Upgrade of the Pacific Highway, between Ourimbah Street and Parsons Road, Lisarow

Addendum review of environmental factors – construction compound

Roads and Maritime Services | August 2018

NSW GOVERNMENT

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Prepared by GHD Pty Ltd and Roads and Maritime Services
Revision 1
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Document controls

Approval and authorisation

Title	Upgrade of the Pacific Highway, between Ourimbah Street and Parsons Road, Lisarow - Addendum review of environmental factors – construction compound
Accepted on behalf of NSW Roads and Maritime Services by:	Daryl Fidge Project Manager
Signed:	
Dated:	24 August 2018

Executive summary

The proposed modification

Roads and Maritime Services (Roads and Maritime) proposes to modify the Upgrade of the Pacific Highway, between Ourimbah Street and Parsons Road, Lisarow (the project) by making adjustments to the construction ancillary facilities for the project (the proposed modification).

The proposed modification has resulted from a review of constructability requirements for the project and issues raised by the local community during the construction of the adjacent Pacific Highway upgrade project (Ourimbah to Lisarow).

Key features of the proposed modification are:

- The establishment of a new main ancillary facility site to be known as “Compound 4” located at 60 Railway Crescent, Lisarow (Lot 17 DP 241243) within a large level hardstand area
- The establishment of an alternative main ancillary facility to be known as “Compound 5” located at 15 Excelsior Street, Lisarow (Lot 101 DP 1225026) within an existing grassed paddock area. This site would be used as the main compound site if Compound Site 4 is unavailable for lease
- Reduction in the activities at the construction compound described as Compound 2 in the previously published addendum review of environmental factors (GHD 2017) to reduce the impacts on the nearby residents.

Background

A review of environmental factors (REF) (*Upgrade of the Pacific Highway – Ourimbah Street to Parsons Road, Lisarow review of environmental factors* (Jacobs 2016a)) was prepared for the project in June 2016 (the project REF). The project REF was placed on public display between 18 July 2016 and 19 August 2016 for community and stakeholder comment. The *Pacific Highway Upgrade – Ourimbah Street to Parsons Road, Lisarow – submissions report* (the submissions report), dated October 2016 (Jacobs 2016b), was prepared to respond to issues raised.

The project REF included a species impact statement (Jacobs 2016c) prepared in accordance with Director General Requirements issued by the NSW Office of Environment and Heritage (OEH) on 26 March 2015. OEH issued conditions of concurrence on 31 January 2017. The project REF was determined on 21 February 2017.

An addendum REF (*Upgrade of the Pacific Highway – Ourimbah Street to Parsons Road, Lisarow - Addendum review of environmental factors* (GHD 2017) (Addendum REF 1)) was prepared in October 2017 to assess various detailed design refinements. Addendum REF 1 was determined on 9 October 2017.

This addendum REF has been prepared by GHD Pty Ltd (GHD) on behalf of Roads and Maritime Greater Sydney Project Office. 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).

Need for the proposed modification

Section 2 of the project REF addresses the strategic need for the project, the project objectives and the options considered. The proposed modification described and assessed in this addendum REF is consistent with and supports the strategic need for the project.

The Pacific Highway provides the main north-south link between Gosford and the M1 Pacific Motorway on the Central Coast, NSW. The Pacific Highway connects the growing urban, commercial and industrial precincts in the Central Coast local government area. Roads and

Maritime is upgrading the Pacific Highway between Lisarow and the M1 Pacific Motorway in a number of stages, with the project representing Stage 3B of the upgrade.

The need for the proposed modification has been identified as a result of a review of constructability requirements for the project and community issues which have emerged at compound 2 during the construction of the Stage 3A project. The proposed modification is needed to ensure the project can be safely constructed and the project objectives can be achieved.

Options considered

In Addendum REF 1, it was proposed to use compound 2 as the main compound for construction of the project. However, due to ongoing access and community issues associated with the current use of this ancillary facility for the Pacific Highway upgrade between Ourimbah Street and Glen Road (Stage 3A) project, continued use of this site for this project (Stage 3B) would be limited to project offices, parking (plant, equipment and light vehicles) and hard materials laydown. Stockpiling of topsoil, spoil, mulch etc would not be permitted.

Roads and Maritime has identified two potential locations for additional construction compound as follows:

- Compound 4 is the preferred main ancillary facility
- Compound 5 is the alternate ancillary facility. This facility would be used as a main ancillary facility if compound 4 is available.

The 'do nothing' option was not considered as an ancillary facility is required to enable earthworks stockpiling and construction of the project.

Roads and Maritime has commenced consultation with the property owners and would enter into a lease agreement when the ancillary facility sites are confirmed.

Statutory and planning framework

The proposed modification is categorised as development for the purpose of road infrastructure facilities and is being carried out by a public authority. Under clause 94 of the *State Environmental Planning Policy (Infrastructure) 2007* (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 Part 5 of the EP&A Act.

Community and stakeholder consultation

Consultation with potentially affected property owners, relevant government agencies and other stakeholders has been carried out during the concept design and detailed design phases of the project. The consultation has been carried out as part of the wider program to upgrade the Pacific Highway on the central coast, refer to Roads and Maritime's website: http://www.rms.nsw.gov.au/projects/central-coast/pacific-highway/index.html

Consultation, including ISEPP consultation, carried out during earlier stages of the project are documented in the project REF and submissions report.

The project is currently in detailed design and Roads and Maritime has carried out ongoing consultation with Central Coast Council and other key stakeholders including Sydney Trains, affected land owners, business owners and utility providers. Feedback from this consultation has been incorporated into the proposed modification.

Registered stakeholders and the community have been kept informed about the project at key stages including project notifications in May and June 2017 and specific consultation with adjoining residents as enabling works for the project were carried out between October 2017 and April 2018.

For the proposed modification, a letter was sent to Central Coast Council on the 5 April 2018 as per the requirements of clause 13 of ISEPP. At the time of finalising this addendum REF no response had been received from Central Coast Council. Roads and Maritime will continue to consult with Central Coast Council regarding the project.

Roads and Maritime has commenced consultation with the property owners and would enter into a lease agreement when the ancillary facility sites are confirmed. No other specific consultation is required or has been carried out for the proposed modification as part of this addendum REF.

When the ancillary facility locations are confirmed, Roads and Maritime would notify surrounding residents and businesses as part of consultation with the community about the start of construction of the project.

Environmental impacts

Key potential impacts associated with the proposed modification include construction noise associated with use of the new ancillary facility sites and increased construction traffic movements on Railway Crescent. These are summarised below. All other potential impacts are expected to be consistent with the assessments in the project REF and Addendum REF 1.

Key environmental issues

Noise and vibration
The updated construction noise assessment predicts the following:

- The restricted use of compound 2 would result in reduced construction noise levels for surrounding residential and non-residential receivers but may still exceed the construction noise management level at Ourimbah Church (when in use)
- Without management, activities at compound 4 are likely to exceed the construction noise management levels for two additional residential receivers in noise catchment area 2 during the day work period
- Without management, activities at compound 4 and compound 5 are likely to exceed the construction noise management levels for nearby residential receivers during both evening and night work periods and have the potential to result in sleep disturbance.

Construction activities at the compounds 2, 4 and 5 would be carried out at the same time as construction work associated with the project (eg road construction). Impacts associated with the ancillary facility activities are typically lower than those predicted from the main construction work (assessed in the project REF).

Construction noise management measures, including community consultation, would be implemented where feasible and reasonable as outlined in the project REF and provided in this addendum REF in particular, for out-of-hours activities at compounds 2, 4 and 5.

Traffic and transport
Additional potential impacts as a result of the proposed modification beyond those identified in the project REF are:

- Reduced construction traffic movements and parking due to the restricted use of compound 2
- Increased construction traffic movements and parking due to the addition of compound 4 and/or compound 5.

The predicted construction traffic volumes contained in the project REF are not expected to significantly change as a result of the proposed modification and as such, there are no expected significant additional impacts beyond those described in the project REF.

As described in the project REF, in order to minimise impacts to the local road network and residents, construction parking would be provided in the construction ancillary facility sites. Limited car parking would be provided within the proposed road corridor, near nominated access gates, where this would not interfere with traffic on the Pacific Highway or local property access.

Access to all ancillary facility sites would be carried out in accordance with a traffic management plan and traffic control plans, including specific management of out of hours traffic movements.

Justification and 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 modification.

The proposed modification as described in the addendum REF best meets the project objectives, but would still result in some impacts related to construction noise and traffic. Safeguards and management measures as detailed in this addendum REF would ameliorate or minimise these expected impacts. The project, including the proposed modification, would also enhance road safety and travel times which would be expected to increase along this section of the Pacific Highway if the project is not constructed. On balance the proposed modification is considered justified and the following conclusions are made.

The proposed modification would not result in a significant change to the findings of the project REF, submissions report or Addendum REF 1 and would not 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 species impact statement for the proposed modification is not required. The proposed modification is subject to assessment under Division 5.1 of the EP&A Act. Consent from Central Coast Council is not required.

The proposed modification would not likely cause a significant impact on any matters of national environmental significance or the environment of Commonwealth land within the meaning of the E*nvironment Protection and Biodiversity Conservation Act 1999.* A referral to the Australian Department of the Environment and Energy is not required.

Contents

Appendices

1 Introduction

1.1 Proposed modification overview

Roads and Maritime Services (Roads and Maritime) proposes to modify the Upgrade of the Pacific Highway, between Ourimbah Street and Parsons Road, Lisarow (the project) by making adjustments to the construction ancillary facility sites for the project (the proposed modification).

The proposed modification has resulted from a review of constructability requirements for the project and issues raised by the local community during the construction of the adjacent Pacific Highway upgrade project (Ourimbah to Lisarow).

Key features of the proposed modification are:

- The establishment of a new main ancillary facility site to be known as “Compound 4” located at 60 Railway Crescent, Lisarow (Lot 17 DP 241243) within a large level hardstand area
- The establishment of an alternative ancillary facility to be known as “Compound 5” located at 15 Excelsior Street, Lisarow (Lot 101 DP 1225026) within an existing grassed paddock area. This site would be used as a main ancillary facility if Compound Site 4 is unavailable for lease
- Reduction in the activities at the construction compound described as Compound 2 in the previously published addendum review of environmental factors (GHD 2017) to reduce the impacts on the nearby residents.

The location of the proposed modification is shown in Figure 1-1 and the proposed modification is shown in Figure 1-2. Section 3 describes the proposed modification in more detail.

A review of environmental factors (REF) (*Upgrade of the Pacific Highway – Ourimbah Street to Parsons Road, Lisarow review of environmental factors* (Jacobs 2016a)) was prepared for the project in June 2016 (the project REF). The project REF was placed on public display between 18 July 2016 and 19 August 2016 for community and stakeholder comment. The *Pacific Highway Upgrade – Ourimbah Street to Parsons Road, Lisarow – submissions report* (the submissions report), dated October 2016 (Jacobs 2016b), was prepared to respond to issues raised.

The project REF included a species impact statement (Jacobs 2016c) prepared in accordance with Director General Requirements issued by the NSW Office of Environment and Heritage (OEH) on 26 March 2015. OEH issued conditions of concurrence on 31 January 2017. The project REF was determined on 21 February 2017.

An addendum REF (*Upgrade of the Pacific Highway – Ourimbah Street to Parsons Road, Lisarow - Addendum review of environmental factors* (GHD 2017) (Addendum REF 1)) was prepared in October 2017 to assess various detailed design refinements. Addendum REF 1 was determined on 9 October 2017.

1.2 Purpose of the report

This addendum REF has been prepared by GHD Pty Ltd (GHD) on behalf of Roads and Maritime Greater Sydney Project Office. 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).

This addendum REF is to be read in conjunction with the project REF (Jacobs 2016a), submissions report (Jacobs 2016b) and Addendum REF 1 (GHD 2017). The purpose of this addendum REF is to describe the proposed modification, to document and assess the likely

impacts of the proposed modification on the environment, and to detail protective measures to be implemented.

The description of the proposed work and assessment of associated environmental impacts has been carried out in the context of clause 228 of the Environmental Planning and Assessment Regulation 2000, the factors in *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 Related Facilities EIS Guideline (DUAP 1996)*, the former *Threatened Species Conservation Act 1995* (TSC Act) and transitional provisions of the *Biodiversity Conservation Act 2016, 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 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 strategic assessment approval granted by the Federal Government under the EPBC Act in September 2015, with respect to the impacts of Roads and Maritime's road activities on nationally listed threatened species, populations, ecological communities and migratory species.

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 (former) TSC 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 under the transitional provisions of the *Biodiversity Conservation Act 2016*
- The significance of any impact on nationally listed biodiversity matters under the EPBC Act, including whether there is a real possibility 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 Commonwealth Minister for the Environment on whether assessment and approval is required under the EPBC Act.

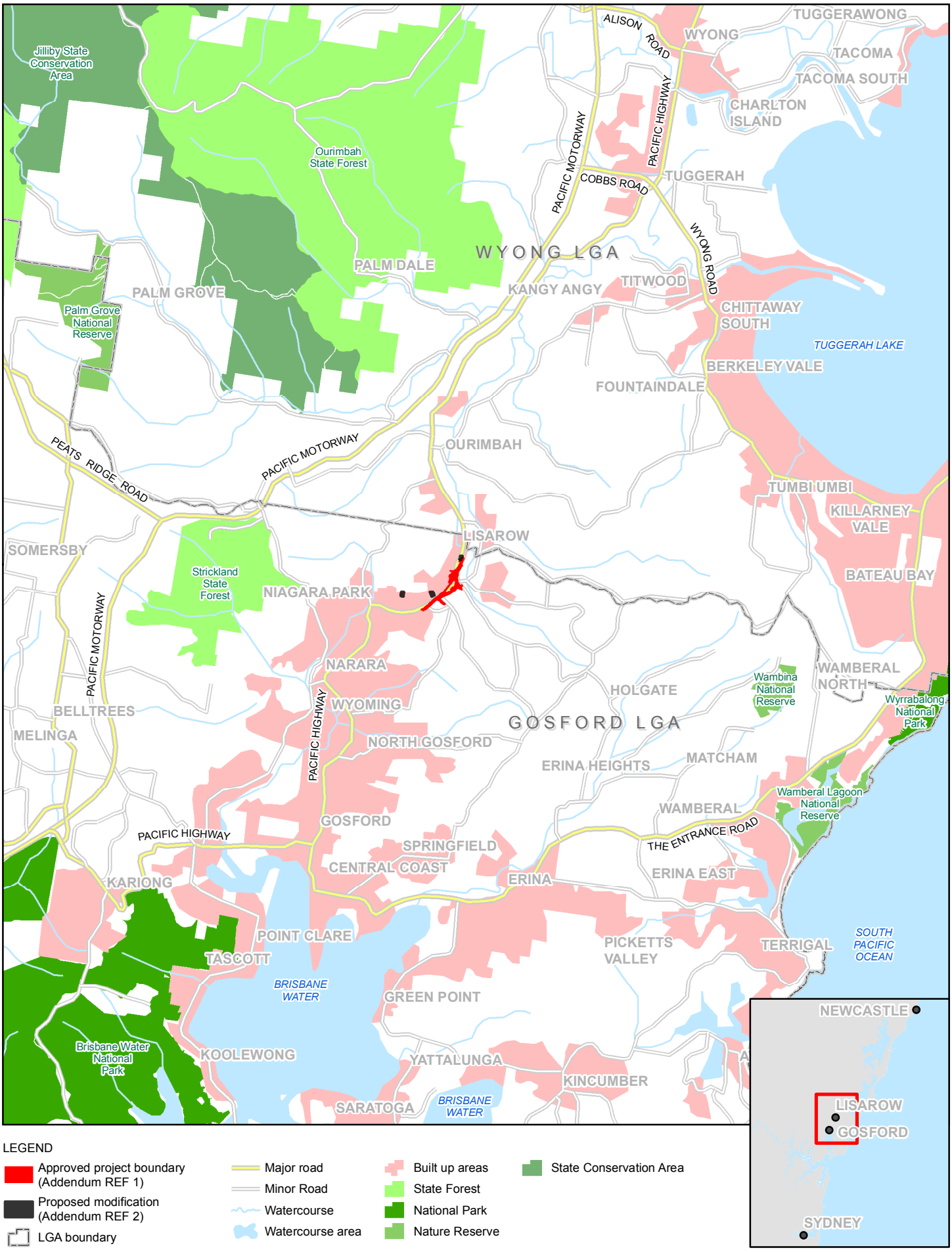
1.3 Terms used in this report

The following terms are used in this addendum REF:

- Project – the Pacific Highway upgrade between Ourimbah Street and Parsons Road, Lisarow as described in, and referred to as the proposal in the project REF. The project REF is based on the concept design for the project
- Project REF – *Upgrade of the Pacific Highway – Ourimbah Street to Parsons Road, Lisarow Review of environmental factors*, June 2016 (Jacobs 2016a)
- Addendum REF 1 – *Upgrade of the Pacific Highway – Ourimbah Street to Parsons Road, Lisarow - Addendum review of environmental factors* (GHD 2017)
- Approved project – the project as described in the project REF and Addendum REF 1
- Approved project boundary– the area which would be directly impacted by the construction and operation of the project as described in, and referred to as the project in Addendum REF 1

- Proposed modification – changes to the approved project as described in this addendum REF (Addendum REF 2). The proposed modification and project described in this report is based on the detailed design for the project.

Further terms and acronyms are defined in Section 11.



LEGEND

- Approved project boundary (Addendum REF 1)
- Proposed modification (Addendum REF 2)
- LGA boundary
- Major road
- Minor Road
- Watercourse
- Watercourse area
- Built up areas
- State Forest
- National Park
- Nature Reserve
- State Conservation Area

Paper Size A4

0 0.75 1.5 2.25 3

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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Roads and Maritime Services
Pacific Highway Upgrade Stage 3B, Lisarow
Addendum Review of Environmental Factors 2

Job Number	22-18239
Revision	0
Date	26 Jun 2018

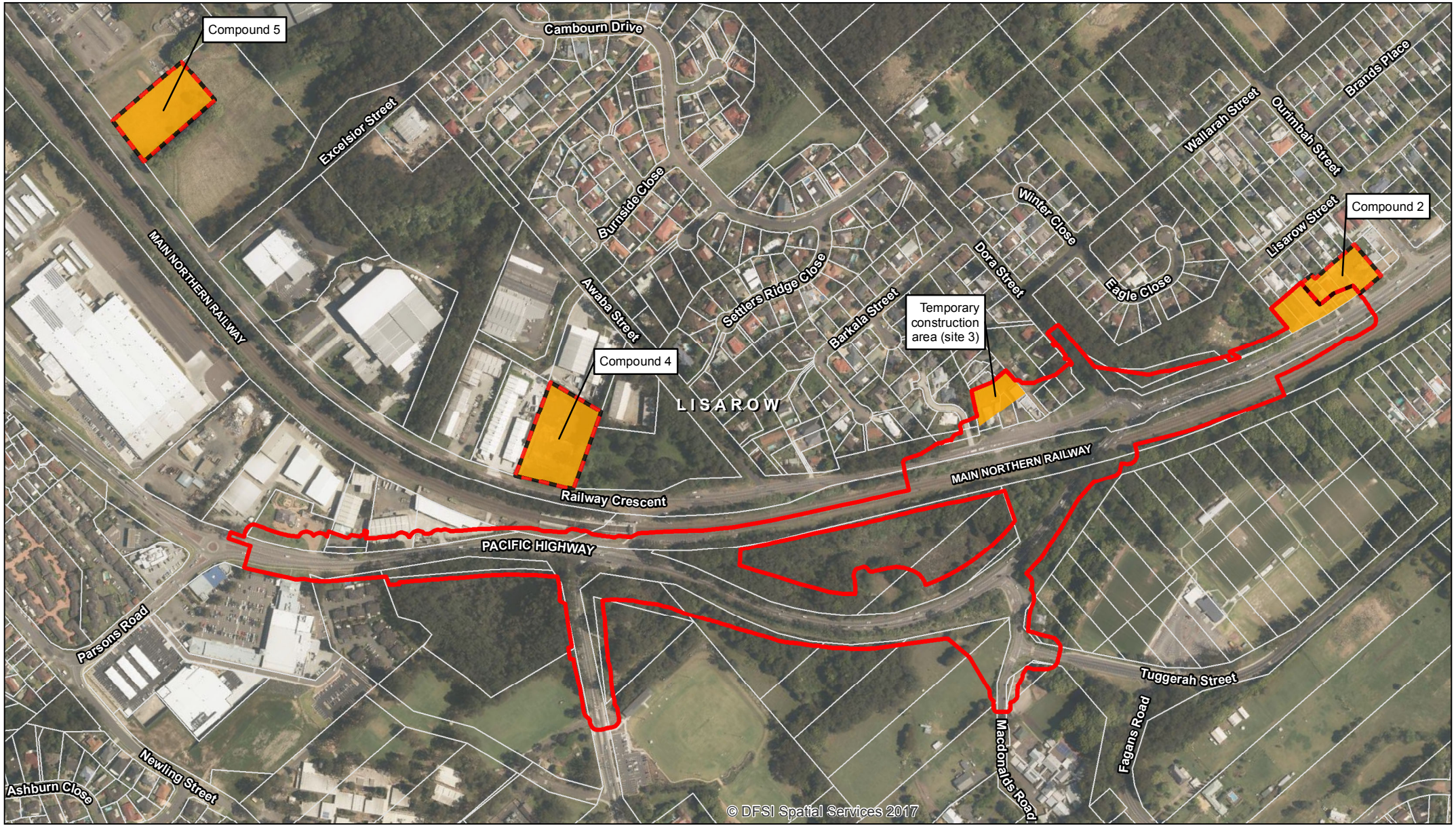
Location of the proposed modification

Figure 1-1

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com **W** www.ghd.com.au

G:\22\18239\GIS\Maps\Deliverables\AddendumREF2_Compounds\2218239_AREF200_Locality_0.mxd

Data source: Geoscience Australia: 250k Topographic Data Series 3, 2006; LPI: DTDB, 2015. Created by: fmackay, tmorton



Paper Size A4

0 25 50 100 150 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

LEGEND

- Cadastre
- Approved project boundary (Addendum REF 1)
- Proposed modification (Addendum REF 2)
- Compound site

Roads and Maritime Services
Pacific Highway Upgrade Stage 3B, Lisarow
Addendum Review of Environmental Factors 2

Job Number	22-18239
Revision	0
Date	26 Jun 2018

Proposed modification

Figure 1-2

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Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 T 61 2 4979 9999 F 61 2 4979 9988 E ntlmail@ghd.com W www.ghd.com.au

Data source: LPI: Aerial imagery, 2015; DTDB/DCDB, 2015. Created by: tmorton, fmackay

2 Need and options considered

2.1 Strategic need for the proposed modification

Section 2 of the project REF addresses the strategic need for the project, the project objectives and the options considered. The proposed modification described and assessed in this addendum REF is consistent with and supports the strategic need for the project.

The Pacific Highway provides the main north-south link between Gosford and the M1 Pacific Motorway on the Central Coast, NSW. The Pacific Highway connects the growing urban, commercial and industrial precincts in the Central Coast local government area. Roads and Maritime is upgrading the Pacific Highway between Lisarow and the M1 Pacific Motorway in a number of stages, with the project representing Stage 3B of the upgrade.

The need for the proposed modification has been identified as a result of a review of constructability requirements for the project and community issues which have emerged at compound 2 during the construction of the Stage 3A project. The proposed modification is needed to ensure the project can be safely constructed and the project objectives can be achieved.

2.2 Project objectives and development criteria

Sections 2 and 3 of the project REF identifies the project objectives and development criteria which apply to the proposed modification.

2.3 Alternatives and options considered

In Addendum REF 1, it was proposed to use compound 2 as the main ancillary facility for construction of the project. However, due to ongoing access and community issues associated with the current use of this ancillary facility for the Pacific Highway upgrade between Ourimbah Street and Glen Road (Stage 3A) project, continued use of this site for this project (Stage 3B) would be limited to project offices, parking (plant, equipment and light vehicles) and hard materials laydown. Stockpiling of topsoil, spoil, mulch etc would not be permitted.

Roads and Maritime has identified two potential locations for additional construction compounds as follows:

- Compound 4 is the preferred main ancillary facility, and is located within a large level hardstand area
- Compound 5 is the alternate ancillary facility. This ancillary facility consists of a grassed paddock area and would be utilised as the main ancillary facility if compound 4 is unavailable, and as an additional construction ancillary facility (stockpiling) if compound 4 is available.

The ‘do nothing’ option was not considered as ancillary facility sites are required to enable earthworks stockpiling and construction of the project.

The locations have been selected following a review of possible locations which best met the following considerations:

- Located near the project
- Not prone to excessive flooding
- Not located near to residential properties
- Minimise the use of local residential streets
- Relatively flat ground which does not require substantial reshaping

- In previously disturbed areas which do not require additional clearing of native vegetation and are unlikely to contain Aboriginal heritage
- Available for lease during the construction period.

Roads and Maritime has commenced consultation with the property owners and would enter into a lease agreement when the ancillary facility sites are confirmed.

2.4 Preferred option

The preferred option for the proposed modification is described in Section 3 of this addendum REF and includes consideration of compound 4 and/or compound 5 and restricted use of compound 2, subject to Roads and Maritime reaching an agreed arrangement with the property owners.

3 Description of the proposed modification

3.1 The proposed modification

Roads and Maritime proposes to modify the Upgrade of the Pacific Highway, between Ourimbah Street and Parsons Road, Lisarow (the project) by making adjustments to elements of the project (the proposed modification). The proposed modification has resulted from a review of constructability requirements for the project and issues raised by the local community during the construction of the adjacent Pacific Highway upgrade project (Ourimbah to Lisarow).

The proposed modification is shown in Figure 1-2 and key features of the proposed modification are described in Section 3.4.

Key features of the proposed modification are:

- The establishment of a new main ancillary facility site to be known as “Compound 4” located at 60 Railway Crescent, Lisarow (Lot 17 DP 241243) within a large level hardstand area
- The establishment of an alternative ancillary facility to be known as “Compound 5” located at 15 Excelsior Street, Lisarow (Lot 101 DP 1225026) within an existing grassed paddock area. This site would be used as the main ancillary facility if Compound Site 4 is unavailable for lease
- Reduction in the activities at the construction compound described as Compound 2 in the previously published addendum review of environmental factors (GHD 2017) to reduce the impacts on the nearby residents.

The proposed modification is within the Central Coast Council local government area (LGA) (formerly the Gosford LGA). Compound 4 and 5 are both within an urban/industrial area on the northern side of Railway Crescent, Lisarow, and immediately north of the Main Northern Railway. Access to both of these ancillary facility locations would be from Railway Crescent. Compound 2 is within a residential area with access via Ourimbah Street/ Pacific Highway.

As stated in Section 3.3 of the project REF, the detailed construction staging plans and methods would be determined by the construction contractor(s).

A contractor environmental management framework to manage and mitigate impacts associated with the proposed modification is presented in Section 7 of this addendum REF. The final construction plan and methods chosen by the contractor would also be required to be consistent with this framework.

3.2 Construction hours and duration

The ancillary facility sites would generally operate during standard construction working hours in accordance with the *Interim Construction Noise Guideline* (DECC, 2009) as follows:

- Monday to Friday: 7 am to 6 pm
- Saturday: 8 am to 1 pm
- Sunday and public holidays: No work.

However, there would be periods when out-of-hours work would occur including utility cutovers, pavement works and during rail possessions (24 hours per day typically over three to four days). This would minimise disruption to daily traffic and disturbance to surrounding landowners and businesses and for safety purposes for road and rail users and pedestrians.

Where work needs to be carried out outside standard construction working hours, it would be in accordance with the project environment protection licence (EPL 21076), *Interim Construction Noise Guideline* (DECC, 2009) and Roads and Maritime's *Construction Noise and Vibration Guideline* (Roads and Maritime 2016). The construction contractor would give the community prior notice of any work planned to be carried out outside normal construction hours.

The existing project EPL (21076) would be modified to include the ancillary facility locations when confirmed.

3.3 Traffic management and access

Section 3.3.7 of the project REF identifies the traffic management and access arrangements which would be used to construct the proposed modification.

Construction vehicles would generally access compound 4 or 5 directly from Railway Crescent via the Pacific Highway. Access to compound 2 would only be from the northbound lanes of the Pacific Highway south of the Ourimbah Street intersection.

Construction traffic would include light and heavy vehicles. Construction traffic would be greatest during the main earthwork and civil construction, and would comprise vehicles transporting equipment, materials and spoil, and construction workers accessing the work sites.

Where practical, materials and plant would be removed and delivered outside peak traffic periods to minimise delays. Traffic control measures would be used to manage access to/from ancillary facility sites, general earthwork and the import and export of material.

3.4 Ancillary facilities

The proposed modification includes changes to the ancillary facility sites proposed for construction of the project as described in this section and shown on Figure 1-2.

Drainage infrastructure, including diversion of upslope runoff and connection to utilities would be installed as required.

A summary of each of the proposed ancillary facility sites is provided below.

Compound 2

This ancillary facility is located at 962, 964, 966 and 968 - 974 Pacific Highway, Lisarow (Lot 1 DP 560299, Lot 25 DP 580016, Lot 24 DP 580016, Lot 42 DP 571908, Lot 54, DP 576760, Lot 53 DP 576760 and Lot 3 DP 553381). This ancillary facility is currently being used as an ancillary facility for construction of the adjacent Stage 3A project.

Land use surrounding this ancillary facility includes the Pacific Highway to the east, Lisarow Cemetery to the south and residential properties to the west and north. Ourimbah Church is also located immediately to the north-west.

Access to the ancillary facility would only be left turn in and out, from the northbound lanes of the Pacific Highway, south of the Ourimbah Street intersection.

Activities at this ancillary facility would include:

- Site offices
- Parking – plant, equipment and light vehicles
- Hard materials (eg concrete pipes) laydown.

Compound 4

This ancillary facility is located at 60 Railway Crescent, Lisarow (Lot 17 DP 241243), and is the preferred main ancillary facility. This ancillary facility consists of a large level hardstand area about 55 metres wide by about 75 metre long, with narrow vegetated (grass) boundaries to the south and east.

Commercial and light industrial buildings are located to the west and north and the Main Northern Railway is located to the south of the site. The closest residence to this ancillary facility is about 130 metres to the east.

Access to the ancillary facility would be from Railway Crescent via the Pacific Highway.

Activities at this ancillary facility would include:

- Site offices
- Materials and equipment storage
- Parking – plant, equipment and light vehicles
- Hard materials (eg concrete pipes) laydown
- Stockpiling – spoil, topsoil, mulch and potentially contaminated materials.

Compound 5

This ancillary facility is located at 15 Excelsior Street, Lisarow (Lot 101 DP 1225026), and is the alternate main ancillary facility. This ancillary facility site consists of a grassed paddock area with a vegetated windbreak along the eastern boundary, comprised of the exotic species Camphor Laurel. Compound 5 would be constructed and supplemented as required, to provide a stable base (eg coarse aggregate) beneath the entire site and would require an application for and construction of a new temporary access off Railway Crescent.

The ancillary facility is surrounded by vacant land and industrial land with the Main Northern Railway located to the south. The closest residence to this ancillary facility is about 250 metres to the east.

Access to the ancillary facility would be from a new temporary access off Railway Crescent via the Pacific Highway.

If this ancillary facility is established as a main ancillary facility, activities would be as described for compound 4.

If this ancillary facility is used as a stockpiling ancillary facility, activities would include:

- Stockpiling – spoil, topsoil, mulch and potentially contaminated materials.

3.5 Public utility adjustment

Connection to utilities may be required for the ancillary facility sites and would be determined by the construction contractor in consultation with the utility owner.

3.6 Property acquisition

The proposed modification does not require any additional property acquisition.

Roads and Maritime has commenced consultation with the property owners and would enter into a lease agreement when the ancillary facility sites are confirmed.

4 Statutory and planning framework

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 a road and is to be carried out on 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 proposed modification is not located on land reserved under the *National Parks and Wildlife Act 1974* and does not affect land or development regulated by *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 Section 5 of this addendum REF.

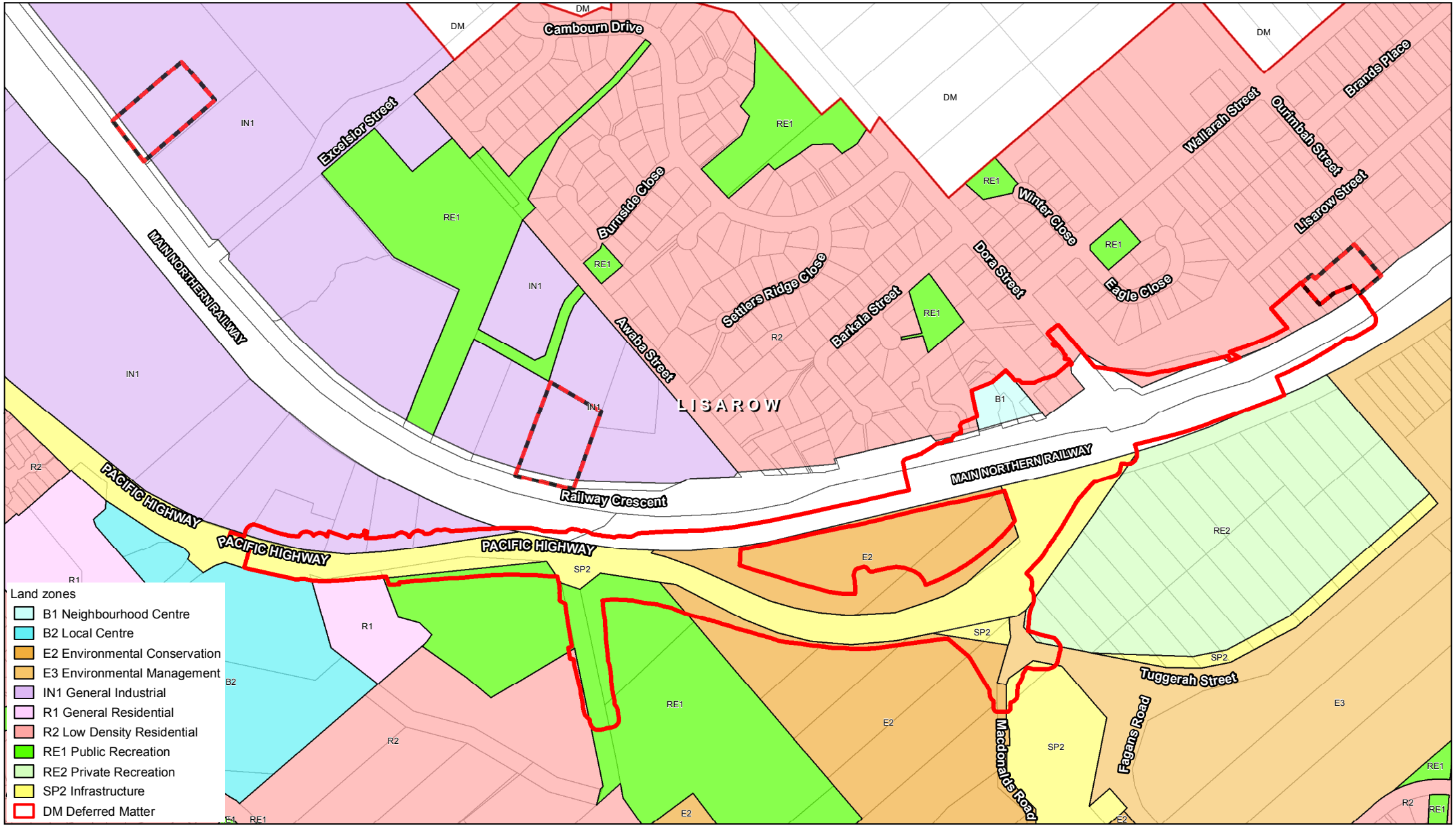
4.1.2 Local Environmental Plans

The project is located within the Central Coast Council local government area, formed by the amalgamation of the Wyong Shire and Gosford City councils. Due to this amalgamation only having recently occurred (May 2016), there is no local environmental plan applicable to the local government area. As such, reference has been made to the *Gosford Local Environmental Plan 2014* (Gosford LEP) as the relevant existing local planning instrument for the project.

Both compound 4 and 5 are predominately located within zone IN1 – General Industrial (Figure 4-1). A small section of each land parcel located along Railway Crescent is zoned SP2 – Infrastructure.

The zone provisions of the Gosford LEP provide the project, including the proposed modification, would be permitted with or without consent under all the nearby zones. However, clause 5.12 of the Gosford LEP states '*this Plan does not restrict or prohibit, or enable the restriction or prohibition of, the carrying out of any development, by or on behalf of a public authority, that is permitted to be carried out with or without development consent, or that is exempt development, under State Environmental Planning Policy (Infrastructure) 2007*.'

As the project, including the proposed modification, is permitted without consent under ISEPP (Section 4.1.1), the consent requirements of the Gosford LEP do not apply.



Paper Size A4

0 25 50 100 150 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

LEGEND

- Cadastre
- Approved project boundary (Addendum REF 1)
- Proposed modification (Addendum REF 2)

Roads and Maritime Services
Pacific Highway Upgrade Stage 3B, Lisarow
Addendum Review of Environmental Factors 2

Job Number	22-18239
Revision	0
Date	26 Jun 2018

Land zones

Figure 4-1

G:\22\18239\GIS\Maps\Deliverables\AddendumREF2_Compounds\2218239_AREF203_LandZoning_0.mxd

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 T 61 2 4979 9999 F 61 2 4979 9988 E ntlmail@ghd.com W www.ghd.com.au

Data source: LPI: DTDB/DCDB, 2015; DPE: Land Zoning, 2016. Created by: tmorton, fmackay

4.2 Other relevant NSW legislation

The following NSW legislation is relevant to the proposed modification. Other relevant legislation is considered within project REF and Addendum REF 1.

4.2.1 Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (POEO Act) establishes, amongst other things, the procedures for issuing licences for environmental protection in relation to aspects such as waste, air, water and noise pollution control. The owner or occupier of premises engaged in scheduled activities is required to hold an environment protection licence and comply with the conditions of the licence.

Roads and Maritime holds an environment protection licence for the project for extractive activities (EPL 21076) for *the extraction, processing or storage of more than 30,000 tonnes per year of extractive materials*. Following approval of this addendum REF, an application to vary the EPL scheduled premises boundary to include the proposed ancillary facility will be sought. Activities within the proposed modification would not trigger any additional scheduled activities under the *Protection of the Environment Operations Act 1997.*

4.2.2 Biodiversity Conservation Act 2016

The *Biodiversity Conservation Act 2016* came into effect in August 2017. The NSW Government, however, has established transitional arrangements related to biodiversity assessments which are set out in the Biodiversity Conservation (Savings and Transitional) Regulation 2017. As part of these transitional arrangements environmental assessments for proposed modifications can continue under the former legislation provided the proposed modification commences within 18 months of commencement of the new Act. Therefore this addendum REF will be assessed under the former *Threatened Species Conservation Act 1995* (TSC Act), in particular given the proposed modification would not affect any threatened species or endangered ecological communities.

4.2.3 Threatened Species Conservation Act 1995 (TSC Act)

The TSC Act provides for listing of threatened species, populations and ecological communities as well as critical habitat and key threatening processes.

Determination of activities under Part 5 of the EP&A Act requires an assessment of the impacts of the proposal on land which is critical habitat or is likely to significantly affect threatened species, populations or ecological communities, or their habitats, as listed under the TSC Act. The assessment is carried out in the form of an Assessment of Significance according to the seven criteria listed under Section 5A of the EP&A Act. The seven factors are used to assist in the determination of whether the proposed activity is 'likely' to have a 'significant effect' on threatened biota listed under the TSC Act.

The proposed modification is not likely to significantly impact threatened species, populations or ecological communities or their habitats, within the meaning of the TSC Act, and therefore a species impact statement is not required. Further detail is provided in Section 6.1.

4.2.4 National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* (NPW Act) aims to conserve nature, objects, places or features (including biological diversity) of cultural value within the landscape. The NPW Act also aims to foster public appreciation, understanding and enjoyment of nature and cultural heritage, and provides for the preservation and management of national parks, historic sites and certain other areas identified under the Act. The NPW Act is administered by OEH.

Assessments were carried out for the project REF, including stage 1 and 2 assessments in accordance with the *Procedure for Aboriginal Cultural Heritage Consultation and Investigation* (PACHCI) (Roads and Maritime 2011) and searches of the Aboriginal Heritage Information Management System (AHIMS). The assessments did not identify any Aboriginal heritage sites near the project and concluded there is a low likelihood for Aboriginal cultural heritage potential to be present.

A Stage 1 Archaeological Baseline Assessment has been prepared by Virtus Heritage for the two proposed ancillary facility locations. The purpose of this assessment is to provide preliminary advice on Aboriginal archaeological (scientific) values of the proposed modification. This allows Roads and Maritime to meet the Archaeological Baseline Assessment requirement of Stage 1 of Roads and Maritime internal *Procedure for Aboriginal cultural heritage consultation and investigation, November 2011* (PACHCI) (Roads and Maritime 2011). As part of the assessment, an updated AHIMS database search was carried out on 20 March 2018 (Appendix D) which confirmed no previously recorded Aboriginal heritage items or places are located in the area which would be impacted by the project, including the proposed modification.

A PACHCI stage 1 assessment and inspection of the proposed modification areas was carried out by the Roads and Maritime Aboriginal Cultural Heritage Officer. The assessment confirmed no Aboriginal archaeological sites or areas of cultural significance are located within the proposed modification area and therefore no further assessment is required.

Therefore, the proposed modification would not impact any known Aboriginal sites and there is a low likelihood for Aboriginal cultural heritage potential to be present. In the event of an unexpected find of an Aboriginal heritage item (or suspected item), work will cease in the affected area and the *Unexpected Heritage Items* procedure (Roads and Maritime 2015) will be followed.

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*'. These are considered Section 6 of this addendum REF.

A referral is not required for proposed road actions which 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 Section 6 of this 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 and the environment of Commonwealth land found 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.

4.4 Confirmation of statutory position

The proposed modification is categorised as development for the purpose of road infrastructure facilities and is being carried out by a public authority. Under clause 94 of 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 Central Coast Council is not required.

5 Consultation

5.1 Consultation strategy

Consultation with potentially affected property owners, relevant government agencies and other stakeholders has been carried out during the concept design and detailed design phases of the project. The purpose of consultation has been to:

- Inform the community of the project
- Canvas comments and issues about the project from those who may be affected
- Advise potentially directly affected stakeholders of the project and its possible property impacts
- Advise stakeholders on how they may obtain further information or communicate concerns, complaints or suggestions.

The consultation has been carried out as part of the wider program to upgrade the Pacific Highway on the central coast, refer to Roads and Maritime's website:
http://www.rms.nsw.gov.au/projects/central-coast/pacific-highway/index.html

5.2 Consultation outcomes

Consultation, including ISEPP consultation, carried out during earlier stages of the project are documented in the project REF and submissions report.

The project is currently nearing completion of detailed design and Roads and Maritime has carried out ongoing consultation with Central Coast Council and other key stakeholders including Sydney Trains, affected land owners, business owners and utility providers. Feedback from this consultation has been incorporated into the project and considered in the proposed modification.

Registered stakeholders and the community have been kept informed about the project at key stages including project notifications in May and June 2017. Specific consultation was also carried out with adjoining residents for project enabling works which were carried out between October 2017 and April 2018.

A letter was sent to Central Coast Council on the 5 April 2018 as per the requirements of clause 13 of ISEPP. This is due to the potential impacts on council infrastructure, including council roads (connection to Railway Crescent) and potential connection to stormwater, sewer and water supply. At the time of finalising this addendum REF no response had been received from Central Coast Council. Roads and Maritime will continue to consult with Central Coast Council regarding the project.

Appendix B contains an ISEPP consultation checklist which documents how ISEPP consultation requirements have been considered.

Roads and Maritime has commenced consultation with the property owners and would enter into a lease agreement when the ancillary facility sites are confirmed.

No other specific consultation is required or has been carried out for the proposed modification as part of this addendum REF. When the ancillary facility locations are confirmed, Roads and Maritime would notify surrounding residents and businesses as part of consultation with the community about the start of construction of the project

5.3 Ongoing or future consultation

Future planned consultation to be carried out by Roads and Maritime during construction would include, as relevant:

- Meetings with Central Coast Council and other relevant stakeholders, including government agencies, utility providers, adjacent landowners, business owners and community stakeholders
- Providing project updates to the local community during the construction phase, which would include a notification about this addendum REF and information on where it can be viewed
- Updating the Roads and Maritime website.

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. All aspects of the environment potentially impacted upon by the proposed modification are considered. This includes consideration of:

- Potential impacts on matters of national environmental significance under the EPBC Act
- The factors specified in the guidelines *Is an EIS required?* (DUAP 1995/1996) as required under clause 228(1) of the Environmental Planning and Assessment Regulation 2000 and the Roads and Related Facilities EIS Guideline (DUAP 1996). 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 mitigate the identified potential impacts.

6.1 Biodiversity

6.1.1 Methodology

An assessment of potential impacts to biodiversity (including threatened species and endangered ecological communities) were carried out in the project REF, including a biodiversity assessment (Jacobs 2015b and GHD 2017) and species impact statement (Jacobs 2016c), and Addendum REF 1 (GHD 2017). The species impact statement was prepared in accordance with Director General Requirements issued by the NSW Office of Environment and Heritage (OEH) on 26 March 2015. OEH issued conditions of concurrence on 31 January 2017.

The assessments identified the project would impact on biodiversity, including threatened species and endangered ecological communities, and there would be a significant impact on the population of *Melaleuca biconvexa*. A biodiversity offset strategy was prepared for the project to offset the identified impacts.

The additional areas impacted by the proposed modification are located outside the previous survey area. As such, GHD ecologists carried out a site inspection of these additional areas on 8 March 2018.

The purpose of this inspection was to identify vegetation communities and the likelihood of presence of threatened species and endangered ecological communities. The site inspection confirmed the additional areas as part of the proposed modification contain areas of exotic grass, trees and shrubs or established hardstand areas which are unlikely to support threatened species. As such, a detailed biodiversity assessment has not been carried out for the proposed modification.

The following updated database searches were carried out for the addendum REF:

- EPBC Act protected matters search tool with 10 kilometre buffer (27 March 2018)
- Office of Environment and Heritage NSW Wildlife Atlas Search with 10 kilometre buffer (27 March 2018)
- Department of Primary Industries freshwater threatened species distribution maps (27 March 2018).

6.1.2 Existing environment

A detailed description of the existing environment within and surrounding the approved project boundary is contained in the project REF (Jacobs 2016a), biodiversity assessment (Jacobs 2015b), species impact statement (Jacobs 2016c) and addendum REF 1 (GHD 2017).

Mapping of existing vegetation communities is provided on Figure 6-1. The additional areas inspected as part of the addendum REF are mostly comprised of exotic grass, trees and shrubs or disturbed lands.

Compound 4 which is the preferred ancillary facility site consists mainly of existing hardstand areas. The site also contains a small area of remnant trees mapped as Coastal Narrabeen Moist Forest, located to the north and south of the hardstand area. This vegetation community is present in surrounding areas and is not listed as threatened under the TSC Act or EPBC Act. No threatened flora species were recorded or are likely to occur within this vegetation community. There is potential for threatened fauna species to occur within this vegetation community.

Compound 5 site consists predominantly of exotic grassland with planted *Cinnamomum camphora* (Camphor Laurel) and exotic shrubs located on the eastern boundary. *Cinnamomum camphora* is listed as an environmental weed under the *Biosecurity Act 2015*. There are no habitat trees present within the proposed compound 5 site.

Four additional threatened flora species listed under the TSC Act and/or EPBC Act were identified as potentially occurring in the study area which were not previously considered in the biodiversity assessments for the project. This is due to these species being listed following completion of the previous assessments and/or new records within the study area.

These are:

- *Angophora inopina* (Charmhaven Apple)
- *Cynanchum elegans*
- *Thesium australe* (Austral toadflax)
- *Dendrobium melaleucaphilum* (Spider Orchid)

None of these species are likely to occur within the proposed modification area due to the absence of suitable habitat.

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Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

LEGEND

Cadastre

Approved project boundary (Addendum REF 1)

Proposed modification (Addendum REF 2)

Vegetation

Coastal Narrabeen Moist Forest

Exotic grassland / trees

Established hardstand

Roads and Maritime Services
Pacific Highway Upgrade Stage 3B, Lisarow
Addendum Review of Environmental Factors 2

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Revision	0
Date	26 Jun 2018

Vegetation communities

Figure 6-1

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Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com **W** www.ghd.com.au

Data source: LPI: Aerial imagery, 2015; DTDB/DCDB, 2015. Created by: tmorton, fmackay

6.1.3 Potential impacts

Construction

There would be no vegetation clearing at compound 4 as the existing hardstand area would be used. The Coastal Narrabeen Moist Forest, located to the north and south of the hardstand area, would be fenced off and would not be impacted by the proposed modification.

Compound 5 would require some vegetation clearing to allow for establishment of the ancillary facility. Vegetation clearing within this site would involve clearing of 0.65 hectares of exotic grassland. No woody vegetation would be removed as part of the proposal. The planted *Cinnamomum camphora* (Camphor Laurel) and exotic shrubs located on the eastern boundary would be fenced off and would not be impacted by the proposed modification.

All other potential biodiversity impacts associated with the proposed modification are consistent with those described in the project REF and Addendum REF 1 and as such, no further assessment has been carried out.

At the completion of construction the ancillary facility would be rehabilitated as required and therefore no further impacts are likely.

Operation

The proposed modification would not result in any additional impacts during operation beyond those identified in the project REF.

Conclusion on significance of impacts

The proposed modification is not likely to significantly impact threatened species, populations or ecological communities or their habitats, within the meaning of the TSC Act, EPBC Act or *Fisheries Management Act 1994* and therefore a species impact statement is not required.

6.1.4 Safeguards and management measures

The additional measures described in Table 6-1 will be implemented to avoid or minimise potential biodiversity impacts as a result of the proposed modification.

Table 6-1 Additional safeguards and management measures – biodiversity

Impact	Environmental safeguards	Responsibility	Timing
Vegetation impacts – compound 4	The Coastal Narrabeen Moist Forest, located to the north and south of the hardstand area, will be fenced off prior to construction as directed by Roads and Maritime in accordance with the vegetation mapping in this addendum REF.	Construction contractor	Pre-construction
Vegetation impacts – compound 5	The planted *Cinnamomum camphora* (Camphor Laurel) and exotic shrubs located on the eastern boundary will be fenced off prior to construction as directed by Roads and Maritime in accordance with the vegetation mapping in this addendum REF.	Construction contractor	Pre-construction

6.1.5 Biodiversity offsets

No additional biodiversity offsets beyond those identified in the project REF are required for the proposed modification.

6.2 Noise and vibration

6.2.1 Existing environment

The existing environment is described in detail in the project REF. Identified sensitive receivers are shown on Figure 6-2. Additional sensitive receivers have been identified for this addendum REF. The study area has been divided into noise catchment areas (NCA) as shown in the construction noise assessment (GHD 2018b) in Appendix F.

6.2.2 Potential impacts

Construction

Additional potential impacts as a result of the proposed modification beyond those identified in the project REF are:

- Additional construction noise and vibration due to potential addition of compound 4
- Additional construction noise and vibration due to the potential addition of compound 5
- Reduced construction noise and vibration due to the restricted use of compound 2.

All other potential impacts associated with the proposed modification are consistent with those described in the project REF and as such, no further assessment has been carried out.

Noise impacts of compounds

A construction noise assessment (GHD 2018b) has been prepared for the ancillary facility sites and is provided in Appendix F. The assessment was carried out to take into account the proposed changes to the ancillary facility sites in accordance with the *Construction Noise and Vibration Guideline* (Roads and Maritime 2016).

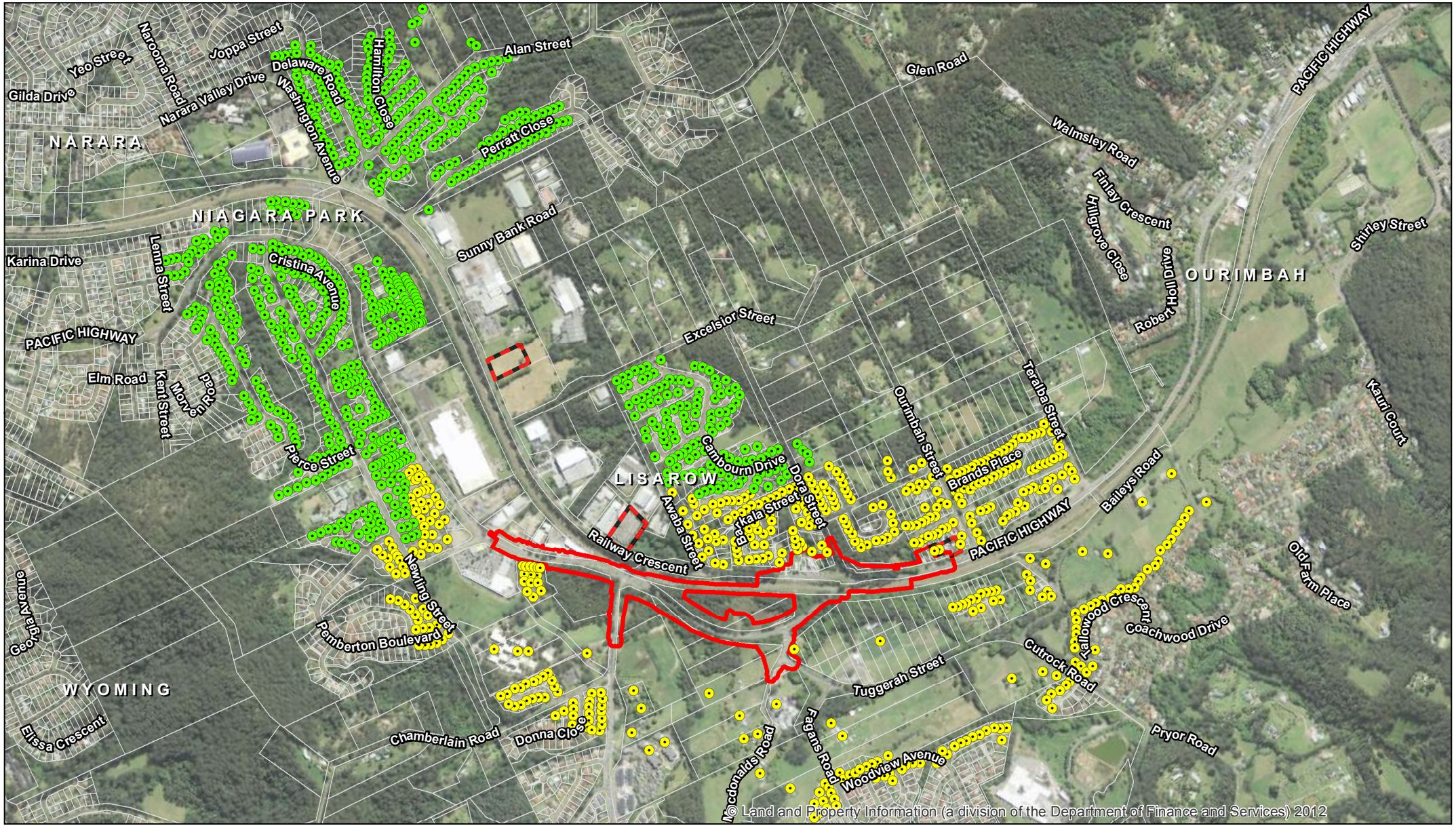
Construction noise – compound 2

Compound 2 was previously assessed (in addendum REF 1) as a main ancillary facility site. It is proposed to reduce the proposed activities at compound 2. The predicted number of exceedances of the construction noise management levels for residential receivers are presented in Table 6-2.

With the restricted activities at compound 2, the number of exceedances would decrease.

Compound 2 activities would exceed the construction noise management level at one non-residential receiver, Ourimbah Church (when in use).

Construction activities at the compound 2 would be carried out at the same time as construction work associated with the project (eg road construction). Impacts associated with the ancillary facility activities are typically lower than those predicted from the main construction work (assessed in the project REF). A comparison of the impacts from road construction and ancillary facility activities is provided in Figure 6-3 and Figure 6-4.



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Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

LEGEND

- Approved project boundary (Addendum REF 1)
- Proposed modification (Addendum REF 2)
- Cadastre
- Sensitive receiver
- Additional identified sensitive receivers

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Pacific Highway Upgrade Stage 3B, Lisarow
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Sensitive receivers

Figure 6-2

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Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 T 61 2 4979 9999 F 61 2 4979 9988 E ntlmail@ghd.com W www.ghd.com.au

Data source: LPI: Aerial imagery, 2015; DTDB/DCDB, 2015. Created by: tmorton, fmackay

Table 6-2 Predicted number of exceedances (residential receivers) - compound 2

NCA	Full compound activities (addendum REF 1)			Restricted compound activities (addendum REF 2)		
	Number of exceedances					
	Day	Evening	Night	Day	Evening	Night
1	11	76	103	11	46	103
2	3	48	87	1	20	61
3	1	19	92	Nil	1	56
4	Nil	Nil	Nil	Nil	Nil	Nil
Total	**15**	**143**	**282**	**12**	**67**	**220**

Construction noise – compounds 4 and 5

The predicted number of exceedances of the construction noise management levels for residential receivers are summarised in Table 6-3 (compound 4) and Table 6-4 (compound 5). The results indicate:

- There would be exceedances for residential receivers near to compound 4 during most work periods
- No residential receivers are predicted to exceed the highly noise affected level
- No non-residential receivers are predicted to exceed their noise management level.

For receivers located near to the project, impacts from compounds 4 and 5 are typically lower than those predicted from the main construction work (for those receivers assessed in the project REF). A comparison of the impacts from road construction and compound activities is provided in Figure 6-3 and Figure 6-4.

Table 6-3 Predicted number of exceedances (residential receivers) – compound 4

Noise catchment area	Number of exceedances Day	Number of exceedances Evening	Number of exceedances Night
1	Nil	Nil	15
2	2	42	161
3	Nil	26	88
4	Nil	13	108
Total	**2**	**81**	**372**

Table 6-4 Predicted number of exceedances (residential receivers) – compound 5

Noise catchment area	Number of exceedances Day	Number of exceedances Evening	Number of exceedances Night
1	Nil	Nil	Nil
2	Nil	6	242
3	Nil	Nil	32
4	Nil	117	262
Total	**Nil**	**123**	**536**

Sleep disturbance – compounds
Sleep disturbance predictions are based on the L_{A1} noise level for typical compound activities provided in the *Construction Noise and Vibration Guideline* (CNVG) (Roads and Maritime Services 2016). Sleep disturbance is considered likely when $L_{A1\ (1\text{-minute})}$ noise levels exceed the $L_{A90\ (15\text{-minute})}$ noise levels by more than 15 dB(A).

