
2	NEW_111		Residential	1	3	59	55	60	56	59	55	61	57	1.4	1.3	1.4	1.4	60	55	NO	NO	NO	NO	NO
2	NEW_112		Residential	G	3	58	53	59	55	58	54	60	56	1.5	1.6	1.5	1.5	60	55	NO	NO	NO	NO	NO
2	NEW_112		Residential	1	3	60	56	62	57	61	56	62	58	1.5	1.5	1.5	1.6	60	55	NO	NO	NO	NO	NO
2	NEW_113		Residential	G	3	59	55	61	57	60	55	62	57	1.9	1.9	1.9	1.9	60	55	NO	NO	NO	NO	NO
2	NEW_113		Residential	1	3	61	57	63	59	62	58	64	60	1.8	1.8	1.8	1.8	60	55	NO	YES	NO	YES	NO
2	NEW_114		Residential	G	2	64	60	67	62	65	60	67	63	2.6	2.6	2.6	2.6	60	55	YES	YES	YES	YES	NO
2	NEW_114		Residential	1	2	66	62	69	65	67	63	70	65	2.7	2.7	2.7	2.7	60	55	YES	YES	YES	YES	NO
3	3_001	·17 Memorial Avenue (Fro	Residential	G	9	68	63	68	64	68	64	68	64	0.1	0.1	0.2	0.2	60	55	YES	YES	YES	YES	NO
3	3_001	·17 Memorial Avenue (Fro	Residential	1	9	71	66	71	66	71	67	71	67	-0.2	-0.1	-0.1	-0.1	60	55	YES	YES	YES	YES	NO
3	3_002	-17 Memorial Avenue (Re	Residential	G	5	59	55	59	55	60	55	60	55	0.2	0.2	0.2	0.1	60	55	NO	NO	NO	NO	NO
3	3_002	-17 Memorial Avenue (Re	Residential	1	5	60	56	61	56	61	57	61	57	0.1	0.2	0.2	0.2	60	55	NO	NO	NO	NO	NO
3	3_003	25 Memorial Avenue	Residential	G	1	67	63	66	62	68	64	67	63	-0.7	-0.8	-0.7	-0.8	60	55	YES	YES	YES	YES	YES
3	3_003	25 Memorial Avenue	Residential	1	1	69	65	69	65	70	66	69	65	-0.7	-0.6	-0.6	-0.6	60	55	YES	YES	YES	YES	YES
3	3_005	27 Memorial Avenue	Residential	G	1	66	62	65	60	67	62	65	61	-1.4	-1.3	-1.5	-1.5	60	55	YES	YES	YES	YES	YES
3	3_006	91 Memorial Avenue	Residential	G	4	65	60	64	59	65	61	64	60	-0.9	-1	-0.9	-0.9	60	55	NO	YES	NO	YES	NO
3	3_007	37 John Hillas Avenue	Residential	G	3	57	52	57	53	57	53	58	54	0.6	0.6	0.6	0.7	60	55	NO	NO	NO	NO	NO
3	3_008	39 John Hillas Avenue	Residential	G	3	54	50	55	51	55	51	56	52	0.8	0.8	0.8	0.8	60	55	NO	NO	NO	NO	NO
3	3_009	45 John Hillas Avenue	Residential	G	3	54	50	55	51	55	51	56	51	0.7	0.7	0.8	0.7	60	55	NO	NO	NO	NO	NO
3	3_010	15 Butler Avenue	Residential	G	2	52	48	53	49	53	49	54	50	1	1	1.1	1.1	60	55	NO	NO	NO	NO	NO
3	3_011	4 Leverton Street	Residential	G	4	55	51	56	52	56	51	57	53	1.1	1.2	1.1	1.2	60	55	NO	NO	NO	NO	NO
3	3_012	8 Leverton Street	Residential	G	4	52	47	52	48	52	48	53	48	0.5	0.5	0.6	0.6	60	55	NO	NO	NO	NO	NO
3	3_013	.01 Thomas Boulton Circui	Residential	G	4	67	63	66	62	68	63	67	62	-1	-0.9	-0.9	-0.9	60	55	YES	YES	YES	YES	NO
3	3_014	49 Water Creek Boulevard	Residential	G	3	48	44	49	45	49	45	50	45	0.6	0.6	0.7	0.6	60	55	NO	NO	NO	NO	NO
3	3_015	30 Bruhn Circuit	Residential	G	4	67	63	66	62	67	63	67	63	-0.7	-0.6	-0.6	-0.6	60	55	YES	YES	YES	YES	NO
3	3_016	32 Bruhn Circuit	Residential	G	4	67	63	66	62	68	63	67	63	-0.9	-0.8	-0.8	-0.8	60	55	YES	YES	YES	YES	NO
3	3_017	12 Butler Avenue	Residential	G	2	52	48	53	49	53	48	53	49	0.8	0.7	0.8	0.8	60	55	NO	NO	NO	NO	NO
3	3_018	13 Butler Avenue	Residential	G	2	52	48	53	49	53	48	54	50	1.1	1.1	1.2	1.2	60	55	NO	NO	NO	NO	NO
3	3_019	14 Butler Avenue	Residential	G	2	52	48	53	49	53	49	54	49	0.7	0.8	0.8	0.7	60	55	NO	NO	NO	NO	NO
3	NEW_003		Residential	G	1	50	46	51	46	50	46	51	47	0.7	0.7	0.7	0.7	60	55	NO	NO	NO	NO	NO
3	NEW_003		Residential	1	1	54	49	55	50	54	50	55	51	1	1.1	1	1.1	60	55	NO	NO	NO	NO	NO
3	NEW_004		Residential	G	2	51	47	52	47	52	47	52	48	0.6	0.6	0.7	0.7	60	55	NO	NO	NO	NO	NO
3	NEW_004		Residential	1	2	55	51	56	52	56	52	57	53	1.1	1.1	1.2	1.1	60	55	NO	NO	NO	NO	NO
3	NEW_005		Residential	G	2	51	47	52	47	52	47	52	48	0.6	0.6	0.7	0.6	60	55	NO	NO	NO	NO	NO
3	NEW_005		Residential	1	2	55	51	56	52	56	52	57	53	1.1	1.1	1.1	1.1	60	55	NO	NO	NO	NO	NO
3	NEW_006		Residential	G	2	51	46	51	47	51	47	52	48	0.6	0.6	0.6	0.6	60	55	NO	NO	NO	NO	NO
3	NEW_006		Residential	1	2	55	51	56	52	55	51	57	52	1.1	1.1	1.2	1.2	60	55	NO	NO	NO	NO	NO
3	NEW_007		Residential	G	2	50	46	51	46	51	46	51	47	0.6	0.6	0.6	0.6	60	55	NO	NO	NO	NO	NO
3	NEW_007		Residential	1	2	55	51	56	51	55	51	56	52	1	0.9	1	1.1	60	55	NO	NO	NO	NO	NO
3	NEW_008		Residential	G	2	52	47	52	48	52	48	53	49	0.7	0.7	0.7	0.7	60	55	NO	NO	NO	NO	NO
3	NEW_008		Residential	1	2	55	51	56	51	55	51	56	52	0.8	0.8	0.9	0.8	60	55	NO	NO	NO	NO	NO
3	NEW_009		Residential	G	1	52	48	53	48	52	48	53	49	0.8	0.8	0.9	0.8	60	55	NO	NO	NO	NO	NO
3	NEW_009		Residential	1	1	55	51	56	52	56	51	57	52	1.1	1	1	1	60	55	NO	NO	NO	NO	NO
3	NEW_010		Residential	G	4	52	48	53	49	53	48	54	49	1	1	1.1	1.1	60	55	NO	NO	NO	NO	NO
3	NEW_010		Residential	1	4	54	50	55	50	54	50	55	51	0.9	0.9	1	0.9	60	55	NO	NO	NO	NO	NO
3	NEW_011		Residential	G	1	54	50	55	51	55	51	56	51	0.7	0.7	0.7	0.7	60	55	NO	NO	NO	NO	NO
3	NEW_011		Residential	1	1	56	52	57	52	57	53	57	53	0.6	0.6	0.6	0.6	60	55	NO	NO	NO	NO	NO
3	NEW_012		Residential	G	4	53	49	54	50	54	49	55	50	0.8	0.8	0.8	0.8	60	55	NO	NO	NO	NO	NO
3	NEW_012		Residential	1	4	55	51	56	52	56	52	57	52	0.8	0.7	0.8	0.7	60	55	NO	NO	NO	NO	NO
3	NEW_013		Residential	G	1	52	48	53	48	53	48	53	49	0.6	0.6	0.7	0.6	60	55	NO	NO	NO	NO	NO
3	NEW_013		Residential	1	1	55	51	56	52	56	51	57	52	1	1	1	1	60	55	NO	NO	NO	NO	NO
3	NEW_014		Residential	G	1	53	49	53	49	53	49	54	50	0.6	0.6	0.5	0.6	60	55	NO	NO	NO	NO	NO
3	NEW_014		Residential	1	1	56	52	57	52	56	52	57	53	0.9	0.9	1	0.9	60	55	NO	NO	NO	NO	NO
3	NEW_015		Residential	G	1	53	49	54	49	54	49	54	50	0.6	0.6	0.6	0.6	60	55	NO	NO	NO	NO	NO

NCA	NCA ID	Receiver Address	Receiver Type	Facade		Opening Year				Design Year				Trigger 1 Increase (Build - No Build)				NCG noise criteria		Trigger 2 Do noise levels exceed the cumlative limit with project roads adding ≥2dB to the total noise levels?		Trigger 3 Is the contribution from the road project Acute?		Consider additional noise mitigation?
						No Build		Build		No Build		Build		Opening Year		Design Year						Day	Night	
				Floor	Orientation	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night					
						dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	Day	Night	≥ 65dB LAeq,15h	≥ 60dB LAeq,9h	
3	NEW_015		Residential	1	1	56	52	57	53	57	52	58	53	0.9	1	1	1	60	55	NO	NO	NO	NO	NO
3	NEW_016		Residential	G	1	54	50	55	50	55	50	55	51	0.6	0.6	0.7	0.6	60	55	NO	NO	NO	NO	NO
3	NEW_016		Residential	1	1	57	53	58	54	57	53	58	54	0.9	0.9	1	1	60	55	NO	NO	NO	NO	NO
3	NEW_017		Residential	G	4	56	52	57	52	56	52	57	53	0.9	0.9	1	1	60	55	NO	NO	NO	NO	NO
3	NEW_017		Residential	1	4	58	54	59	55	59	54	60	55	0.7	0.8	0.8	0.9	60	55	NO	NO	NO	NO	NO
3	NEW_018		Residential	G	1	55	51	55	51	55	51	56	51	0.1	0.1	0.2	0.2	60	55	NO	NO	NO	NO	NO
3	NEW_018		Residential	1	1	59	54	59	55	59	55	60	55	0.3	0.3	0.3	0.3	60	55	NO	NO	NO	NO	NO
3	NEW_019		Residential	G	1	54	50	54	50	54	50	55	50	0.2	0.3	0.3	0.3	60	55	NO	NO	NO	NO	NO
3	NEW_019		Residential	1	1	58	54	58	54	58	54	59	55	0.5	0.5	0.6	0.6	60	55	NO	NO	NO	NO	NO
3	NEW_020		Residential	G	1	53	49	53	49	54	50	54	50	0.3	0.2	0.3	0.2	60	55	NO	NO	NO	NO	NO
3	NEW_020		Residential	1	1	57	53	57	53	58	53	58	54	0.4	0.4	0.4	0.5	60	55	NO	NO	NO	NO	NO
3	NEW_021		Residential	G	1	54	50	54	50	55	50	55	50	0.2	0.1	0.2	0.1	60	55	NO	NO	NO	NO	NO
3	NEW_021		Residential	1	1	58	53	58	53	58	54	58	54	0.2	0.2	0.3	0.3	60	55	NO	NO	NO	NO	NO
3	NEW_022		Residential	G	1	52	48	53	48	53	49	53	49	0.3	0.3	0.3	0.2	60	55	NO	NO	NO	NO	NO
3	NEW_022		Residential	1	1	57	52	57	53	57	53	58	53	0.4	0.4	0.5	0.4	60	55	NO	NO	NO	NO	NO
3	NEW_023		Residential	G	1	52	48	52	48	52	48	53	49	0.4	0.3	0.4	0.3	60	55	NO	NO	NO	NO	NO
3	NEW_023		Residential	1	1	56	52	57	52	57	53	57	53	0.5	0.5	0.5	0.5	60	55	NO	NO	NO	NO	NO
3	NEW_024		Residential	G	4	56	52	56	52	56	52	57	52	0	0.1	0.1	0.1	60	55	NO	NO	NO	NO	NO
3	NEW_024		Residential	1	4	58	54	59	54	59	55	59	55	0.4	0.4	0.4	0.4	60	55	NO	NO	NO	NO	NO
3	NEW_025		Residential	G	2	61	57	60	56	62	57	61	56	-0.9	-0.9	-0.9	-0.9	60	55	NO	NO	NO	NO	NO
3	NEW_025		Residential	1	3	68	63	66	62	68	64	66	62	-1.7	-1.7	-1.7	-1.7	60	55	YES	YES	YES	YES	NO
3	NEW_026		Residential	G	2	56	52	56	51	57	52	56	52	-0.5	-0.5	-0.4	-0.5	60	55	NO	NO	NO	NO	NO
3	NEW_026		Residential	1	3	67	63	66	62	68	64	67	62	-1.3	-1.3	-1.4	-1.4	60	55	YES	YES	YES	YES	NO
3	NEW_027		Residential	G	2	55	51	55	51	56	52	56	51	-0.4	-0.3	-0.4	-0.3	60	55	NO	NO	NO	NO	NO
3	NEW_027		Residential	1	3	68	63	66	62	68	64	67	63	-1.2	-1.3	-1.3	-1.3	60	55	YES	YES	YES	YES	NO
3	NEW_028		Residential	G	4	57	52	56	52	57	53	57	52	-0.6	-0.6	-0.5	-0.5	60	55	NO	NO	NO	NO	NO
3	NEW_028		Residential	1	3	68	64	67	62	69	64	67	63	-1.4	-1.3	-1.4	-1.4	60	55	YES	YES	YES	YES	NO
3	NEW_029		Residential	G	4	58	54	57	53	58	54	58	54	-0.5	-0.6	-0.5	-0.6	60	55	NO	NO	NO	NO	NO
3	NEW_029		Residential	1	3	68	64	67	62	68	64	67	63	-1.1	-1.2	-1.1	-1.1	60	55	YES	YES	YES	YES	NO
3	NEW_030		Residential	G	2	57	53	57	52	58	54	57	53	-0.4	-0.5	-0.4	-0.4	60	55	NO	NO	NO	NO	NO
3	NEW_030		Residential	1	3	68	63	67	62	68	64	67	63	-1.1	-1.1	-1.1	-1.1	60	55	YES	YES	YES	YES	NO
3	NEW_031		Residential	G	3	65	61	64	59	66	61	64	60	-1.4	-1.4	-1.5	-1.4	60	55	NO	YES	NO	YES	NO
3	NEW_031		Residential	1	3	68	64	67	63	69	64	68	63	-1	-0.9	-1	-1	60	55	YES	YES	YES	YES	NO
3	NEW_032		Residential	G	3	66	62	65	61	67	62	65	61	-1.3	-1.2	-1.2	-1.2	60	55	YES	YES	YES	YES	NO
3	NEW_032		Residential	1	3	69	65	68	64	69	65	69	64	-0.8	-0.7	-0.8	-0.8	60	55	YES	YES	YES	YES	NO
3	NEW_033		Residential	G	2	48	44	49	44	49	44	49	45	0.7	0.6	0.7	0.7	60	55	NO	NO	NO	NO	NO
3	NEW_033		Residential	1	2	51	46	51	47	51	47	52	48	0.8	0.8	0.9	0.8	60	55	NO	NO	NO	NO	NO
3	NEW_034		Residential	G	3	51	46	51	47	51	47	52	48	0.7	0.8	0.8	0.8	60	55	NO	NO	NO	NO	NO
3	NEW_034		Residential	1	3	52	48	53	49	53	48	54	49	0.8	0.8	0.9	0.9	60	55	NO	NO	NO	NO	NO
3	NEW_035		Residential	G	3	51	46	52	47	51	47	52	48	1	1	1	1	60	55	NO	NO	NO	NO	NO
3	NEW_035		Residential	1	3	52	48	53	49	53	48	54	49	1	1	1	1	60	55	NO	NO	NO	NO	NO
3	NEW_036		Residential	G	2	49	45	50	45	50	45	50	46	0.7	0.6	0.7	0.7	60	55	NO	NO	NO	NO	NO
3	NEW_036		Residential	1	2	51	47	52	48	52	47	53	48	0.9	0.8	0.9	0.9	60	55	NO	NO	NO	NO	NO
3	NEW_037		Residential	G	4	48	44	49	45	49	45	49	45	0.6	0.7	0.6	0.6	60	55	NO	NO	NO	NO	NO
3	NEW_037		Residential	1	4	52	47	53	48	52	48	53	49	0.8	0.8	0.7	0.8	60	55	NO	NO	NO	NO	NO
3	NEW_038		Residential	G	4	48	44	49	45	49	45	50	46	1	0.9	1	1	60	55	NO	NO	NO	NO	NO
3	NEW_038		Residential	1	4	52	48	53	49	53	49	54	50	0.9	0.9	0.9	1	60	55	NO	NO	NO	NO	NO
3	NEW_039		Residential	G	4	53	49	53	49	53	49	54	50	0.6	0.6	0.6	0.6	60	55	NO	NO	NO	NO	NO
3	NEW_039		Residential	1	4	55	51	56	52	56	52	57	53	0.9	0.9	0.9	0.9	60	55	NO	NO	NO	NO	NO
3	NEW_040		Residential	G	3	53	49	54	50	54	50	55	50	0.6	0.7	0.6	0.7	60	55	NO	NO	NO	NO	NO
3	NEW_040		Residential	1	3	56	52	57	52	56	52	57	53	0.9	0.9	1	0.9	60	55	NO	NO	NO	NO	NO
3	NEW_041		Residential	G	3	54	49	55	50	54	50	55	51	1	0.9	1	0.9	60	55	NO	NO	NO	NO	NO
3	NEW_041		Residential	1	3	56	52	57	53	56	52	57	53	1	0.9	1	1	60	55	NO	NO	NO	NO	NO
3	NEW_042		Residential	G	1	52	47	53	48	52	48	53	49	0.9	0.9	0.9	0.9	60	55	NO	NO	NO	NO	NO
3	NEW_042		Residential	1	1	54	50	55	51	55	50	56	51	0.9	1	0.9	1	60	55	NO	NO	NO	NO	NO
3	NEW_043		Residential	G	1	49	45	50	46	50	45	51	47	1.1	1.1	1	1.1	60	55	NO	NO	NO	NO	NO
3	NEW_043		Residential	1	1	52	48	53	49	53	49	54	50	1	1	1.1	1	60	55	NO	NO	NO	NO	NO

NCA	NCA ID	Receiver Address	Receiver Type	Facade		Opening Year				Design Year				Trigger 1 Increase (Build - No Build)				NCG noise criteria		Trigger 2 Do noise levels exceed the cumlative limit with project roads adding ≥2dB to the total noise levels?		Trigger 3 Is the contribution from the road project Acute?		Consider additional noise mitigation?
						No Build		Build		No Build		Build		Opening Year		Design Year						Day	Night	
				Floor	Orientation	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night					
						dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	Day	Night	≥ 65dB LAeq,15h	≥ 60dB LAeq,9h	
3	NEW_044		Residential	G	2	48	44	49	45	49	45	50	46	1	1	1	1	60	55	NO	NO	NO	NO	NO
3	NEW_044		Residential	1	2	51	47	52	48	52	47	53	48	0.9	0.9	1	1	60	55	NO	NO	NO	NO	NO
3	NEW_045		Residential	G	4	46	42	47	43	47	43	48	43	0.6	0.6	0.6	0.6	59	55	NO	NO	NO	NO	NO
3	NEW_045		Residential	1	3	54	49	54	50	54	50	55	50	0.6	0.6	0.7	0.6	60	55	NO	NO	NO	NO	NO
3	NEW_046		Residential	G	3	51	47	52	48	52	48	52	48	0.5	0.5	0.5	0.5	60	55	NO	NO	NO	NO	NO
3	NEW_046		Residential	1	3	53	49	54	50	54	50	55	50	0.6	0.6	0.6	0.6	60	55	NO	NO	NO	NO	NO
3	NEW_047		Residential	G	3	50	46	51	46	51	46	51	47	0.6	0.6	0.7	0.6	60	55	NO	NO	NO	NO	NO
3	NEW_047		Residential	1	3	53	48	53	49	53	49	54	50	0.7	0.7	0.7	0.7	60	55	NO	NO	NO	NO	NO
3	NEW_048		Residential	G	3	52	48	53	48	53	48	53	49	0.4	0.4	0.4	0.5	60	55	NO	NO	NO	NO	NO
3	NEW_048		Residential	1	3	54	50	55	51	55	51	55	51	0.3	0.4	0.4	0.4	60	55	NO	NO	NO	NO	NO
3	NEW_049		Residential	G	4	50	45	50	46	50	46	51	47	0.5	0.6	0.6	0.5	60	55	NO	NO	NO	NO	NO
3	NEW_049		Residential	1	4	52	48	53	48	53	49	53	49	0.5	0.5	0.6	0.6	60	55	NO	NO	NO	NO	NO
3	NEW_050		Residential	G	4	47	43	48	44	48	43	48	44	0.6	0.7	0.7	0.7	60	55	NO	NO	NO	NO	NO
3	NEW_050		Residential	1	4	50	46	51	47	51	47	52	48	0.8	0.8	0.7	0.8	60	55	NO	NO	NO	NO	NO
3	NEW_051		Residential	G	3	56	52	56	52	57	53	56	52	-0.4	-0.5	-0.4	-0.4	60	55	NO	NO	NO	NO	NO
3	NEW_051		Residential	1	3	59	55	58	54	60	55	59	55	-0.6	-0.5	-0.5	-0.5	60	55	NO	NO	NO	NO	NO
3	NEW_052		Residential	G	4	65	61	64	60	66	62	65	60	-1.2	-1.3	-1.3	-1.2	60	55	YES	YES	YES	YES	NO
3	NEW_052		Residential	1	4	68	64	67	63	69	65	68	63	-1.2	-1.3	-1.2	-1.3	60	55	YES	YES	YES	YES	NO
3	NEW_053		Residential	G	3	53	48	53	49	53	49	54	49	0.3	0.3	0.3	0.3	60	55	NO	NO	NO	NO	NO
3	NEW_053		Residential	1	3	58	53	58	54	58	54	59	54	0.3	0.3	0.3	0.3	60	55	NO	NO	NO	NO	NO
3	NEW_054		Residential	G	3	55	51	55	51	56	51	56	51	0.1	0.1	0.1	0	60	55	NO	NO	NO	NO	NO
3	NEW_054		Residential	1	3	58	54	59	54	59	55	59	55	0.1	0.1	0.2	0.2	60	55	NO	NO	NO	NO	NO
3	NEW_055		Residential	G	3	56	52	56	52	57	52	57	52	0	0	0	-0.1	60	55	NO	NO	NO	NO	NO
3	NEW_055		Residential	1	3	59	55	59	54	59	55	59	55	-0.2	-0.2	-0.2	-0.2	60	55	NO	NO	NO	NO	NO
3	NEW_056		Residential	G	3	66	61	65	60	66	62	65	61	-0.8	-0.8	-0.7	-0.7	60	55	YES	YES	YES	YES	NO
3	NEW_056		Residential	1	3	69	64	68	63	69	65	68	64	-0.8	-0.8	-0.7	-0.8	60	55	YES	YES	YES	YES	NO
3	NEW_057		Residential	G	3	67	62	66	61	67	63	66	62	-1	-1.1	-1.1	-1.1	60	55	YES	YES	YES	YES	NO
3	NEW_057		Residential	1	3	69	65	68	64	70	65	69	65	-0.6	-0.7	-0.6	-0.7	60	55	YES	YES	YES	YES	NO
3	NEW_058		Residential	G	3	52	47	52	48	52	48	53	49	0.7	0.7	0.7	0.7	60	55	NO	NO	NO	NO	NO
3	NEW_058		Residential	1	3	54	50	55	51	55	50	55	51	0.9	0.9	0.9	0.9	60	55	NO	NO	NO	NO	NO
3	NEW_059		Residential	G	3	53	48	53	49	53	49	54	50	0.8	0.8	0.8	0.8	60	55	NO	NO	NO	NO	NO
3	NEW_059		Residential	1	3	55	51	56	52	56	51	57	52	0.9	0.9	0.9	0.9	60	55	NO	NO	NO	NO	NO
3	NEW_060		Residential	G	3	54	50	55	50	55	50	55	51	0.7	0.7	0.7	0.7	60	55	NO	NO	NO	NO	NO
3	NEW_060		Residential	1	3	56	52	57	53	57	52	57	53	0.8	0.9	0.8	0.8	60	55	NO	NO	NO	NO	NO
3	NEW_061		Residential	G	3	55	51	56	51	56	52	56	52	0.6	0.6	0.6	0.6	60	55	NO	NO	NO	NO	NO
3	NEW_061		Residential	1	3	57	53	58	54	58	53	58	54	0.7	0.7	0.8	0.8	60	55	NO	NO	NO	NO	NO
3	NEW_062		Residential	G	3	59	55	59	55	60	55	60	55	0.1	0.1	0.2	0.1	60	55	NO	NO	NO	NO	NO
3	NEW_062		Residential	1	3	61	57	61	57	62	57	62	58	0.1	0.2	0.2	0.1	60	55	NO	NO	NO	NO	NO
3	NEW_063		Residential	G	3	63	59	63	58	63	59	63	59	-0.3	-0.2	-0.2	-0.2	60	55	NO	NO	NO	NO	NO
3	NEW_063		Residential	1	3	65	60	64	60	65	61	65	61	-0.3	-0.2	-0.2	-0.3	60	55	YES	YES	YES	YES	NO
3	NEW_064		Residential	G	4	71	67	69	65	72	67	70	66	-1.6	-1.6	-1.6	-1.5	60	55	YES	YES	YES	YES	NO
3	NEW_064		Residential	1	4	73	69	71	67	73	69	72	68	-1.4	-1.5	-1.4	-1.4	60	55	YES	YES	YES	YES	NO
3	NEW_065		Residential	G	4	66	62	66	62	67	63	66	62	-0.5	-0.5	-0.5	-0.5	60	55	YES	YES	YES	YES	NO
3	NEW_065		Residential	1	4	69	64	68	64	69	65	69	65	-0.5	-0.5	-0.5	-0.4	60	55	YES	YES	YES	YES	NO
3	NEW_066		Residential	G	4	56	51	55	51	56	52	56	52	-0.2	-0.2	-0.2	-0.2	60	55	NO	NO	NO	NO	NO
3	NEW_066		Residential	1	4	58	54	58	54	59	54	59	54	-0.2	-0.2	-0.1	-0.1	60	55	NO	NO	NO	NO	NO
3	NEW_067		Residential	G	2	54	49	55	50	54	50	55	51	0.9	0.9	0.9	0.9	60	55	NO	NO	NO	NO	NO
3	NEW_067		Residential	1	2	56	52	57	53	57	53	58	54	0.9	0.9	0.9	0.9	60	55	NO	NO	NO	NO	NO
3	NEW_068		Residential	G	4	52	48	53	49	52	48	54	49	1.1	1.1	1.2	1.1	60	55	NO	NO	NO	NO	NO
3	NEW_068		Residential	1	3	55	50	56	51	55	51	56	52	1.2	1.2	1.3	1.3	60	55	NO	NO	NO	NO	NO
3	NEW_069		Residential	G	3	52	48	53	48	52	48	53	49	0.9	0.9	1	1	60	55	NO	NO	NO	NO	NO
3	NEW_069		Residential	1	3	54	50	55	51	54	50	56	51	1.2	1.2	1.2	1.2	60	55	NO	NO	NO	NO	NO
3	NEW_070		Residential	G	2	51	47	52	48	52	47	53	48	0.9	1	1	0.9	60	55	NO	NO	NO	NO	NO
3	NEW_070		Residential	1	2	53	48	54	50	53	49	54	50	1.1	1.1	1.1	1.1	60	55	NO	NO	NO	NO	NO
3	NEW_071		Residential	G	3	52	48	54	49	53	49	54	50	1.3	1.2	1.3	1.3	60	55	NO	NO	NO	NO	NO
3	NEW_071		Residential	1	3	55	50	56	52	55	51	57	52	1.3	1.3	1.4	1.4	60	55	NO	NO	NO	NO	NO
3	NEW_072		Residential	G	3	54	49	55	50	54	50	55	51	0.8	0.9	0.8	0.9	60	55	NO	NO	NO	NO	NO