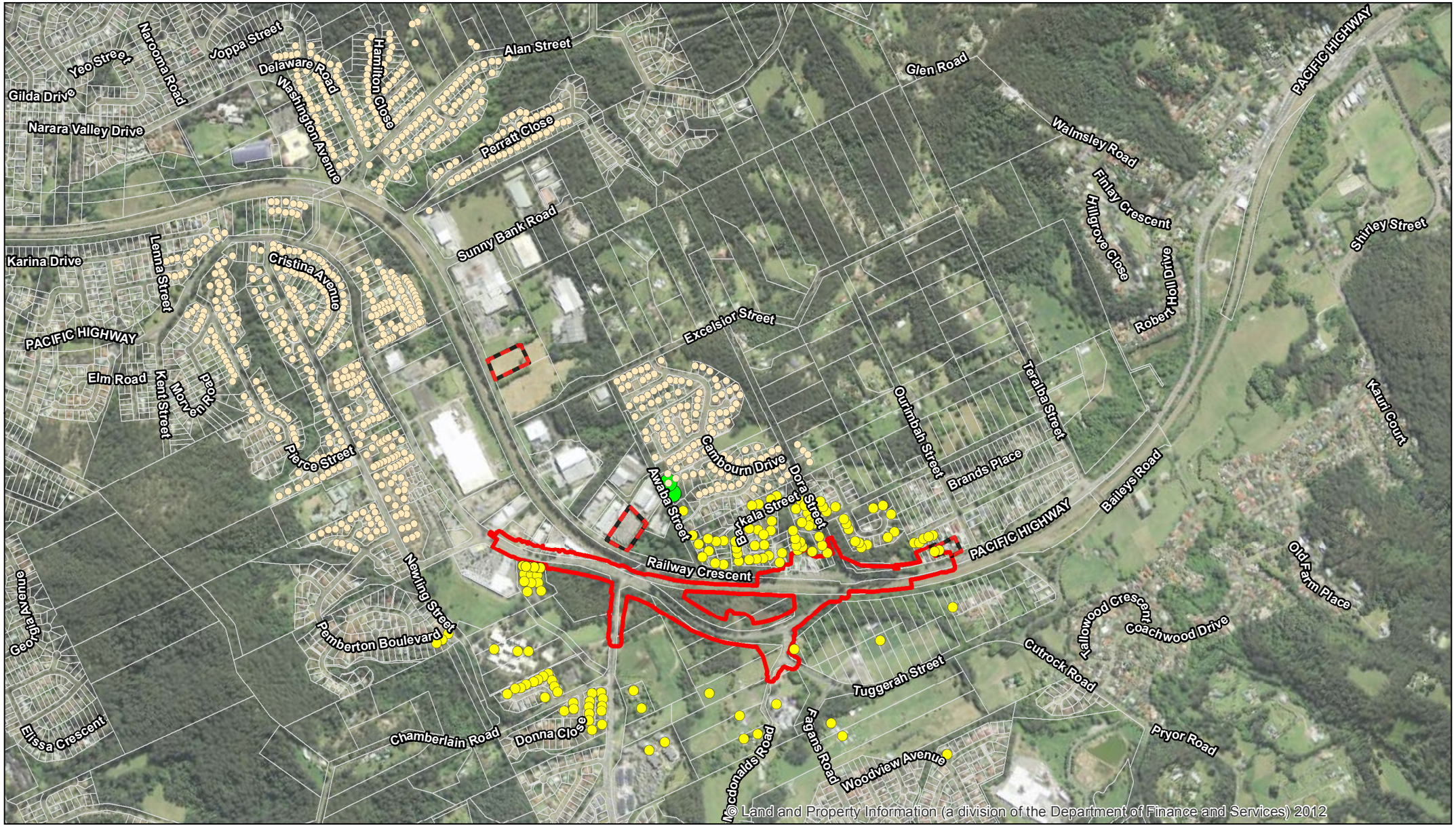
Predicted number of exceedances of sleep disturbance screening criteria for night time are presented in Table 6-5. Additionally, the predicted sleep disturbance impacts for the construction work associated with the project (eg road construction) which was assessed in the project REF have been included in this table for comparison.

The predicted night time compound noise levels indicate residential receivers in all noise catchment areas have the potential to experience sleep disturbance impacts. The overall potential impacts from the compounds are expected to be lower than those predicted from the main construction work (assessed in the project REF). However, there would be additional receivers potentially subject to exceedances which were not assessed in the project REF (Figure 6-4).

With the restricted activities at compound 2, the number of exceedances would decrease.

Table 6-5 Predicted number of exceedances of sleep disturbance screening criteria (residential receivers) – compounds

NCA	Earthworks (project REF)-	Compound 2 (addendum REF 1)	Compound 2 (restricted activities)	Compound 4	Compound 5
1	108	45	40	Nil	Nil
2	138	38	33	81	8
3	149	82	77	12	Nil
4	62	31	26	7	56
Total	**457**	**196**	**176**	**100**	**64**



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Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

LEGEND

- Approved project boundary (Addendum REF 1)
- Proposed modification (Addendum REF 2)
- Cadastre
- Not previously assessed
- Exceedance
- Exceedance - Compound 4 only

Roads and Maritime Services
Pacific Highway Upgrade Stage 3B, Lisarow
Addendum Review of Environmental Factors 2

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Construction noise exceedances Day

Figure 6-3

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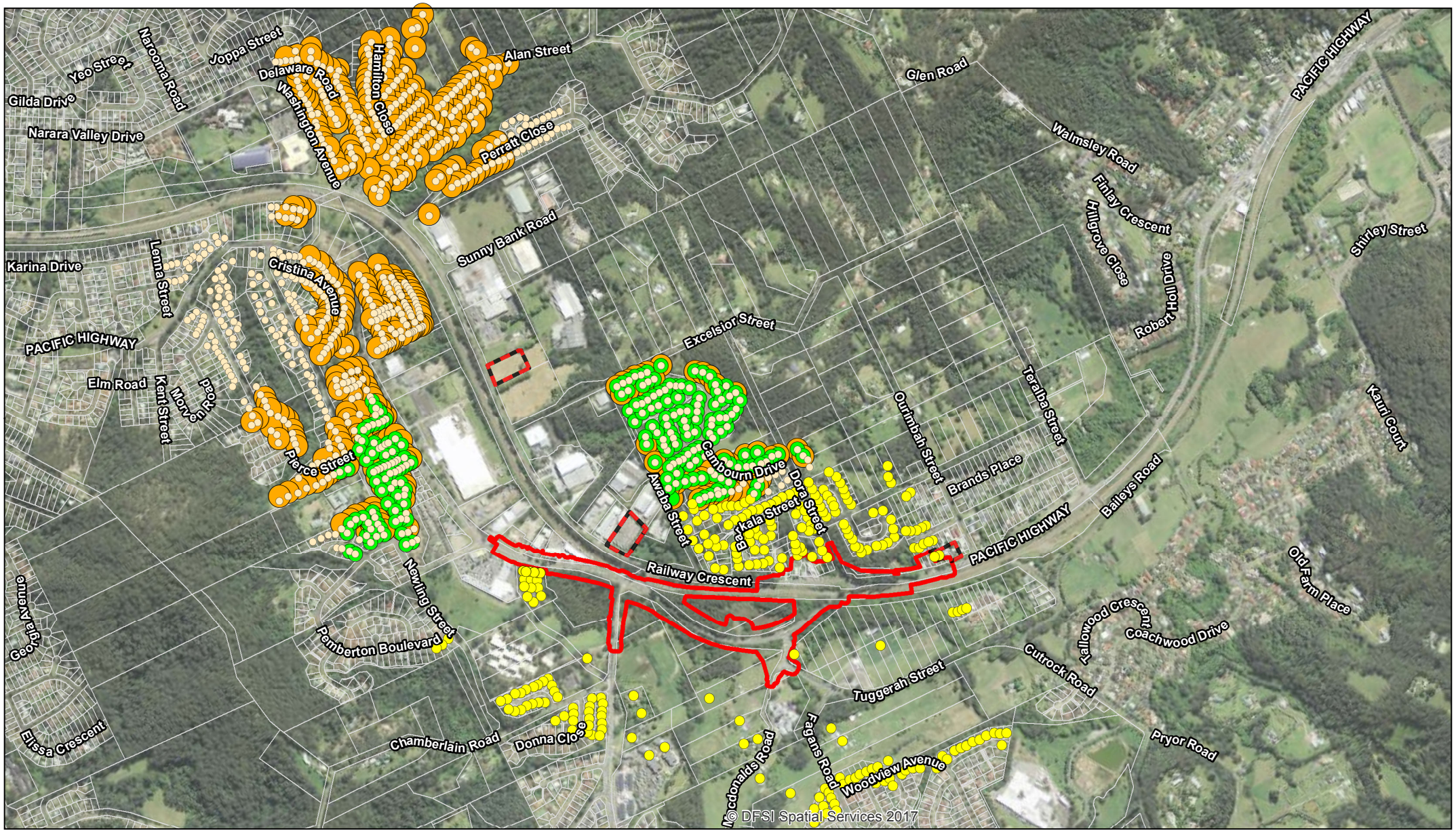
Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 T 61 2 4979 9999 F 61 2 4979 9988 E ntlmail@ghd.com W www.ghd.com.au

Data source: LPI: Aerial imagery, 2015; DTDB/DCDB, 2015. Created by: tmorton, fmackay



Paper Size A4

0 65 130 260 390 520

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

LEGEND

- Approved project boundary (Addendum REF 1)
- Proposed modification (Addendum REF 2)
- Cadastre
- Not previously assessed
- Exceedance
- Exceedance - Compound 4 only
- Exceedance - Compound 5 only

Roads and Maritime Services
Pacific Highway Upgrade Stage 3B, Lisarow
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Construction noise exceedances Night

Figure 6-4

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Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 T 61 2 4979 9999 F 61 2 4979 9988 E ntlmail@ghd.com W www.ghd.com.au

Data source: LPI: Aerial imagery, 2015; DTDB/DCDB, 2015. Created by: tmorton, fmackay

Summary of key findings – compounds
The updated construction noise assessment for the proposed changes to the compounds predicts the following:

- The restricted use of compound 2 would result in reduced construction noise levels for surrounding residential and non-residential receivers
- Compound 2 activities would still exceed the construction noise management level at one non-residential receiver, Ourimbah Church (when in use)
- Activities at compound 4 are likely to exceed the construction noise management levels for two residential receivers in NCA2 during the day work period
- Activities at compound 4 and compound 5 are likely to exceed the construction noise management levels for nearby residential receivers during evening and night work periods
- Night time activities at all compounds have the potential to result in sleep disturbance for surrounding residential receivers.

Construction activities at the compounds 2, 4 and 5 would be carried out at the same time as construction work associated with the project (eg road construction). Impacts associated with the compound activities are typically lower than those predicted from the main construction work (assessed in the project REF) as shown on Figure 6-3 and Figure 6-4. However, a number of additional receivers have been identified in this addendum REF which would be impacted by activities at compounds 4 and 5.

The noise impacts identified in this assessment and the project REF represent worst-case noise impacts. During any given period, the construction items to be used would operate at maximum sound power levels for only brief stages. At other times, the machinery may produce lower sound levels while carrying out activities not requiring full power. It is highly unlikely all construction equipment would be present near the receivers and operating at their maximum sound power levels at any one time.

Construction noise management measures, including community consultation, would be implemented where feasible and reasonable as outlined in the project REF and provided in Section 7 of this addendum REF. Additional mitigation measures for ancillary facility activities are detailed in Section 6.2.3.

Construction traffic noise impacts

The *Road Noise Policy* (DECCW, 2011) states *for existing residences and other sensitive land uses affected by additional traffic on existing roads generated by land use developments, any increase in the total traffic noise level should be limited to 2 dB above that of the corresponding 'no build option'*. This increase limit applies wherever the noise level without the development is within 2 dB of, or exceeds, the relevant day or night noise assessment criterion. This is also considered to be applicable for construction noise and therefore if road traffic noise increases due to construction traffic are less than 2 dB(A) then the objectives of the Road Noise Policy are achieved. If the road traffic noise level increases by more than 2 dB due to construction traffic, then further assessment is required using Roads and Maritime's *Noise Criteria Guideline* with consideration given to noise mitigation measures.

The predicted increase in noise level due to construction traffic on Railway Crescent has been calculated based on the total estimated (worst case) construction vehicle movements relative to the predicted (2021) day and night traffic volumes and is presented in Table 6-6 and Table 6-7.

Table 6-6 Construction traffic noise – predicted noise increases (day)

Road	Predicted traffic		Construction traffic		Predicted increase (dBA)
	Light	Heavy	Light	Heavy	
Railway Crescent	9310	358	300	70	0.3

Table 6-7 Construction traffic noise – predicted noise increases (night)

Road	Predicted traffic		Construction traffic		Predicted increase (dBA)
	Light	Heavy	Light	Heavy	
Railway Crescent	1137	95	300	70	1.7

The proposed use of Railway Crescent is not predicted to increase traffic noise levels by more than 2 dBA. Therefore, further consideration of mitigation measures is not required. Access to all compounds would be carried out in accordance with a traffic management plan and traffic control plans, including specific management of out-of-hours traffic movements.

Operation

The proposed modification would not result in any additional impacts during operation beyond those identified in the project REF.

6.2.3 Safeguards and management measures

The additional measures described in Table 6-8 will be implemented to avoid or minimise potential noise and vibration impacts as a result of the proposed modification.

Table 6-8 Additional safeguards and management measures – noise and vibration

Impact	Environmental safeguards	Responsibility	Timing
Construction noise impacts – construction compounds 2, 4 and 5	The use of construction compounds 2, 4 and 5 outside standard hours of work will be assessed and managed in accordance with the project environment protection licence (EPL 21076), *Interim Construction Noise Guideline* (DECC, 2009) and *Construction Noise and Vibration Guideline* (Roads and Maritime, 2016).	Construction contractor	Construction

6.3 Traffic and access

6.3.1 Existing environment

The existing environment is described in detail in the project REF.

Access to and from compound 4 and 5 would be along Railway Crescent via the Pacific Highway. Access to and from compound 2 would be from Ourimbah Street via the Pacific Highway.

Railway Crescent is nominated as a Higher Mass Limit (HML) route (NSW Roads and Maritime HML and RAV Map 2016). HML allows particular heavy vehicles to access additional mass entitlements, which provides a significant increase in the productivity of road freight transport vehicles.

6.3.2 Potential impacts

Construction

Additional potential impacts as a result of the proposed modification beyond those identified in the project REF are:

- Reduced construction traffic movements and parking due to the restricted use of compound 2
- Increased construction traffic movements and parking due to the addition of compound 4 and/or compound 5.

Access to all compounds would be carried out in accordance with a traffic management plan and traffic control plans, including specific management of out-of-hours traffic movements.

The estimated construction traffic movements on Railway Crescent to and from the proposed compounds relative to the predicted (2021) daily traffic volumes between the hours of 7am and 10pm are summarised in Table 6-9. These numbers represent peak construction traffic movements (worst case), and would not be experienced during the entire construction period.

Table 6-9 Construction traffic – Railway Crescent

Road	Predicted traffic		Construction traffic	
	Light	Heavy	Light	Heavy
Railway Crescent	9310	358	300	70

The traffic volumes presented in Table 6-9 are for all construction traffic movements (northbound and southbound), however it is anticipated most construction traffic movements would be from the north.

The majority of deliveries such as concrete and asphalt would go directly to site, and are therefore unlikely to go via the compound.

Compound 2 was identified in the project REF as a main construction compound (including site offices, stockpiling, material laydown and parking) for the duration of construction of the project (about 30 months). Restricted use of this compound would result in reduced traffic and access impacts to residents of Ourimbah Street and users of the Pacific Highway.

The predicted construction traffic volumes contained in the project REF are not expected to significantly change as a result of the proposed modification and as such, there are no expected significant additional impacts beyond those described in the project REF.

As per the Higher Mass Limit (HML) restrictions, B-Doubles are only permitted to enter and exit Railway Crescent from the Pacific Highway north of the compound.

Parking

As described in the project REF, in order to minimise impacts to the local road network and residents, construction parking would be provided in the construction compounds. Limited car

parking would be provided within the proposed road corridor, near nominated access gates, where this would not interfere with traffic on the Pacific Highway or local property access.

Operation

The proposed modification would not result in any additional impacts during operation beyond those identified in the project REF.

6.3.3 Safeguards and management measures

The additional measures described in Table 6-10 will be implemented to avoid or minimise potential traffic and access impacts.

Table 6-10 Additional safeguards and management measures – traffic

Impact	Environmental safeguards	Responsibility	Timing
Higher Mass Limit (HML) restrictions – Railway Crescent	B-Doubles are only permitted to enter and exit Railway Crescent from the Pacific Highway north of the compound and will comply with HML restrictions.	Construction contractor	Construction

6.4 Contamination

6.4.1 Existing environment

Compound 4 is currently a hardstand area which is currently undergoing remediation to address existing contamination and make the site suitable for commercial/industrial land use. Previous environmental investigations at the site had identified the presence of asbestos fines, asbestos fragments and hydrocarbon contamination associated with underground storage tanks (now removed). A draft soil validation assessment (Prensa 2018) identified remediation of the site has removed the identified contamination. The landowner is currently awaiting issue of a validation certificate from an independent contaminated sites auditor to confirm the identified contamination has been removed.

A preliminary site investigation has been prepared by GHD (2018a) for compound 5. A summary of this is provided below, and the full report is provided in Appendix C. This investigation was based on a desktop study and site inspection (from the property boundary) to assess the potential for soil or water contamination at compound 5 and assess potential risks posed by contaminants to future users of this compound.

The assessment identified likelihood for chemical contamination to be present across compound 5 is considered to be low however, there is the potential for chemical contamination associated with the following:

- Historical use of pesticides and herbicides associated with agricultural activities
- Hazardous building materials (asbestos, lead paint) from former buildings/ structures
- Asbestos used in irrigational pipes
- Potential spills or leaks of oils, fuels, herbicides or pesticides which may have been used or stored in the area
- Spillage or leakage of chemicals used on the surrounding land and waterways (eg herbicides)
- Use of fill from unknown sources
- Illegal dumping or landfilling of waste materials.

6.4.2 Potential impacts

As compound 4 is currently a hardstand area which has been remediated and excavation of the site will not be permitted, no impacts are expected. Roads and Maritime would only use this site as a compound if the landowner can provide the final validation certificate.

The establishment of compound 5 could interact with historical contamination, particularly if any excavation is carried out.

Compound 2 is an existing compound site and no additional impacts are expected.

6.4.3 Safeguards and management measures

The additional measures described in Table 6-11 will be implemented to avoid or minimise potential contamination impacts.

Table 6-11 Additional safeguards and management measures – contamination

Impact	Environmental safeguards	Responsibility	Timing
Waste removal	Removal of general building wastes and rubbish with detailed inspection for potential asbestos containing materials (PACM) at compound 5.	Construction contractor	Pre-construction

6.5 Aboriginal heritage

6.5.1 Methodology

A Stage 1 Archaeological Baseline Assessment has been prepared by Virtus Heritage for the two proposed ancillary facility locations (Appendix D). The purpose of the assessment was to provide preliminary advice on Aboriginal archaeological (scientific) values of the proposed modification. This allows Roads and Maritime to meet the Archaeological Baseline Assessment requirement of Stage 1 of their internal *Procedure for Aboriginal cultural heritage consultation and investigation, November 2011* (PACHCI) (Roads and Maritime 2011).

The assessment includes an evaluation of the proposed modification, specifically known archaeological sites identified by previous archaeological investigations, and the understanding of Aboriginal heritage developed by previous work.

The following heritage register and database searches were carried out as part of this preliminary assessment:

- National Native Title Tribunal (NNTT)
- Aboriginal Heritage Information Management System (AHIMS)
- The Australian Heritage Database (AHD)
- State Heritage Register (SHR) and Inventory (SHI)
- Gosford Local Environmental Plan (2014).

A PACHCI stage 1 assessment and inspection of the proposed modification areas was also carried out by the Roads and Maritime Aboriginal Cultural Heritage Officer.

6.5.2 Existing environment

The proposed modification lies within lands traditionally associated with the Darkinyung (also known as Darginjung) language group (Virtus Heritage, 2018a).

Statutory searches and a review of previous archaeological research carried out as part of the Stage 1 Archaeological Baseline assessment identified no Aboriginal objects or places within or near the proposed modification.

The previous archaeological research (detailed in Appendix D) suggests the proposed modification has been highly modified and will most likely have a low archaeological potential. The majority of the proposed modification is within a highly modified landform due to extensive roads, railway and urban infrastructure.

The proposed modification is situated near creeks, Tuggerah Lake and the Pacific Ocean which support a range of vegetation communities providing diverse habitats for a wide variety of terrestrial and aquatic Aboriginal prey species. The vegetation communities would also have provided floral resources which would have been exploited by Aboriginal peoples for food, medicine and other items. Early industries of the Gosford region, including timber getting and farming, altered the landscape and heavily impacted Aboriginal cultural heritage such as scarred or modified trees. Later urbanisation of Lisarow including infrastructure construction such as railway and roads has also acted to substantially modify the landscape. Previous land use history has affected the potential for identifying Aboriginal sites and objects within the proposed modification locations and the integrity of any cultural deposits, if present.

There is no evidence to suggest rock art, rock shelter, engraving or grinding grooves could not be identified in the proposed modification locations or suitable sandstone geology is present and still existing.

The PACHCI stage 1 assessment and inspection by the Roads and Maritime Aboriginal Cultural Heritage Officer confirmed no Aboriginal archaeological sites or areas of cultural significance are located within the proposed modification area and therefore no further assessment is required.

6.5.3 Potential impacts

Construction

No Aboriginal objects or places were identified as part of the Stage 1 Archaeological Baseline Assessment, or the Roads and Maritime PACHCI.

The previous archaeological research suggests locations which have been highly modified will most likely have a low archaeological potential.

The majority of the proposed modification is a highly modified landform due to extensive roads, rail and urban infrastructure. No known or predicted archaeological sites or areas of archaeological sensitivity are predicted within the proposed modification locations.

Operation

The proposed modification would not result in any additional impacts during operation beyond those identified in the project REF.

6.5.4 Safeguards and management measures

No additional safeguards or management measures are required as a result of the proposed modification.

6.6 Other impacts

For environmental factors where the incremental impact of the proposed modification was deemed to be negligible to minor, an assessment of the existing environment and potential impacts has been assessed in Table 6-12.

Table 6-12 Existing environment and potential impacts

Environmental factor	Existing environment	Potential impacts / additional safeguards
Geology and soils	The existing environment in the proposed modification area is consistent with those described in approved project REF, with the site being located within the rolling hills and foot slopes of the Erina landscape on the Terrigal Formation of the Narrabeen Group. Three main soil types occur within the Erina erosional landscape. They are soils formed on shale, soils formed on sandstone and deep soils formed on weathered course sandstone. Compound 4 is a level, hardstand site and compound 5 is an exotic grassed paddock which generally slopes to the south/ south west towards Railway Crescent.	<u>Potential impacts</u> While there would be a minor increase in the area of exposed surface from the proposed modification (compound 5 only), potential construction and operation phase impacts for the proposed modification are consistent with the approved project REF. Sediment and erosion controls would be required for the proposed compounds and rehabilitation following demobilisation of the site compounds would be required to minimise impacts. <u>Safeguards and management measures</u> No additional safeguards or management measures are required for the proposed modification.

Environmental factor	Existing environment	Potential impacts / additional safeguards
Landscape and visual amenity	Both proposed compounds are within urban/industrial areas. Compound 4 is located within a large level hardstand area about 55 metres wide by about 75 metre long, with narrow vegetated (grass) boundaries to the south and east. Commercial and light industrial buildings are located to the west and north. Compound 5 consists of a grassed paddock area with a vegetated windbreak along the eastern boundary. A food processing factory is located to the west and north. The landscape character in the areas of the proposed modification mostly comprises existing transport corridors.	<u>Potential impacts</u> During construction, the site compound may result in temporary visual impacts. The use of lighting towers during any night work may result in light spill impacting nearby properties and residents. No vegetation would be cleared at compound 4. Compound 5 would require some exotic grassland vegetation clearing to allow for temporary hardstands and equipment laydown. No woody vegetation would be removed as part of the proposed modification. Some of this vegetation contributes to the amenity and character of the local area. The restricted use of compound 2 would reduce the visual and amenity impacts for residents at Ourimbah Street. Site compounds would be rehabilitated post construction. The proposed modification would not result in any operational impacts to landscape or visual amenity. <u>Safeguards and management measures</u> No additional safeguards are required for the proposed modification.

Environmental factor	Existing environment	Potential impacts / additional safeguards
Land use	The proposed modification is within the Central Coast Council local government area (LGA) (formerly the Gosford LGA). Compound 4 and 5 are on the northern side of Railway Crescent, Lisarow and immediately north of the Main Northern Railway. The proposed modification, is permitted without consent under ISEPP and the consent requirements of the Gosford LEP do not apply.	<u>Potential impacts</u> The ancillary facility sites would be leased by Roads and Maritime for the duration of construction. Roads and Maritime has commenced consultation with the property owners and would enter into a lease agreement when the ancillary facility sites are confirmed. Site compounds would be rehabilitated post construction. There are no expected impacts during operation. <u>Safeguards and management measures</u> No additional safeguards are required for the proposed modification.
Socio-economic	Both proposed compounds are within urban/industrial areas. The businesses in this area generally comprise large warehouses, sheds and office buildings.	<u>Potential impacts</u> During construction, the potential socio-economic impacts associated with the proposed modification are consistent with those described in the approved project REF and submissions report. However, the restricted use of compound 2 would reduce the local amenity impacts in the area surrounding Ourimbah Street. Site compounds would be rehabilitated post construction. There are no expected impacts during operation. <u>Safeguards and management measures</u> No additional safeguards are required for the proposed modification.

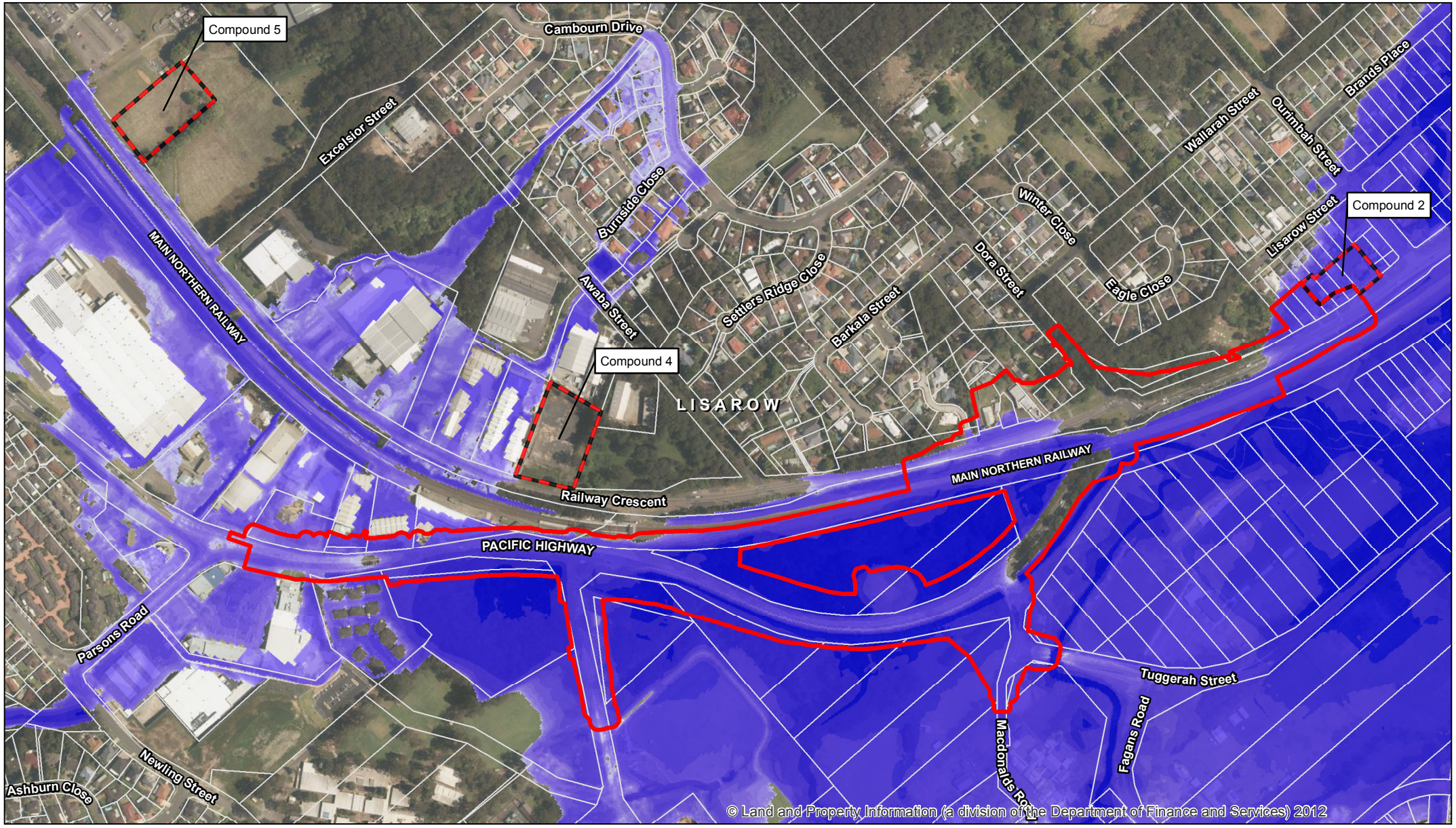
Environmental factor	Existing environment	Potential impacts / additional safeguards
Non-Aboriginal heritage	A Preliminary Historical Heritage report (Appendix E) has been prepared by Virtus Heritage for the proposed modification. The assessment included searches of the Australian Heritage Database, NSW State Heritage Inventory, State Heritage Register and The *Gosford Local Environmental Plan 2014*, Schedule 5, Environmental Heritage. No items of historical heritage were identified within the proposed modification.	<u>Potential impacts</u> Based on the Virtus Heritage preliminary assessment (2018b) and a review of the project REF, no listed or registered historical heritage sites or places are identified within the proposed modification area. No further assessment is required. There are no expected impacts during operation. <u>Safeguards and management measures</u> No additional safeguards are required for the proposed modification.

Environmental factor	Existing environment	Potential impacts / additional safeguards
Hydrology, water quality and flooding	Cut Rock Creek, which rises in the hills near Lisarow, lies approximately 1 kilometre to the east of the proposed modification. This creek flows northwards to join Bangalow Creek approximately 1.5 kilometres north of the proposed modification. Bangalow Creek then continues flowing north to join Ourimbah Creek, which outlets to Tuggerah Lake at Chittaway Point some 10 kilometres north-east of the proposed modification. Several swamps are located nearby on either side of the highway, particularly along sections located to the south of the Main Northern Railway. Flooding in the area occurs when runoff from the contributing catchments accumulates in the low-lying areas around the project areas (Jacobs 2014b). Compound 5 does include a small table drain which intercepts local runoff and conveys it to a culvert under Railway Crescent. The morphology of the creeks and adjoining floodplain have been significantly affected in recent times by minor road crossings, Pacific Highway crossings, railway line crossings, urban development within Lisarow, and channel works (Webb et al 1997). Flood modelling previously carried out for the project indicates the proposed modification is located outside of the estimated flood affected areas for the 100 year flood event (Figure 6-5).	<u>Potential impacts</u> As the proposed modification is located outside of the area affected by the 100 year flood event (Figure 6-5), the proposed modification is not expected to affect surrounding flood levels. Establishment and operation of compound 5, and operation of compound 4 has the potential to impact the downstream environment through: • Increased total suspended solids • Oils and grease concentrations • Turbidity levels. These potential impacts will be managed through standard practices including refuelling and maintenance in designated areas and erosion and sediment controls. All other potential construction impacts associated with the proposed modification are consistent with those described in the project REF and as such, no further assessment has been carried out. Site compounds would be rehabilitated post construction. There are no expected impacts during operation. <u>Safeguards and management measures</u> No additional safeguards are required for the proposed modification.

Environmental factor	Existing environment	Potential impacts / additional safeguards
Air quality	The existing environment is described in detail in the project REF. Identified sensitive receivers are shown on Figure 6-2.	<u>Potential impacts</u> Activities carried out at compound 4 and 5 has the potential to result in increased air quality impacts associated with general compound activities and stockpiling. However, given the distance to the nearest sensitive receivers this is not expected to be significant. As stated in the project REF all stockpiles will be managed in accordance with the Stockpile Site Management Guideline (RTA 2011f). The restricted use of compound 2 would reduce the air quality impacts near Ourimbah Street. Site compounds would be rehabilitated post construction. There are no expected impacts during operation. <u>Safeguards and management measures</u> No additional safeguards or management measures are required for the proposed modification.

Environmental factor	Existing environment	Potential impacts / additional safeguards
Resource use and waste management	Roads and Maritime is committed to ensuring responsible management of unavoidable waste and to promoting the reuse of such waste through appropriate measures in accordance with the resource management hierarchy principles embodied in the *Waste Avoidance and Resource Recovery Act 2001*. By adopting these principles, Roads and Maritime encourages the most efficient use of resources and reduces cost and environmental harm in accordance with the principles of ecologically sustainable development.	<u>Potential impacts</u> Construction of the project would require the use of a number of resources and the generation of a range of waste streams as described in the approved project REF. The requirements of the proposed modification would be consistent with those stated in the approved project REF. As stated in the project REF all stockpiles will be managed in accordance with the Stockpile Site Management Guideline (RTA 2011f). There are no expected impacts during operation. <u>Safeguards and management measures</u> No additional safeguards or management measures are required for the proposed modification.
Hazards and risks	Existing hazards and risks in the vicinity of the project site are generally associated with operation of the existing road network and surrounding industrial industries.	<u>Potential impacts</u> Storage of chemicals and fuels at the site compound comprises a hazard and risk for the project. These potential impacts are consistent with those identified in the project REF and can be effectively managed with the implementation of standard management measures. There are no expected impacts during operation. <u>Safeguards and management measures</u> No additional safeguards are required for the proposed modification.

Environmental factor	Existing environment	Potential impacts / additional safeguards
Greenhouse gas and climate change	The latest breakdown of Australia's greenhouse gas emissions by state and territory was published in February 2018 on the Commonwealth Department of Environment website for 2016 (DotE 2018). Total emissions for New South Wales in 2016 were 131.6 Mt CO2-e (a 18.7% decrease on 2005). The major emission sources for NSW were fuel combustion for stationary energy purposes and fuel combustion for transport purposes.	Potential impacts No additional impacts are expected. Safeguards and management measures No additional safeguards are required for the proposed modification.



Paper Size A4

0 25 50 100 150 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

LEGEND

Cadastre

Approved project boundary (Addendum REF 1)

Proposed modification (Addendum REF 2)

Depth (metres)

< 0.01
< 0.02
< 0.03
< 0.05
< 0.1
< 0.2
< 0.3
< 0.5
< 1
< 2
< 3
> 3

Roads and Maritime Services
Pacific Highway Upgrade Stage 3B, Lisarow
Addendum Review of Environmental Factors 2

Job Number 22-18239
Revision 0
Date 26 Jun 2018

100 year flood depths
existing conditions

Figure 6-5

G:\22\18239\GIS\Maps\Deliverables\AddendumREF2_Compounds\2218239_AREF204_FloodDepths_0.mxd

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 T 61 2 4979 9999 F 61 2 4979 9988 E ntlmail@ghd.com W www.ghd.com.au

Data source: LPI: Aerial imagery, 2015; DTDB/DCDB, 2015. Created by: tmorton, fmackay

6.7 Cumulative impacts

Cumulative impacts have the potential to arise from the interaction of individual elements within the project and the additive effects of other external projects. Roads and Maritime is required under Clause 228 (2) of the EP&A Act, to take into account potential cumulative impacts as a result of the project.

6.7.1 Potential impacts

There are no additional cumulative impacts beyond those identified in the project REF and addendum REF 1 anticipated as a result of the proposed modification relative to other known projects. Potential cumulative impacts associated with the proposed modification relative to the project as described in the project REF and addendum REF 1 are considered as relevant, in Section 6 of this addendum REF.

6.7.2 Safeguards and management measures

No additional safeguards or management measures are required as a result of the proposed modification.

7 Environmental management

7.1 Environmental management plans

A number of safeguards and management measures have been identified in the addendum REF in order to minimise adverse environmental impacts which could potentially arise as a result of the proposed modification. Should the proposed modification proceed, these safeguards and management measures would be applied during the construction and operation of the project.

A Project Environmental Management Plan (PEMP) and a Construction Environmental Management Plan (CEMP) will be prepared to describe the safeguards and management measures identified. The PEMP and CEMP will provide a framework for establishing how these measures will be implemented and who would be responsible for their implementation.

The PEMP and CEMP will be prepared prior to construction of the proposal and must be reviewed and certified by the Roads and Maritime Environment Officer, Greater Sydney Project Office prior to the commencement of any on-site works. The CEMP will be a working document, subject to ongoing change and updated as necessary to respond to specific requirements. The CEMP and PEMP will be developed in accordance with the specifications set out in the QA Specification *G36 – Environmental Protection (Management System)*, QA Specification *G38 – Soil and Water Management (Soil and Water Plan)*, QA Specification *G40 – Clearing and Grubbing*, QA Specification *G10 – Traffic Management.*

7.2 Summary of safeguards and management measures

Environmental safeguards and management measures for the project are summarised in Table 7-1.

Additional or changed safeguards and management measures identified in this addendum REF are indicated by bold/ italicised and struck out font.

Other minor changes have also been made to reflect organisational, administrative and document updates that have occurred since completion of the project REF and addendum REF 1.

The safeguards and management measures will be incorporated into the PEMP and CEMP 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 project, including the proposed modification, on the surrounding environment.

Table 7-1 Summary of safeguards and management measures

No.	Impact	Environmental safeguards	Responsibility	Timing
General				
G-1	General	All environmental safeguards must be incorporated within the following: • Project Environmental Management Plan • Detailed design stage • Contract specifications for the proposal • Contractor's Environmental Management Plan.	Project manager	Pre-construction
G-2	General	The following measures will be implemented: • A risk assessment must be carried out on the proposal in accordance with the Roads and Maritime Services Project Pack and PMS risk assessment procedures ***(or equivalent procedures current at the time of implementation)*** to determine an audit and inspection program for the works. The recommendations of the risk assessment are to be implemented. • A review of the risk assessment must be undertaken after the initial audit or inspection to evaluate is the level of risk chosen for the proposal is appropriate. • Any works resulting from the proposal and as covered by the project REF ~~**and**~~ addendum REF ***1 and addendum REF 2*** may be subject to environmental audit(s) and/or inspection(s) at any time during their duration.	Project manager and regional environmental staff	Pre-construction After first audit
G-3	General	The environmental contract specifications G36, G38 and G40 must be forwarded to the Roads and Maritime Services Environment Branch (Greater Sydney Project Office) for review at least 10 working days prior to the tender stage. A contractual hold point must be maintained until the CEMP is reviewed by the Roads and Maritime Services Environment Branch (Greater Sydney Project Office).	Project manager	Pre-construction
G-4	General	The Roads and Maritime Services Project Manager must notify the nominated Roads and Maritime Services Environment Branch (Greater Sydney Project Office) at least five working days prior to work commencing.	Project manager	Pre-construction
G-5	General	All businesses and residences likely to be affected by the proposed works must be notified at least five working days prior to the commencement of the proposed activities.	Project manager	Pre-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
G-6	General	Environmental awareness training must be provided, by the contractor, to all field personnel and subcontractors.	Construction contractor	Pre-construction, Construction (as required)
Biodiversity				
B-1	Impacts to native vegetation	Impacts to native vegetation are to be avoided where possible, through the detailed design stage following review of biodiversity constraints and sensitive placement of construction compounds. The proposal will be designed to minimise impacts to areas of high condition vegetation and the population of the threatened Melaleuca biconvexa where possible during the detailed design phase.	Roads and Maritime	Detailed design

No.	Impact	Environmental safeguards	Responsibility	Timing
B-2	Impact on flora and fauna	A Flora and Fauna Management Plan will be prepared as part of the Construction Environmental Management Plan (CEMP). It will be prepared in accordance with the Roads and Maritime *Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects* (RTA 2011) (Biodiversity Guidelines) and Section 4.8 of *QA Specification G36 Environment Protection*. The plan will include a clearing procedure which will include: • The process for pre-clearing surveys in accordance with Guide 1 of the Biodiversity Guidelines • A procedure for dealing with unexpected threatened species finds on site • Identifying, defining and managing exclusion zones for construction sites, including temporary fencing requirements, to avoid damage to vegetation. Maps of exclusion zones will be provided and developed in accordance with Guide 2 of the Biodiversity Guidelines • Staged habitat removal in accordance of Guide 4 of the Biodiversity Guidelines • A process for fauna handling in accordance with Guide 9 of the Biodiversity Guidelines including a requirement to contact a local vet and wildlife handler before vegetation clearance to ensure they will be willing to treat any fauna injuries that may occur during clearing and other construction activities • Identified nearby habitats along the proposal suitable for the release of fauna, should they be encountered any time during construction, including pre-clearing and clearing process • Provision for the education of all construction personnel with regards to the importance of clearing limits, exclusion zones and remnants/individual trees of value • Coarse woody debris and rocks removed in the process of clearing shall, where practical, be placed in areas of vegetation located next to the proposal in accordance with Guide 5 of the Biodiversity Guidelines. • Measures to prevent the introduction and/or spread of pathogens such as bacteria and fungi need to be incorporated into the CEMP for the proposal. • Measures to confirm the presence of pathogens/disease causing agents such as bacteria and fungi may be undertaken before construction and would inform the need to development site specific management actions. This includes a background search of government-maintained websites for the most recent known locations of contamination and for the most up-to-date hygiene protocols for each pathogen. If risks are identified in the vicinity of the proposal, testing from a National Association of Testing Authorities (NATA) approved laboratory may be required to confirm the presence of pathogens in the soil and/or water.	Construction contractor	Pre-construction and during construction

No.	Impact	Environmental safeguards	Responsibility	Timing
B-3	Impacts to retained vegetation	Existing trees, plants, and other vegetation that are to remain within or adjacent to Existing trees, plants, and other vegetation that are to remain within or adjacent to the proposal are to be preserved where practical to prevent damage or injury and in accordance with the Roads and Maritime *Biodiversity Guidelines* (RTA 2011). Areas of retained vegetation are to be identified and protected as exclusion zones in accordance with the *Biodiversity Guidelines* (RTA 2011).	Construction Contractor	Construction
B-4	Removal of vegetation	A *Landscape Management Plan* (refer to mitigation measure LA-5) and a Wetlands Management Plan (refer to mitigation measure B-13) will be developed for the proposal to manage impacts from the removal of vegetation. The *Landscape Management Plan* will cover all areas of vegetation and the *Wetland Management Plan* will specifically cover areas of EEC and the threatened flora *Melaleuca biconvexa* impacted by construction of the proposal. The plans will include but not be limited to the following: • Replanting using species representative of the natural ecological communities of the immediate area excluding threatened species • Where practical it will include replanting of foraging species for the Grey Headed Flying Fox but will avoid planting too close to the road and powerline easements • Any re-establishment of habitat will take into account Guide 3 of the *Biodiversity Guidelines* (RTA 2011) • Swales will be planted with indigenous wetland plants with a particular focus on macrophytes, however threatened species will be avoided • Planting will include measures to facilitate fauna passage along Cut Rock Creek in areas in and next to the construction footprint.	Construction Contractor	Pre-construction and post-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
B-5	Removal of vegetation	During the detailed design phase opportunities to reduce the requirement for clearing will be sought and undertaken where possible. This could include: • Maintain and where possible minimise the width of the alignment in areas where the road adjoins EECs and/or *Melaleuca biconvexa* • By use of temporary or permanent retaining walls and/or dry stone walls in place of batters around individual indigenous trees and around stands of *Melaleuca biconvexa* in order to protect vegetation and avoid loss • Minimising the size of the construction footprint and subsequent removal of vegetation. Specific measures include: − Avoiding threatened flora species where possible, particularly areas of *Melaleuca biconvexa* this may include replacing batters in some locations to retaining walls − Minimise impacts to areas of higher condition terrestrial and aquatic habitats − Minimise impacts to threatened ecological communities − Maintaining existing water quality and hydrological flow regimes.	Roads and Maritime	Detailed design
B-6	Removal of vegetation	Vegetation removal to be in accordance with Roads and Maritime *Specification G40 Clearing and Grubbing*.	Construction contractor	During construction
B-7	Impact on aquatic ecosystems	The design of creek and waterway crossings will maintain fish passage in accordance with "*Why do fish need to cross the road? Fish passage requirements for waterway crossings*" (Fairfull and Witheridge 2003) and NSW *Fisheries Policy and Guidelines for fish habitat conservation and management* (DPI, 2013)).	Roads and Maritime	Detailed design
B-8	Impact on *Melaleuca biconvexa*	Individuals of *Melaleuca biconvexa* within the construction footprint will be retained where possible. The clearing footprint includes a 10 metre buffer from the base of batters. Following construction this area would likely regenerate naturally and is expected that regeneration of *Melaleuca biconvexa* would occur. Soil disturbance in this area will be avoided where possible to maintain the viability of propagules (ie seeds, roots, rhizomes) in the soil so that this area will readily regenerate following construction.	Roads and Maritime	Pre-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
B-9	Controlling the spread of noxious weeds	A *Weed Management Plan* will be developed as part of the CEMP in accordance with *Roads and Maritime Biodiversity Guidelines (Guide 6: Weed* Management) and *Introductory Weed Management Manual* (Natural Heritage Trust 2004). Specific attention will be given to the areas of EEC and *Melaleuca biconvexa* on Roads and Maritime controlled lands or alternatively specific weed management actions will be incorporated into the *Wetland Management Plan.* Noxious weeds will be disposed of to a licensed waste facility. The *Weed Management Plan* should be consistent with other plans of management for the area. As part of the weed management plan a site assessment by an ecologist or person trained in weed identification and management would be required to assess the extent and severity of weed species in the clearing footprint with particular emphasis on noxious weed species. A weed management plan should also be consistent with other plans of management for the area. The *Weed Management Plan* or specific actions would include descriptions and mapping of major weed infestations during pre-clearing surveys and appropriate management actions to be undertaken for each infestation. The details of the *Weed Management Plan* may include: • Weed management priorities and objectives. • Sensitive environmental areas on Roads and Maritime controlled lands. • Location of weed infested areas. • Mechanical weed control methods such as slashing or mowing, as well as a range of herbicides to avoid the development of herbicide resistance. • Measures to prevent the spread of weeds. • A monitoring program to measure the success of weed management. Appropriate disposal of weed infested materials and soils to be identified in the CEMP. • Communication strategies to improve contractor awareness of weeds and weed management.	Construction contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
B-10	Controlling the spread of pathogens / diseases	If pathogens/disease causing agents are found to be present, measures to prevent the introduction and/or spread of these pathogens/disease causing agents are to be incorporated into the CEMP for the proposal. The CEMP will be developed in accordance with *Guide 7 Pathogen Management* of the Roads and Maritime Biodiversity Guidelines (RTA 2011) and will include the following: • Vehicle and boot wash down procedures and facilities will be made available to ensure vehicles and footwear are free of pathogens before entering and leaving site • Regular communication to staff and contractors during inductions and toolbox talks, of the risk of spreading pathogens and the mitigation measures required on site. • To avoid the introduction of pathogens into the area, all new plant and top soil material brought to site will be certified disease-free by the supplier • Construction work will be programmed to move from uninfected areas to any known infected areas • Restricting vehicles to designated tracks, trails and parking areas.	Construction contractor	Construction
B-11	Wildlife connectivity	Revegetation around and beneath the rail overbridge will aim to provide some low cover for fauna approaching and exiting the structure. In-stream structures will be designed and constructed to minimise potential impacts to fish passage with consideration to "*Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings*" (Fairfull and Witheridge 2003).	Construction contractor	Construction
B-12	Impacts to EECs	Before clearing, exclusion zones will be erected to identify environmentally sensitive areas such as EECs in accordance with *Roads and Maritime Biodiversity Guidelines (Guide 2 Exclusion Zones)*. The location of EECs will be mapped and identified in the CEMP.	Construction contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
B-13	Impacts to EECs and *Melaleuca biconvexa*	A suitably qualified ecologist will develop a *Wetland Management Plan* that will document specific pre-construction and construction mitigation measures. The plan should include a program to monitor the effectiveness of mitigation measures and will be prepared before the start of construction. The contents of the *Wetland Management Plan* will include but not be limited to the following: • Introduction – purpose, objectives, background and report structure • Management and mitigation measures – environmental management responsibilities, pre-construction management measures, including survey, type and location of control measures. Construction measures will include but not limited to contractor education and induction, hygiene and pre-clearance protocols, fencing, during construction • Monitoring –methods, timing, intensity and duration, controls, performance indicators and criteria, proposal review and monitoring, responsibility, timing and corrective actions reporting requirements and periods. • A summary and implementation schedule. Roads and Maritime will consult with Central Coast Council during development of the component plans of the Wetland Management Plan, including in areas such as weed control and revegetation.	Roads and Maritime	Detailed design

No.	Impact	Environmental safeguards	Responsibility	Timing
B-14	Impacts to EECs and *Melaleuca biconvexa*	A *Biodiversity Offset Strategy* (for inclusion as Appendix E of the SIS) will be prepared to investigates the offsets required and the availability of suitable offsets in the region to compensate for the loss of important habitat associated with the proposal. The offset strategy will focus on identifying offsets that contain a population of *Melaleuca biconvexa* and the endangered ecological communities (swamp sclerophyll forest and/or freshwater wetlands) and which would include potential habitat for threatened fauna species affected by the proposal. The final selection of offset sites will be subject to site survey using the BioBanking Assessment Methodology to compare the condition of the site habitats and ecosystem credits with those being impacted. The revised figures for vegetation clearing impacts to the two EECs; Freshwater Wetlands and Swamp Sclerophyll Forest (as summarised in Table 6-2 of this addendum REF) and individuals of Melaleuca biconvexa (as summarised in Section 6.2.3 of this addendum REF) will be, after consulting with OEH, used in the Biodiversity Offset Strategy for calculating offset requirements for the proposal.	Roads and Maritime	Detailed design

No.	Impact	Environmental safeguards	Responsibility	Timing
B-15	Management of unexpected finds	Pre-clearing surveys will be undertaken by an experienced ecologist to identify any nesting/roosting animals present in the proposal area. In particular it would be important to conduct a pre-clearing inspection for any artificial structures such as culverts which are proposed to be physically disturbed. The inspection is required to identify if threatened bat species are present and are using the structure for roosting and/or breeding habitat. The inspection will be conducted during the day and will ensure that all cracks, fissures, scuppers, lifting holes, etc., within concrete structures are inspected for microbats prior to any works commencing. Because no structures are proposed to be demolished, it is unlikely works will have a significant impact on any microbats roosting in adjacent structures. However, if bats are found, an appropriately qualified ecologist will be engaged and provide advice on work methods and timing to minimise impacts on the bats. If exclusions are required, these will be done in accordance with a Bat Management Plan prepared by an appropriately qualified ecologist. While the study area has been assessed as containing sub-optimal habitat for threatened frogs there is low to moderate potential for some species to occur. Because of this, the unexpected threatened species finds procedure will be followed as outlined in the *Roads and Maritime Biodiversity Guidelines* (RTA 2011). This procedure is particularly relevant to the potential presence of microbats in artificial structures and threatened frogs in freshwater aquatic habitats. The procedure is to be adopted through the construction phase of the proposal. As a first step photos and descriptions of roosting bats and threatened frogs are to be included in the CEMP and/or the flora and fauna management sub-plan. All personnel will be inducted on the potential for these threatened species occurring on site and the unexpected threatened species finds procedure.	Construction contractor	Construction
B-16	Impacts to threatened flora and fauna	All conditions and requirements from the OEH SIS concurrence will be incorporated into the CEMP, Wetlands Management Plan, or plans.	Construction contractor	Detailed design, pre-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
B-17	***Vegetation impacts – compound 4***	***The Coastal Narrabeen Moist Forest, located to the north and south of the hardstand area, will be fenced off prior to construction as directed by Roads and Maritime in accordance with the vegetation mapping in this addendum REF.***	***Construction contractor***	***Pre-construction***
B-18	***Vegetation impacts – compound 5***	***The planted Cinnamomum camphora (Camphor Laurel) and exotic shrubs located on the eastern boundary will be fenced off prior to construction as directed by Roads and Maritime in accordance with the vegetation mapping in this addendum REF.***	***Construction contractor***	***Pre-construction***
OEH-1	Impacts to threatened flora and fauna	The development must be undertaken in accordance with the Species Impact Statement (SIS) including but not limited to the ameliorative measures documented in Section 7 of the SIS.	Construction contractor	Pre-construction, construction
OEH-2	Impacts to threatened flora and fauna	In the event of any inconsistency between the Review of Environmental Factors (REF), the SIS and the conditions of the Threatened Species Concurrence shall prevail.	Construction contractor	Pre-construction, construction
OEH-3	Impacts to threatened flora and fauna	The proponent must provide an appropriate biodiversity offset package to the satisfaction of Office of Environment and Heritage (OEH), noting that OEH's preference is physical land based offsets or the retirement of biodiversity credits in accordance with either (i) fully implementing the BioBanking Scheme for the project in accordance with Part 7A of the TSC Act; OR, (ii) implementing the 'OEH principles for the use of biodiversity offsets in NSW'. [http://www.environment.nsw.gov.au/biodivoffsets/oehoffsetprincip.htm]. Under the latter, OEH understands that such an offset package may include a mix of: the provision of an offsite offset, the retirement of an appropriate number and type of biodiversity credits (both ecosystem and species credits) in accordance with BioBanking, or supplementary measures. Offsets will cover impacts to the two EECs and the direct and indirect impacts to *Melaleuca biconvexa*.	Roads and Maritime	Pre-construction
OEH-4	Impacts to threatened flora and fauna	The proponent must provide (i) an appropriate biodiversity offset package before impacting on any matter which are subjects of the offset package, or (ii) be able to demonstrate to the satisfaction of the Senior Team Leader Planning, Hunter Central Coast that the proponent is able to secure an appropriate biodiversity offsetting package before impacting on matters subject of the offset package.	Roads and Maritime	Pre-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
OEH-5	Impacts to threatened flora and fauna	The Threatened Species Concurrence conditions determination, and conditions of the determination, do not relieve the applicant of any obligation to obtain other statutory approvals necessary to undertake the activity, including but not limited to any approvals required under the Australian Government Environment Protection and Biodiversity Conservation Act 1999.	Construction contractor	Pre-construction, construction
OEH-6	Impact on flora and fauna	Prior to the commencement of the activity, the applicant must complete or comply with the following: prepare a construction environmental management plan (CEMP), which will include, but not be limited to sub-plans such as: Wetland Management Plan, Flora and Fauna Management Plan.	Construction contractor	Pre-construction
OEH-8	Impact on flora and fauna	A Flora and Fauna Management Plan (FFMP) is to be prepared to manage biodiversity values during the construction stage of the activity. Roads and Maritime Services shall discuss with council and identify any need for support in the management of biodiversity values of those parts of the site which will come under Council control post construction, and that may also be subject to indirect impact from the project footprint. The appropriate form of support if any, limited to a maximum of three (3) years post construction completion, should be decided in cooperation between Council and Roads and Maritime Services.	Roads and Maritime	Pre-construction, construction, post-construction
OEH-9	Impacts to threatened flora and fauna	If, during the course of undertaking the activity, the applicant becomes aware of the presence of threatened species, populations or EEC, or their habitats, that were not identified and assessed in the REF and which are likely to be affected by the activity, the applicant must: • Immediately cease all work likely to affect the threatened species, populations or EEC • Notify the OEH Senior Team Leader Planning, Hunter Central Coast as soon as practicable by telephone, electronically or in writing • Not recommence work likely to affect the threatened species, populations or EEC, or their habitats until receiving written advice from the NPWS to do so.	Construction contractor	Construction
OEH-10	Impact on flora and fauna	At all times when the activity is not being undertaken, the applicant must store any machinery, equipment or material required at a secure onsite location. Machinery, vehicles and other construction equipment must be cleaned in accordance with the CEMP. All fuels, oils and pollutants are to be stored in a designated bunded area. Vehicles and machinery must be refuelled within designated bunded areas.	Construction contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
OEH-11	Impact on flora and fauna	The applicant must ensure that fire-fighting equipment is provided on site during periods of declared high fire danger. Machinery which may result in sparking or ignition must not be operated during total fire bans. The applicant must store fuel and other similar flammable materials, such as gas cylinders and paint, in appropriate fire-resistant storage containers.	Construction contractor	Construction
OEH-13	Impact on flora and fauna	The applicant must only use locally sourced endemic native plant species for site restoration works, if required.	Construction contractor	Construction
Traffic				
TT-1	Impacts to traffic flow and property access during construction	A detailed traffic management plan (TMP) will be prepared during the detailed design phase. The TMP will be prepared in accordance with the Roads and Maritime *Guide to Traffic Control at Work Sites and Roads and Maritime QA Specification G10 Traffic Management* and will include guidelines, general requirements and procedures to be used when activities or areas of work have a potential impact on existing traffic arrangements, ***including specific management of out of hours construction traffic movements***. The TMP may be submitted in stages to reflect the progress of work and will: • Consider other developments that may also be under construction, to minimise traffic conflict and congestion that may occur due to the cumulative increase in construction vehicle traffic • Make provision for consultation with relevant local government authorities, emergency services, the community and transport service providers, as appropriate. Consultation will be in accordance with the consultation strategy for the proposal.	Construction contractor	Pre-construction
TT-2	Impacts to traffic flow and property access during construction	Traffic control plans (TCPs) will be prepared for the appropriate stage of work in accordance with the Roads and Maritime *Traffic Control at Worksites Manual* and *Roads and Maritime QA Specification G10 Traffic Management*. ***The TCPs will include specific management for out of hours construction traffic movements.*** Roads and Maritime will consider safe access options to Lisarow Station from Railway Crescent in consultation with Sydney Trains during the detailed design.	Construction contractor	Pre-construction, construction

No.	Impact	Environmental safeguards	Responsibility	Timing
TT-3	Impacts to traffic flow and property access during construction	A vehicle movement plan (VMP) and appropriate haulage routes will be developed in accordance with *Roads and Maritime QA Specification G10 Traffic Management*, to ensure that traffic associated with the works manoeuvre safely into and out of traffic streams and work areas. This will include consideration of emergency vehicle access.	Construction contractor	Pre-construction
TT-4	Modification of public transport routes and stops	Temporary bus stops (including the stop east of Lisarow Station) will be installed as close as reasonable to existing stops to limit impact to commuters and bus operators. The temporary bus stop locations will be selected in consultation with Busways, Red Bus Service and NSW Trains to identify appropriate sites. The bus stops (with the exception of the removed bus stops) will be reinstated after construction. The temporary locations will also be identified as part of the Traffic and Transport Management Plan which will be developed as part of the CEMP in accordance with *Roads and Maritime QA specification G10 Traffic Management and Disability Standards for Accessible Public Transport 2010*. Roads and Maritime will consult with Busways, Red Bus Service and NSW Trains to identify appropriate sites for bus stops. Bus stops will be reinstated after construction is complete.	Construction contractor/ Roads and Maritime	Pre-construction
TT-5	Impacts to rail traffic from rail track possessions	The timing and duration of rail track possessions will be scheduled through consultation with NSW Trains, and where possible occur concurrently with other track possessions. The design of the bridge will be developed during the detailed design phase to minimise the number of track possessions required during construction.	Construction contractor/ Roads and Maritime	Detailed design and pre-construction
TT-6	Impacts to local roads during construction	Roads and Maritime will undertake a photographic inspection of local roads surrounding the proposal before construction in order to identify condition of the local roads. Follow-up condition surveys will be taken during and at the end of construction to identify any damage from construction vehicles during construction of the proposal. Any damage to the local roads will be repaired by Roads and Maritime to that identified in the existing condition survey.	Roads and Maritime	Pre-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
TT-7	Capacity of right-turn lanes from Pacific Highway into The Ridgeway and Tuggerah Street	Undertake a review of traffic modelling and confirm the lengths of the right-turn lanes from the Pacific Highway into The Ridgeway and also into Tuggerah Street during detailed design	Detail designer	Detailed design
TT-8	Pedestrian and cyclist facilities	Undertake further detailed investigations of the Macdonalds Road / Tuggerah Street intersection to ensure a safe crossing at the end of the shared pathway.	Detail designer	Detailed design
TT-9	***Higher Mass Limit (HML) restrictions – Railway Crescent***	***B-Doubles are only permitted to enter and exit Railway Crescent from the Pacific Highway north of the compound and will comply with HML restrictions.***	***Construction contractor***	***Construction***

No.	Impact	Environmental safeguards	Responsibility	Timing
Flooding and hydrology				
FH-1	Flood impacts during operation of the proposal	• Enlargement and optimisation of the cross drainage culverts where possible • Inclusion of debris guards at the inlets of selected culverts to reduce the risk of blocking • Use of land between the Pacific Highway and railway line, north of Lisarow Station for temporary flood detention • Placement of a concrete retaining wall along the railway corridor to keep flood level increases within low lying land, and to avoid impact on the Main Northern Railway • In the selection of road furniture, consider avoiding solid obstructions and features, such as noise barriers, which will obstruct flows in extreme flood events during which the highway will be overtopped • Maintain finished surface levels on Macdonalds Road and The Ridgeway close to existing levels to avoid flood level increases. • Remodelling of flooding impacts will be undertaken during detailed design for the construction of the viaduct option for the southern approach to the rail overbridge. • The remodelling will consider the changed water levels during flood events on Wetlands A, B and C and where possible design out changes in hydrology • Investigate scour protection measures downstream of the new Macdonalds Road culverts to manage flow velocity increases as part of the proposal.	Detailed design	Detailed design
FH-2	Flooding impacts on construction site compounds and stockpiles	The stockpile sites are to be located in areas away from flood flow paths, and preferably where peak flood depths and velocities are likely to be low.	Construction contractor	Pre-construction
FH-3	Flooding and scour impacts from diverting drainage lines	The design and capacity of temporary diversions and clean water pipes will be appropriately assessed and monitored to ensure there are no scour or flooding impacts during construction.	Construction contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
FH-4	Raising Tuggerah Street to improve flood evacuation	Examine the feasibility of raising Tuggerah Street between Pacific Highway and Macdonalds Road during detailed design, and have ongoing discussions with Central Coast Council regarding the inclusion, or otherwise, of these works into the proposal (subject to funding by Council).	Roads and Maritime	Detailed design
Noise and vibration				
NV-1	Impacts to sensitive receivers from operational noise	Following consultation with affected landholders, feasible and reasonable measures that could be selected to manage potential operational noise impacts, will be identified. All feasible and reasonable measures will be considered in accordance with the NSW Road Noise Policy (DECCW, March 2011) and Construction Noise and Vibration Guideline (Roads and Maritime Services 2016).	Roads and Maritime	Detailed design
NV-2	Impacts to sensitive receivers from operational noise	Post-construction monitoring will be undertaken in accordance with the Construction Noise and Vibration Guideline (Roads and Maritime Services 2016). The monitoring will be undertaken between 6-12 months of opening of the proposal to identify the effectiveness of the operational noise mitigation measures. Where noise levels exceed the predictions all further feasible and reasonable measures will be considered.	Roads and Maritime	Post construction

No.	Impact	Environmental safeguards	Responsibility	Timing
NV-3	Impacts to sensitive receivers from construction noise	A Noise Management Plan (NMP) and a Vibration Management Plan (VMP) will be prepared as part of the CEMP before construction in accordance with *QA Specification G36 Environment Protection.* The NMP and VMP will address all stages of construction. These plan will include but not be limited to: • The use of alternative low-noise processes and equipment • The placement of work compounds, parking areas, equipment and material stockpile sites away from noise-sensitive locations • The use of screening or enclosures for noise-generating equipment. • Restrictions on times when noisy work can be carried out • A process for assessing maximum noise levels for each proposal phase • Put the compound buildings close to sensitive receivers to form a buffer from the compound site. Consultation with affected residents before construction occurring and throughout works. A consultation strategy will be developed and will include: • A process for handling and responding to noise or vibration related complaints • The maintenance and operation of construction plant and equipment. All plant and equipment will be: - Fitted with properly maintained noise suppression devices in accordance with the manufacturer's specifications - Maintained in an efficient condition • Operated in a proper and efficient manner.	Construction contractor	Pre-construction
NV-4	Noise impacts from out-of-hours construction	Where out-of-hours construction is required, a detailed assessment will be carried out to identify specific impacts and mitigation measures. Following the development of a detailed construction methodology, a detailed assessment of likely construction noise impacts will be undertaken to identify specific impacts and mitigation measures.	Construction contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
NV-5	Noise impact for acutely affect residences	General mitigation and construction noise management measures will be implemented for the proposal and additional consideration will be given to the category of 'highly noise affected' receivers. Sensitive receivers will be notified before any work planned to be carried out outside normal construction hours starts. Appropriate noise mitigation measures in accordance with the Construction Noise and Vibration Guideline (Roads and Maritime Services 2016) will be investigated during detailed design and applied as necessary before construction.	Construction contractor	Construction
NV-6	Vibration impacts on buildings and heritage items	Building condition inspection reports must be completed in accordance with QA Specification G36 for all heritage structures in the work area and any other nearby structures or buildings at risk from vibration impacts. Undertake a follow up building condition inspection of all heritage structures in the work area when work is complete.	Construction contractor	Pre-construction and during construction as required
NV-7	General vibration during construction	Appropriately sized equipment will be selected to minimise vibration emissions where required.	Construction contractor	Construction
NV-8	Vibration monitoring near the cemetery	To avoid or reduce the impact of vibration during construction near the cemetery: • Undertake vibration monitoring proactively and in response to community complaints to determine the extent of actual vibration levels • Carry out attended vibration monitoring in accordance with the criteria set out in DIN 4150 -3, Part 3: Structural Vibration in Buildings: Effects on Structures as construction approaches the Lisarow Cemetery. Monitoring is to be carried out by suitable qualified and experienced specialists. The purpose of this monitoring will be to determine site specific separation distances for ongoing work • If any damage to graves occurs based on the photographic pre-condition survey of graves completed before work s starts all work must stop and, safeguards as set out in mitigation measure NA-7 must be implemented.	Construction contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
NV-9	Construction noise impacts – compound site 2	Roads and Maritime will consult with Ourimbah Church to identify sensitive periods when the facility is in use and implement a process for minimising impacts during construction	Roads and Maritime	Pre-construction
~~**NV-10**~~ ***NV-9***	Construction noise impacts – temporary construction area (site 3)	The use of temporary construction area (site 3) in Railway Crescent outside standard hours of work will be limited as far as is practicable, and assessed and managed in accordance with the Construction Noise and Vibration Guideline (Roads and Maritime Services 2016).	Construction contractor	Construction
NV-10	***Construction noise impacts – construction compounds 2, 4 and 5***	***The use of construction compounds 2, 4 and 5 outside standard hours of work will be assessed and managed in accordance with the project environment protection licence (EPL 21076), Interim Construction Noise Guideline (DECC, 2009) and Construction Noise and Vibration Guideline (Roads and Maritime, 2016).***	***Construction contractor***	***Construction***
Water quality				
WQ-1	Pollution as a result of sediment entering waterways during construction	Water management controls and an associated maintenance and inspection program will be developed during detailed design in accordance with the water quality control strategy for the proposal included in Appendix L of the project REF. Controls to improve the water quality from construction sites will include sediment basins as shown in Figure 1-2 of the project REF. During detailed design, the following will be confirmed: • Location and size of sedimentation basins • Capacity for spills in the sediment basin design volume • Installation of other water quality measures where required.	Design contractor and Roads and Maritime	Detailed design

No.	Impact	Environmental safeguards	Responsibility	Timing
WQ-2	Pollution as a result of sediment entering waterways during construction	A *Soil and Water Management Plan* (SWMP) will be developed in accordance with the *Managing Urban Stormwater – Soils and Construction, Volumes 1 and 2D* (Landcom, 2004 and DECCW, 2008) and *RTA Road Design Guideline: Section 8 Erosion and Sedimentation* (RTA 2003) and *QA Specification G38 Soil and Water Management* (SWMP) (Roads and Maritime, 2011c). The SWMP will include, but not be limited to procedures for controlling the following standard activities: • Mud and litter transfer • Maintenance and cleaning of sediment controls • Soil and stockpile management (in accordance with Roads and Maritime Stockpile Site Management Guideline (RTA 2011f) • Work within wetlands and in Cut Rock Creek • Tannin leachate management control (if stockpiling of vegetation will occur during construction) • Chemical water quality controls • Maintenance regimes for all controls • Water quality monitoring method and checklists. The SWMP will include a preliminary erosion and sediment control plan (ESCP) which will identify the erosion and sediment control measures that will be implemented on site. Progressive ESCPs will be developed throughout construction to reflect the changes in activities and risk throughout the construction process. The plan will include diagrams of erosion and sediment control techniques and details of when and where these measures will be applied.	Construction contractor	Pre-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
WQ-3	Pollution as a result of sediment entering waterways during construction	A soil conservationist from the Roads and Maritime Erosion, Sediment and Soil Conservation Consultancy Services Register will be engaged during Detailed Design stage to develop an Erosion and Sediment Management Report which will inform the SWMP. The construction contractor will undertake regular inspections throughout the construction phase of the proposal to ensure the mitigation measures included in the SWMP are implemented.	Roads and Maritime Construction contractor	Detailed design Construction
WQ-4	Site management erosion controls	Construction activities will be sequenced and managed to minimise potential water quality degradation due to erosion. Management methods will include: • Early installation of physical controls, including cross drainage to convey clean water around or through the site and the construction of the two sedimentation basins identified in Jacobs (2014j) refer to Figure 1-2 and Appendix L of the project REF • Minimising the duration of exposed topsoil by retaining topsoil cover, grassed drainage lines and shrub cover on the soil surface for as long as possible • Minimising the extent of disturbed areas • Minimising stockpiling areas • Minimising the lengths of slopes through limiting the extent of excavations and the use of diversion drains to reduce water velocity over disturbed areas • Where possible, constructing working platforms from rock fill so that bare earth is not exposed • Progressive rehabilitation or sealing of work areas.	Construction contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
WQ-5	Contaminants entering receiving environments during construction	The following measures will be implemented to minimise the risk of contaminants entering receiving environments: • All fuels, chemicals and liquids will be stored and disposed of in accordance with DECC *Storing and Handling Liquids: Environmental Protection Participants Manual*, (May 2007) and stored in impervious bunded areas located a minimum of 50 metres from drainage lines or waterways • Do not refuel or maintain plant and equipment, mix cutting oil with bitumen, or carry out any other activity which may result in spillage of a chemical, fuel or lubricant at any location which drains directly to waters or environmentally sensitive areas, without the appropriate temporary bunding being provided • Plant, equipment and vehicle wash down will occur in a designated bunded area away from waterways and drainage lines • All concrete washout will occur into a sealed receptacle or bunded concrete washout with an impermeable liner. The concrete washout must be sized to be 120 per cent of the estimated volume of the waste that will be received into the washout at any one time • Any material transported onto road surfaces will be swept and removed at the end of each working day.	Construction contractor	Construction
WQ-6	Impacts on downstream water quality during construction and operation	A Water Quality Monitoring Plan will be prepared in accordance with Roads and Maritime's Guideline for Construction Water Quality Monitoring (RTA, 2003). The plan will focus on the water quality of receiving waterways. It will include water quality monitoring: • Before construction: Water quality monitoring at sites where the most recent sampling data is over one year old to provide assurance of compliance with regulatory requirements. Sampling locations, monitoring frequency and monitoring methodology will be determined during detailed design • During construction: Monitoring to immediately detect any environmental degradation as a result of construction work.	Roads and Maritime	Pre-construction, construction

No.	Impact	Environmental safeguards	Responsibility	Timing
WQ-7	Contaminants entering receiving environments during operation	Water management controls and an associated maintenance and inspection program will be developed during detailed design in accordance with the water quality control strategy for the proposal (Jacobs, 2014j). Currently this includes the water quality controls as shown in Figure 2-7 of the project REF. Scour mitigation devices such as energy dissipaters will be included in the drainage design where scour may occur along drainage outlet points, existing natural channels, batter outlets and basin spillways. After construction, the operational water quality basin will be managed and maintained by Central Coast Council, who will be responsible for periodically cleaning out the basins during operation.	Roads and Maritime	Detailed design and operation
WQ-8	Pollution of downstream waterways due to maintenance practices during operation	Roads and Maritime's standard maintenance controls will be applied in a manner that will minimise any potential water pollution due to maintenance practices (such as herbicide use, mowing, and road surface cleaning).	Roads and Maritime	Detailed design and operation
WQ-9	Accidental spill / contamination of the surrounding environment during construction	A site specific emergency spill plan will be developed, and include spill management measures in accordance with the *Roads and Maritime Code of Practice for Water Management and Bunding and Liquid Chemical Storage, Handling and Spill Management* (DEC 2005b). Should a spill occur during construction, the emergency spill plan will be implemented and the incident will be managed in accordance with the *Roads and Maritime "Environmental Incident and Classification and Reporting procedure"*. Emergency spill kits will be kept at areas identified as having the highest spill risk at all times during construction.	Construction contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
WQ-10	Pollution as a result of sediment runoff from stockpiles	The location of the stockpile and storage areas within the main construction compound area and construction footprint would be *subject to the site location criteria set out in the Stockpile* Site Management Procedure (RTA 2011) and QA specification *R44-Earthworks - IC-QA-R44* (Roads and Maritime, 2011a). They would ideally be located: • On relatively level ground • In a place accessible to construction traffic and deliveries • Away from areas of ecological and heritage conservation value • In areas previously disturbed within the proposal area that do not require the clearing of native vegetation • Away from residential buildings or heritage items • In plain view of the public to deter theft and illegal dumping • Close to key construction activities to minimise transport of materials and equipment • Within the area of potential impact on minimise impacts on private and public property • In areas not prone to flash flooding and more than 40 metres from a watercourse • Outside the drip line of trees.	Construction contractor	Construction
WQ-11	Pollution as a result of waste onsite	Liquid and solid waste would be removed by tanker or truck and disposed of off- site at a suitably licensed facility able to accept those wastes for storage, reuse or disposal. Fuel and chemical storage areas would be bunded and protected in accordance with the specifications set out by the Office of Environment and Heritage (OEH) and WorkCover. Each site would be securely fenced with temporary fencing. Signage would be erected advising the general public of access restrictions. Upon completion of construction, the temporary compound, work area and stockpile sites would be removed, cleared of all rubbish and materials, and rehabilitated.	Construction contractor	Construction
Non-Aboriginal heritage				
NA-1	Impacts to heritage items of local significance	Consultation will be undertaken with Central Coast Council about potential impacts to the Lisarow Cemetery which is listed under the Gosford LEP, refer further to Table 5-2 of the project REF.	Roads and Maritime	Detailed design

No.	Impact	Environmental safeguards	Responsibility	Timing
NA-2	Demolition of the Pryor Brothers Store	As required as part of DA for the demolition of Pryor Brothers Store, archival and photographic recording of the Pryor Brothers Store has been undertaken in order to document the character of the building prior to its demolition. Roads and Maritime will install a plaque to commemorate the history and heritage values of the former building during the construction phase of the proposal. The plaque will be installed in accordance with Roads and Maritime's draft *Heritage Interpretation Guidelines* or advice from Roads and Maritime's heritage specialists.	Roads and Maritime	Pre-construction and construction
NA-3	Impact on heritage items from construction activities	Construction site inductions will include a briefing of heritage items located close to the proposal area and construction areas. Heritage items will be fenced off and appropriate signage erected.	Roads and Maritime and construction contractor	Construction
NA-4	Removal and relocation of the cemetery gates	The Lisarow Cemetery gates will be removed and relocation as part of the proposal. To minimise impact on the heritage significance of the cemetery, the following must be undertaken: • Before the gates are removed, detailed photography of the gate will be completed and then each stone of the gate will be numbered with a non- permanent marking to ensure that they can be restored in the exact same order • Remove the stone and the gates from the construction site and store securely to prevent loss or theft of the original material • Remove and relocate the gates using an appropriately qualified stonemason • The existing cemetery gate will be relocated and incorporated into the stairs/ retaining wall structure that will be constructed along the cemetery boundary. The exact location of the new gate will be identified in detailed design but will be situated as close as possible to its existing location. The sandstone stones that form the existing gate will be re-used in the new gate and the retaining wall in this location will be finished such that it ties in with the heritage values of the cemetery.	Roads and Maritime and construction contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
NA-5	Removal of the vegetation along the cemetery boundary	Fast growing native tree species (such as *Acacias spp* identified within Coastal Narrabeen Moist Forest) will be planted along the new border of the cemetery. More permanent, slow growing species (such as Spotted Gum (*Corymbia maculate)* and Bottlebrush (*Callistemon sp*.) will also be planted that will become a replacement for the fast growing trees, refer to the landscape plan, Figure 12 in Appendix D of the project REF.	Roads and Maritime and construction contractor	Construction
NA-6	Potential physical damage to the headstones and the above ground components of the graves	Before the start of the construction work, barrier fencing must be installed between the graves and the proposal with a buffer of five metres where possible between the graves and the fencing. No machinery or vehicles are to be used or parked within the boundary of the cemetery. All mechanical work must be undertaken from the road and road reserve. When required, workers may work within the boundary of the cemetery only if they are on foot.	Roads and Maritime and construction contractor	Pre-construction and construction

No.	Impact	Environmental safeguards	Responsibility	Timing
NA-7	Potential physical damage to the headstones and the above ground components of the graves due to vibration.	Construction methods with reduced levels of vibration, and monitoring of vibration levels will be required in accordance with the Noise and Vibration Assessment for the proposal. A building condition inspection report including a photographic record of the graves will be undertaken before the start of work by a qualified contractor, and the condition reassessed following the completion of construction. Ongoing monitoring of the condition of headstones and other grave components must also take place throughout construction. If any damage occurs during construction, additional protection of the headstones and grave components will be required. Protective measures may include: • The erection of support structures; shoring up of the headstones and above ground components of the graves • Stabilisation, reconstruction or restoration of the susceptible headstones and grave components • Decisions about protective measures will be made with input from a suitably qualified heritage consultant and a qualified stonemason • Where damage to the above ground components of the graves has occurred, it will be repaired once construction is complete • Repairs will be undertaken by a suitably qualified stonemason with input from a qualified heritage consultant.	Roads and Maritime and construction contractor	Construction
NA-8	Unexpected heritage find	If unexpected heritage item/s, archaeological remains or potential relics are uncovered during construction, all work will near the material/find and the Roads and Maritime *Standard Management Procedure - Unexpected Archaeological Finds* (Roads and Maritime 2015) will be followed.	Roads and Maritime and construction contractor	Construction
Landscape character, visual amenity and urban design				
LA-1	Change of landscape character and visual impact	Detailed design will be undertaken according to the urban design vision, objectives and principles which underpin the concept design.	Roads and Maritime	Detailed design

No.	Impact	Environmental safeguards	Responsibility	Timing
LA-2	Visual impact of earthwork: retaining walls, embankments and cuttings	Retaining walls will be designed to complement the character of the precinct in which they occur with an emphasis on natural materials. Retaining wall finishes will be constructed of materials that will : • Minimise the opportunity for graffiti through selection of surface texture • Visually integrate with the surrounding geology, landscape and heritage of the cemetery • Retaining walls located below the road corridor should be dark in colour • The retaining wall along the edge of Lisarow Cemetery will consider using wall treatment such as a sandstone finish to integrate with the heritage values of this location. Roads and Maritime will consult with potentially impacted property owners/representatives in relation to the treatment of retaining wall (RW1) and the boundary fence in this location (refer to Figure 1-2 of the project REF).	Roads and Maritime	Detailed design
LA-3	Visual impact of the new railway overbridge	• Consideration will be given to the utilisation of surplus bridge deck to provide appropriate landscaping • Opportunities will be considered to developed the zones between the road and the bridge as markers of the changing alignment context with appropriate landscaping to integrate the bridge with the surroundings • Throw screens to protect the rail corridor will be integrated with the bridge barrier where possible.	Roads and Maritime	Detailed design
LA-4	Maintaining connectivity and movement	• Connection will be maintained between land uses and transport linkages • Shared paths will be provided which will tie-into the exiting pathways • Opportunities to separate the shared path form the road will be investigated around the wetlands and the cemetery to enhance the pathways functionality and experience.	Roads and Maritime and construction contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
LA-5	Visual impact of the construction crew, stockpiles, plant and equipment during construction	• Work sites will be tidied at the end of each working day. Rubbish and garbage will be appropriately disposed of at an appropriately licensed facility • Vegetation will be maintained as long as possible, and removed according to construction staging requirements • Cleared areas will be progressively rehabilitated as each construction stage is completed, in accordance with the *Landscape Management Plan* which includes a site specific rehabilitation plan and which will be included in the CEMP) • The *Landscape Management Plan* will incorporate and integrate all relevant biodiversity safeguards where the proposal is impacting on biodiversity values. The *Landscape Management Plan* will specifically consider and incorporate the requirements from the *Wetlands Management Plan* (B13).	Roads and Maritime and construction contractor	Construction
LA-6	Visual impact of 132 kV power line realignment	The new poles for the 132 kV realignment will be finished in a mid to dark green colour to reduce the contrast with the existing vegetation.	Roads and Maritime	Detailed design
LA-7		Landscape plans will include additional landscape treatment along the eastern side of Railway Crescent, where the existing 132 kV power line is removed including additional canopy trees in the south east corner of the intersection.	Roads and Maritime	Detailed design
LA-8		Landscape plans will include provision of additional landscape treatment along the western side of Railway Crescent, where existing buildings are to be demolished to assist with screening of utilities.	Roads and Maritime	Detailed design
LA-9		Vegetation removals for the 132 kV power line realignment will be minimised as far as practicable.	Construction contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
Topography, geology, soils and contamination				
TG-1	Impact on potentially contaminated sites	• An *Asbestos Management Plan* will be prepared as part of the CEMP prior to any excavation works within the fill area adjacent to The Ridgeway (asbestos impacted area). Suitably trained and equipped workers will be present to implement the plan and to ensure that all works are undertaken with appropriate control measures to reduce the potential for impacts to workers and the community. Controls will ensure that any surface water flows are controlled during ground disturbance works, to reduce the potential for offsite migration. In addition, the *Asbestos Management Plan* will also include but not be limited to: - Identification of areas with known and potential asbestos on site - Procedures to manage and handle asbestos both known and unknown sources - Procedures for disposal of asbestos in accordance with NSW EPA *Protection of the Environment (Waste) Regulation 2005 Roads and Maritime Waste Fact Sheet 5* and relevant Australian Standards - All asbestos material will be removed by a licensed contractor and be disposed of at a licensed waste facility. • A *Contaminated Land Management Plan* will be prepared as and implemented as part of the CEMP for any areas of existing contaminated land or to address land contamination likely to be caused by the activity. The plan will be prepared in accordance with relevant requirements of the Roads and Maritime Guideline for the Management of Contamination and, as a minimum address the following matters: - Identification of contaminated areas and sensitive surrounding environments - Control measures to divert surface runoff away from the contaminated land - Capture and manage any surface runoff contaminated by exposure to the contaminated land - Manage the remediation and subsequent validation of the contaminated land, including any certification required		

No.	Impact	Environmental safeguards	Responsibility	Timing
		- Measures to ensure the safety of site personnel (including hygiene practices) and local communities during construction - Procedures to deal with unexpected contamination (e.g. stained or odorous soil and/or waters encountered during construction). • Ground disturbance works within the rail corridor (adjacent to the rail overpass) and workshop area (identified benzo(a)pyrene impacted areas) will implement controls, such as, appropriate hygiene practices and standard construction controls (soil and water management) to minimise the potential for exposure to workers and the surrounding environmental receptors • Prior to construction, workers will be informed of the potential for contamination, based on historical practices and if any stained or odorous soil and/or waters are encountered, works will be ceased and advice regarding management will be sought. • Additional contamination investigations will be undertaken in the area identified as workshops to determine the extent of polycyclic aromatic hydrocarbons (PAH) contamination. Additional testing will inform the Contaminated Land Management Plan, specifically: - The interaction of the construction work with contaminated materials - Workplace, health and safety requirements to ensure the safety of site personnel (including hygiene practices) and local communities during construction - Waste classification for any material that is to be removed from site or managed on site - Provide details on the management of any residual contamination in relation to the final land use and whether a remediation action plan is required to validate the site - Procedures to deal with unexpected contamination (eg stained or odorous soil and/or waters encountered during construction).		
TG-2	***Waste removal***	***Removal of general building wastes and rubbish with detailed inspection for potential asbestos containing materials (PACM) at compound 5.***	***Construction contractor***	***Pre-construction***

No.	Impact	Environmental safeguards	Responsibility	Timing
~~***TG-2***~~ ***TG-3***	Land contamination during construction	To avoid or limit the impact of contamination during construction: • Standard contingency measures (including for unknown contaminants, asbestos-containing materials and site operations) in accordance with *QA G36 Environment protection* will be incorporated into the CEMP to allow for further investigation and treatment/ disposal as appropriate. • All potentially contaminated wastes generated during construction will be classified according to the *Waste Classification Guidelines: Parts 1 and 2* (DECC, 2008). Wastes will be disposed to a licensed disposal facility or re-used in construction, as appropriate. • All road base/bitumen excavated during roadwork will be re-used or disposed of in accordance with the *Waste Classification Guidelines: Parts 1 and 2* (DECC, 2008). • Further investigations would be carried out before construction, to determine the most appropriate disposal of excavated materials. These investigations would also consider the suitability of these contaminated areas for treatment and use for road infrastructure and in some portions of the workshop area, for residential purposes. To manage these areas of contamination during construction, an *Asbestos Management Plan* and a *Contaminated Land Management Plan* would be prepared and implemented to manage impacts and the contamination at the site is considered manageable.	Construction contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
~~***TG-3***~~ ***TG-4***	Erosion and sedimentation leading to impacts on water quality, air quality and downstream biodiversity	A SWMP incorporating an ESCP will be developed as part of the CEMP and implemented throughout the construction period. It will include the following safeguards: • Construction will be carried out in accordance with Roads and Maritime's Technical Guideline – *Temporary Stormwater Drainage for Road Construction* (Roads and Maritime, 2011d) • Designated exclusion zones will be identified for the storage and use of construction plant and equipment. These zones will delineate traffic areas and restrict entry and exit points to construction sites • Areas of risk near the proposal, such as steep areas or highly erodible soils, will be identified and appropriate management controls implemented • Temporary or permanent diversion drains will be used to divert off-site run- off around or through the construction site to minimise the volume of flow that mixes with on-site run-off • Physical controls will be developed in line with the ESCP, including sediment fences, sediment filters, rock check dams, level spreaders, and onsite diversion drains installed before construction and maintained during construction • Channels and other concentrated flow paths will be lined • Exposed batters will be lined, if required • Run-off will be captured from exposed areas within sediment basins and treated to reduce sediment to the required level before it is discharged into downstream waterways • A schedule for the ongoing maintenance and inspection of temporary erosion and sediment controls will be developed.	Construction contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
~~***TG-4***~~ ***TG-5***	Pollution as a result of sediment and other contaminants entering waterways during construction	Ancillary facility sites, plant and equipment will be managed within the ESCP. The following measures will be included to limit sediment and other contaminations entering receiving waterways: • Chemicals will be stored within a sealed or bunded area • Appropriate controls will be in place where plant is stored • Run-off from site compounds will be controlled and treated before discharging into downstream waterways • Vehicle movements will be restricted to designated pathways where feasible • Areas that will be exposed for extended periods, such as car parks and main access roads, will be stabilised where feasible.	Construction contractor	Construction
OEH-7	General	Prior to the commencement of the activity, the applicant and/or contractor must ensure that appropriate erosion and sediment control measures are identified in the CEMP. The measures must be consistent with the guidelines Managing Urban Stormwater: Soils and Construction (Landcom 2004) and relevant OEH guidelines.	Construction contractor	Pre-construction
OEH-12	Acid sulfate soils	If unexpected Acid Sulfate Soils are found, the applicant must comply with the Acid Sulfate Soil Management Plan prepared in accordance with the NSW Acid Sulfate Soils Manual (ASSMAC 1998). Identification, sampling and treatment of any Potential Acid Sulfate Soils either uncovered or removed is to be done in accordance with the Acid Sulfate Soil Management Plan as described above and consistent with the NSW Acid Sulfate Soils Manual (ASSMAC 1998).	Construction contractor	Construction
Climate change and air quality				
AQ-1	Excessive exhaust emissions arising from construction plant and equipment	Ensure that plant and equipment operates in a proper and efficient manner by: • Inspecting the plant/equipment before the start of construction on site • Conduct routine servicing and maintenance, and subsequent inspections to ensure that equipment continues to operate efficiently.	Construction contractor	Pre-construction and routinely during construction

No.	Impact	Environmental safeguards	Responsibility	Timing
AQ-2	Dust emissions arising from disturbed, exposed and/or non- vegetated surfaces and stockpiled materials	Stage work to minimise to the extent practical exposed areas and stockpiles. Wherever possible, avoid completing work with a high potential to result in dust during dry conditions when winds are blowing in the direction of nearby receivers. Regular watering of exposed and disturbed areas and stockpiles, especially during dry weather conditions.	Construction contractor	Pre-construction and during construction
AQ-3	Dust emissions arising during the haulage of materials and construction vehicle movements	During construction the following measures will be implemented to minimise dust emissions to nearby sensitive receivers: • Ensure that loads are covered • Regularly water unsealed traffic routes • Impose speed limits along unsealed routes • Where possible, restrict movements along unsealed routes.	Construction contractor	During construction
AQ-4	Dust emissions arising from non-vegetated surfaces	Staging of work to ensure that finished areas are revegetated as soon as possible. Regular maintenance and watering of revegetation areas to aid the establishment of adequate vegetation cover.	Construction contractor	During and post-construction
AQ-5	Dust emissions emanating beyond the proposal area	Install depositional dust gauges to monitor and measure depositional dust at one of the most potentially affected receivers along the northern and southern ends of the alignment to evaluate compliance with EPA criteria.	Construction contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
AQ-6	Dust emissions from compounds	The following controls will be implemented ***by the construction contractor as directed by Roads and Maritime*** at ***all compounds*** ~~***Compound Site 2***~~ and temporary construction area (site 3): • The site will be constructed and supplemented as required, to provide a stable base (eg coarse aggregate) beneath the entire site in order to minimise dust generation. • Dust screens will be placed on all external fences and open boundaries where dust generation is likely to blow over fences (eg high stockpiles) or fences are not likely to block dust plumes and where there are no fences • All stockpiles will be covered or watered as necessary to prevent excessive levels of wind blown material • All stockpiles will be limited in height so as to not exceed screening heights • Dust monitoring will be carried out during construction in accordance with a monitoring plan approved by Roads and Maritime. The plan will detail monitoring locations, methods and performance outcomes to be achieved.	Construction contractor	Construction
AQ-7	Dust emissions from crane pads	The following controls will be implemented at the crane pads (including access tracks): • The pads will be constructed and supplemented as required, to provide a stable base (eg coarse aggregate) beneath the entire site in order to minimise dust generation • The pads and access tracks will be rehabilitated as soon as practical following completion of relevant activities.	Construction contractor	Construction
Aboriginal heritage				
AH-1	Finding unexpected artefacts	In the event of an unexpected find of an Aboriginal heritage item***, object or human remains*** (or suspected item***, object or human remains***), work will cease in the affected area and the *Unexpected Archaeological Finds Procedure* (Roads and Maritime, 2015) will be followed. ***These requirements will be included in the induction for all workers.***	Construction contractor	Pre-construction, construction
Land use and property				
LU-1	Change in land use	Consultation will be undertaken with property owners partially or wholly impacted by the proposal.	Roads and Maritime	Detailed design

No.	Impact	Environmental safeguards	Responsibility	Timing
LU-2	Property acquisition	Roads and Maritime will consult with property owners and known legal interests impacted by the proposal. Property acquisition will be managed in accordance with the provisions of Roads and Maritime's Land Acquisition Policy (Roads and Maritime, 2012c) and the *Land Acquisition (Just Terms Compensation) Act 1991*.	Roads and Maritime	Detailed design
LU-3	Property access	Property access will be maintained wherever possible. Before any unavoidable disruption to access, consultation will be undertaken with the affected property owner. The treatment of new accesses will be made in consultation with the property owners and will be to a similar standard to that used for the existing driveways.	Construction contractor	Prior and during construction and operation
Socio-economic				
SE-1	Start of construction	Local residents will be notified before construction starts. They will also be regularly kept informed of construction activities during the construction process as part of the wider Pacific Highway upgrade program.	Roads and Maritime	Pre-construction and construction
SE-2	Community	The community will be kept informed about upcoming road construction activities, including through advertisements in the local media and by prominently placed advisory notices and/or variable message signs.	Roads and Maritime	Pre-construction and construction
SE-3	Complaints	A complaints-handling procedure and register will be included in the CEMP.	Roads and Maritime	Pre-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
SE-4	Access and connectivity	The following measures relating to maintaining access and connectivity: • Where necessary, construction work will occur outside of peak travel times to minimise traffic disruptions • Where possible, pedestrian and cyclist access will be maintained throughout construction • Provision of signage outlining the pedestrian and cyclist diversion routes will be displayed during construction • There will be advance notification of any construction work that affect pedestrians and cyclists • Local residents are to be notified about any new or changed construction activities which will affect access to their properties or otherwise disrupt the residents' use of their premises, at least five working days before commencing work affecting residents • The traffic management plan will include measures to minimise heavy vehicle usage and parking on local roads. Where practicable, deliveries of construction plant and materials will be undertaken outside of peak traffic periods • Access to appropriate bus stop locations will be maintained during construction in consultation with bus operators • Ongoing updates on locations and access to bus stops will be provided to the community during construction period to ensure that disruption is minimised • Access to Lisarow Station will be maintained at all times.	Roads and Maritime and construction contractor	Construction
SE-5	Emergency vehicle access	Access will be maintained for emergency vehicles in the vicinity of construction work. Roads and Maritime will consult with emergency services throughout construction to ensure that potential impacts are identified and appropriately managed.	Construction contractor	Construction
SE-6	Interruptions to utility services	Roads and Maritime will inform residents before any interruptions to utility services that may be experienced when utilities need to be relocated.	Roads and Maritime	Construction
Waste and resource management				
WR-1	Generation of construction waste	The construction contractor will prepare a waste management plan and a waste management register in accordance with the requirements of Roads and Maritime's *QA Specification G36 – Environmental Protection (Management System).* The plan will include the process for managing excess material.	Construction contractor	Pre-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
WR-2	Generation of construction waste	A pre and post construction land condition assessment for site facilities must be undertaken in accordance with *QA Specification G36 Environment Protection* to ensure no unauthorised wastes attributed to the activity are left behind.	Construction contractor	Pre and post construction
WR-3	Generation of construction waste	The generation of construction waste is to be managed under the principles of avoiding unnecessary resource consumption, resource recovery, and lastly disposal (in accordance with the *Waste Avoidance and Resource Recovery Act 2001*).	Construction contractor	Construction
WR-4	Generation of construction waste	The construction contractor will regularly address housekeeping at the construction site. This will include collection and sorting of recycling, general waste and green waste. Waste will be disposed regularly at a licensed waste facility.	Construction contractor	Construction
WR-5	Generation of construction waste	Minimise disturbance of asphalt containing coal tar during detailed design and construction. Any coal tar requiring removal will be handled following appropriate guidelines and disposed of offsite at an appropriate facility.	Construction contractor	Construction
WR-6	Generation of construction waste	All waste generated will be disposed of by an appropriately licensed waste disposal contractor at an approved facility. The nearest landfill facility is the Mangrove Mountain landfill Waste Management facility located about 22 kilometres north of Lisarow.	Construction contractor	Construction
WR-7	Construction waste from the demolition of existing structures	The demolition of any structure will be undertaken in accordance with Australian Standard AS2601: The demolition of structures. Before the demolition of any structures, an inspection will occur to assess the potential for the presence of asbestos or other hazardous materials. If hazardous materials are found on site, measures to protect the health of workers and the general community will be developed. In order to reduce potable water consumption, alternate sources of water will be investigated including using treated water collected in sediment basins.	Construction contractor	Construction
WR-8	Waste generation during operation	Green waste from maintenance activities will be disposed of appropriately or re- used where practicable. Wastes such as oils and greases will be disposed of to an appropriate licensed facility.	Roads and Maritime	Operation

No.	Impact	Environmental safeguards	Responsibility	Timing
Cumulative				
CE-1	Cumulative traffic, biodiversity, noise and air quality impacts due to construction of multiple projects	To minimise potential impacts during construction, the construction timetable for the upgrades will be co-ordinated to minimise disruption to motorists. This will allow construction to be carried out on a section-by-section basis. This approach will ensure that negative cumulative impacts on both the function of the Pacific Highway and the surrounding environment will be minimised where possible.	Roads and Maritime	Detailed design, pre-construction

7.3 Licensing and approvals

All relevant licences, permits, notifications and approvals needed for the Pacific Highway Upgrade project between Ourimbah Street and Parsons Road, Lisarow and when they need to be obtained are listed in Table 7-2. Additional or changed licenses and approval requirements identified in this addendum REF are indicated by bold/ italicised and struck out font.

Table 7-2 Summary of licensing and approval required

Instrument	Requirement	Timing
Water Management Act 2000	Should the construction contractor have the need to establish bores for the purpose of taking or using of water from the aquifer including for dewatering purposes, a licence will be required under Section 112 of the *Water Act 1912* from the NSW Department of Primary Industries – Water. In the event that construction activities intersect with groundwater and/or require the establishment of bores for the extraction of groundwater, the construction contractor will require an aquifer interference approval under section 91 of the *Water Management Act 2000*. The approval would be subject to an allocation of water issued under the Water Sharing Plan for the *North Coast Fractured and Porous Rock Groundwater Sources 2016*.	Before taking or using any water from the bore Before taking or using any groundwater from a bore or intersecting with groundwater
Roads Act 1993	In accordance with Section 138 of the *Roads Act 1993*, a road occupancy licence will need to be obtained from Roads and Maritime for construction work within the road corridor.	Before construction within the road reserve
Threatened Species Conservation Act 1995	~~***Roads and Maritime will be submitting the Review of Environmental Factors, Submissions Report and Species Impact Statement to the Office of Environment and Heritage for approval under the TSC Act. Although not anticipated by Roads and Maritime, conditions imposed by OEH during this process may trigger some further design and construction phase actions and/or investigations. These will be published with project information on the website and outlined in future community updates.***~~ ***Roads and Maritime submitted the project REF, Submissions Report and Species Impact Statement to OEH. OEH issued conditions of concurrence on 31 January 2017 and the project will be carried out in accordance with these.***	~~***Prior to start of the activity***~~ ***During detailed design, construction and post-construction***

Instrument	Requirement	Timing
Fisheries Management Act 1994	Roads and Maritime will consult with Department of Primary Industries (Fisheries) to determine the need for a permit under section 219 of the *Fisheries Management Act 1994* for the blocking of fish passage during construction.	Prior to construction
	If required, the construction contractor will obtain a permit under section 219 of the *Fisheries Management Act 1994* for the blocking of fish passage.	Prior to commencement of activities that would block fish passage
	In accordance with section 199 of the *Fisheries Management Act 1994*, Roads and Maritime will provide written notice to the Minister of the intent to carry out dredging and reclamation activities. Roads and Maritime must consider any issues raised by the Minister prior to carrying out the activity.	More than 21 days prior to the commencement of dredging and reclamation activities
	In accordance with section 199 of the *Fisheries Management Act 1994*, Roads and Maritime will provide written notice to the Minister that it intends to carry out dredging and reclamation activities.	More than 14 days prior to the commencement of dredging and reclamation activities
Protection of the Environment Operations Act 1997	***Roads and Maritime holds an environment protection licence for the project for extractive activities (EPL 21076) for the extraction, processing or storage of more than 30,000 tonnes per year of extractive materials. Following approval of this addendum REF, an application to vary the EPL scheduled premises boundary to include the proposed compound will be sought. Activities within the proposed modification would not trigger any additional scheduled activities under the Protection of the Environment Operations Act 1997.*** ***In the event the volume of waste (including spoil) exceeds 1000 tonnes at any one time at the compounds then the EPL will need to be amended.***	***Prior to construction***

8 Conclusion

This section provides a justification for the proposed modification, taking into account its environmental and social impacts, the suitability of the site, and whether or not the proposed modification is in the public interest. The proposed modification is also considered in the context of the objectives of the EP&A Act, including the principles of ecologically sustainable development, as defined in Schedule 2 of the Environmental Planning and Assessment Regulation 2000.

8.1 Justification

The Pacific Highway provides the main north-south link between Gosford and the M1 Pacific Motorway on the Central Coast, NSW. The Pacific Highway connects the growing urban, commercial and industrial precincts in the Central Coast local government area. Roads and Maritime is upgrading the Pacific Highway between West Gosford and the M1 Pacific Motorway in a number of stages, with the project representing Stage 3B of the upgrade.

As stated in Section 8.1 of the project REF, the section of the Pacific Highway between Parsons Road and Ourimbah Street is currently operating near capacity for through traffic and key intersections are experiencing queuing and delays during peak periods. Further, the existing road geometry, sight distance and lane widths are less than current standards and there are a number of hazards, particularly trees, within the clear zone.

The project, including the proposed modification, would address these traffic and safety issues and will achieve the objectives of:

- Improving safety for motorists, cyclists and pedestrians by reducing the number of crashes
- Increasing traffic capacity and improving performance by reducing congestion
- Improving accessibility for all road user by providing reasonable efficiency and acceptable levels of service. including:
    - Minimising the impact on the natural environment
    - Maintaining sensitivity to the surrounding land uses and the community
    - Capitalising on opportunities in urban design
- Providing the best value for money solution
- Minimising the impact on the environment along the route.

The project, including the proposed modification, is consistent with a number of national, State and local strategies and plans, as detailed in Section 2 of the project REF, including:

- *NSW State Plan 2021: A Plan to Make NSW Number One* (Department of Premier and Cabinet 2011)
- *NSW Government State Infrastructure Strategy 2012 – 2032: First Things First* (Department of Premier and Cabinet 2012)
- *NSW Long Term Transport Master Plan* (Transport for NSW 2012)
- *Central Coast Regional Transport Plan* (Transport for NSW 2013)
- *Central Coast Regional Strategy* (Department of Planning 2008).

The proposed modification is needed to ensure the project can be safely constructed and the project objectives can be achieved.

8.2 Objects of the EP&A Act

Table 8-1 identifies the objects of the EP&A Act and their relevance to the project, including the proposed modification.

Table 8-1 Summary of objects 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 design for the project, including the proposed modification, impact safeguards and management measures detailed in this addendum REF allow for the proper management, development and conservation of natural and artificial resources. The proposed modification (ancillary facility sites) have been selected to use disturbed areas and therefore minimise environmental and community impacts.
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 to 8.2.4 of this addendum REF.
1.3(c) To promote the orderly and economic use and development of land.	The project, including the proposed modification, has considered anticipated growth within the area and where appropriate included consideration of it in the design.
1.3(d) To promote the delivery and maintenance of affordable housing.	This clause is not relevant to the project, including the proposed modification.

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 project, including the proposed modification, has been subject to biodiversity assessment as described in Section 6.1. Design of the project, including the proposed modification, has minimised potential direct and indirect impacts to biodiversity matters as far as practicable. A range of safeguards have been proposed (Section 7) to manage potential biodiversity impacts. With the proposed modification, only a small amount of exotic grassland would be cleared for compound 5. Compound 4 is an existing hardstand area and would not result in the clearing of any additional vegetation. The four additional threatened flora species which have been identified by database searches as having potentially to occur within the locality are not likely to occur within the area proposed to be disturbed by the project. As such, there are no expected additional impacts to biodiversity associated with the proposed modification. The proposed modification is not likely to significantly impact threatened species, populations or ecological communities or their habitats, within the meaning of the TSC Act, EPBC Act or *Fisheries Management Act 1994*.
1.3(f) To promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage).	A Stage 1 Archaeological Baseline Assessment and Roads and Maritime PACHCI stage 1 assessment and inspection confirmed no Aboriginal archaeological sites or areas of cultural significance are located within the proposed modification area and therefore no further assessment is required.
1.3(g) To promote good design and amenity of the built environment.	The project, including the proposed modification, has considered community amenity and urban design principles and where appropriate included it in the design.
1.3(h) To promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants.	This clause is not relevant to the project, including the proposed modification.
1.3(i) To promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State.	This clause is not relevant to the project, including the proposed modification.

Object	Comment
1.3(j) To provide increased opportunity for community participation in environmental planning and assessment.	The project, including the proposed modification, has involved extensive consultation with relevant stakeholders during the preparation of the project REF, Addendum REF 1 and this addendum REF. Consultation carried out is discussed in Section 5 of this addendum REF. Consultation would be ongoing during construction.

8.2.1 The precautionary principle

This principle states '*if there are threats of serious or irreversible damage, lack of scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation*'.

Evaluation and assessment of alternative options for the project, including the proposed modification, has aimed to reduce the risk of serious and irreversible impacts on the environment. Stakeholder consultation considered issues raised by stakeholders and a range of specialist studies were carried out for key issues to provide accurate and impartial information to assist in the development process. The assessment of the potential impacts of the project, including the proposed modification, is considered to be consistent with the precautionary principle.

The detailed design has sought to minimise impacts on the amenity of the study area while maintaining engineering feasibility and safety for all road users. A number of safeguards have been proposed to minimise potential impacts. These safeguards would be implemented during construction and operation of the project, including the proposed modification, to provide a high degree of scientific certainty that no unexpected significant environmental impacts would occur. No safeguards have been postponed as a result of lack of scientific certainty.

A Construction Environmental Management Plan would be prepared before construction starts so the project, including the proposed modification, achieves a high-level of environmental performance. No management measures or mechanisms would be postponed as a result of a lack of information.

8.2.2 Intergenerational equity

This principle states, '*the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations*'.

The proposed modification would not result in any impacts which are likely to adversely impact on the health, diversity or productivity of the environment for future generations. The project, including the proposed modification, would benefit future generations by enhancing road safety and travel times which would be expected to increase along this section of the Pacific Highway as the volume of traffic increases over time.

8.2.3 Conservation of biological diversity and ecological integrity

This principle states the '*diversity of genes, species, populations and communities, as well as the ecosystems and habitats to which they belong, must be maintained and improved to ensure their survival*'.

As discussed in Section 6.1, the project REF included a biodiversity assessment (Jacobs 2015b) and species impact statement (Jacobs 2016c) to assess the potential impacts of the project on biodiversity, including threatened species and endangered ecological communities. The assessments identified the project would impact on biodiversity, including threatened species and endangered ecological communities, and there would be a significant impact on the population of *Melaleuca biconvexa*. A biodiversity offset strategy was prepared for the project to offset the identified impacts.

The species impact statement was prepared in accordance with Director General Requirements issued by the NSW Office of Environment and Heritage (OEH) on 26 March 2015. OEH issued conditions of concurrence on 31 January 2017.

The proposed modification would clear a small amount of exotic grassland for compound 5. Compound 4 is an existing hardstand area and would not result in the clearing of any additional vegetation. The proposed modification is not likely to significantly impact threatened species, populations or ecological communities or their habitats, within the meaning of the TSC Act, EPBC Act or *Fisheries Management Act 1994* and therefore a species impact statement is not required.

No additional biodiversity offsets beyond those identified in the project REF are required for the proposed modification.

The biodiversity assessment (Jacobs 2015b) includes a biodiversity offset strategy and this will be further developed by Roads and Maritime to ensure it still meets the offset requirements of the project.

8.2.4 Improved valuation, pricing and incentive mechanisms

This principle requires '*costs to the environment should be factored into the economic costs of a proposal*'.

The project REF, Addendum REF 1 and this addendum REF have examined the environmental consequences of the project, including the proposed modification, and identified management measures to manage the potential for adverse impacts. The requirement to implement these management measures would result in an economic cost to Roads and Maritime. The implementation of management measures would increase both the capital and operating costs of the project, including the proposed modification. This signifies environmental resources have been given appropriate valuation.

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 modification.

This has included consideration where relevant, of conservation agreements and plans of management under the NPW Act, joint management and biobanking agreements under the TSC Act, wilderness areas, critical habitat, 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.

The proposed modification as described in this addendum REF best meets the project objectives, but would still result in some impacts related to construction noise and traffic. Safeguards and management measures as detailed in this addendum REF would ameliorate or minimise these expected impacts. The project would also enhance road safety and travel times which would not be realised if the project is not constructed. The proposed modification is needed to ensure the project can be safely constructed and the project objectives can be achieved. 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 significant change to the findings of the project REF or Addendum REF 1 and would not 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 species impact statement for the proposed modification is not required. The proposed modification is subject to assessment under Division 5.1 of the EP&A Act. Consent from Central Coast 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 E*nvironment Protection and Biodiversity Conservation Act 1999.* A referral to the Australian 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.

Simon Pearce
Technical Director – Environment
GHD Pty Ltd
Date: 24/08/18

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

Daryl Fidge
Project Manager
Roads and Maritime Greater Sydney Project Office
Date:

10 References

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11 Terms and acronyms used in this addendum REF

Term / Acronym	Description
AHIMS	Aboriginal Heritage Information Management System
CEMP	Construction / Contractor's environmental management plan
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.
FM Act	*Fisheries Management Act 1994* (NSW)
ISEPP	State Environmental Planning Policy (Infrastructure) 2007
kV	Kilovolt
LEP	Local Environmental Plan. A type of planning instrument made under Part 3 of the EP&A Act.
NPW Act	*National Parks and Wildlife Act 1974* (NSW)
OEH	NSW Office of Environment and Heritage
PEMP	Project environmental management plan
Roads and Maritime	NSW Roads and Maritime Services
REF	Review of environmental factors
SEPP	State Environmental Planning Policy. A type of planning instrument made under Part 3 of the EP&A Act.
SEPP 19	*State Environmental Planning Policy No 19 — Bushland in Urban Areas*
SEPP 55	*State Environmental Planning Policy No. 55 – Remediation of Land*
TSC Act	*Threatened Species Conservation Act 1995* (NSW)

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?* (Department of Urban Affairs and Planning 1999) guideline and the *Roads and Related Facilities EIS Guideline* (Department of Urban Affairs and Planning 1996) as detailed in the addendum 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 proposed modification on the natural and built environment.

Factor	Impact
a. Any environmental impact on a community? During construction of the proposed modification there would be adverse impacts to the community associated with noise, air quality, traffic and visual amenity. These impacts are likely to occur throughout the construction period (about 30 months) and would be managed by implementation of the safeguards listed in Section 7. However there would be a benefit to nearby residents with the restricted use of compound 2.	Short term – minor negative and minor positive
The proposed modification requires property lease arrangements at the ancillary facility. Roads and Maritime has commenced consultation with the property owners and would enter into a lease agreement when the ancillary facility sites are confirmed.	Short term – neutral
The long term benefits of the project, including the proposed modification, would include improved road safety, improved travel times, reduced congestion and improved safety for pedestrians and cyclists.	Long term – moderate positive
b. Any transformation of a locality? The proposed modification, would result in temporary changes to the locality associated with compound activities. These impacts would be managed by implementation of the safeguards listed in Section 7 including rehabilitation and landscaping of disturbed areas.	Short term – minor negative
c. Any environmental impact on the ecosystems of the locality? The proposed modification would clear a small amount of exotic grassland for compound 5. Compound 4 is an existing hardstand area and would not result in the clearing of any additional vegetation. Compound 2 is an existing compound being used for the Stage 3A project and is currently cleared of vegetation. The proposed modification is not likely to significantly impact threatened species, populations or ecological communities or their habitats, within the meaning of the TSC Act, EPBC Act or *Fisheries Management Act 1994* and therefore a species impact statement is not required. No additional biodiversity offsets beyond those identified in the project REF are required for the proposed modification. Impacts would be managed by implementation of the safeguards listed in Section 7 including biodiversity offsets.	Short term – minor negative

Factor	Impact
d. Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality? The proposed modification, in conjunction with the project, would result in a minor reduction in the aesthetic quality of the locality; however, these changes would be consistent with the regional context which is industrial, commercial and urban in character. These impacts would be managed by implementation of the safeguards listed in Section 7 including rehabilitation and landscaping of disturbed areas. The project, including the proposed modification, has considered the values of the locality (aesthetic, recreational and environmental) and incorporated these into the urban and landscape design. As such, it would result in improved amenity.	Short term – minor negative Long term – minor positive
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? The proposed modification would not result in any impacts to known heritage items or places.	Nil
f. Any impact on the habitat of protected fauna (within the meaning of the *National Parks and Wildlife Act 1974*)? The proposed modification, is located within a mostly disturbed environment. Compound 2 is an existing compound being used for the Stage 3A project and is currently cleared of vegetation. Compound 4 consists mainly of existing hardstand areas. The site also contains a small area of remnant trees mapped as Coastal Narrabeen Moist Forest, located to the north and south of the hardstand area. This vegetation would be fenced off and would not be impacted by the proposed modification. This vegetation community is present in surrounding areas and is not listed as threatened under the TSC Act or EPBC Act. No threatened flora species were recorded or are likely to occur within this vegetation community. There is potential for threatened fauna species to occur within this vegetation community however, as mentioned above this vegetation would be fenced off and would not be impacted by the proposed modification. The proposed compound 5 site consists predominantly of exotic grassland with planted *Cinnamomum camphora* (Camphor Laurel) and exotic shrubs located on the eastern site boundary. Impacts would be managed by implementation of the safeguards listed in Section 7 including biodiversity offsets.	Short term – minor negative

Factor	Impact
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 modification would clear a small amount of exotic grassland for compound 5. Compound 4 is an existing hardstand area and would not result in the clearing of any additional vegetation. Compound 2 is an existing compound being used for the Stage 3A project and is currently cleared of vegetation. The proposed modification is not likely to significantly impact threatened species, populations or ecological communities or their habitats, within the meaning of the TSC Act, EPBC Act or *Fisheries Management Act 1994* and therefore a species impact statement is not required. No additional biodiversity offsets beyond those identified in the project REF are required for the proposed modification. Impacts would be managed by implementation of the safeguards listed in Section 7 including biodiversity offsets.	Short term – minor negative
h. Any long-term effects on the environment? The proposed modification is unlikely to cause any long-term effects on the environment.	Nil
i. Any degradation of the quality of the environment? During construction of the proposed modification there is potential for temporary degradation of the quality of the environment through soil and water, biodiversity, air quality and accidental spills of fuels and chemicals. These impacts are likely to occur throughout the construction period and would be managed by implementation of the safeguards listed in Section 7.	Short term – minor negative
j. Any risk to the safety of the environment? During construction of the proposed modification there is potential to temporarily decrease safety along the Pacific Highway and Railway Crescent. These impacts are likely to occur throughout the construction period and would be managed by implementation of the safeguards listed in Section 7. The project, including the proposed modification, would result in an improvement in safety for road users, pedestrians and cyclists.	Short term – minor negative Long term – moderate positive
k. Any reduction in the range of beneficial uses of the environment? The proposed modification would not result in any reduction in beneficial uses of the environment. The long term benefits of the project, including the proposed modification, would include improved road safety, improved travel times, reduced congestion and improved safety for pedestrians and cyclists.	Nil Long term – moderate positive
l. Any pollution of the environment? During construction of the proposed modification there is potential for pollution of the environment from sediments, soil nutrients, waste, and spilt fuels and chemicals. These impacts would be managed by implementation of the safeguards listed in Section 7.	Short term – minor negative

Factor	Impact
m. Any environmental problems associated with the disposal of waste? The proposed modification would not involve the generation of any waste streams which would be problematic for disposal.	Minor negative
n. Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply? All resources required for the proposed modification are readily available and are not in short supply.	Nil
o. Any cumulative environmental effect with other existing or likely future activities? The proposed modification would not result in any additional adverse impacts beyond those assessed in the project REF.	Nil
p. Any impact on coastal processes and coastal hazards, including those under projected climate change conditions? The proposed modification is not located within a coastal area and would not result in any impact on coastal processes and coastal 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 proposed modification should be referred to the Australian Government Department of the Environment and Energy.

A referral is not required for proposed actions which may affect nationally listed threatened species, endangered ecological communities and migratory species. Impacts on these matters are still assessed as part of the REF in accordance with Australian Government significant impact criteria and taking into account relevant guidelines and policies.

Factor	Impact
a. Any impact on a World Heritage property? There would be no impact to World Heritage properties by the project, including the proposed modification.	Nil
b. Any impact on a National Heritage place? There would be no impact to National Heritage places by the project, including the proposed modification.	Nil
c. Any impact on a wetland of international importance? There would be no impact to wetlands of international importance by the project, including the proposed modification.	Nil
d. Any impact on a listed threatened species or communities? There are no EPBC listed threatened ecological communities which would be impacted by the proposed modification. Safeguards to mitigate and manage any potential indirect impacts are listed in Section 7.	Nil
e. Any impacts on listed migratory species? There would be no significant impact to migratory species or important habitat by the project, including the proposed modification.	Nil
f. Any impact on a Commonwealth marine area? There would be no impact to Commonwealth marine areas by the project, including the proposed modification.	Nil
g. Any impact on the Great Barrier Reef Marine Park? The Great Barrier Reef Marine Park would not be impacted by the project, including the proposed modification.	Nil
h. Does the proposed modification involve a nuclear action (including uranium mining)? The project, including the proposed modification, does not involve a nuclear action (including uranium mining).	Not applicable
i. Is the proposed modification a coal seam gas development of large coal mining development? The project, including the proposed modification, is not a coal seam gas development of large coal mining development.	Not applicable

Factor	Impact
Additionally, any impact (direct or indirect) on Commonwealth land? There would be no direct or indirect impact to Commonwealth land by the project, including the proposed modification.	Nil

Appendix B

Statutory consultation checklists

Infrastructure SEPP

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	The proposed modification would not result in a substantial change to impacts from those documented in the project REF. Roads and Maritime is carrying out ongoing consultation with Central Coast Council regarding the project, including the proposed modification. A letter was sent to Central Coast Council on the 5 April 2018 to request feedback regarding council infrastructure, including council roads (connection to Railway Crescent) and potential connection to stormwater, sewer and water supply. Refer to Section 5 for a summary of consultation.	ISEPP cl.13(1)(a)
Traffic	Are the works likely to generate traffic to an extent which will *strain* 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?	No		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?	No		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?	No		ISEPP cl.13(1)(f)

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 (which 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 the potential impacts to the item/area are more than *minor* or *inconsequential*?	No	The proposed modification would not result in a substantial change to impacts from those documented in the project REF. Roads and Maritime is carrying out ongoing consultation with Central Coast Council regarding the project, including the proposed modification.	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	The proposed modification would not result in a substantial change to impacts from those documented in the project REF. Roads and Maritime is carrying out ongoing consultation with Central Coast Council regarding the project, including the proposed modification.	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	Office of Environment and Heritage	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?		Office of Environment and Heritage	ISEPP cl. 16(2)(b)
Aquatic reserves	Are the works adjacent to an aquatic reserve or a marine park declared under the *Marine Estate Management Act 2014*?	No	Department of Primary Industries	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	Sydney Harbour Foreshore Authority	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	Rural Fire Service	ISEPP cl.16(2)(f)
Artificial light	Would the works increase the amount of artificial light in the night sky and 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	Director of the Siding Spring Observatory	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	Secretary of the Commonwealth Department of Defence	ISEPP cl. 16(2)(h)
Mine subsidence land	Are the works on land in a mine subsidence district within the meaning of the *Coal Mine Subsidence Compensation Act 2017*? (previously the *Mine Subsidence Compensation Act 1961*)	No	Subsidence Advisory NSW (previously the *Mine Subsidence Board*)	ISEPP cl. 16(2)(i)

Appendix C

Contamination – Preliminary Site Investigation

Roads and Maritime Services

Preliminary Site Investigation - Railway Crescent, Lisarow

June 2018

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Appendices

1. Introduction

GHD Pty Ltd (GHD) was commissioned by Roads and Maritime Services (Roads and Maritime) to undertake a Preliminary Site Investigation (PSI) for a proposed construction compound required as part of the upgrade of the Pacific Highway between Ourimbah Street and Parsons Road, Lisarow.

The proposed compound (here in referred to as the Site) is to be located within the south-western portion of Lot 101 DP1225026, located on Railway Crescent, Lisarow. This Site would facilitate construction of the Lisarow project. Construction activities at this compound would include light vehicle car parking, site offices, main amenities, minor chemical storage and the main material stockpile area. A site location plan is provided in Figure 1, Appendix A.

1.1 Objectives

The objectives of the PSI were to identify potential contamination issues within the Site and provide recommendations as to the requirement for further investigations, remediation or management of any contamination issues identified. :

1.2 Scope of work

The scope of works for the PSI included.

- A review of current and historical aerial photographs.
- A review of any previous contamination investigations pertaining to the Site.
- Review of Council records for the Site.
- Review of geology, hydrology and topography information for the Site.
- A review of NSW Environment Protection Authority (EPA) notices under the *Contaminated Land Management Act 1997* and a search of the *Protection of the Environment and Operations Act* (POEO) Environment Protection License Register.
- Review of groundwater information for the area.
- A site inspection to assess the current site conditions and potential contamination issues. The site inspection was completed from the property boundary due to site access restrictions.
- Preparation of this report with reference to the *Guidelines for Consultants Reporting on Contaminated Sites* (OEH 2011) summarising the works undertaken, results of the desktop review and site inspection and provision of recommendations for further investigations, remediation or management of any contamination issues.

2. Site information

2.1 Site identification

The Site is located within the south western quadrant of the Lot 101 DP 1225026 (referred to as the Lot) as shown on Figure 2, Appendix A. A summary of the Site identification details are provided in Table 2-1.