NCA	NCA ID	Receiver Address	Receiver Type	Facade		Opening Year				Design Year				Trigger 1 Increase (Build - No Build)				NCG noise criteria		Trigger 2 Do noise levels exceed the cumlative limit with project roads adding ≥2dB to the total noise levels?		Trigger 3 Is the contribution from the road project Acute?		Consider additional noise mitigation?
						No Build		Build		No Build		Build		Opening Year		Design Year						Day	Night	
				Floor	Orientation	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night					
						dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	Day	Night	≥ 65dB LAeq,15h	≥ 60dB LAeq,9h	
3	NEW_072		Residential	1	3	56	51	57	52	56	52	57	53	1.1	1	1.1	1.1	60	55	NO	NO	NO	NO	NO
3	NEW_073		Residential	G	4	60	56	60	56	60	56	61	56	0.2	0.1	0.2	0.2	60	55	NO	NO	NO	NO	NO
3	NEW_073		Residential	1	4	64	59	64	60	64	60	65	60	0.5	0.4	0.5	0.4	60	55	YES	YES	YES	YES	NO
3	NEW_074		Residential	G	3	66	62	66	61	67	62	66	62	-0.5	-0.5	-0.5	-0.4	60	55	YES	YES	YES	YES	NO
3	NEW_074		Residential	1	3	69	64	68	64	69	65	69	65	-0.5	-0.5	-0.5	-0.4	60	55	YES	YES	YES	YES	NO
3	NEW_075		Residential	G	3	66	62	66	61	67	62	66	62	-0.5	-0.5	-0.5	-0.5	60	55	YES	YES	YES	YES	NO
3	NEW_075		Residential	1	3	69	64	68	64	69	65	69	65	-0.5	-0.6	-0.5	-0.5	60	55	YES	YES	YES	YES	NO
3	NEW_076		Residential	G	3	67	62	66	62	67	63	67	62	-0.5	-0.5	-0.5	-0.5	60	55	YES	YES	YES	YES	NO
3	NEW_076		Residential	1	3	69	65	68	64	69	65	69	65	-0.5	-0.5	-0.5	-0.5	60	55	YES	YES	YES	YES	NO
3	NEW_077		Residential	G	4	54	50	55	51	55	50	56	51	0.9	0.9	1	1	60	55	NO	NO	NO	NO	NO
3	NEW_077		Residential	1	4	56	52	57	52	56	52	57	53	0.8	0.8	0.9	0.9	60	55	NO	NO	NO	NO	NO
3	NEW_078		Residential	G	3	53	49	54	49	53	49	54	50	0.8	0.8	0.9	0.9	60	55	NO	NO	NO	NO	NO
3	NEW_078		Residential	1	3	55	50	55	51	55	51	56	52	0.8	0.8	0.8	0.8	60	55	NO	NO	NO	NO	NO
4	4_001	2 Rocks Street	Residential	G	2	62	58	63	59	62	58	64	60	1.6	1.6	1.7	1.7	60	55	NO	YES	NO	YES	NO
4	4_001	2 Rocks Street	Residential	1	2	63	59	65	61	64	60	66	62	1.7	1.7	1.7	1.7	60	55	YES	YES	YES	YES	NO
4	4_002	4 Rocks Street	Residential	G	3	58	54	60	56	59	55	61	56	1.7	1.7	1.7	1.7	60	55	NO	NO	NO	NO	NO
4	4_002	4 Rocks Street	Residential	1	3	60	56	62	58	61	57	62	58	1.6	1.5	1.6	1.6	60	55	NO	NO	NO	NO	NO
4	4_003	6 Rocks Street	Residential	G	3	57	53	59	54	58	53	59	55	1.6	1.6	1.7	1.7	60	55	NO	NO	NO	NO	NO
4	4_003	6 Rocks Street	Residential	1	3	59	55	60	56	60	55	61	57	1.5	1.4	1.5	1.5	60	55	NO	NO	NO	NO	NO
4	4_004	8 Rocks Street	Residential	G	3	56	51	57	53	56	52	58	54	1.6	1.6	1.6	1.6	60	55	NO	NO	NO	NO	NO
4	4_004	8 Rocks Street	Residential	1	3	58	54	59	55	58	54	60	56	1.4	1.3	1.4	1.4	60	55	NO	NO	NO	NO	NO
4	4_005	10 Rocks Street	Residential	G	3	55	50	56	52	55	51	57	53	1.6	1.6	1.6	1.5	60	55	NO	NO	NO	NO	NO
4	4_005	10 Rocks Street	Residential	1	3	57	53	58	54	58	53	59	55	1.3	1.3	1.3	1.4	60	55	NO	NO	NO	NO	NO
4	4_006	12 Rocks Street	Residential	G	3	54	50	56	51	55	50	56	52	1.5	1.5	1.6	1.5	60	55	NO	NO	NO	NO	NO
4	4_006	12 Rocks Street	Residential	1	3	56	52	58	53	57	53	58	54	1.3	1.3	1.3	1.3	60	55	NO	NO	NO	NO	NO
4	4_007	14 Rocks Street	Residential	G	4	53	49	55	51	54	50	55	51	1.5	1.5	1.5	1.5	60	55	NO	NO	NO	NO	NO
4	4_007	14 Rocks Street	Residential	1	4	56	51	57	53	56	52	57	53	1.2	1.2	1.2	1.2	60	55	NO	NO	NO	NO	NO
4	4_008	2 Rutherford Avenue	Residential	G	2	51	46	53	49	51	47	54	50	2.7	2.7	2.7	2.7	60	55	NO	NO	NO	NO	NO
4	4_008	2 Rutherford Avenue	Residential	1	4	54	50	56	51	55	50	56	52	1.4	1.4	1.4	1.5	60	55	NO	NO	NO	NO	NO
4	4_009	4 Rutherford Avenue	Residential	G	1	51	46	53	49	51	47	54	50	2.6	2.5	2.5	2.5	60	55	NO	NO	NO	NO	NO
4	4_009	4 Rutherford Avenue	Residential	1	3	54	50	55	51	54	50	56	52	1.4	1.4	1.5	1.5	60	55	NO	NO	NO	NO	NO
4	4_010	6 Rutherford Avenue	Residential	G	2	51	46	53	49	51	47	54	50	2.5	2.6	2.6	2.6	60	55	NO	NO	NO	NO	NO
4	4_010	6 Rutherford Avenue	Residential	1	2	53	49	55	51	53	49	56	51	2.2	2.1	2.2	2.2	60	55	NO	NO	NO	NO	NO
4	4_011	8 Rutherford Avenue	Residential	G	1	51	46	53	49	51	47	54	50	2.5	2.6	2.6	2.6	60	55	NO	NO	NO	NO	NO
4	4_011	8 Rutherford Avenue	Residential	1	1	53	49	55	51	53	49	56	51	2.1	2.2	2.2	2.2	60	55	NO	NO	NO	NO	NO
4	4_012	10 Rutherford Avenue	Residential	G	2	51	47	54	49	52	48	54	50	2.3	2.4	2.4	2.4	60	55	NO	NO	NO	NO	NO
4	4_012	10 Rutherford Avenue	Residential	1	2	54	49	55	51	54	50	56	52	1.9	2	2	2	60	55	NO	NO	NO	NO	NO
4	4_013	12 Rutherford Avenue	Residential	G	2	51	47	53	49	52	48	54	50	2.4	2.4	2.4	2.4	60	55	NO	NO	NO	NO	NO
4	4_013	12 Rutherford Avenue	Residential	1	2	54	49	56	51	54	50	56	52	1.9	2	2	1.9	60	55	NO	NO	NO	NO	NO
4	4_014	14 Rutherford Avenue	Residential	G	1	50	45	50	46	50	46	51	47	0.9	0.9	0.9	0.9	60	55	NO	NO	NO	NO	NO
4	4_014	14 Rutherford Avenue	Residential	1	3	54	49	56	51	54	50	56	52	1.9	1.9	1.9	1.9	60	55	NO	NO	NO	NO	NO
4	4_015	16 Rutherford Avenue	Residential	G	1	50	45	50	46	50	46	51	47	0.9	0.9	0.9	0.9	60	55	NO	NO	NO	NO	NO
4	4_015	16 Rutherford Avenue	Residential	1	2	54	49	55	51	54	50	56	52	1.9	1.9	1.9	1.9	60	55	NO	NO	NO	NO	NO
4	4_016	18 Rutherford Avenue	Residential	G	1	49	45	50	46	50	46	51	47	0.8	0.8	0.9	0.9	60	55	NO	NO	NO	NO	NO
4	4_016	18 Rutherford Avenue	Residential	1	2	53	49	55	51	54	50	56	51	1.8	1.7	1.8	1.8	60	55	NO	NO	NO	NO	NO
4	4_017	20 Rutherford Avenue	Residential	G	1	49	44	49	45	49	45	50	46	0.9	0.9	0.9	0.9	60	55	NO	NO	NO	NO	NO
4	4_017	20 Rutherford Avenue	Residential	1	3	53	49	54	50	54	50	55	51	0.9	0.9	1	0.9	60	55	NO	NO	NO	NO	NO
4	4_018	22 Rutherford Avenue	Residential	G	4	53	48	54	50	53	49	54	50	1.1	1.1	1.1	1	60	55	NO	NO	NO	NO	NO
4	4_018	22 Rutherford Avenue	Residential	1	4	56	52	58	53	57	52	58	54	1.5	1.4	1.5	1.5	60	55	NO	NO	NO	NO	NO
4	4_019	24 Rutherford Avenue	Residential	G	3	53	48	54	49	53	49	54	50	1	1	1.1	1.1	60	55	NO	NO	NO	NO	NO
4	4_019	24 Rutherford Avenue	Residential	1	3	56	52	58	53	57	52	58	54	1.7	1.8	1.8	1.8	60	55	NO	NO	NO	NO	NO
4	4_020	26 Rutherford Avenue	Residential	G	4	52	47	53	48	52	48	53	49	0.9	0.9	1	1	60	55	NO	NO	NO	NO	NO
4	4_020	26 Rutherford Avenue	Residential	1	4	56	51	57	53	56	52	58	54	1.5	1.6	1.6	1.7	60	55	NO	NO	NO	NO	NO
4	4_021	28 Rutherford Avenue	Residential	G	3	51	47	52	48	52	47	53	48	0.9	0.9	1	0.9	60	55	NO	NO	NO	NO	NO
4	4_021	28 Rutherford Avenue	Residential	1	3	55	51	57	53	56	52	57	53	1.6	1.6	1.6	1.6	60	55	NO	NO	NO	NO	NO
4	4_022	30 Rutherford Avenue	Residential	G	3	51	47	52	47	51	47	52	48	0.8	0.9	0.9	0.9	60	55	NO	NO	NO	NO	NO
4	4_022	30 Rutherford Avenue	Residential	1	3	55	51	56	52	55	51	57	53	1.5	1.5	1.6	1.6	60	55	NO	NO	NO	NO	NO

NCA	NCA ID	Receiver Address	Receiver Type	Facade		Opening Year				Design Year				Trigger 1 Increase (Build - No Build)				NCG noise criteria		Trigger 2 Do noise levels exceed the cumlative limit with project roads adding ≥2dB to the total noise levels?		Trigger 3 Is the contribution from the road project Acute?		Consider additional noise mitigation?
						No Build		Build		No Build		Build		Opening Year		Design Year						Day	Night	
				Floor	Orientation	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night					
						dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	Day	Night	≥ 65dB LAeq,15h	≥ 60dB LAeq,9h	
4	4_023	32 Rutherford Avenue	Residential	G	2	51	47	53	48	52	48	53	49	1.3	1.4	1.3	1.3	60	55	NO	NO	NO	NO	NO
4	4_023	32 Rutherford Avenue	Residential	1	2	54	50	56	52	55	51	57	52	1.7	1.7	1.7	1.7	60	55	NO	NO	NO	NO	NO
4	4_024	34 Rutherford Avenue	Residential	G	3	56	51	58	54	56	52	59	54	2.3	2.4	2.3	2.3	60	55	NO	NO	NO	NO	NO
4	4_024	34 Rutherford Avenue	Residential	1	3	57	53	59	55	58	54	60	56	2.1	2.1	2.1	2.1	60	55	NO	NO	NO	NO	NO
4	4_025	36 Rutherford Avenue	Residential	G	3	55	51	58	53	56	52	58	54	2.3	2.3	2.3	2.3	60	55	NO	NO	NO	NO	NO
4	4_025	36 Rutherford Avenue	Residential	1	3	57	53	59	55	58	54	60	56	2	2	2	2	60	55	NO	NO	NO	NO	NO
4	4_026	38 Rutherford Avenue	Residential	G	3	50	45	51	46	50	46	51	47	1	1	1	1	60	55	NO	NO	NO	NO	NO
4	4_026	38 Rutherford Avenue	Residential	1	3	54	50	55	51	55	51	56	52	1	1	1	1	60	55	NO	NO	NO	NO	NO
4	4_027	40 Rutherford Avenue	Residential	G	4	50	45	51	46	50	46	51	47	1.1	1.1	1.2	1.2	60	55	NO	NO	NO	NO	NO
4	4_027	40 Rutherford Avenue	Residential	1	4	55	50	56	52	55	51	56	52	1.1	1.1	1.1	1.1	60	55	NO	NO	NO	NO	NO
4	4_028	42 Rutherford Avenue	Residential	G	3	52	48	53	49	52	48	54	49	1.2	1.2	1.2	1.1	60	55	NO	NO	NO	NO	NO
4	4_028	42 Rutherford Avenue	Residential	1	3	56	52	57	53	57	53	58	54	1.3	1.2	1.3	1.2	60	55	NO	NO	NO	NO	NO
4	4_029	44 Rutherford Avenue	Residential	G	1	55	51	57	53	56	52	58	54	2	2.1	2.1	2.1	60	55	NO	NO	NO	NO	NO
4	4_029	44 Rutherford Avenue	Residential	1	1	58	53	59	55	58	54	60	56	1.8	1.7	1.8	1.8	60	55	NO	NO	NO	NO	NO
4	4_030	46 Rutherford Avenue	Residential	G	3	55	51	57	53	56	52	58	54	2.1	2.2	2.2	2.2	60	55	NO	NO	NO	NO	NO
4	4_030	46 Rutherford Avenue	Residential	1	3	57	53	59	55	57	53	59	55	2	1.9	2	2	60	55	NO	NO	NO	NO	NO
4	4_031	48 Rutherford Avenue	Residential	G	2	55	50	57	53	55	51	58	54	2.6	2.6	2.6	2.6	60	55	NO	NO	NO	NO	NO
4	4_031	48 Rutherford Avenue	Residential	1	2	57	52	59	55	57	53	59	55	2.3	2.4	2.3	2.3	60	55	NO	NO	NO	NO	NO
4	4_032	50 Rutherford Avenue	Residential	G	2	55	51	57	53	56	52	58	54	2.4	2.4	2.3	2.3	60	55	NO	NO	NO	NO	NO
4	4_032	50 Rutherford Avenue	Residential	1	2	57	53	59	55	58	53	60	56	2.2	2.1	2.2	2.2	60	55	NO	NO	NO	NO	NO
4	4_033	52 Rutherford Avenue	Residential	G	3	59	54	61	56	59	55	61	57	1.8	1.8	1.8	1.9	60	55	NO	NO	NO	NO	NO
4	4_033	52 Rutherford Avenue	Residential	1	3	60	56	62	58	61	57	63	59	1.9	1.8	1.8	1.9	60	55	NO	NO	NO	NO	NO
4	4_034	54 Rutherford Avenue	Residential	G	3	65	61	67	63	65	61	68	63	2.1	2.2	2.2	2.2	60	55	YES	YES	YES	YES	NO
4	4_034	54 Rutherford Avenue	Residential	1	3	67	62	69	65	67	63	70	66	2.7	2.8	2.8	2.8	60	55	YES	YES	YES	YES	NO
4	4_035	56 Rutherford Avenue	Residential	G	3	65	61	67	63	65	61	68	63	2.1	2.2	2.1	2.2	60	55	YES	YES	YES	YES	NO
4	4_035	56 Rutherford Avenue	Residential	1	3	67	62	69	65	67	63	70	66	2.7	2.7	2.7	2.8	60	55	YES	YES	YES	YES	NO
4	4_036	58 Rutherford Avenue	Residential	G	3	65	61	67	63	65	61	68	63	2.2	2.2	2.2	2.2	60	55	YES	YES	YES	YES	NO
4	4_036	58 Rutherford Avenue	Residential	1	3	66	62	69	65	67	63	70	66	2.7	2.7	2.7	2.7	60	55	YES	YES	YES	YES	NO
4	4_037	60 Rutherford Avenue	Residential	G	4	65	60	67	63	65	61	67	63	2.2	2.2	2.2	2.2	60	55	YES	YES	YES	YES	NO
4	4_037	60 Rutherford Avenue	Residential	1	4	66	62	69	65	67	63	70	65	2.7	2.7	2.7	2.7	60	55	YES	YES	YES	YES	NO
4	4_038	62 Rutherford Avenue	Residential	G	3	64	60	67	62	65	61	67	63	2.2	2.2	2.2	2.2	60	55	YES	YES	YES	YES	NO
4	4_038	62 Rutherford Avenue	Residential	1	3	66	62	69	65	67	63	69	65	2.7	2.6	2.7	2.6	60	55	YES	YES	YES	YES	NO
4	4_039	64 Rutherford Avenue	Residential	G	3	64	60	67	62	65	61	67	63	2.2	2.2	2.2	2.2	60	55	YES	YES	YES	YES	NO
4	4_039	64 Rutherford Avenue	Residential	1	3	66	62	69	64	67	62	69	65	2.6	2.6	2.7	2.6	60	55	YES	YES	YES	YES	NO
4	4_040	66 Rutherford Avenue	Residential	G	3	64	60	66	62	65	61	67	63	2.2	2.3	2.3	2.3	60	55	YES	YES	YES	YES	NO
4	4_040	66 Rutherford Avenue	Residential	1	3	66	62	69	64	67	62	69	65	2.6	2.6	2.6	2.6	60	55	YES	YES	YES	YES	NO
4	4_041	68 Rutherford Avenue	Residential	G	4	64	60	66	62	65	61	67	63	2.3	2.3	2.3	2.3	60	55	YES	YES	YES	YES	NO
4	4_041	68 Rutherford Avenue	Residential	1	4	66	62	69	64	67	62	69	65	2.6	2.6	2.6	2.7	60	55	YES	YES	YES	YES	NO
4	4_042	70 Rutherford Avenue	Residential	G	3	64	60	66	62	65	60	67	63	2.3	2.2	2.3	2.3	60	55	YES	YES	YES	YES	NO
4	4_042	70 Rutherford Avenue	Residential	1	3	66	62	68	64	66	62	69	65	2.6	2.5	2.6	2.6	60	55	YES	YES	YES	YES	NO
4	4_043	72 Rutherford Avenue	Residential	G	3	64	60	66	62	65	60	67	63	2.3	2.3	2.3	2.4	60	55	YES	YES	YES	YES	NO
4	4_043	72 Rutherford Avenue	Residential	1	3	66	61	68	64	66	62	69	65	2.6	2.6	2.6	2.6	60	55	YES	YES	YES	YES	NO
4	4_044	74 Rutherford Avenue	Residential	G	4	64	60	66	62	64	60	67	63	2.3	2.3	2.3	2.3	60	55	YES	YES	YES	YES	NO
4	4_044	74 Rutherford Avenue	Residential	1	4	66	61	68	64	66	62	69	65	2.5	2.5	2.5	2.5	60	55	YES	YES	YES	YES	NO
4	4_045	76 Rutherford Avenue	Residential	G	3	65	60	67	63	65	61	68	63	2.5	2.5	2.6	2.6	60	55	YES	YES	YES	YES	NO
4	4_045	76 Rutherford Avenue	Residential	1	3	66	62	69	65	67	63	70	65	2.8	2.8	2.8	2.8	60	55	YES	YES	YES	YES	NO
4	4_046	78 Rutherford Avenue	Residential	G	4	65	60	67	63	65	61	68	64	2.6	2.6	2.7	2.6	60	55	YES	YES	YES	YES	NO
4	4_046	78 Rutherford Avenue	Residential	1	4	66	62	69	65	67	63	70	66	2.8	2.8	2.8	2.9	60	55	YES	YES	YES	YES	NO
4	4_047	80 Rutherford Avenue	Residential	G	4	64	59	66	62	64	60	67	62	2.4	2.3	2.4	2.4	60	55	YES	YES	YES	YES	NO
4	4_047	80 Rutherford Avenue	Residential	1	4	66	61	68	64	66	62	69	65	2.8	2.8	2.8	2.8	60	55	YES	YES	YES	YES	NO
4	4_048	82 Rutherford Avenue	Residential	G	2	57	53	60	55	58	54	60	56	2.2	2.3	2.2	2.2	60	55	NO	NO	NO	NO	NO
4	4_048	82 Rutherford Avenue	Residential	1	2	60	56	62	58	61	56	63	58	2	2.1	2	2.1	60	55	NO	NO	NO	NO	NO
4	4_049	84 Rutherford Avenue	Residential	G	1	59	54	60	56	59	55	60	56	1.3	1.2	1.2	1.2	60	55	NO	NO	NO	NO	NO
4	4_049	84 Rutherford Avenue	Residential	1	1	61	57	62	58	62	57	63	59	1.5	1.4	1.5	1.5	60	55	NO	NO	NO	NO	NO
4	4_050	86 Rutherford Avenue	Residential	G	1	57	53	58	54	58	54	59	55	1.1	1.1	1.1	1.1	60	55	NO	NO	NO	NO	NO
4	4_050	86 Rutherford Avenue	Residential	1	1	60	55	61	57	60	56	61	57	1.2	1.2	1.2	1.2	60	55	NO	NO	NO	NO	NO
4	4_051	88 Rutherford Avenue	Residential	G	1	56	52	57	53	57	53	58	54	1.1	1.1	1	1	60	55	NO	NO	NO	NO	NO

NCA	NCA ID	Receiver Address	Receiver Type	Facade		Opening Year				Design Year				Trigger 1 Increase (Build - No Build)				NCG noise criteria		Trigger 2 Do noise levels exceed the cumlative limit with project roads adding ≥2dB to the total noise levels?		Trigger 3 Is the contribution from the road project Acute?		Consider additional noise mitigation?
						No Build		Build		No Build		Build		Opening Year		Design Year						Day	Night	
				Floor	Orientation	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night					
						dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	Day	Night	≥ 65dB LAeq,15h	≥ 60dB LAeq,9h	
4	4_051	88 Rutherford Avenue	Residential	1	1	59	54	60	55	59	55	60	56	1.1	1.1	1.1	1.1	60	55	NO	NO	NO	NO	NO
4	4_052	90 Rutherford Avenue	Residential	G	1	55	51	56	52	56	51	57	52	1.1	1.2	1.1	1.1	60	55	NO	NO	NO	NO	NO
4	4_052	90 Rutherford Avenue	Residential	1	1	57	53	58	54	58	54	59	55	1	1.1	1	1.1	60	55	NO	NO	NO	NO	NO
4	4_053	92 Rutherford Avenue	Residential	G	1	54	50	55	51	55	50	56	51	1.2	1.1	1.2	1.1	60	55	NO	NO	NO	NO	NO
4	4_053	92 Rutherford Avenue	Residential	1	3	57	52	58	54	57	53	59	54	1.4	1.5	1.5	1.4	60	55	NO	NO	NO	NO	NO
4	4_054	94 Rutherford Avenue	Residential	G	2	53	49	55	50	54	50	55	51	1.2	1.2	1.3	1.3	60	55	NO	NO	NO	NO	NO
4	4_054	94 Rutherford Avenue	Residential	1	2	56	52	58	53	57	53	58	54	1.5	1.4	1.5	1.4	60	55	NO	NO	NO	NO	NO
4	4_055	96 Rutherford Avenue	Residential	G	2	53	49	54	50	54	49	55	51	1.2	1.2	1.2	1.3	60	55	NO	NO	NO	NO	NO
4	4_055	96 Rutherford Avenue	Residential	1	2	56	52	57	53	57	52	58	54	1.4	1.5	1.5	1.4	60	55	NO	NO	NO	NO	NO
4	4_056	98 Rutherford Avenue	Residential	G	3	53	49	54	50	54	49	55	51	1.2	1.2	1.2	1.2	60	55	NO	NO	NO	NO	NO
4	4_056	98 Rutherford Avenue	Residential	1	3	56	52	57	53	57	52	58	54	1.5	1.5	1.5	1.5	60	55	NO	NO	NO	NO	NO
4	4_057	100 Rutherford Avenue	Residential	G	2	53	49	54	50	53	49	55	50	1.2	1.2	1.2	1.2	60	55	NO	NO	NO	NO	NO
4	4_057	100 Rutherford Avenue	Residential	1	2	56	52	57	53	56	52	58	54	1.6	1.5	1.6	1.6	60	55	NO	NO	NO	NO	NO
4	4_058	102 Rutherford Avenue	Residential	G	3	53	48	54	49	53	49	54	50	1.1	1.1	1.2	1.2	60	55	NO	NO	NO	NO	NO
4	4_058	102 Rutherford Avenue	Residential	1	3	56	51	57	53	56	52	58	54	1.6	1.6	1.6	1.6	60	55	NO	NO	NO	NO	NO
4	4_059	104 Rutherford Avenue	Residential	G	2	52	48	53	49	53	49	54	50	1.1	1.1	1.1	1.2	60	55	NO	NO	NO	NO	NO
4	4_059	104 Rutherford Avenue	Residential	1	2	55	51	57	53	56	52	57	53	1.6	1.6	1.6	1.6	60	55	NO	NO	NO	NO	NO
4	4_060	106 Rutherford Avenue	Residential	G	3	52	48	53	49	53	48	54	50	1.1	1.1	1.1	1.1	60	55	NO	NO	NO	NO	NO
4	4_060	106 Rutherford Avenue	Residential	1	3	55	51	57	52	56	52	57	53	1.6	1.6	1.6	1.6	60	55	NO	NO	NO	NO	NO
4	4_061	108 Rutherford Avenue	Residential	G	2	52	47	53	48	52	48	53	49	0.9	1	1	0.9	60	55	NO	NO	NO	NO	NO
4	4_061	108 Rutherford Avenue	Residential	1	2	55	50	56	52	55	51	57	53	1.5	1.6	1.6	1.6	60	55	NO	NO	NO	NO	NO
4	4_062	110 Rutherford Avenue	Residential	G	2	50	46	51	47	51	46	52	48	1.1	1.1	1.2	1.2	60	55	NO	NO	NO	NO	NO
4	4_062	110 Rutherford Avenue	Residential	1	2	54	50	56	51	54	50	56	52	1.9	1.8	1.9	1.9	60	55	NO	NO	NO	NO	NO
4	4_063	112 Rutherford Avenue	Residential	G	3	53	49	55	51	53	49	55	51	1.9	2	1.9	1.9	60	55	NO	NO	NO	NO	NO
4	4_063	112 Rutherford Avenue	Residential	1	3	55	51	57	52	55	51	57	53	1.8	1.7	1.8	1.8	60	55	NO	NO	NO	NO	NO
4	4_064	114 Rutherford Avenue	Residential	G	1	64	60	66	62	65	60	66	62	1.8	1.8	1.7	1.7	60	55	YES	YES	YES	YES	NO
4	4_064	114 Rutherford Avenue	Residential	1	1	66	62	69	64	67	62	69	65	2.6	2.6	2.7	2.7	60	55	YES	YES	YES	YES	NO
4	4_065	116 Rutherford Avenue	Residential	G	4	65	60	67	62	65	61	67	63	2.1	2.2	2.1	2.1	60	55	YES	YES	YES	YES	NO
4	4_065	116 Rutherford Avenue	Residential	1	4	66	62	69	65	67	63	70	65	2.6	2.6	2.6	2.7	60	55	YES	YES	YES	YES	NO
4	4_066	118 Rutherford Avenue	Residential	G	2	65	60	67	62	65	61	67	63	2.1	2.1	2.1	2.1	60	55	YES	YES	YES	YES	NO
4	4_066	118 Rutherford Avenue	Residential	1	2	66	62	69	65	67	63	69	65	2.6	2.5	2.6	2.6	60	55	YES	YES	YES	YES	NO
4	4_067	120 Rutherford Avenue	Residential	G	3	65	60	67	63	65	61	67	63	2.2	2.2	2.2	2.2	60	55	YES	YES	YES	YES	NO
4	4_067	120 Rutherford Avenue	Residential	1	3	66	62	69	65	67	63	70	65	2.5	2.6	2.6	2.5	60	55	YES	YES	YES	YES	NO
4	4_068	122 Rutherford Avenue	Residential	G	2	65	60	67	63	65	61	67	63	2.2	2.2	2.1	2.1	60	55	YES	YES	YES	YES	NO
4	4_068	122 Rutherford Avenue	Residential	1	2	66	62	69	65	67	63	69	65	2.5	2.6	2.5	2.5	60	55	YES	YES	YES	YES	NO
4	4_069	124 Rutherford Avenue	Residential	G	2	65	61	67	63	65	61	68	63	2.2	2.1	2.2	2.2	60	55	YES	YES	YES	YES	NO
4	4_069	124 Rutherford Avenue	Residential	1	2	66	62	69	65	67	63	70	65	2.5	2.6	2.6	2.5	60	55	YES	YES	YES	YES	NO
4	4_070	126 Rutherford Avenue	Residential	G	2	65	61	67	63	65	61	68	63	2.2	2.1	2.1	2.1	60	55	YES	YES	YES	YES	NO
4	4_070	126 Rutherford Avenue	Residential	1	2	66	62	69	65	67	63	70	65	2.5	2.5	2.6	2.5	60	55	YES	YES	YES	YES	NO
4	4_071	23 Pellizzer Boulevard	Residential	G	1	52	47	53	48	52	48	53	49	1	1	1	1	60	55	NO	NO	NO	NO	NO
4	4_071	23 Pellizzer Boulevard	Residential	1	3	54	49	56	51	54	50	56	52	2	2	2	2	60	55	NO	NO	NO	NO	NO
4	4_072	25 Pellizzer Boulevard	Residential	G	1	52	48	53	49	52	48	53	49	1	1	1	1.1	60	55	NO	NO	NO	NO	NO
4	4_072	25 Pellizzer Boulevard	Residential	1	2	54	50	56	52	55	50	57	52	2	2.1	2	2	60	55	NO	NO	NO	NO	NO
4	4_073	27 Pellizzer Boulevard	Residential	G	1	52	48	53	49	53	48	54	50	1	1.1	1.1	1.1	60	55	NO	NO	NO	NO	NO
4	4_073	27 Pellizzer Boulevard	Residential	1	2	54	50	56	51	55	50	56	52	1.8	1.8	1.8	1.8	60	55	NO	NO	NO	NO	NO
4	4_074	29 Pellizzer Boulevard	Residential	G	1	52	48	54	49	53	49	54	50	1.2	1.1	1.2	1.1	60	55	NO	NO	NO	NO	NO
4	4_074	29 Pellizzer Boulevard	Residential	1	1	55	50	56	52	55	51	56	52	1.1	1.2	1.1	1.1	60	55	NO	NO	NO	NO	NO
4	4_075	31 Pellizzer Boulevard	Residential	G	1	53	48	54	50	53	49	55	50	1.2	1.2	1.3	1.3	60	55	NO	NO	NO	NO	NO
4	4_075	31 Pellizzer Boulevard	Residential	1	1	55	51	56	52	56	52	57	53	1.2	1.2	1.2	1.2	60	55	NO	NO	NO	NO	NO
4	4_076	33 Pellizzer Boulevard	Residential	G	1	53	49	54	50	54	49	55	51	1.2	1.3	1.3	1.3	60	55	NO	NO	NO	NO	NO
4	4_076	33 Pellizzer Boulevard	Residential	1	1	56	51	57	53	56	52	57	53	1.2	1.2	1.2	1.3	60	55	NO	NO	NO	NO	NO
4	4_077	35 Pellizzer Boulevard	Residential	G	1	54	49	55	51	54	50	56	51	1.4	1.3	1.4	1.4	60	55	NO	NO	NO	NO	NO
4	4_077	35 Pellizzer Boulevard	Residential	1	1	56	52	57	53	57	52	58	54	1.3	1.3	1.3	1.4	60	55	NO	NO	NO	NO	NO
4	4_078	37 Pellizzer Boulevard	Residential	G	1	54	50	56	51	55	50	56	52	1.5	1.5	1.5	1.5	60	55	NO	NO	NO	NO	NO
4	4_078	37 Pellizzer Boulevard	Residential	1	1	57	52	58	54	57	53	59	54	1.4	1.4	1.4	1.4	60	55	NO	NO	NO	NO	NO
4	4_079	39 Pellizzer Boulevard	Residential	G	1	55	50	56	52	55	51	57	53	1.5	1.6	1.6	1.6	60	55	NO	NO	NO	NO	NO
4	4_079	39 Pellizzer Boulevard	Residential	1	1	57	53	59	55	58	54	59	55	1.5	1.5	1.5	1.5	60	55	NO	NO	NO	NO	NO