Table 2-1 Site identification summary

Information	Site Details
Street Address	Railway Crescent, Lisarow NSW, 2250
Lot and DP number	Lot 101 DP 1225026
Approximate Site Area	Approximately 0.71 hectares
Local Government Area (LGA)	Central Coast Council
Land Use Zoning	IN1 General Industrial (Gosford LEP 2014)
Current Land Use	Cleared, undeveloped land
Proposed Land Use	Roads and Maritime construction compound

2.2 Surrounding land uses

The land uses surrounding the Site consisted of:

- North: The northern part of Lot 101 DP 1225026, followed by a bathroom warehouse and showroom bordered by uncleared vegetated land.
- East: The eastern part of Lot 101 DP 1225026, followed by Excelsior Street, and then a book warehouse and carpark.
- South: Railway Crescent, followed by a railway corridor and then a storage warehouse.
- West: Commercial bakery.

2.3 Site inspection

GHD completed a site inspection of Lot 101 DP 1225026 (Lot) on 11 April 2018. The site inspection was completed from the property boundary due to site access restrictions. Site photographs are presented below. The main site features observed are summarised below and shown on Figure 2, Appendix A.

- The Lot was fenced with a chain wire fence on the western side and a star picket wire fence on the southern and eastern sides.
- The Lot was vegetated with long grass with trees located along the eastern and central portions of the Lot. Vegetation appeared to be healthy, with a small portion of grass showing a yellow tinge on the eastern side of the Lot.
- The Lot generally sloped to the south/south west towards Railway Crescent. A drainage swale crossed the south western portion of the Lot (northern portion of the Site) diverting water to a culvert that runs under Railway Crescent.
- A former house was located within the north eastern corner of the Lot. Remnants (mostly timber and metal) of a building/shed was located within the north eastern corner of the Site.

- Due to the height of the grass it was difficult to identify any filling across the Lot. Potential filling was noted up to 0.5 metres deep near the southern boundary, between the western boundary and the drainage swale outlet. Other localised filling was potentially identified on the downslope side of the swale and at the former house and structures.
- A small amount of rubbish was noted near the southern boundary of the Site.
- Sara Lee factory was located to the west of the Lot. Storage tanks and a small area used for storage of materials was located near the western boundary of the Lot. The area to the north was vegetated with trees and had a commercial/industrial building with two drainage ponds. Scholastics was located to the east of Excelsior Street.

Photograph 1. Lot looking North towards the house in the north east corner

Photograph 2 – Former house located within the north east corner of the Lot

Photograph 3 - Row of trees located to the east of the Site (looking north)

Photograph 4 – Site looking north east

Photograph 5 - Looking at the Site from the south west corner

Photograph 6 - Southern boundary of the Site looking from the south west corner

3. Environmental setting

The following section provides an overview of the environmental setting of the Site obtained from publically available information. Much of the information in Sections 3 and 4 was obtained from a Lotsearch report (2018) for the Site, which is presented in Appendix B. GHD notes that the boundary shown in the Lotsearch report (Appendix B) is the boundary of the entire Lot. The actual site boundary for the investigation is shown in Figure 1 and 2, Appendix A.

3.1 Soils and geology

The 1:100,000 Geology Sheet for the Gosford-Lake Macquarie area shows the Site is underlain by the Middle Triassic age Terrigal Formation, which forms part of the Narrabeen Group (Clifton Subgroup). It comprises sandstone, interbedded sandstone and siltstone, claystone and Widden Brook conglomerate.

The 1:100,000 Gosford-Lake Macquarie Soil Landscape Sheet shows the Site is classified as Erina (er) soil landscape. This landscape is characterised by moderately deep yellow podzolic soils. Local relief is <60 m and slope gradients are <25%. The Site is not affected by Dryland Salinity.

3.2 Acid Sulfate Soils

The Site located within an area that has an extremely low likelihood of containing acid sulfate soils (class 5), according to NSW Planning and Environment (search undertaken by Lotsearch).

3.3 Topography

The Site is located 25 m Australian Height Datum. A review of the topographic map for the Site (as shown by Lotsearch) showed that the Site is within 20 – 30 m Australian Height Datum (AHD). The site slopes generally to the south/south west.

3.4 Hydrology

An unnamed tributary of Narara Creek is located approximately 500 m west and south and 550 m north of the Site. A smaller creek is noted to the approximately 100 m north of the Site draining to two surface water ponds. Narara Creek is located approximately 2.5 km to the southwest of the Site.

Surface water runoff within the Lot is expected to flow towards the south towards Railway Crescent. The drainage swale within the south western portion of the Site would direct some surface water flow from the Site towards the drainage culvert which runs under Railway Crescent towards the Great Northern Railway.

3.5 Hydrogeology

A review of existing groundwater borehole records using the DPI Office of Water database (as conducted by Lotsearch) was carried out on 3 April 2018. The search was conducted to identify registered groundwater boreholes within 500 m of the Site and to record information such as groundwater use and standing water level. There were three groundwater bores recorded within 500 m of the Site. Details on these groundwater bores is presented in Table 3-1.

Table 3-1 Groundwater bores within 500 m of the site

ID	Purpose	Standing water level (m below ground level) (bgl)	Water bearing zone depth (m bgl)	Well Depth (m bgl)	Approximate distance from Site Boundary (m)	Direction
GW051716	General Use	7.0	18 - 19 and 39 - 40	45.0	131	Northwest
GW201407	Monitoring	2.0	1 – 4	4.5	169	South
GW023748	Irrigation	-	-	21.3	394	East

Based on the topography of the Site, groundwater is expected to be at depths greater than 10 meters bgl. Groundwater is expected to flow to the south. Given the area is located in an area which is supplied by potable water, it is unlikely groundwater is used for drinking water. However, it is possible that groundwater is used for irrigation purposes.

3.6 Sensitive receptors

Based on the desktop review and site inspection, the following potential sensitive human and environmental receptors for contamination during the use of the site as a Roads and Maritime construction compound were identified for the Site and surrounding areas.

Human health receptors

- Current and future workers, subcontractors and visitors to the Site.
- Current and future occupants of surrounding properties (e.g. workers, subcontractors, members of the public).

Environmental receptors

- Flora and fauna within the Site and surrounding land.
- Narara Creek and its tributaries.
- Local drainage channels and surface water.
- Groundwater beneath the Site.

4. Desktop information

4.1 Previous reports

No previous reports relating to the site were identified as part of this PSI.

4.2 Site history

4.2.1 Historical aerial photographs

A selection of historical aerial photographs (at least one per decade) were examined to assess past activities and land uses at the Site. Photographs were examined from the years 1954, 1965, 1976, 1984, 1991, 1998, 2007, 2010 and 2016. Copies of the photographs are provided in Appendix B.

A summary of the information gained from the review of historical aerial photographs for the Site and the surrounding area are provided in Table 4-1.

In summary, the lot on which the Site is located consisted of orchards and several farm buildings until sometime around 1984.

Table 4-1 Review of historical aerial photographs

Photograph Information	Surrounds
1954 Black and White	The Lot appears to be an orchard made up of four distinct vegetated segments, divided in the centre by a road with an east-west orientation. There are three small sheds visible along the roadside, and one larger building in the north-eastern corner of the Lot. The Site comprises the south-western orchard on the Lot which appears to have been more recently planted when compared to the other three sections. The surrounding land is also made up of orchards to the north, east and west. There is a portion of cleared agricultural land to the north-west, and undisturbed bushland to the north-east. To the south there is an unsealed road, followed by a small section of vegetated land and then the Great Northern Railway.
1965 Black and White	The orchards are still present across the Lot, and the three buildings located along the central access road have been developed into larger, elongated farm sheds. The building in the north-eastern corner appears to have been re-built and is slightly larger than its former footprint. The Site itself now has an access road down the middle, with a north-south orientation and connects to the main access road within the Lot. The trees in the vegetation buffer on the eastern boundary of the Site are still present. Orchards remain in the northern, eastern and western portions of site, and have extended to the north-west to fill the previously cleared agricultural land. One orchard to the west has been cleared.
1976 Colour	Two buildings within the Lot have been demolished, the rest of the Lot appears mostly unchanged. Orchards are still present in the surrounding area to the north and west. The eastern orchards are no longer visible, and have been replaced by a building. A large portion of orchards have been removed in the north-west and a large building and small sealed car-park is now visible. The road immediately east of the Lot (Excelsior Street) has been sealed and straightened.
1984 Black and White	The northern half of the Lot has been cleared, the north-western portion has remnants of orchard plants. The remainder of the Lot appears mostly unchanged. Additional clearing has occurred to the north and no orchards remain in this area. There are still sections of orchards remaining on the western boundary, however the land has been cleared beyond that and a carpark is visible, followed by another building. The existing buildings north-west and east of the Lot have doubled in size.
1991 Colour	The Lot has been cleared of orchards. The vegetation buffer on the eastern boundary of the investigation area still remains and the access tracks through the Lot are still visible. Cleared land has replaced the former orchards to the west of the Lot, as well as a sealed carpark and access road. A storage area and workshop is visible further north of this. There is a dam visible to the north of the Lot. The remaining area surrounding the Lot appears to have no other significant, observable changes.
1998 Colour	No significant, observable changes are noted within the Lot. A small building is visible immediately outside the western boundary, and the carpark further west of this has increased in size.

Photograph Information	Surrounds
2007 Colour	There appears to be more vegetation within the Lot. The last building within the Lot is no longer visible. No other significant, observable changes are noted within the Lot. The building complex to the north west of the Lot has increased and a second large building and carpark is now visible.
2010 Colour	No significant, observable changes within the Lot or surrounding area.
2016 Colour	The Lot appears to have been cleared of the scattered vegetation noted in previous aerials. The vegetation buffer is still visible within the Lot. The small buildings immediately west of the Lot have been removed, and a workshop pad remains. No other significant, observable changes.

4.3 Regulatory information

4.3.1 Overview

As part of the desk based review, information was obtained from a number of sources to enable a greater understanding of the potential for contamination at the Site. The desk based regulatory information review included a review of the following sources of information:

- Council information including land zoning and permissible use
- NSW EPA Contaminated Sites Register (notifications or incidents)
- NSW EPA, POEO Licence register

The findings of the information review are summarised below.

4.3.2 Council information

The Site is located in the local government area of Central Coast Council. In accordance with the *Gosford LEP* 2014, the Site is zoned as IN1 General Industrial. The objective of this zone is:

- To provide a wide range of industrial and warehouse land uses
- To encourage employment opportunities
- To minimise any adverse effect of industry on other land uses
- To support and protect industrial land for industrial uses
- To promote ecologically, socially and economically sustainable development
- To ensure that retail, commercial or service land uses in industrial areas are of an ancillary nature
- To ensure that development is compatible with the desired future character of the zone

4.3.3 NSW Environment Protection Authority

A search of the datasets maintained by NSW EPA including notices under the CLM Act and POEO Environment Protection License Register were carried out. The search results are summarised below.

Contaminated sites register

A site will be on the Contaminated Land: Record of Notices only if the EPA has issued a regulatory notice in relation to the site under the CLM Act.

No contaminated land records were listed for the Site or for any sites within a one kilometre radius of the Site.

List of NSW contaminated sites notified to EPA

A site appearing on the EPA 'List of NSW contaminated sites notified to the EPA' indicates that the notifier considers the site is contaminated and warrants reporting to EPA. However, the contamination may or may not be significant enough to warrant regulation by the EPA. The EPA needs to review information before it can make a determination as to whether the site warrants regulation.

The search did not identify any listings for the Site. One listing was identified within 500 metres of the site for OneSteel Recycling located at 902A Pacific Highway Lisarow. Regulation under CLM Act is not required.

POEO licence register

The POEO register identifies premises that are licensed for certain activities under the POEO Act. Information of particular relevance to this assessment, which are listed on the Register, includes site location, activity type, relevant clean up notice and non-compliance information. Each licence provides information on potential point and non-point sources of soil and groundwater contamination that may be generated on-site through standard operations, accidental spills and leaks.

A search was undertaken of the register on 3 April 2018 by Lotsearch and no premises with a current or former POEO licence within a one kilometre radius of the Site was identified. There were no delicensed activities still regulated by the EPA recorded within one kilometre of the Site.

EPA PFAS Investigation Program

The EPA is undertaking an investigation program to assess the legacy of per- and poly-fluoroalkyl substances (PFAS) use across NSW.

There were no identified sites that are part of the EPA PFAS investigation program within one kilometre of the Site.

5. Preliminary conceptual site model

A conceptual site model (CSM) is a representation of site-related information regarding contamination sources, receptors and exposure pathways between those sources and receptors. A CSM provides the framework for identifying contamination sources and how potential receptors may be exposed to contamination. Based on the information collected as part of this investigation, the following preliminary CSM has been developed for the Site during the use of the site as a Roads and Maritime construction compound.

5.1 Potential contaminant sources

Based on the results of the desktop assessment including review of historical information for the Site and results of the site inspection, the following potential contamination sources have been identified for the Site:

- Historical use of pesticides and herbicides associated with agricultural activities
- Hazardous building materials (asbestos, lead paint) from former buildings/structures
- Asbestos used in irrigational pipes
- Potential spills or leaks of oils, fuels, herbicides or pesticides that may have been used or stored on Site
- Spillage or leakage of chemicals used on the surrounding land and waterways, e.g. herbicides
- Use of fill from unknown sources
- Illegal dumping or landfilling of waste materials

5.2 Potential contaminant pathways

The primary pathways by which current and future receptors could be exposed to the potential sources of contamination during the use of the site as a Roads and Maritime construction compound are considered to be:

- Direct contact (including ingestion) with potentially contaminated soil
- Inhalation of potential contaminants in soil (disturbance or volatilisation of chemicals)
- Vertical and horizontal migration of potential contaminants within the groundwater
- Mobilisation of soil contamination through windborne dust or via surface water flow
- Groundwater beneath the Site

5.3 Potential contaminant receptors

When evaluating potential adverse health/environmental effects from exposure to a contaminated site, all potentially exposed populations should be considered. For the Site, the key populations or receptors of interest during the use of the site as a Roads and Maritime construction compound are listed below.

Human health receptors

- Current and future workers, subcontractors and visitors to the Site
- Current and future occupants of surrounding properties (e.g. workers, subcontractors, members of the public)

Environmental receptors

- Flora and fauna within the Site and surrounding land
- Narara Creek and its tributaries
- Local drainage channels and surface water
- Groundwater beneath the Site

5.4 Potential for contamination

Table 5-1 summarises the potential areas of environmental concern based on the results of the desk-top review and site inspection.

Table 5-1 Potential areas of environmental concern

Description	Rationale/detail	Potential contamination
Agricultural land uses.	Use of pesticides or herbicides on the site for weed or insect control. Use of asbestos irrigation pipes.	Arsenic, OCPs, OPPs and asbestos.
Storage and use of chemicals.	Storage of oils, fuels, grease, herbicides and pesticides.	TRH, BTEX, PAHs, phenols, heavy metals, OCPs and OPPs.
Buildings and sheds	Use of asbestos within structures. Lead paint on buildings.	Asbestos and lead.
Use of fill	Potential use of fill on Site.	Heavy Metals, TPH, BTEX, PAHs, PCBs OCPs, OPPs, phenols and asbestos.
Illegal dumping or burial of waste	Potential for illegal dumping and/or burial of waste materials on site.	Heavy Metals, TPH, BTEX, PAHs, PCBs OCPs, OPPs, phenols and asbestos.

TRH – Total Recoverable Hydrocarbons

PAH – Polycyclic Aromatic Hydrocarbons

OPP – Organophosphate Pesticides

BTEX – Benzene, Toluene, Ethyl-benzene and Xylenes.

OCP – Organochlorine Pesticides.

PCB – Polychlorinated biphenyls.

Based on the results of the desktop assessment, the overall likelihood for significant chemical contamination to be present within the Site is considered to be low. However, there is a potential for residual chemical contamination to be present on Site as a result of historical agricultural activities and potential filling or disposal of waste materials. There is also a potential for asbestos irrigational pipes on the property.

Prior to construction, it is recommended that baseline contamination testing is completed to assess the nature and extent of any potential contamination.

6. Conclusions and recommendations

GHD Pty Ltd (GHD) was commissioned by Roads and Maritime Services (Roads and Maritime) to undertake a Preliminary Site Investigation (PSI) for a proposed construction compound required as part of the upgrade of the Pacific Highway between Ourimbah Street and Parsons Road, Lisarow. The proposed compound (Site) is to be located within the south-western portion of Lot 101 DP1225026, located on Railway Crescent, Lisarow.

The objectives of the PSI were to identify potential contamination issues within the Site and provide recommendations as to the requirement for further investigations, remediation or management of any contamination issues identified.

GHD completed a desktop study and site inspection (from the property boundary) to assess the potential for soil or water contamination at the Site and assess potential risks posed by contaminants to future users of the Site.

In accordance with the objectives detailed in Section 1.1 and based on the information contained within this assessment and limitations outlined in Section 7, the following conclusions were made:

- The likelihood for chemical contamination to be present across the Site is considered to be low however, there is the potential for chemical contamination associated with the following:
  - Historical use of pesticides and herbicides associated with agricultural activities
  - Hazardous building materials (asbestos, lead paint) from former buildings/structures
  - Asbestos used in irrigational pipes
  - Potential spills or leaks of oils, fuels, herbicides or pesticides that may have been used or stored on Site
  - Spillage or leakage of chemicals used on the surrounding land and waterways, e.g. herbicides
  - Use of fill from unknown sources
  - Illegal dumping or landfilling of waste materials

Based on the above assessment, GHD recommends the following measures be undertaken to address the identified issues:

- Removal of general building wastes and rubbish with detailed inspection for PACM also undertaken within these areas

7. Limitations

This report has been prepared by GHD Pty Ltd for Roads and Maritime Services and may only be used and relied on by Roads and Maritime Services for the purpose as set out in Section 1 of this report.

GHD expressly disclaims responsibility for any error in, or omission from, this Report arising from or in connection with any of the Assumptions being incorrect except where GHD has been negligent in the adoption of those Assumptions. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

GHD has prepared this report on the basis of information provided by Roads and Maritime Services and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

Inspections undertaken in respect of this Report are limited to visual inspections only and did not include intrusive soil or groundwater investigations.

Except as otherwise expressly stated in this Report GHD makes no warranty or representation as to the presence or otherwise of asbestos and/or asbestos containing materials (“ACM”) on the site. If fill material has been imported on to the site at any time, or if any buildings constructed prior to the prohibition date of asbestos in Australia, 31 December 2003, have been demolished on the site or material from such buildings disposed of on the site, the site may contain asbestos or ACM.

Except as otherwise expressly stated in this Report, GHD makes no warranty, statement or representation of any kind concerning the suitability of the site for any purpose or the permissibility of any use, development or re-development of the site.

8. References

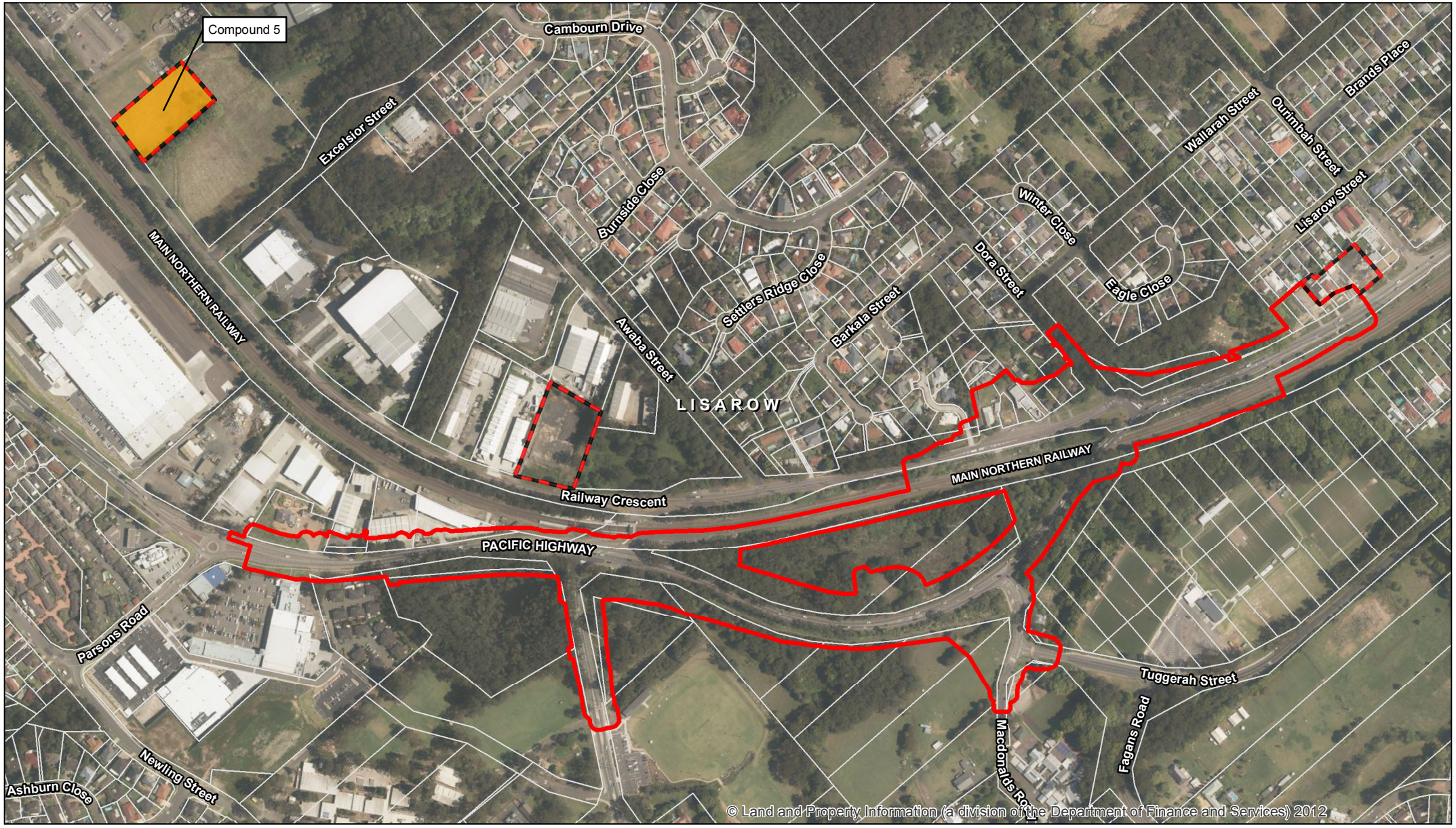
Gosford-Lake Macquarie 1:100 000 Geological Sheets 9131 & 9231, Geological Survey of New South Wales, Sydney.

Murphy CL, 1993, Soil Landscapes of the Gosford-Lake Macquarie 1:100,000 Sheet map and report, Department of Conservation and Land Management, Sydney.

OEH 2011. *Guidelines for Consultants Reporting on Contaminated Sites*. Office of Environment and Heritage (OEH).

Appendices

Appendix A – Figures



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Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

LEGEND

- Cadastre
- Approved project boundary (Addendum REF 1)
- Proposed modification (Addendum REF 2)
- Compound site

Roads and Maritime Services
Pacific Highway Upgrade Stage 3B, Lisarow
Phase 1 Contamination Assessment

Job Number	22-18239
Revision	0
Date	26 Jun 2018

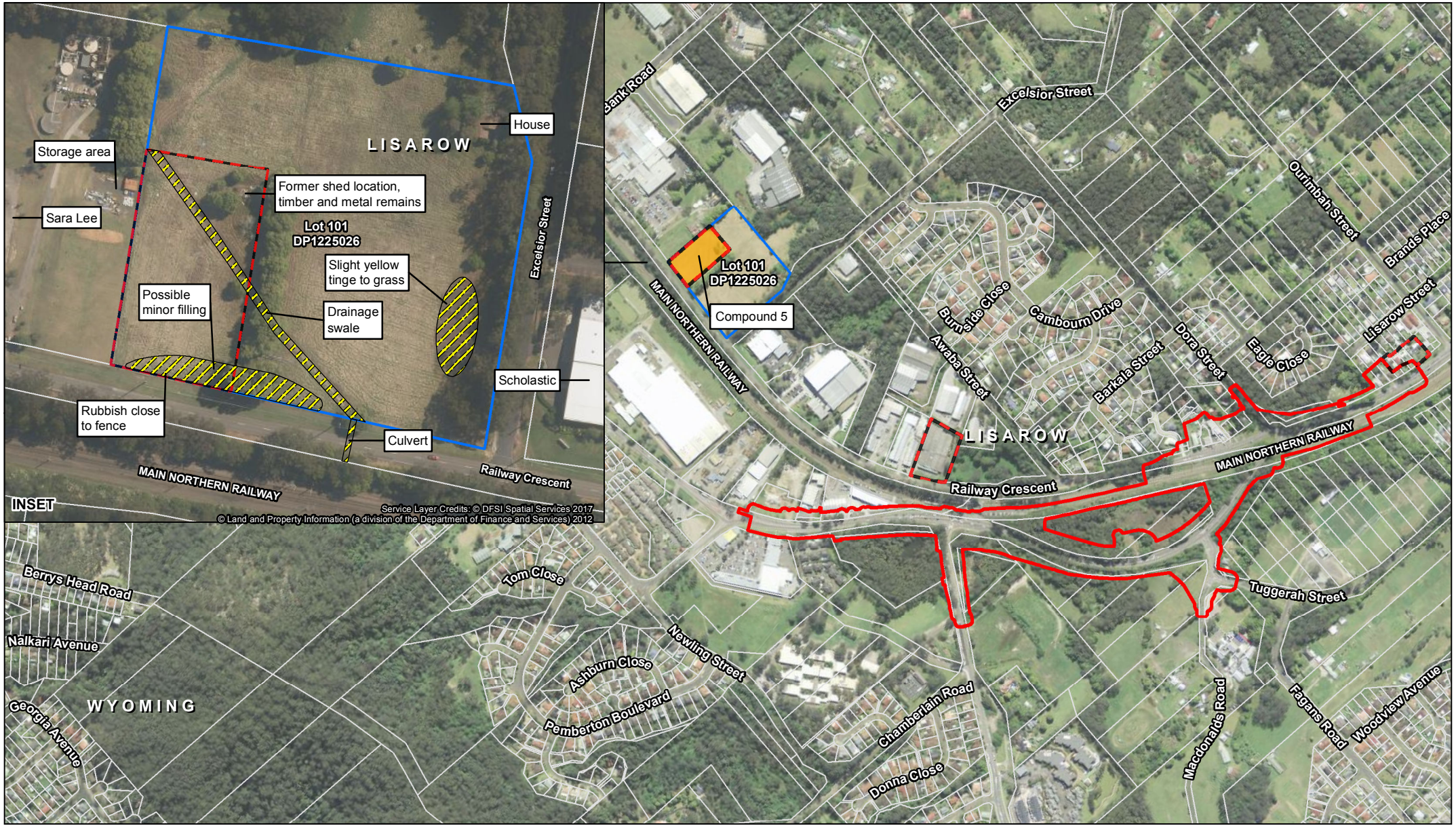
Site location

Figure 1

G:\22\18239\GIS\Maps\Deliverables\AddendumREF2_Compounds\ContamAssessment_Phase1\2218239_AREF_C301_SiteLocation_0.mxd

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 T 61 2 4979 9999 F 61 2 4979 9988 E ntlmail@ghd.com W www.ghd.com.au

Data source: LPI: Aerial imagery, 2015; DTDB/DCDB, 2015. Created by: tmorton, fmackay



Paper Size A4

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Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

LEGEND

- Lot 101 DP1225026
- Cadastre
- Approved project boundary (Addendum REF 1)
- Proposed modification (Addendum REF 2)
- Compound site
- Site features

Roads and Maritime Services
Pacific Highway Upgrade Stage 3B, Lisarow
Phase 1 Contamination Assessment

Job Number	22-18239
Revision	0
Date	26 Jun 2018

Site features

Figure 2

G:\22\18239\GIS\Maps\Deliverables\AddendumREF2_Compounds\ContamAssessment_Phase1\2218239_AREF_C302_SiteFeatures_0.mxd

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com **W** www.ghd.com.au

Data source: LPI: Aerial imagery, 2015; DTDB/DCDB, 2015. Created by: tmorton, fmackay

Appendix B – Desktop Review Information

LOTSEARCH

LOTSEARCH ENVIRO PROFESSIONAL

Date: 05 Apr 2018 13:09:55

Reference: LS003117

Address: Railway Crescent, Lisarow, NSW 2250

Table of Contents

Location Confidences

Where Lotsearch has had to georeference features from supplied addresses, a location confidence has been assigned to the data record. This indicates a confidence to the positional accuracy of the feature. Where applicable, a code is given under the field heading “LC” or “LocConf”. These codes lookup to the following location confidences:

LC Code	Location Confidence
1	Georeferenced to the site location / premise or part of site
2	Georeferenced with the confidence of the general/approximate area
3	Georeferenced to the road or rail
4	Georeferenced to the road intersection
5	Feature is a buffered point
6	Land adjacent to Georeferenced Site
7	Georeferenced to a network of features

Dataset Listing

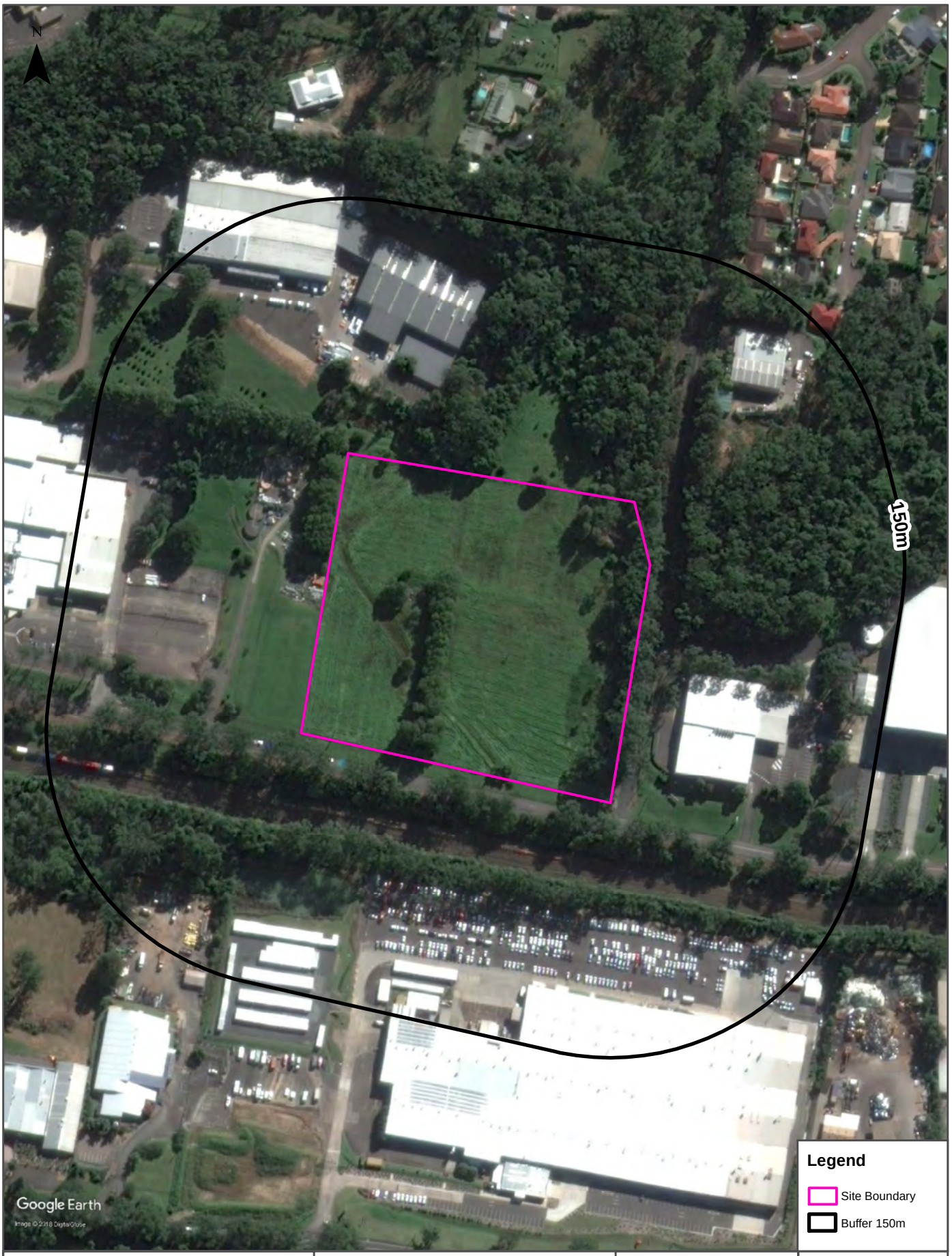
Datasets contained within this report, detailing their source and data currency:

Dataset Name	Custodian	Supply Date	Currency Date	Update Frequency	Dataset Buffer (m)	No. Features Onsite	No. Features within 100m	No. Features within Buffer
Cadastre Boundaries	Dept. Finance, Services & Innovation	05/04/2018	05/04/2018	Daily	-	-	-	-
Topographic Data	Dept. Finance, Services & Innovation	11/01/2018	11/01/2018	As required	-	-	-	-
List of NSW contaminated sites notified to EPA	Environment Protection Authority	05/03/2018	09/02/2018	Monthly	1000	0	0	1
Contaminated Land: Records of Notice	Environment Protection Authority	05/03/2018	05/03/2018	Monthly	1000	0	0	0
Former Gasworks	Environment Protection Authority	05/03/2018	12/09/2017	Monthly	1000	0	0	0
National Waste Management Site Database	Geoscience Australia	02/02/2018	07/03/2017	Quarterly	1000	0	0	0
EPA PFAS Investigation Program	Environment Protection Authority	07/03/2018	07/03/2018	Monthly	2000	0	0	0
EPA Other Sites with Contamination Issues	Environment Protection Authority	11/01/2018	11/01/2018	Quarterly	1000	0	0	0
Licensed Activities under the POEO Act 1997	Environment Protection Authority	09/03/2018	09/03/2018	Monthly	1000	0	3	3
Delicensed POEO Activities still Regulated by the EPA	Environment Protection Authority	09/03/2018	09/03/2018	Monthly	1000	0	0	0
Former POEO Licensed Activities now revoked or surrendered	Environment Protection Authority	09/03/2018	09/03/2018	Monthly	1000	0	3	3
UPSS Environmentally Sensitive Zones	Environment Protection Authority	14/04/2015	12/01/2010	As required	1000	1	1	1
UBD Business Directory 1982 (Premise & Intersection Matches)	Hardie Grant			Not required	150	0	0	0
UBD Business Directory 1982 (Road & Area Matches)	Hardie Grant			Not required	150	-	7	7
UBD Business Directory 1970 (Premise & Intersection Matches)	Hardie Grant			Not required	150	0	0	0
UBD Business Directory 1970 (Road & Area Matches)	Hardie Grant			Not required	150	-	0	0
UBD Business Directory 1961 (Premise & Intersection Matches)	Hardie Grant			Not required	150	0	0	0
UBD Business Directory 1961 (Road & Area Matches)	Hardie Grant			Not required	150	-	0	0
UBD Business Directory 1950 (Premise & Intersection Matches)	Hardie Grant			Not required	150	0	0	0
UBD Business Directory 1950 (Road & Area Matches)	Hardie Grant			Not required	150	-	0	0
UBD Business Directory Drycleaners & Motor Garages/Service Stations (Premise & Intersection Matches)	Hardie Grant			Not required	1000	0	0	0
UBD Business Directory Drycleaners & Motor Garages/Service Stations (Road & Area Matches)	Hardie Grant			Not required	1000	-	0	3
Points of Interest	Dept. Finance, Services & Innovation	11/01/2018	11/01/2018	Annually	1000	0	0	26
Tanks (Areas)	Dept. Finance, Services & Innovation	11/01/2018	11/01/2018	Annually	1000	0	0	0
Tanks (Points)	Dept. Finance, Services & Innovation	11/01/2018	11/01/2018	Annually	1000	0	0	0
Major Easements	Dept. Finance, Services & Innovation	08/01/2018	08/01/2018	As required	1000	0	0	16
State Forest	Dept. Finance, Services & Innovation	18/01/2018	18/01/2018	As required	1000	0	0	0
NSW National Parks and Wildlife Service Reserves	NSW Office of Environment & Heritage	18/01/2018	30/09/2017	Annually	1000	0	0	0
Hydrogeology Map of Australia	Commonwealth of Australia (Geoscience Australia)	08/10/2014	17/03/2000	As required	1000	1	1	1

Dataset Name	Custodian	Supply Date	Currency Date	Update Frequency	Dataset Buffer (m)	No. Features Onsite	No. Features within 100m	No. Features within Buffer
Botany Groundwater Management Zones	NSW Department of Primary Industries	15/03/2018	01/10/2005	As required	1000	0	0	0
Groundwater Boreholes	NSW Dept. of Primary Industries - Office of Water / Water Administration Ministerial Corporation; Commonwealth of Australia (Bureau of Meteorology)	21/03/2016	01/12/2015	Annually	2000	0	0	30
Geological Units 1:250,000	NSW Dept. of Industry, Resources & Energy	20/08/2014		None planned	1000	1	-	2
Geological Structures 1:250,000	NSW Dept. of Industry, Resources & Energy	20/08/2014		None planned	1000	0	-	0
Naturally Occurring Asbestos Potential	NSW Dept. of Industry, Resources & Energy	04/12/2015	24/09/2015	Unknown	1000	0	0	0
Soil Landscapes	NSW Office of Environment & Heritage	12/08/2014		None planned	1000	1	-	3
Atlas of Australian Soils	CSIRO	19/05/2017	17/02/2011	As required	1000	1	1	1
Standard Local Environmental Plan Acid Sulfate Soils	NSW Planning and Environment	07/10/2016	07/10/2016	As required	500	1	-	-
Atlas of Australian Acid Sulfate Soils	CSIRO	19/01/2017	21/02/2013	As required	1000	1	1	1
Dryland Salinity - National Assessment	National Land and Water Resources Audit	18/07/2014	12/05/2013	None planned	1000	0	0	0
Dryland Salinity Potential of Western Sydney	NSW Office of Environment & Heritage	12/05/2017	01/01/2002	None planned	1000	-	-	-
Mining Subsidence Districts	Dept. Finance, Services & Innovation	13/07/2017	01/07/2017	As required	1000	0	0	0
SEPP 14 - Coastal Wetlands	NSW Planning and Environment	17/12/2015	24/10/2008	Annually	1000	0	0	0
SEPP 26 - Littoral Rainforest	NSW Planning and Environment	17/12/2015	05/02/1988	Annually	1000	0	0	0
SEPP 71 - Coastal Protection	NSW Planning and Environment	17/12/2015	01/08/2003	Annually	1000	0	0	0
SEPP Major Developments 2005	NSW Planning and Environment	09/03/2013	25/05/2005	Under Review	1000	0	0	0
SEPP Strategic Land Use Areas	NSW Planning and Environment	01/08/2017	28/01/2014	Annually	1000	0	1	1
LEP - Land Zoning	NSW Planning and Environment	29/01/2018	19/01/2018	Quarterly	1000	2	5	56
LEP - Minimum Subdivision Lot Size	NSW Planning and Environment	04/04/2018	23/03/2018	Quarterly	0	0	-	-
LEP - Height of Building	NSW Planning and Environment	04/04/2018	23/03/2018	Quarterly	0	0	-	-
LEP - Floor Space Ratio	NSW Planning and Environment	04/04/2018	23/03/2018	Quarterly	0	0	-	-
LEP - Land Application	NSW Planning and Environment	04/04/2018	23/03/2018	Quarterly	0	1	-	-
LEP - Land Reservation Acquisition	NSW Planning and Environment	04/04/2018	09/03/2018	Quarterly	0	1	-	-
State Heritage Items	NSW Office of Environment & Heritage	04/04/2018	30/09/2016	Quarterly	1000	0	0	0
Local Heritage Items	NSW Planning and Environment	04/04/2018	23/03/2018	Quarterly	1000	0	0	2
Bush Fire Prone Land	NSW Rural Fire Service	05/02/2018	23/01/2018	Quarterly	1000	3	3	3
Vegetation of Gosford LGA	Council of the City of Gosford / NSW Office of Environment and Heritage	08/12/2014	31/12/2009	As required	1000	2	3	11
RAMSAR Wetlands	Commonwealth of Australia Department of the Environment	08/10/2014	24/06/2011	As required	1000	0	0	0
Groundwater Dependent Ecosystems	Bureau of Meteorology	14/08/2017	15/05/2017	Unknown	1000	1	1	3
Inflow Dependent Ecosystems Likelihood	Bureau of Meteorology	14/08/2017	15/05/2017	Unknown	1000	2	2	9
NSW BioNet Species Sightings	NSW Office of Environment & Heritage	04/04/2018	04/04/2018	Daily	10000	-	-	-

Aerial Imagery 2017

Railway Crescent, Lisarow, NSW 2250



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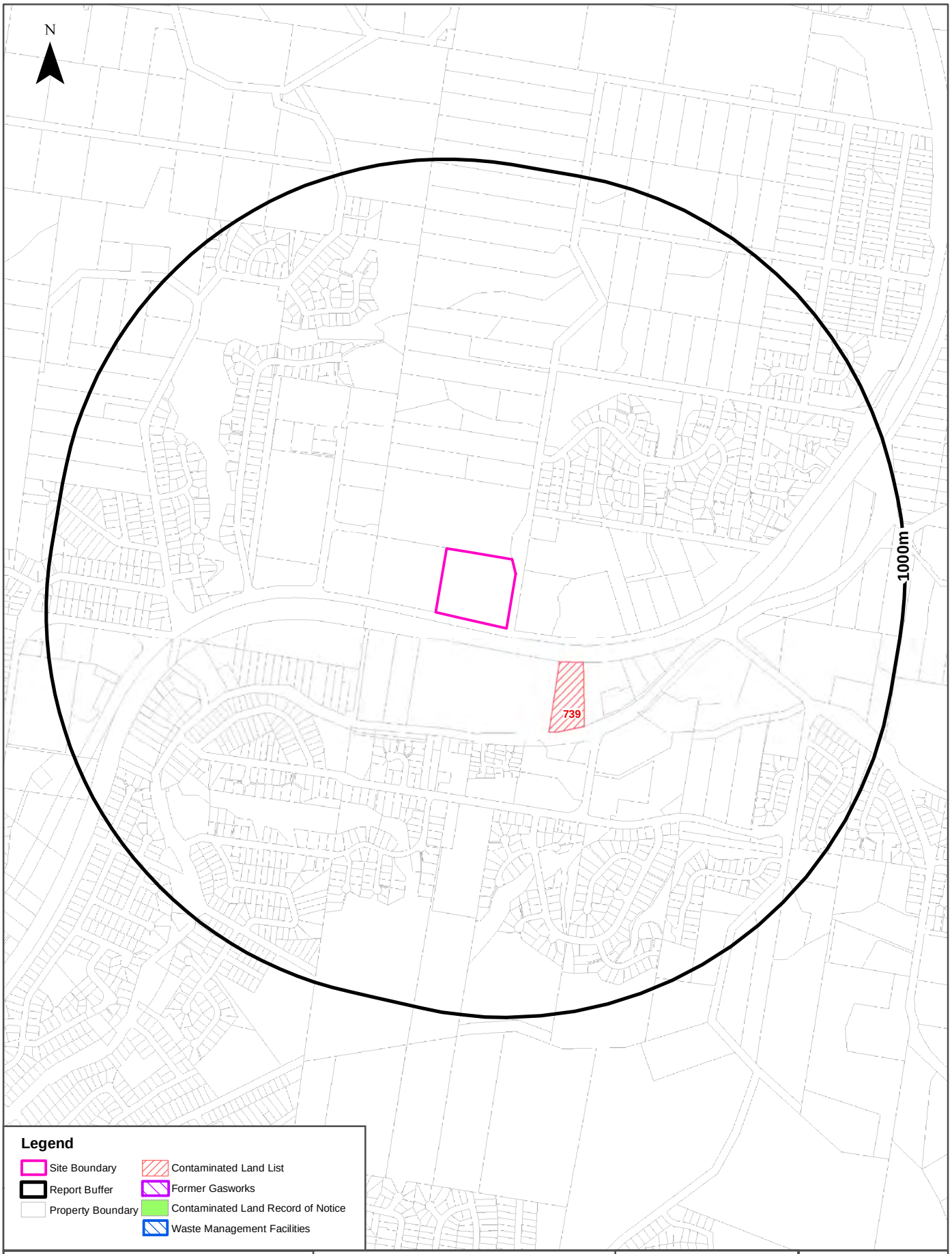
Data Source Aerial Imagery: © 2018 Google Inc, used with permission. Google and the Google logo are registered trademarks of Google Inc.

Coordinate System:
GDA 1994 MGA Zone 56

Date: 03 April 2018

Contaminated Land & Waste Management Facilities

Railway Crescent, Lisarow, NSW 2250



Scale: 0 100 200 400 600 Meters

Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2018

Coordinate System: GDA 1994 MGA Zone 56

Date: 03 April 2018

Contaminated Land & Waste Management Facilities

Railway Crescent, Lisarow, NSW 2250

List of NSW contaminated sites notified to EPA

Records from the NSW EPA Contaminated Land list within the dataset buffer:

Map Id	Site	Address	Suburb	Activity	Management Class	Status	Location Confidence	Dist (m)	Direction
739	OneSteel Recycling	902A Pacific HIGHWAY	Lisarow	Metal Industry	Regulation under CLM Act not required	Current EPA List	Premise Match	161m	South East

The values within the EPA site management class in the table above, are given more detailed explanations in the table below:

EPA site management class	Explanation
Contamination being managed via the planning process (EP&A Act)	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation. The contamination of this site is managed by the consent authority under the Environmental Planning and Assessment Act 1979 (EP&A Act) planning approval process, with EPA involvement as necessary to ensure significant contamination is adequately addressed. The consent authority is typically a local council or the Department of Planning and Environment.
Contamination currently regulated under CLM Act	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation under the Contaminated Land Management Act 1997 (CLM Act). Management of the contamination is regulated by the EPA under the CLM Act. Regulatory notices are available on the EPA's Contaminated Land Public Record of Notices.
Contamination currently regulated under POEO Act	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation. Management of the contamination is regulated under the Protection of the Environment Operations Act 1997 (POEO Act). The EPA's regulatory actions under the POEO Act are available on the POEO public register.
Contamination formerly regulated under the CLM Act	The EPA has determined that the contamination is no longer significant enough to warrant regulation under the Contaminated Land Management Act 1997 (CLM Act). The contamination was addressed under the CLM Act.
Contamination formerly regulated under the POEO Act	The EPA has determined that the contamination is no longer significant enough to warrant regulation. The contamination was addressed under the Protection of the Environment Operations Act 1997 (POEO Act).
Contamination was addressed via the planning process (EP&A Act)	The EPA has determined that the contamination is no longer significant enough to warrant regulation. The contamination was addressed by the appropriate consent authority via the planning process under the Environmental Planning and Assessment Act 1979 (EP&A Act).
Ongoing maintenance required to manage residual contamination (CLM Act)	The EPA has determined that ongoing maintenance, under the Contaminated Land Management Act 1997 (CLM Act), is required to manage the residual contamination. Regulatory notices under the CLM Act are available on the EPA's Contaminated Land Public Record of Notices.
Regulation being finalised	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation under the Contaminated Land Management Act 1997. A regulatory approach is being finalised.
Regulation under the CLM Act not required	The EPA has completed an assessment of the contamination and decided that regulation under the Contaminated Land Management Act 1997 is not required.
Under assessment	The contamination is being assessed by the EPA to determine whether regulation is required. The EPA may require further information to complete the assessment. For example, the completion of management actions regulated under the planning process or Protection of the Environment Operations Act 1997. Alternatively, the EPA may require information via a notice issued under s77 of the Contaminated Land Management Act 1997 or issue a Preliminary Investigation Order.

NSW EPA Contaminated Land List Data Source: Environment Protection Authority

Contaminated Land & Waste Management Facilities

Railway Crescent, Lisarow, NSW 2250

Contaminated Land: Records of Notice

Record of Notices within the dataset buffer:

Map Id	Name	Address	Suburb	Notices	Area No	Location Confidence	Distance	Direction
N/A	No records in buffer							

Contaminated Land Records of Notice Data Source: Environment Protection Authority

Terms of use and disclaimer for Contaminated Land: Record of Notices, please visit
http://www.epa.nsw.gov.au/clm/clmdisclaimer.htm

Former Gasworks

Former Gasworks within the dataset buffer:

Map Id	Location	Council	Further Info	Location Confidence	Distance	Direction
N/A	No records in buffer					

Former Gasworks Data Source: Environment Protection Authority

National Waste Management Site Database

Sites on the National Waste Management Site Database within the dataset buffer:

Site Id	Owner	Name	Address	Suburb	Class	Landfill	Reprocess	Transfer	Comments	Loc Conf	Dist (m)	Direction
N/A	No records in buffer											

Waste Management Facilities Data Source: Geoscience Australia

EPA PFAS Investigation Program

Railway Crescent, Lisarow, NSW 2250

EPA PFAS Investigation Program

Sites that are part of the EPA PFAS investigation program, within the dataset buffer:

Id	Site	Address	Location Confidence	Distance	Direction
N/A	No records in buffer				

EPA PFAS Investigation Program: Environment Protection Authority

EPA Other Sites with Contamination Issues

Railway Crescent, Lisarow, NSW 2250

EPA Other Sites with Contamination Issues

This dataset contains other sites identified on the EPA website as having contamination issues. This dataset currently includes:

- James Hardie asbestos manufacturing and waste disposal sites
- Radiological investigation sites in Hunter's Hill

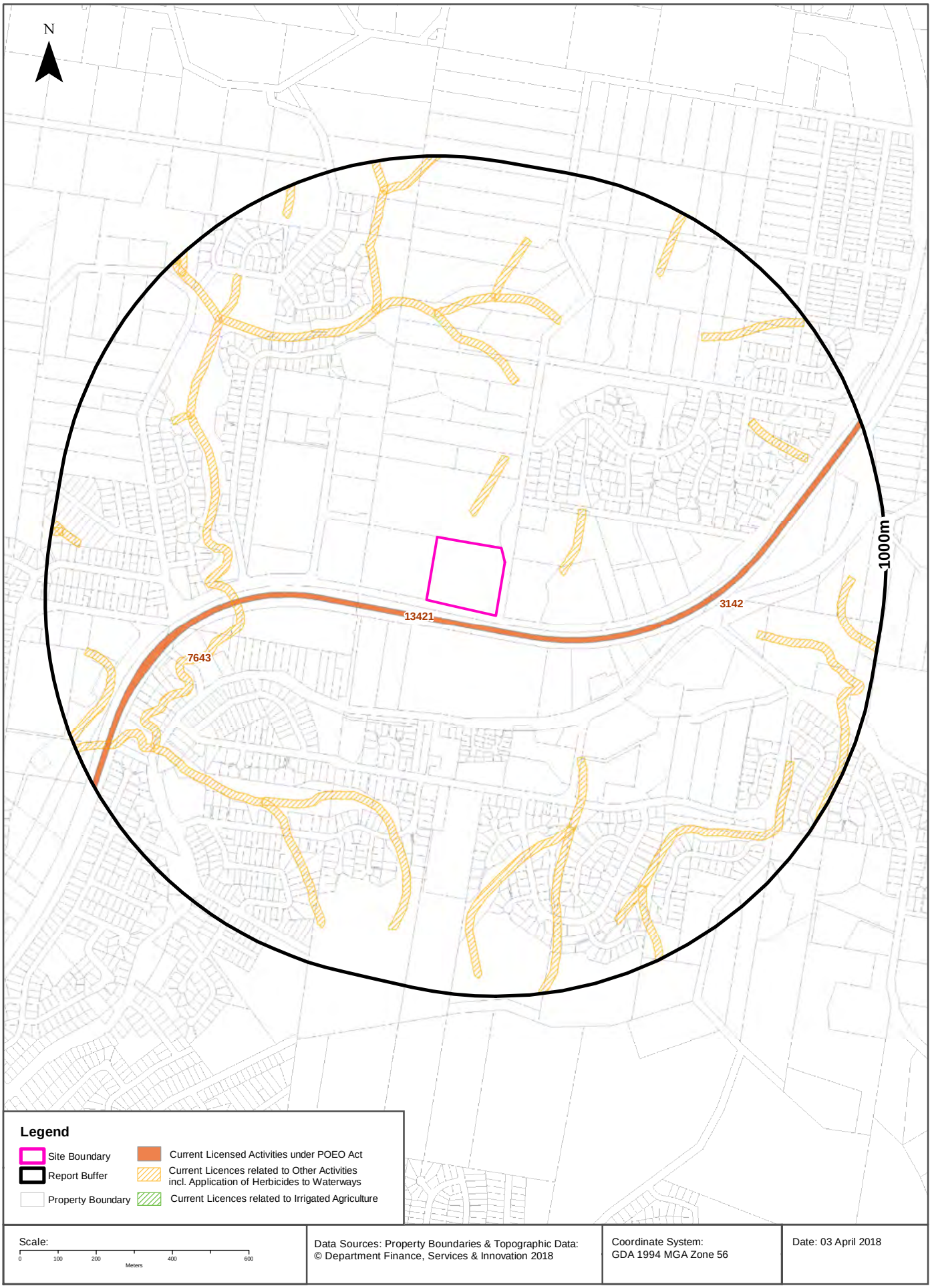
Sites within the dataset buffer:

Site Id	Site Name	Site Address	Dataset	Comments	Location Confidence	Distance	Direction
N/A	No records in buffer						

EPA Other Sites with Contamination Issues: Environment Protection Authority

Current EPA Licensed Activities

Railway Crescent, Lisarow, NSW 2250



Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2018

Coordinate System: GDA 1994 MGA Zone 56

Date: 03 April 2018

EPA Activities

Railway Crescent, Lisarow, NSW 2250

Licensed Activities under the POEO Act 1997

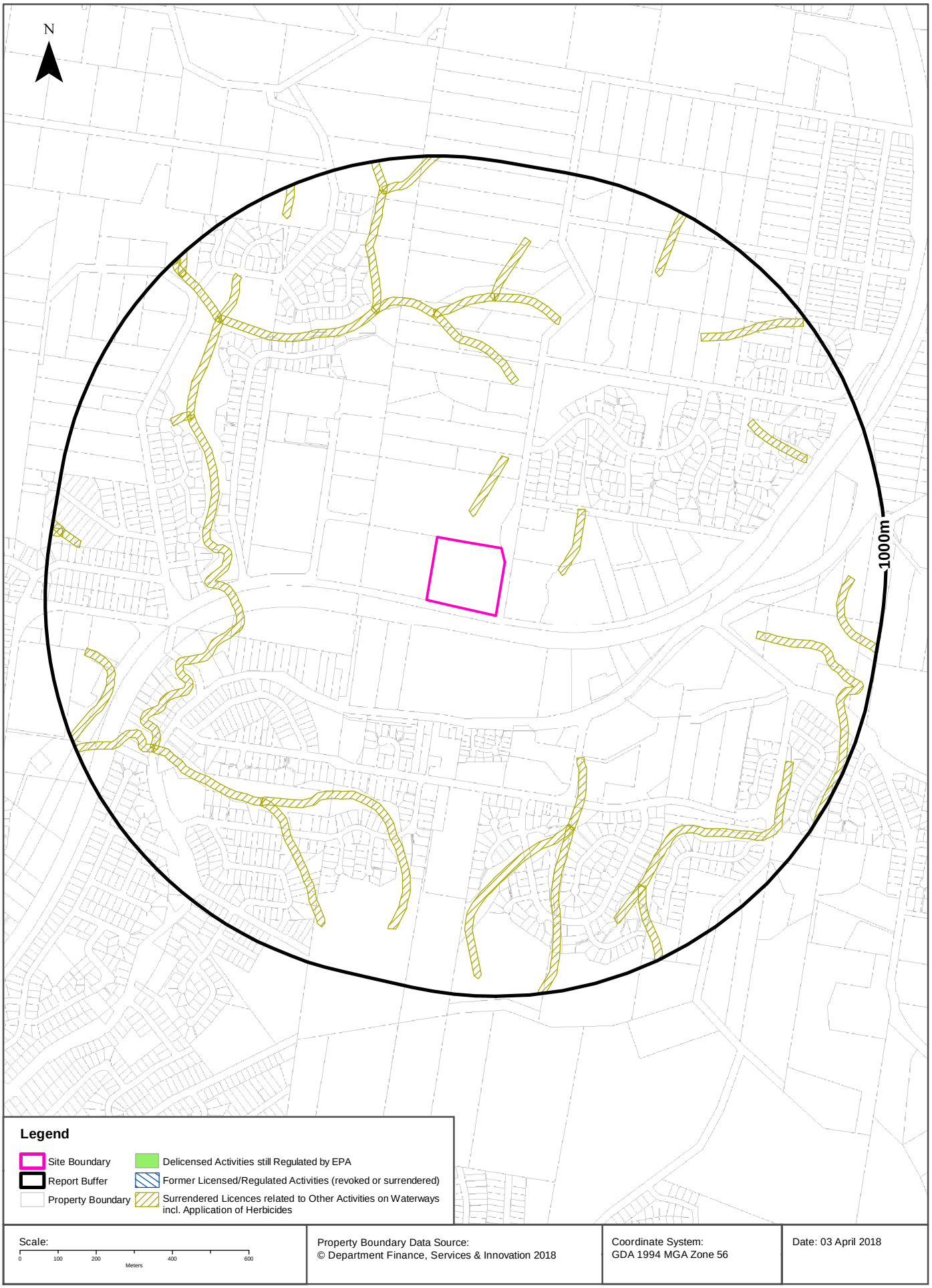
Licensed activities under the Protection of the Environment Operations Act 1997, within the dataset buffer:

EPL	Organisation	Name	Address	Suburb	Activity	Loc Conf	Distance	Direction
3142	AUSTRALIAN RAIL TRACK CORPORATION LIMITED		GPO BOX 14, SYDNEY, NSW 2001		Railway systems activities	Network of Features	33m	South
13421	JOHN HOLLAND RAIL PTY LTD		PO Box 215 , PARRAMATTA, NSW 2124		Railway systems activities	Road Match	33m	South
7643	Central Coast Council	WATERWAYS OF GOSFORD CITY COUNCIL	-	GOSFORD	Other activities	Network of Features	69m	North

POEO Licence Data Source: Environment Protection Authority

Delicensed & Former Licensed EPA Activities

Railway Crescent, Lisarow, NSW 2250



Scale: 0 100 200 400 600 Meters

Property Boundary Data Source:
© Department Finance, Services & Innovation 2018

Coordinate System:
GDA 1994 MGA Zone 56

Date: 03 April 2018

EPA Activities

Railway Crescent, Lisarow, NSW 2250

Delicensed Activities still regulated by the EPA

Delicensed activities still regulated by the EPA, within the dataset buffer:

Licence No	Organisation	Name	Address	Suburb	Activity	Loc Conf	Distance	Direction
N/A	No records in buffer							

Delicensed Activities Data Source: Environment Protection Authority

Former Licensed Activities under the POEO Act 1997, now revoked or surrendered

Former Licensed activities under the Protection of the Environment Operations Act 1997, now revoked or surrendered, within the dataset buffer:

Licence No	Organisation	Location	Status	Issued Date	Activity	Loc Conf	Distance	Direction
4653	LUHRMANN ENVIRONMENT MANAGEMENT PTY LTD	WATERWAYS THROUGHOUT NSW	Surrendered		Other Activities / Non Scheduled Activity - Application of Herbicides	Network of Features	69m	-
4838	Robert Orchard	Various Waterways throughout New South Wales - SYDNEY NSW 2000	Surrendered		Other Activities / Non Scheduled Activity - Application of Herbicides	Network of Features	69m	-
6630	SYDNEY WEED & PEST MANAGEMENT PTY LTD	WATERWAYS THROUGHOUT NSW - PROSPECT, NSW, 2148	Surrendered		Other Activities / Non Scheduled Activity - Application of Herbicides	Network of Features	69m	-

Former Licensed Activities Data Source: Environment Protection Authority

UPSS Sensitive Zones

Railway Crescent, Lisarow, NSW 2250

Scale:
0 100 200 400 600
Meters

UPSS Data Source: Environment Protection Authority
© Dept of Environment, Climate Change & Water (NSW)