NCA	NCA ID	Receiver Address	Receiver Type	Facade		Opening Year				Design Year				Trigger 1 Increase (Build - No Build)				NCG noise criteria		Trigger 2 Do noise levels exceed the cumlative limit with project roads adding ≥2dB to the total noise levels?		Trigger 3 Is the contribution from the road project Acute?		Consider additional noise mitigation?
						No Build		Build		No Build		Build		Opening Year		Design Year						Day	Night	
				Floor	Orientation	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night					
						dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	Day	Night	≥ 65dB LAeq,15h	≥ 60dB LAeq,9h	
4	4_080	41 Pellizzer Boulevard	Residential	G	1	55	51	57	53	56	52	58	53	1.7	1.6	1.6	1.6	60	55	NO	NO	NO	NO	NO
4	4_080	41 Pellizzer Boulevard	Residential	1	1	58	54	60	55	59	54	60	56	1.5	1.6	1.6	1.6	60	55	NO	NO	NO	NO	NO
4	4_081	43 Pellizzer Boulevard	Residential	G	1	56	51	58	53	56	52	58	54	1.8	1.8	1.7	1.8	60	55	NO	NO	NO	NO	NO
4	4_081	43 Pellizzer Boulevard	Residential	1	1	58	54	60	56	59	55	61	56	1.7	1.7	1.7	1.6	60	55	NO	NO	NO	NO	NO
4	4_082	45 Pellizzer Boulevard	Residential	G	1	58	53	60	55	58	54	60	56	2	1.9	1.9	1.9	60	55	NO	NO	NO	NO	NO
4	4_082	45 Pellizzer Boulevard	Residential	1	1	60	56	62	58	61	57	63	59	1.9	1.9	1.9	1.9	60	55	NO	NO	NO	NO	NO
4	4_083	47 Pellizzer Boulevard	Residential	G	3	61	57	63	59	62	58	64	60	2.2	2.2	2.2	2.2	60	55	NO	YES	NO	YES	NO
4	4_083	47 Pellizzer Boulevard	Residential	1	3	63	59	66	61	64	60	66	62	2.2	2.2	2.2	2.2	60	55	YES	YES	YES	YES	NO
4	4_084	Grace Crescent	Residential	G	2	56	52	57	53	56	52	58	53	1.3	1.2	1.3	1.2	60	55	NO	NO	NO	NO	NO
4	4_084	Grace Crescent	Residential	1	2	57	53	58	54	58	54	59	55	1.1	1.1	1.1	1.1	60	55	NO	NO	NO	NO	NO
4	4_085	Grace Crescent	Residential	G	1	56	52	57	53	57	53	58	54	1.3	1.3	1.2	1.2	60	55	NO	NO	NO	NO	NO
4	4_085	Grace Crescent	Residential	1	1	58	53	59	54	58	54	59	55	1.1	1.1	1.1	1.1	60	55	NO	NO	NO	NO	NO
4	4_086	Grace Crescent	Residential	G	1	56	52	58	53	57	53	58	54	1.2	1.1	1.2	1.1	60	55	NO	NO	NO	NO	NO
4	4_086	Grace Crescent	Residential	1	1	58	54	59	55	59	54	60	55	1	1	1.1	1	60	55	NO	NO	NO	NO	NO
4	4_087	Grace Crescent	Residential	G	2	57	53	58	54	57	53	59	54	1.1	1.1	1.2	1.1	60	55	NO	NO	NO	NO	NO
4	4_087	Grace Crescent	Residential	1	2	58	54	59	55	59	55	60	56	1	1	1	1	60	55	NO	NO	NO	NO	NO
4	4_088	Grace Crescent	Residential	G	1	57	53	58	54	58	54	59	55	1.1	1	1.1	1	60	55	NO	NO	NO	NO	NO
4	4_088	Grace Crescent	Residential	1	1	59	55	60	56	59	55	60	56	1	1	1	1	60	55	NO	NO	NO	NO	NO
4	4_089	Grace Crescent	Residential	G	1	58	53	59	54	58	54	59	55	1	1	1.1	1	60	55	NO	NO	NO	NO	NO
4	4_089	Grace Crescent	Residential	1	1	59	55	60	56	60	56	61	57	1	0.9	0.9	0.9	60	55	NO	NO	NO	NO	NO
4	4_090	Grace Crescent	Residential	G	2	58	54	59	55	59	55	60	56	1	0.9	0.9	0.9	60	55	NO	NO	NO	NO	NO
4	4_090	Grace Crescent	Residential	1	2	60	56	61	57	61	56	61	57	0.9	0.9	0.9	0.9	60	55	NO	NO	NO	NO	NO
4	4_091	Grace Crescent	Residential	G	1	59	55	60	55	59	55	60	56	0.9	0.8	0.9	0.8	60	55	NO	NO	NO	NO	NO
4	4_091	Grace Crescent	Residential	1	1	60	56	61	57	61	57	62	58	0.8	0.8	0.9	0.8	60	55	NO	NO	NO	NO	NO
4	4_092	Grace Crescent	Residential	G	1	60	56	61	56	60	56	61	57	0.9	0.9	1	0.9	60	55	NO	NO	NO	NO	NO
4	4_092	Grace Crescent	Residential	1	1	61	57	62	58	62	58	63	59	1	0.9	0.9	0.9	60	55	NO	NO	NO	NO	NO
4	4_093	Grace Crescent	Residential	G	3	62	58	63	59	63	59	64	60	1	1	1	0.9	60	55	NO	YES	NO	YES	NO
4	4_093	Grace Crescent	Residential	1	3	64	60	65	61	64	60	66	61	1.2	1.1	1.2	1.1	60	55	YES	YES	YES	YES	NO
4	4_094	Grace Crescent	Residential	G	2	63	59	64	60	64	60	65	61	1.2	1.2	1.1	1.1	60	55	YES	YES	YES	YES	NO
4	4_094	Grace Crescent	Residential	1	2	65	60	66	62	65	61	67	62	1.4	1.4	1.4	1.3	60	55	YES	YES	YES	YES	NO
4	4_095	Grace Crescent	Residential	G	3	67	62	69	64	67	63	69	65	2.1	2.1	2.1	2	60	55	YES	YES	YES	YES	NO
4	4_095	Grace Crescent	Residential	1	3	68	64	71	67	69	65	72	67	2.6	2.6	2.6	2.6	60	55	YES	YES	YES	YES	NO
4	4_096	Grace Crescent	Residential	G	3	66	62	68	64	67	62	69	65	2.4	2.3	2.4	2.4	60	55	YES	YES	YES	YES	NO
4	4_096	Grace Crescent	Residential	1	3	68	64	71	67	68	64	72	67	3.1	3.1	3.2	3.2	60	55	YES	YES	YES	YES	NO
4	4_097	Grace Crescent	Residential	G	3	66	62	68	64	67	62	69	65	2.5	2.4	2.4	2.4	60	55	YES	YES	YES	YES	NO
4	4_097	Grace Crescent	Residential	1	3	68	63	71	67	68	64	72	67	3.3	3.2	3.2	3.3	60	55	YES	YES	YES	YES	NO
4	4_098	Grace Crescent	Residential	G	3	66	62	68	64	66	62	69	65	2.5	2.5	2.5	2.5	60	55	YES	YES	YES	YES	NO
4	4_098	Grace Crescent	Residential	1	3	68	63	71	67	68	64	72	67	3.3	3.3	3.3	3.3	60	55	YES	YES	YES	YES	NO
4	4_099	Grace Crescent	Residential	G	4	66	62	68	64	66	62	69	65	2.5	2.6	2.5	2.5	60	55	YES	YES	YES	YES	NO
4	4_099	Grace Crescent	Residential	1	4	68	63	71	67	68	64	72	67	3.3	3.4	3.4	3.3	60	55	YES	YES	YES	YES	NO
4	4_100	Grace Crescent	Residential	G	2	66	62	68	64	66	62	69	65	2.6	2.7	2.6	2.6	60	55	YES	YES	YES	YES	NO
4	4_100	Grace Crescent	Residential	1	2	68	63	71	67	68	64	72	67	3.4	3.4	3.4	3.4	60	55	YES	YES	YES	YES	NO
4	4_101	Grace Crescent	Residential	G	3	66	62	68	64	66	62	69	65	2.6	2.6	2.7	2.7	60	55	YES	YES	YES	YES	NO
4	4_101	Grace Crescent	Residential	1	3	67	63	71	67	68	64	72	67	3.4	3.4	3.4	3.4	60	55	YES	YES	YES	YES	NO
4	4_102	Grace Crescent	Residential	G	4	66	61	68	64	66	62	69	65	2.5	2.5	2.5	2.4	60	55	YES	YES	YES	YES	NO
4	4_102	Grace Crescent	Residential	1	4	67	63	71	66	68	64	71	67	3.3	3.2	3.3	3.3	60	55	YES	YES	YES	YES	NO
4	4_103	Grace Crescent	Residential	G	3	66	61	68	64	66	62	69	64	2.4	2.4	2.3	2.3	60	55	YES	YES	YES	YES	NO
4	4_103	Grace Crescent	Residential	1	3	67	63	70	66	68	64	71	67	3.2	3.1	3.1	3.2	60	55	YES	YES	YES	YES	NO
4	4_104	Grace Crescent	Residential	G	2	66	61	68	64	66	62	68	64	2.3	2.2	2.3	2.2	60	55	YES	YES	YES	YES	NO
4	4_104	Grace Crescent	Residential	1	2	67	63	70	66	68	64	71	67	3	3	3.1	3	60	55	YES	YES	YES	YES	NO
4	4_105	Grace Crescent	Residential	G	4	66	61	68	64	66	62	68	64	2.2	2.2	2.1	2.1	60	55	YES	YES	YES	YES	NO
4	4_105	Grace Crescent	Residential	1	4	67	63	70	66	68	64	71	67	2.9	3	3	2.9	60	55	YES	YES	YES	YES	NO
4	4_106	Grace Crescent	Residential	G	2	64	60	66	62	65	61	67	62	1.7	1.7	1.6	1.6	60	55	YES	YES	YES	YES	NO
4	4_106	Grace Crescent	Residential	1	2	66	62	68	64	67	62	69	65	2.3	2.3	2.3	2.2	60	55	YES	YES	YES	YES	NO
4	4_107	Grace Crescent	Residential	G	3	65	60	66	62	65	61	67	63	1.9	1.9	1.9	1.9	60	55	YES	YES	YES	YES	NO
4	4_107	Grace Crescent	Residential	1	3	66	62	68	64	67	63	69	65	2.3	2.4	2.4	2.3	60	55	YES	YES	YES	YES	NO
4	4_108	Grace Crescent	Residential	G	4	65	61	67	63	66	61	67	63	1.9	1.9	1.8	1.8	60	55	YES	YES	YES	YES	NO

NCA	NCA ID	Receiver Address	Receiver Type	Facade		Opening Year				Design Year				Trigger 1 Increase (Build - No Build)				NCG noise criteria		Trigger 2 Do noise levels exceed the cumlative limit with project roads adding ≥2dB to the total noise levels?		Trigger 3 Is the contribution from the road project Acute?		Consider additional noise mitigation?
						No Build		Build		No Build		Build		Opening Year		Design Year						Day	Night	
				Floor	Orientation	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night					
						dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	Day	Night	≥ 65dB LAeq,15h	≥ 60dB LAeq,9h	
4	4_108	Grace Crescent	Residential	1	4	66	62	69	65	67	63	69	65	2.4	2.3	2.4	2.4	60	55	YES	YES	YES	YES	NO
4	4_109	Grace Crescent	Residential	G	4	65	60	66	62	65	61	67	63	1.8	1.9	1.8	1.8	60	55	YES	YES	YES	YES	NO
4	4_109	Grace Crescent	Residential	1	4	66	62	68	64	67	62	69	64	2.1	2.2	2.2	2.1	60	55	YES	YES	YES	YES	NO
4	4_110	Grace Crescent	Residential	G	2	63	58	64	60	63	59	65	60	1.4	1.4	1.3	1.4	60	55	YES	YES	YES	YES	NO
4	4_110	Grace Crescent	Residential	1	2	64	60	66	62	65	61	66	62	1.7	1.6	1.6	1.6	60	55	YES	YES	YES	YES	NO
4	4_111	Grace Crescent	Residential	G	3	63	59	64	60	63	59	65	61	1.4	1.5	1.4	1.4	60	55	YES	YES	YES	YES	NO
4	4_111	Grace Crescent	Residential	1	3	64	60	66	62	65	61	66	62	1.5	1.5	1.5	1.5	60	55	YES	YES	YES	YES	NO
4	4_112	Grace Crescent	Residential	G	4	63	59	65	60	64	59	65	61	1.5	1.5	1.5	1.5	60	55	YES	YES	YES	YES	NO
4	4_112	Grace Crescent	Residential	1	4	64	60	66	62	65	61	67	62	1.6	1.6	1.6	1.6	60	55	YES	YES	YES	YES	NO
4	4_113	Grace Crescent	Residential	G	3	62	57	63	59	62	58	64	60	1.4	1.4	1.4	1.4	60	55	NO	YES	NO	NO	NO
4	4_113	Grace Crescent	Residential	1	3	63	59	64	60	64	59	65	61	1.3	1.3	1.3	1.4	60	55	YES	YES	YES	YES	NO
4	4_114	Grace Crescent	Residential	G	2	60	56	62	57	61	57	62	58	1.4	1.4	1.4	1.4	60	55	NO	NO	NO	NO	NO
4	4_114	Grace Crescent	Residential	1	2	62	57	63	59	62	58	64	59	1.3	1.3	1.3	1.3	60	55	NO	NO	NO	NO	NO
4	4_115	Grace Crescent	Residential	G	4	61	57	62	58	62	57	63	59	1.2	1.3	1.2	1.3	60	55	NO	NO	NO	NO	NO
4	4_115	Grace Crescent	Residential	1	4	62	58	63	59	63	59	64	60	1.2	1.2	1.2	1.2	60	55	NO	YES	NO	YES	NO
4	4_116	Grace Crescent	Residential	G	4	60	56	61	57	61	57	62	58	1.2	1.2	1.2	1.2	60	55	NO	NO	NO	NO	NO
4	4_116	Grace Crescent	Residential	1	4	62	57	63	58	62	58	63	59	1.1	1.1	1.1	1.2	60	55	NO	NO	NO	NO	NO
4	4_117	Grace Crescent	Residential	G	2	59	54	60	56	59	55	61	56	1.3	1.3	1.3	1.4	60	55	NO	NO	NO	NO	NO
4	4_117	Grace Crescent	Residential	1	2	60	56	61	57	61	56	62	58	1.2	1.2	1.3	1.2	60	55	NO	NO	NO	NO	NO
4	4_118	Grace Crescent	Residential	G	4	59	55	60	56	59	55	61	56	1.3	1.2	1.3	1.3	60	55	NO	NO	NO	NO	NO
4	4_118	Grace Crescent	Residential	1	4	60	56	61	57	61	57	62	58	1.2	1.1	1.2	1.1	60	55	NO	NO	NO	NO	NO
4	4_119	Grace Crescent	Residential	G	4	58	54	59	55	59	54	60	56	1.2	1.3	1.2	1.2	60	55	NO	NO	NO	NO	NO
4	4_119	Grace Crescent	Residential	1	4	59	55	61	56	60	56	61	57	1.1	1.1	1.1	1.1	60	55	NO	NO	NO	NO	NO
4	4_120	Grace Crescent	Residential	G	2	56	52	58	53	57	52	58	54	1.4	1.4	1.4	1.5	60	55	NO	NO	NO	NO	NO
4	4_120	Grace Crescent	Residential	1	2	58	53	59	55	58	54	59	55	1.1	1.2	1.1	1.2	60	55	NO	NO	NO	NO	NO
4	4_121	Grace Crescent	Residential	G	4	57	53	58	54	58	53	59	55	1.3	1.3	1.3	1.2	60	55	NO	NO	NO	NO	NO
4	4_121	Grace Crescent	Residential	1	4	58	54	59	55	59	55	60	56	1.1	1	1.1	1.1	60	55	NO	NO	NO	NO	NO
4	4_122	Grace Crescent	Residential	G	4	56	52	57	53	57	53	58	54	1.2	1.2	1.2	1.2	60	55	NO	NO	NO	NO	NO
4	4_122	Grace Crescent	Residential	1	4	58	53	59	54	58	54	59	55	1	1	1	1.1	60	55	NO	NO	NO	NO	NO
4	4_123	Grace Crescent	Residential	G	2	54	49	55	51	54	50	56	51	1.3	1.2	1.3	1.3	60	55	NO	NO	NO	NO	NO
4	4_123	Grace Crescent	Residential	1	2	55	51	56	52	56	52	57	53	1.1	1.1	1.1	1	60	55	NO	NO	NO	NO	NO
4	4_124	Grace Crescent	Residential	G	4	55	51	56	52	56	52	57	53	1.1	1.1	1.1	1.2	60	55	NO	NO	NO	NO	NO
4	4_124	Grace Crescent	Residential	1	4	57	52	58	53	57	53	58	54	0.9	1	1	0.9	60	55	NO	NO	NO	NO	NO
4	4_125	Grace Crescent	Residential	G	4	54	50	55	51	54	50	56	51	1.2	1.2	1.2	1.3	60	55	NO	NO	NO	NO	NO
4	4_125	Grace Crescent	Residential	1	4	55	51	56	52	56	52	57	53	1	0.9	1	1	60	55	NO	NO	NO	NO	NO
4	4_126	Grace Crescent	Residential	G	2	53	49	54	50	54	49	55	51	1.2	1.3	1.2	1.2	60	55	NO	NO	NO	NO	NO
4	4_126	Grace Crescent	Residential	1	2	55	50	56	51	55	51	56	52	1	1	1	1	60	55	NO	NO	NO	NO	NO
4	4_127	Grace Crescent	Residential	G	4	53	49	55	50	54	50	55	51	1.1	1.1	1.2	1.1	60	55	NO	NO	NO	NO	NO
4	4_127	Grace Crescent	Residential	1	4	55	51	56	52	55	51	56	52	1	0.9	1	0.9	60	55	NO	NO	NO	NO	NO
4	4_128	Grace Crescent	Residential	G	2	52	47	53	49	52	48	53	49	1.1	1.2	1.1	1.2	60	55	NO	NO	NO	NO	NO
4	4_128	Grace Crescent	Residential	1	2	53	49	54	50	54	50	55	51	1	0.9	1	1	60	55	NO	NO	NO	NO	NO
4	4_129	Grace Crescent	Residential	G	2	51	47	53	48	52	48	53	49	1.2	1.2	1.2	1.2	60	55	NO	NO	NO	NO	NO
4	4_129	Grace Crescent	Residential	1	2	53	49	54	50	54	49	55	50	0.9	1	1	1	60	55	NO	NO	NO	NO	NO
4	4_130	Grace Crescent	Residential	G	3	51	47	52	48	52	48	53	49	1.1	1.1	1.2	1.2	60	55	NO	NO	NO	NO	NO
4	4_130	Grace Crescent	Residential	1	3	53	49	54	50	53	49	54	50	1	1	1	1	60	55	NO	NO	NO	NO	NO
4	4_131	Grace Crescent	Residential	G	2	51	47	52	48	51	47	53	48	1.2	1.1	1.2	1.2	60	55	NO	NO	NO	NO	NO
4	4_131	Grace Crescent	Residential	1	2	53	48	54	49	53	49	54	50	1	1	1	0.9	60	55	NO	NO	NO	NO	NO
4	4_132	Grace Crescent	Residential	G	2	51	46	52	48	51	47	52	48	1.1	1.2	1.1	1.1	60	55	NO	NO	NO	NO	NO
4	4_132	Grace Crescent	Residential	1	2	52	48	53	49	53	49	54	50	0.9	0.9	0.9	1	60	55	NO	NO	NO	NO	NO
4	4_133	Grace Crescent	Residential	G	3	51	46	52	47	51	47	52	48	1.1	1.1	1.1	1.2	60	55	NO	NO	NO	NO	NO
4	4_133	Grace Crescent	Residential	1	3	52	48	53	49	53	49	54	49	1	1	1	0.9	60	55	NO	NO	NO	NO	NO
4	4_134	Grace Crescent	Residential	G	3	51	46	52	47	51	47	52	48	1.1	1.1	1.1	1	60	55	NO	NO	NO	NO	NO
4	4_134	Grace Crescent	Residential	1	3	52	48	53	49	53	49	54	50	0.9	0.9	0.9	0.9	60	55	NO	NO	NO	NO	NO
4	4_135	Grace Crescent	Residential	G	2	51	47	52	48	52	47	53	48	1	1	1.1	1	60	55	NO	NO	NO	NO	NO
4	4_135	Grace Crescent	Residential	1	2	53	48	54	49	53	49	54	50	0.9	0.9	0.9	0.8	60	55	NO	NO	NO	NO	NO
4	4_136	Grace Crescent	Residential	G	3	51	47	52	48	52	48	53	49	0.9	0.9	1	0.9	60	55	NO	NO	NO	NO	NO
4	4_136	Grace Crescent	Residential	1	3	53	48	54	49	53	49	54	50	0.9	0.9	0.9	0.8	60	55	NO	NO	NO	NO	NO

NCA	NCA ID	Receiver Address	Receiver Type	Facade		Opening Year				Design Year				Trigger 1 Increase (Build - No Build)				NCG noise criteria		Trigger 2 Do noise levels exceed the cumlative limit with project roads adding ≥2dB to the total noise levels?		Trigger 3 Is the contribution from the road project Acute?		Consider additional noise mitigation?
						No Build		Build		No Build		Build		Opening Year		Design Year						Day	Night	
				Floor	Orientation	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night					
						dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	Day	Night	≥ 65dB LAeq,15h	≥ 60dB LAeq,9h	
4	4_137	Grace Crescent	Residential	G	3	54	49	55	50	54	50	55	51	1.2	1.2	1.2	1.2	60	55	NO	NO	NO	NO	NO
4	4_137	Grace Crescent	Residential	1	3	58	54	59	55	58	54	60	55	1.1	1.2	1.2	1.1	60	55	NO	NO	NO	NO	NO
4	4_138	Grace Crescent	Residential	G	2	53	48	54	49	53	49	54	50	0.9	0.9	0.9	1	60	55	NO	NO	NO	NO	NO
4	4_138	Grace Crescent	Residential	1	2	56	52	57	53	57	52	57	53	0.9	0.8	0.9	0.8	60	55	NO	NO	NO	NO	NO
4	4_139	Grace Crescent	Residential	G	2	52	48	53	49	52	48	54	49	1.2	1.2	1.2	1.1	60	55	NO	NO	NO	NO	NO
4	4_139	Grace Crescent	Residential	1	2	55	51	57	52	56	51	57	53	1.6	1.6	1.7	1.6	60	55	NO	NO	NO	NO	NO
4	4_140	Grace Crescent	Residential	G	3	53	49	54	50	54	50	55	50	0.8	0.8	0.8	0.9	60	55	NO	NO	NO	NO	NO
4	4_140	Grace Crescent	Residential	1	3	58	54	59	54	59	54	59	55	0.7	0.8	0.7	0.7	60	55	NO	NO	NO	NO	NO
4	4_141	Grace Crescent	Residential	G	3	53	49	54	50	54	50	55	50	0.8	0.8	0.8	0.8	60	55	NO	NO	NO	NO	NO
4	4_141	Grace Crescent	Residential	1	3	58	54	59	55	58	54	59	55	1.1	1	1	1	60	55	NO	NO	NO	NO	NO
4	4_142	Grace Crescent	Residential	G	2	52	47	52	48	52	48	53	49	0.8	0.9	0.9	0.8	60	55	NO	NO	NO	NO	NO
4	4_142	Grace Crescent	Residential	1	2	55	51	56	52	56	52	57	52	0.7	0.7	0.7	0.6	60	55	NO	NO	NO	NO	NO
4	4_143	Grace Crescent	Residential	G	3	53	49	54	50	54	49	55	50	0.9	0.9	0.9	0.9	60	55	NO	NO	NO	NO	NO
4	4_143	Grace Crescent	Residential	1	3	58	54	59	55	59	54	59	55	0.9	0.8	0.9	0.9	60	55	NO	NO	NO	NO	NO
4	4_144	Grace Crescent	Residential	G	3	53	49	54	50	54	50	55	50	1	1	1	0.9	60	55	NO	NO	NO	NO	NO
4	4_144	Grace Crescent	Residential	1	3	58	54	59	55	59	54	60	55	0.9	0.9	0.9	0.9	60	55	NO	NO	NO	NO	NO
4	4_145	Grace Crescent	Residential	G	2	51	47	52	48	52	48	53	48	0.8	0.8	0.8	0.8	60	55	NO	NO	NO	NO	NO
4	4_145	Grace Crescent	Residential	1	2	55	51	56	52	56	52	57	53	0.7	0.8	0.8	0.8	60	55	NO	NO	NO	NO	NO
4	4_146	Grace Crescent	Residential	G	2	53	49	54	50	54	49	55	50	0.9	0.9	0.9	1	60	55	NO	NO	NO	NO	NO
4	4_146	Grace Crescent	Residential	1	2	56	52	57	53	57	53	58	53	0.8	0.8	0.8	0.8	60	55	NO	NO	NO	NO	NO
4	4_147	Grace Crescent	Residential	G	3	55	51	56	52	56	51	57	53	1.1	1.1	1.2	1.1	60	55	NO	NO	NO	NO	NO
4	4_147	Grace Crescent	Residential	1	3	59	55	60	56	59	55	61	56	1.1	1.1	1.1	1.1	60	55	NO	NO	NO	NO	NO
4	4_148	Grace Crescent	Residential	G	3	54	50	55	51	55	51	56	52	1	1	1.1	1	60	55	NO	NO	NO	NO	NO
4	4_148	Grace Crescent	Residential	1	3	58	53	58	54	58	54	59	55	0.8	0.8	0.8	0.9	60	55	NO	NO	NO	NO	NO
4	4_149	Grace Crescent	Residential	G	2	52	48	53	48	52	48	53	49	0.8	0.8	0.9	0.8	60	55	NO	NO	NO	NO	NO
4	4_149	Grace Crescent	Residential	1	2	56	52	57	52	57	52	57	53	0.7	0.7	0.7	0.6	60	55	NO	NO	NO	NO	NO
4	4_150	Grace Crescent	Residential	G	3	52	48	53	49	53	48	53	49	0.8	0.8	0.8	0.9	60	55	NO	NO	NO	NO	NO
4	4_150	Grace Crescent	Residential	1	3	56	52	57	53	57	53	58	53	0.7	0.7	0.7	0.7	60	55	NO	NO	NO	NO	NO
4	4_151	Grace Crescent	Residential	G	3	52	48	53	48	53	48	53	49	0.8	0.8	0.8	0.8	60	55	NO	NO	NO	NO	NO
4	4_151	Grace Crescent	Residential	1	3	56	52	57	52	57	52	57	53	0.6	0.6	0.7	0.7	60	55	NO	NO	NO	NO	NO
4	4_152	Grace Crescent	Residential	G	2	50	46	51	47	51	46	52	47	0.9	0.8	0.9	0.9	60	55	NO	NO	NO	NO	NO
4	4_152	Grace Crescent	Residential	1	2	55	50	55	51	55	51	56	52	0.7	0.7	0.7	0.7	60	55	NO	NO	NO	NO	NO
4	4_153	Grace Crescent	Residential	G	3	52	47	53	48	52	48	53	49	0.8	0.8	0.8	0.8	60	55	NO	NO	NO	NO	NO
4	4_153	Grace Crescent	Residential	1	3	55	51	56	52	56	52	57	53	0.7	0.7	0.7	0.8	60	55	NO	NO	NO	NO	NO
4	4_154	Grace Crescent	Residential	G	2	51	47	52	48	52	48	53	48	0.7	0.7	0.7	0.8	60	55	NO	NO	NO	NO	NO
4	4_154	Grace Crescent	Residential	1	2	55	51	56	51	55	51	56	52	0.7	0.7	0.8	0.7	60	55	NO	NO	NO	NO	NO
4	4_155	Grace Crescent	Residential	G	2	49	45	50	46	50	45	51	46	0.8	0.9	0.8	0.9	60	55	NO	NO	NO	NO	NO
4	4_155	Grace Crescent	Residential	1	2	53	49	54	50	54	50	55	51	0.8	0.8	0.8	0.8	60	55	NO	NO	NO	NO	NO
4	4_156	Grace Crescent	Residential	G	3	51	47	52	47	51	47	52	48	0.8	0.8	0.8	0.7	60	55	NO	NO	NO	NO	NO
4	4_156	Grace Crescent	Residential	1	3	54	50	55	51	55	51	56	51	0.7	0.8	0.8	0.8	60	55	NO	NO	NO	NO	NO
4	4_157	Grace Crescent	Residential	G	2	51	46	51	47	51	47	52	48	0.7	0.7	0.8	0.8	60	55	NO	NO	NO	NO	NO
4	4_157	Grace Crescent	Residential	1	2	54	50	55	50	54	50	55	51	0.8	0.8	0.8	0.8	60	55	NO	NO	NO	NO	NO
4	4_158	Grace Crescent	Residential	G	2	49	44	49	45	49	45	50	46	0.8	0.8	0.9	0.8	60	55	NO	NO	NO	NO	NO
4	4_158	Grace Crescent	Residential	1	2	53	48	53	49	53	49	54	50	0.7	0.8	0.8	0.8	60	55	NO	NO	NO	NO	NO
4	4_159	Grace Crescent	Residential	G	3	50	46	51	47	51	47	52	47	0.8	0.7	0.8	0.8	60	55	NO	NO	NO	NO	NO
4	4_159	Grace Crescent	Residential	1	3	53	49	54	50	54	50	55	51	0.8	0.8	0.8	0.8	60	55	NO	NO	NO	NO	NO
4	4_160	Grace Crescent	Residential	G	2	50	45	50	46	50	46	51	47	0.8	0.8	0.8	0.8	60	55	NO	NO	NO	NO	NO
4	4_160	Grace Crescent	Residential	1	2	53	48	53	49	53	49	54	50	0.8	0.8	0.9	0.8	60	55	NO	NO	NO	NO	NO
4	4_161	Grace Crescent	Residential	G	2	47	43	48	43	48	43	48	44	0.7	0.6	0.7	0.6	60	55	NO	NO	NO	NO	NO
4	4_161	Grace Crescent	Residential	1	2	51	46	51	47	51	47	52	48	0.6	0.6	0.6	0.6	60	55	NO	NO	NO	NO	NO
4	4_162	Grace Crescent	Residential	G	3	49	45	50	46	50	46	51	46	0.8	0.7	0.8	0.7	60	55	NO	NO	NO	NO	NO
4	4_162	Grace Crescent	Residential	1	3	52	48	53	49	53	48	54	49	0.8	0.8	0.8	0.9	60	55	NO	NO	NO	NO	NO
4	4_163	Grace Crescent	Residential	G	3	51	46	51	47	51	47	52	48	0.8	0.8	0.8	0.8	60	55	NO	NO	NO	NO	NO
4	4_163	Grace Crescent	Residential	1	3	54	49	55	50	54	50	55	51	0.8	0.8	0.9	0.9	60	55	NO	NO	NO	NO	NO
4	4_164	Grace Crescent	Residential	G	3	51	46	52	47	51	47	52	48	0.8	0.8	0.8	0.8	60	55	NO	NO	NO	NO	NO
4	4_164	Grace Crescent	Residential	1	3	54	49	54	50	54	50	55	51	0.8	0.8	0.8	0.8	60	55	NO	NO	NO	NO	NO
4	4_165	Grace Crescent	Residential	G	2	50	46	51	47	51	47	51	47	0.6	0.6	0.7	0.7	60	55	NO	NO	NO	NO	NO