Coordinate System:
GDA 1994 MGA Zone 56

Date: 03 April 2018

1982 Historical Business Directory Records

Railway Crescent, Lisarow, NSW 2250

Data Sources: Universal Business Directories (UBD) - Derived Data Licensed from Hardie Grant.
Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2018

Coordinate System:
GDA 1994 MGA Zone 56

Date:
03 April 2018

Historical Business Directories

Railway Crescent, Lisarow, NSW 2250

1982 Business Directory Records
Premise or Road Intersection Matches

Records from the 1982 UBD Business Directory, mapped to a premise or road intersection, within the dataset buffer:

Business Activity	Premise	Ref No.	Location Confidence	Distance to Feature Point	Direction
N/A	No records in buffer				

Business Directory Content Derived from Universal Business Directories (UBD) - Licensed from Hardie Grant

1982 Business Directory Records
Road or Area Matches

Records from the 1982 UBD Business Directory, mapped to a road or an area, within the dataset buffer. Records are mapped to the road when a building number is not supplied, cannot be found, or the road has been renumbered since the directory was published:

Business Activity	Premise	Ref No.	Location Confidence	Distance to Road Corridor or Area
PEST CONTROL	Chase Pest Control, Excelsior St., Lisarow., Gosford	124980	Road Match	0m
TIMBER MERCHANTS &/ OR SAWMILLERS	Clifton, V., Railway Cr., Lisarow., Gosford	125420	Road Match	0m
FLY SCREEN DOOR &/OR WINDOW MFRS. &/OR DISTS	Kennard, N. J. & Co., Excelsior St., Usarow., Gosford	124153	Road Match	0m
FOODS - FROZEN MFRS. &/OR DISTS	Kitchens of Sara Lee .(Australia) Pty. Ltd., Railway Cr., Lisarow., Gosford	124156	Road Match	0m
N/A	Millmaster Feeds Ourimbah Pty. Ltd., Railway Yard., Ourimbah	125583	Road Match	0m
METAL PRESSERS &/OR STAMPERS	Parco .(A'sia) Pty. Ltd., Foil Division, 161 Railway Cr., Lisarow., Gosford	124598	Road Match	0m
ALUMINIUM PRODUCTS MFRS. &/OR DISTS.	Parco .(A'sia) Pty. Ltd., Foil Division. 161 Railway Cr., Lisarow., Gosford	123463	Road Match	0m

Business Directory Content Derived from Universal Business Directories (UBD) - Licensed from Hardie Grant

Historical Business Directories

Railway Crescent, Lisarow, NSW 2250

1970 Business Directory Records
Premise or Road Intersection Matches

Records from the 1970 UBD Business Directory, mapped to a premise or road intersection, within the dataset buffer:

Business Activity	Premise	Ref No.	Location Confidence	Distance to Feature Point	Direction
N/A	No records in buffer				

Business Directory Content Derived from Universal Business Directories (UBD) - Licensed from Hardie Grant

1970 Business Directory Records
Road or Area Matches

Records from the 1970 UBD Business Directory, mapped to a road or an area, within the dataset buffer. Records are mapped to the road when a building number is not supplied, cannot be found, or the road has been renumbered since the directory was published:

Business Activity	Premise	Ref No.	Location Confidence	Distance to Road Corridor or Area
N/A	No records in buffer			

Business Directory Content Derived from Universal Business Directories (UBD) - Licensed from Hardie Grant

Historical Business Directories

Railway Crescent, Lisarow, NSW 2250

1961 Business Directory Records
Premise or Road Intersection Matches

Records from the 1961 UBD Business Directory, mapped to a premise or road intersection, within the dataset buffer:

Business Activity	Premise	Ref No.	Location Confidence	Distance to Feature Point	Direction
N/A	No records in buffer				

Business Directory Content Derived from Universal Business Directories (UBD) - Licensed from Hardie Grant

1961 Business Directory Records
Road or Area Matches

Records from the 1961 UBD Business Directory, mapped to a road or an area, within the dataset buffer. Records are mapped to the road when a building number is not supplied, cannot be found, or the road has been renumbered since the directory was published:

Business Activity	Premise	Ref No.	Location Confidence	Distance to Road Corridor or Area
N/A	No records in buffer			

Business Directory Content Derived from Universal Business Directories (UBD) - Licensed from Hardie Grant

Historical Business Directories

Railway Crescent, Lisarow, NSW 2250

1950 Business Directory Records
Premise or Road Intersection Matches

Records from the 1950 UBD Business Directory, mapped to a premise or road intersection, within the dataset buffer:

Business Activity	Premise	Ref No.	Location Confidence	Distance to Feature Point	Direction
N/A	No records in buffer				

Business Directory Content Derived from Universal Business Directories (UBD) - Licensed from Hardie Grant

1950 Business Directory Records
Road or Area Matches

Records from the 1950 UBD Business Directory, mapped to a road or an area, within the dataset buffer. Records are mapped to the road when a building number is not supplied, cannot be found, or the road has been renumbered since the directory was published:

Business Activity	Premise	Ref No.	Location Confidence	Distance to Road Corridor or Area
N/A	No records in buffer			

Business Directory Content Derived from Universal Business Directories (UBD) - Licensed from Hardie Grant

Historical Business Directories

Railway Crescent, Lisarow, NSW 2250

Dry Cleaners, Motor Garages & Service Stations Premise or Road Intersection Matches

Dry Cleaners, Motor Garages & Service Stations from UBD Business Directories, mapped to a premise or road intersection, within the dataset buffer:

Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Feature Point	Direction
N/A	No records in buffer					

Business Directory Content Derived from Universal Business Directories (UBD) - Licensed from Hardie Grant

Historical Business Directories

Railway Crescent, Lisarow, NSW 2250

Dry Cleaners, Motor Garages & Service Stations Road or Area Matches

Dry Cleaners, Motor Garages & Service Stations from UBD Business Directories, mapped to a road or an area, within the dataset buffer. Records are mapped to the road when a building number is not supplied, cannot be found, or the road has been renumbered since the directory was published:

Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Road Corridor or Area
MOTOR GARAGES & ENGINEERS	Bailey, R. E., Pacific Hghwy. Ourimbah	148510	1950	Road Match	329m
MOTOR GARAGES & ENGINEERS	Sainsbury's Garage and Service Station, Pacific Hghwy. Ourimbah	148511	1950	Road Match	329m
MOTOR GARAGES &/OR ENGINEERS &/ OR SERVICE STATIONS	BP Wyoming Service Station, Pacific H'way., Wyoming., Gosford	124751	1982	Road Match	994m

Business Directory Content Derived from Universal Business Directories (UBD) - Licensed from Hardie Grant

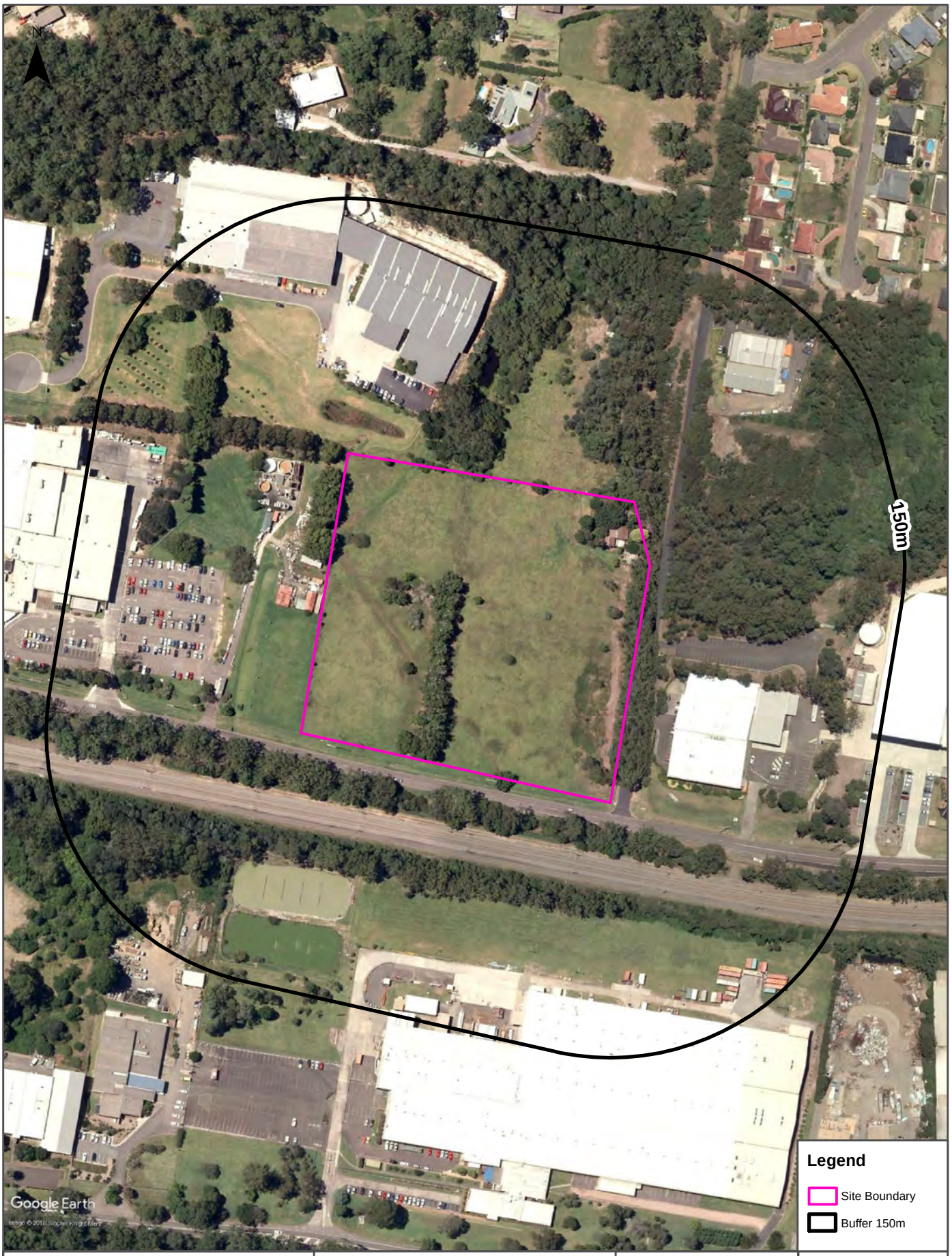
Aerial Imagery 2016

Railway Crescent, Lisarow, NSW 2250

Scale:	Data Sources: Aerial Imagery © Department Finance, Services & Innovation	Coordinate System: GDA 1994 MGA Zone 56	Date: 03 April 2018
0 50 100 Meters			

Aerial Imagery 2010

Railway Crescent, Lisarow, NSW 2250



Scale:
0 25 50 100
Meters

Data Source Aerial Imagery: © 2018 Google Inc, used with permission. Google and the Google logo are registered trademarks of Google Inc.

Coordinate System:
GDA 1994 MGA Zone 56

Date: 03 April 2018

Aerial Imagery 2007

Railway Crescent, Lisarow, NSW 2250

Scale:
0 25 50 100
Meters

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Coordinate System:
GDA 1994 MGA Zone 56

Date: 03 April 2018

Aerial Imagery 1998

Railway Crescent, Lisarow, NSW 2250

Scale:
0 25 50 100
Meters

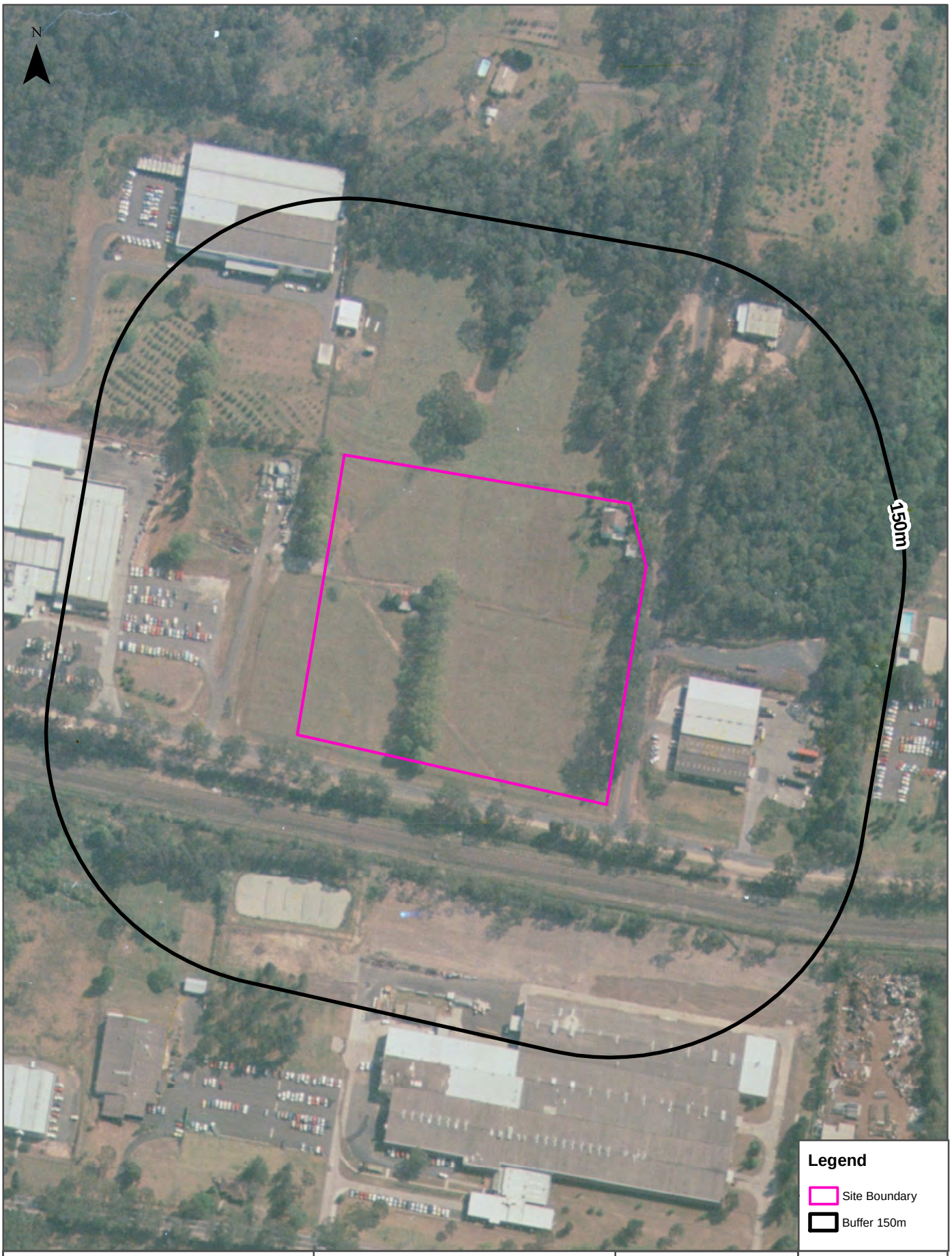
Data Source Aerial Imagery:
© NSW Department Finance, Services & Innovation

Coordinate System:
GDA 1994 MGA Zone 56

Date: 04 April 2018

Aerial Imagery 1991

Railway Crescent, Lisarow, NSW 2250



Scale:	Data Source Aerial Imagery:	Coordinate System:	Date: 03 April 2018
0 25 50 100 Meters	© NSW Department Finance, Services & Innovation	GDA 1994 MGA Zone 56	

Aerial Imagery 1984

Railway Crescent, Lisarow, NSW 2250

Scale:
0 25 50 100
Meters

Data Source Aerial Imagery:
© NSW Department Finance, Services & Innovation

Coordinate System:
GDA 1994 MGA Zone 56

Date: 03 April 2018

Aerial Imagery 1976

Railway Crescent, Lisarow, NSW 2250

Scale:
0 25 50 100
Meters

Data Source Aerial Imagery:
© NSW Department Finance, Services & Innovation

Coordinate System:
GDA 1994 MGA Zone 56

Date: 03 April 2018

Aerial Imagery 1965

Railway Crescent, Lisarow, NSW 2250

Scale:
0 25 50 100
Meters

Data Source Aerial Imagery:
© NSW Department Finance, Services & Innovation

Coordinate System:
GDA 1994 MGA Zone 56

Date: 04 April 2018

Aerial Imagery 1954

Railway Crescent, Lisarow, NSW 2250

Scale:
0 25 50 100
Meters

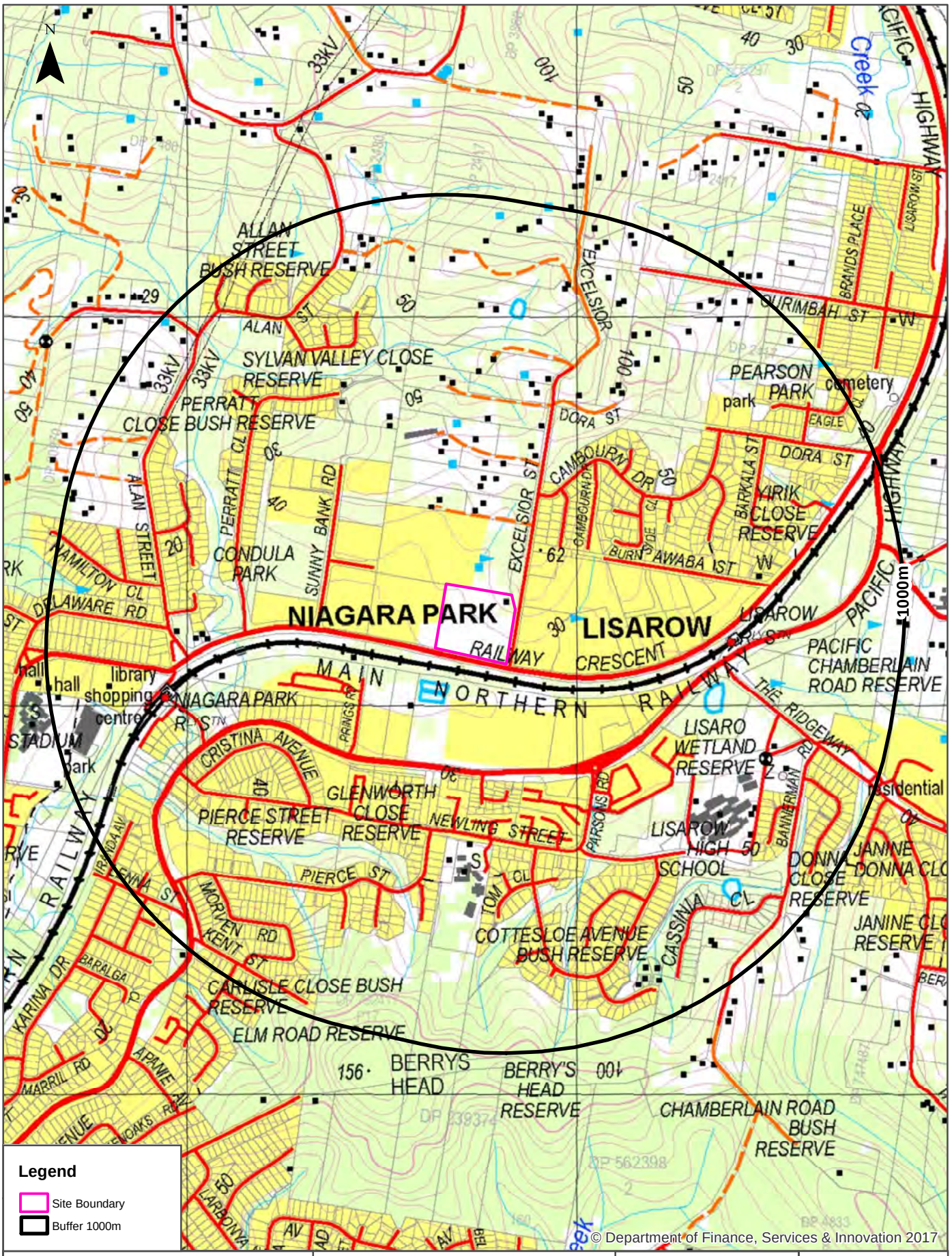
Data Source Aerial Imagery:
© NSW Department Finance, Services & Innovation

Coordinate System:
GDA 1994 MGA Zone 56

Date: 04 April 2018

Topographic Map 2015

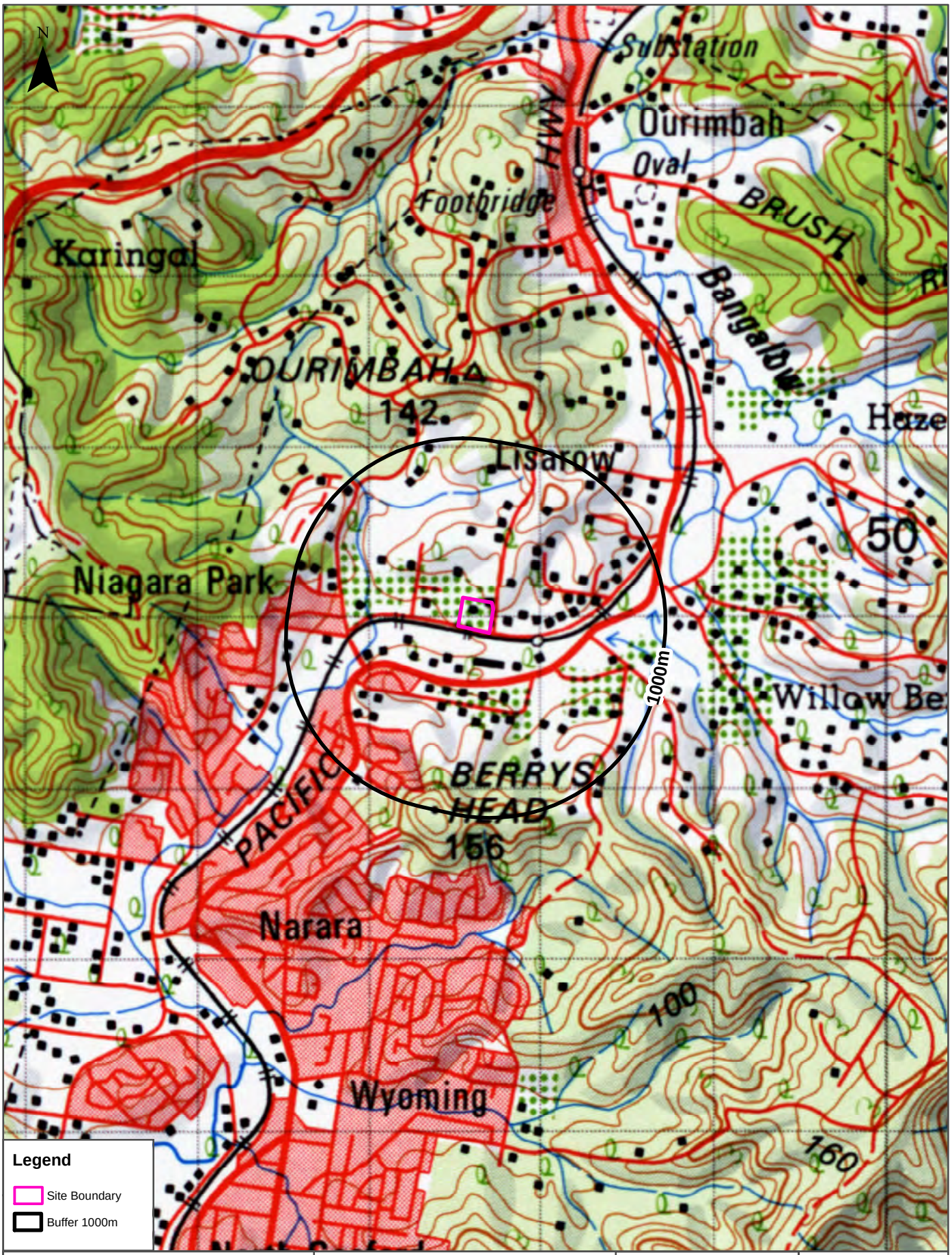
Railway Crescent, Lisarow, NSW 2250



Scale:	Data Sources: Topographic Map Data © NSW Land and Property Information	Coordinate System: GDA 1994 MGA Zone 56	Date: 03 April 2018

Historical Map 1975

Railway Crescent, Lisarow, NSW 2250



Scale: 0 300 600 Meters 1,200

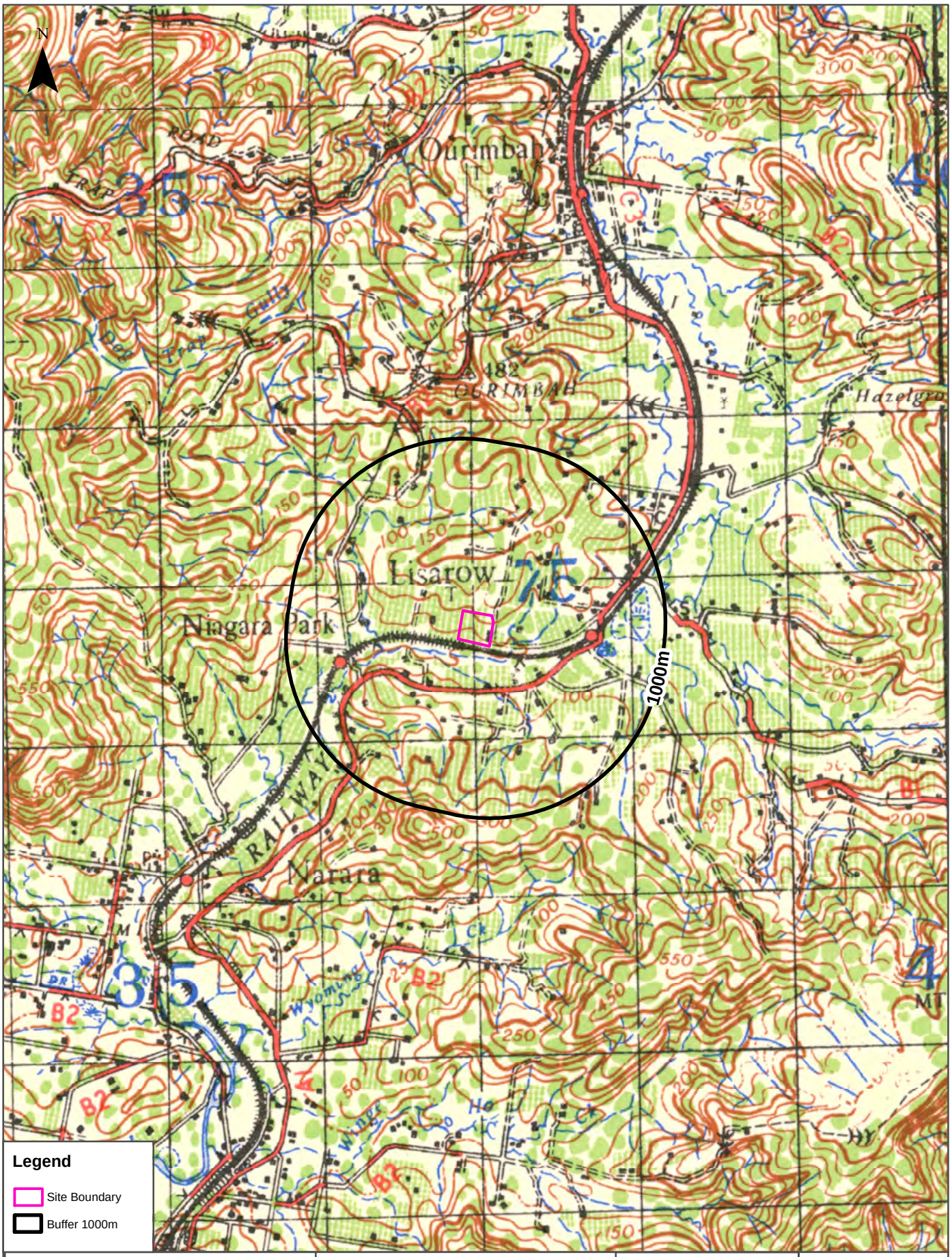
Data Sources: Sheet 9131, Edition 1, Gosford, NSW, National Topographic Map Series Commonwealth of Australia

Coordinate System: GDA 1994 MGA Zone 56

Date: 03 April 2018

Historical Map 1942

Railway Crescent, Lisarow, NSW 2250



Scale: 0 400 800 Meters 1,600

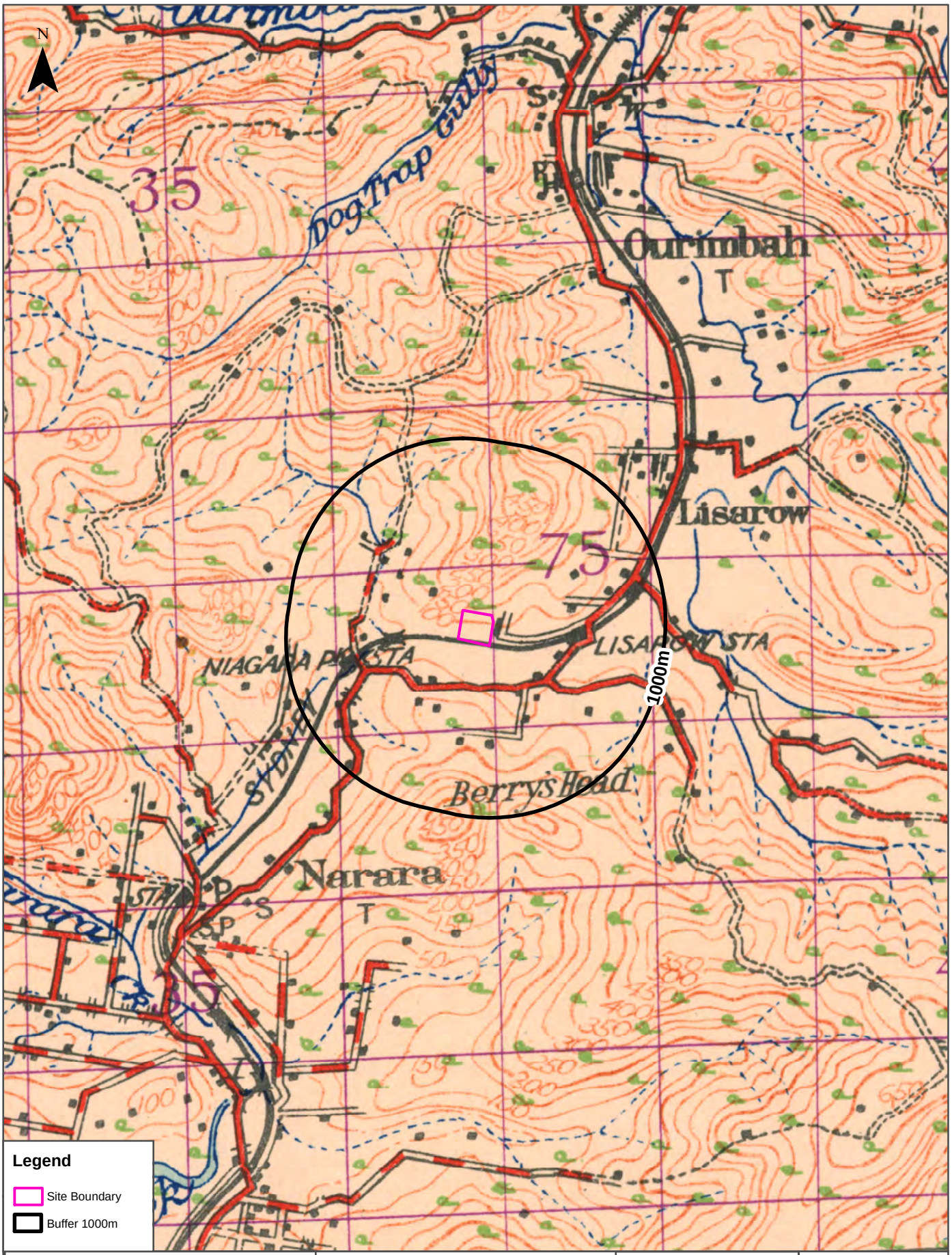
Data Sources: Australia 1:63360, Sheet 410, Gosford and Norahville, New South Wales. Prepared by Commonwealth Section Imperial General Staff

Coordinate System: GDA 1994 MGA Zone 56

Date: 03 April 2018

Historical Map 1921

Railway Crescent, Lisarow, NSW 2250



Scale: 0 400 800 Meters 1,600

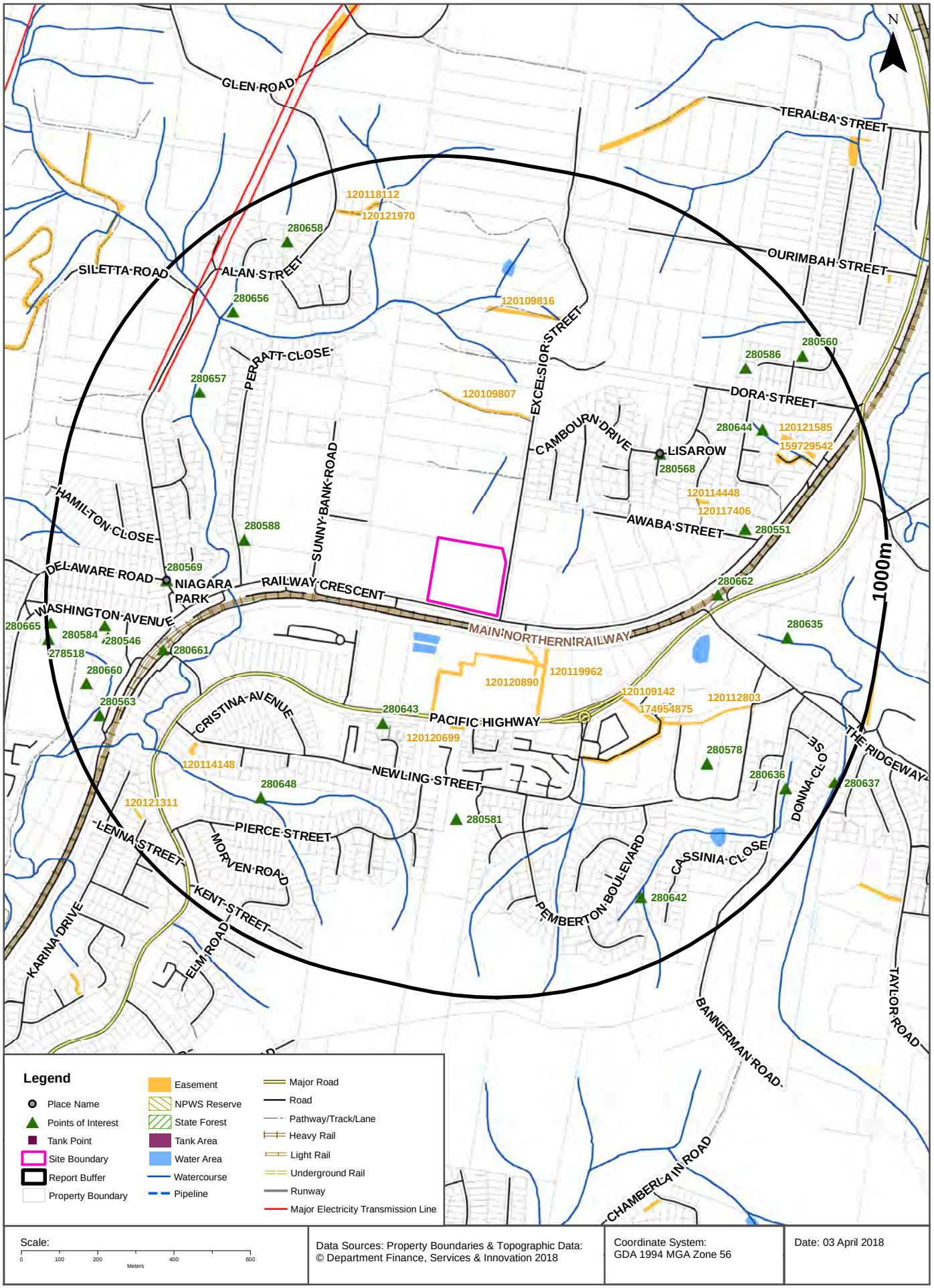
Data Sources: Australia 1:63360, Sheet 410, Gosford and Norahville, New South Wales. Prepared by Commonwealth Section Imperial General Staff

Coordinate System: GDA 1994 MGA Zone 56

Date: 03 April 2018

Topographic Features

Railway Crescent, Lisarow, NSW 2250



Legend

- Place Name
- Points of Interest
- Tank Point
- Site Boundary
- Report Buffer
- Property Boundary
- Easement
- NPWS Reserve
- State Forest
- Tank Area
- Water Area
- Watercourse
- Pipeline
- Major Road
- Road
- Pathway/Track/Lane
- Heavy Rail
- Light Rail
- Underground Rail
- Runway
- Major Electricity Transmission Line

Scale: 0 100 200 400 600 Meters

Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2018

Coordinate System: GDA 1994 MGA Zone 56

Date: 03 April 2018

Topographic Features

Railway Crescent, Lisarow, NSW 2250

Points of Interest

What Points of Interest exist within the dataset buffer?

Map Id	Feature Type	Label	Distance	Direction
280643	Park	GLENWORTH CLOSE RESERVE	342m	South West
280568	Village	LISAROW	481m	North East
280588	Park	CONDULA PARK	499m	West
280581	Primary School	NARARA PUBLIC SCHOOL	543m	South
280662	Railway Station	LISAROW RAILWAY STATION	561m	East
280551	Place Of Worship	CHURCH OF CHRIST	633m	East
280578	High School	LISAROW HIGH SCHOOL	673m	South East
280648	Park	PIERCE STREET RESERVE	676m	South West
280569	Village	NIAGARA PARK	685m	West
280661	Railway Station	NIAGARA PARK RAILWAY STATION	704m	West
280657	Park	PERRATT CLOSE BUSH RESERVE	731m	North West
280644	Park	YIRIK CLOSE RESERVE	749m	North East
280635	Park	PACIFIC CHAMBERLAIN ROAD RESERVE	759m	East
280586	Park	Park	793m	North East
280656	Park	SYLVAN VALLEY CLOSE RESERVE	798m	North West
280642	Park	COTTESLOE AVENUE BUSH RESERVE	828m	South East
280584	Shopping Centre	NIAGARA PARK SHOPPING CENTRE	842m	West
280546	Library	NIAGARA LIBRARY	847m	West
280658	Park	ALLAN STREET BUSH RESERVE	870m	North West
280636	Park	DONNA CLOSE RESERVE	881m	South East
280563	Park	Park	910m	West
280660	Sports Centre	NIAGARA PARK STADIUM	919m	West
280560	Park	PEARSON PARK	934m	North East
280637	Park	JANINE DONNA CLOSE RESERVE	986m	South East
280665	Child Care Centre	NIAGARA PARK CHILDRENS CENTRE	988m	West
278518	Community Facility	NIAGARA PARK GUIDE HALL	997m	West

Topographic Features

Railway Crescent, Lisarow, NSW 2250

Tanks (Areas)

What are the Tank Areas located within the dataset buffer?
Note. The large majority of tank features provided by LPI are derived from aerial imagery & are therefore primarily above ground tanks.

Map Id	Tank Type	Status	Name	Feature Currency	Distance	Direction
	No records in buffer					

Tanks (Points)

What are the Tank Points located within the dataset buffer?
Note. The large majority of tank features provided by LPI are derived from aerial imagery & are therefore primarily above ground tanks.

Map Id	Tank Type	Status	Name	Feature Currency	Distance	Direction
	No records in buffer					

Major Easements

What Major Easements exist within the dataset buffer?
Note. Easements provided by LPI are not at the detail of local governments. They are limited to major easements such as Right of Carriageway, Electrical Lines (66kVa etc.), Easement to drain water & Significant subterranean pipelines (gas, water etc.).

Map Id	Easement Class	Easement Type	Easement Width	Distance	Direction
120119962	Primary	Undefined		103m	South
120120890	Primary	Undefined		109m	South East
120120699	Primary	Undefined		303m	South
120109807	Primary	Undefined		343m	North
120109142	Primary	Undefined		395m	South East
174954875	Primary	Right of way	Var	432m	South East
120117406	Primary	Undefined		526m	East
120114448	Primary	Undefined		531m	East
120112803	Primary	Undefined		553m	South East
120109816	Primary	Undefined		611m	North
120114148	Primary	Undefined		712m	South West
159729542	Primary	Right of way	8.5m and VAR	752m	East
120121585	Primary	Undefined		786m	East

Map Id	Easement Class	Easement Type	Easement Width	Distance	Direction
120118112	Primary	Undefined		868m	North
120121970	Primary	Undefined		881m	North
120121311	Primary	Undefined		939m	South West

Topographic Features

Railway Crescent, Lisarow, NSW 2250

State Forest

What State Forest exist within the dataset buffer?

State Forest Number	State Forest Name	Distance	Direction
N/A	No records in buffer		

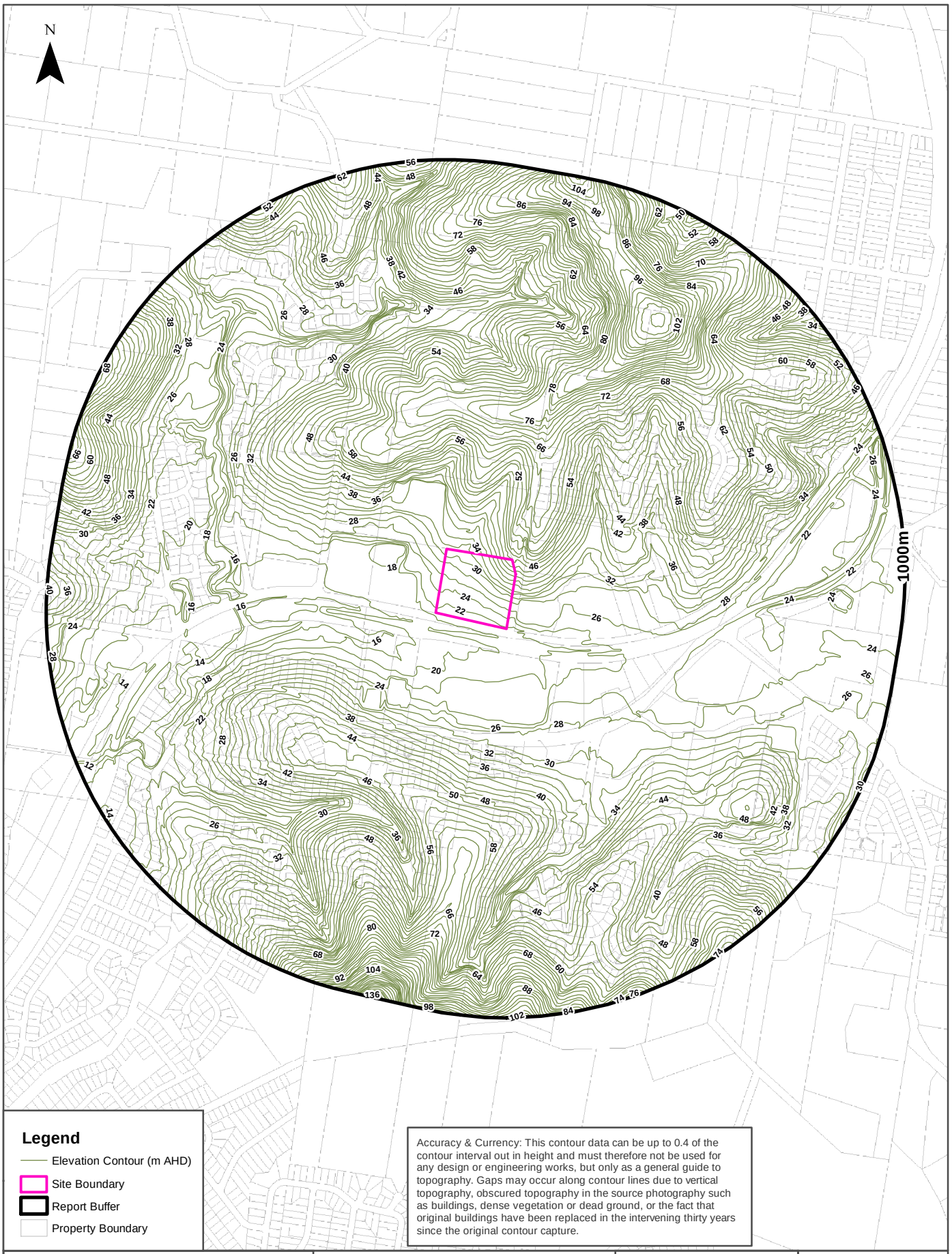
National Parks and Wildlife Service Reserves

What NPWS Reserves exist within the dataset buffer?

Reserve Number	Reserve Type	Reserve Name	Gazetted Date	Distance	Direction
N/A	No records in buffer				

Elevation Contours (m AHD)

Railway Crescent, Lisarow, NSW 2250



Accuracy & Currency: This contour data can be up to 0.4 of the contour interval out in height and must therefore not be used for any design or engineering works, but only as a general guide to topography. Gaps may occur along contour lines due to vertical topography, obscured topography in the source photography such as buildings, dense vegetation or dead ground, or the fact that original buildings have been replaced in the intervening thirty years since the original contour capture.

Scale:	Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2018	Coordinate System: GDA 1994 MGA Zone 56	Date: 03 April 2018
0 100 200 400 Meters			

Hydrogeology & Groundwater

Railway Crescent, Lisarow, NSW 2250

Hydrogeology

Description of aquifers on-site:

Description
Porous, extensive aquifers of low to moderate productivity

Description of aquifers within the dataset buffer:

Description
Porous, extensive aquifers of low to moderate productivity

Hydrogeology Map of Australia : Commonwealth of Australia (Geoscience Australia)

Botany Groundwater Management Zones

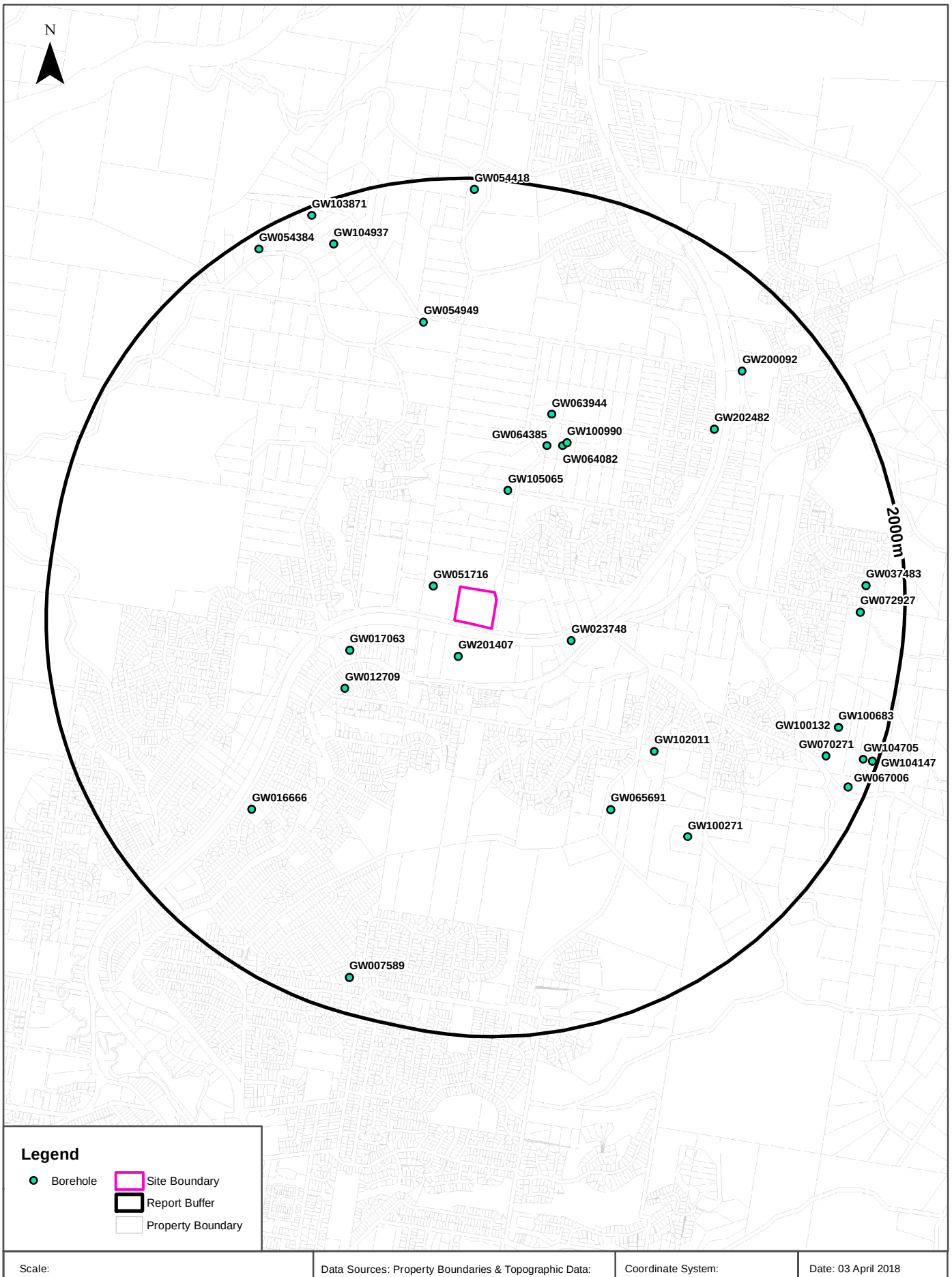
Groundwater management zones relating to the Botany Sand Beds aquifer within the dataset buffer:

Management Zone No.	Restriction	Distance	Direction
N/A	No records in buffer		

Botany Groundwater Management Zones Data Source : NSW Department of Primary Industries

Groundwater Boreholes

Railway Crescent, Lisarow, NSW 2250



Scale: 0 100 200 400 600 800 1,000 1,200 Meters

Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2018

Coordinate System: GDA 1994 MGA Zone 56

Date: 03 April 2018

Hydrogeology & Groundwater

Railway Crescent, Lisarow, NSW 2250

Groundwater Boreholes

Boreholes within the dataset buffer:

GW No.	Licence No	Work Type	Owner Type	Purpose	Contractor	Complete Date	Final Depth (m)	Drilled Depth (m)	Salinity (mg/L)	SWL (m)	Yield (L/s)	Elev (AHD)	Dist	Dir
GW051716	20BL113606	Bore open thru rock	Private	General Use		01/08/1980	45.00	45.00	Good				131m	North West
GW201407	20BL172487	Spear	Private	Monitoring		01/06/2010	4.50	4.50		2.00			169m	South
GW023748	20BL017401	Bore	Private	Irrigation		01/01/1966	21.30	21.30	Good				394m	East
GW105065	20BL157657	Bore	Private	Domestic		01/01/1989	51.00				0.233		502m	North
GW017063	20BL007612	Bore open thru rock	Private	Stock		01/11/1957	29.50	29.60	1001-3000 ppm				534m	West
GW012709	20BL005549	Bore open thru rock	Private	General Use			24.30		0-500 ppm				632m	South West
GW064385	20BL135864	Bore open thru rock	Private	Domestic, Stock		01/01/1919	80.00						761m	North East
GW064082	20BL136078	Bore open thru rock	Private	Domestic		01/02/1987	100.00						792m	North East
GW100990	20BL156954	Bore	Private	Domestic, Stock	JH Iselt Pty Ltd	26/11/1995	101.00	101.00	Fresh	44.00	0.070		814m	North East
GW063944	20BL135708	Bore	Private	Domestic, Stock		01/01/1987	97.00	97.00	Good				915m	North
GW102011	20BL158329	Bore		Domestic, Stock	JH Iselt Pty Ltd	18/12/1997	60.00	60.00	Fresh	10.00	0.220		1000m	South East
GW065691		(Unknown)		Irrigation									1063m	South East
GW054949	20BL118643	Bore	Private	Domestic, Stock		01/09/1981	106.00	106.00		37.00	0.080		1306m	North
GW202482	20BL173265	Bore	Other Govt	Monitoring		23/08/2012	26.20	26.20					1340m	North East
GW016666	20BL007073	Bore open thru rock	Private	Irrigation		01/01/1957	10.30	10.40	Domestic				1357m	South West
GW100271	20BL153377	Bore	Private	Domestic	Rose & Hawley Drilling Pty Ltd	18/11/1993	120.00	120.00		40.00	0.300		1403m	South East
GW200092	20BL169382	Bore		Test Bore		14/12/2005							1627m	North East
GW070271	20BL150366	Bore open thru rock	Private	Domestic		17/07/1992	43.00		Fresh				1754m	South East
GW100683	20BL157786	Bore	Private	Domestic, Stock	Intertec Drilling Services	12/11/1996	23.50	23.50	400	2.00	1.500		1767m	East
GW100132	20BL144478	Bore	Private	Domestic, Stock	ELAL Holdings	13/11/1991	28.00	28.00	Good	10.00	0.560		1767m	East
GW072927	20BL150700	Bore	Private	Domestic, Stock		10/10/1992	210.50	210.50			0.100		1783m	East

GW No.	Licence No	Work Type	Owner Type	Purpose	Contractor	Complete Date	Final Depth (m)	Drilled Depth (m)	Salinity (mg/L)	SWL (m)	Yield (L/s)	Elev (AHD)	Dist	Dir
GW104937	20BL160702	Bore	Private	Domestic	Slade Drilling	25/06/2002	66.00	66.00		30.00	0.570		1788 m	North
GW037483	20BL100407, 20BL132534	Bore	Private	General Use		01/06/1973	30.40						1811 m	East
GW007589		Well	Private	General Use		01/01/1947	7.00		0-500 ppm				1825 m	South
GW067006		Bore		Domestic		22/10/1990	37.10	37.10		26.00	1.300	50.00	1910 m	South East
GW054384	20BL115841	Bore open thru rock	Private	Domestic		01/04/1981	38.00	38.00	Good				1923 m	North West
GW104705	20BL160910	Bore	Private	Domestic, Stock	JH Iselt Pty Ltd	28/09/2002	61.00	61.00		20.00	0.250		1931 m	East
GW054418	20BL114465	Bore open thru rock	Private	Domestic, Stock		01/08/1980	84.00	84.00	1001-3000 ppm				1946 m	North
GW103871	20BL159530	Bore		Domestic	Slade Drilling	07/06/2000	96.00	96.00	Good				1956 m	North West
GW104147	20BL160405	Bore		Domestic, Stock	JH Iselt Pty Ltd	10/12/2001	52.00	52.00					1976 m	East

Hydrogeology & Groundwater

Railway Crescent, Lisarow, NSW 2250

Driller's Logs

Drill log data relevant to the boreholes within the dataset buffer:

Groundwater No	Drillers Log	Distance	Direction
GW051716	0.00m-1.00m Soil 1.00m-9.00m Clay 9.00m-45.00m Sandstone Water Supply	131m	North West
GW201407	0.00m-0.80m Fill, Sandy Clay 0.80m-1.40m Silty Clay 1.40m-2.80m Sand, fine-medium, grey-dark grey 2.80m-4.50m Sandy Clay, medium grained, grey-dark grey	169m	South
GW023748	0.00m-0.45m Soil 0.45m-7.62m Clay 7.62m-9.14m Sandstone 9.14m-17.37m Clay Sandy 17.37m-18.28m Gravel Water Supply 18.28m-19.81m Sand Clay 19.81m-21.33m Sand Gravel Water Supply	394m	East
GW017063	0.00m-4.26m Clay 4.26m-29.56m Sandstone Water Supply	534m	West
GW100990	0.00m-1.30m TOPSOIL 1.30m-4.20m CLAY BROWN 4.20m-16.40m MUDSTONE GREY 16.40m-23.30m SANDSTONE YELLOW 23.30m-28.00m SANDSTONE WHITE 28.00m-43.80m SANDSTONE BROWN 43.80m-44.10m SANDSTONE GREY 44.10m-44.30m SANDSTONE GREY W.B. 44.30m-101.00m SANDSTONE GREY	814m	North East
GW063944	0.00m-1.22m Soil Clay 1.22m-61.00m Sandstone Water Supply 61.00m-97.00m Sandstone Grey Shale	915m	North
GW102011	0.00m-0.40m Topsoil 0.40m-13.00m Brown Clay 13.00m-15.50m Grey Sand 15.50m-28.20m Grey Sandstone 28.20m-29.00m Yellow Sandstone W. B. 29.00m-35.00m Yellow Sandstone 35.00m-56.00m Grey Sandstone 56.00m-57.00m Grey Sandstone W. B. 57.00m-60.00m Grey Sandstone	1000m	South East
GW054949	0.00m-5.00m Soil Clayey, Soft Rock 5.00m-25.00m Sandstone 25.00m-32.00m Shale 32.00m-67.00m Sandstone 67.00m-75.00m Shale Water Supply 75.00m-85.00m Sandstone 85.00m-106.00m Shale	1306m	North

Groundwater No	Drillers Log	Distance	Direction
GW202482	0.00m-1.10m Fill 1.10m-3.25m Silty Clay 3.25m-4.75m Clayey Sand 4.75m-5.80m Sand, Silty Clayey 5.80m-7.20m Clayey Sand 7.20m-9.60m Silty Sand 9.60m-10.00m Silty Clay 10.00m-10.70m Sandy Clay/Clayey Sand 10.70m-11.10m Sand 11.10m-12.40m Sandy Clay 12.40m-13.50m Silty Clay 13.50m-15.00m Clay, Sandy Silty 15.00m-22.50m Clayey Sand 22.50m-24.70m Sand 24.70m-24.75m Gravel 24.75m-24.85m Sandstone, ferruginised 24.85m-24.90m Soil/Gravel, residual 24.90m-25.80m (Unknown) core loss 25.80m-26.00m Soil, residual 26.00m-26.20m Sandstone, weathered	1340m	North East
GW016666	0.00m-0.30m Topsoil 0.30m-2.43m Clay Light 2.43m-7.92m Clay Red Stones Small 7.92m-10.36m Sandstone Very Hard Water Supply	1357m	South West
GW100271	0.00m-1.00m TOPSOIL & CLAY 1.00m-19.00m BROWN WEATHERED SANDSTONE 19.00m-23.00m GREY CLAYSTONE 23.00m-30.00m WEATHERED SANDSTONE 30.00m-40.00m GREY SILTSTONE 40.00m-42.00m WEATHERED SANDSTONE 42.00m-64.00m GREY SILTSTONE 64.00m-97.00m GREY SANDSTONE 97.00m-98.00m FRACTURED SHALY SANDSTONE 98.00m-114.00m GREY SILTSTONE 114.00m-115.00m FRACTURED SANDSTONE 115.00m-120.00m GREY SANDSTONE	1403m	South East
GW100132	0.00m-9.00m BROWN CLAY 9.00m-16.00m BROWN SANDSTONE 16.00m-28.00m WHITE SANDSTONE	1767m	East
GW100683	0.00m-8.00m Clay 8.00m-14.00m Brown, Weathered Sandstone 14.00m-14.80m Sandstone, White, Fine Grain 14.80m-19.70m Sandstone, Light Grey, Fine Grain 19.70m-23.50m Sandstone, Light Grey, Med Grain	1767m	East
GW072927	0.00m-2.50m Soil & Clay 2.50m-20.00m Weathered Sandstone 20.00m-21.00m Clay Band 21.00m-23.50m Slightly Weathered Sandstone 23.50m-49.00m Fine Grain Sandstone 49.00m-73.00m Interbedded Shale, Grey Sandstone Some Fractures 73.00m-76.50m Shale Band 76.50m-118.00m Grey Fine/med Sandstone 118.00m-121.00m Red/brown Shale 121.00m-132.50m Grey/white Bnd Sandstone 132.50m-176.00m Grey/white Bnd Sandstone 176.00m-180.00m Interbedded Sandstone Shale 180.00m-210.50m Red/brown Shale Small Silt Sandstone Bands	1783m	East
GW104937	0.00m-0.50m TOPSOIL 0.50m-66.00m SANDSTONE	1788m	North
GW054384	0.00m-1.00m Soil 1.00m-3.00m Clay 3.00m-7.00m Sandstone 7.00m-15.00m Shale 15.00m-26.00m Sandstone 26.00m-38.00m Shale Water Supply	1923m	North West
GW104705	0.00m-0.60m TOPSOIL 0.60m-1.60m GRAVEL 1.60m-9.20m CLAY GREY 9.20m-12.90m SANDSTONE CG YELLOW DK 12.90m-48.90m SANDSTONE FG GREY LT 48.90m-49.40m FRACTURED SANDSTONE CG GREY LT 49.40m-50.10m CLAY GREY 50.10m-61.00m SANDSTONE FG GREY LT	1931m	East

Groundwater No	Drillers Log	Distance	Direction
GW054418	0.00m-1.00m Soil 1.00m-7.00m Clay Sandstone Interlayere 7.00m-18.00m Sandstone 18.00m-21.00m Shale 21.00m-84.00m Sandstone Water Supply	1946m	North
GW103871	0.00m-0.60m SAND 0.60m-3.00m CLAYS 3.00m-96.00m SANDSTONE	1956m	North West
GW104147	0.00m-0.50m TOPSOIL 0.50m-8.20m SANDY CLAY BROWN/YELLOW 8.20m-17.40m SANDSTONE C.G. YELLOW DARK 17.40m-47.90m SANDSTONE M.G. LT 47.90m-48.10m CLAY GREY 48.10m-48.70m FRACTURED SANDSTONE C.G. 48.70m-52.00m SANDSTONE M.G. GREY LT	1976m	East

Drill Log Data Source: NSW Department of Primary Industries - Office of Water / Water Administration Ministerial Corp

Geology 1:250,000

Railway Crescent, Lisarow, NSW 2250

Geology

Railway Crescent, Lisarow, NSW 2250

Geological Units

What are the Geological Units onsite?

Symbol	Description	Unit Name	Group	Sub Group	Age	Dom Lith	Map Sheet	Dataset
Rn	Sandstone, interbedded sandstone and siltstone, claystone. conglomerate and sandstone (Widden Brook conglomerate)	Narrabeen Group	Narrabeen Group	Clifton Subgroup	Mesozoic			1:250,000

What are the Geological Units within the dataset buffer?

Symbol	Description	Unit Name	Group	Sub Group	Age	Dom Lith	Map Sheet	Dataset
Qa	Undifferentiated alluvial deposits; sand, silt, clay and gravel; some residual and colluvial deposits. Includes some channel, levee, lacustrine, floodplain and swamp deposits. May include some higher level Tertiary terraces	undifferentiated			Cainozoic			1:250,000
Rn	Sandstone, interbedded sandstone and siltstone, claystone. conglomerate and sandstone (Widden Brook conglomerate)	Narrabeen Group	Narrabeen Group	Clifton Subgroup	Mesozoic			1:250,000

Geological Structures

What are the Geological Structures onsite?

Feature	Name	Description	Map Sheet	Dataset
No features				1:250,000

What are the Geological Structures within the dataset buffer?

Feature	Name	Description	Map Sheet	Dataset
No features				1:250,000

Geological Data Source : NSW Department of Industry, Resources & Energy

Naturally Occurring Asbestos Potential

Railway Crescent, Lisarow, NSW 2250

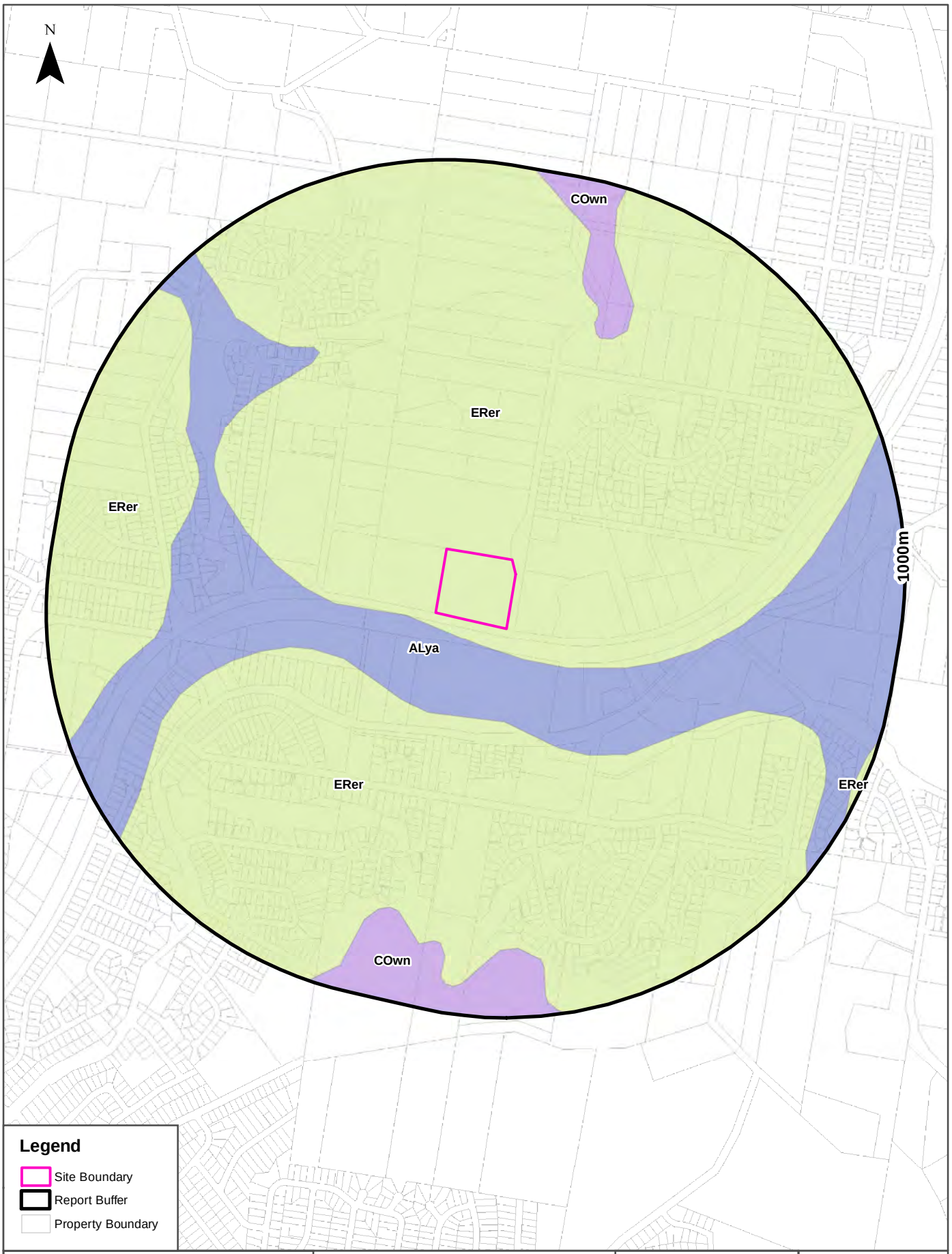
Naturally Occurring Asbestos Potential

Naturally Occurring Asbestos Potential within the dataset buffer:

Potential	Sym	Strat Name	Group	Formation	Scale	Min Age	Max Age	Rock Type	Dom Lith	Description	Dist	Dir
No records in buffer												

Soil Landscapes

Railway Crescent, Lisarow, NSW 2250



Scale: 0 100 200 400 600 Meters

Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2018

Coordinate System: GDA 1994 MGA Zone 56

Date: 03 April 2018

Soils

Railway Crescent, Lisarow, NSW 2250

Soil Landscapes

What are the onsite Soil Landscapes?

Soil Code	Name	Group	Process	Map Sheet	Scale
ERer	ERINA		EROSIONAL	Gosford & Lake Macquarie	1:100,000

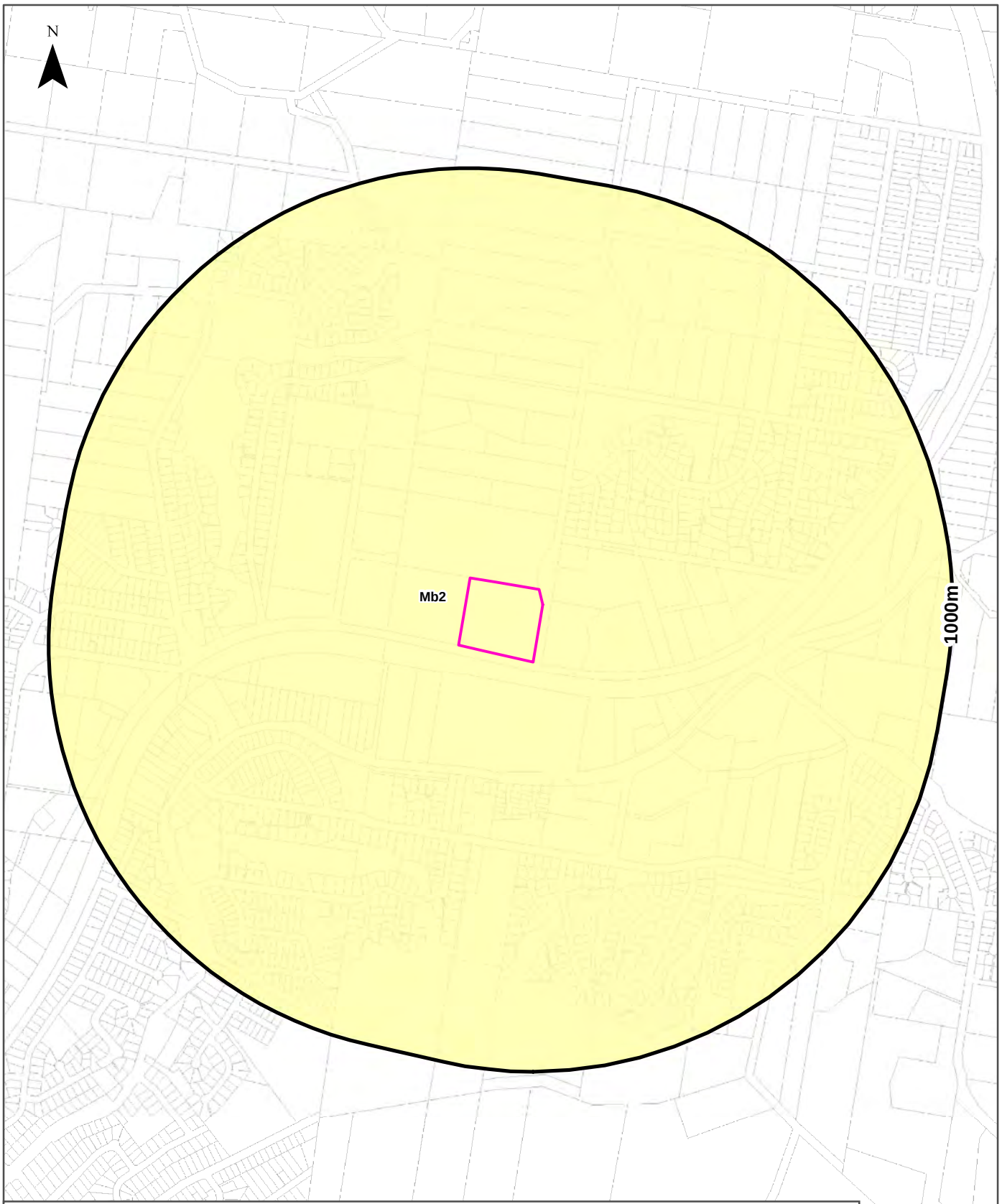
What are the Soil Landscapes within the dataset buffer?

Soil Code	Name	Group	Process	Map Sheet	Scale
ALya	YARRAMALONG		ALLUVIAL	Gosford & Lake Macquarie	1:100,000
COwn	WATAGAN		COLLUVIAL	Gosford & Lake Macquarie	1:100,000
ERer	ERINA		EROSIONAL	Gosford & Lake Macquarie	1:100,000

Soils Landscapes Data Source : NSW Office of Environment and Heritage

Atlas of Australian Soils

Railway Crescent, Lisarow, NSW 2250



Legend

- Site Boundary
- Report Buffer
- Property Boundary

Australian Soil Classification Orders

Anthroposol	Dermosol	Kandosol	Podosol	Tenosol	No Data
Calcarosol	Ferrosol	Kurosol	Rudosol	Vertosol	
Chromosol	Hydrosol	Organosol	Sodosol	Lake	

Scale: 0 100 200 400 600 Meters

Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2018

Coordinate System: GDA 1994 MGA Zone 56

Date: 03 April 2018

Soils

Railway Crescent, Lisarow, NSW 2250

Atlas of Australian Soils

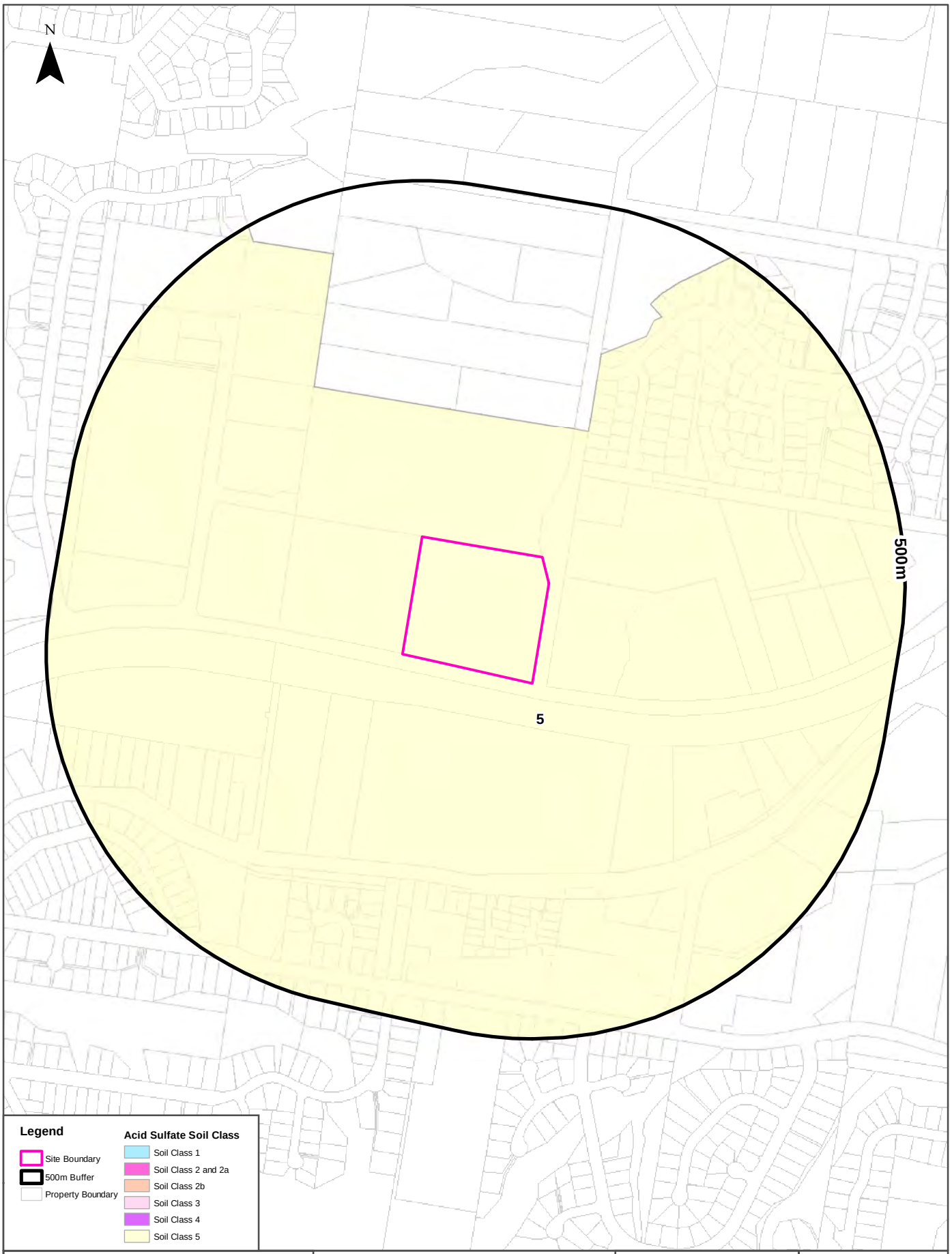
Soil mapping units and Australian Soil Classification orders within the dataset buffer:

Map Unit Code	Soil Order	Map Unit Description	Distance
Mb2	Kandosol	Dissected sandstone plateau of moderate to strong relief with sandstone pillars, ledges, and slabs-- level to undulating ridges, irregularly benched slopes, steep ridges, cliffs, canyons, narrow sandy valleys: chief soils are (i) on areas of gentle to moderate relief, acid yellow leached earths (Gn2.74) and (Gn2.34) and acid leached yellow earths (Gn2.24)-sometimes these soils contain ironstone gravel; and (ii) on, or adjacent to, areas of strong relief, siliceous sands (Uc1.2), leached sands (Uc2.12) and (Uc2.2), and shallow forms of the above (Gn2) soils. Associated are: (i) on flat to gently undulating remnants of the original plateau surface, leached sands (Uc2.3), siliceous sands (Uc1.2), sandy earths (Uc5.22), and (Gn2) soils as for (i) above (these areas are in part comparable with unit Cb29); (ii) on flat ironstone gravelly remnants of the original plateau surface, (Gn2) soils as for unit Mb5(i); (iii) on gently undulating ridges where interbedded shales are exposed, shallow, often stony (Dy3.41), (Dr2.21), and related soils similar to unit Tb35; (iv) narrow valleys of (Uc2.3) soils flanked by moderate slopes of (Dy3.41) soils; (v) escarpments of steep hills with shallow (Dy) and (Dr) soils between sandstone pillars; and (vi) shallow (Um) soils, such as (Um6.21) on steep hills of basic rocks. As mapped, minor areas of units Mg20, Mm1, and Mw8 are included. Data are limited.	0m

Atlas of Australian Soils Data Source: CSIRO

Acid Sulfate Soils

Railway Crescent, Lisarow, NSW 2250



Scale: 0 100 200 Meters

Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2018

Coordinate System: GDA 1994 MGA Zone 56

Date: 03 April 2018

Acid Sulfate Soils

Railway Crescent, Lisarow, NSW 2250

Standard Local Environmental Plan Acid Sulfate Soils

What is the on-site Acid Sulfate Soil Plan Class that presents the largest environmental risk?

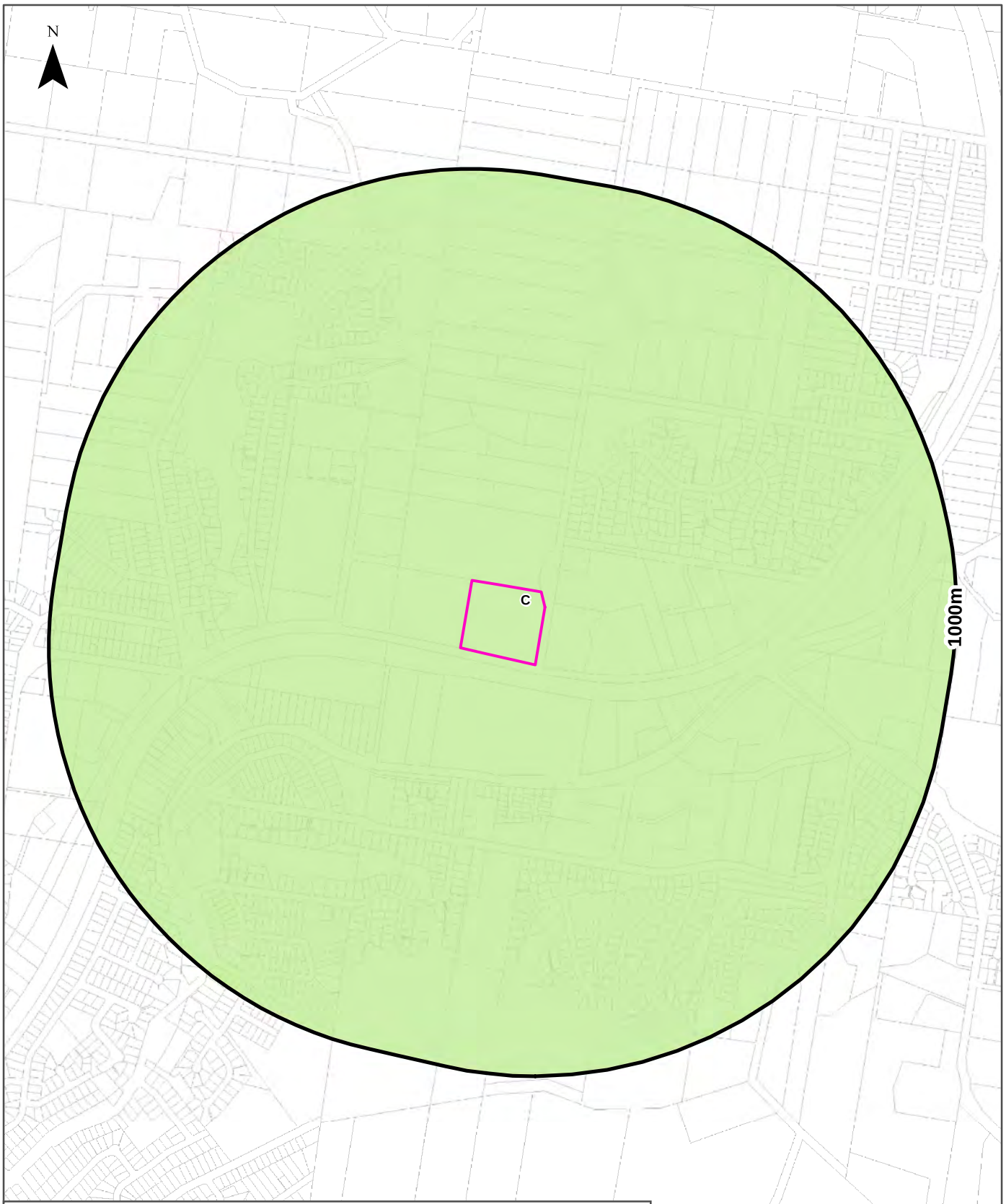
Soil Class	Description	LEP
5	Works within 500 metres of adjacent Class 1, 2, 3, or 4 land that is below 5 metres AHD and by which the watertable is likely to be lowered below 1 metre AHD on adjacent Class 1, 2, 3 or 4 land, present an environmental risk	Gosford Local Environmental Plan 2014

If the on-site Soil Class is 5, what other soil classes exist within 500m?

Soil Class	Description	LEP	Distance	Direction
None				

Atlas of Australian Acid Sulfate Soils

Railway Crescent, Lisarow, NSW 2250



Legend

- Site Boundary
- Report Buffer
- Property Boundary

Probability of occurrence of Acid Sulfate Soils

- A. High (>70%)
- B. Low (6-70%)
- C. Extremely Low (1-5%)
- D. No Chance (0%)
- No Data

Scale: 0 100 200 400 600 Meters

Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2018

Coordinate System: GDA 1994 MGA Zone 56

Date: 03April 2018

Acid Sulfate Soils

Railway Crescent, Lisarow, NSW 2250

Atlas of Australian Acid Sulfate Soils

Atlas of Australian Acid Sulfate Soil categories within the dataset buffer:

Class	Description	Distance
C	Extremely low probability of occurrence. 1-5% chance of occurrence with occurrences in small localised areas.	0m

Atlas of Australian Acid Sulfate Soils Data Source: CSIRO

Dryland Salinity

Railway Crescent, Lisarow, NSW 2250

Dryland Salinity - National Assessment

Is there Dryland Salinity - National Assessment data onsite?

No

Is there Dryland Salinity - National Assessment data within the dataset buffer?

No

What Dryland Salinity assessments are given?

Assessment 2000	Assessment 2020	Assessment 2050	Distance	Direction
N/A	N/A	N/A	N/A	N/A

Dryland Salinity Data Source : National Land and Water Resources Audit
The Commonwealth and all suppliers of source data used to derive the maps of "Australia, Forecast Areas Containing Land of High Hazard or Risk of Dryland Salinity from 2000 to 2050" do not warrant the accuracy or completeness of information in this product. Any person using or relying upon such information does so on the basis that the Commonwealth and data suppliers shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information. Any persons using this information do so at their own risk.
In many cases where a high risk is indicated, less than 100% of the area will have a high hazard or risk.

Dryland Salinity Potential of Western Sydney

Dryland Salinity Potential of Western Sydney within the dataset buffer?

Feature Id	Classification	Description	Distance	Direction
N/A	Outside Data Coverage			

Dryland Salinity Potential of Western Sydney Data Source : NSW Office of Environment and Heritage

Mining Subsidence Districts

Railway Crescent, Lisarow, NSW 2250

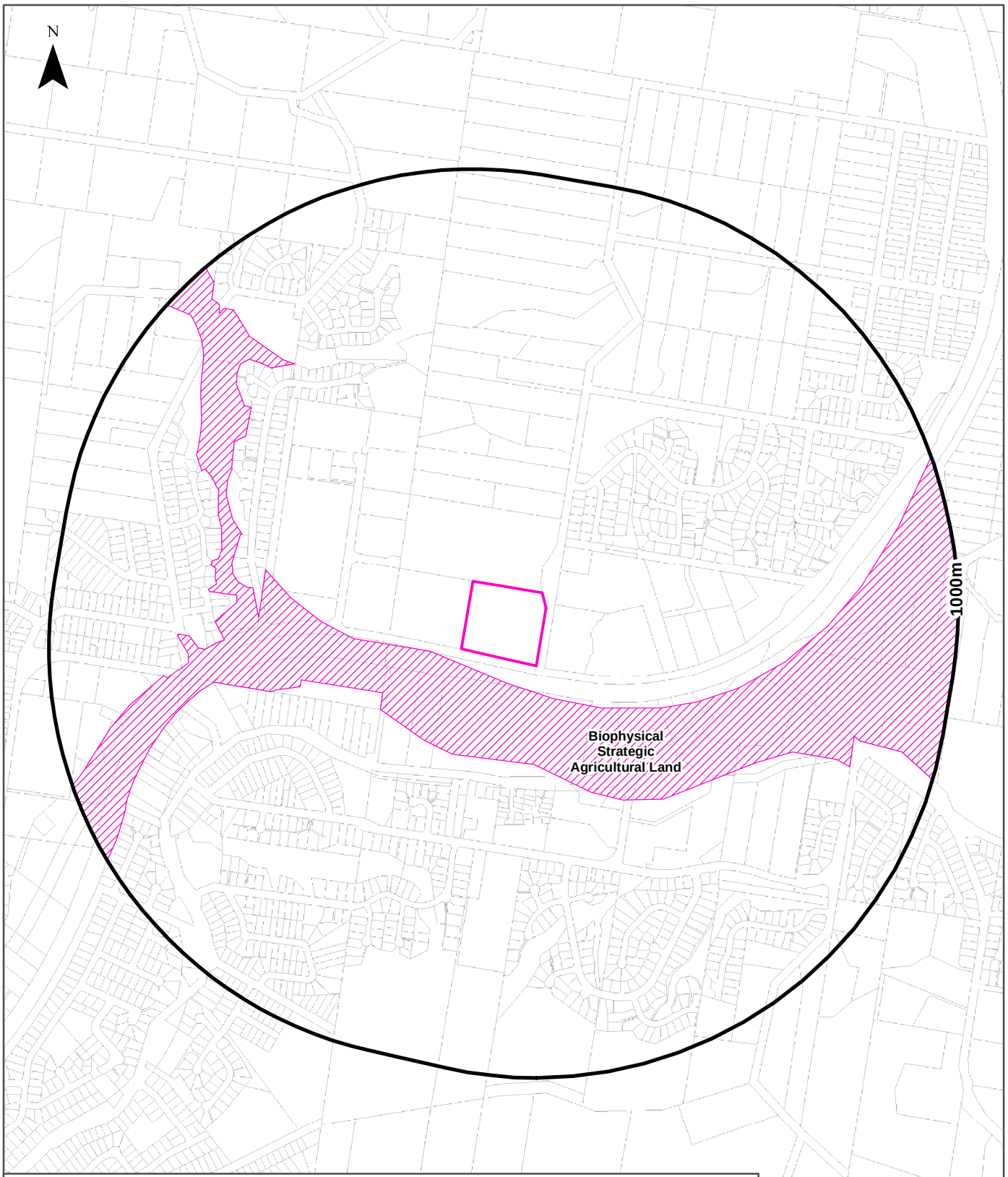
Mining Subsidence Districts

Mining Subsidence Districts within the dataset buffer:

District	Distance	Direction
There are no Mining Subsidence Districts within the report buffer		

State Environmental Planning Policy

Railway Crescent, Lisarow, NSW 2250



Legend

- Site Boundary
- Report Buffer
- Property Boundary
- SEPP 14 - Coastal Wetlands
- SEPP 26 - Littoral Rainforests
- SEPP 71 - Coastal Protection
- SEPP Major Developments 2005
- Strategic Land Use - Future Residential Growth Areas
- Strategic Land Use - Additional Rural Village Land
- Strategic Land Use -Biophysical Strategic Agricultural Land
- Strategic Land Use -Critical Industry Cluster (Equine)
- Strategic Land Use -Critical Industry Cluster (Viticulture)

Scale:	Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2018	Coordinate System: GDA 1994 MGA Zone 56	Date: 03 April 2018
0 100 200 400 600 Meters			

Environmental Zoning

Railway Crescent, Lisarow, NSW 2250

State Environmental Planning Policy Protected Areas

Are there any State Environmental Planning Policy Protected Areas onsite or within the dataset buffer?

Dataset	Onsite	Within Site Buffer	Distance
SEPP14 - Coastal Wetlands	No	No	N/A
SEPP26 - Littoral Rainforests	No	No	N/A
SEPP71 - Coastal Protection Zone	No	No	N/A

SEPP Protected Areas Data Source: NSW Department of Planning & Environment

State Environmental Planning Policy Major Developments (2005)

State Environmental Planning Policy Major Developments within the dataset buffer:

Map Id	Feature	Effective Date	Distance	Direction
N/A	No records within buffer			

SEPP Major Development Data Source: NSW Department of Planning & Environment

State Environmental Planning Policy Strategic Land Use Areas

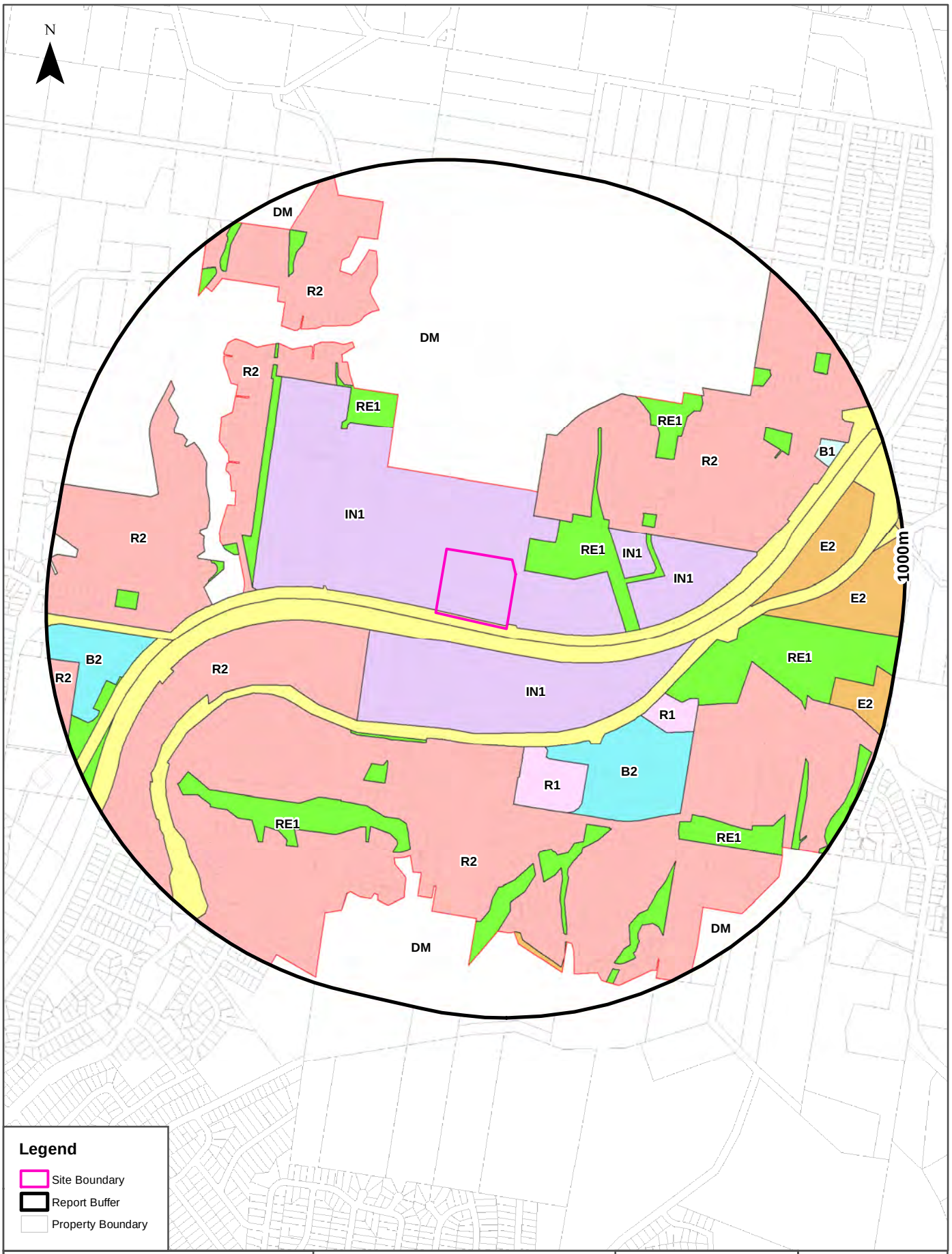
State Environmental Planning Policy Strategic Land Use Areas onsite or within the dataset buffer:

Strategic Land Use	SEPPNo	Effective Date	Amendment	Amendment Year	Distance	Direction
Biophysical Strategic Agricultural Land	2007	28/01/2014	Coal Seam Gas	2014	34m	North

SEPP Strategic Land Use Data Source: NSW Department of Planning & Environment

LEP Planning Zones

Railway Crescent, Lisarow, NSW 2250



Scale: 0 100 200 400 600 Meters

Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2018
Planning: NSW Crown Copyright - Planning & Environment

Coordinate System: GDA 1994 MGA Zone 56

Date: 03 April 2018

Local Environmental Plan

Railway Crescent, Lisarow, NSW 2250

Land Zoning

What Local Environmental Plan Land Zones exist within the dataset buffer?

Zone	Description	Purpose	LEP or SEPP	Published Date	Commenced Date	Currency Date	Amendment	Distance	Direction
IN1	General Industrial		Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	11/08/2017		0m	Onsite
SP2	Infrastructure	Road	Gosford Local Environmental Plan 2014	04/08/2017	04/08/2017	11/08/2017	Amendment No 25	0m	Onsite
SP2	Infrastructure	Rail Infrastructure Facility	Gosford Local Environmental Plan 2014	04/08/2017	04/08/2017	11/08/2017	Amendment No 25	21m	South West
RE1	Public Recreation		Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	11/08/2017		23m	East
IN1	General Industrial		Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	11/08/2017		61m	South
R2	Low Density Residential		Gosford Local Environmental Plan 2014	04/08/2017	04/08/2017	11/08/2017	Amendment No 25	127m	North East
R2	Low Density Residential		Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	11/08/2017		176m	South West
DM	Deferred Matter		Gosford Local Environmental Plan 2014	04/08/2017	04/08/2017	11/08/2017	Amendment No 25	183m	West
IN1	General Industrial		Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	11/08/2017		260m	East
SP2	Infrastructure	Road	Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	11/08/2017		268m	South West
IN1	General Industrial		Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	11/08/2017		284m	East
R2	Low Density Residential		Gosford Local Environmental Plan 2014	04/08/2017	04/08/2017	11/08/2017	Amendment No 25	301m	South
R1	General Residential		Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	11/08/2017		307m	South
B2	Local Centre		Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	11/08/2017		319m	South East
RE1	Public Recreation		Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	11/08/2017		324m	South West
RE1	Public Recreation		Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	11/08/2017		340m	North West
RE1	Public Recreation		Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	11/08/2017		345m	East
RE1	Public Recreation		Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	11/08/2017		400m	South West
R1	General Residential		Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	11/08/2017		409m	South East
RE1	Public Recreation		Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	11/08/2017		438m	East
RE1	Public Recreation		Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	11/08/2017		452m	North East
R2	Low Density Residential		Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	11/08/2017		464m	North West
RE1	Public Recreation		Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	11/08/2017		477m	North West
RE1	Public Recreation		Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	11/08/2017		523m	West
RE1	Public Recreation		Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	11/08/2017		527m	South West
RE1	Public Recreation		Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	11/08/2017		541m	South
RE1	Public Recreation		Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	11/08/2017		556m	West

Zone	Description	Purpose	LEP or SEPP	Published Date	Commenced Date	Currency Date	Amendment	Distance	Direction
R2	Low Density Residential		Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	11/08/2017		572m	West
RE1	Public Recreation		Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	11/08/2017		606m	South
E2	Environmental Conservation		Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	11/08/2017		607m	East
DM	Deferred Matter		Gosford Local Environmental Plan 2014	04/08/2017	04/08/2017	11/08/2017	Amendment No 25	623m	South East
R2	Low Density Residential		Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	11/08/2017		625m	North West
E2	Environmental Conservation		Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	11/08/2017		640m	East
RE1	Public Recreation		Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	11/08/2017		655m	North West
RE1	Public Recreation		Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	11/08/2017		665m	South East
SP2	Infrastructure	Road	Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	11/08/2017		678m	South West
RE1	Public Recreation		Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	11/08/2017		715m	North East
B2	Local Centre		Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	11/08/2017		717m	West
RE1	Public Recreation		Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	11/08/2017		738m	South East
RE1	Public Recreation		Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	11/08/2017		761m	North East
RE1	Public Recreation		Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	11/08/2017		765m	West
E2	Environmental Conservation		Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	11/08/2017		779m	South
RE1	Public Recreation		Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	11/08/2017		808m	North West
RE1	Public Recreation		Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	11/08/2017		818m	South
B1	Neighbourhood Centre		Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	11/08/2017		820m	East
RE1	Public Recreation		Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	11/08/2017		823m	South West
RE1	Public Recreation		Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	11/08/2017		836m	South East
RE1	Public Recreation		Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	11/08/2017		866m	South West
RE1	Public Recreation		Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	11/08/2017		911m	North West
RE1	Public Recreation		Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	11/08/2017		913m	North East
RE1	Public Recreation		Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	11/08/2017		915m	South
SP2	Infrastructure	Road	Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	11/08/2017		917m	East
R2	Low Density Residential		Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	11/08/2017		925m	West
RE1	Public Recreation		Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	11/08/2017		953m	South East
E3	Environmental Management		Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	11/08/2017		980m	East
RE2	Private Recreation		Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	11/08/2017		992m	East

Local Environmental Plan

Railway Crescent, Lisarow, NSW 2250

Minimum Subdivision Lot Size

What are the onsite Local Environmental Plan Minimum Subdivision Lot Sizes?

Symbol	Minimum Lot Size	LEP or SEPP	Published Date	Commenced Date	Currency Date	Amendment	Percentage of Site Area
No Data							

Maximum Height of Building

What are the onsite Local Environmental Plan Maximum Height of Buildings?

Symbol	Maximum Height of Building	LEP or SEPP	Published Date	Commenced Date	Currency Date	Amendment	Percentage of Site Area
No Data							

Floor Space Ratio

What are the onsite Local Environmental Plan Floor Space Ratios?

Symbol	Floor Space Ratio	LEP or SEPP	Published Date	Commenced Date	Currency Date	Amendment	Percentage of Site Area
No Data							

Land Application

What are the onsite Local Environmental Plan Land Applications?

Application Type	LEP or SEPP	Published Date	Commenced Date	Currency Date	Amendment	Percentage of Site Area
Included	Gosford Local Environmental Plan 2014	04/08/2017	04/08/2017	04/08/2017	Amendment No 25	100

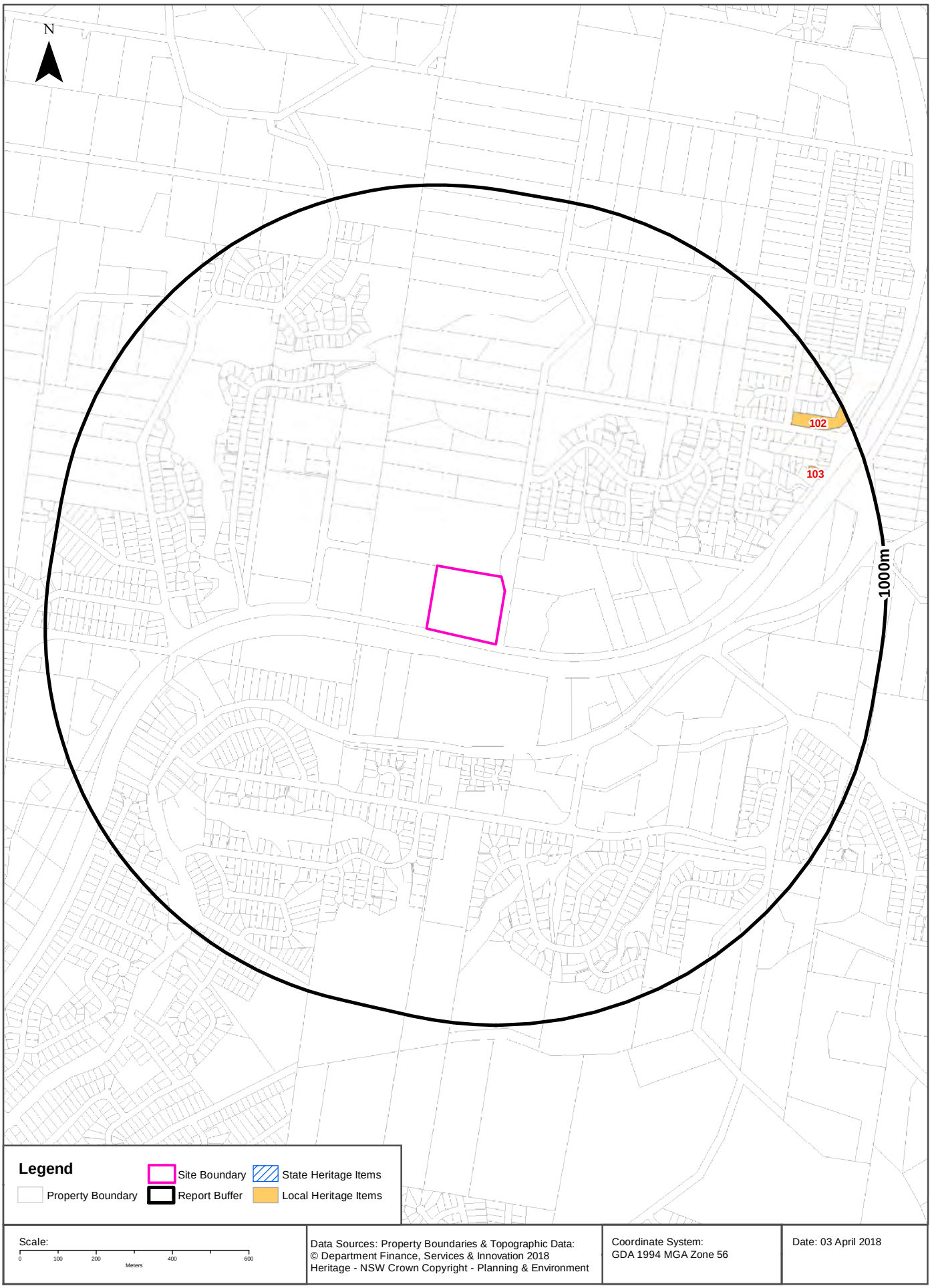
Land Reservation Acquisition

What are the onsite Local Environmental Plan Land Reservation Acquisitions?

Reservation	LEP	Published Date	Commenced Date	Currency Date	Amendment	Comments	Percentage of Site Area
Infrastructure	Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	04/08/2017			4.7

Heritage Items

Railway Crescent, Lisarow, NSW 2250



Data Sources: Property Boundaries & Topographic Data:
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Heritage - NSW Crown Copyright - Planning & Environment

Coordinate System:
GDA 1994 MGA Zone 56

Date: 03 April 2018

Heritage

Railway Crescent, Lisarow, NSW 2250

State Heritage Items

What are the State Heritage Items located within the dataset buffer?

Map Id	Name	Address	LGA	Listing Date	Listing No	Plan No	Distance	Direction
N/A	No records in buffer							

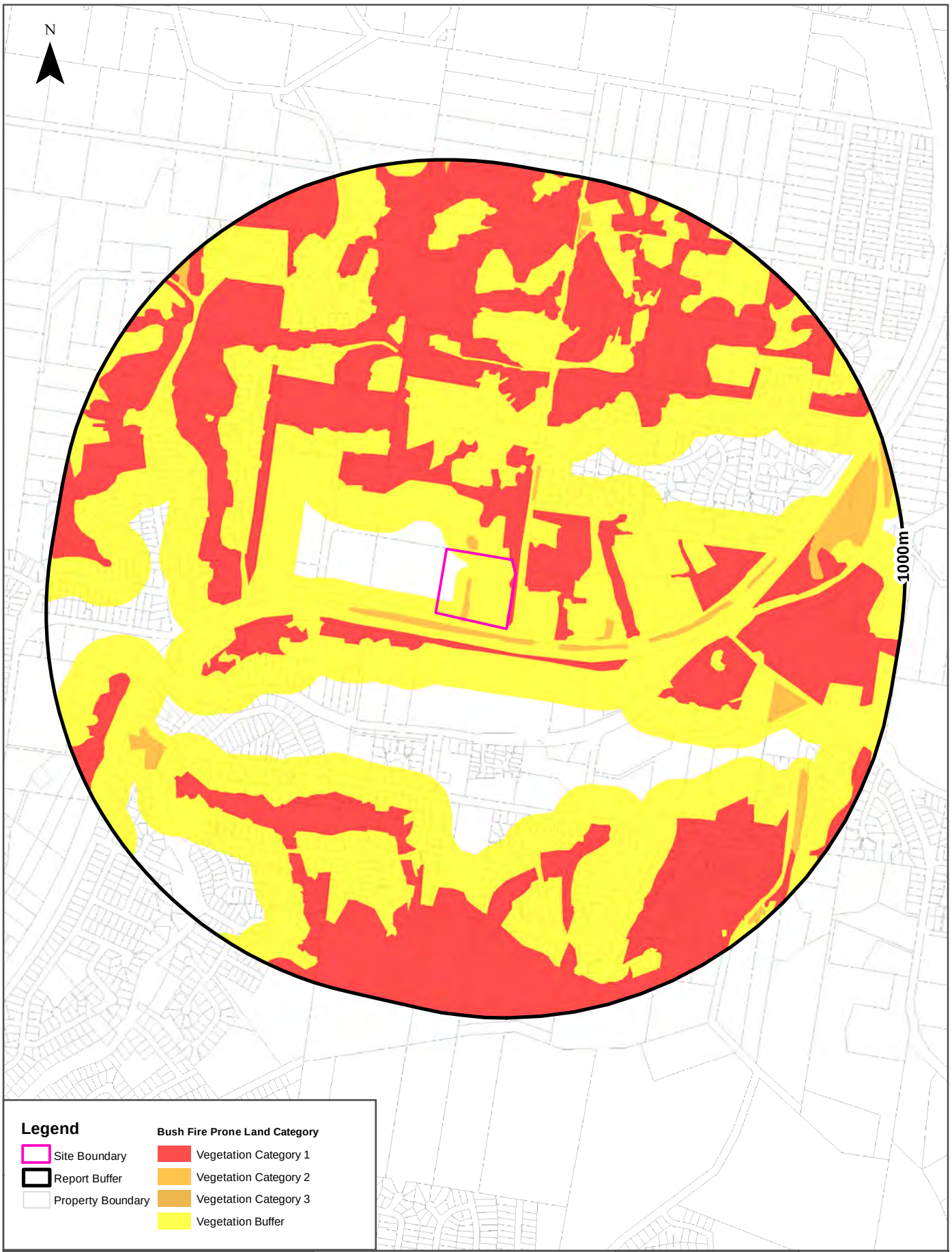
Local Heritage Items

What are the Local Heritage Items located within the dataset buffer?

Map Id	Name	Classification	Significance	LEP or Act	Published Date	Commenced Date	Currency Date	Distance	Direction
103	Post office, shop and outbuilding (Pryor Brothers)	Item - General	Local	Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	04/08/2017	854m	East
102	Cemetery	Item - General	Local	Gosford Local Environmental Plan 2014	11/02/2014	11/02/2014	04/08/2017	857m	North East

Natural Hazards - Bush Fire Prone Land

Railway Crescent, Lisarow, NSW 2250



Scale: 0 100 200 400 600 Meters

Data Sources: Bush Fire Prone Land: © NSW Rural Fire Service 2018. Property Boundaries: © Department Finance, Services & Innovation 2018

Coordinate System: GDA 1994 MGA Zone 56

Date: 03 April 2018

Natural Hazards

Railway Crescent, Lisarow, NSW 2250

Bush Fire Prone Land

What are the nearest Bush Fire Prone Land Categories that exist within the dataset buffer?

Bush Fire Prone Land Category	Distance	Direction
Vegetation Buffer	0m	Onsite
Vegetation Category 1	0m	Onsite
Vegetation Category 2	0m	Onsite

Ecological Constraints - Vegetation & RAMSAR Wetlands

Railway Crescent, Lisarow, NSW 2250

Scale: 0 100 200 400 600 Meters

Data Sources: Property Boundaries & Topographic Data: © Land and Property Information (a division of the Department of Finance and Services) 2018

Coordinate System: GDA 1994 MGA Zone 56

Date: 03April 2018

Ecological Constraints

Railway Crescent, Lisarow, NSW 2250

Vegetation of Gosford LGA

What vegetation of Gosford LGA exists within the dataset buffer?

Veg Class	Community	Keith Class	REMS Name	Key Species	EEC Equivalent	Myrtle Rust	Significance	Distance	Direction
E6ai	E6ai - Coastal Narrabeen Moist Forest	North Coast Wet Sclerophyll Forests	Coastal Narrabeen Moist Forest	E.saligna A.torulosa S.glomulifera E.acmenoides E.pilularis		Extreme		0m	Onsite
Xx	Disturbed - exotic vegetation			various		Low		0m	Onsite
Xr	Disturbed - Canopy Only			various	Individual site assessment required	Low		17m	South West
Xs	Disturbed - Regrowth			various	Individual site assessment required	Low		168m	North East
E37a	E37a - Alluvial Paperbark Sedge Forest	Coastal Swamp Forests	Swamp Mahogany - Paperbark Forest	E.robusta M.biconvexa C.salignus L.australis G.clarkei	Swamp Sclerophyll Forest on Coastal Floodplains EEC	Extreme	Endangered Ecological Communities	232m	South East
Water	Water					Low		528m	East
E6b	E6b - Coastal Narrabeen Ironbark Forest	Northern Hinterland Wet Sclerophyll Forests	Coastal Narrabeen Moist Forest	E.paniculata E.punctata S.glomulifera E.acmenoides		Extreme	Regionally Significant Vegetation	680m	North
E22b	E22b - Narrabeen Coastal Apple Forest	Northern Hinterland Wet Sclerophyll Forests	Coastal Narrabeen Shrub Forest	A.floribunda E.siderophloia A.torulosa		Low	Regionally Significant Vegetation	718m	South
E46a	E46a - Freshwater Typha Wetland	Coastal Freshwater Lagoons	Freshwater Wetland Complex	T.orientalis	Freshwater Wetlands on Coastal Floodplains EEC	Low	Endangered Ecological Communities	750m	East
E22ai	E22ai - Narrabeen Coastal Blackbutt Forest	Northern Hinterland Wet Sclerophyll Forests	Coastal Narrabeen Shrub Forest	E.pilularis S.glomulifera A.torulosa		High	Regionally Significant Vegetation	853m	North East
E1ai	E1ai - Coastal Warm Temperate Rainforest	Northern Warm Temperate Rainforests/ Subtropical Rainforests	Coastal Warm Temperate - Subtropical Rainforest	A.smithii D.sassafras C.glaucescens C.apetalum E.saligna A.excelsa	Lowland Rainforest EEC (site-by-site assessment required)	Extreme	Endangered Ecological Communities	925m	North West

Vegetation of Gosford LGA: Council of the City of Gosford / NSW Office of Environment and Heritage

RAMSAR Wetlands

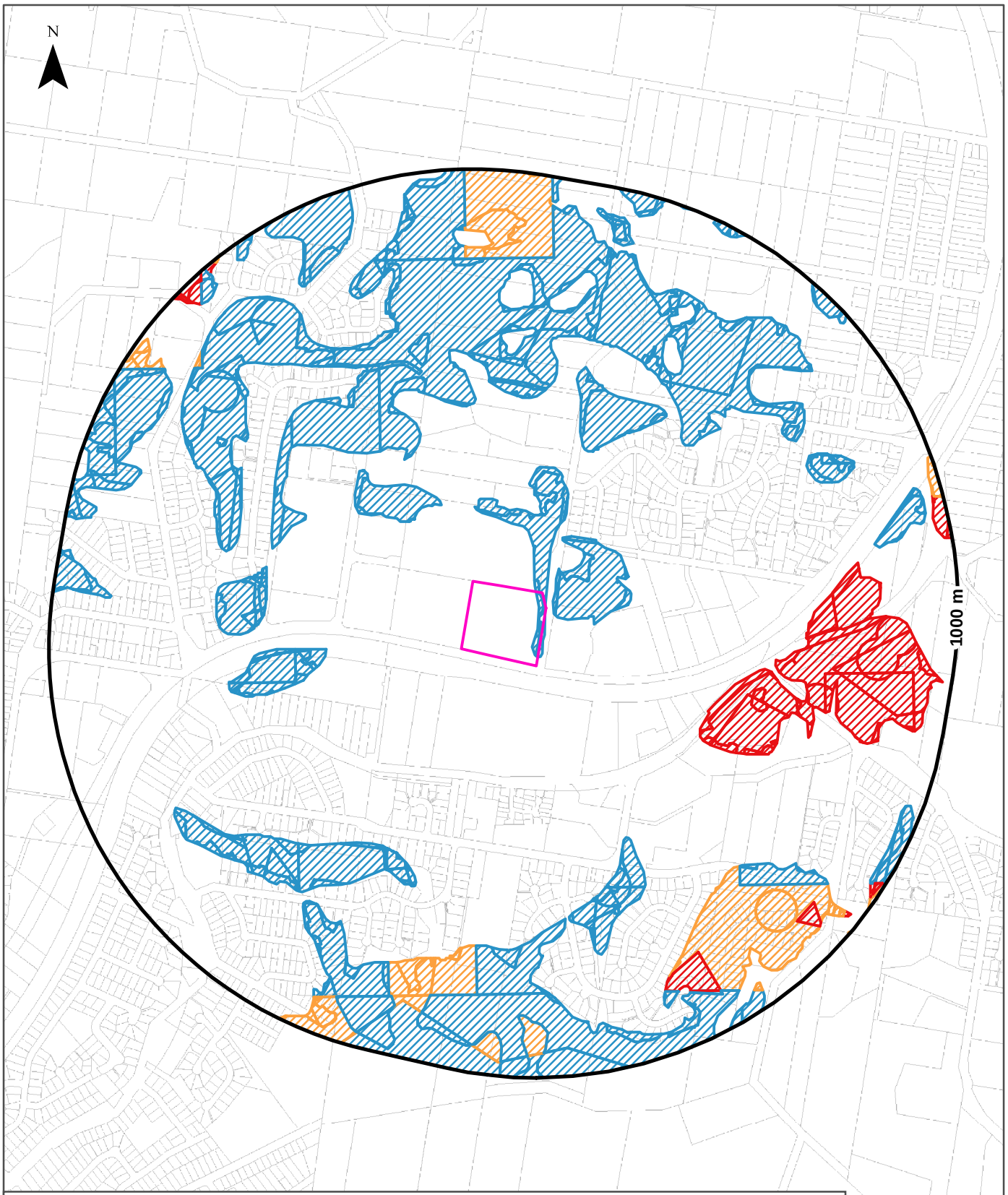
What RAMSAR Wetland areas exist within the dataset buffer?

Map Id	RAMSAR Name	Wetland Name	Designation Date	Source	Distance	Direction
N/A	No records in buffer					

RAMSAR Wetlands Data Source: © Commonwealth of Australia - Department of Environment

Ecological Constraints - Groundwater Dependent Ecosystems Atlas

Railway Crescent, Lisarow, NSW 2250



Legend

- Site Boundary
- Report Buffer
- Property Boundaries
- High potential GDE - from national assessment
- High potential GDE - from regional studies
- Moderate potential GDE - from national assessment
- Moderate potential GDE - from regional studies
- Low potential GDE - from national assessment
- Low potential GDE - from regional studies
- Known GDE - from regional studies
- Unclassified potential GDE - from national assessment
- Unclassified potential GDE - from regional studies

Scale: 0 100 200 400 600 Meters

Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2018

Coordinate System: GDA 1994 MGA Zone 56

Date: 03 April 2018

Ecological Constraints

Railway Crescent, Lisarow, NSW 2250

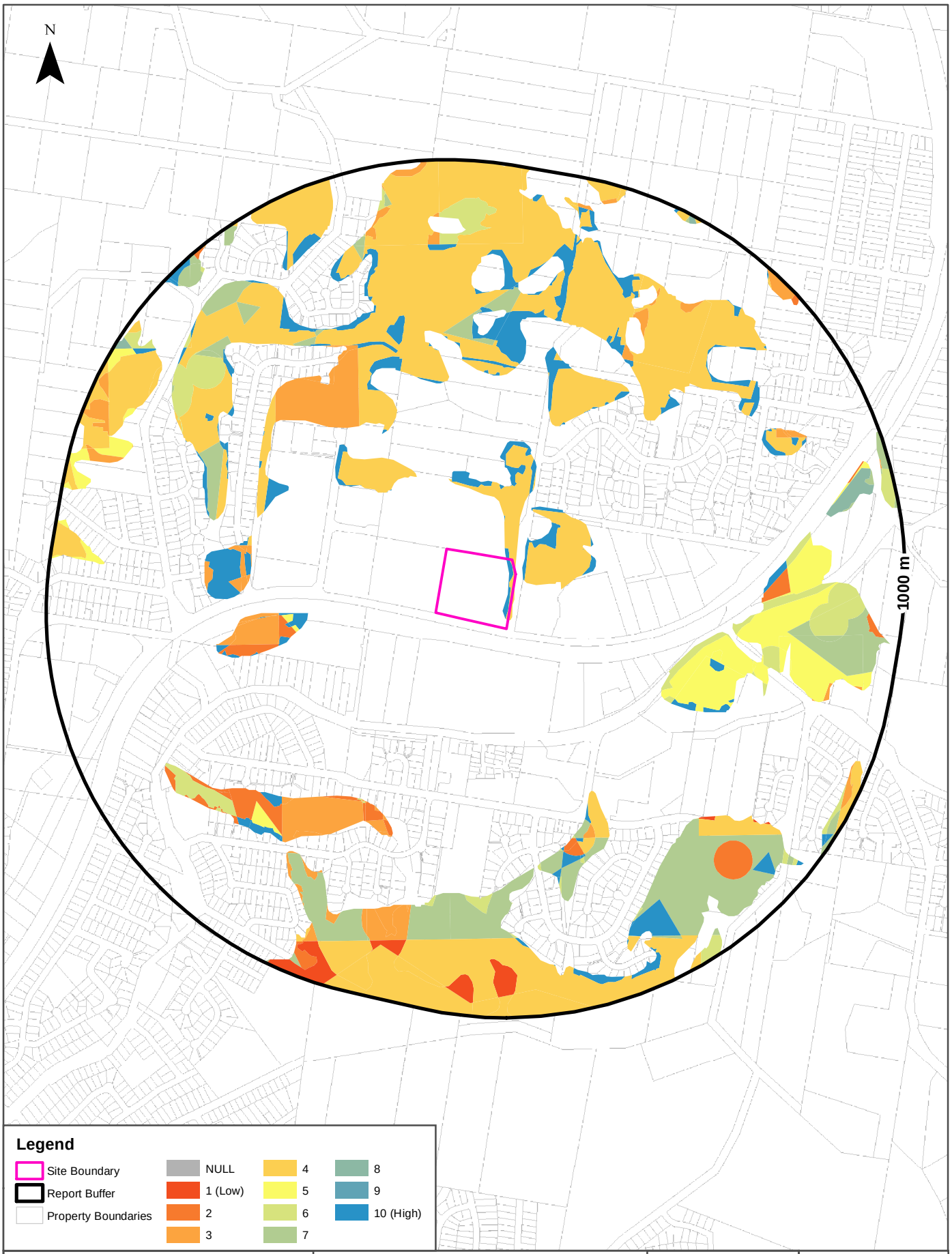
Groundwater Dependent Ecosystems Atlas

Type	GDE Potential	Geomorphology	Ecosystem Type	Aquifer Geology	Distance
Terrestrial	Low potential GDE - from regional studies	Deeply dissected sandstone plateaus.	Vegetation		0m
Terrestrial	High potential GDE - from regional studies	Deeply dissected sandstone plateaus.	Vegetation		424m
Terrestrial	Moderate potential GDE - from regional studies	Deeply dissected sandstone plateaus.	Vegetation		683m

Groundwater Dependent Ecosystems Atlas Data Source: The Bureau of Meteorology

Ecological Constraints - Inflow Dependent Ecosystems Likelihood

Railway Crescent, Lisarow, NSW 2250



Scale: 0 100 200 400 600 Meters

Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2018

Coordinate System: GDA 1994 MGA Zone 56

Date: 03 April 2018

Ecological Constraints

Railway Crescent, Lisarow, NSW 2250

Inflow Dependent Ecosystems Likelihood

Type	IDE Likelihood	Geomorphology	Ecosystem Type	Aquifer Geology	Distance
Terrestrial	4	Deeply dissected sandstone plateaus.	Vegetation		0m
Terrestrial	10	Deeply dissected sandstone plateaus.	Vegetation		0m
Terrestrial	5	Deeply dissected sandstone plateaus.	Vegetation		351m
Terrestrial	2	Deeply dissected sandstone plateaus.	Vegetation		361m
Terrestrial	3	Deeply dissected sandstone plateaus.	Vegetation		374m
Terrestrial	6	Deeply dissected sandstone plateaus.	Vegetation		424m
Terrestrial	7	Deeply dissected sandstone plateaus.	Vegetation		527m
Terrestrial	1	Deeply dissected sandstone plateaus.	Vegetation		692m
Terrestrial	8	Deeply dissected sandstone plateaus.	Vegetation		811m

Inflow Dependent Ecosystems Likelihood Data Source: The Bureau of Meteorology

Ecological Constraints

Railway Crescent, Lisarow, NSW 2250

NSW BioNet Atlas

Species on the NSW BioNet Atlas that have a NSW or federal conservation status, a NSW sensitivity status, or are listed under a migratory species agreement, and are within 10km of the site?