NCA	NCA ID	Receiver Address	Receiver Type	Facade		Opening Year				Design Year				Trigger 1 Increase (Build - No Build)				NCG noise criteria		Trigger 2 Do noise levels exceed the cumlative limit with project roads adding ≥2dB to the total noise levels?		Trigger 3 Is the contribution from the road project Acute?		Consider additional noise mitigation?
						No Build		Build		No Build		Build		Opening Year		Design Year						Day	Night	
				Floor	Orientation	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night					
						dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	Day	Night	≥ 65dB LAeq,15h	≥ 60dB LAeq,9h	
4	4_165	Grace Crescent	Residential	1	2	53	49	54	49	54	49	54	50	0.6	0.6	0.7	0.6	60	55	NO	NO	NO	NO	NO
4	4_166	Grace Crescent	Residential	G	4	51	47	52	48	52	48	53	49	0.7	0.7	0.8	0.8	60	55	NO	NO	NO	NO	NO
4	4_166	Grace Crescent	Residential	1	4	54	50	55	51	55	50	55	51	0.7	0.7	0.8	0.7	60	55	NO	NO	NO	NO	NO
4	4_167	Grace Crescent	Residential	G	4	52	47	52	48	52	48	53	49	0.7	0.7	0.7	0.8	60	55	NO	NO	NO	NO	NO
4	4_167	Grace Crescent	Residential	1	4	54	50	55	51	55	50	55	51	0.7	0.7	0.7	0.8	60	55	NO	NO	NO	NO	NO
4	4_168	Grace Crescent	Residential	G	3	52	47	52	48	52	48	53	49	0.6	0.6	0.7	0.7	60	55	NO	NO	NO	NO	NO
4	4_168	Grace Crescent	Residential	1	3	54	50	55	50	54	50	55	51	0.6	0.6	0.7	0.7	60	55	NO	NO	NO	NO	NO
4	4_169	Grace Crescent	Residential	G	2	51	47	52	48	52	48	52	48	0.6	0.6	0.7	0.7	60	55	NO	NO	NO	NO	NO
4	4_169	Grace Crescent	Residential	1	2	54	50	54	50	54	50	55	51	0.5	0.6	0.5	0.5	60	55	NO	NO	NO	NO	NO
4	4_170	Grace Crescent	Residential	G	4	52	48	53	48	52	48	53	49	0.7	0.7	0.8	0.8	60	55	NO	NO	NO	NO	NO
4	4_170	Grace Crescent	Residential	1	4	55	50	55	51	55	51	56	52	0.7	0.7	0.7	0.7	60	55	NO	NO	NO	NO	NO
4	4_171	Grace Crescent	Residential	G	4	52	47	52	48	52	48	53	49	0.7	0.7	0.7	0.7	60	55	NO	NO	NO	NO	NO
4	4_171	Grace Crescent	Residential	1	4	54	50	55	51	55	51	55	51	0.6	0.7	0.6	0.6	60	55	NO	NO	NO	NO	NO
4	4_172	Grace Crescent	Residential	G	3	52	47	52	48	52	48	53	49	0.8	0.8	0.8	0.9	60	55	NO	NO	NO	NO	NO
4	4_172	Grace Crescent	Residential	1	3	54	50	55	51	55	51	56	51	0.7	0.7	0.7	0.7	60	55	NO	NO	NO	NO	NO
4	4_173	Grace Crescent	Residential	G	3	51	47	52	47	51	47	52	48	0.7	0.7	0.7	0.7	60	55	NO	NO	NO	NO	NO
4	4_173	Grace Crescent	Residential	1	3	54	50	55	50	55	50	55	51	0.6	0.6	0.6	0.7	60	55	NO	NO	NO	NO	NO
4	4_174	Grace Crescent	Residential	G	3	51	47	52	48	52	48	53	48	0.7	0.8	0.8	0.7	60	55	NO	NO	NO	NO	NO
4	4_174	Grace Crescent	Residential	1	3	54	50	55	51	55	51	56	51	0.7	0.7	0.8	0.7	60	55	NO	NO	NO	NO	NO
4	4_175	Grace Crescent	Residential	G	4	51	47	52	47	52	47	52	48	0.7	0.7	0.8	0.8	60	55	NO	NO	NO	NO	NO
4	4_175	Grace Crescent	Residential	1	4	54	50	55	51	55	51	55	51	0.7	0.7	0.7	0.7	60	55	NO	NO	NO	NO	NO
4	4_176	Grace Crescent	Residential	G	3	51	46	52	47	51	47	52	48	0.8	0.8	0.8	0.8	60	55	NO	NO	NO	NO	NO
4	4_176	Grace Crescent	Residential	1	3	54	50	55	51	55	50	55	51	0.7	0.7	0.8	0.8	60	55	NO	NO	NO	NO	NO
4	4_177	Grace Crescent	Residential	G	3	50	46	51	47	51	47	52	47	0.8	0.7	0.8	0.8	60	55	NO	NO	NO	NO	NO
4	4_177	Grace Crescent	Residential	1	3	54	50	55	50	55	50	55	51	0.8	0.7	0.7	0.7	60	55	NO	NO	NO	NO	NO
4	4_178	Grace Crescent	Residential	G	2	51	47	52	48	52	48	53	49	0.9	0.9	0.9	0.9	60	55	NO	NO	NO	NO	NO
4	4_178	Grace Crescent	Residential	1	2	55	51	56	52	56	52	57	53	1	0.9	1	1	60	55	NO	NO	NO	NO	NO
4	4_179	Grace Crescent	Residential	G	2	50	46	51	47	51	47	51	47	0.6	0.6	0.7	0.6	60	55	NO	NO	NO	NO	NO
4	4_179	Grace Crescent	Residential	1	2	53	48	53	49	53	49	54	50	0.8	0.8	0.8	0.8	60	55	NO	NO	NO	NO	NO
4	4_180	Grace Crescent	Residential	G	3	50	46	51	47	51	47	52	47	0.7	0.7	0.8	0.7	60	55	NO	NO	NO	NO	NO
4	4_180	Grace Crescent	Residential	1	3	53	48	54	49	53	49	54	50	0.8	0.8	0.8	0.8	60	55	NO	NO	NO	NO	NO
4	4_181	Grace Crescent	Residential	G	3	50	46	51	47	51	47	52	47	0.7	0.7	0.8	0.7	60	55	NO	NO	NO	NO	NO
4	4_181	Grace Crescent	Residential	1	3	53	48	54	49	53	49	54	50	0.9	0.9	0.9	0.8	60	55	NO	NO	NO	NO	NO
4	4_182	Grace Crescent	Residential	G	4	50	46	51	47	51	47	52	48	0.8	0.8	0.8	0.8	60	55	NO	NO	NO	NO	NO
4	4_182	Grace Crescent	Residential	1	4	53	48	54	49	53	49	54	50	0.9	0.9	0.9	1	60	55	NO	NO	NO	NO	NO
4	4_183	Grace Crescent	Residential	G	3	51	46	51	47	51	47	52	48	0.7	0.8	0.8	0.8	60	55	NO	NO	NO	NO	NO
4	4_183	Grace Crescent	Residential	1	3	53	48	54	49	53	49	54	50	0.9	0.9	1	1	60	55	NO	NO	NO	NO	NO
4	4_184	Grace Crescent	Residential	G	3	50	46	51	47	51	47	52	48	0.9	0.9	0.8	0.8	60	55	NO	NO	NO	NO	NO
4	4_184	Grace Crescent	Residential	1	3	53	48	53	49	53	49	54	50	0.9	1	1	1	60	55	NO	NO	NO	NO	NO
4	4_185	Grace Crescent	Residential	G	3	50	46	51	47	51	47	52	47	0.9	0.8	0.9	0.8	60	55	NO	NO	NO	NO	NO
4	4_185	Grace Crescent	Residential	1	3	52	48	53	49	53	49	54	50	1	1	1	1	60	55	NO	NO	NO	NO	NO
4	4_186	Grace Crescent	Residential	G	3	50	46	51	47	51	46	52	47	0.8	0.8	0.8	0.8	60	55	NO	NO	NO	NO	NO
4	4_186	Grace Crescent	Residential	1	3	52	48	53	49	53	48	54	49	0.9	1	1	1	60	55	NO	NO	NO	NO	NO
4	4_187	Grace Crescent	Residential	G	2	50	46	51	47	51	47	52	47	0.7	0.7	0.8	0.7	60	55	NO	NO	NO	NO	NO
4	4_187	Grace Crescent	Residential	1	2	52	48	53	49	53	49	54	50	0.9	0.9	0.9	0.9	60	55	NO	NO	NO	NO	NO
4	4_188	Grace Crescent	Residential	G	2	50	46	51	47	51	47	52	47	0.6	0.6	0.7	0.6	60	55	NO	NO	NO	NO	NO
4	4_188	Grace Crescent	Residential	1	2	53	48	53	49	53	49	54	50	0.8	0.8	0.8	0.8	60	55	NO	NO	NO	NO	NO
4	4_189	Grace Crescent	Residential	G	3	50	46	51	47	51	47	51	47	0.7	0.7	0.6	0.6	60	55	NO	NO	NO	NO	NO
4	4_189	Grace Crescent	Residential	1	3	53	48	53	49	53	49	54	50	0.7	0.7	0.7	0.7	60	55	NO	NO	NO	NO	NO
4	4_190	Grace Crescent	Residential	G	2	51	47	52	48	52	48	53	49	0.9	0.9	0.9	0.9	60	55	NO	NO	NO	NO	NO
4	4_190	Grace Crescent	Residential	1	2	54	50	55	51	55	51	56	52	1	0.9	1	1	60	55	NO	NO	NO	NO	NO
4	4_191	Grace Crescent	Residential	G	2	50	46	51	47	51	47	52	48	0.9	0.9	0.9	0.8	60	55	NO	NO	NO	NO	NO
4	4_191	Grace Crescent	Residential	1	2	53	49	54	50	54	49	55	50	0.9	0.9	0.9	1	60	55	NO	NO	NO	NO	NO
4	4_192	Grace Crescent	Residential	G	2	50	46	51	46	51	46	51	47	0.6	0.6	0.6	0.7	60	55	NO	NO	NO	NO	NO
4	4_192	Grace Crescent	Residential	1	2	53	48	53	49	53	49	54	50	0.6	0.7	0.7	0.7	60	55	NO	NO	NO	NO	NO
4	4_193	Grace Crescent	Residential	G	3	51	47	52	47	52	47	52	48	0.8	0.8	0.8	0.9	60	55	NO	NO	NO	NO	NO
4	4_193	Grace Crescent	Residential	1	3	54	50	55	51	55	50	56	51	1	1.1	1.1	1.1	60	55	NO	NO	NO	NO	NO

NCA	NCA ID	Receiver Address	Receiver Type	Facade		Opening Year				Design Year				Trigger 1 Increase (Build - No Build)				NCG noise criteria		Trigger 2 Do noise levels exceed the cumlative limit with project roads adding ≥2dB to the total noise levels?		Trigger 3 Is the contribution from the road project Acute?		Consider additional noise mitigation?
						No Build		Build		No Build		Build		Opening Year		Design Year						Day	Night	
				Floor	Orientation	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night					
						dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	Day	Night	≥ 65dB LAeq,15h	≥ 60dB LAeq,9h	
4	4_194	Grace Crescent	Residential	G	4	51	46	52	47	51	47	52	48	0.9	0.9	1	1	60	55	NO	NO	NO	NO	NO
4	4_194	Grace Crescent	Residential	1	4	54	50	55	51	54	50	56	51	1	1	1.1	1	60	55	NO	NO	NO	NO	NO
4	4_195	Grace Crescent	Residential	G	2	49	45	50	45	49	45	50	46	0.7	0.6	0.7	0.7	60	55	NO	NO	NO	NO	NO
4	4_195	Grace Crescent	Residential	1	2	53	48	53	49	53	49	54	50	0.6	0.6	0.6	0.6	60	55	NO	NO	NO	NO	NO
4	4_196	Grace Crescent	Residential	G	4	51	46	52	47	51	47	52	48	0.9	1	1	0.9	60	55	NO	NO	NO	NO	NO
4	4_196	Grace Crescent	Residential	1	4	54	50	55	51	55	50	56	51	0.9	0.9	1	1	60	55	NO	NO	NO	NO	NO
4	4_197	Grace Crescent	Residential	G	4	51	47	52	47	51	47	52	48	0.9	0.9	1	0.9	60	55	NO	NO	NO	NO	NO
4	4_197	Grace Crescent	Residential	1	4	54	50	55	51	55	50	55	51	0.9	0.9	0.8	0.9	60	55	NO	NO	NO	NO	NO
4	4_198	Grace Crescent	Residential	G	3	50	46	51	47	51	47	52	48	0.8	0.8	0.9	0.9	60	55	NO	NO	NO	NO	NO
4	4_198	Grace Crescent	Residential	1	3	54	49	54	50	54	50	55	51	0.7	0.7	0.7	0.7	60	55	NO	NO	NO	NO	NO
4	4_199	Grace Crescent	Residential	G	3	49	45	50	46	50	46	50	46	0.7	0.6	0.7	0.6	60	55	NO	NO	NO	NO	NO
4	4_199	Grace Crescent	Residential	1	3	53	49	54	49	54	49	54	50	0.5	0.5	0.5	0.5	60	55	NO	NO	NO	NO	NO
4	4_200	Grace Crescent	Residential	G	1	52	48	53	49	52	48	53	49	0.9	1	1	1	60	55	NO	NO	NO	NO	NO
4	4_200	Grace Crescent	Residential	1	3	54	50	55	51	55	51	56	51	0.9	0.9	0.9	0.8	60	55	NO	NO	NO	NO	NO
4	4_201	Grace Crescent	Residential	G	2	52	48	53	49	53	49	54	50	1	1	1.1	1	60	55	NO	NO	NO	NO	NO
4	4_201	Grace Crescent	Residential	1	4	54	50	55	51	55	51	56	52	0.9	0.9	0.9	0.8	60	55	NO	NO	NO	NO	NO
4	4_202	Grace Crescent	Residential	G	3	49	45	50	46	50	45	50	46	0.7	0.7	0.8	0.7	60	55	NO	NO	NO	NO	NO
4	4_202	Grace Crescent	Residential	1	3	53	49	54	50	54	50	55	50	0.6	0.6	0.6	0.5	60	55	NO	NO	NO	NO	NO
4	4_203	Grace Crescent	Residential	G	1	53	49	54	50	53	49	55	50	1.2	1.2	1.3	1.2	60	55	NO	NO	NO	NO	NO
4	4_203	Grace Crescent	Residential	1	1	54	50	55	51	55	51	56	52	1	1.1	1.1	1.1	60	55	NO	NO	NO	NO	NO
4	4_204	Grace Crescent	Residential	G	2	53	49	54	50	53	49	55	51	1.3	1.3	1.4	1.3	60	55	NO	NO	NO	NO	NO
4	4_204	Grace Crescent	Residential	1	2	54	50	56	51	55	51	56	52	1.1	1	1.1	1	60	55	NO	NO	NO	NO	NO
4	4_205	Grace Crescent	Residential	G	1	53	48	54	49	53	49	54	50	1	1	1.1	1	60	55	NO	NO	NO	NO	NO
4	4_205	Grace Crescent	Residential	1	1	54	50	55	51	55	51	56	51	0.9	0.9	1	0.8	60	55	NO	NO	NO	NO	NO
4	4_206	Grace Crescent	Residential	G	3	48	43	48	44	48	44	49	45	0.8	0.7	0.8	0.7	60	55	NO	NO	NO	NO	NO
4	4_206	Grace Crescent	Residential	1	3	52	47	53	48	52	48	53	49	0.8	0.8	0.8	0.8	60	55	NO	NO	NO	NO	NO
4	4_207	Grace Crescent	Residential	G	1	54	49	55	51	54	50	56	52	1.4	1.4	1.4	1.3	60	55	NO	NO	NO	NO	NO
4	4_207	Grace Crescent	Residential	1	1	55	51	56	52	56	52	57	53	1.1	1.2	1.2	1.2	60	55	NO	NO	NO	NO	NO
4	4_208	Grace Crescent	Residential	G	2	54	50	55	51	55	50	56	52	1.3	1.3	1.3	1.3	60	55	NO	NO	NO	NO	NO
4	4_208	Grace Crescent	Residential	1	2	55	51	57	52	56	52	57	53	1.1	1.1	1.1	1.1	60	55	NO	NO	NO	NO	NO
4	4_209	Grace Crescent	Residential	G	3	49	44	49	45	49	45	50	46	0.7	0.7	0.8	0.7	60	55	NO	NO	NO	NO	NO
4	4_209	Grace Crescent	Residential	1	3	52	48	53	49	53	49	54	50	0.8	0.8	0.8	0.8	60	55	NO	NO	NO	NO	NO
4	4_210	Grace Crescent	Residential	G	1	55	51	56	52	55	51	57	53	1.4	1.3	1.4	1.3	60	55	NO	NO	NO	NO	NO
4	4_210	Grace Crescent	Residential	1	1	56	52	57	53	57	53	58	54	1.2	1.2	1.1	1.1	60	55	NO	NO	NO	NO	NO
4	4_211		Residential	G	3	65	61	68	63	66	62	68	64	2.4	2.3	2.4	2.4	60	55	YES	YES	YES	YES	NO
4	4_211		Residential	1	3	67	62	69	65	67	63	70	65	2.4	2.5	2.5	2.4	60	55	YES	YES	YES	YES	NO
4	4_212		Residential	G	3	65	61	67	63	66	61	68	64	2.4	2.3	2.4	2.3	60	55	YES	YES	YES	YES	NO
4	4_212		Residential	1	3	66	62	69	65	67	63	70	65	2.5	2.5	2.5	2.5	60	55	YES	YES	YES	YES	NO
4	4_213		Residential	G	3	65	61	67	63	65	61	68	63	2.2	2.2	2.3	2.2	60	55	YES	YES	YES	YES	NO
4	4_213		Residential	1	3	66	62	69	64	67	63	69	65	2.5	2.4	2.5	2.5	60	55	YES	YES	YES	YES	NO
4	4_214		Residential	G	4	64	60	67	62	65	61	67	63	2.1	2.1	2	2	60	55	YES	YES	YES	YES	NO
4	4_214		Residential	1	4	66	62	69	64	67	62	69	65	2.5	2.4	2.5	2.4	60	55	YES	YES	YES	YES	NO
4	4_215		Residential	G	4	58	54	60	55	59	54	60	56	1.5	1.6	1.6	1.6	60	55	NO	NO	NO	NO	NO
4	4_215		Residential	1	4	60	56	62	57	61	57	62	58	1.4	1.4	1.4	1.4	60	55	NO	NO	NO	NO	NO
4	4_216		Residential	G	4	57	53	59	54	58	54	59	55	1.5	1.5	1.5	1.5	60	55	NO	NO	NO	NO	NO
4	4_216		Residential	1	4	59	55	61	56	60	56	61	57	1.3	1.3	1.3	1.3	60	55	NO	NO	NO	NO	NO
4	4_217		Residential	G	4	56	52	58	53	57	53	58	54	1.4	1.4	1.4	1.4	60	55	NO	NO	NO	NO	NO
4	4_217		Residential	1	4	58	54	59	55	59	55	60	56	1.2	1.2	1.2	1.3	60	55	NO	NO	NO	NO	NO
4	4_218		Residential	G	4	55	51	57	52	56	52	57	53	1.4	1.3	1.4	1.4	60	55	NO	NO	NO	NO	NO
4	4_218		Residential	1	4	57	53	58	54	58	54	59	55	1.2	1.2	1.2	1.1	60	55	NO	NO	NO	NO	NO
4	4_219		Residential	G	4	54	50	56	51	55	51	56	52	1.2	1.2	1.2	1.3	60	55	NO	NO	NO	NO	NO
4	4_219		Residential	1	4	56	52	58	53	57	53	58	54	1.1	1.1	1.1	1.1	60	55	NO	NO	NO	NO	NO
4	4_220		Residential	G	4	54	49	55	50	54	50	55	51	1.2	1.1	1.2	1.2	60	55	NO	NO	NO	NO	NO
4	4_220		Residential	1	4	56	51	57	52	56	52	57	53	1	1	1.1	1	60	55	NO	NO	NO	NO	NO
4	4_221		Residential	G	4	53	49	54	50	54	49	55	51	1.1	1.1	1.1	1.1	60	55	NO	NO	NO	NO	NO
4	4_221		Residential	1	4	55	51	56	52	56	52	57	53	1	1	1	0.9	60	55	NO	NO	NO	NO	NO
4	4_222		Residential	G	4	53	48	54	49	53	49	54	50	1	1	1	1	60	55	NO	NO	NO	NO	NO