Kingdom	Class	Scientific	Common	NSW Conservation Status	NSW Sensitivity Class	Federal Conservation Status	Migratory Species Agreements
Animalia	Amphibia	Crinia tinnula	Wallum Froglet	Vulnerable	Not Sensitive	Not Listed	
Animalia	Amphibia	Heleioporus australiacus	Giant Burrowing Frog	Vulnerable	Not Sensitive	Vulnerable	
Animalia	Amphibia	Litoria aurea	Green and Golden Bell Frog	Endangered	Not Sensitive	Vulnerable	
Animalia	Amphibia	Litoria brevipalmata	Green-thighed Frog	Vulnerable	Not Sensitive	Not Listed	
Animalia	Amphibia	Mixophyes balbus	Stuttering Frog	Endangered	Category 2	Vulnerable	
Animalia	Amphibia	Mixophyes iteratus	Giant Barred Frog	Endangered	Category 2	Endangered	
Animalia	Amphibia	Pseudophryne australis	Red-crowned Toadlet	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Anthochaera phrygia	Regent Honeyeater	Critically Endangered	Not Sensitive	Critically Endangered	
Animalia	Aves	Apus pacificus	Fork-tailed Swift	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Ardea ibis	Cattle Egret	Not Listed	Not Sensitive	Not Listed	CAMBA;JAMBA
Animalia	Aves	Ardenna carneipes	Flesh-footed Shearwater	Vulnerable	Not Sensitive	Not Listed	ROKAMBA;JAMBA
Animalia	Aves	Ardenna grisea	Sooty Shearwater	Not Listed	Not Sensitive	Not Listed	CAMBA;JAMBA
Animalia	Aves	Ardenna pacificus	Wedge-tailed Shearwater	Not Listed	Not Sensitive	Not Listed	JAMBA
Animalia	Aves	Ardenna tenuirostris	Short-tailed Shearwater	Not Listed	Not Sensitive	Not Listed	ROKAMBA;JAMBA
Animalia	Aves	Artamus cyanopterus cyanopterus	Dusky Woodswallow	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Botaurus poiciloptilus	Australasian Bittern	Endangered	Not Sensitive	Endangered	
Animalia	Aves	Burhinus grallarius	Bush Stone-curlew	Endangered	Not Sensitive	Not Listed	
Animalia	Aves	Calidris acuminata	Sharp-tailed Sandpiper	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Calidris canutus	Red Knot	Not Listed	Not Sensitive	Endangered	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Calidris ferruginea	Curlew Sandpiper	Endangered	Not Sensitive	Critically Endangered	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Calidris ruficollis	Red-necked Stint	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Calidris tenuirostris	Great Knot	Vulnerable	Not Sensitive	Critically Endangered	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Callocephalon fimbriatum	Gang-gang Cockatoo	Vulnerable	Category 3	Not Listed	
Animalia	Aves	Calyptorhynchus lathami	Glossy Black-Cockatoo	Vulnerable	Category 2	Not Listed	
Animalia	Aves	Charadrius leschenaultii	Greater Sand-plover	Vulnerable	Not Sensitive	Vulnerable	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Chthonicola sagittata	Speckled Warbler	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Daphoenositta chrysoptera	Varied Sittella	Vulnerable	Not Sensitive	Not Listed	

Kingdom	Class	Scientific	Common	NSW Conservation Status	NSW Sensitivity Class	Federal Conservation Status	Migratory Species Agreements
Animalia	Aves	Ephippiorhynchus asiaticus	Black-necked Stork	Endangered	Not Sensitive	Not Listed	
Animalia	Aves	Falco subniger	Black Falcon	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Gallinago hardwickii	Latham's Snipe	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Glossopsitta pusilla	Little Lorikeet	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Grantiella picta	Painted Honeyeater	Vulnerable	Not Sensitive	Vulnerable	
Animalia	Aves	Haematopus fuliginosus	Sooty Oystercatcher	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Haematopus longirostris	Pied Oystercatcher	Endangered	Not Sensitive	Not Listed	
Animalia	Aves	Haliaeetus leucogaster	White-bellied Sea-Eagle	Vulnerable	Not Sensitive	Not Listed	CAMBA
Animalia	Aves	Hamirostra melanosternon	Black-breasted Buzzard	Vulnerable	Category 3	Not Listed	
Animalia	Aves	Hieraaetus morphnoides	Little Eagle	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Hirundapus caudacutus	White-throated Needletail	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Hydroprogne caspia	Caspian Tern	Not Listed	Not Sensitive	Not Listed	CAMBA;JAMBA
Animalia	Aves	Ixobrychus flavicollis	Black Bittern	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Lathamus discolor	Swift Parrot	Endangered	Category 3	Critically Endangered	
Animalia	Aves	Limosa lapponica	Bar-tailed Godwit	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Lophoictinia isura	Square-tailed Kite	Vulnerable	Category 3	Not Listed	
Animalia	Aves	Merops ornatus	Rainbow Bee-eater	Not Listed	Not Sensitive	Not Listed	JAMBA
Animalia	Aves	Neophema pulchella	Turquoise Parrot	Vulnerable	Category 3	Not Listed	
Animalia	Aves	Ninox connivens	Barking Owl	Vulnerable	Category 3	Not Listed	
Animalia	Aves	Ninox strenua	Powerful Owl	Vulnerable	Category 3	Not Listed	
Animalia	Aves	Numenius madagascariensis	Eastern Curlew	Not Listed	Not Sensitive	Critically Endangered	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Onychoprion fuscata	Sooty Tern	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Pachycephala olivacea	Olive Whistler	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Pandion cristatus	Eastern Osprey	Vulnerable	Category 3	Not Listed	
Animalia	Aves	Petroica boodang	Scarlet Robin	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Phaethon rubricauda	Red-tailed Tropicbird	Vulnerable	Not Sensitive	Not Listed	CAMBA
Animalia	Aves	Pluvialis fulva	Pacific Golden Plover	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Pluvialis squatarola	Grey Plover	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Pterodroma nigripennis	Black-winged Petrel	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Ptilinopus magnificus	Wompoo Fruit-Dove	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Ptilinopus superbus	Superb Fruit-Dove	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Puffinus assimilis	Little Shearwater	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Stercorarius parasiticus	Arctic Jaeger	Not Listed	Not Sensitive	Not Listed	ROKAMBA;JAMBA

Kingdom	Class	Scientific	Common	NSW Conservation Status	NSW Sensitivity Class	Federal Conservation Status	Migratory Species Agreements
Animalia	Aves	Sterna hirundo	Common Tern	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Sternula albifrons	Little Tern	Endangered	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Thalassarche cauta	Shy Albatross	Vulnerable	Not Sensitive	Vulnerable	
Animalia	Aves	Thalassarche chrysostoma	Grey-headed Albatross	Not Listed	Not Sensitive	Endangered	
Animalia	Aves	Todiramphus chloris	Collared Kingfisher	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Tringa brevipes	Grey-tailed Tattler	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Tringa nebularia	Common Greenshank	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Tringa stagnatilis	Marsh Sandpiper	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Tyto novaehollandiae	Masked Owl	Vulnerable	Category 3	Not Listed	
Animalia	Aves	Tyto tenebricosa	Sooty Owl	Vulnerable	Category 3	Not Listed	
Animalia	Aves	Xenus cinereus	Terek Sandpiper	Vulnerable	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Insecta	Petalura gigantea	Giant Dragonfly	Endangered	Not Sensitive	Not Listed	
Animalia	Mammalia	Cercartetus nanus	Eastern Pygmy-possum	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Chalinolobus dwyeri	Large-eared Pied Bat	Vulnerable	Not Sensitive	Vulnerable	
Animalia	Mammalia	Dasyurus maculatus	Spotted-tailed Quoll	Vulnerable	Not Sensitive	Endangered	
Animalia	Mammalia	Dasyurus viverrinus	Eastern Quoll	Endangered	Not Sensitive	Endangered	
Animalia	Mammalia	Eubalaena australis	Southern Right Whale	Endangered	Not Sensitive	Endangered	
Animalia	Mammalia	Falsistrellus tasmaniensis	Eastern False Pipistrelle	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Kerivoula papuensis	Golden-tipped Bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Macropus parma	Parma Wallaby	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Megaptera novaeangliae	Humpback Whale	Vulnerable	Not Sensitive	Vulnerable	
Animalia	Mammalia	Miniopterus australis	Little Bentwing-bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Mormopterus norfolkensis	Eastern Freetail-bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Myotis macropus	Southern Myotis	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Petauroides volans	Greater Glider	Not Listed	Not Sensitive	Vulnerable	
Animalia	Mammalia	Petaurus australis	Yellow-bellied Glider	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Petaurus norfolcensis	Squirrel Glider	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Phascolarctos cinereus	Koala	Vulnerable	Not Sensitive	Vulnerable	
Animalia	Mammalia	Physeter macrocephalus	Sperm Whale	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Potorous tridactylus	Long-nosed Potoroo	Vulnerable	Not Sensitive	Vulnerable	
Animalia	Mammalia	Pseudomys gracilicaudatus	Eastern Chestnut Mouse	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Pteropus poliocephalus	Grey-headed Flying-fox	Vulnerable	Not Sensitive	Vulnerable	
Animalia	Mammalia	Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	Vulnerable	Not Sensitive	Not Listed	

Kingdom	Class	Scientific	Common	NSW Conservation Status	NSW Sensitivity Class	Federal Conservation Status	Migratory Species Agreements
Animalia	Mammalia	Scoteanax rueppellii	Greater Broad-nosed Bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Vespadelus troughtoni	Eastern Cave Bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Reptilia	Chelonia mydas	Green Turtle	Vulnerable	Not Sensitive	Vulnerable	
Animalia	Reptilia	Dermochelys coriacea	Leatherback Turtle	Endangered	Not Sensitive	Endangered	
Animalia	Reptilia	Hoplocephalus bitorquatus	Pale-headed Snake	Vulnerable	Not Sensitive	Not Listed	
Animalia	Reptilia	Hoplocephalus bungaroides	Broad-headed Snake	Endangered	Category 2	Vulnerable	
Animalia	Reptilia	Hoplocephalus stephensii	Stephens' Banded Snake	Vulnerable	Not Sensitive	Not Listed	
Animalia	Reptilia	Varanus rosenbergi	Rosenberg's Goanna	Vulnerable	Not Sensitive	Not Listed	
Plantae	Flora	Baloskion longipes	Dense Cord-rush	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Callistemon linearifolius	Netted Bottle Brush	Vulnerable	Category 3	Not Listed	
Plantae	Flora	Chamaesyce psammogeton	Sand Spurge	Endangered	Not Sensitive	Not Listed	
Plantae	Flora	Cryptostylis hunteriana	Leafless Tongue Orchid	Vulnerable	Category 2	Vulnerable	
Plantae	Flora	Darwinia glaucophylla		Vulnerable	Not Sensitive	Not Listed	
Plantae	Flora	Dendrobium melaleucaphilum	Spider orchid	Endangered	Category 2	Not Listed	
Plantae	Flora	Diuris bracteata		Endangered	Category 2	Extinct	
Plantae	Flora	Epacris purpurascens subsp. purpurascens		Vulnerable	Not Sensitive	Not Listed	
Plantae	Flora	Eucalyptus camfieldii	Camfield's Stringybark	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Eucalyptus glaucina	Slaty Red Gum	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Eucalyptus oblonga	Stringybark	Endangered Population	Not Sensitive	Not Listed	
Plantae	Flora	Eucalyptus scoparia	Wallangarra White Gum	Endangered	Not Sensitive	Vulnerable	
Plantae	Flora	Grevillea shiressii		Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Hibbertia procumbens	Spreading Guinea Flower	Endangered	Not Sensitive	Not Listed	
Plantae	Flora	Lindsaea fraseri	Fraser's Screw Fern	Endangered	Category 3	Not Listed	
Plantae	Flora	Macadamia integrifolia	Macadamia Nut	Not Listed	Not Sensitive	Vulnerable	
Plantae	Flora	Macadamia tetraphylla	Rough-shelled Bush Nut	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Maundia triglochinoides		Vulnerable	Not Sensitive	Not Listed	
Plantae	Flora	Melaleuca biconvexa	Biconvex Paperbark	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Persoonia hirsuta	Hairy Geebung	Endangered	Category 3	Endangered	
Plantae	Flora	Prostanthera askania	Tranquility Mintbush	Endangered	Not Sensitive	Endangered	
Plantae	Flora	Prostanthera junonis	Somersby Mintbush	Endangered	Not Sensitive	Endangered	
Plantae	Flora	Senecio spathulatus	Coast Groundsel	Endangered	Not Sensitive	Not Listed	
Plantae	Flora	Senna acclinis	Rainforest Cassia	Endangered	Not Sensitive	Not Listed	
Plantae	Flora	Syzygium hodgkinsoniae	Red Lilly Pilly	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Syzygium paniculatum	Magenta Lilly Pilly	Endangered	Not Sensitive	Vulnerable	

Kingdom	Class	Scientific	Common	NSW Conservation Status	NSW Sensitivity Class	Federal Conservation Status	Migratory Species Agreements
Plantae	Flora	Tetratheca glandulosa		Vulnerable	Not Sensitive	Not Listed	
Plantae	Flora	Tetratheca juncea	Black-eyed Susan	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Tinospora smilacina	Tinospora Vine	Endangered	Not Sensitive	Not Listed	
Plantae	Flora	Tylophora woollsii	Cryptic Forest Twiner	Endangered	Not Sensitive	Endangered	
Plantae	Flora	Wilsonia backhousei	Narrow-leafed Wilsonia	Vulnerable	Not Sensitive	Not Listed	

Data does not include NSW category 1 sensitive species.

Data obtained 05/04/2018

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Revision	Author	Reviewer		Approved for Issue		
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0	B. Ashlee	A. Monkley S. Pearce		G. Wood		26/06/18

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Appendix D

Stage 1 Archaeological Baseline Assessment

VIRTUSHERITAGE

Stage 1 Archaeological Baseline Assessment Proposed Works Compounds Lisarow, NSW

Report prepared for GHD on behalf of NSW Roads and Maritime Services

Figures

Appendices

EXECUTIVE SUMMARY

Virtus Heritage was engaged by GHD Pty Limited (GHD) on behalf of NSW Roads and Maritime Service (RMS) to prepare a Stage 1 Archaeological Baseline Assessment for the two proposed works compounds (hereafter, referred to as 'the project areas') for the Upgrade of the Pacific Highway, Ourimbah Street to Parsons Road, Lisarow, NSW. The project is within the Central Coast Local Government Area (LGA) (refer to **Figure 1**).

RMS now require establishment of two works compounds (hereafter, 'project areas') outside of the assessed REF and HIS area for the proposed upgrade (refer to **Figure 1**). These two proposed works compounds are within the Central Coast Council Local Government Area (LGA) (formerly the Gosford LGA). Both proposed works compounds are on the northern side of Railway Crescent, Lisarow and immediately north of the Main Northern Railway. Both proposed compounds are within urban/industrial areas (refer to **Figure 2**).

Statutory searches and a review of previous archaeological research was undertaken as part of this assessment, presented in **Section 4** and **Section 5**. No Aboriginal objects or places were identified as part of this assessment.

The previous archaeological research suggests that the project areas have been highly modified will most likely have a low archaeological potential. The majority of the project area is within a highly modified landform due to extensive roads, railway and urban infrastructure.

The following recommendations have been made based on the information provided on project impacts, consultation to date, and archaeological and environmental background research:

1. No Aboriginal objects or places or areas of sensitivity for PAD are identified triggering further assessment or mitigation under the provisions of the *National Parks and Wildlife Act, 1974* or to trigger Stages 2 to 4 of the RMS internal *Procedure for Aboriginal cultural heritage consultation and investigation, November 2011* (PACHCI).
2. If there are changes or any potential ground disturbing works or direct impacts to the project areas not outlined in this report or outside the provided project area, further impact assessment must be undertaken and this assessment revised.
3. As part of an induction, in the unlikely event that any unknown Aboriginal objects or historical heritage relics are uncovered during proposed works, all RMS workers and sub-contractors should be aware of their responsibilities under the provisions of the *National Parks and Wildlife Act, 1974* (including the penalties under the ancillary provisions) and *NSW Heritage Act 1977*. This induction should include RMS Procedures for *Unexpected Finds* and the requirement to stop work immediately until this process is followed and these responsibilities are met.
4. In the extremely unlikely event that any suspected human remains are uncovered during proposed works, all works must cease immediately and the RMS Project Manager immediately notified, and the area secured. The RMS Environmental Manager will contact the NSW Police (if required). If these remains are deemed to require archaeological investigation by the NSW Police or NSW Coroner, then OEH (Contact OEH's Enviroline 131 555) and the Darkinjung LALC must be notified by the Roads and Maritime Environmental Manager for further assessment and management. No works could continue until OEH (or other determining authority such as Department of Planning) provide written notification to proceed in this scenario.

1. INTRODUCTION

Virtus Heritage was engaged by GHD Pty Limited (GHD) on behalf of NSW Roads and Maritime Service (RMS) to prepare a Stage 1 Archaeological Baseline Assessment for the two proposed works compounds (hereafter, referred to as 'the project areas') for the Upgrade of the Pacific Highway, Ourimbah Street to Parsons Road, Lisarow, NSW. The project is within the Central Coast Local Government Area (LGA) (refer to **Figure 1**).

Roads and Maritime Services (RMS) commissioned Jacobs to prepare a Stage 2 Archaeological Assessment of an earlier identified PAD 1 as part of a Review of Environmental Factors (REF) for the Upgrade of the Pacific Highway, Ourimbah Street to Parsons Road, Lisarow, NSW (Jacobs, 2014a). This areas is outside of the project areas for this assessment but is within close proximity.

RMS now require establishment of two works compounds (hereafter, 'project areas') outside of the assessed REF and HIS area for the proposed upgrade (refer to **Figure 1**). These two proposed works compounds are within the Central Coast Council Local Government Area (LGA) (formerly the Gosford LGA). Both proposed works compounds are on the northern side of Railway Crescent, Lisarow and immediately north of the Main Northern Railway. Both proposed compounds are within urban/industrial areas (refer to **Figure 2**).

1.1 Report Aims and Limitations

This report is a Stage 1 Archaeological Baseline Assessment and does not comply with the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW and Archaeological Investigation of Aboriginal Objects Code of Practice* (hereafter referred to as the Code of Practice) (DECCW 2010) as no site inspection to date has been undertaken. The purpose of this report is to provide preliminary advice on Aboriginal archaeological (scientific) values of the project area in relation to the proposed works to guide the client in its decision making process and meet the Archaeological Baseline Assessment requirement of Stage 1 of RMS internal *Procedure for Aboriginal cultural heritage consultation and investigation, November 2011* (PACHCI) (RMS 2011:25).

Aboriginal people are the primary determinants of their culture and heritage, and cultural values can only be assessed and advised by the relevant Aboriginal parties for the locality. It should be noted that Aboriginal heritage refers both to Aboriginal archaeological sites and sites/places of cultural value to Aboriginal people, protected under the *National Parks and Wildlife Act, 1974* (NPW Act, 1974) as "Aboriginal Objects" and "Aboriginal Places". Sites and places of Aboriginal cultural significance can only be identified by the relevant local Aboriginal people and are likely in many cases (for example, song lines and story places) to not contain any archaeological evidence. This assessment was conducted by an archaeologist providing advice on the archaeological (scientific) values of the project area.

The preliminary Stage 1 review does not include consultation with the Darkinjung Local Aboriginal Land Council, the relevant Aboriginal land council for the project area and further consultation is required by RMS and with RMS's Aboriginal cultural heritage advisor on the results of this preliminary assessment.

This report is limited to the assessment of the project area and information provided by GHD on behalf of RMS. Virtus Heritage takes no responsibility for errors within Office of Environment and Heritage (OEH) Aboriginal Heritage Information Management Systems (AHIMS) data, and the Heritage Division, NSW listings and has assumed information provided by OEH is accurate.

1.2 Project Team and Qualifications

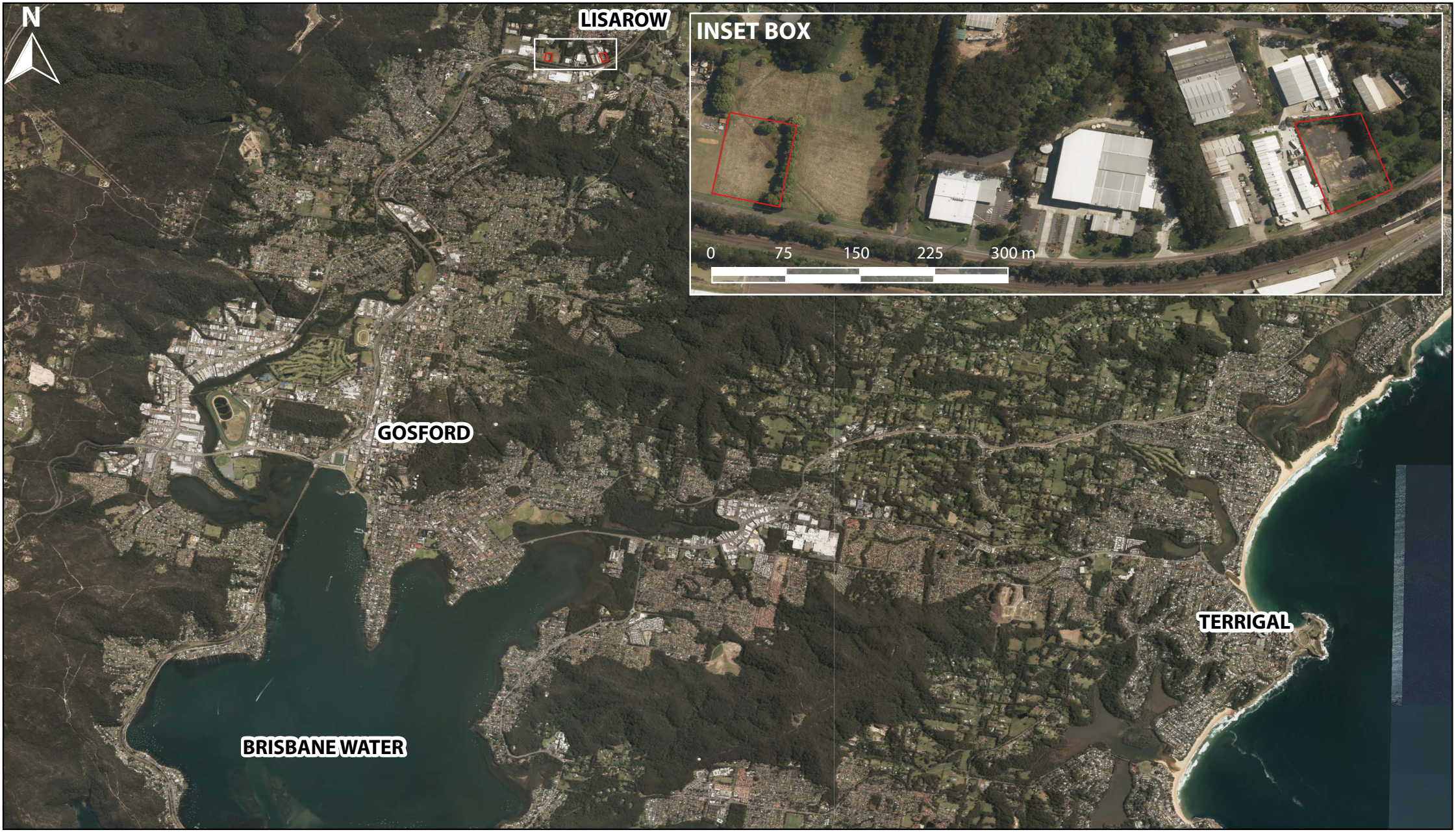
This report was compiled by Bernadette Allen (B.Arts Hon.s Archaeology, University of Queensland) and Dr Mary-Jean Sutton (PhD, Archaeology, University of Queensland; B.Arts Hon.s Prehistoric and Historical Archaeology, University of Sydney). Project information and description of works compiled in **Section 2** was provided by GHD and RMS.

1.3 Acknowledgements

We would like to acknowledge the assistance of the following individuals for the completion of this report:

- Bernadette Wood, GHD; and
- Simon Pearce, GHD.

Figure 1. Locality Map and Project Area



Source: SIXMAPS

0 1 2 3 4 km

Legend

Project areas

Maps and figures contained within this document may be based on third party data, may not be to scale and are intended for use as a guide only. Virtus Heritage does not warrant the accuracy of any such maps or figures.

VIRTUSHERITAGE

Figure 1
Locality Map

2. PROJECT DESCRIPTION

The following project description has been extracted from the RMS

(Bernadette and Simon please provide)

2.1 Summary

These proposed works have potential to harm any Aboriginal objects or areas of predicted occupation deposit within the project areas

3. ENVIRONMENTAL CONTEXT

This section of the report describes the environmental context of the project area spanning previous land-use history, topography and landforms, soils and geology, and fauna and flora, all of which are important factors influencing Aboriginal use of the land, the resultant patterning of archaeological sites, and the survival of sites in the modern landscape.

3.1 Previous Land Use History

In March 1788, Governor Arthur Phillip and a team of officers and marines explored the area of Broken Bay and a tributary called the north-east arm. In 1789, further exploration continued and in time this location was called Brisbane Water. White settlement around the future site of Gosford, to the south of the project areas, began in the 1820s when timber getters entered the area. Small farming enterprises, shell collection for lime-burning and boat building operations that lasted into the 20th century were other early industries in the area. (www.heritageaustralia.com.au). In 1823 James Webb received permission to temporarily occupy 300 acres in Brisbane Water for a cattle run and is considered the first white settler of Brisbane Water. As work was commencing on the Great North Road, the original Gosford watch-house was built in 1827 and the courthouse in 1833. The town of Gosford was named in 1839 after Archibald Acheson the 2nd Earl of Gosford (Gosford City Council Website, Significant Events Webpage).

Lisarow was named after Lisarow Estate in Ireland, the family home of Mrs Robert Cox (nee Gee) who lived in the area. An early name for Lisarow was Blue Gum Flat. Settlement in Lisarow itself began around the 1830's, with timber getting and cattle being two early enterprises of the largely unpopulated area. Populations increased in the late 1880's with the opening of the railway line and Lisarow became a rich citrus growing area with some of the districts larger orchards. Many small selections were taken up in the area in the early 1900s, and transport through Lisarow improved greatly in the 1930s with the opening of the Pacific Highway. Post war years saw significant development, with a major boom period in the 1990s (ID Community Website, Central Coast NSW Webpage)

Lisarow today is a rural, residential and industrial area. The major impacts for the project areas are the clearing of original vegetation, and the urbanisation of the areas with associated infrastructure.

3.2 Geology, Soils and Landform

The project areas lie within the rolling hills and footslopes of the Erina landscape on the Terrigal Formation of the Narrabeen Group. Local relief is <60m with slopes that are gently to moderately inclined with gradients <25%. Ridges and crests are moderately broad (100-300 m) and valleys are moderately narrow (300-800 m). The geology associated with this group include lithic and quartz sandstone and siltstone, minor sedimentary breccia, claystone and conglomerate. Some sandstones are highly weathered and friable. Rock outcrop is rarely present (Murphy 1993:52). The western project area is within a modified footslope and the eastern project area is within a modified lower slope.

Three main soil types occur within the Erina erosional landscape. They are soils formed on shale, soils formed on sandstone and deep soils formed on weathered course sandstone. Topsoils (A horizon) consist of fine sandy loam or loam fine sand with weak pedal structure and rough-faced porous fabric. Brown sandy clay loam with apedal massive structure and a porous earthy fabric are also present in some areas. Sandy clay loam with a massive structure and earthy fabric occurs as subsoil (B horizon) on footslopes (Murphy 1993:53).

3.3 Hydrology

Cut Rock Creek, which rises in the hills near Lisarow, lies approximately 1km to the east of the project areas. This creek flows northwards to join Bangalow Creek approximately 1.5km north of the project areas. Bangalow Creek then continues flowing north to join Ourimbah Creek, which outlets to Tuggerah Lake at Chittaway Point some 10km north-east of the project areas. Several swamps are located nearby on either side of the highway, particularly along sections located to the south of the Main Northern Railway. Flooding in the area occurs when runoff from the contributing catchments accumulates in the low-lying areas around the project areas (Jacobs 2014b:8).

The morphology of the creeks and adjoining floodplain have been significantly affected in recent times by minor road crossings, Pacific Highway crossings, railway line crossings, urban development within Lisarow, and channel works (Webb et al 1997:3).

3.4 Fauna and Flora

Vegetation communities comprise extensively cleared open-forest with open hearth in exposed coastal locations. Common species of the open forest include blackbutt (*Eucalyptus pilularis*), forest oak (*Allocasurina torulosa*), turpentine (*Syncarpia glomulifera*), spotted gum (*E. maculate*), smooth-barked apple (*Angohora costata)*, grey iron bark (*E. panicultata*) and Sydney blue gum (*E. saligna*). Swamp mahogany (*E. robusta*) and swamp oak (*Casuarina glauca*) occur in poorly drained areas such as those around the edge of Brisbane Water. Heathlands contain coastal banksia (*Banksia integrifoloia*), black she-oak (*Allocasurina littoralis*), native rosemary (*Westringia fruticosa*) and Sydney golden wattle (*Acacia longifolia* var. *sophorae*) (Murphy 1997:52).

Associated vegetation communities include forested wetland, open wetland and riparian moist forest. These vegetation communities would have provided habitats for a wide range of terrestrial and aquatic fauna of amphibians, reptiles and mammals including platypus, water birds, fish species, shellfish, edible bivalves, and crustacean resources. Mangrove creeks are also important habitats for fish, crabs, birds and other animals. Mangrove trees provide large amounts of organic matter, which is eaten by many small aquatic animals, and subsequently form a food resource for larger carnivorous fish and other animals. Seagrass beds would support many small organisms such as prawns and fish. The diverse forest ecosystems support a range of ground and arboreal animals including snakes, lizards, bandicoots, antechinus, wallabies, possums, gliders, forest birds and bats (Gosford City Council Website, Terrestrial Species List Webpage).

The vegetation communities provide foraging and shelter resources for fauna, as well as breeding habitats and refuge. Cut Rock Creek, which links freshwater wetland habitats to a riparian corridor along Bangalow Creek and large bushland areas to the west of Tuggerah Lake provides opportunities for fauna movement within the local landscape and may be an important means of dispersal for some species between coastal and range habitats (Hyder 2011:27).

3.5 Summary

The project area is situated near creeks, Tuggerah Lake and the Pacific Ocean which support a range of vegetation communities providing diverse habitats for a wide variety of terrestrial and aquatic Aboriginal prey species. The vegetation communities would also have provided floral resources which would have been exploited by Aboriginal peoples for food, medicine and other items. Early industries of the Gosford region, including timber getting and farming, altered the landscape and heavily impacted Aboriginal cultural heritage such as scarred or modified trees. Later urbanisation of Lisarow including infrastructure construction such as railway and roads has also acted to substantially modify the landscape. Previous land use history has affected the potential for identifying Aboriginal sites and objects within the project areas and the integrity of any cultural deposits, if present.

There is no evidence to suggest that rock art, rock shelter, engraving or grinding grooves could not be identified in the project areas or that suitable sandstone geology is present and still extant.

4. ETHNOHISTORY

The project area lies within lands traditionally associated with the Darkinyung (also known as Darginjung) language group (Hodgetts, 2012:13). This view is contested by some other families who also claim that these lands are home to "the Guringai speaking Mob (Wanangine), for generations and seasonally occupied in various locations by the Darginyung peoples, pre and post European settlement (Howie, 2012).

Well known and documented members of the Guringai mob were; Boongaree (aka, Bungaree), Matora, Mosquito, Jewfish, Cora (aka, Gooseberry), Flathead, Long Dick, Sophy, Kitty and Charlotte Ashby (nee. Webb). Their presence in this area was initially recorded pre 1790. References to these Guringai speaking people are located on Government Blanket list and Court Bench records taken in the Gosford areas and Colonial Secretary minutes, which are held at Gosford Library and early recordings from surveyors John Fraser, Chappell, Felton & Sarah Matthews, journals written by Rev. L.E. Threlkeld, Rev. Glennie, Matthew Flinders, Augustus Earl, R.H Mathews, and current AIATSIS maps (Howie, 2012:7).

The Darkinyung traditional boundary "extends from the Hawkesbury River in the south, Lake Macquarie in the north, the McDonald River and Wollombi up to Mt Yengo to the west and the Pacific Ocean in the East. Darkinjung Territory embraces the Country watered by Colo, MacDonald and Wollombi Rivers, with numerous tributaries" (Darkinjung Local Aboriginal Land Council Website, Culture and Heritage Webpage). Darkinyung have uterine descents, and is divided. Howie also notes that:

> The traditional areas occupied by the Guringai speaking comprises of; All of Port Jackson catchment, including the tributaries of Middle Harbour and Lane Cove River, the Broken Bay catchment, including tributaries of Brisbane Water, Cowan Creek and Pitt Water, the water shed along Peats Ridge, following along the range through to Kulnura, as well as the Lakes of the Central Coast to lower Lake Macquarie (Howie 2013:7).

As noted by Hodgetts (2012:13) "several researches and publications show tribal or language group boundaries within similar areas, but exact boundaries are unlikely. Boundaries are a European concept and there was likely a zone between language groups which was shared and utilised by neighbouring groups". As noted in the Wyong Thematic History " Indigenous people defined, and continue to define the land to which they are connected by territories rather than boundaries, the boundaries have been identified by the Umulliko Darkinjung Research Working Group as a way in which to understand these territories (Secomb 2010:8). The Umulliko Darkinjung Research Working Group has described Darkinjung country as a fusion of that area designated by Tindale (1974), "the administration district of Brisbane Water which existed in official records from 1823 until the beginning of the 20th century; and the current geographical area known as the Central Coast of New South Wales, comprising Gosford and Wyong Local Government Areas" (cited from Secomb 2010:9-10). Similarly the Wyong Thematic History states that Dr John Fraser's map of 1892 "provides another perspective of the various connections between the people living in the Colony of New South Wales,... he draws a coastal nation that embraces the lands from the Macleay to the Hawkesbury, and he calls this group the "Kuring-Gai" (Secomb 2010:9-10).

There are approximately "320 words that have been recorded by researcher R. H. Matthews in the nineteenth century" (Secomb, 2010:11). These words include:

BUDGEWOI - Young grass
DOORALONG - Timber for making spears
GOROKAN - Dawn or early morning
GWANDALAN - Peace
JILLIBY - Where two creeks meet
KANWAL - Snakes indeed
OURIMBA - Sacred circle of the initiation for investing the 'ourn' womanhood
TERRIGAL - Place of little birds
TOOWOON BAY - The mating call of the Wonga Pigeon
TOUKLEY - Many brambles
TUGGERAH - Savanah grasslands
TUMBI UMBI - Plenty of water
WATANOBBI - Hills surrounded by water
WYONG - An edible yam

There is also a historical reconstruction of a grammar dictionary for the area by Jones (2008). There are a number of early ethno-historic sources which provide information on early European and non-Indigenous people's interactions and observations of Aboriginal people of the Central Coast region. These sources include early explorers including Captain Cook and Governor Phillip, records from government and administrative agents including magistrate records, blanket returns, ration records, the diaries and papers of Reverend Threlkeld, a local missionary and early researchers, such as R.H. Matthews and Felton. These records are often biased by prejudices and attitudes of the nineteenth century and provide a piece meal account and portrayal of Aboriginal people during this time. Population estimates during this time are often underestimated due to the impact of European diseases on Aboriginal families and later violence during the 1830s to 1870s circa.

5. ARCHAEOLOGICAL CONTEXT

This section presents the archaeological context for the evaluation of the project area, specifically known archaeological sites identified by previous archaeological investigations, and the understanding of Aboriginal heritage developed by previous work.

5.1 Heritage Register and Database Searches

The following heritage register and database searches were undertaken as part of this preliminary assessment:

- National Native Title Tribunal (NNTT);
- Aboriginal Heritage Information Management System (AHIMS);
- The Australian Heritage Database (AHD);
- State Heritage Register (SHR) and Inventory (SHI); and
- Gosford Local Environmental Plan (2014).

5.1.1 National Native Title Tribunal

A Native Title search was undertaken of the National Native Title Tribunal (NNTT) on 20 March 2018 of the project area to identify if any Native Title claims exist over the project area. The searches identified no approved native title determinations over the project area (refer to **Appendix A**).

5.1.2 Aboriginal Heritage Information Management System (AHIMS Search)

A search was conducted of the AHIMS register on 20 March 2018 for any Aboriginal heritage sites recorded within or adjacent the project areas within a buffer zone of 200 metres GDA, Zone: 56, Eastings: 347626 - 348319, Northings: 6305204 - 6305212 with a Buffer of 200 metres.

There are no registered Aboriginal objects or places within or adjacent to the project areas.

5.1.3 Australian Heritage Database

The Australian Heritage Database was searched on 20 March 2018 for the LGA. No items of Aboriginal heritage were identified in the locality or in the project area.

5.1.4 NSW State Heritage Register and NSW State Heritage Inventory

The NSW State Heritage Inventory and State Heritage Register was searched on 20 March 2018. No items of Aboriginal heritage were identified in the project area.

5.1.5 Gosford Local Environmental Plan (2014)

The Gosford Local Environmental Plan, 2014, Schedule 5, Environmental Heritage was searched on 20 March 2018. No items of Aboriginal heritage were identified in the project area.

Figure 2. AHIMS Search Results

Source: SIXMAPS

0 75 150 225 300 m

Legend

Project areas

Maps and figures contained within this document may be based on third party data, may not be to scale and are intended for use as a guide only. Virtus Heritage does not warrant the accuracy of any such maps or figures.

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Figure 2
Project areas

5.2 Previous Archaeological Research

Lisarow falls within the Sydney Basin region where numerous rock art and Aboriginal archaeological studies have been undertaken focussing on the sandstone geology for rock shelters, rock art, middens and other types of Aboriginal occupation, including important studies by Attenbrow (2012, 2010, 2009), McDonald (2008), Huntley (2015) and Vinnecombe (1980). These studies note that Aboriginal people found this region highly favourable for occupation due to the array of prey, economic and medical resources in fauna and flora, sandstone morphology suitable for shelters and art and also the abundance of fresh water and salt water species to sustain families and communities. This region is also known for the importance of ceremonial and mythological sites. Aboriginal occupation of this region ranges from the mid to early Holocene and occupation dates are debatable (Huntley 2015).

A review of the OEH AHIMS library and online searches were undertaken to obtain copies of previous Aboriginal heritage studies and archaeological investigations within the locality of the project areas. There does not appear to be any previous assessments available that have surveyed the entire project areas. However, there are investigations associated with Pacific Highway upgrade at Lisarow, and a number of previous Aboriginal heritage surveys and archaeological research within the Central Coast area, with some relevant information for understanding Aboriginal occupation in the landscape.

This section discusses a number of studies in the locality and Central Coast area that can assist in building a picture of the potential archaeology of the region. This in turn can help to predict the types of sites that may be expected to be present within the project areas. Archaeological excavations which have been undertaken within a similar landform context to the project areas are also a tool to be used to predict possible site types.

5.2.1 Cosmos Archaeology (2010a), Pacific Highway Upgrade: Stage 3A Lisarow to Ourimbah

Cosmos Archaeology was commissioned by Hyder Consulting to undertake an Indigenous and non-Indigenous heritage assessment for the Pacific Highway upgrade project from Dora Street Lisarow (approximately 1 km north-east of the current project areas) to Ourimbah (Cosmos Archaeology 2010a). A preliminary environmental investigation identified no previously recorded Aboriginal sites within or immediately adjacent the Pacific Highway project area. A site survey with representatives of the Darkinjung Local Aboriginal Land Council identified no items of Aboriginal cultural heritage existed within the assessed study area.

5.2.2 Cosmos Archaeology (2010b), Pacific Highway Upgrade: Stage 4A Preliminary Environmental Impact Assessment

Cosmos Archaeology (2010b), on behalf of Hyder Consulting, undertook an assessment and survey of the proposed Pacific Highway upgrade between Ourimbah Street to Parsons Road, Lisarow. Parsons Road is directly south of the current eastern project area.

The survey identified seven areas of Potential Archaeological Deposit (PAD), collectively called PAD 1 on the raised bench areas above the swamp. PAD 1 includes an area of land on the eastern side of the Pacific Highway; the area north of McDonalds Road to the railway overpass; the area south of McDonalds Road on the eastern side of the Pacific Highway that continues to Chamberlain Road; an area of land on the western side of the Pacific Highway across from McDonalds Road between the highway and the railway line; and a parcel of land south of Chamberlain Road on the south-eastern side of the Pacific Highway (refer to **Figure 3** below).

Cosmos Archaeology (2010b) argue that PAD 1 is likely to extend further to the south-east.

No artefacts were recorded in association with this PAD, and Cosmos Archaeology did not register it subsequently on the OEH AHIMS database.

Cosmos Archaeology (2010b) surveyed the boundaries of the two project areas for the proposed works compounds but not the entire areas (refer to **Figure 3**). The project areas were not identified by Cosmos Archaeology (2010) as having any archaeological potential.

5.2.3 Jacobs (2014a) Pacific Highway Upgrade, Ourimbah Street to Parsons Road, Lisarow

Jacobs (2014a) reassessed Cosmos Archaeology's PAD 1 for RMS, as part of the Pacific Highway Upgrade Project, Ourimbah Street to Parsons Road, Lisarow. This reassessment accompanied a Stage 1 assessment completed by RMS where no Aboriginal heritage objects, places or areas of potential sensitivity for Aboriginal cultural heritage were identified.

In order to determine the presence and extent of PAD 1, Jacobs undertook a site survey, and reinspected each unit of PAD 1. Jacobs (2014a) concluded that PAD 1 did not contain any potential for archaeological deposit, and that no further archaeological assessment was required.

5.2.4 Mary Dallas Consulting (1989) Fagans Road Lisarow Archaeological Survey

Mary Dallas Consulting (1989) conducted a survey of 12.6 hectares of land at 26 Fagans Road Lisarow, approximately 2km north-east of the current project areas. The Fagans road study area included a water course (Cut Rock Creek), creek flats and adjacent steep hillslopes. Dallas notes several disturbances of the area including clearing, ploughing, rapid water erosion, fence lines and extensive rubbish dumping. Mary Dallas Consulting (1989) concluded that "the degree and extent of surface and sub-surface disruption over the land make it highly unlikely any significant undisturbed potential artefact bearing soil is located there". No constraints for proposed works proceeding were identified.

5.2.5 Artefact Heritage (2012). Pacific Highway/Wyong Road Intersection Upgrade, Tuggerah. Aboriginal Archaeological Survey

Artefact Heritage (2012) was commissioned by Sinclair Knight Mertz to conduct an assessment of Aboriginal cultural heritage as part of a Review of Environmental Factors, for upgrades to the intersection of the Pacific Highway and Wyong Road at Tuggerah, approximately 10km north-east of the current project areas. Disturbance in the forms of clearing, grazing and ploughing were noted which had accelerated erosion, as well as more recent disturbance by the construction of roads and railway lines. No items of Aboriginal cultural heritage were identified during survey. Due to the significant disturbance present, listed above, the area was assessed as having low potential for any intact sub-surface deposits, and as such there were no constraints on the proposed development with regard to Aboriginal cultural heritage.

5.3 Regional Context

Aboriginal occupation of the NSW Central Coast region has been dated to around 15,000 years in the Newcastle Bight, with occupation of Mangrove Creek Dam catchment being dated to 11,000 years BP. Most sites in the Gosford-Wyong region have been dated or are assumed to date to the late Holocene (< 4,000 years BP) (Jacobs 2014a:287)

Vinnecombe (1980) undertook a study of the Gosford – Wyong region to define Aboriginal heritage resources within the Central Coast region (which includes the project areas). Vinnecombe (1980) identified various ecological zones within the study area and sought to determine the differences within and between these areas that might make Aboriginal site prediction more accurate. Three different environments were investigated, including open coastline and coastal estuary, riverine estuary and inland sclerophyll forest.

Vinnecombe's (1980) study concluded that:

- An average of 11 sites/km^2 in coastal estuary areas, 8 sites/km^2 in riverine estuary areas and 6 sites/km^2 in inland sclerophyll zones. Given the (then) current levels of development and the ecological landscape of the Gosford / Wyong area, Vinnecombe (1980) predicted that there could be an overall total of 13,000 sites within the locality. Vinnecombe (1980) related decreasing site densities directly to the distance from marine resources;
- Artefact scatters and open camp sites are relatively rare within the region, but may occur on any flat terrain near water;
- Rock shelter sites are found in exposed Hawkesbury sandstone terrain above valley floors or below ridge tops. Although rock shelters occur on both Hawkesbury and Narrabeen formations, they tend to occur with more frequency on the Hawkesbury Sandstone. These shelters range from those which are exceptionally dry with deep accumulations of deposit to those that are subject to inundation and rain wash with only scattered deposit. This suggests a pattern of opportunistic use of shelters;
- Axe grinding grooves occur within exposures of Hawkesbury sandstone near water; and
- Shellfish remains are generally found in middens in either coastal or estuarine locations. Coastal middens tend to be dominated by Oyster, Mussel, Limpet, Cartrut, Turban, Triton and Pipi species. Estuarine middens also include Oyster and Mussel species and vary from coastal middens with the inclusion of Sydney Cockles, Whelks, Mud oysters and Scallops.

5.4 Summary

The previous archaeological research suggests that locations which have been highly modified will most likely have a low archaeological potential. There is recorded evidence of Aboriginal occupation and subsistence activities surrounding the project area. Unmodified areas from previous land use history in proximity to streams have the highest potential for remnant evidence of Aboriginal occupation. Sandstone outcropping, and unmodified areas from previous land use history in proximity to streams have the highest potential for remnant evidence of Aboriginal occupation.

6. PREDICTIVE MODEL AND ARCHAEOLOGICAL POTENTIAL

Based on the known archaeological, environmental and landscape context of the locality, a predictive model for evidence of Aboriginal occupation for the project area is presented below:

Scarred trees and **carved trees** contain evidence of scars and carved patterns which can be attributed as having Aboriginal cultural origin. Scarred trees include the removal of bark from the trunk of the tree (usually with a stone axe) to make shields, canoes, implements and other types of items which leave a wound on the tree trunk. Carved trees contain carved patterns on the tree trunk and are often found in association with ceremonial grounds, burials or cultural sites. Carved trees are a very rare site type, which are considered unlikely to be found in the project area based on its history of previous land use. Scarred trees may still be found where areas of mature trees are still present within the project areas. However, the highly modified urban landscape indicates the majority of the project area has previously been cleared of trees. There is some potential for scarred/modified trees to survive in the adjoining landscape outside of the project area.

Isolated artefacts and **open campsites (artefact scatters)** are the locations of discarded stone artefacts, often material that has been discarded as part of making stone tools or over frequent episodes of occupation/visitation in an area. The objects are most likely to be found within 200 metres of a major water course in well drained alluvial flats and lower slopes or near the lake foreshore where the landscape has not been heavily modified. Objects are also known to occur on crest landforms. The project area has been heavily modified to create an urban landscape in lower slope landforms, isolated artefacts and artefact scatters are therefore of low potential.

Potential Archaeological Deposits refers to soil profiles within landforms which are predicted to contain buried evidence of Aboriginal occupation. This buried evidence is most often stone artefact scatters which survive most frequently in the archaeological record. In the region, buried archaeological deposits are nearly always found within the A unit soils (topsoil) or in alluvial deposits at depth. Occasionally artefacts are found in the B horizon in cracking clays where artefacts have moved down from the topsoil. How archaeological potential is defined and to be assessed in this report is provided in **Table 3**.

The majority of the project area is a modified landscape with extensive urban infrastructure and related utilities acting to impact and modify the subsurface matrix resulting in low archaeological potential. **Figure 3** provides a map of landforms within the project areas which are modified.

Table 1. Definitions of Archaeological Potential

Archaeological Potential	Definition
Low to Zero	Landforms that have been totally modified and have low to zero potential for any remaining original soil profile or intact archaeological deposits. This category includes existing roads, quarry areas or any area where the original soil profile (topsoil – A horizon) has been stripped and the landform completely modified. This landform may also include areas where there is no intact A horizon soils due to high levels of erosion.
Low	Landforms that may have been utilised by Aboriginal people in the past, but at a lower intensity relative to all surrounding landforms, resulting in a lower artefact density than all surrounding landforms. This category also includes landscape areas of low terrain integrity, where geomorphic processes or human action may have redistributed artefacts from their deposited locations, such as stripping of soil to create levees or excavation to create roads, housing and industrial areas, culverts, dams or bridges, resulting in site disturbance or destruction. In **Figure 3**, these areas are mapped as modified landforms.
Moderate	Landforms that are predicted to have been utilised by Aboriginal people in the past, but not intensively or repeatedly. There is therefore potential for artefactual deposition, but at a lower frequency and density than in areas of high archaeological potential. This category may also refer to landforms known to be sensitive for higher levels of Aboriginal occupation but where prior ground surface disturbances has decreased the archaeological integrity and potential of finding evidence of Aboriginal occupation (for example, creek confluences, alluvial terraces where stratigraphic integrity may have decreased due to previous land use).
High	Landscape areas predicted to have been intensively or repeatedly utilised by Aboriginal people in the past, such as creek confluences, Pleistocene terraces, floodplains or elevated landforms above major watercourses or floodplains or areas that contain sandstone morphology suitable for rock shelters, engravings and rock art sites. In these areas, site and artefact density are expected to be higher than the surrounding landscape, and sites in these areas may possibly be more complex. Terrain integrity in these areas may be variable although prior ground surface disturbance should be low or non-existent. An important characteristic of areas of high archaeological potential is the research potential or the capacity of sites to provide valuable information on past Aboriginal land use.

Middens are the accumulation of debris from fish, crustaceans and other shell fish (shells, fish bones) consumed as part of Aboriginal people's diet. Middens also often contain charcoal, stone artefacts, bone and other types of material used by Aboriginal people. Middens often occur within close proximity to freshwater and saltwater sources which have potential to contain mussels, oysters and other types of edible bivalves. There are no known water sources crossing the project areas with potential for midden deposit.

Figure 3. Landforms Map

Source: SIXMAPS

0 10 20 30 40 50 m

Legend

- Project areas
- Modified footslope
- Modified lower slope

Maps and figures contained within this document may be based on third party data, may not be to scale and are intended for use as a guide only. Virtus Heritage does not warrant the accuracy of any such maps or figures.

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Figure 3

Project Area and Landforms

There are no known **burial sites, bora grounds** or **stone arrangements** within the project area based on AHIMS searches and previous archaeological and historical research for this review. However, no Aboriginal consultation has been undertaken to date for this project. Burial sites, which are a very rare site type, are unlikely to be found within the project area due to the high degree of modification from road and urban infrastructure. Stone arrangements and bora grounds are also similarly rare site types and if present in the past, unlikely to survive within the impact area due to its previous land use history

Petroglyphs (also referred to as Rock Engravings) are art sites where marks have been made in stone by Aboriginal people (for example, spirit figures, animals, implements and footprints) and **rock shelter sites with art** (rock overhangs used for shelter by Aboriginal people and where smooth surfaces on the walls of the shelter (sandstone surfaces) are painted with ochres and pigments) and **rock shelter sites with occupation deposit** are found where there is suitable geology and topography. No such topography is evident from aerial photographs in the project area.

Aboriginal axe grinding grooves are grooves most often found in sandstone where Aboriginal people have sharpened or manufactured stone axes and other implements and in some cases, ground seed and grains in the sandstone forming 'bowls'. This site type can occur where suitable geology is present.

6.1 Summary

The majority of the project area is a highly modified landform due to extensive roads, rail and urban infrastructure. No known or predicted archaeological sites or areas of archaeological sensitivity are predicted within the project areas.

7. LEGISLATIVE CONTEXT

Potential management and mitigation measures for the project areas are discussed in this section within the broader context of relevant legislation protecting Aboriginal heritage within NSW and the Commonwealth.

7.1 Statutory Requirements

The *National Parks and Wildlife Act 1974* (NPW Act), the *Environmental Planning and Assessment Act 1979* (EP&A Act) and the *Heritage Act, 1977* are the relevant statutory controls protecting Aboriginal heritage within New South Wales. These acts and other relevant State and Commonwealth legislation are discussed below.

7.1.1. State Legislation

National Parks and Wildlife Act 1974

Under the provisions of the NPW Act, all Aboriginal objects are protected regardless of their significance or land tenure. Aboriginal objects are defined as '*any deposit, object or material evidence (not being a handicraft made for sale) relating to Aboriginal habitation of the area that comprises NSW, being habitation before or concurrent with the occupation of that area by persons of non-Aboriginal extraction, and includes Aboriginal remains'*.

Aboriginal objects are therefore limited to physical evidence and may also be referred to as 'Aboriginal sites', 'relics' or 'cultural material'. Aboriginal objects can include pre-contact features such as scarred trees, middens and artefact scatters, as well as physical evidence of post-contact use of the area such as Aboriginal built fencing or stockyards and missions.

The NPW Act also protects Aboriginal Places, which are defined as *'a place that is or was of special significance to Aboriginal culture. It may or may not contain Aboriginal objects'*. Aboriginal Places can only be declared by the Minister administering the NPW Act. The NPW Act protects Aboriginal objects and Aboriginal places in NSW. Under the *National Parks and Wildlife Act 1974* (NPW Act), including the 2010 amendments, it is an offence to harm an Aboriginal object:

- Which the person knows is an Aboriginal object (a 'knowing offence')
- Whether or not a person knows it is an Aboriginal object (a 'strict liability offence').

At 1 October 2010, the maximum penalty for a knowing offence is $550,000 for an individual or $1.1 million for a corporation and a 2 year gaol term. The maximum penalty for a strict liability offence is $110,000 for an individual or $220,000 for a corporation (Code of Practice 2010:5). A person or organisation who exercises due diligence in determining that their actions would not harm Aboriginal objects has a defence against prosecution for the strict liability offence if they later unknowingly harm an object without an AHIP (Code of Practice, 2010:5). The due diligence defence is not available for activities which harm Aboriginal places. The Code of Practice sets out a procedure which, when followed, will satisfy the due diligence requirement.

If a person or company can demonstrate that they exercised due diligence and determined that it was unlikely that Aboriginal objects would be harmed, then they have a defence to prosecution under the strict liability offence under Section 86(2) of the NPW Act (Code of Practice 2010:5).

Harm includes activities that destroy, deface or damage of Aboriginal object or Aboriginal Place, and in relation to an object, moving the object from the land on which it has been situated. Under Section 91 of the Act, the OEH must be informed upon the identification of all Aboriginal Objects. Failure to do this within reasonable time is an offence under the Act. Under Section 90 of the Act, it is an offence for a person to destroy, deface, damage or desecrate an Aboriginal Object or Aboriginal Place without the prior issue of Section 90 consent. Section 90 consents may only be obtained from the Environmental Protection and Regulation Division (EPRD) of OEH. Part 6 of the NPW Act provides specific protection for Aboriginal objects and places by making it an offence to harm them. If harm to Aboriginal objects and places is anticipated an Aboriginal Heritage Impact Permit (AHIP) is required.

The Act also provides for stop-work orders under Section 91A if an action is likely to significantly affect an Aboriginal Object or Aboriginal Place. The order may require that an action is to cease or that no action is carried out in the vicinity of the Aboriginal Object or Aboriginal Place for a period of up to 40 days.

There are no know or predicted Aboriginal objects or places within the project area.

Heritage Act, 1977

The *Heritage Act, 1977* (as amended in 2009) protects and aims to conserve the environmental heritage of New South Wales. *Environmental heritage* is broadly defined under Section 4 of the *Heritage Act* as consisting of "those places, buildings, works, relics, moveable objects, and precincts, of State or local heritage significance" (Heritage Branch, DoP 2009:4). Aboriginal places or objects that are recognized as having high cultural value (potentially of local and State significance) can be listed on the State Heritage Register and protected under the provisions of the *Heritage Act* (http://www.heritage.nsw.gov.au/06_subnav_01.htm).

Recent amendments to the *Heritage Act* made in 2009 have changed the definition of an archaeological *'relic'* under the Act, so that it is no longer based on age. A relic is now an archaeological deposit, resource or feature that has *heritage significance* at a local or State level. This significance, based approach to identifying 'relics' is consistent with the way other heritage items such as buildings, works, precincts or landscapes are identified and managed in NSW (Heritage Branch, DoP 2009:1). Section 4(1) of the *Heritage Act* (as amended 2009) defines 'relic' as follows:

> ***Relic*** *means any deposit, artefact, object or material evidence that:*
> *(a) relates to the settlement of the area that comprises New South Wales, not being Aboriginal settlement, and*
> *(b) is of State or local heritage significance* (Heritage Branch, DoP, 2009:6).

No known Aboriginal objects or places listed in the SHR or SHI were identified by this assessment.

Environmental Planning and Assessment Act 1979

The EP&A Act requires that consideration be given to environmental impacts as part of the land use planning process. In NSW, environmental impacts include cultural heritage impacts. Part 3 of the Act relates to planning instruments including those at local and regional levels, Part 4 of the Act controls development assessment processes and Part 5 of the Act refers to approvals by determining authorities.

7.1.2 Commonwealth Legislation

Native Title legislation

The Native Title Act 1993 (NTA) provides the legislative framework to:

- recognise and protect native title
- establish ways in which future dealings affecting native title may proceed and to set standards for those dealings, including providing certain procedural rights for registered native title claimants and native title holders in relation to acts which affect native title
- establish a mechanism for determining claims to native title
- provide for, or permit, the validation of past acts invalidated because of the existence of native title.

The *NSW Native Title Act 1994* was introduced to make sure the laws of NSW are consistent with the Commonwealth's NTA on future dealings. It validates past and intermediate acts that may have been invalidated because of the existence of native title.

The National Native Title Tribunal has a number of functions under the NTA, including maintaining the Register of Native Title Claims, the National Native Title Register and the Register of Indigenous Land Use Agreements and mediating native title claims.