NCA	NCA ID	Receiver Address	Receiver Type	Facade		Opening Year				Design Year				Trigger 1 Increase (Build - No Build)				NCG noise criteria		Trigger 2 Do noise levels exceed the cumlative limit with project roads adding ≥2dB to the total noise levels?		Trigger 3 Is the contribution from the road project Acute?		Consider additional noise mitigation?
						No Build		Build		No Build		Build		Opening Year		Design Year						Day	Night	
				Floor	Orientation	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night					
						dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	Day	Night	≥ 65dB LAeq,15h	≥ 60dB LAeq,9h	
4	4_222		Residential	1	4	55	51	56	51	55	51	56	52	0.9	0.9	0.9	0.9	60	55	NO	NO	NO	NO	NO
4	4_223		Residential	G	4	52	48	53	49	53	49	54	50	0.9	0.9	0.9	1	60	55	NO	NO	NO	NO	NO
4	4_223		Residential	1	4	55	50	56	51	55	51	56	52	0.8	0.8	0.9	0.9	60	55	NO	NO	NO	NO	NO
4	4_224		Residential	G	4	52	48	53	49	53	49	54	50	0.9	0.8	0.9	0.9	60	55	NO	NO	NO	NO	NO
4	4_224		Residential	1	4	55	50	56	51	55	51	56	52	0.9	0.9	0.9	0.8	60	55	NO	NO	NO	NO	NO
4	4_225		Residential	G	4	53	48	53	49	53	49	54	50	0.7	0.7	0.8	0.8	60	55	NO	NO	NO	NO	NO
4	4_225		Residential	1	3	55	51	56	52	56	52	57	53	1	0.9	1	0.9	60	55	NO	NO	NO	NO	NO
4	4_226		Residential	G	4	53	49	55	50	54	50	55	51	1.4	1.4	1.4	1.4	60	55	NO	NO	NO	NO	NO
4	4_226		Residential	1	4	55	51	57	52	56	52	57	53	1.4	1.4	1.4	1.4	60	55	NO	NO	NO	NO	NO
4	4_227		Residential	G	4	51	47	52	48	52	47	53	48	1.1	1	1.1	1	60	55	NO	NO	NO	NO	NO
4	4_227		Residential	1	4	55	51	56	52	56	51	57	52	0.8	0.8	0.8	0.8	60	55	NO	NO	NO	NO	NO
4	4_228		Residential	G	4	49	45	50	45	50	45	50	46	0.6	0.6	0.7	0.6	60	55	NO	NO	NO	NO	NO
4	4_228		Residential	1	4	55	51	56	51	55	51	56	52	0.7	0.7	0.7	0.7	60	55	NO	NO	NO	NO	NO
4	4_229		Residential	G	1	53	49	54	50	54	49	55	50	0.9	0.9	1	0.9	60	55	NO	NO	NO	NO	NO
4	4_229		Residential	1	4	56	52	57	53	57	52	57	53	0.6	0.7	0.7	0.7	60	55	NO	NO	NO	NO	NO
4	4_230		Residential	G	1	53	49	54	50	54	49	55	50	0.9	1	1	1.1	60	55	NO	NO	NO	NO	NO
4	4_230		Residential	1	1	55	51	56	52	56	52	57	52	0.9	0.8	0.9	0.8	60	55	NO	NO	NO	NO	NO
4	4_231		Residential	G	1	53	49	54	50	54	50	55	51	1	1	1	1.1	60	55	NO	NO	NO	NO	NO
4	4_231		Residential	1	1	56	51	56	52	56	52	57	53	0.9	0.9	1	0.9	60	55	NO	NO	NO	NO	NO
4	4_232		Residential	G	1	53	49	55	50	54	50	55	51	1.2	1.1	1.1	1.2	60	55	NO	NO	NO	NO	NO
4	4_232		Residential	1	1	56	52	57	53	56	52	57	53	1	1	1	1	60	55	NO	NO	NO	NO	NO
4	4_233		Residential	G	1	54	50	55	51	54	50	56	51	1.2	1.2	1.3	1.2	60	55	NO	NO	NO	NO	NO
4	4_233		Residential	1	1	56	52	57	53	57	53	58	54	1	1	1.1	1	60	55	NO	NO	NO	NO	NO
4	4_234		Residential	G	1	54	50	56	51	55	51	56	52	1.3	1.3	1.3	1.3	60	55	NO	NO	NO	NO	NO
4	4_234		Residential	1	1	57	53	58	54	57	53	58	54	1.1	1	1.1	1.1	60	55	NO	NO	NO	NO	NO
4	4_235		Residential	G	1	55	51	56	52	55	51	57	53	1.4	1.4	1.4	1.4	60	55	NO	NO	NO	NO	NO
4	4_235		Residential	1	1	57	53	59	54	58	54	59	55	1.1	1.1	1.2	1.2	60	55	NO	NO	NO	NO	NO
4	4_236		Residential	G	1	56	51	57	53	56	52	58	53	1.4	1.4	1.4	1.4	60	55	NO	NO	NO	NO	NO
4	4_236		Residential	1	1	58	54	59	55	59	54	60	56	1.2	1.2	1.3	1.2	60	55	NO	NO	NO	NO	NO
4	4_237		Residential	G	1	57	52	58	54	57	53	59	54	1.5	1.5	1.5	1.5	60	55	NO	NO	NO	NO	NO
4	4_237		Residential	1	1	59	55	60	56	59	55	61	57	1.3	1.3	1.4	1.3	60	55	NO	NO	NO	NO	NO
4	4_238		Residential	G	1	58	53	59	55	58	54	60	55	1.5	1.5	1.6	1.6	60	55	NO	NO	NO	NO	NO
4	4_238		Residential	1	1	60	55	61	57	60	56	62	57	1.4	1.4	1.4	1.4	60	55	NO	NO	NO	NO	NO
4	4_239		Residential	G	1	59	54	60	56	59	55	61	57	1.7	1.7	1.7	1.7	60	55	NO	NO	NO	NO	NO
4	4_239		Residential	1	1	61	56	62	58	61	57	63	59	1.6	1.6	1.6	1.6	60	55	NO	NO	NO	NO	NO
4	4_240		Residential	G	1	54	50	56	52	55	51	57	53	1.9	1.9	2	1.9	60	55	NO	NO	NO	NO	NO
4	4_240		Residential	1	1	56	51	57	53	56	52	58	54	1.5	1.6	1.5	1.5	60	55	NO	NO	NO	NO	NO
4	4_241		Residential	G	1	54	50	56	52	55	50	57	52	1.8	1.8	1.9	1.9	60	55	NO	NO	NO	NO	NO
4	4_241		Residential	1	1	55	51	57	53	56	52	58	53	1.5	1.5	1.5	1.5	60	55	NO	NO	NO	NO	NO
4	4_242		Residential	G	4	54	50	56	52	55	51	57	52	1.8	1.7	1.8	1.8	60	55	NO	NO	NO	NO	NO
4	4_242		Residential	1	4	56	51	57	53	56	52	58	53	1.4	1.5	1.4	1.5	60	55	NO	NO	NO	NO	NO
4	4_243		Residential	G	4	54	50	56	52	55	51	57	52	1.7	1.7	1.7	1.7	60	55	NO	NO	NO	NO	NO
4	4_243		Residential	1	4	56	51	57	53	56	52	58	54	1.3	1.4	1.4	1.5	60	55	NO	NO	NO	NO	NO
4	4_244		Residential	G	4	55	50	56	52	55	51	57	53	1.7	1.7	1.7	1.7	60	55	NO	NO	NO	NO	NO
4	4_244		Residential	1	4	56	52	57	53	57	52	58	54	1.4	1.3	1.4	1.4	60	55	NO	NO	NO	NO	NO
4	4_245		Residential	G	3	55	51	57	52	55	51	57	53	1.7	1.7	1.8	1.8	60	55	NO	NO	NO	NO	NO
4	4_245		Residential	1	3	56	52	58	53	57	53	58	54	1.4	1.4	1.4	1.4	60	55	NO	NO	NO	NO	NO
4	4_246		Residential	G	4	54	50	56	52	55	50	57	53	2.3	2.3	2.4	2.5	60	55	NO	NO	NO	NO	NO
4	4_246		Residential	1	4	56	51	57	53	56	52	58	54	1.8	1.8	1.8	1.8	60	55	NO	NO	NO	NO	NO
4	4_247		Residential	G	3	55	50	56	52	55	51	56	52	1.1	1.1	1.2	1.1	60	55	NO	NO	NO	NO	NO
4	4_247		Residential	1	3	55	51	56	52	56	52	57	53	1.1	1.2	1.1	1.1	60	55	NO	NO	NO	NO	NO
4	4_248		Residential	G	2	54	49	53	49	54	50	54	50	-0.2	-0.2	-0.2	-0.2	60	55	NO	NO	NO	NO	NO
4	4_248		Residential	1	2	54	50	54	50	55	51	55	51	0	0	0.1	0	60	55	NO	NO	NO	NO	NO
4	4_249		Residential	G	3	53	49	53	49	54	50	54	50	0.1	0	0.1	0	60	55	NO	NO	NO	NO	NO
4	4_249		Residential	1	1	53	49	54	50	54	50	55	51	0.8	0.7	0.8	0.7	60	55	NO	NO	NO	NO	NO
4	4_250		Residential	G	2	53	49	53	48	54	49	53	49	-0.4	-0.4	-0.3	-0.4	60	55	NO	NO	NO	NO	NO
4	4_250		Residential	1	4	54	50	55	51	55	51	56	51	0.8	0.9	0.9	0.8	60	55	NO	NO	NO	NO	NO

NCA	NCA ID	Receiver Address	Receiver Type	Facade		Opening Year				Design Year				Trigger 1 Increase (Build - No Build)				NCG noise criteria		Trigger 2 Do noise levels exceed the cumlative limit with project roads adding ≥2dB to the total noise levels?		Trigger 3 Is the contribution from the road project Acute?		Consider additional noise mitigation?
						No Build		Build		No Build		Build		Opening Year		Design Year						Day	Night	
				Floor	Orientation	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night					
						dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	Day	Night	≥ 65dB LAeq,15h	≥ 60dB LAeq,9h	
4	4_251		Residential	G	4	54	50	55	51	54	50	56	51	1.3	1.3	1.2	1.2	60	55	NO	NO	NO	NO	NO
4	4_251		Residential	1	4	55	51	56	52	56	52	57	53	1.1	1	1.1	1.1	60	55	NO	NO	NO	NO	NO
4	4_252		Residential	G	1	51	47	52	47	52	47	52	48	0.6	0.6	0.6	0.6	60	55	NO	NO	NO	NO	NO
4	4_252		Residential	1	1	53	48	53	49	53	49	54	50	0.6	0.6	0.6	0.6	60	55	NO	NO	NO	NO	NO
4	4_253		Residential	G	2	53	49	53	48	53	49	53	49	-0.1	-0.1	0	-0.1	60	55	NO	NO	NO	NO	NO
4	4_253		Residential	1	3	55	50	55	51	55	51	56	51	0.4	0.4	0.4	0.4	60	55	NO	NO	NO	NO	NO
4	4_254		Residential	G	3	53	49	54	49	54	50	54	50	0.4	0.4	0.5	0.4	60	55	NO	NO	NO	NO	NO
4	4_254		Residential	1	3	54	50	55	51	55	51	56	51	0.6	0.5	0.5	0.5	60	55	NO	NO	NO	NO	NO
4	4_255		Residential	G	1	53	49	54	49	54	50	54	50	0.6	0.5	0.6	0.5	60	55	NO	NO	NO	NO	NO
4	4_255		Residential	1	1	54	50	55	50	55	50	55	51	0.6	0.6	0.6	0.6	60	55	NO	NO	NO	NO	NO
4	4_256		Residential	G	1	53	49	53	49	53	49	54	50	0.6	0.5	0.6	0.5	60	55	NO	NO	NO	NO	NO
4	4_256		Residential	1	1	54	50	54	50	54	50	55	51	0.6	0.6	0.7	0.6	60	55	NO	NO	NO	NO	NO
4	4_257		Residential	G	1	53	49	53	49	53	49	54	50	0.6	0.5	0.6	0.5	60	55	NO	NO	NO	NO	NO
4	4_257		Residential	1	1	54	50	55	50	55	50	55	51	0.6	0.6	0.6	0.6	60	55	NO	NO	NO	NO	NO
4	4_258		Residential	G	4	53	49	54	50	54	50	54	50	0.5	0.4	0.5	0.5	60	55	NO	NO	NO	NO	NO
4	4_258		Residential	1	4	54	50	55	51	55	51	56	51	0.5	0.6	0.5	0.5	60	55	NO	NO	NO	NO	NO
5	5_001	75 Hartigan Avenue	Residential	G	4	50	46	52	47	51	46	52	48	1.7	1.7	1.8	1.8	60	55	NO	NO	NO	NO	NO
5	5_001	75 Hartigan Avenue	Residential	1	2	53	49	54	50	53	49	55	50	1	1.1	1.1	1.1	60	55	NO	NO	NO	NO	NO
5	5_002	77 Hartigan Avenue	Residential	G	4	51	47	53	49	52	48	54	49	1.7	1.8	1.8	1.8	60	55	NO	NO	NO	NO	NO
5	5_002	77 Hartigan Avenue	Residential	1	4	53	49	55	51	54	50	56	52	1.9	1.9	1.9	1.8	60	55	NO	NO	NO	NO	NO
5	5_003	79 Hartigan Avenue	Residential	G	4	51	47	53	49	52	48	54	50	1.7	1.7	1.8	1.8	60	55	NO	NO	NO	NO	NO
5	5_003	79 Hartigan Avenue	Residential	1	4	54	50	56	52	55	50	57	52	1.9	1.9	1.9	1.9	60	55	NO	NO	NO	NO	NO
5	5_004	81 Hartigan Avenue	Residential	G	5	50	46	53	48	51	47	53	49	2.1	2.2	2.2	2.2	60	55	NO	NO	NO	NO	NO
5	5_004	81 Hartigan Avenue	Residential	1	5	55	50	56	52	55	51	57	53	1.9	1.9	1.9	1.9	60	55	NO	NO	NO	NO	NO
5	5_005	83 Hartigan Avenue	Residential	G	4	52	48	54	50	53	48	55	51	2.3	2.3	2.4	2.4	60	55	NO	NO	NO	NO	NO
5	5_005	83 Hartigan Avenue	Residential	1	1	56	52	58	54	57	52	59	55	2.2	2.2	2.2	2.2	60	55	NO	NO	NO	NO	NO
5	5_006	85 Hartigan Avenue	Residential	G	2	53	49	55	51	54	50	56	52	1.8	1.8	1.8	1.8	60	55	NO	NO	NO	NO	NO
5	5_007	87 Hartigan Avenue	Residential	G	4	53	49	56	52	54	50	57	52	2.5	2.5	2.6	2.5	60	55	NO	NO	NO	NO	NO
5	5_007	87 Hartigan Avenue	Residential	1	4	57	53	60	56	58	54	61	57	2.7	2.6	2.7	2.6	60	55	NO	NO	NO	NO	NO
5	5_008	89 Hartigan Avenue	Residential	G	4	63	59	68	63	64	60	68	64	4.1	4.1	4.1	4.1	60	55	YES	YES	YES	YES	NO
5	5_008	89 Hartigan Avenue	Residential	1	4	65	61	69	65	66	62	70	66	4.2	4.1	4.2	4.2	60	55	YES	YES	YES	YES	NO
5	5_009	Hartigan Avenue	Residential	G	1	50	46	51	47	51	46	52	47	1	1	1	1	60	55	NO	NO	NO	NO	NO
5	5_009	Hartigan Avenue	Residential	1	1	53	48	54	50	53	49	55	50	1.2	1.3	1.3	1.3	60	55	NO	NO	NO	NO	NO
5	5_010	Hartigan Avenue	Residential	G	7	49	45	51	46	50	46	51	47	1.5	1.5	1.5	1.4	60	55	NO	NO	NO	NO	NO
5	5_010	Hartigan Avenue	Residential	1	7	53	48	54	50	53	49	55	51	1.8	1.8	1.8	1.8	60	55	NO	NO	NO	NO	NO
5	5_011	Hartigan Avenue	Residential	G	3	50	45	51	47	50	46	52	48	1.7	1.7	1.8	1.7	60	55	NO	NO	NO	NO	NO
5	5_011	Hartigan Avenue	Residential	1	3	53	48	55	50	53	49	55	51	1.8	1.8	1.9	1.9	60	55	NO	NO	NO	NO	NO
5	5_012	Hartigan Avenue	Residential	G	1	50	46	52	48	51	47	52	48	1.6	1.6	1.7	1.6	60	55	NO	NO	NO	NO	NO
5	5_012	Hartigan Avenue	Residential	1	1	54	49	55	51	54	50	56	52	1.9	1.8	1.9	1.9	60	55	NO	NO	NO	NO	NO
5	5_013	Hartigan Avenue	Residential	G	4	52	48	54	50	53	49	54	50	1.8	1.7	1.8	1.7	60	55	NO	NO	NO	NO	NO
5	5_014	Hartigan Avenue	Residential	G	4	51	47	53	49	52	47	54	49	1.9	1.9	2	2	60	55	NO	NO	NO	NO	NO
5	5_014	Hartigan Avenue	Residential	1	1	55	51	57	53	56	52	58	54	1.9	2	2	2	60	55	NO	NO	NO	NO	NO
5	5_015	Hartigan Avenue	Residential	G	4	53	49	55	51	54	50	56	52	2	2	2.1	2	60	55	NO	NO	NO	NO	NO
5	5_016	Hartigan Avenue	Residential	G	1	53	49	55	51	54	50	56	52	2.1	2.1	2.1	2.1	60	55	NO	NO	NO	NO	NO
5	5_016	Hartigan Avenue	Residential	1	1	58	54	60	56	59	55	61	57	2	2.1	2.1	2.1	60	55	NO	NO	NO	NO	NO
5	5_017	Hartigan Avenue	Residential	G	4	55	51	58	54	56	52	59	54	2.5	2.5	2.5	2.4	60	55	NO	NO	NO	NO	NO
5	5_018	3 Gorman Avenue	Residential	G	2	52	47	52	48	52	48	53	49	0.9	1	1	1	60	55	NO	NO	NO	NO	NO
5	5_018	3 Gorman Avenue	Residential	1	2	54	49	55	50	54	50	55	51	1.1	1.1	1.2	1.1	60	55	NO	NO	NO	NO	NO
5	5_019	5 Gorman Avenue	Residential	G	2	52	47	53	48	52	48	53	49	1.2	1.2	1.3	1.2	60	55	NO	NO	NO	NO	NO
5	5_019	5 Gorman Avenue	Residential	1	1	54	50	56	52	55	50	56	52	1.8	1.9	1.8	1.9	60	55	NO	NO	NO	NO	NO
5	5_020	7 Gorman Avenue	Residential	G	2	52	48	53	49	52	48	54	50	1.4	1.4	1.5	1.4	60	55	NO	NO	NO	NO	NO
5	5_021	9 Gorman Avenue	Residential	G	2	53	49	55	51	54	49	55	51	1.8	1.9	1.8	1.9	60	55	NO	NO	NO	NO	NO
5	5_021	9 Gorman Avenue	Residential	1	2	55	51	57	53	56	52	58	54	1.8	1.8	1.9	1.8	60	55	NO	NO	NO	NO	NO
5	5_022	10 Gorman Avenue	Residential	G	4	52	47	53	49	52	48	54	50	1.8	1.8	1.8	1.8	60	55	NO	NO	NO	NO	NO
5	5_022	10 Gorman Avenue	Residential	1	4	54	50	56	52	55	51	57	52	1.9	1.8	1.9	1.8	60	55	NO	NO	NO	NO	NO
5	5_023	11 Gorman Avenue	Residential	G	2	54	50	56	52	54	50	57	52	2.1	2.1	2.2	2.1	60	55	NO	NO	NO	NO	NO
5	5_023	11 Gorman Avenue	Residential	1	2	56	52	58	54	57	53	59	55	2	2.1	2	2.1	60	55	NO	NO	NO	NO	NO

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						No Build		Build		No Build		Build		Opening Year		Design Year						Day	Night	
				Floor	Orientation	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night					
						dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	Day	Night	≥ 65dB LAeq,15h	≥ 60dB LAeq,9h	
5	5_024	12 Gorman Avenue	Residential	G	4	52	48	54	50	53	48	54	50	1.9	1.9	1.9	1.9	60	55	NO	NO	NO	NO	NO
5	5_024	12 Gorman Avenue	Residential	1	4	55	51	57	52	55	51	57	53	1.9	1.9	2	1.9	60	55	NO	NO	NO	NO	NO
5	5_025	13 Gorman Avenue	Residential	G	2	55	51	58	54	56	52	59	54	2.4	2.4	2.5	2.4	60	55	NO	NO	NO	NO	NO
5	5_025	13 Gorman Avenue	Residential	1	1	59	55	61	57	59	55	62	58	2.2	2.3	2.3	2.3	60	55	NO	NO	NO	NO	NO
5	5_026	14 Gorman Avenue	Residential	G	1	54	50	57	52	55	51	57	53	2.1	2.1	2.1	2.1	60	55	NO	NO	NO	NO	NO
5	5_026	14 Gorman Avenue	Residential	1	1	58	54	60	56	58	54	61	56	2.1	2.1	2.2	2.1	60	55	NO	NO	NO	NO	NO
5	5_027	15 Gorman Avenue	Residential	G	2	57	53	60	56	58	54	61	56	2.7	2.7	2.7	2.6	60	55	NO	NO	NO	NO	NO
5	5_028	16 Gorman Avenue	Residential	G	1	60	56	63	59	61	57	64	60	2.8	2.8	2.8	2.7	60	55	NO	YES	NO	YES	NO
5	5_029	17 Gorman Avenue	Residential	G	1	64	59	68	63	64	60	68	64	4	4	4	3.9	60	55	YES	YES	YES	YES	NO
5	5_029	17 Gorman Avenue	Residential	1	1	65	61	69	65	66	62	70	66	4	4	4	4	60	55	YES	YES	YES	YES	NO
5	5_030	19 Gorman Avenue	Residential	G	1	64	59	68	64	64	60	68	64	4	4.1	4.1	4	60	55	YES	YES	YES	YES	NO
5	5_031	21 Gorman Avenue	Residential	G	1	64	59	68	64	64	60	69	64	4.3	4.2	4.3	4.2	60	55	YES	YES	YES	YES	NO
5	5_031	21 Gorman Avenue	Residential	1	1	65	61	70	65	66	62	70	66	4.3	4.3	4.3	4.3	60	55	YES	YES	YES	YES	NO
5	5_032	10 Burns Rd	Residential	G	1	55	51	57	53	55	51	58	53	2.1	2.1	2.2	2.1	60	55	NO	NO	NO	NO	NO
5	5_033	12 Burns Rd	Residential	G	4	51	47	53	49	52	48	54	50	1.8	1.8	1.8	1.7	60	55	NO	NO	NO	NO	NO
5	5_033	12 Burns Rd	Residential	1	1	56	52	58	54	57	53	59	55	2.1	2.1	2.2	2.1	60	55	NO	NO	NO	NO	NO
5	5_034	Burns Road	Residential	G	4	64	60	67	63	64	60	68	64	3.4	3.3	3.4	3.4	60	55	YES	YES	YES	YES	NO
5	5_034	Burns Road	Residential	1	4	67	63	71	67	68	64	72	67	3.8	3.8	3.7	3.7	60	55	YES	YES	YES	YES	NO
5	5_035	Burns Road	Residential	G	1	63	59	67	63	64	60	67	63	3.3	3.4	3.4	3.4	60	55	YES	YES	YES	YES	NO
5	5_035	Burns Road	Residential	1	1	67	63	71	67	68	64	71	67	3.8	3.7	3.8	3.7	60	55	YES	YES	YES	YES	NO
5	5_036	Burns Road	Residential	G	1	63	59	67	62	64	60	67	63	3.4	3.4	3.4	3.4	60	55	YES	YES	YES	YES	NO
5	5_036	Burns Road	Residential	1	1	67	63	71	67	68	64	71	67	3.8	3.7	3.8	3.7	60	55	YES	YES	YES	YES	NO
5	5_037	Burns Road	Residential	G	1	64	59	67	63	64	60	68	64	3.4	3.3	3.4	3.3	60	55	YES	YES	YES	YES	NO
5	5_037	Burns Road	Residential	1	1	67	63	71	67	68	64	72	68	3.9	3.8	3.9	3.9	60	55	YES	YES	YES	YES	NO
5	5_038	Burns Road	Residential	G	1	64	60	67	63	65	61	68	64	3.2	3.2	3.2	3.1	60	55	YES	YES	YES	YES	NO
5	5_038	Burns Road	Residential	1	1	67	63	71	67	68	64	72	68	3.9	3.8	3.9	3.8	60	55	YES	YES	YES	YES	NO
5	5_039	Burns Road	Residential	G	1	64	60	67	63	65	61	68	64	3.2	3.2	3.2	3.2	60	55	YES	YES	YES	YES	NO
5	5_039	Burns Road	Residential	1	1	68	63	71	67	68	64	72	68	3.8	3.8	3.9	3.8	60	55	YES	YES	YES	YES	NO
5	5_040	Burns Road	Residential	G	4	59	55	62	58	60	56	63	58	2.8	2.8	2.8	2.8	60	55	NO	NO	NO	NO	NO
5	5_040	Burns Road	Residential	1	4	61	57	64	59	62	57	64	60	2.7	2.6	2.7	2.7	60	55	NO	YES	NO	YES	NO
5	5_041	Burns Road	Residential	G	4	57	53	60	56	58	54	61	57	2.7	2.6	2.7	2.7	60	55	NO	NO	NO	NO	NO
5	5_041	Burns Road	Residential	1	4	59	55	62	58	60	56	63	59	2.5	2.5	2.5	2.6	60	55	NO	NO	NO	NO	NO
5	5_042	Burns Road	Residential	G	4	57	52	59	55	57	53	60	56	2.6	2.6	2.6	2.5	60	55	NO	NO	NO	NO	NO
5	5_042	Burns Road	Residential	1	4	59	54	61	57	59	55	62	58	2.4	2.4	2.4	2.3	60	55	NO	NO	NO	NO	NO
5	5_043	Burns Road	Residential	G	4	55	51	58	54	56	52	59	55	2.5	2.4	2.5	2.5	60	55	NO	NO	NO	NO	NO
5	5_043	Burns Road	Residential	1	4	58	54	60	56	58	54	61	56	2.2	2.2	2.3	2.2	60	55	NO	NO	NO	NO	NO
5	5_044	Burns Road	Residential	G	4	55	50	57	53	55	51	58	54	2.4	2.4	2.3	2.4	60	55	NO	NO	NO	NO	NO
5	5_044	Burns Road	Residential	1	4	57	53	59	55	58	54	60	56	2.1	2.1	2	2.1	60	55	NO	NO	NO	NO	NO
5	5_045	Burns Road	Residential	G	4	53	49	55	51	54	50	56	52	2.2	2.2	2.2	2.2	60	55	NO	NO	NO	NO	NO
5	5_045	Burns Road	Residential	1	4	56	52	58	54	57	53	59	55	1.9	1.9	2	1.9	60	55	NO	NO	NO	NO	NO
5	5_046	Burns Road	Residential	G	5	56	52	58	54	57	52	59	55	2.4	2.4	2.4	2.3	60	55	NO	NO	NO	NO	NO
5	5_046	Burns Road	Residential	1	5	59	54	61	57	59	55	61	57	2.2	2.2	2.2	2.2	60	55	NO	NO	NO	NO	NO
5	5_047	Burns Road	Residential	G	4	51	47	52	48	51	47	53	49	1.6	1.6	1.7	1.6	60	55	NO	NO	NO	NO	NO
5	5_047	Burns Road	Residential	1	4	55	51	57	53	56	52	58	53	1.6	1.6	1.7	1.6	60	55	NO	NO	NO	NO	NO
5	5_048	Burns Road	Residential	G	4	51	46	52	48	51	47	53	49	1.5	1.6	1.6	1.6	60	55	NO	NO	NO	NO	NO
5	5_048	Burns Road	Residential	1	4	55	51	57	53	56	52	57	53	1.5	1.6	1.5	1.6	60	55	NO	NO	NO	NO	NO
5	5_049	Burns Road	Residential	G	4	50	46	52	48	51	47	53	48	1.5	1.5	1.5	1.5	60	55	NO	NO	NO	NO	NO
5	5_049	Burns Road	Residential	1	4	55	51	57	52	56	52	57	53	1.4	1.4	1.5	1.4	60	55	NO	NO	NO	NO	NO
5	5_050	Burns Road	Residential	G	2	51	46	52	47	51	47	52	48	0.8	0.8	0.8	0.8	60	55	NO	NO	NO	NO	NO
5	5_050	Burns Road	Residential	1	4	55	51	56	52	55	51	57	53	1.3	1.3	1.4	1.4	60	55	NO	NO	NO	NO	NO
5	5_051	Burns Road	Residential	G	2	50	46	51	47	51	47	52	47	0.7	0.8	0.8	0.7	60	55	NO	NO	NO	NO	NO
5	5_051	Burns Road	Residential	1	4	55	51	56	52	55	51	57	53	1.3	1.3	1.3	1.3	60	55	NO	NO	NO	NO	NO
5	5_052	Burns Road	Residential	G	4	52	48	54	50	52	48	54	50	2	2	2	2	60	55	NO	NO	NO	NO	NO
5	5_052	Burns Road	Residential	1	4	55	51	57	52	55	51	57	53	1.6	1.7	1.7	1.7	60	55	NO	NO	NO	NO	NO
5	5_053	Burns Road	Residential	G	4	52	48	54	50	53	49	55	51	2	1.9	2	1.9	60	55	NO	NO	NO	NO	NO
5	5_053	Burns Road	Residential	1	4	55	51	57	53	56	52	57	53	1.7	1.8	1.7	1.8	60	55	NO	NO	NO	NO	NO
5	5_054	Burns Road	Residential	G	1	50	46	51	47	50	46	52	48	1.4	1.4	1.4	1.5	60	55	NO	NO	NO	NO	NO

NCA	NCA ID	Receiver Address	Receiver Type	Facade		Opening Year				Design Year				Trigger 1 Increase (Build - No Build)				NCG noise criteria		Trigger 2 Do noise levels exceed the cumlative limit with project roads adding ≥2dB to the total noise levels?		Trigger 3 Is the contribution from the road project Acute?		Consider additional noise mitigation?
						No Build		Build		No Build		Build		Opening Year		Design Year						Day	Night	
				Floor	Orientation	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night					
						dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	Day	Night	≥ 65dB LAeq,15h	≥ 60dB LAeq,9h	
5	5_054	Burns Road	Residential	1	1	53	49	55	50	54	50	55	51	1.4	1.4	1.4	1.5	60	55	NO	NO	NO	NO	NO
5	5_055	Burns Road	Residential	G	1	50	46	51	47	51	46	52	48	1.4	1.4	1.4	1.4	60	55	NO	NO	NO	NO	NO
5	5_055	Burns Road	Residential	1	1	53	49	55	51	54	50	55	51	1.4	1.4	1.4	1.4	60	55	NO	NO	NO	NO	NO
5	5_056	Burns Road	Residential	G	1	50	46	51	47	50	46	52	48	1.3	1.3	1.4	1.4	60	55	NO	NO	NO	NO	NO
5	5_056	Burns Road	Residential	1	3	55	50	55	51	55	51	56	51	0.6	0.6	0.7	0.7	60	55	NO	NO	NO	NO	NO
5	5_057	6 Windsor Road	Residential	G	2	66	62	67	63	67	62	67	63	0.7	0.7	0.7	0.7	60	55	YES	YES	YES	YES	YES
5	5_058	8 Windsor Road	Residential	G	2	67	63	68	63	67	63	68	64	0.5	0.5	0.5	0.5	60	55	YES	YES	YES	YES	YES
5	5_058	8 Windsor Road	Residential	1	2	69	65	70	65	69	65	70	66	0.7	0.7	0.7	0.7	60	55	YES	YES	YES	YES	YES
5	5_059	10 Windsor Road	Residential	G	2	67	62	67	63	67	63	68	64	0.7	0.6	0.7	0.7	60	55	YES	YES	YES	YES	YES
5	5_060	12 Windsor Road	Residential	G	2	67	63	68	63	67	63	68	64	0.6	0.5	0.6	0.6	60	55	YES	YES	YES	YES	YES
5	5_062	18-20 Windsor Road	Residential	G	2	67	62	68	63	67	63	68	64	0.8	0.7	0.8	0.8	60	55	YES	YES	YES	YES	YES
5	5_062	18-20 Windsor Road	Residential	1	2	69	64	70	65	69	65	70	66	0.7	0.8	0.8	0.8	60	55	YES	YES	YES	YES	YES
5	5_063	1 Arnold Avenue	Residential	G	1	64	60	66	62	65	61	67	63	1.9	1.9	1.9	1.9	60	55	YES	YES	YES	YES	YES
5	5_064	22 Windsor Road	Residential	G	4	66	61	66	62	66	62	66	62	0.3	0.3	0.2	0.2	60	55	YES	YES	YES	YES	YES
5	5_065	24 Windsor Road	Residential	G	8	68	64	68	64	69	64	69	64	-0.1	-0.1	0	0	60	55	YES	YES	YES	YES	YES
5	5_066	26 Windsor Road	Residential	G	4	67	62	67	62	67	63	67	63	-0.1	-0.1	-0.1	0	60	55	YES	YES	YES	YES	YES
5	5_066	26 Windsor Road	Residential	1	4	69	65	69	65	69	65	70	65	0.1	0.1	0.1	0.1	60	55	YES	YES	YES	YES	YES
5	5_067	28 Windsor Road	Residential	G	4	67	62	67	62	67	63	67	63	0.1	0.1	0	0	60	55	YES	YES	YES	YES	YES
5	5_068		Residential	G	2	59	55	61	57	60	56	62	58	1.9	1.9	2	1.9	60	55	NO	NO	NO	NO	NO
5	5_068		Residential	1	2	61	57	63	59	62	58	64	60	1.7	1.7	1.7	1.7	60	55	NO	YES	NO	YES	NO
5	5_069		Residential	G	1	55	51	56	52	55	51	57	52	1.1	1.1	1.2	1.2	60	55	NO	NO	NO	NO	NO
5	5_069		Residential	1	1	57	53	59	54	58	54	59	55	1.2	1.2	1.3	1.2	60	55	NO	NO	NO	NO	NO
5	5_070		Residential	G	1	54	49	55	51	54	50	55	51	1.2	1.1	1.3	1.2	60	55	NO	NO	NO	NO	NO
5	5_070		Residential	1	1	56	52	57	53	57	53	58	54	1.2	1.2	1.2	1.2	60	55	NO	NO	NO	NO	NO
5	5_071		Residential	G	1	53	49	54	50	53	49	55	50	1.1	1.1	1.2	1.1	60	55	NO	NO	NO	NO	NO
5	5_071		Residential	1	1	55	51	57	52	56	52	57	53	1.2	1.1	1.2	1.2	60	55	NO	NO	NO	NO	NO
5	5_072		Residential	G	1	53	49	55	50	54	50	55	51	1.2	1.1	1.2	1.2	60	55	NO	NO	NO	NO	NO
5	5_072		Residential	1	1	56	51	57	53	56	52	57	53	1.2	1.1	1.2	1.1	60	55	NO	NO	NO	NO	NO
5	5_073		Residential	G	1	53	48	54	49	53	49	54	50	1	1	1.1	1	60	55	NO	NO	NO	NO	NO
5	5_073		Residential	1	2	55	51	56	52	56	51	57	53	1.2	1.2	1.2	1.2	60	55	NO	NO	NO	NO	NO
5	5_074		Residential	G	1	52	48	53	49	53	48	54	50	1.3	1.3	1.4	1.3	60	55	NO	NO	NO	NO	NO
5	5_074		Residential	1	1	55	51	56	52	55	51	57	53	1.3	1.4	1.4	1.3	60	55	NO	NO	NO	NO	NO
5	5_075		Residential	G	1	53	49	54	50	53	49	54	50	1.1	1.1	1.1	1.1	60	55	NO	NO	NO	NO	NO
5	5_075		Residential	1	1	55	51	56	52	56	51	57	52	1	1	1	1	60	55	NO	NO	NO	NO	NO
5	5_076		Residential	G	1	52	48	54	49	53	49	54	50	1.1	1.1	1.2	1.1	60	55	NO	NO	NO	NO	NO
5	5_076		Residential	1	1	55	50	56	51	55	51	56	52	0.9	0.9	1	1	60	55	NO	NO	NO	NO	NO
5	5_077		Residential	G	1	52	48	53	49	53	48	54	49	1.2	1.1	1.1	1.1	60	55	NO	NO	NO	NO	NO
5	5_077		Residential	1	1	54	50	55	51	55	51	56	52	0.9	1	1	1	60	55	NO	NO	NO	NO	NO
5	5_078		Residential	G	1	52	47	53	49	52	48	53	49	1.2	1.2	1.2	1.2	60	55	NO	NO	NO	NO	NO
5	5_078		Residential	1	1	54	50	55	51	54	50	56	51	1	1	1.1	1	60	55	NO	NO	NO	NO	NO
5	5_079		Residential	G	1	51	47	53	48	52	48	53	49	1.2	1.2	1.2	1.2	60	55	NO	NO	NO	NO	NO
5	5_079		Residential	1	1	54	49	55	50	54	50	55	51	1	1	1.1	1.1	60	55	NO	NO	NO	NO	NO
5	5_080		Residential	G	1	59	55	61	57	60	55	62	58	2.1	2.1	2.2	2.2	60	55	NO	NO	NO	NO	NO
5	5_080		Residential	1	1	61	57	63	59	62	57	64	59	2	2	2.1	2	60	55	NO	NO	NO	NO	NO
5	5_081		Residential	G	3	54	50	57	52	55	51	57	53	2.4	2.3	2.4	2.3	60	55	NO	NO	NO	NO	NO
5	5_081		Residential	1	3	58	53	60	55	58	54	60	56	2	1.9	2	2	60	55	NO	NO	NO	NO	NO
5	5_082		Residential	G	4	52	47	54	50	52	48	55	50	2.3	2.2	2.3	2.2	60	55	NO	NO	NO	NO	NO
5	5_082		Residential	1	4	56	51	57	53	56	52	58	54	1.7	1.8	1.8	1.8	60	55	NO	NO	NO	NO	NO
5	5_083		Residential	G	3	51	46	53	48	51	47	53	49	2.1	2.1	2.2	2.1	60	55	NO	NO	NO	NO	NO
5	5_083		Residential	1	3	55	51	56	52	55	51	57	53	1.7	1.6	1.7	1.7	60	55	NO	NO	NO	NO	NO
5	5_084		Residential	G	1	58	54	61	56	59	55	61	57	2.3	2.2	2.2	2.2	60	55	NO	NO	NO	NO	NO
5	5_084		Residential	1	1	60	56	62	58	61	57	63	59	2.1	2.2	2.1	2.1	60	55	NO	NO	NO	NO	NO
5	5_085		Residential	G	3	56	51	58	53	56	52	58	54	1.9	2	2	1.9	60	55	NO	NO	NO	NO	NO
5	5_085		Residential	1	3	57	53	59	55	58	54	60	56	1.9	1.9	1.9	1.8	60	55	NO	NO	NO	NO	NO
5	5_086		Residential	G	3	55	51	57	53	56	52	58	53	1.9	1.9	1.9	1.9	60	55	NO	NO	NO	NO	NO
5	5_086		Residential	1	3	57	53	59	54	57	53	59	55	1.8	1.8	1.9	1.8	60	55	NO	NO	NO	NO	NO
5	5_087		Residential	G	3	55	50	56	52	55	51	57	53	1.8	1.8	1.9	1.8	60	55	NO	NO	NO	NO	NO

NCA	NCA ID	Receiver Address	Receiver Type	Facade		Opening Year				Design Year				Trigger 1 Increase (Build - No Build)				NCG noise criteria		Trigger 2 Do noise levels exceed the cumlative limit with project roads adding ≥2dB to the total noise levels?		Trigger 3 Is the contribution from the road project Acute?		Consider additional noise mitigation?
						No Build		Build		No Build		Build		Opening Year		Design Year						Day	Night	
				Floor	Orientation	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night					
						dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	Day	Night	≥ 65dB LAeq,15h	≥ 60dB LAeq,9h	
5	5_087		Residential	1	3	56	52	58	54	57	53	59	55	1.7	1.7	1.8	1.7	60	55	NO	NO	NO	NO	NO
5	5_088		Residential	G	3	54	50	56	52	55	51	57	53	1.8	1.7	1.8	1.8	60	55	NO	NO	NO	NO	NO
5	5_088		Residential	1	3	56	52	58	53	57	52	58	54	1.7	1.7	1.7	1.7	60	55	NO	NO	NO	NO	NO
5	5_089		Residential	G	2	54	49	55	51	54	50	56	52	1.7	1.7	1.8	1.7	60	55	NO	NO	NO	NO	NO
5	5_089		Residential	1	2	55	51	57	53	56	52	58	53	1.6	1.7	1.7	1.7	60	55	NO	NO	NO	NO	NO
5	5_090		Residential	G	3	53	48	54	50	53	49	55	51	1.5	1.6	1.6	1.6	60	55	NO	NO	NO	NO	NO
5	5_090		Residential	1	3	54	50	56	52	55	51	57	52	1.5	1.5	1.5	1.5	60	55	NO	NO	NO	NO	NO
5	5_091		Residential	G	2	52	48	54	50	53	49	55	50	1.5	1.5	1.6	1.5	60	55	NO	NO	NO	NO	NO
5	5_091		Residential	1	2	54	50	56	51	55	51	56	52	1.4	1.4	1.5	1.4	60	55	NO	NO	NO	NO	NO
5	5_092		Residential	G	2	52	48	54	49	53	48	54	50	1.5	1.5	1.5	1.5	60	55	NO	NO	NO	NO	NO
5	5_092		Residential	1	2	54	49	55	51	54	50	56	52	1.4	1.4	1.4	1.4	60	55	NO	NO	NO	NO	NO
5	5_093		Residential	G	2	52	47	53	49	52	48	54	50	1.4	1.5	1.4	1.5	60	55	NO	NO	NO	NO	NO
5	5_093		Residential	1	2	53	49	55	51	54	50	55	51	1.4	1.4	1.4	1.4	60	55	NO	NO	NO	NO	NO
5	5_094	31 Gorman Avenue	Residential	G	4	56	52	59	55	57	53	60	56	2.8	2.8	2.9	2.9	60	55	NO	NO	NO	NO	NO
5	5_095	35 Gorman Avenue	Residential	G	3	54	50	57	53	55	51	57	53	2.7	2.6	2.7	2.6	60	55	NO	NO	NO	NO	NO
5	5_095	35 Gorman Avenue	Residential	1	3	56	52	58	54	56	52	59	55	2.4	2.4	2.4	2.4	60	55	NO	NO	NO	NO	NO
5	5_096	43 Gorman Avenue	Residential	G	4	52	47	53	49	52	48	54	50	1.9	2	1.9	1.9	60	55	NO	NO	NO	NO	NO
5	5_096	43 Gorman Avenue	Residential	1	4	53	49	55	51	54	50	56	52	1.8	1.8	1.8	1.8	60	55	NO	NO	NO	NO	NO
5	5_097		Residential	G	4	52	47	53	49	52	48	54	49	1.4	1.5	1.5	1.4	60	55	NO	NO	NO	NO	NO
5	5_098		Residential	G	2	51	47	53	49	52	48	53	49	1.7	1.8	1.7	1.7	60	55	NO	NO	NO	NO	NO
5	5_098		Residential	1	2	54	49	55	51	54	50	56	52	1.7	1.8	1.7	1.7	60	55	NO	NO	NO	NO	NO
5	5_099		Residential	G	1	56	51	56	52	56	52	56	52	0.4	0.5	0.5	0.5	60	55	NO	NO	NO	NO	NO
5	5_099		Residential	1	1	58	53	58	54	58	54	59	54	0.5	0.6	0.6	0.6	60	55	NO	NO	NO	NO	NO
5	5_100		Residential	G	1	56	51	56	52	56	52	57	53	0.5	0.5	0.6	0.6	60	55	NO	NO	NO	NO	NO
5	5_100		Residential	1	1	58	54	59	54	59	54	59	55	0.6	0.7	0.6	0.6	60	55	NO	NO	NO	NO	NO
5	5_101		Residential	G	1	56	52	57	52	56	52	57	53	0.6	0.7	0.7	0.7	60	55	NO	NO	NO	NO	NO
5	5_101		Residential	1	1	58	54	59	55	59	55	59	55	0.7	0.7	0.7	0.7	60	55	NO	NO	NO	NO	NO
5	5_102		Residential	G	1	56	52	57	53	57	53	58	53	0.7	0.8	0.7	0.7	60	55	NO	NO	NO	NO	NO
5	5_102		Residential	1	1	59	54	59	55	59	55	60	56	0.7	0.8	0.7	0.7	60	55	NO	NO	NO	NO	NO
5	5_103		Residential	G	1	57	52	57	53	57	53	58	54	0.8	0.8	0.9	0.9	60	55	NO	NO	NO	NO	NO
5	5_103		Residential	1	1	59	54	60	55	59	55	60	56	0.8	0.9	0.9	0.9	60	55	NO	NO	NO	NO	NO
5	5_104		Residential	G	1	57	52	58	53	57	53	58	54	0.9	1	1	1	60	55	NO	NO	NO	NO	NO
5	5_104		Residential	1	1	59	55	60	56	60	55	61	56	1	1	1	1	60	55	NO	NO	NO	NO	NO
5	5_105		Residential	G	1	57	53	58	54	58	53	59	55	1.1	1.1	1.2	1.2	60	55	NO	NO	NO	NO	NO
5	5_105		Residential	1	1	59	55	61	56	60	56	61	57	1.2	1.2	1.2	1.2	60	55	NO	NO	NO	NO	NO
5	5_106		Residential	G	1	56	52	57	53	57	52	58	54	1.2	1.3	1.4	1.4	60	55	NO	NO	NO	NO	NO
5	5_106		Residential	1	1	59	54	60	56	59	55	60	56	1.3	1.4	1.3	1.3	60	55	NO	NO	NO	NO	NO
5	5_107		Residential	G	2	63	59	67	63	64	60	67	63	3.5	3.5	3.6	3.5	60	55	YES	YES	YES	YES	NO
5	5_107		Residential	1	2	67	63	71	67	68	64	72	67	3.7	3.6	3.7	3.6	60	55	YES	YES	YES	YES	NO
5	5_108		Residential	G	1	67	62	67	63	67	63	68	63	0.6	0.5	0.6	0.6	60	55	YES	YES	YES	YES	NO
5	5_108		Residential	1	1	69	64	70	65	69	65	70	66	0.7	0.7	0.6	0.6	60	55	YES	YES	YES	YES	NO
5	5_109		Residential	G	4	60	55	60	56	60	56	61	56	0.4	0.4	0.4	0.5	60	55	NO	NO	NO	NO	NO
5	5_109		Residential	1	2	63	58	63	59	63	59	64	59	0.4	0.4	0.4	0.5	60	55	NO	NO	NO	NO	NO
5	5_110		Residential	G	4	58	53	58	54	58	54	59	54	0.3	0.3	0.3	0.3	60	55	NO	NO	NO	NO	NO
5	5_110		Residential	1	2	61	56	61	57	61	57	61	57	0.5	0.5	0.6	0.6	60	55	NO	NO	NO	NO	NO
5	5_111		Residential	G	4	57	53	57	53	57	53	58	54	0.2	0.3	0.3	0.3	60	55	NO	NO	NO	NO	NO
5	5_111		Residential	1	2	59	55	60	56	60	56	60	56	0.7	0.8	0.7	0.7	60	55	NO	NO	NO	NO	NO
5	5_112		Residential	G	4	51	47	53	48	52	48	53	49	1.5	1.5	1.6	1.5	60	55	NO	NO	NO	NO	NO
5	5_112		Residential	1	4	54	50	56	51	55	50	56	52	1.6	1.6	1.7	1.7	60	55	NO	NO	NO	NO	NO
5	5_113		Residential	G	1	50	46	51	47	50	46	52	48	1.5	1.5	1.6	1.6	60	55	NO	NO	NO	NO	NO
5	5_113		Residential	1	1	53	49	54	50	53	49	55	51	1.4	1.4	1.5	1.5	60	55	NO	NO	NO	NO	NO
5	5_114		Residential	G	1	50	45	51	47	50	46	52	48	1.4	1.5	1.4	1.4	60	55	NO	NO	NO	NO	NO
5	5_114		Residential	1	1	53	49	54	50	53	49	55	51	1.2	1.2	1.3	1.3	60	55	NO	NO	NO	NO	NO
5	5_115		Residential	G	1	50	45	51	47	50	46	52	48	1.4	1.5	1.5	1.5	60	55	NO	NO	NO	NO	NO
5	5_115		Residential	1	2	54	50	55	50	54	50	55	51	0.6	0.7	0.7	0.7	60	55	NO	NO	NO	NO	NO
5	5_116		Residential	G	4	50	45	51	47	50	46	52	48	1.6	1.7	1.7	1.6	60	55	NO	NO	NO	NO	NO
5	5_116		Residential	1	2	55	50	55	51	55	51	56	52	0.6	0.6	0.6	0.6	60	55	NO	NO	NO	NO	NO

NCA	NCA ID	Receiver Address	Receiver Type	Facade		Opening Year				Design Year				Trigger 1 Increase (Build - No Build)				NCG noise criteria		Trigger 2 Do noise levels exceed the cumlative limit with project roads adding ≥2dB to the total noise levels?		Trigger 3 Is the contribution from the road project Acute?		Consider additional noise mitigation?
						No Build		Build		No Build		Build		Opening Year		Design Year						Day	Night	
				Floor	Orientation	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night					
						dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	Day	Night	≥ 65dB LAeq,15h	≥ 60dB LAeq,9h	
5	5_117		Residential	G	2	56	51	56	52	56	52	56	52	0.4	0.4	0.4	0.3	60	55	NO	NO	NO	NO	NO
5	5_117		Residential	1	2	58	53	58	54	58	54	59	54	0.5	0.5	0.5	0.4	60	55	NO	NO	NO	NO	NO
5	5_118		Residential	G	2	56	51	56	51	56	52	56	52	0.2	0.3	0.2	0.2	60	55	NO	NO	NO	NO	NO
5	5_118		Residential	1	2	58	53	58	54	58	54	58	54	0.4	0.4	0.3	0.3	60	55	NO	NO	NO	NO	NO
5	5_119		Residential	G	2	56	51	56	51	56	52	56	52	0.2	0.2	0.2	0.3	60	55	NO	NO	NO	NO	NO
5	5_119		Residential	1	2	58	53	58	54	58	54	58	54	0.3	0.3	0.4	0.3	60	55	NO	NO	NO	NO	NO
5	5_120		Residential	G	2	56	52	56	52	56	52	57	52	0.2	0.2	0.2	0.2	60	55	NO	NO	NO	NO	NO
5	5_120		Residential	1	2	58	54	59	54	59	54	59	55	0.2	0.3	0.2	0.2	60	55	NO	NO	NO	NO	NO
5	5_121		Residential	G	3	56	51	56	51	56	52	56	52	0	0.1	0.1	0.1	60	55	NO	NO	NO	NO	NO
5	5_121		Residential	1	3	57	53	58	53	58	54	58	54	0.2	0.1	0.1	0.2	60	55	NO	NO	NO	NO	NO
5	5_122		Residential	G	3	55	50	55	50	55	51	55	51	0.1	0.1	0	0	60	55	NO	NO	NO	NO	NO
5	5_122		Residential	1	3	57	52	57	52	57	53	57	53	0.2	0.2	0.2	0.2	60	55	NO	NO	NO	NO	NO
5	5_123		Residential	G	3	55	50	55	50	55	51	55	51	0.2	0.1	0.2	0.2	60	55	NO	NO	NO	NO	NO
5	5_123		Residential	1	3	56	52	57	52	57	52	57	53	0.2	0.2	0.2	0.2	60	55	NO	NO	NO	NO	NO
5	5_124		Residential	G	4	51	47	52	48	52	48	53	49	1.1	1.2	1.2	1.1	60	55	NO	NO	NO	NO	NO
5	5_124		Residential	1	4	54	49	55	50	54	50	55	51	1.1	1.1	1.1	1.1	60	55	NO	NO	NO	NO	NO
5	5_125		Residential	G	4	51	47	52	48	52	47	53	49	1.3	1.3	1.3	1.3	60	55	NO	NO	NO	NO	NO
5	5_125		Residential	1	4	54	49	55	51	54	50	55	51	1.2	1.3	1.2	1.3	60	55	NO	NO	NO	NO	NO
5	5_126		Residential	G	1	50	45	51	46	50	46	51	47	0.9	1	0.9	0.9	60	55	NO	NO	NO	NO	NO
5	5_126		Residential	1	3	55	50	55	51	55	51	55	51	0.4	0.4	0.4	0.4	60	55	NO	NO	NO	NO	NO
5	5_127		Residential	G	1	50	45	51	46	50	46	51	47	0.9	1	0.9	0.9	60	55	NO	NO	NO	NO	NO
5	5_127		Residential	1	1	53	49	54	50	54	50	55	51	1	1	1.1	1.1	60	55	NO	NO	NO	NO	NO
5	5_128	33 Gorman Avenue	Residential	G	3	55	51	58	53	55	51	58	54	2.9	2.8	2.9	2.8	60	55	NO	NO	NO	NO	NO
5	5_128	33 Gorman Avenue	Residential	1	4	57	53	60	56	58	54	61	56	2.5	2.5	2.5	2.5	60	55	NO	NO	NO	NO	NO
5	5_129	29 Gorman Avenue	Residential	G	4	57	53	60	56	57	53	61	56	3.1	3.2	3.1	3.2	60	55	NO	NO	NO	NO	NO
5	5_129	29 Gorman Avenue	Residential	1	4	59	54	61	57	59	55	62	58	2.9	2.9	3	2.9	60	55	NO	NO	NO	NO	NO
5	5_130	37 Gormon Avenue	Residential	G	4	54	49	56	52	54	50	57	52	2.3	2.3	2.4	2.3	60	55	NO	NO	NO	NO	NO
5	5_131	3 Dunn Way	Residential	G	4	52	48	54	50	53	49	55	51	1.8	1.8	1.9	1.9	60	55	NO	NO	NO	NO	NO
5	5_132	4 Dunn Way	Residential	G	1	51	46	53	49	51	47	54	49	2.2	2.2	2.2	2.2	60	55	NO	NO	NO	NO	NO
5	5_132	4 Dunn Way	Residential	1	1	54	50	56	52	55	51	57	53	2	2	2.1	2	60	55	NO	NO	NO	NO	NO
5	5_133	5 Dunn Way	Residential	G	4	53	49	55	51	54	49	56	51	2	1.9	2	1.9	60	55	NO	NO	NO	NO	NO
5	NEW_115		Residential	G	2	63	58	67	62	63	59	67	63	4	4	4	4	60	55	YES	YES	YES	YES	NO
5	NEW_115		Residential	1	2	65	60	69	64	65	61	69	65	4.1	4	4	3.9	60	55	YES	YES	YES	YES	NO
5	NEW_116		Residential	G	1	63	59	67	63	64	60	67	63	3.7	3.7	3.7	3.7	60	55	YES	YES	YES	YES	NO
5	NEW_116		Residential	1	1	65	61	69	65	65	61	69	65	3.9	3.9	4	3.9	60	55	YES	YES	YES	YES	NO
5	NEW_117		Residential	G	3	51	47	52	48	52	47	53	48	1	1	1	1	60	55	NO	NO	NO	NO	NO
5	NEW_117		Residential	1	3	53	49	54	50	54	50	55	51	1.2	1.2	1.2	1.2	60	55	NO	NO	NO	NO	NO
6	6_001	2 Hector Court	Residential	G	3	60	55	61	56	60	56	61	57	1.1	1	1	1	60	55	NO	NO	NO	NO	NO
6	6_002	2A Hector Court	Residential	G	6	56	52	58	53	57	53	58	54	1.4	1.5	1.4	1.4	60	55	NO	NO	NO	NO	NO
6	6_004	Memorial Avenue	Open Space (Active)	G	3	61	56	62	56	61	56	62	57	0.8	0.8	0.8	0.8	60	-	NO	NO	NO	NO	NO
6	NEW_118		Residential	G	1	56	52	57	52	57	53	57	53	0.6	0.6	0.6	0.5	60	55	NO	NO	NO	NO	NO
6	NEW_118		Residential	1	1	58	53	58	54	58	54	59	55	0.7	0.6	0.8	0.7	60	55	NO	NO	NO	NO	NO
6	NEW_119		Residential	G	2	56	52	57	52	57	52	57	53	0.5	0.5	0.6	0.6	60	55	NO	NO	NO	NO	NO
6	NEW_119		Residential	1	2	58	53	58	54	58	54	59	55	0.7	0.7	0.7	0.6	60	55	NO	NO	NO	NO	NO
6	NEW_120		Residential	G	1	56	52	57	52	57	52	57	53	0.6	0.6	0.6	0.6	60	55	NO	NO	NO	NO	NO
6	NEW_120		Residential	1	1	58	53	58	54	58	54	59	55	0.6	0.7	0.7	0.7	60	55	NO	NO	NO	NO	NO
6	NEW_121		Residential	G	2	56	52	57	52	57	52	57	53	0.6	0.6	0.6	0.7	60	55	NO	NO	NO	NO	NO
6	NEW_121		Residential	1	2	58	53	58	54	58	54	59	55	0.6	0.7	0.7	0.6	60	55	NO	NO	NO	NO	NO
6	NEW_122		Residential	G	4	57	52	57	53	57	53	58	54	0.6	0.7	0.7	0.6	60	55	NO	NO	NO	NO	NO
6	NEW_122		Residential	1	4	58	54	59	55	59	55	60	55	0.6	0.7	0.7	0.7	60	55	NO	NO	NO	NO	NO
6	NEW_123		Residential	G	4	57	53	57	53	57	53	58	54	0.6	0.6	0.7	0.6	60	55	NO	NO	NO	NO	NO
6	NEW_123		Residential	1	4	59	54	59	55	59	55	60	56	0.6	0.7	0.7	0.6	60	55	NO	NO	NO	NO	NO
6	NEW_124		Residential	G	3	57	53	58	53	58	53	58	54	0.6	0.5	0.5	0.6	60	55	NO	NO	NO	NO	NO
6	NEW_124		Residential	1	3	59	55	60	55	60	55	60	56	0.6	0.6	0.6	0.6	60	55	NO	NO	NO	NO	NO
6	NEW_125		Residential	G	4	58	53	58	54	58	54	59	54	0.5	0.6	0.6	0.6	60	55	NO	NO	NO	NO	NO
6	NEW_125		Residential	1	4	60	55	60	56	60	56	61	56	0.5	0.6	0.6	0.5	60	55	NO	NO	NO	NO	NO
6	NEW_126		Residential	G	4	58	54	59	54	59	54	59	55	0.5	0.5	0.5	0.5	60	55	NO	NO	NO	NO	NO

NCA	NCA ID	Receiver Address	Receiver Type	Facade		Opening Year				Design Year				Trigger 1 Increase (Build - No Build)				NCG noise criteria		Trigger 2 Do noise levels exceed the cumlative limit with project roads adding ≥2dB to the total noise levels?		Trigger 3 Is the contribution from the road project Acute?		Consider additional noise mitigation?
						No Build		Build		No Build		Build		Opening Year		Design Year						Day	Night	
				Floor	Orientation	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night					
						dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	Day	Night	≥ 65dB LAeq,15h	≥ 60dB LAeq,9h	
6	NEW_126		Residential	1	4	60	56	61	56	61	57	61	57	0.5	0.4	0.4	0.4	60	55	NO	NO	NO	NO	NO
6	NEW_127		Residential	G	4	59	55	59	55	59	55	60	56	0.4	0.5	0.5	0.5	60	55	NO	NO	NO	NO	NO
6	NEW_127		Residential	1	4	61	57	62	57	62	58	62	58	0.5	0.4	0.4	0.4	60	55	NO	NO	NO	NO	NO
6	NEW_128		Residential	G	4	60	56	60	56	60	56	61	57	0.4	0.4	0.4	0.4	60	55	NO	NO	NO	NO	NO
6	NEW_128		Residential	1	4	62	58	63	58	63	59	63	59	0.4	0.3	0.3	0.4	60	55	NO	NO	NO	NO	NO
6	NEW_129		Residential	G	4	61	56	61	57	61	57	62	57	0.3	0.4	0.4	0.4	60	55	NO	NO	NO	NO	NO
6	NEW_129		Residential	1	4	63	59	64	59	64	60	64	60	0.4	0.3	0.3	0.4	60	55	NO	YES	NO	YES	NO
6	NEW_130		Residential	G	3	67	62	67	63	67	63	68	63	0.5	0.5	0.4	0.4	60	55	YES	YES	YES	YES	NO
6	NEW_130		Residential	1	3	69	65	70	65	70	65	70	66	0.5	0.5	0.5	0.6	60	55	YES	YES	YES	YES	NO
6	NEW_131		Residential	G	3	67	62	67	63	67	63	67	63	0.5	0.5	0.5	0.4	60	55	YES	YES	YES	YES	NO
6	NEW_131		Residential	1	3	69	65	70	65	70	65	70	66	0.6	0.6	0.6	0.6	60	55	YES	YES	YES	YES	NO
6	NEW_132		Residential	G	3	66	61	66	62	66	62	67	62	0.5	0.5	0.5	0.5	60	55	YES	YES	YES	YES	NO
6	NEW_132		Residential	1	3	69	64	69	65	69	65	70	65	0.8	0.8	0.7	0.7	60	55	YES	YES	YES	YES	NO
6	NEW_133		Residential	G	3	65	60	65	61	65	61	66	61	0.5	0.5	0.5	0.5	60	55	YES	YES	YES	YES	NO
6	NEW_133		Residential	1	3	68	63	69	64	68	64	69	65	0.9	0.9	0.8	0.8	60	55	YES	YES	YES	YES	NO
6	NEW_134		Residential	G	1	57	52	58	53	57	53	58	54	0.7	0.7	0.7	0.7	60	55	NO	NO	NO	NO	NO
6	NEW_134		Residential	1	1	60	56	61	56	61	56	61	57	0.6	0.6	0.6	0.5	60	55	NO	NO	NO	NO	NO
7	7_008	1 President Road	Residential	G	3	57	52	57	53	57	53	57	53	0.3	0.4	0.3	0.3	60	55	NO	NO	NO	NO	NO
7	7_009	1B President Road	Residential	G	2	63	58	63	59	63	59	63	59	0.3	0.3	0.3	0.3	60	55	NO	NO	NO	NO	NO
7	7_011	Lot 9 Windsor Road	Residential	G	2	72	68	72	67	72	68	72	68	-0.2	-0.2	-0.2	-0.2	60	55	YES	YES	YES	YES	YES
7	7_014	12 Benalla Ave	Residential	G	1	60	55	60	55	60	56	60	56	0	0	0	0.1	60	55	NO	NO	NO	NO	NO
7	7_015	14 Benalla Ave	Residential	G	1	60	56	60	56	61	57	61	57	0	0	0.1	0	60	55	NO	NO	NO	NO	NO
7	7_016	16 Benalla Ave	Residential	G	2	60	56	60	56	61	56	61	56	0	0	0	0	60	55	NO	NO	NO	NO	NO
7	7_017	18 Benalla Ave	Residential	G	1	68	63	68	63	68	64	68	64	0	0	0	0	60	55	YES	YES	YES	YES	YES
7	7_018	20 Benalla Ave	Residential	G	2	69	64	69	64	69	65	69	65	0	0	0	0	60	55	YES	YES	YES	YES	YES
7	7_019	22 Benalla Ave	Residential	G	2	69	64	69	65	69	65	70	65	0.2	0.2	0.2	0.2	60	55	YES	YES	YES	YES	YES
7	7_020	24 Benalla Ave	Residential	G	2	69	65	69	65	70	65	69	65	0	0	-0.1	0	60	55	YES	YES	YES	YES	YES
7	7_021	26 Benalla Ave	Residential	G	3	58	53	58	53	58	54	58	54	0.1	0.1	0.2	0.1	60	55	NO	NO	NO	NO	NO
7	7_021	26 Benalla Ave	Residential	1	3	62	57	62	58	62	58	62	58	0.2	0.2	0.2	0.2	60	55	NO	NO	NO	NO	NO
7	7_022	28 Benalla Ave	Residential	G	2	58	54	58	54	59	54	59	54	0.1	0.1	0.1	0.1	60	55	NO	NO	NO	NO	NO
7	7_023	30 Benalla Ave	Residential	G	2	60	56	61	56	61	57	61	57	0.4	0.5	0.5	0.5	60	55	NO	NO	NO	NO	NO
7	7_024	32 Benalla Ave	Residential	G	2	60	56	60	56	61	56	61	56	0	0	0	0	60	55	NO	NO	NO	NO	NO
7	7_025	34 Benalla Ave	Residential	G	2	60	55	60	55	60	56	60	56	0	0.1	0.1	0.1	60	55	NO	NO	NO	NO	NO
7	7_026	36 Benalla Ave	Residential	G	1	69	64	69	64	69	65	69	65	0.2	0.2	0.3	0.3	60	55	YES	YES	YES	YES	YES
7	7_027	38 Benalla Ave	Residential	G	2	68	63	68	63	68	64	68	64	0.1	0.1	0.1	0.1	60	55	YES	YES	YES	YES	YES
7	7_028	40 Benalla Ave	Residential	G	2	68	63	68	63	68	64	68	64	-0.1	0	-0.1	-0.1	60	55	YES	YES	YES	YES	YES
7	7_029	42 Benalla Ave	Residential	G	2	69	64	69	64	69	65	69	65	-0.2	-0.3	-0.2	-0.2	60	55	YES	YES	YES	YES	YES
7	7_030	44 Benalla Ave	Residential	G	2	59	54	59	54	59	55	59	55	0.1	0.1	0.2	0.1	60	55	NO	NO	NO	NO	NO
7	7_031	46 Benalla Ave	Residential	G	3	57	52	57	52	57	53	57	53	0.1	0.1	0.1	0.1	60	55	NO	NO	NO	NO	NO
7	7_031	46 Benalla Ave	Residential	1	2	61	56	61	56	61	57	61	57	0.1	0	0.1	0.1	60	55	NO	NO	NO	NO	NO
7	7_032	48 Benalla Ave	Residential	G	2	56	51	56	51	56	52	56	52	0	0.1	0	0	60	55	NO	NO	NO	NO	NO
7	7_033	50 Benalla Ave	Residential	G	3	55	50	55	50	55	51	55	51	0	0.1	0	0	60	55	NO	NO	NO	NO	NO
7	7_033	50 Benalla Ave	Residential	1	2	58	54	58	54	58	54	59	54	0.1	0.1	0.1	0.1	60	55	NO	NO	NO	NO	NO
7	7_034	Lot 1 Windsor Road	Residential	G	2	67	63	67	63	68	63	68	63	-0.2	-0.2	-0.1	-0.1	60	55	YES	YES	YES	YES	YES
7	7_034	Lot 1 Windsor Road	Residential	1	2	70	65	69	65	70	66	70	65	-0.1	-0.1	-0.1	-0.1	60	55	YES	YES	YES	YES	YES
7	7_035	10 Hart Place	Residential	G	1	57	53	57	53	58	54	58	53	-0.1	-0.1	-0.1	-0.1	60	55	NO	NO	NO	NO	NO
7	7_036	12 Hart Place	Residential	G	2	60	55	60	55	60	56	60	56	-0.1	-0.1	0	0	60	55	NO	NO	NO	NO	NO
7	7_037	16 Hart Place	Residential	G	2	68	63	68	63	68	64	68	64	-0.4	-0.4	-0.3	-0.3	60	55	YES	YES	YES	YES	YES
7	7_038	17 Hart Place	Residential	G	2	62	57	62	57	62	58	62	58	-0.1	-0.1	-0.1	-0.1	60	55	NO	NO	NO	NO	NO
7	7_039	18 Hart Place	Residential	G	2	69	64	68	64	69	65	69	64	-0.4	-0.4	-0.3	-0.3	60	55	YES	YES	YES	YES	YES
7	7_040	20 Hart Place	Residential	G	2	70	66	70	65	70	66	70	66	-0.3	-0.3	-0.3	-0.3	60	55	YES	YES	YES	YES	YES
7	7_041	22 Hart Place	Residential	G	2	62	57	62	57	62	58	62	58	-0.1	-0.1	-0.1	-0.1	60	55	NO	NO	NO	NO	NO
7	7_042	2 Wrights Road	Residential	G	2	67	62	66	62	67	63	67	62	-0.3	-0.2	-0.3	-0.3	60	55	YES	YES	YES	YES	YES
7	7_042	2 Wrights Road	Residential	1	2	69	65	69	65	70	65	70	65	-0.2	-0.2	-0.2	-0.2	60	55	YES	YES	YES	YES	YES
7	7_043	4 Wrights Road	Residential	G	6	60	56	60	55	60	56	60	56	-0.4	-0.4	-0.4	-0.4	60	55	NO	NO	NO	NO	NO
7	7_044	6 Wrights Road	Residential	G	5	59	54	58	54	59	55	59	54	-0.3	-0.4	-0.3	-0.3	60	55	NO	NO	NO	NO	NO
7	7_045a	3-5 President Road	Childcare Outdoor Play	G	1	55	50	55	50	56	50	56	51	0.1	0.2	0.2	0.2	55	-	NO	NO	NO	NO	NO

NCA	NCA ID	Receiver Address	Receiver Type	Facade		Opening Year				Design Year				Trigger 1 Increase (Build - No Build)				NCG noise criteria		Trigger 2 Do noise levels exceed the cumlative limit with project roads adding ≥2dB to the total noise levels?		Trigger 3 Is the contribution from the road project Acute?		Consider additional noise mitigation?
						No Build		Build		No Build		Build		Opening Year		Design Year						Day	Night	
				Floor	Orientation	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night					
						dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	Day	Night	≥ 65dB LAeq,15h	≥ 60dB LAeq,9h	
7	7_045b	3-5 President Road	Childcare Indoor Play	G	3	57	52	57	52	57	53	57	53	0.1	0.2	0.1	0.1	50	-	YES	NO	NO	NO	YES
7	7_046		Residential	G	4	57	53	57	53	57	53	58	53	0.2	0.2	0.2	0.2	60	55	NO	NO	NO	NO	NO
7	7_046		Residential	1	4	59	54	59	54	59	55	59	55	0.2	0.2	0.2	0.2	60	55	NO	NO	NO	NO	NO
7	7_047		Residential	G	4	57	52	57	52	57	53	57	53	0.2	0.2	0.2	0.2	60	55	NO	NO	NO	NO	NO
7	7_047		Residential	1	4	59	54	59	54	59	55	59	55	0.2	0.2	0.2	0.2	60	55	NO	NO	NO	NO	NO
7	7_048		Residential	G	4	56	52	57	52	57	52	57	53	0.2	0.1	0.2	0.2	60	55	NO	NO	NO	NO	NO
7	7_048		Residential	1	4	59	54	59	54	59	55	59	55	0.2	0.2	0.2	0.2	60	55	NO	NO	NO	NO	NO
7	7_049		Residential	G	3	56	52	56	52	57	52	57	53	0.1	0.2	0.1	0.1	60	55	NO	NO	NO	NO	NO
7	7_049		Residential	1	3	59	54	59	54	59	55	59	55	0.2	0.1	0.2	0.2	60	55	NO	NO	NO	NO	NO
7	7_050		Residential	G	3	56	51	56	51	56	52	56	52	0.1	0.2	0.2	0.1	60	55	NO	NO	NO	NO	NO
7	7_050		Residential	1	3	58	54	59	54	59	55	59	55	0.1	0.1	0.1	0.1	60	55	NO	NO	NO	NO	NO
7	7_051		Residential	G	3	54	50	55	50	55	50	55	51	0.2	0.2	0.1	0.2	60	55	NO	NO	NO	NO	NO
7	7_051		Residential	1	3	58	54	59	54	59	54	59	55	0.1	0.1	0.1	0.2	60	55	NO	NO	NO	NO	NO
7	7_052		Residential	G	3	54	50	55	50	55	51	55	51	0.1	0.1	0.1	0.1	60	55	NO	NO	NO	NO	NO
7	7_052		Residential	1	2	56	52	56	52	57	52	57	53	0.1	0.1	0.2	0.1	60	55	NO	NO	NO	NO	NO
7	7_053		Residential	G	3	49	45	50	45	50	46	50	46	0.1	0.1	0.1	0.1	60	55	NO	NO	NO	NO	NO
7	7_053		Residential	1	3	55	50	55	51	55	51	55	51	0.2	0.2	0.2	0.2	60	55	NO	NO	NO	NO	NO
7	7_054		Residential	G	2	50	45	50	45	50	46	50	46	0.1	0.1	0.1	0.1	60	55	NO	NO	NO	NO	NO
7	7_054		Residential	1	2	55	51	55	51	55	51	56	51	0.1	0.1	0.2	0.2	60	55	NO	NO	NO	NO	NO
7	7_055		Residential	G	4	50	45	50	46	50	46	50	46	0.1	0.2	0.1	0.1	60	55	NO	NO	NO	NO	NO
7	7_055		Residential	1	4	55	51	56	51	56	51	56	52	0.2	0.2	0.1	0.2	60	55	NO	NO	NO	NO	NO
7	7_056		Residential	G	3	50	46	50	46	51	46	51	46	0.1	0.1	0.1	0.1	60	55	NO	NO	NO	NO	NO
7	7_056		Residential	1	3	55	51	56	51	56	52	56	52	0.1	0.1	0.2	0.2	60	55	NO	NO	NO	NO	NO
7	7_057		Residential	G	2	51	46	51	47	51	47	51	47	0.1	0.1	0.1	0.1	60	55	NO	NO	NO	NO	NO
7	7_057		Residential	1	2	56	51	56	51	56	52	56	52	0.2	0.2	0.1	0.2	60	55	NO	NO	NO	NO	NO
7	7_058		Residential	G	2	52	48	52	48	52	48	53	48	0.2	0.2	0.3	0.2	60	55	NO	NO	NO	NO	NO
7	7_058		Residential	1	3	56	52	56	52	56	52	57	52	0.2	0.2	0.1	0.2	60	55	NO	NO	NO	NO	NO
7	7_059		Residential	G	4	55	50	55	51	55	51	55	51	0.1	0.1	0.1	0.1	60	55	NO	NO	NO	NO	NO
7	7_060	President Road	School Classroom	G	4	56	51	56	52	56	52	56	52	0.2	0.2	0.1	0.2	50	-	YES	NO	NO	NO	YES
7	7_060	President Road	School Classroom	1	4	58	54	58	54	59	54	59	55	0.2	0.3	0.2	0.2	50	-	YES	NO	NO	NO	YES
7	7_061	President Road	Places of worship	G	2	54	50	55	50	55	50	55	51	0.3	0.3	0.3	0.3	50	50	YES	NO	NO	NO	YES
7	7_062		Residential	G	3	55	51	55	51	55	51	56	51	0.2	0.2	0.2	0.2	60	55	NO	NO	NO	NO	NO
7	7_063		Residential	G	2	55	50	55	51	55	51	55	51	0.2	0.2	0.2	0.2	60	55	NO	NO	NO	NO	NO
7	7_063		Residential	1	2	57	52	57	52	57	53	57	53	0.2	0.3	0.3	0.2	60	55	NO	NO	NO	NO	NO
7	7_064		Residential	G	1	52	48	52	48	52	48	53	48	0.1	0.1	0.1	0.1	60	55	NO	NO	NO	NO	NO
7	7_064		Residential	1	3	53	49	54	49	54	50	54	50	0.3	0.3	0.4	0.3	60	55	NO	NO	NO	NO	NO
7	7_065		Residential	G	1	52	47	52	48	52	48	52	48	0.1	0.1	0.1	0.1	60	55	NO	NO	NO	NO	NO
7	7_066		Residential	G	3	50	46	50	46	51	46	51	46	0.2	0.1	0.1	0.1	60	55	NO	NO	NO	NO	NO
7	7_066		Residential	1	3	54	50	55	50	55	50	55	51	0.2	0.2	0.2	0.2	60	55	NO	NO	NO	NO	NO
7	7_067		Residential	G	3	51	47	51	47	51	47	52	47	0.2	0.2	0.1	0.2	60	55	NO	NO	NO	NO	NO
7	7_067		Residential	1	3	55	50	55	50	55	51	55	51	0.2	0.2	0.2	0.2	60	55	NO	NO	NO	NO	NO
7	7_068		Residential	G	3	52	47	52	47	52	48	52	48	0.3	0.4	0.3	0.3	60	55	NO	NO	NO	NO	NO
7	7_068		Residential	1	3	56	51	56	52	56	52	56	52	0.2	0.2	0.2	0.2	60	55	NO	NO	NO	NO	NO
7	7_069		Residential	G	4	56	51	56	52	56	52	56	52	0.2	0.3	0.2	0.3	60	55	NO	NO	NO	NO	NO
7	7_069		Residential	1	4	58	53	58	53	58	54	58	54	0.2	0.3	0.3	0.2	60	55	NO	NO	NO	NO	NO
7	7_070		Residential	G	3	56	52	56	52	57	52	57	53	0.2	0.2	0.2	0.3	60	55	NO	NO	NO	NO	NO
7	7_070		Residential	1	3	58	53	58	54	58	54	58	54	0.2	0.2	0.3	0.3	60	55	NO	NO	NO	NO	NO
7	7_071		Residential	G	4	57	52	57	53	57	53	58	53	0.2	0.3	0.3	0.2	60	55	NO	NO	NO	NO	NO
7	7_071		Residential	1	4	58	53	58	54	58	54	58	54	0.2	0.2	0.3	0.2	60	55	NO	NO	NO	NO	NO
7	7_072		Residential	G	3	56	52	57	52	57	53	57	53	0.2	0.2	0.2	0.2	60	55	NO	NO	NO	NO	NO
7	7_072		Residential	1	3	58	53	58	53	58	54	58	54	0.2	0.2	0.2	0.2	60	55	NO	NO	NO	NO	NO
7	7_073		Residential	G	4	55	51	56	51	56	51	56	52	0.2	0.2	0.2	0.2	60	55	NO	NO	NO	NO	NO
7	7_073		Residential	1	4	57	53	58	53	58	53	58	54	0.2	0.2	0.2	0.2	60	55	NO	NO	NO	NO	NO
7	7_074		Residential	G	3	55	51	55	51	56	51	56	52	0.2	0.2	0.2	0.2	60	55	NO	NO	NO	NO	NO
7	7_074		Residential	1	3	57	53	57	53	58	53	58	54	0.2	0.2	0.1	0.2	60	55	NO	NO	NO	NO	NO
7	7_075		Residential	G	3	56	51	56	51	56	52	56	52	0.3	0.3	0.3	0.3	60	55	NO	NO	NO	NO	NO
7	7_075		Residential	1	3	58	53	58	53	58	54	58	54	0.2	0.3	0.3	0.2	60	55	NO	NO	NO	NO	NO

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						No Build		Build		No Build		Build		Opening Year		Design Year						Day	Night	
				Floor	Orientation	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night					
						dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	Day	Night	≥ 65dB LAeq,15h	≥ 60dB LAeq,9h	
7	7_076		Residential	G	4	48	44	49	44	49	44	49	45	0.1	0.1	0.2	0.2	60	55	NO	NO	NO	NO	NO
7	7_076		Residential	1	4	55	50	55	50	55	51	55	51	0.2	0.2	0.2	0.2	60	55	NO	NO	NO	NO	NO
7	7_077		Residential	G	4	49	44	49	44	49	45	49	45	0.1	0.1	0.1	0.1	60	55	NO	NO	NO	NO	NO
7	7_077		Residential	1	4	55	50	55	50	55	51	55	51	0.2	0.2	0.2	0.2	60	55	NO	NO	NO	NO	NO
7	7_078		Residential	G	3	50	45	50	45	50	46	50	46	0	0	0	0.1	60	55	NO	NO	NO	NO	NO
7	7_078		Residential	1	3	54	50	55	50	55	51	55	51	0.1	0.2	0.2	0.1	60	55	NO	NO	NO	NO	NO
7	7_079		Residential	G	3	51	46	51	47	51	47	51	47	0.1	0.1	0.1	0.1	60	55	NO	NO	NO	NO	NO
7	7_079		Residential	1	3	55	50	55	51	55	51	56	51	0.2	0.2	0.2	0.3	60	55	NO	NO	NO	NO	NO
7	7_080		Residential	G	4	53	49	53	49	54	49	54	50	0.2	0.2	0.2	0.2	60	55	NO	NO	NO	NO	NO
7	7_081		Residential	G	3	53	49	54	49	54	50	54	50	0.1	0.2	0.2	0.2	60	55	NO	NO	NO	NO	NO
7	7_081		Residential	1	2	55	50	55	51	55	51	56	51	0.2	0.3	0.2	0.3	60	55	NO	NO	NO	NO	NO
7	7_082		Residential	G	4	53	49	53	49	54	49	54	50	0.2	0.2	0.2	0.2	60	55	NO	NO	NO	NO	NO
7	7_082		Residential	1	4	55	50	55	50	55	51	55	51	0.2	0.2	0.2	0.2	60	55	NO	NO	NO	NO	NO
7	7_083		Residential	G	3	50	46	50	46	50	46	51	46	0.1	0.1	0.1	0.2	60	55	NO	NO	NO	NO	NO
7	7_083		Residential	1	3	54	49	54	50	54	50	55	50	0.2	0.2	0.2	0.2	60	55	NO	NO	NO	NO	NO
7	7_084		Residential	G	3	50	45	50	46	50	46	50	46	0.1	0.1	0.1	0.1	60	55	NO	NO	NO	NO	NO
7	7_084		Residential	1	3	54	50	54	50	55	50	55	51	0.2	0.3	0.3	0.3	60	55	NO	NO	NO	NO	NO
7	7_085		Residential	G	4	50	45	50	45	50	46	50	46	0	0.1	0.1	0	60	55	NO	NO	NO	NO	NO
7	7_085		Residential	1	4	54	50	54	50	54	50	55	50	0.2	0.1	0.2	0.2	60	55	NO	NO	NO	NO	NO
7	7_086		Residential	G	4	49	44	49	44	49	45	49	45	0.1	0.1	0.1	0	60	55	NO	NO	NO	NO	NO
7	7_086		Residential	1	4	54	49	54	49	54	50	54	50	0.1	0.2	0.1	0.1	60	55	NO	NO	NO	NO	NO
7	7_087		Residential	G	3	55	51	55	51	56	51	56	51	0.1	0.2	0.2	0.1	60	55	NO	NO	NO	NO	NO
7	7_087		Residential	1	3	58	53	58	53	58	54	58	54	0.1	0.1	0.2	0.1	60	55	NO	NO	NO	NO	NO
7	7_088		Residential	G	1	55	50	55	50	55	51	55	51	0.1	0.1	0.1	0.1	60	55	NO	NO	NO	NO	NO
7	7_089		Residential	G	1	54	49	54	49	54	50	54	50	0.2	0.2	0.1	0.2	60	55	NO	NO	NO	NO	NO
7	7_090		Residential	G	3	56	52	57	52	57	53	57	53	0.2	0.2	0.2	0.2	60	55	NO	NO	NO	NO	NO
7	7_091		Residential	G	3	54	49	54	49	54	50	54	50	0.1	0.1	0.2	0.1	60	55	NO	NO	NO	NO	NO
7	7_092		Residential	G	3	54	50	54	50	54	50	55	50	0.1	0.1	0.1	0.1	60	55	NO	NO	NO	NO	NO
7	7_093		Residential	G	3	54	49	54	49	54	50	54	50	0	0.1	0.1	0.1	60	55	NO	NO	NO	NO	NO
7	7_094		Residential	G	1	53	49	54	49	54	50	54	50	0.1	0.1	0.1	0.1	60	55	NO	NO	NO	NO	NO
7	7_095		Residential	G	4	54	49	54	49	54	50	54	50	0.2	0.1	0.1	0.2	60	55	NO	NO	NO	NO	NO
7	7_096		Residential	G	2	55	51	56	51	56	51	56	52	0.5	0.5	0.5	0.5	60	55	NO	NO	NO	NO	NO
7	7_097		Residential	G	2	55	50	55	51	55	51	55	51	0	0.1	0.1	0.1	60	55	NO	NO	NO	NO	NO
7	7_098		Residential	G	1	55	51	55	51	56	51	56	51	0.1	0	0.1	0	60	55	NO	NO	NO	NO	NO
7	7_099		Residential	G	2	54	49	54	49	54	50	54	50	0.1	0.1	0.1	0	60	55	NO	NO	NO	NO	NO
7	7_100		Residential	G	1	53	48	53	48	53	49	53	49	0	0	0	0	60	55	NO	NO	NO	NO	NO
7	7_100		Residential	1	4	57	52	57	52	57	53	57	53	0.1	0.1	0.1	0.1	60	55	NO	NO	NO	NO	NO
7	7_101		Residential	G	1	52	47	52	48	52	48	52	48	0.1	0.1	0.1	0	60	55	NO	NO	NO	NO	NO
7	7_101		Residential	1	1	56	51	56	51	56	52	56	52	0	0.1	0.1	0.1	60	55	NO	NO	NO	NO	NO
7	7_102		Residential	G	1	52	48	52	48	53	48	53	48	0	0	0.1	0	60	55	NO	NO	NO	NO	NO
7	7_102		Residential	1	4	56	51	56	51	56	52	56	52	0	0.1	0.1	0.1	60	55	NO	NO	NO	NO	NO
7	7_103		Residential	G	4	51	47	51	47	52	47	52	47	0.1	0	0.1	0	60	55	NO	NO	NO	NO	NO
7	7_104		Residential	G	4	54	49	54	49	54	50	54	50	0.1	0.2	0.2	0.2	60	55	NO	NO	NO	NO	NO
7	7_105		Residential	G	4	55	50	55	50	55	51	55	51	0.1	0.2	0.2	0.2	60	55	NO	NO	NO	NO	NO
7	7_106		Residential	G	4	54	49	54	50	54	50	54	50	0.2	0.1	0.1	0.1	60	55	NO	NO	NO	NO	NO
7	7_107		Residential	G	4	53	49	54	49	54	50	54	50	0.1	0	0	0	60	55	NO	NO	NO	NO	NO
7	7_108		Residential	G	1	57	53	57	53	58	53	58	53	0	0	0	-0.1	60	55	NO	NO	NO	NO	NO
7	7_109		Residential	G	2	54	49	54	49	54	50	54	50	-0.1	-0.1	-0.1	0	60	55	NO	NO	NO	NO	NO
7	7_109		Residential	1	1	59	55	60	55	60	56	60	56	0.2	0.2	0.1	0.1	60	55	NO	NO	NO	NO	NO
7	7_110		Residential	G	4	52	48	53	48	53	48	53	49	0.2	0.2	0.2	0.2	60	55	NO	NO	NO	NO	NO
7	7_111		Residential	G	1	52	48	52	48	52	48	52	48	0	0	0	0	60	55	NO	NO	NO	NO	NO
7	7_111		Residential	1	4	56	52	56	52	56	52	56	52	0	0	0	0	60	55	NO	NO	NO	NO	NO
7	7_112		Residential	G	4	52	47	52	48	52	48	52	48	0.2	0.2	0.2	0.2	60	55	NO	NO	NO	NO	NO
7	7_113		Residential	G	3	53	48	53	48	53	49	53	49	0	0	0	0.1	60	55	NO	NO	NO	NO	NO
7	7_114		Residential	G	2	53	48	53	48	53	49	53	49	0.1	0.1	0.1	0.1	60	55	NO	NO	NO	NO	NO
7	7_114		Residential	1	2	56	51	56	51	56	52	56	52	0.1	0.1	0.1	0.1	60	55	NO	NO	NO	NO	NO
7	7_115		Residential	G	3	52	48	52	48	53	48	53	48	0	0	0	0	60	55	NO	NO	NO	NO	NO

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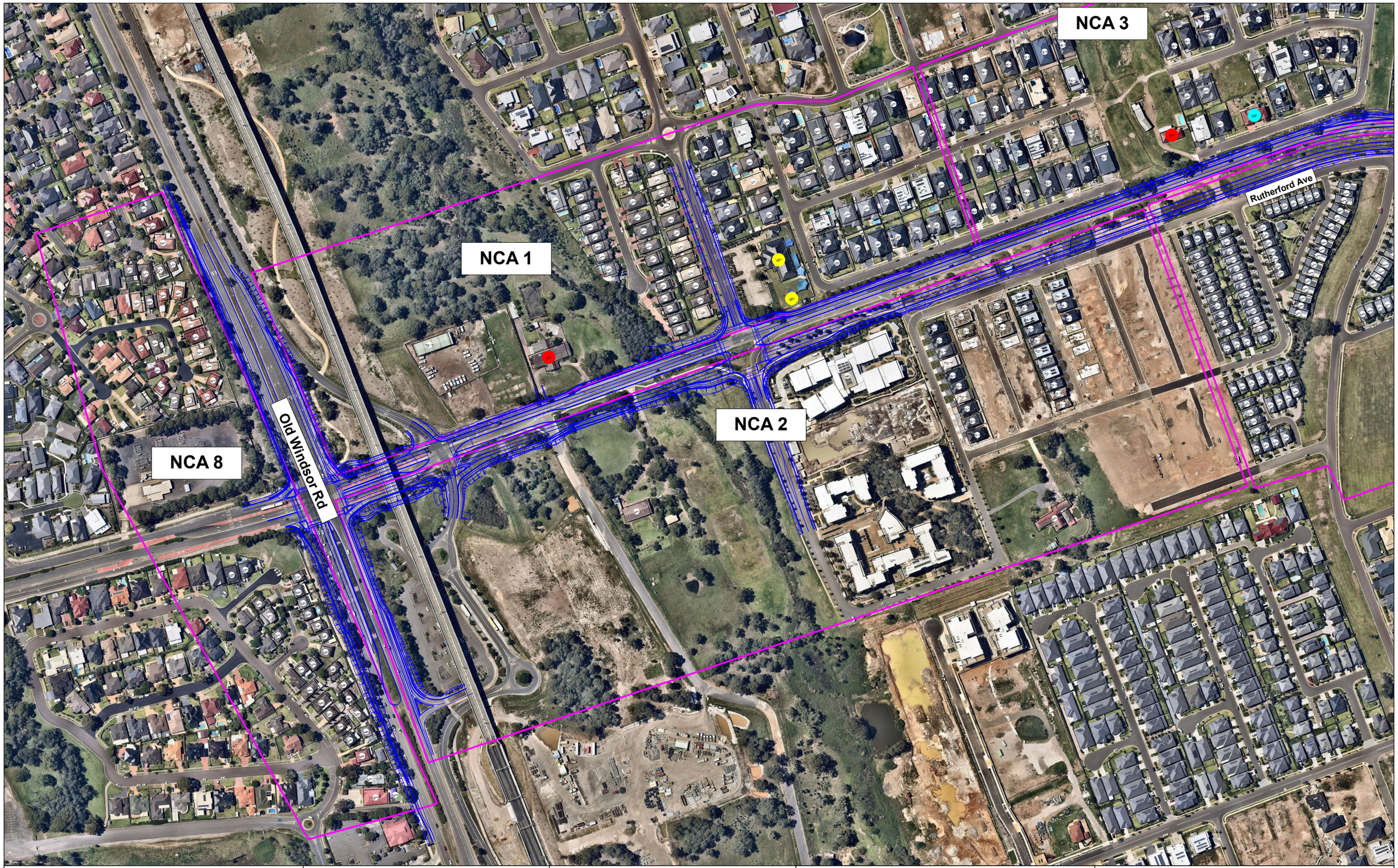
						No Build		Build		No Build		Build		Opening Year		Design Year						Day	Night	
				Floor	Orientation	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night					
						dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	Day	Night	≥ 65dB LAeq,15h	≥ 60dB LAeq,9h	
7	7_116		Residential	G	2	52	47	52	47	52	48	52	48	0	0	0	0	60	55	NO	NO	NO	NO	NO
7	7_116		Residential	1	2	55	50	55	50	55	51	55	51	0	0	0	0	60	55	NO	NO	NO	NO	NO
7	7_117		Residential	G	2	55	50	55	50	55	51	55	51	0.1	0.1	0	0	60	55	NO	NO	NO	NO	NO
7	7_117		Residential	1	2	58	54	58	54	59	54	59	54	0.1	0.1	0	0.1	60	55	NO	NO	NO	NO	NO
7	7_118		Residential	G	2	53	49	53	49	54	49	54	49	0.1	0.1	0	0	60	55	NO	NO	NO	NO	NO
7	7_119		Residential	G	2	58	53	58	53	58	54	58	54	0.1	0.1	0.1	0.1	60	55	NO	NO	NO	NO	NO
7	7_119		Residential	1	2	61	56	61	56	61	57	61	57	0.1	0.1	0.1	0	60	55	NO	NO	NO	NO	NO
7	7_120		Residential	G	1	56	52	56	52	56	52	57	52	0	0.1	0.1	0	60	55	NO	NO	NO	NO	NO
7	7_121		Residential	G	4	56	51	56	51	56	52	56	52	0	0.1	0.1	0	60	55	NO	NO	NO	NO	NO
7	7_122		Residential	G	3	54	50	54	50	55	50	55	50	0	0.1	0.1	0.1	60	55	NO	NO	NO	NO	NO
7	7_122		Residential	1	2	59	54	59	54	59	55	59	55	0	0	0	0.1	60	55	NO	NO	NO	NO	NO
7	7_123		Residential	G	3	53	49	53	49	54	49	54	49	0.1	0.2	0.1	0.1	60	55	NO	NO	NO	NO	NO
7	7_123		Residential	1	3	56	51	56	51	56	52	56	52	0.1	0.1	0.2	0.1	60	55	NO	NO	NO	NO	NO
7	7_124		Residential	G	4	52	48	52	48	53	48	53	48	0.1	0.1	0	0.1	60	55	NO	NO	NO	NO	NO
7	7_125		Residential	G	2	53	48	53	48	53	49	53	49	0	0	0	0.1	60	55	NO	NO	NO	NO	NO
7	7_126		Residential	G	1	55	50	55	50	55	51	55	51	0	0	-0.1	-0.1	60	55	NO	NO	NO	NO	NO
7	7_127		Residential	G	1	56	52	56	51	56	52	56	52	-0.2	-0.2	-0.2	-0.2	60	55	NO	NO	NO	NO	NO
7	7_128		Residential	G	1	57	53	57	52	58	53	57	53	-0.4	-0.4	-0.4	-0.4	60	55	NO	NO	NO	NO	NO
7	7_128		Residential	1	2	61	57	61	57	62	57	62	57	0	0	-0.1	-0.1	60	55	NO	NO	NO	NO	NO
8	8_010	36 Kentwell Crescent	Residential	G	1	58	54	58	54	58	54	59	54	0.2	0.2	0.2	0.3	60	55	NO	NO	NO	NO	NO
8	8_014	43 Kentwell Crescent	Residential	G	4	68	64	68	63	68	64	68	64	-0.2	-0.2	-0.1	-0.2	60	55	NO	NO	NO	NO	NO
8	8_015	49 Kentwell Crescent	Residential	G	3	67	63	67	63	68	64	68	64	0	0	0	0	60	55	NO	NO	NO	NO	NO
8	8_016	45 Kentwell Crescent	Residential	G	4	67	63	67	63	68	63	68	63	-0.3	-0.2	-0.2	-0.2	60	55	NO	NO	NO	NO	NO
8	8_016	45 Kentwell Crescent	Residential	1	4	70	66	70	66	70	66	70	66	-0.1	-0.1	-0.2	-0.1	60	55	NO	NO	NO	NO	NO
8	8_017	47 Kentwell Crescent	Residential	G	6	68	64	68	63	68	64	68	64	-0.4	-0.4	-0.4	-0.4	60	55	NO	NO	NO	NO	NO
8	8_017	47 Kentwell Crescent	Residential	1	6	71	66	70	66	71	67	71	66	-0.2	-0.2	-0.2	-0.2	60	55	NO	NO	NO	NO	NO
8	8_018	51 Kentwell Crescent	Residential	G	3	61	57	61	57	61	57	61	57	0.2	0.1	0.1	0.1	60	55	NO	NO	NO	NO	NO
8	8_019	53 Kentwell Crescent	Residential	G	1	58	53	58	53	58	54	58	54	0.1	0.1	0.2	0.2	60	55	NO	NO	NO	NO	NO
8	8_020	55 Kentwell Crescent	Residential	G	4	56	52	56	52	57	52	57	52	0.2	0.2	0.1	0.2	60	55	NO	NO	NO	NO	NO
8	8_020	55 Kentwell Crescent	Residential	1	1	61	57	61	57	62	57	62	57	0.2	0.2	0.3	0.2	60	55	NO	NO	NO	NO	NO
8	8_022	6 Meldon Place	Residential	G	5	57	53	57	53	57	53	58	54	0.4	0.3	0.4	0.4	60	55	NO	NO	NO	NO	NO
8	8_023	8 Meldon Place	Residential	G	3	57	53	57	53	57	53	57	53	0.2	0.2	0.2	0.2	60	55	NO	NO	NO	NO	NO
8	8_024	9 Meldon Place	Residential	G	1	57	53	57	53	57	53	58	53	0.3	0.3	0.3	0.4	60	55	NO	NO	NO	NO	NO
8	8_025	10 Meldon Place	Residential	G	4	57	53	58	54	58	54	58	54	0.7	0.6	0.6	0.7	60	55	NO	NO	NO	NO	NO
8	8_026	11 Meldon Place	Residential	G	1	57	53	57	53	58	53	58	54	0.3	0.3	0.4	0.4	60	55	NO	NO	NO	NO	NO
8	8_026	11 Meldon Place	Residential	1	1	61	57	61	57	61	57	62	57	0.2	0.2	0.2	0.2	60	55	NO	NO	NO	NO	NO
8	8_027	12 Meldon Place	Residential	G	6	58	54	59	55	59	54	59	55	0.6	0.7	0.7	0.7	60	55	NO	NO	NO	NO	NO
8	8_028	13 Meldon Place	Residential	G	3	59	54	59	55	59	55	59	55	0.2	0.1	0.2	0.1	60	55	NO	NO	NO	NO	NO
8	8_028	13 Meldon Place	Residential	1	3	62	58	62	58	63	58	63	58	0.1	0.2	0.2	0.2	60	55	NO	NO	NO	NO	NO
8	8_029	14 Meldon Place	Residential	G	3	60	56	61	57	61	57	62	57	0.6	0.6	0.6	0.6	60	55	NO	NO	NO	NO	NO
8	8_029	14 Meldon Place	Residential	1	3	62	58	63	59	63	59	63	59	0.5	0.5	0.5	0.6	60	55	NO	NO	NO	NO	NO
8	8_030	15 Meldon Place	Residential	G	4	65	61	65	61	65	61	65	61	0.1	0.2	0.2	0.2	60	55	NO	NO	NO	NO	NO
8	8_030	15 Meldon Place	Residential	1	4	68	64	68	64	68	64	68	64	0.2	0.2	0.2	0.2	60	55	NO	NO	NO	NO	NO
8	8_031	16 Meldon Place	Residential	G	1	61	56	61	57	61	57	62	57	0.5	0.5	0.5	0.5	60	55	NO	NO	NO	NO	NO
8	8_031	16 Meldon Place	Residential	1	1	63	59	63	59	63	59	64	60	0.4	0.5	0.4	0.4	60	55	NO	NO	NO	NO	NO
8	8_032	17 Meldon Place	Residential	G	6	66	62	66	62	66	62	66	62	0.2	0.2	0.1	0.2	60	55	NO	NO	NO	NO	NO
8	8_033	19 Meldon Place	Residential	G	6	66	62	66	62	67	62	67	62	0.2	0.2	0.2	0.1	60	55	NO	NO	NO	NO	NO
8	8_034	21 Meldon Place	Residential	G	3	66	62	66	62	66	62	67	62	0.1	0.1	0.2	0.1	60	55	NO	NO	NO	NO	NO
8	8_035	23 Meldon Place	Residential	G	6	66	61	66	62	66	62	66	62	0.1	0.1	0.1	0.2	60	55	NO	NO	NO	NO	NO
8	8_036	25 Meldon Place	Residential	G	6	66	62	66	62	66	62	66	62	0	0.1	0.1	0	60	55	NO	NO	NO	NO	NO
8	8_037	27 Meldon Place	Residential	G	4	64	60	64	60	65	60	65	60	0.1	0.2	0.2	0.1	60	55	NO	NO	NO	NO	NO
8	8_037	27 Meldon Place	Residential	1	3	67	63	67	63	67	63	67	63	0.1	0.1	0	0.1	60	55	NO	NO	NO	NO	NO
8	8_038	29 Meldon Place	Residential	G	1	62	58	63	58	63	58	63	59	0.3	0.4	0.3	0.3	60	55	NO	NO	NO	NO	NO
8	8_038	29 Meldon Place	Residential	1	4	65	61	65	61	66	61	66	61	0.1	0.1	0.1	0.2	60	55	NO	NO	NO	NO	NO
8	8_039	1 Carolyn Court	Residential	G	3	62	58	63	59	63	59	64	59	0.7	0.7	0.7	0.8	60	55	NO	NO	NO	NO	NO
8	8_039	1 Carolyn Court	Residential	1	3	67	63	68	63	67	63	68	64	0.8	0.7	0.8	0.8	60	55	NO	NO	NO	NO	NO
8	8_040	3 Carolyn Court	Residential	G	3	62	58	63	58	62	58	63	59	0.6	0.6	0.7	0.7	60	55	NO	NO	NO	NO	NO

NCA	NCA ID	Receiver Address	Receiver Type	Facade		Opening Year				Design Year				Trigger 1 Increase (Build - No Build)				NCG noise criteria		Trigger 2 Do noise levels exceed the cumlative limit with project roads adding ≥2dB to the total noise levels?		Trigger 3 Is the contribution from the road project Acute?		Consider additional noise mitigation?
						No Build		Build		No Build		Build		Opening Year		Design Year						Day	Night	
				Floor	Orientation	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night					
						dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	Day	Night	≥ 65dB LAeq,15h	≥ 60dB LAeq,9h	
8	8_040	3 Carolyn Court	Residential	1	3	66	62	67	63	67	62	67	63	0.7	0.7	0.8	0.7	60	55	NO	NO	NO	NO	NO
8	8_041	15 Carolyn Court	Residential	G	2	62	58	63	58	63	58	63	59	0.3	0.3	0.4	0.3	60	55	NO	NO	NO	NO	NO
8	8_041	15 Carolyn Court	Residential	1	3	70	66	70	66	71	66	71	66	0.1	0.1	0.1	0	60	55	NO	NO	NO	NO	NO
8	8_042	2 Jakob Way	Residential	G	1	60	55	60	56	60	56	61	56	0.6	0.6	0.7	0.6	60	55	NO	NO	NO	NO	NO
8	8_042	2 Jakob Way	Residential	1	1	62	58	63	59	63	59	63	59	0.6	0.6	0.6	0.5	60	55	NO	NO	NO	NO	NO
8	8_043	3 Jakob Way	Residential	G	4	63	58	62	58	63	59	63	58	-0.3	-0.4	-0.4	-0.3	60	55	NO	NO	NO	NO	NO
8	8_043	3 Jakob Way	Residential	1	4	68	64	68	64	69	64	69	64	0	0	0	0	60	55	NO	NO	NO	NO	NO
8	8_044	4 Jakob Way	Residential	G	2	58	54	59	54	59	54	59	55	0.4	0.4	0.4	0.5	60	55	NO	NO	NO	NO	NO
8	8_044	4 Jakob Way	Residential	1	2	61	57	62	57	62	57	62	58	0.4	0.5	0.4	0.4	60	55	NO	NO	NO	NO	NO
8	8_045	5 Jakob Way	Residential	G	4	62	58	62	58	63	58	63	58	-0.1	0	0	0	60	55	NO	NO	NO	NO	NO
8	8_045	5 Jakob Way	Residential	1	4	68	64	68	64	69	64	69	64	0	0	0.1	0	60	55	NO	NO	NO	NO	NO
8	8_046	7 Jakob Way	Residential	G	4	62	58	62	58	63	58	63	58	0	0	0	0	60	55	NO	NO	NO	NO	NO
8	8_046	7 Jakob Way	Residential	1	4	68	64	68	64	69	64	69	64	0	0	0	0	60	55	NO	NO	NO	NO	NO
8	8_047	3 Rory Court	Residential	G	2	58	54	58	54	58	54	59	54	0.3	0.3	0.3	0.3	60	55	NO	NO	NO	NO	NO
8	8_047	3 Rory Court	Residential	1	2	61	57	61	57	61	57	62	57	0.2	0.3	0.2	0.2	60	55	NO	NO	NO	NO	NO
8	8_048	4 Rory Court	Residential	G	1	57	53	57	53	57	53	58	54	0.5	0.5	0.6	0.6	60	55	NO	NO	NO	NO	NO
8	8_048	4 Rory Court	Residential	1	1	60	55	60	56	60	56	60	56	0.4	0.4	0.4	0.5	60	55	NO	NO	NO	NO	NO
8	8_049	6 Rory Court	Residential	G	2	58	53	57	53	58	53	58	53	-0.1	0	-0.1	-0.1	60	55	NO	NO	NO	NO	NO
8	8_049	6 Rory Court	Residential	1	2	61	57	61	57	62	57	62	57	0	0.1	0.1	0.1	60	55	NO	NO	NO	NO	NO
8	8_050	8 Rory Court	Residential	G	3	63	59	63	58	64	59	63	59	-0.6	-0.6	-0.6	-0.6	60	55	NO	NO	NO	NO	NO
8	8_050	8 Rory Court	Residential	1	3	69	64	69	64	69	65	69	65	0	0	0	0	60	55	NO	NO	NO	NO	NO
8	8_051	10 Rory Court	Residential	G	3	62	58	61	57	62	58	61	57	-0.9	-1	-1	-0.9	60	55	NO	NO	NO	NO	NO
8	8_051	10 Rory Court	Residential	1	3	70	66	70	66	71	66	71	66	0	0.1	0	0	60	55	NO	NO	NO	NO	NO
8	8_052	12 Rory Court	Residential	G	4	62	58	61	57	62	58	62	57	-0.6	-0.6	-0.5	-0.6	60	55	NO	NO	NO	NO	NO
8	8_052	12 Rory Court	Residential	1	4	70	65	70	65	70	66	70	66	0	0	0	0	60	55	NO	NO	NO	NO	NO
8	8_053a	6 Rothwell Circuit	Childcare Outdoor Play	G	4	63	58	64	58	64	58	64	58	0.3	0.3	0.3	0.3	55	-	NO	NO	NO	NO	NO
8	8_053b	6 Rothwell Circuit	Childcare Indoor Play	G	4	62	58	62	58	62	58	63	58	0.3	0.3	0.3	0.3	50	-	NO	NO	NO	NO	NO
8	8_054	8 Rothwell Circuit	Residential	G	5	62	58	62	58	62	58	63	58	0.4	0.3	0.3	0.3	60	55	NO	NO	NO	NO	NO
8	8_055	10 Rothwell Circuit	Residential	G	4	63	58	63	59	63	59	64	59	0.3	0.4	0.4	0.3	60	55	NO	NO	NO	NO	NO
8	8_055	10 Rothwell Circuit	Residential	1	4	68	64	69	64	69	64	69	64	0.3	0.2	0.2	0.2	60	55	NO	NO	NO	NO	NO
8	8_056	12 Rothwell Circuit	Residential	G	1	62	58	62	58	62	58	63	58	0.3	0.3	0.3	0.3	60	55	NO	NO	NO	NO	NO
8	8_056	12 Rothwell Circuit	Residential	1	4	72	67	72	67	72	67	72	68	0.2	0.2	0.2	0.2	60	55	NO	NO	NO	NO	NO
8	8_057	14 Rothwell Circuit	Residential	G	1	59	54	59	55	59	55	60	55	0.5	0.5	0.5	0.5	60	55	NO	NO	NO	NO	NO
8	8_057	14 Rothwell Circuit	Residential	1	1	63	58	63	59	63	59	63	59	0.3	0.3	0.3	0.3	60	55	NO	NO	NO	NO	NO
8	8_058	16 Rothwell Circuit	Residential	G	3	56	52	56	52	57	52	57	52	0.2	0.2	0.2	0.2	60	55	NO	NO	NO	NO	NO
8	8_058	16 Rothwell Circuit	Residential	1	3	60	56	60	56	60	56	61	56	0.2	0.2	0.2	0.2	60	55	NO	NO	NO	NO	NO
8	8_059	16A Rothwell Circuit	Residential	G	4	64	60	65	60	65	60	65	60	0.3	0.2	0.3	0.2	60	55	NO	NO	NO	NO	NO
8	8_059	16A Rothwell Circuit	Residential	1	4	71	66	71	67	71	67	71	67	0.1	0.2	0.1	0.2	60	55	NO	NO	NO	NO	NO
8	8_060	18 Rothwell Circuit	Residential	G	4	56	51	56	51	56	51	56	52	0.2	0.2	0.2	0.2	60	55	NO	NO	NO	NO	NO
8	8_060	18 Rothwell Circuit	Residential	1	4	59	55	60	55	60	55	60	56	0.2	0.2	0.2	0.2	60	55	NO	NO	NO	NO	NO
8	8_061	18A Rothwell Circuit	Residential	G	3	63	59	63	59	63	59	64	59	0.4	0.3	0.3	0.3	60	55	NO	NO	NO	NO	NO
8	8_061	18A Rothwell Circuit	Residential	1	3	70	65	70	66	70	66	70	66	0.1	0.2	0.2	0.2	60	55	NO	NO	NO	NO	NO
8	8_062	20 Rothwell Circuit	Residential	G	3	58	53	58	53	58	53	58	54	0.1	0.1	0.1	0.1	60	55	NO	NO	NO	NO	NO
8	8_062	20 Rothwell Circuit	Residential	1	3	61	57	61	57	61	57	61	57	0.1	0.1	0.1	0.1	60	55	NO	NO	NO	NO	NO
8	8_063	22 Rothwell Circuit	Residential	G	4	64	59	64	60	64	60	65	60	0.3	0.4	0.3	0.4	60	55	NO	NO	NO	NO	NO
8	8_063	22 Rothwell Circuit	Residential	1	4	71	66	71	66	71	66	71	67	0.2	0.1	0.1	0.1	60	55	NO	NO	NO	NO	NO
8	8_064	24 Rothwell Circuit	Residential	G	3	63	59	63	59	64	59	63	59	-0.3	-0.4	-0.4	-0.4	60	55	NO	NO	NO	NO	NO
8	8_064	24 Rothwell Circuit	Residential	1	3	70	65	70	65	70	65	70	65	0.1	0	0	0	60	55	NO	NO	NO	NO	NO
8	8_065	26 Rothwell Circuit	Residential	G	4	57	53	57	53	57	53	57	53	0	0	0	0	60	55	NO	NO	NO	NO	NO
8	8_065	26 Rothwell Circuit	Residential	1	4	60	56	60	56	61	56	61	56	0.1	0	0	0.1	60	55	NO	NO	NO	NO	NO

APPENDIX F Properties eligible for consideration of treatment



Legend:

- Single storey dwelling
- Double storey dwelling
- Other sensitive receiver
- NCA

Consultant:

RENZO TONIN & ASSOCIATES
inspired to achieve
Acoustics, Vibration & Structural Dynamics
Sydney Melbourne Brisbane Gold Coast Kuwait
1/418A Elizabeth Street, SURRY HILLS NSW 2010
P: 02 8218 0500 F: 02 8218 0501

Client:

Beca

Project:

MEMORIAL AVENUE UPGRADE
OLD WINDSOR ROAD TO WINDSOR ROAD

Description:

RECEIVERS TO BE CONSIDERED FOR FURTHER TREATMENT
NCA 1, 2 & 8

Noise levels are approximate due to interpolation of contours and should be used for reference only.
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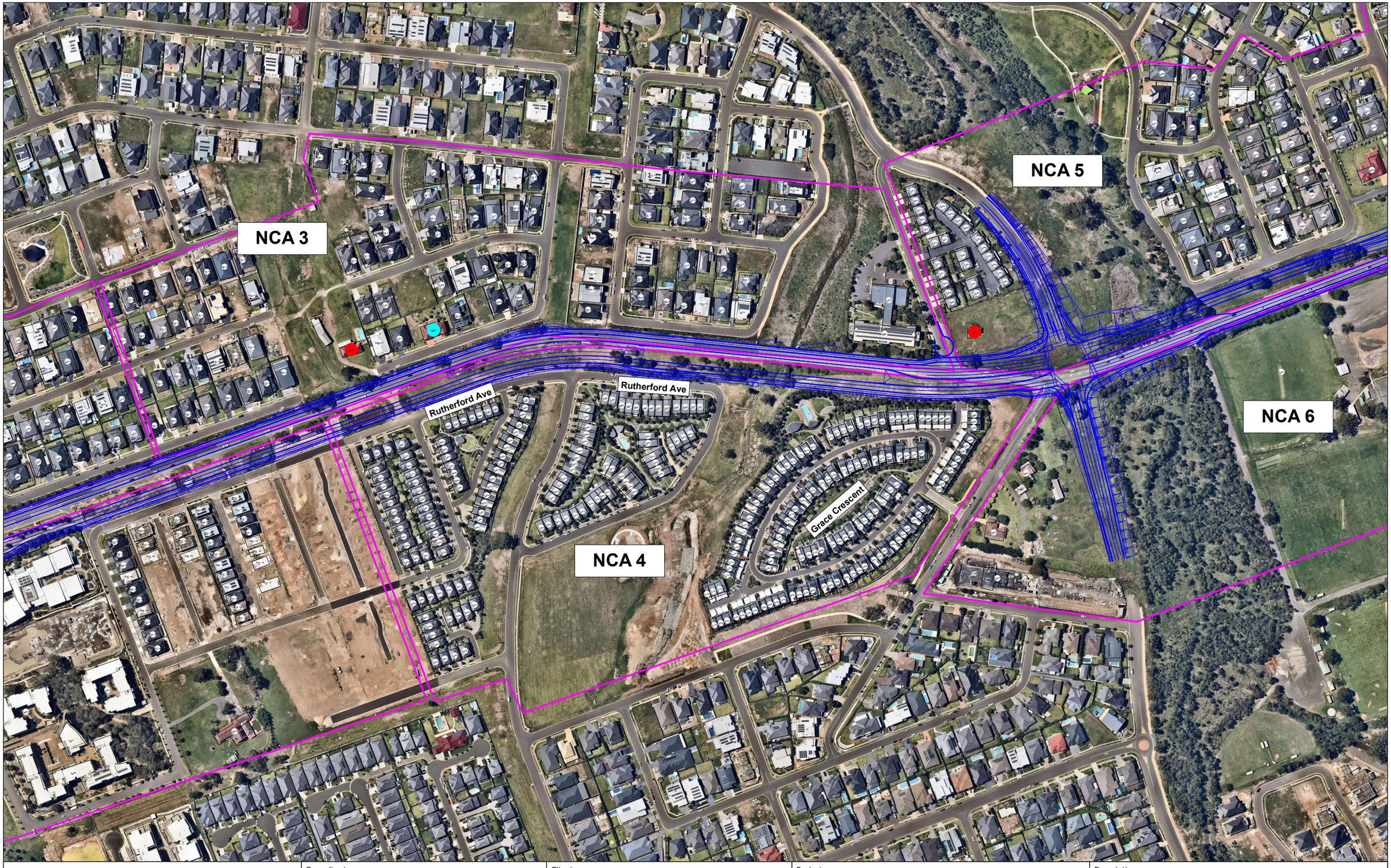
Fig Ref:	TH310-03.05.04.P02 (r1)	Grid:	-
Date:	2019.05.15	Scale:	1: 3500 A3



Legend:

- Single storey dwelling
- Double storey dwelling
- Other sensitive receiver
- NCA

Consultant:

RENZO TONIN & ASSOCIATES
inspired to achieve
Acoustics, Vibration & Structural Dynamics
Sydney Melbourne Brisbane Gold Coast Kuwait
1/418A Elizabeth Street, SURRY HILLS NSW 2010
P: 02 8218 0500 F: 02 8218 0501

Client:

Beca

Project:

MEMORIAL AVENUE UPGRADE
OLD WINDSOR ROAD TO WINDSOR ROAD

Description:

RECEIVERS TO BE CONSIDERED FOR FURTHER TREATMENT
NCA 3 & 4

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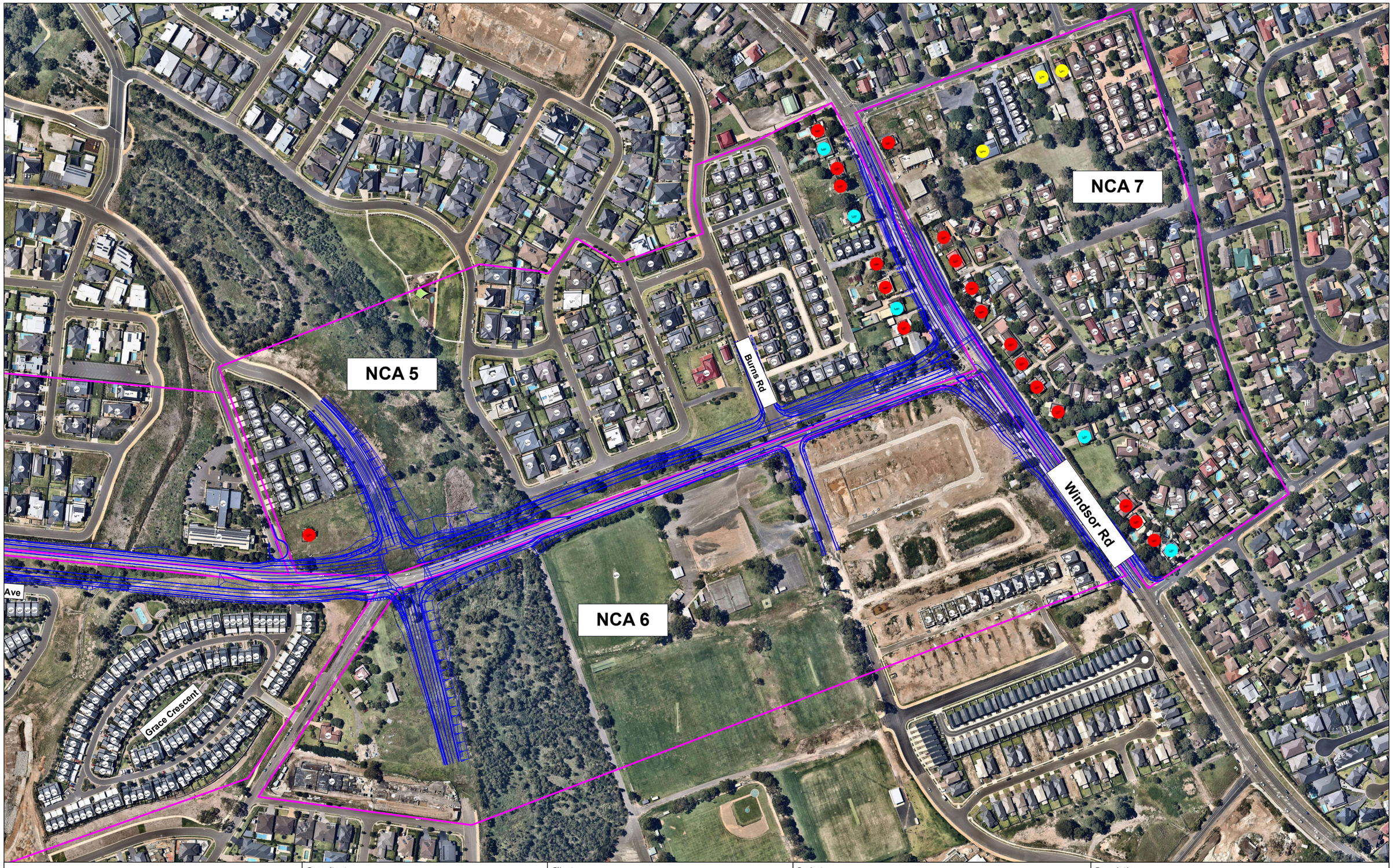
Fig Ref:	TH310-03.05.04.P03 (r1)	Grid:	-
Date:	2019.05.15	Scale:	1: 3500 A3



Legend:

- Single storey dwelling
- Double storey dwelling
- Other sensitive receiver
- NCA

Consultant:

RENZO TONIN & ASSOCIATES
inspired to achieve
Acoustics, Vibration & Structural Dynamics
Sydney Melbourne Brisbane Gold Coast Kuwait
1/418A Elizabeth Street, SURRY HILLS NSW 2010
P: 02 8218 0500 F: 02 8218 0501

Client:

Beca

Project:

MEMORIAL AVENUE UPGRADE
OLD WINDSOR ROAD TO WINDSOR ROAD

Description:

RECEIVERS TO BE CONSIDERED FOR FURTHER TREATMENT
NCA 5, 6 & 7

Noise levels are approximate due to interpolation of contours and should be used for reference only.
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Project No.:	TH310-03	Created by:	BC
Fig Ref:	TH310-03.05.04.P04 (r2)	Grid:	-
Date:	2019.05.15	Scale:	1: 3500 A3