Other Acts

The Australian Government *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* may be relevant if any item of Aboriginal heritage significance to an Aboriginal community or historical heritage is under threat of injury or desecration and state-based processes are unable to protect it. The *Environment Protection and Biodiversity Conservation Act 1999* is relevant to projects where there are heritage values of national significance present.

No known heritage values of national significance were recorded during this assessment.

8. RECOMMENDATIONS

The following recommendations have been made based on the information provided on project impacts, consultation to date, and archaeological and environmental background research:

1. No Aboriginal objects or places or areas of sensitivity for PAD are identified triggering further assessment or mitigation under the provisions of the *National Parks and Wildlife Act, 1974* or to trigger Stages 2 to 4 of the RMS internal *Procedure for Aboriginal cultural heritage consultation and investigation, November 2011* (PACHCI).
2. If there are changes or any potential ground disturbing works or direct impacts to the project areas not outlined in this report or outside the provided project area, further impact assessment must be undertaken and this assessment revised.
3. As part of an induction, in the unlikely event that any unknown Aboriginal objects or historical heritage relics are uncovered during proposed works, all RMS workers and sub-contractors should be aware of their responsibilities under the provisions of the *National Parks and Wildlife Act, 1974* (including the penalties under the ancillary provisions) and *NSW Heritage Act 1977*. This induction should include RMS Procedures for *Unexpected Finds* and the requirement to stop work immediately until this process is followed and these responsibilities are met.
4. In the extremely unlikely event that any suspected human remains are uncovered during proposed works, all works must cease immediately and the RMS Project Manager immediately notified, and the area secured. The RMS Environmental Manager will contact the NSW Police (if required). If these remains are deemed to require archaeological investigation by the NSW Police or NSW Coroner, then OEH (Contact OEH's Enviroline 131 555) and the Darkinjung LALC must be notified by the Roads and Maritime Environmental Manager for further assessment and management. No works could continue until OEH (or other determining authority such as Department of Planning) provide written notification to proceed in this scenario.

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APPENDIX A

NATIONAL NATIVE TITLE TRIBUNAL SEARCH

National Native Title Tribunal

Overlap Analysis Report

Disclaimer
This information product has been created to assist in understanding the spatial characteristics and relationships of this native title matter and is intended as a guide only. Spatial data used has been sourced from the relevant custodians in each jurisdiction, and/or the Tribunal, and is referenced to the GDA94 datum.

While the National Native Title Tribunal (NNTT) and the Native Title Registrar (Registrar) have exercised due care in ensuring the accuracy of the information provided, it is provided for general information only and on the understanding that neither the NNTT, the Registrar nor the Commonwealth of Australia is providing professional advice. Appropriate professional advice relevant to your circumstances should be sought rather than relying on the information provided. In addition, you must exercise your own judgment and carefully evaluate the information provided for accuracy, currency, completeness and relevance for the purpose for which it is to be used.
The information provided is often supplied by, or based on, data and information from external sources, therefore the NNTT and Registrar cannot guarantee that the information is accurate or up-to-date.
The NNTT and Registrar expressly disclaim any liability arising from the use of this information.
This information should not be relied upon in relation to any matters associated with cultural heritage.

Please note:

- Calculated areas may not be the same as the legal area of a parcel.
- Where shown, NNTT Tenure Class for a non freehold parcel refers to a tenure grouping derived for the purposes of the Tribunal, and does not necessarily represent the jurisdictional tenure type.
- Overlap results are returned only for the currently active jurisdiction.

Selected feature

Name	Central Coast
Full name	Central Coast Council
As at	1/08/2017
Calculated area SqKm	1,845.4279

Selected feature

Overlap details

Schedule of Native Title Determination Applications

Overlap Tribunal ID	Name	FC No	Date Lodged	RT Status	Area sq km(calculated)	Overlap Area sq km (calculated)
NN2017/005	Darkinjung Local Aboriginal Land Council	NSD943/2017	15/06/2017	Not currently identified for registration	2.4700	2.4700
NN2017/012	Darkinjung Local Aboriginal Land Council #4	NSD2081/2017	24/11/2017	Not currently identified for registration	5.8789	5.8789

Register of Native Title Claims

No overlap found

Native Title Determinations

Overlap Tribunal ID	Name	FC No	Determination Status	Related NTDA	Area sq km(calculated)	Overlap Area sq km (calculated)
NND2000/001	Darkinjung Local Aboriginal Land Council (2000)	NSD6023/1999	In effect - Finalised	NN1999/010	0.0525	0.0525
NND2001/003	Darkinjung Local Aboriginal Land Council (2001)	NSD6010/2000	In effect - Finalised	NN2000/007	0.4058	0.4058
NND2002/003	Darkinjung Local Aboriginal Land Council (2002)	NSD6008/2001	In effect - Finalised	NN2001/007	2.2003	2.2003
NND2003/002	Darkinjung Local Aboriginal Land Council (2003)	NSD6003/2003	In effect - Finalised	NN2003/002	0.0141	0.0141

Native Title Determination Outcomes

Overlap Tribunal ID	Name	Federal Court number	Determined outcome	Determination Type	Determination area Albers	Selected feature area sq km(calculated)	Overlap Area sq km (calculated)	% selected feature covered by outcome
NND2000/001	Darkinjung Local Aboriginal Land Council (2000)	NSD6023/1999	Native title does not exist	In effect - Finalised	0.0525	1845.4279	0.0525	0.003 %
NND2001/003	Darkinjung Local Aboriginal Land Council (2001)	NSD6010/2000	Native title does not exist	In effect - Finalised	0.4058	1845.4279	0.4058	0.02 %
NND2002/003	Darkinjung Local Aboriginal Land Council (2002)	NSD6008/2001	Native title does not exist	In effect - Finalised	2.2003	1845.4279	2.2003	0.12 %
NND2003/002	Darkinjung Local Aboriginal Land Council (2003)	NSD6003/2003	Native title does not exist	In effect - Finalised	0.0141	1845.4279	0.0141	0.001 %
NND2005/005	Darkinjung Local Aboriginal Land Council (2005)	NSD1249/2004	Native title does not exist	In effect - Finalised	0.0873	1845.4279	0.0873	0.005 %

** Note: Outcomes identified as "Native title extinguished" are generally outside the determination area. Refer to the determination document for more information.*

Indigenous Land Use Agreements

No overlap found

RATSIB areas

Name	Organisation	RATSIB Status	Area sq km(calculated)	Overlap Area sq km (calculated)
New South Wales	NTSCORP Limited	NTSP	1,723,577.6107	1,845.4279

APPENDIX B

AHIMS SEARCH

AHIMS Web Services (AWS)
Search Result

Purchase Order/Reference : Lisawrow

Client Service ID : 334582

Emma St Pierre

PO Box 3485
Newmarket Queensland 4051

Attention: Emma St Pierre

Email: emma.st.pierre@gmail.com

Date: 20 March 2018

Dear Sir or Madam:

AHIMS Web Service search for the following area at Datum :GDA, Zone : 56, Eastings : 347626 - 348319, Northings : 6305204 - 6305212 with a Buffer of 200 meters. Additional Info : Archaeological Assessment, conducted by Emma St Pierre on 20 March 2018.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.

A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

0	**Aboriginal sites are recorded in or near the above location.**
0	**Aboriginal places have been declared in or near the above location. ***

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the NSW Government Gazette (http://www.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Office of Environment and Heritage's Aboriginal Heritage Information Unit upon request

Important information about your AHIMS search

- The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not be made available to the public.
- AHIMS records information about Aboriginal sites that have been provided to Office of Environment and Heritage and Aboriginal places that have been declared by the Minister;
- Information recorded on AHIMS may vary in its accuracy and may not be up to date .Location details are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,
- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.
- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.

APPENDIX C
DATABASE SEARCHES

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : Lisarow - 1 km

Client Service ID : 334745

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
	Contact	Recorders						Permits		

There are no sites found for given search criteria.

Report generated by AHIMS Web Service on 21/03/2018 for Emma St Pierre for the following area at Datum :GDA, Zone : 56, Eastings : 347626 - 348319, Northings : 6305204 - 6305212 with a Buffer of 1000 meters. Additional Info : Archaeological Assessment. Number of Aboriginal sites and Aboriginal objects found is 0

Appendix E

Preliminary Historical Heritage Advice

VIRTUSHERITAGE

Ph: (02) 6676 4354 | Mobile: 0439 703 886 | Email: virtusheritage@gmail.com
Postal Address: PO Box 101, Pottsville NSW 2489 | ABN: 86 889 757 693

27 April 2018

Simon Pearce
Technical Director - Environment
GHD Tower,
Level 3 Honeysuckle Drive
Newcastle NSW 2300
Email: Simon.Pearce@ghd.com

Dear Simon,

Re: Preliminary Historical Heritage Advice for proposed works compounds, Lisarow, NSW.

This letter sets out preliminary advice for Non Aboriginal heritage (Historical Heritage) for two proposed works compounds, Lisarow, NSW. The advice draws on the results from historical heritage searches to identify any known heritage items within the proposed project impact area.

Project background and project areas
Roads and Maritime Services (Roads and Maritime) commissioned Jacobs to prepare a Heritage Impact Statement (HIS) as part of a Review of Environmental Factors (REF) for the Upgrade of the Pacific Highway, Ourimbah Street to Parsons Road, Lisarow, NSW (Jacobs, 2016).

Roads and Maritime now require establishment of two works compounds (hereafter, 'project areas') outside of the assessed REF and HIS area for the proposed upgrade (refer to **Figure 1**). These two proposed works compounds are within the Central Coast Council Local Government Area (LGA) (formerly the Gosford LGA). Both proposed works compounds are on the northern side of Railway Crescent, Lisarow and immediately north of the Main Northern Railway. Both proposed compounds are within urban/industrial areas (refer to **Figure 2**).

Purpose and scope of this advice
This document does not meet Heritage Division requirements for a *Statement of Heritage Impact* or for *Assessing Significance* as examination of the Jacobs (2016) HIS and recent heritage register searches indicates that the location of historical heritage items within the project area is unlikely. The purpose of this letter is to provide addendum advice for two proposed works areas limited to updated register searches.

Brief Heritage Context and Results of Register Searches
This section provides a summary of the most relevant heritage study closest to the project areas, Jacobs (2016) and the results of statutory register searches.

Jacobs HIS (2016)
Jacobs (2016) HIS focussed on the original Upgrade project area and was compiled based on background research, survey and register searches. The Jacobs (2016) assessment did not include site inspection of these two project areas as the locations for proposed works compounds were not known at that time. Jacobs (2016) assessment does not identify any heritage issues within these two project areas.

Statutory Searches

The following statutory heritage register and database searches were undertaken:

- The Australian Heritage Database (AHD);
- State Heritage Register (SHR) and Inventory (SHI) (which includes RMS Heritage and Conservation, s.170 register); and
- Gosford Local Environmental Plan (2014).

The results of searches are shown on **Figure 2**.

Australian Heritage Database

The Australian Heritage Database was searched on 20 March 2018. There are no historical or Indigenous heritage places registered on this database within or within proximity to the project areas.

NSW State Heritage Register and NSW State Heritage Inventory

The NSW State Heritage Inventory and State Heritage Register was searched on 20 March 2018.

Current Section 170 registers including the Roads and Maritime Heritage and Conservation Register were included in this search. There are no items registered on the SHR but two items of local significance registered on the SHI in Lisarow:

a) Lisarow Cemetery – Pacific Highway and Eagle Close, Lisarow. This item is located approximately 750 m northeast of the project area (eastern block); and
b) Mrs Pryor's House – 24 Railway Crescent, Lisarow. This item is located approximately 400m northeast of the project area (eastern block). There is currently a new modern house on this block and looking at historic satellite images it looks like the block was completely cleared and demolished sometime after 2005 (refer to **Figure 2**).

No items of historical heritage were identified in the project areas (refer to **Figure 2**).

Gosford Local Environmental Plan (2014)

The Gosford Local Environmental Plan, 2014, Schedule 5, Environmental Heritage was searched on 20 March 2018.

The search results showed a total of 203 heritage items, 1 conservation area and 27 archaeological sites within the LGA. Two heritage items of local significance are located in Lisarow:

a) Lisarow Cemetery – Pacific Highway and Eagle Close, Lisarow. This item is located approximately 750 m northeast of the project area (eastern block); and
b) Post office, shop and outbuilding (Pryor Brothers) – 12A Railway Crescent, Lisarow.

The location of the Post office, shop and outbuilding is located approximately 450m northeast of the project area (eastern block). A news article from March 2015 (Daily Telegraph Online accessed 20 March 2018) indicates these buildings were demolished by Roads and Maritime. GHD (2017:22) also confirmed the destruction of these buildings in "2013 by Roads and Maritime in accordance with development consent from Gosford City Council under Part 4 of the EP&A Act" (refer to **Figure 2**).

Review of Google Street View dating from May 2015, shows an empty lot with no buildings. No items of historical heritage were identified in the project areas.

Legislative Context

Heritage Act, 1977

The *Heritage Act, 1977* (as amended in 2009) protects and aims to conserve the environmental heritage of New South Wales. *Environmental heritage* is broadly defined under Section 4 of the *Heritage Act* as consisting of "those places, buildings, works, relics, moveable objects, and precincts, of State or local heritage significance" (Heritage Branch, DoP 2009:4). Aboriginal places or objects that are recognised as having high cultural value (potentially of local and State significance) can be listed on the State Heritage Register and protected under the provisions of the *Heritage Act* (http://www.heritage.nsw.gov.au/06_subnav_01.htm).

Recent amendments to the *Heritage Act* made in 2009 have changed the definition of an archaeological *'relic'* under the Act, so that it is no longer based on age. A relic is now an archaeological deposit, resource or feature that has *heritage significance* at a local or State level. This significance, based approach to identifying 'relics' is consistent with the way other heritage items such as buildings, works, precincts or landscapes are identified and managed in NSW (Heritage Branch, DoP 2009:1). Section 4(1) of the *Heritage Act* (as amended 2009) defines 'relic' as follows:

> ***Relic*** *means any deposit, artefact, object or material evidence that:*
>
> *(a) relates to the settlement of the area that comprises New South Wales, not being Aboriginal settlement, and*
>
> *(b) is of State or local heritage significance* (Heritage Branch, DoP, 2009:6).

No known historical heritage items or places listed in the SHR or SHI were identified by this assessment within the project area that will be impacted by proposed works.

Environmental Planning and Assessment Act 1979

The EP&A Act requires that consideration be given to environmental impacts as part of the land use planning process. In NSW, environmental impacts include cultural heritage impacts. Part 3 of the Act relates to planning instruments including those at local and regional levels, Part 4 of the Act controls development assessment processes and Part 5 of the Act refers to approvals by determining authorities.

Commonwealth Legislation

The *Environment Protection and Biodiversity Conservation Act 1999* is relevant to projects where there are heritage values of national significance present.

No known heritage values of national significance were recorded during this assessment within the project areas.

Preliminary Management Recommendations
Based on register searches and review of Jacobs (2016), we conclude/recommend that:

1) No further assessment is required, as no historical heritage items were identified within the project areas from register searches and a review of Jacobs (2016) that may be impacted within the project area.

2) As part of an induction, in the unlikely event that any unknown Aboriginal objects or historical heritage relics are uncovered during proposed works, all Roads and Maritime workers and sub-contractors should be aware of their responsibilities under the provisions of the *National Parks and Wildlife Act, 1974* (including the penalties under the ancillary provisions) and *NSW Heritage Act 1977*. This induction should include Roads and Maritime *Procedures for Unexpected Finds* and the requirement to stop work immediately until this process is followed and these responsibilities are met.

3) In the extremely unlikely event that any suspected human remains are uncovered during proposed works, all works must cease immediately and the Roads and Maritime Project Manager immediately notified and the area secured. The Roads and Maritime Environmental Manager will follow the process as identified under the Roads and Maritime, *Unexpected Heritage Finds Procedure*, Appendix E (Roads and Maritime 2015) before works can proceed and these responsibilities are met

Please do not hesitate to contact me if you would like to discuss any aspect of this preliminary heritage advice further on (02) 6676 4354 or 0439 703 886.

Dr Mary-Jean Sutton
Principal Archaeologist/Director

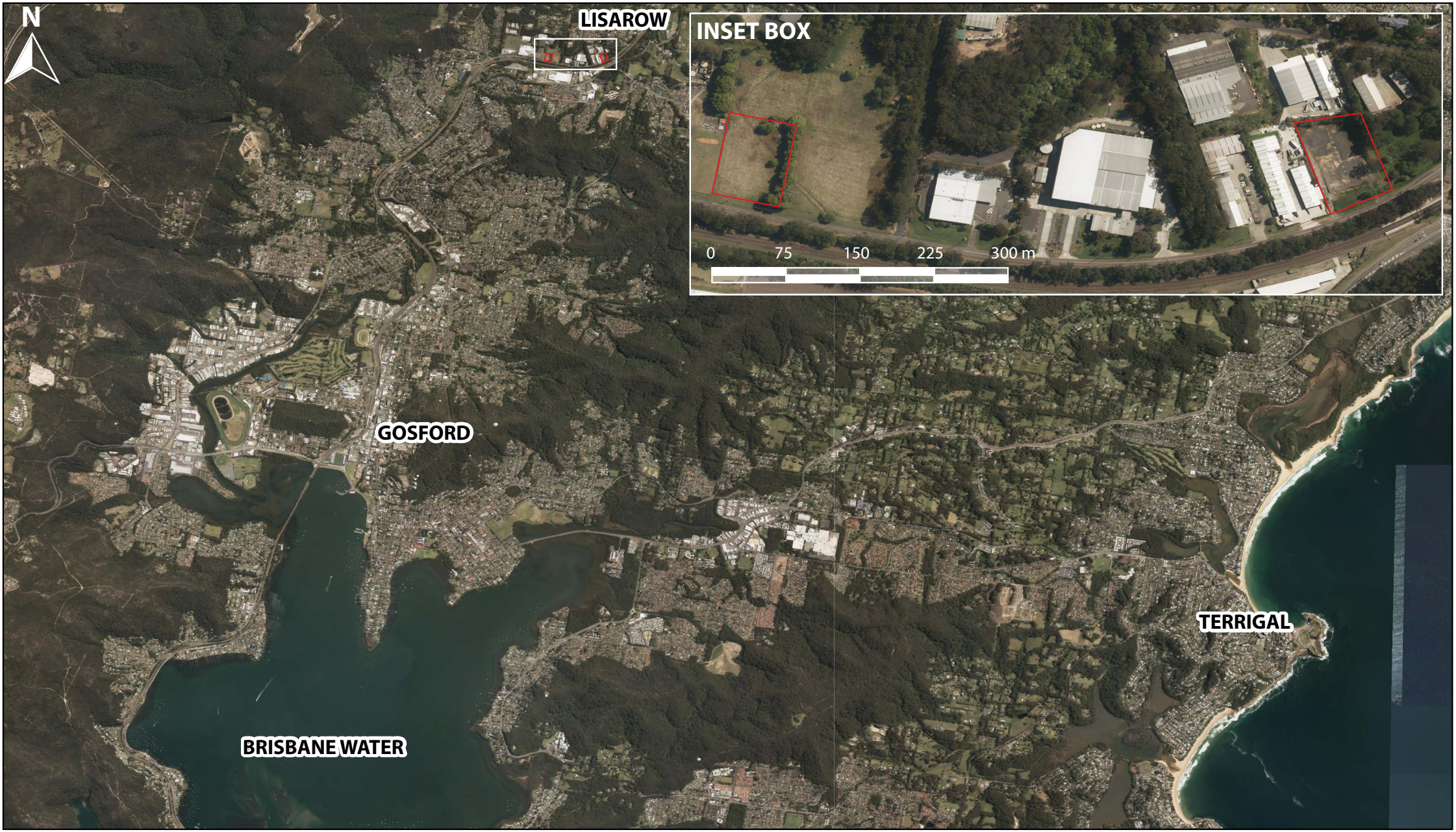
References

Daily Telegraph Online, https://www.dailytelegraph.com.au/newslocal/central-coast/historic-lisarow-general-store-bulldozed-to-make-way-for-pacific-highway-upgrade/news-story/a33273e806939df7222a0a8ff4340455, Accessed March 2018.

GHD, 2017. *Upgrade of the Pacific Highway between Ourimbah Street and Parsons Road, Lisarow. Addendum review of environmental factors*. Report prepared for RMS.

Jacobs, 2016. *Upgrade of the Pacific Highway, Ourimbah Street to Parsons Road, Lisarow Statement of Heritage Impact*. Report prepared for RMS.

Roads and Maritime Services, NSW (RMS), 2011. *Procedure for Unexpected Finds*.



Source: SIXMAPS

0 1 2 3 4 km

Legend

Project areas

Maps and figures contained within this document may be based on third party data, may not be to scale and are intended for use as a guide only. Virtus Heritage does not warrant the accuracy of any such maps or figures.

VIRTUSHERITAGE

Figure 1
Locality Map

Sources: SIXMAPS,
Gosford 2014 LEP,
State Heritage Inventory

Legend

- Project areas
- Gosford 2014 LEP item
- State Heritage Inventory item

0 100 200 300 400 m

Maps and figures contained within this document may be based on third party data, may not be to scale and are intended for use as a guide only. Virtus Heritage does not warrant the accuracy of any such maps or figures.

VIRTUS HERITAGE

Figure 2
Heritage items

Gosford Local Environmental Plan 2014

Current version for 20 October 2017 to date (accessed 20 March 2018 at 15:59)

Schedule 5

Schedule 5 Environmental heritage

(Clause 5.10)

Part 1 Heritage items

Suburb	Item name	Address	Property description	Significance	Item no
Bensville	Hastings Wharf	Kallaroo Road		Local	1
Blackwall	House of Rock Davis, also known as Blackwall House	21 Cedar Crescent	Lot 3, DP 861482	Local	2
Booker Bay	Booker Bay Store	72 Booker Bay Road	Lot A, DP 338628	Local	3
Booker Bay	Shop, “Kings Store”	78 Booker Bay Road	Lot 119A, DP 416609	Local	4
Davistown	Davistown Store	1 McCauley Street	Lot 1, DP 12932	Local	5
Davistown	Davistown Baths	Off Pine Avenue (foreshore reserve)	Adjacent to Lot 7034, DP 1125784	Local	6
East Gosford	House, “Mona Vale”	13 Frederick Street	Part of Lot 16, DP 570400	Local	8
East Gosford	House, “Stonehurst”	64 George Street	Lot 6, DP 227878	Local	9
East Gosford	House	100 Lushington Street	Lot 44, DP 614225	Local	10
East Gosford	Remains of old Punt Bridge	The Entrance Road (north-western corner of Punt Bridge)	Adjacent to Lot 26, DP 227878	Local	7
Empire Bay	Merritt’s Wharf	Off Merritt’s Road		Local	11
Empire Bay	Anglican church	47 Rosella Road	Lot 201, DP 7029	Local	12
Empire Bay	War memorial	Corner of Sorrento and Kendall Roads		Local	16
Empire Bay	House, former boarding house, “Empire House”	8 Sorrento Road	Lot B, DP 102620	Local	13
Empire Bay	Empire Bay Store and residence	12A Sorrento Road	Lot 12, DP 1130259	Local	14
Empire Bay	Boat shed	16B Sorrento Road	Lot 486, DP 727270	Local	15
Erina	Original Erina West Public School buildings	148 The Entrance Road	Lot 1, DP 123747	Local	18
Erina Heights	Original Erina Heights Public School	2 Serpentine Road	Lot 21, DP 1027214	Local	19
Ettalong Beach	House	42 The Esplanade	Lot B, DP 347800	Local	20

Ettalong Beach	Vietnam veterans' memorial	Ettalong Foreshore Reserve, The Esplanade	Part Lot 7308, DP 1159098	Local	21
Glenworth Valley	Grave of Owen Maloney	Glenworth Valley Road	Lot 19, DP 755221	Local	23
Glenworth Valley	House, "Glenworth Valley"	Glenworth Valley Road	Lot 89, DP 755221	Local	24
Glenworth Valley	Remains of stone walling	Glenworth Valley Road	Lot 37, DP 755221	Local	22
Gosford	Avenue and feature trees—Grahame Park	Alfred Higgs Place and Dane Drive	Road reserve; Part Lot 1, DP 1011876	Local	25
Gosford	Stone street wall	2 Broadview Avenue	SP 16709	Local	26
Gosford	Large-faced clock with wooden frame	Burns Crescent (Gosford Railway Station)	Part Lot 100, DP 1006006	Local	49
Gosford	Burns Place Park, feature eucalypt and stands of mature trees	Between Burns Crescent and Mann Street		Local	27
Gosford	Union Hotel	108 Donnison Street	Lot 5, DP 1015908	Local	28
Gosford	Gosford Hotel	102 Erina Street	Lot 1, DP 76776	Local	29
Gosford	Former Gosford Public School and residence, now TAFE Building E	121 Henry Parry Drive	Part of Lot 1, DP 861564	Local	30
Gosford	Gosford City Council Memorial Park, including avenue and feature trees	Mann Street and Vaughan Avenue	Lot 7038, DP 1020204; Lot 7021, DP 1020205	Local	31
Gosford	Former School of Arts	Corner of Mann Street and Georgiana Terrace	Part of Lot 1, DP 1210298	Local	36
Gosford	Stone street and driveway wall	1 Mann Street	SP 6683	Local	32
Gosford	Old Christ Church Anglican Church	3 Mann Street	Lot 13, Section 9, DP 758466; Lot 14, DP 1115314	Local	33
Gosford	Anglican rectory	5 Mann Street	Lot 12, Section 9, DP 758466	Local	34
Gosford	Part of Gosford South Post Office	23 Mann Street	Lot A, DP 88695	Local	35
Gosford	Creighton's Funeral Parlour	37 Mann Street	Lot A, DP 355117	Local	37
Gosford	Conservatorium of Music (former courthouse and police station)	45 Mann Street	Lot 453, DP 727721	Local	38
Gosford	Central Coast Council administration building (Gosford office)	49 Mann Street	Lot 1, DP 564021; Lot 1, DP 251476	Local	39

Gosford	Former Brisbane Water County Council building	50 Mann Street	Lot 1, DP 433839	Local	40
Gosford	Feature tree—fig	Boundary of 81, 83 and 85 Mann Street and 123B Donnison Street	Lots 11, 14 and 15, DP 746819; Lot 3, DP 1023985	Local	41
Gosford	Building facade, First National Real Estate	150 Mann Street	Lot 1, DP 134233	Local	42
Gosford	Mitre 10 store	299–309 Mann Street	Lots 1 and 2, Section 1, DP 1591; Lot 1, DP 911164; Lot 1, DP 911163	Local	43
Gosford	War memorial site, Gosford Olympic Swimming Pool	Masons Parade	Lot 7018, DP 1116947	Local	44
Gosford	Railway bridge and viaduct	Racecourse Road and Etna Street		Local	45
Gosford	Dwyer Pavilion	Showground Road (Gosford Showground)	Lot 245, DP 755227	Local	46
Gosford	Railway turntable	Railway land off Showground Road	Part Lot 100, DP 1006006	Local	47
Gosford	Signal box, water column and tank	Railway land off Showground Road	Part Lot 100, DP 1006006	Local	48
Gosford	Railway bridge and pylons	Between Fagans Bay and Brisbane Water	Railway land; part Lot 1, DP 997118	Local	50
Green Point	House, “Mulhollands”	9 Pixie Avenue	Lot 2, DP 571548	State	53
Green Point	Foreshore land and structures	Reserve adjacent to 9 Pixie Avenue	Lot 1, DP 571548	State	54
Green Point	Farmhouse, “Kenmare”	4 Roslyn Gardens	Lot 9, DP 236432	Local	55
Greengrove	St Peter’s cemetery	Mangrove Creek, off Mangrove Creek Road	Lot 51, DP 755253	Local	51
Greengrove	Grave of John Donovan	3653 Wisemans Ferry Road	Lot 371, DP 129586	Local	52
Gunderman	Roadworks known as Finch’s Ascent	From Roses Creek to The Great North Road	Dharug National Park	Local	57
Gunderman	Cable ferry	Wisemans Ferry Road	Hawkesbury River adjacent to Lot 2, DP 511946	Local	59
Gunderman	Timber and steel bridge over Mill Creek	Wisemans Ferry Road	Road reserve adjacent to Lot 1, DP 24303	Local	58
Gunderman	Lower Hawkesbury Wesleyan Chapel and site	6443 Wisemans Ferry Road	Lot 118, DP 755257	Local	202
Gunderman	Lower Hawkesbury Wesleyan Chapel and site	6445 Wisemans Ferry Road	Lot 4, DP 599807	State	56

Gunderman, Ten Mile Hollow, Kulnura	Roadworks	The Great North Road (between Hawkesbury River, Devine's Hill, Mount Manning and Kulnura)	Dharug National Park	State	60
Kariong	Administration and service buildings—maintenance store, cultural centre, admissions/operations annexe and theatre, school house, Girrakool House, occasional child care, flats	Central Coast Highway	Lot 10, DP 1149050	State	63
Kariong	Built landscape elements—gazebo, stone walls, sculpture park	Central Coast Highway	Lot 10, DP 1149050	Local	68
Kariong	Dam	Central Coast Highway	Lot 10, DP 1149050	Local	70
Kariong	Dormitories —"Carinya", "Sobraon", "Walpole", "Vernon" and "The Wood Building"	Central Coast Highway	Lot 10, DP 1149050	State	62
Kariong	Eastern bushland	Central Coast Highway	Lot 10, DP 1149050	Local	76
Kariong	Entry drive with perimeter brush box and eucalypt plantings	Central Coast Highway	Lot 10, DP 1149050	State	77
Kariong	Mature cultural plantings	Central Coast Highway (along northern end of riding school)	Lot 10, DP 1149050; Lot 702, DP 1128417	Local	72
Kariong	Mature cultural plantings, including coral trees, brush box, camphor laurels, white poplars, hoop pines, an oak and a larch	Central Coast Highway	Lot 10, DP 1149050; Lot 702, DP 1128417	Local	73
Kariong	McCabe Complex—two cottages, McCabe Conference Centre	Central Coast Highway	Lot 10, DP 1149050	State	66
Kariong	Old pine tree group	Central Coast Highway	Lot 10, DP 1149050	Local	69
Kariong	Remnant farm buildings—the barn, storage shed and dairy	Central Coast Highway	Lot 521, DP 1017539	Local	61
Kariong	Residential buildings—six residential cottages, deputy superintendent's cottage	Central Coast Highway	Lot 10, DP 1149050	State	64

Kariong	Service and amenity buildings—art room and ablutions block, former officers' dining room, dining room, main kitchen and laundry	Central Coast Highway	Lot 10, DP 1149050	Local	65
Kariong	Sports field perimeter brush box and eucalypt plantings	Central Coast Highway	Lot 10, DP 1149050	Local	75
Kariong	Sports fields—three sports fields, sports oval	Central Coast Highway	Lot 10, DP 1149050	State	67
Kariong	Two groups of scribbly gums	Central Coast Highway	Lot 10, DP 1149050	Local	74
Kariong	White poplar avenue	Central Coast Highway	Lot 10, DP 1149050	Local	71
Killcare	House, "Capri"	40 Araluen Drive	Lot 49, DP 302278	Local	78
Killcare	House, "Bayview"	42 Araluen Drive	Lot 1, DP 171147	Local	79
Killcare	Killcare Marina site	Opposite 46 Araluen Drive	Lot 495, DP 822113	Local	80
Killcare	Killcare Store	54 Araluen Drive	Lot 43, DP 8830	Local	81
Killcare	Grave of John Menton	15–17 Blythe Street	Lots 81 and 82, DP 8830	Local	82
Killcare Heights	"The Maitland Store"	The Scenic Road (opposite Maitland Bay Drive)	Lot A, DP 102544	Local	83
Kincumber	St Paul's church and graveyard	Corner Avoca and Empire Bay Drives	Lot 1, DP 666699; Lot 11, DP 1045816	Local	84
Kincumber	Post and rail fence	152–154 Avoca Drive	Lots 111 and 112, DP 1124060	Local	85
Kincumber	Manasseh Frost's House	154 Avoca Drive	Lot 112, DP 1124060	Local	86
Kincumber	George Frost's House	Unit 10, 168 Avoca Drive	Lot 10, DP 270585	Local	87
Kincumber	Post and rail fence	170 Avoca Drive	Lot 1, DP 781105	Local	88
Kincumber	School of Arts	172A Avoca Drive	Lot 2, Section 6, DP 758569	Local	89
Kincumber	House, "Boora Boora"	465 Avoca Drive	Lot 1, DP 1088224	Local	90
Kincumber	House, "The Lavender Patch"	7 Joseph Place	Lot 1, DP 870536	Local	91
Kincumber	House of Burns family	20 Kincumber Street	Lot 11, DP 719717	Local	92
Kincumber South	Convent and chapel, Kincumber Orphanage	8 Humphreys Road	Lot 1, DP 252634	Local	94
Kincumber South	Holy Cross Church and graveyard	10 Humphreys Road	Lot 1, DP 587129	Local	93

Koolewong	House	15 Brisbane Water Drive	Lot 2, DP 1133997	Local	96
Koolewong	House and wharf, “Glenrock”	12 Couche Crescent and Brisbane Water	Lot 2, DP 387962; wharf at end of pathway off Couche Crescent to Brisbane Water	Local	97
Koolewong	House,“Sunny Haven”	154 Glenrock Parade	Lot 181, DP 204140	Local	98
Koolewong	House	30 Lara Street	Lot 4, DP 332224	Local	99
Koolewong	House	80 Lara Street	Lot 412, DP 833320	Local	100
Kulnura	House of George Downes	1223 George Downes Drive	Lot 1, DP 525350	Local	101
Lisarow	Cemetery	Pacific Highway	Lot 1, DP 1122707	Local	102
Lisarow	Post office, shop and outbuilding (Pryor Brothers)	12A Railway Crescent	Lot 1, DP 590606	Local	103
MacMasters Beach	Grave of Allan MacMasters	Corribeg Reserve, Tudibaring Parade	Lots 7–10, DP 12921	Local	104
Mangrove Mountain	Public hall	2–4 Waratah Road	Lots 21 and 22, DP 856351	Local	105
Mangrove Mountain	Fire station	6 Waratah Road	Lot 1, DP 600207	Local	106
Mangrove Mountain	“Waratah House”	223 Waratah Road	Lot 1, DP 245129	Local	107
Mangrove Mountain	House, “Bundeena”	435 Waratah Road	Lot 72, DP 755235	Local	108
Mangrove Mountain	Union Church	2154 Wisemans Ferry Road	Lot 78, DP 755235	Local	109
Marlow	House and wharf, previously Greenmans Inn	Colmer Road	Lot 36, DP 755221	Local	110
Mooney Mooney	Grave of Frances Peat	Mooney Mooney Point	Lot 9, DP 863305	Local	112
Narara	House, “White Gates”	18 Hanlan Street	Lot 2, DP 1128998	Local	113
Narara	House, “Valley View”	95 Hanlan Street	Lot 4, DP 612752	Local	114
Narara	House, “Holcombes”	Corner Manns Road and Bellbowrie Avenue	Lot 1, DP 700106	Local	115
Narara	Former Narara Primary School building	651 Pacific Highway	Lot 36, SP 67013	Local	116
Narara	House, “Everinghams”	39 Pearson Street	Lot A, DP 420450	Local	117
Narara	Old railway dams and environs	Off Reeves Street	Lots 1–3, DP 104216; Lot 1, DP 104190; Lot 30, DP 1169069	Local	118
Narara	Former grafting shed/administration block and curtilage	Research Road	Lot 13, DP 1126998	Local	120

Narara	Group of *Araucaria cunninghammii* (hoop pines)	Research Road	Lot 13, DP 1126998	Local	123
Narara	Group of *Taxodium distichum* (bald cypress)	Research Road	Lot 13, DP 1126998	Local	121
Narara	Main entrance gate posts	Research Road	Lot 13, DP 1126998	Local	127
Narara	Manager's cottage, hen house (former shower block) and curtilage	Research Road	Lot 13, DP 1126998	Local	119
Narara	Plantation of *Carya illinoensis* (pecan)	Research Road	Lot 13, DP 1126998	Local	124
Narara	Row of *Pyrus calleryana* (Callery pear)	Research Road	Lot 13, DP 1126998	Local	125
Narara	Specimen of *Syncarpia glomulifera* (turpentine)	Research Road	Lot 13, DP 1126998	Local	122
Narara	Specimen of *Pyrus calleryana* (Callery pear), strain D6	Research Road	Lot 13, DP 1126998	Local	126
North Gosford	Former cemetery, "Bradys Gully"	Henry Parry Drive	Lots 1–3, DP 755227; Lot 7042, DP 1020641	Local	129
Patonga	Seven houses	Dark Corner	Lot 7307, DP 1159203	Local	130
Patonga	War memorial	Intersection of Patonga Drive, Bay Street and Jacaranda Avenue	Road reserve	Local	132
Patonga	Remains of Patonga Store	8 Patonga Drive	Lot 5, DP 23839	Local	131
Pearl Beach	Roadworks, old Pearl Beach Road	Base of Mount Ettalong, off Coral Crescent	Adjacent to Lot 7039, DP 1066789	Local	133
Pearl Beach	House, "Yamba"	13 Crystal Avenue	Lot 480, DP 14592	Local	134
Pearl Beach	Pearl Beach Hall and memorial	9 Diamond Road	Lot 324, DP 14592	Local	135
Peats Ridge	Club rooms/church	1184 Peats Ridge Road	Lot 1, DP 1146636	Local	136
Peats Ridge	Peats Ridge Public School	1231 Peats Ridge Road	Lot 1, DP 122497	Local	137
Peats Ridge	House and gardens	1540 Peats Ridge Road	Lot 79, DP 665343	Local	138
Phegans Bay	Phegans Walking Track	80–92 Monastir Road	Lots 40–46, DP 8421	Local	139
Point Clare	House, "Katie Dawson's"	15 Alukea Avenue	Lot 5, DP 4090	Local	140
Point Clare	House, "Martha Scott's"	27 Brisbane Water Drive	Lot 1, DP 38240	Local	141

Point Clare	House, “Keiraville”	156 Brisbane Water Drive	Lot 4, DP 613722	Local	142
Point Frederick	Former cemetery	Pioneer Park, Albany Street	Lot 7041, DP 1019814	Local	143
Point Frederick	House, “Corra-Lynn”	3 Lynn Avenue	Lot 9, DP 38586	Local	144
Point Frederick	House, “Nettaville”	2 York Street	Lot 52, DP 715094	Local	145
Pretty Beach	House, “Weona”	66 High View Road	Lot 35, Section 2, DP 6552	Local	146
Pretty Beach	Former Pretty Beach Store	38 Pretty Beach Road	Lot 12, Section 1, DP 6552	Local	147
Saratoga	Gravestone of John Campbell	Brooklyn Road	Road reserve adjacent to Lot 13, DP 216113	Local	149
Saratoga	Former Buena Vista Boarding House	76 Steyne Road	Lot 15, DP 561989	Local	150
Saratoga	House, “Rosemount”	36 Village Road	Lot 52, DP 236445	State	151
Somersby	House, “Belbourie”	92 Howes Road	Lot 162, DP 543099	Local	152
Somersby	“Ploddy the Dinosaur”	945 Pacific Highway	Lot 205, DP 747845	Local	153
Somersby	House and gardens, “Linton Park”	611 Wisemans Ferry Road	Lot 3, DP 1027884	Local	154
Somersby	House, “Woodlands”	691 Wisemans Ferry Road	Lot 1, DP 135540	Local	155
Somersby	Somersby Public School	840 Wisemans Ferry Road	Lot 1, DP 505745	Local	156
Spencer	House	3 Collington Road	Lot 4, DP 377437	Local	157
Spencer	Holy Trinity Church, graveyard and wharf	Wisemans Ferry Road	Lot 1, DP 782346	Local	158
Spencer	Well	Wisemans Ferry Road	Reserve west of Lot 135, DP 755257	Local	160
Spencer	Woodbury’s House	4352 Wisemans Ferry Road	Part Lot 113, DP 1082966	Local	159
Tascott	Graves of Scott family	15 Melaleuca Crescent	Lot 33, DP 27767	Local	161
Terrigal	Old post office	4 Ash Street	Lot 28, DP 7914	Local	162
Terrigal	House, “The Gunyah”	168 Terrigal Drive	Lot B, DP 347541	Local	163
Terrigal	House, “Seville”	394 Terrigal Drive	Lot 21, DP 1178742	Local	164
Terrigal	War memorial	Terrigal Beach Foreshore, Terrigal Esplanade		Local	165
Upper Mangrove	St Thomas’ Cemetery	Ten Mile Hollow Road, south of Dubbo Gully Road	Lot 7001, DP 1073448; Lot 7003, DP 1073461; Lot 79, DP 755239	Local	166
Upper Mangrove	Fairview Homestead	248 Ten Mile Hollow Road	Lot 38, DP 755239	Local	201

Wagstaffe	Former St Peter's Church	12 Wagstaffe Avenue	Lot 682, DP 737089	Local	167
Wagstaffe	Boat shed and Norfolk Island pines	43 Wagstaffe Avenue	Lot 222, DP 514964	Local	168
Wagstaffe	Wagstaffe Store	46–48 Wagstaffe Avenue	Lots 1 and 2, DP 7041	Local	169
Wagstaffe	Wagstaffe Memorial Hall	55 Wagstaffe Avenue	Lot 17, DP 4961	Local	170
Wamberal	Former Uniting Church	600 The Entrance Road	Lot 5, DP 959078	Local	171
Wamberal	Cemetery	Ulumba Avenue	Part Lot 170, DP 755234; Lots 171–173, 199, 303 and 304, DP 755234	Local	172
West Gosford	"Kendalls Glen" memorial	Central Coast Highway	Road reserve	Local	173
West Gosford	Henry Kendall Museum (former house of Peter Fagan and Red Cow Inn)	25–27 Henry Kendall Street	Lot A, DP 398172; Lot 12, DP 24491	Local	175
Wondabyne	Nine huts at Mullet Creek	Brisbane Water National Park	Lots 257, 259–262, 266, 268, 273 and 344, DP 755251	Local	177
Wondabyne	Hawkesbury River railway bridge (includes pylons of former Hawkesbury River railway bridge)	Hawkesbury River	Adjacent to Lot A, DP 191003	State	176
Wondabyne	Wondabyne Quarry	Adjacent to Wondabyne Railway Station	Part of Lot 177, DP 755251	Local	178
Woy Woy	Public wharf remains	Western side of Woy Woy Railway Station	Adjacent to Lot 1, DP 1057640	Local	179
Woy Woy	Two shops, "Noonans"	8–10 Blackwall Road	Lot 2, DP 204415; Lot 10, DP 235753	Local	180
Woy Woy	Part of former Alecia Tea Rooms	18 Blackwall Road	Lot C, DP 400718	Local	181
Woy Woy	Former council chambers	42 Blackwall Road	Lot 1, DP 1038859	Local	182
Woy Woy	Former council garage and storeroom	42 Blackwall Road	Lot 1, DP 1038859	Local	183
Woy Woy	Fire station and residence	42 Blackwall Road	Lot 1, DP 1038859	Local	184
Woy Woy	St John the Baptist Church	96–98 Blackwall Road	Lot 50, DP 1124529	Local	185
Woy Woy	St David's Church	120 Blackwall Road	Lot 1, DP 1078856	Local	186
Woy Woy	Former St Luke's Church	267 Blackwall Road	Lot 316, DP 10172	Local	187

Woy Woy	Woy Woy Memorial Park and wall	Brickwharf Road	Part Lot 7302, DP 1162176	Local	188
Woy Woy	Woy Woy Masonic Hall	42 Railway Street	Lot 331, DP 547025	Local	189
Woy Woy	Former shop, “Mrs Wilson’s”	68 Railway Street	Lot 12, DP 1009830	Local	190
Woy Woy	House	146 Railway Street	Lot 1, SP 39309	Local	191
Woy Woy	Bay View Hotel	2 The Boulevarde	Lot 1, DP 877881	Local	192
Woy Woy	Woy Woy Hotel	33 The Boulevarde	Lot 1, DP 657247	Local	193
Woy Woy	Woy Woy Railway Tunnel	Woy Woy Road	Part of Lot 105, DP 1184403; part of Lot 106, DP 1184501	State	203
Woy Woy Bay	House	6 Taylor Street	Lot 26, DP 19469	Local	194
Wyoming	House	10 Akora Road	Lot 5, Section 4, DP 1905	Local	195
Wyoming	Grave of F A Hely	Adjacent to 559 Pacific Highway	Lot D, DP 346298; Lot 1, DP 546958	State	196
Wyoming	House, “Wyoming Cottage”	567 Pacific Highway	Lot 1, DP 20870	State	197
Wyoming	Church	647 Pacific Highway	Lot 5, Section A, DP 2350	Local	198
Wyoming	House, “The Grange”	47 Renwick Street	Lot 10, DP 882347	State	199
Yattalunga	Yattalunga Baths	Yattalunga Public Wharf, Mundoora Avenue	Adjacent to Lot 7047, DP 93727	Local	200

Part 2 Heritage conservation areas

Name of heritage conservation area	Identification on Heritage Map	Significance
Mount Penang Parklands Heritage Conservation Area	Shown by a heavy red line and hatching and labelled “C1”	State

Part 3 Archaeological sites

Suburb	Item name	Address	Property description	Significance	Item no
Bar Point	Shipwreck, HMAS Parramatta	Cascade Gully, Hawkesbury River	Adjacent to Lot 47, DP 755221	State	A1
Bensville	Palmers Wharf site	Palmers Lane		Local	A2
Blackwall	Site of former public wharf	Blackwall Point, Blackwall Road		Local	A3
Booker Bay	Site of house, “Ettalong Hall”	Between Orange Grove Road and Maitland Bay Drive		Local	A4
Daleys Point	Ruins of house	Rileys Bay	Lot 4, DP 863379	Local	A5

East Gosford	Site of former public wharf	Adjacent to 11–13 Wharf Street	Adjacent to Lots 9 and 10, DP 17434	Local	A6
Erina	Site of former public wharf	205A The Entrance Road and Erina Creek	Lot 1, DP 1062620	Local	A7
Gosford	Site of original Gosford Wharf	Dane Drive	Part Lot 22, DP 1040230	Local	A8
Gosford	Footings of former sergeant's residence/police station	38 Mann Street	Lot 1, DP 1210298	Local	A25
Gosford	Footings of former police stables	38 Mann Street	Lot 1, DP 1210298	Local	A26
Gosford	Rotary Club, fountain, garden and original site of Gosford Wharf	Vaughan Avenue	Part Lot 7023, DP 1076182	Local	A9
Green Point	Site of former public wharf	Lexington Parade	Adjacent to Lot 7032, DP 1019817	Local	A11
Greengrove	Former public wharf remains	Mangrove Creek at mouth of Bedlam Creek	Adjacent to Lot 207, DP 755253	Local	A10
Gunderman	Ruins of Bailey's Mill	Wisemans Ferry Road	Road reserve adjacent to Lot 1, DP 24303	Local	A27
Gunderman	Ruins of Singleton's Mill	6746 Wisemans Ferry Road	Lot 18, DP 24303	Local	A12
Killcare	Rickards Wharf	Stanley Street		Local	A13
Kincumber	Wards Wharf	Kincumber Broadwater	Adjacent to Lot 503, DP 722244	Local	A15
Kincumber	Site of former public wharf	Kincumber Creek	Adjacent to Lot 7040, DP 1030914	Local	A14
Mangrove Creek	Site of Pembertons Wharf	Mangrove Creek Road	Adjacent to Lot 121, DP 755253	Local	A16
Mangrove Creek	Ruins of house	Mangrove Creek Road	Part Lot 1700, DP 1127833	Local	A17
Mooney Mooney	Site of George Peat's Inn	Mooney Mooney Point	Part Lot 2, DP 431999	Local	A18
Narara	Venus Wharf site	Narara Creek	Adjacent to Lot 3, DP 527553	Local	A19
Point Clare	Goodawang Wharf and Langley House footings	Kurrawa Avenue	Part Reserve 36775	Local	A20
Somersby	Remains of house, "Belltrees"	278 Wisemans Ferry Road	Lot 5, DP 207951	Local	A21
Ten Mile Hollow	Footings of the Inn of Samuel Paley	Dharug National Park	Lot 49, DP 755239	Local	A22
Upper Mangrove	Site of John Ferguson's Inn	Ten Mile Hollow Road	Lot 37, DP 755239	Local	A23

Woy Woy	Site of brick wharf	Adjacent to reserve, eastern end of Brickwharf Road	Adjacent to Lot 7303, DP 1162281	Local	A24

Blackwall Mount Ornithological Area Kitchener Av	Blackwall, NSW, Australia	(Indicative Place) Register of the National Estate (Non-statutory archive)
Bouddi National Park (1981 boundary) Hawke Head Dr	Killcare, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Bouddi National Park Marine Section	Killcare Heights, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Brisbane Water County Council Building (former) 50 Mann St	Gosford, NSW, Australia	(Indicative Place) Register of the National Estate (Non-statutory archive)
Brisbane Water National Park Pacific Hwy	Gosford, NSW, Australia	(Nomination now ineligible for PPAL) National Heritage List
Brisbane Water National Park (1981 boundary) Pacific Hwy	Gosford, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Brisbane Water and Bouddi National Parks Pacific Hwy	Gosford, NSW, Australia	(Nomination now ineligible for PPAL) National Heritage List
Broken Bay Entrance Foreshores	Ettalong, NSW, Australia	(Indicative Place) Register of the National Estate (Non-statutory archive)
Cottages Dark Corner	Patonga, NSW, Australia	(Indicative Place) Register of the National Estate (Non-statutory archive)
Creighton Funeral Parlour 37 Mann St	Gosford, NSW, Australia	(Indicative Place) Register of the National Estate (Non-statutory archive)

Dharug National Park (1978 boundary) Wisemans Ferry Rd	Spencer, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Gosford Courthouse 45 Mann St	Gosford, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Gosford Hills Landscape Conservation Area	Gosford, NSW, Australia	(Indicative Place) Register of the National Estate (Non-statutory archive)
Gosford Showground Showground Rd	Gosford, NSW, Australia	(Indicative Place) Register of the National Estate (Non-statutory archive)
Great North Road, Wisemans Ferry to Bucketty Old Great North Rd	Wisemans Ferry, NSW, Australia	(Nominated place) National Heritage List
Great Northern Road - Extension Great Northern Rd	Wollombi, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Hawkesbury River Rail Bridge	Brooklyn, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Holy Cross Catholic Church and Graveyard Humphreys Rd	Kincumber South, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Howe Aboriginal Area Grants Rd	Somersby, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Indigenous Place	Calga, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Indigenous Place	Daleys Point, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)

Indigenous Place	Kariong, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Indigenous Place	Narara, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Indigenous Place	St Albans, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Indigenous Place	Woy Woy Bay, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Ku-ring-gai Chase National Park, Lion, Long and Spectacle Island Nature Reserves Ku-ring-gai Chase Rd	Bobbin Head, NSW, Australia	(Listed place) National Heritage List
Lion Island Nature Reserve	Pearl Beach, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Lone grave of Frances Peat Pacific Hwy	Mooney Mooney, NSW, Australia	(Indicative Place) Register of the National Estate (Non-statutory archive)
Lower Hawkesbury Wesleyan Chapel 969 Wisemans Ferry Rd	Wisemans Ferry, NSW, Australia	(Indicative Place) Register of the National Estate (Non-statutory archive)
MacDonald Valley / Wollombi Valley Area	St Albans, NSW, Australia	(Indicative Place) Register of the National Estate (Non-statutory archive)
Mooney Mooney Aboriginal Area Pacific Hwy	Somersby, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Mooney Mooney Creek Site Pacific Hwy	Calga, NSW, Australia	(Registered) Register of the National Estate

		(Non-statutory archive)
Mulholland Farm 9 Pixie Av	Green Point, NSW, Australia	(Indicative Place) Register of the National Estate (Non-statutory archive)
Rileys Island and Pelican Island Nature Reserves	Woy Woy, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Somersby Geological Site	Somersby, NSW, Australia	(Destroyed) Register of the National Estate (Non-statutory archive)
Spectacle Island Nature Reserve	Mooney Mooney, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
St Josephs Educational and Spiritual Centre 8 Humphreys Rd	Kincumber South, NSW, Australia	(Indicative Place) Register of the National Estate (Non-statutory archive)
St Pauls Anglican Church Empire Bay Dr	Kincumber, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
The Grange Renwick St	Wyoming, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Wamberal Lagoon Nature Reserve Ocean View Dr	Wamberall, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Warre Warren Aboriginal Place (proposed)	Mangrove Mountain, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Wyoming Cottage and Helys Grave Pacific Hwy	Wyoming, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)

Item name	Address	Suburb	LGA	SHR
Foreshore land and structures	9 Pixie Avenue	Green Point	Gosford	1306
Grange, The	Renwick Street	Wyoming	Gosford	222
Great North Road, Between Mt Manning and Wollombi	between	Mt Manning and Wollombi	Hawkesbury	1789
Hawkesbury River Rail Bridge and Long Island Group	Main Northern railway	Brooklyn	Gosford	1040
Hely's Grave	Pacific Highway	Wyoming	Gosford	53
HMAS Parramatta shipwreck and memorials	Historic Shipwreck: Cascade Gully Hawkesbury River	Bar Point	Gosford	1676
Lower Hawkesbury Wesleyan Chapel and site	Wisemans Ferry Road	Gunderman	Gosford	576
Mount Penang Parklands	Pacific Highway	Somersby	Gosford	1667
Mulholland's Farm	9 Pixie Avenue	Green Point	Gosford	289
Old Great North Road, Between Devine's Hill and Mount Manning	between	Wiseman's Ferry and Mount Manning	Hawkesbury	991
Rosemount	36 Village Road	East Saratoga	Gosford	286
Woy Woy Railway Tunnel	Woy Woy Road	Woy Woy	Gosford	1835
Wyoming Cottage	Pacific Highway	Wyoming	Gosford	213

Item name	Address	Suburb	LGA	Information source
Allen MacMaster's Gravestone	Tudibaring Parade	MacMasters Beach	Gosford	LGOV
Bay View Hotel	Cnr The Boulevard and Brisbane Water Drive	Woy Woy	Gosford	LGOV
Bimbadeen (Dunromin)	Helen Drive	Copacabana	Gosford	LGOV
Blackwall Wharf	Off Blackwall Road	Blackwall Point	Gosford	LGOV
Bonnie Doon	4 Malinya Road	Davistown	Gosford	LGOV
Booker Bay Store	72 Booker Bay Road	Booker Bay	Gosford	LGOV
Boora Boora	Avoca Drive (near Dunlop Hill)	Kincumber	Gosford	LGOV
Brady's Gully Cemetery	Henry Parry Drive	North Gosford	Gosford	LGOV
Brick Wharf	End of Brickwharf Road	Woy Woy	Gosford	LGOV
Burn's House	Avoca Drive/Kincumber Street	Kincumber	Gosford	LGOV
Cable Ferry - Wisemans Ferry		Wisemans Ferry	Gosford	GAZ
Christ Church (Old)	3 Mann Street	Gosford	Gosford	LGOV
Cottage 1 - Manager’s Residence	Research Road	Narara	Gosford	SGOV
Dark Corner	Dark Corner	Patonga	Gosford	LGOV
Dark Corner	Dark Corner	Patonga	Gosford	LGOV
Dark Corner	Dark Corner	Patonga	Gosford	LGOV
Dark Corner	Dark Corner	Patonga	Gosford	LGOV
Dark Corner (Glencoe)	Dark Corner	Patonga	Gosford	LGOV
Dark Corner (Roskar)	Dark Corner	Patonga	Gosford	LGOV
Davidson's Shop	Restella Avenue	Davistown	Gosford	LGOV
Davis and Settree/Empire Bay Store	12 Sorrento Road	Empire Bay	Gosford	LGOV
Devils Elbow	Debenham Road	West Gosford	Gosford	LGOV
Empire Bay Boatshed	Off Sorrento Road	Empire Bay	Gosford	LGOV
Erina Heights Public School (part)	The Entrance Road	Erina Heights	Gosford	LGOV
Erina West Public School (part) "Woodport"	The Entrance Road	Erina	Gosford	LGOV
Erina Wharf (Site)	The Entrance Road	Erina	Gosford	LGOV

Ettalong Hall Site	Southern end of the Rip Bridge	Booker Bay	Gosford	LGOV
Finch's Ascent	Dharug National Park	Rose's Creek to Great Nth Rd	Gosford	LGOV
George Downes' House	George Downes Drive	Kulnura	Gosford	LGOV
George Peat's Inn Site	Mooney Mooney Point	Public Reserve	Gosford	LGOV
Gosford (Brisbane Water) Railway Underbridge and Piers	near Dane Drive	Gosford	Gosford	SGOV
Gosford (Etna Street) Railway Overbridge	Etna Street	Gosford	Gosford	SGOV
Gosford Anglican Rectory	3 Mann Street	Gosford	Gosford	LGOV
Gosford Court House	Donnison Street	Gosford	Gosford	SGOV
Gosford Horticultural Research & Advisory Station	Research Road	Narara	Gosford	SGOV
Gosford Public School (Old)	Henry Parry Drive	Gosford	Gosford	LGOV
Gosford Railway Clock, Steam Locomotive Facilities & Signal Box	Showground Road	Gosford	Gosford	SGOV
Gosford School of Arts	38 Mann Street	Gosford	Gosford	LGOV
Gosford South Post Office	23 Mann Street	Gosford	Gosford	LGOV
Gosford Wharf Site	Dane Drive	Gosford	Gosford	LGOV
Great North Road (Old)	Wisemans Ferry to Bucketty		Gosford	LGOV
Great North Road, The	Between Devine's Hill and Mount Manning	Wiseman's Ferry	Cessnock	SGOV
Green Point Wharf Site	End of Lexington Parade	Green Point	Gosford	LGOV
Greengrove Wharf	Mouth of Bedlam Creek		Gosford	LGOV
Hagan's/Empire House	8 Sorrento Road	Empire Bay	Gosford	LGOV
Hawkesbury River Pylons	Hawkesbury River	near Mullet Creek	Gosford	LGOV
Hely's Grave	Pacific Highway	Wyoming	Gosford	LGOV

Henry Kendall Cottage	Henry Kendall Street	West Gosford	Gosford	LGOV
HMAS Parramatta wreck - near Milson Island	Cascade Gully	Hawkesbury River	Gosford	GAZ
Holy Cross Church	Humphreys Road	Kincumber	Gosford	LGOV
Holy Cross Graveyard	Humphreys Road	Kincumber	Gosford	LGOV
Holy Trinity	Wisemans Ferry Road	Spencer	Gosford	LGOV
Holy Trinity	Wisemans Ferry Road	Spencer	Gosford	LGOV
Holy Trinity	Wisemans Ferry Road	Spencer	Gosford	LGOV
Holy Trinity Roman Catholic Church, graveyard & wharf	Wisemans Ferry Road	Spencer	Gosford	GAZ
House	Collington Road	Spencer	Gosford	GAZ
John Campbell's Gravestone	Cnr Brooklyn Road and High Street	Saratoga	Gosford	LGOV
John Menton's Grave	Blythe Street	Killcare	Gosford	LGOV
Kendall's Glen	Pacific Highway	West Gosford	Gosford	LGOV
Kincumber Convent and Chapel	Humphreys Road	Kincumber South	Gosford	LGOV
Kincumber Convent and Chapel	Humphreys Road	Kincumber South	Gosford	LGOV
Kincumber School of Arts	Cnr Empire Bay Drive and Tora Avenue	Kincumber	Gosford	LGOV
Kincumber Wharf Site	End of Killuna Road	Kincumber	Gosford	LGOV
Lisarow Cemetery	Pacific Highway and Eagle Close	Lisarow	Gosford	LGOV
Maitland Store (Old)	The Scenic Road	Killcare Heights	Gosford	LGOV
Mangrove Mountain Fire Station	Waratah Road	Mangrove Mountain	Gosford	LGOV
Mangrove Mountain Hall	Cnr Waratah Road and Wismans Ferry Road	Mangrove Mountain	Gosford	LGOV
Mill Creek Bridge	Wisemans Ferry Road	Mill Creek, Gunderman	Gosford	LGOV
Minerva	58/60 Phegans Bay Road	Phegans Bay	Gosford	LGOV
Mirreen Avenue House	2 Mirreen Avenue	Davistown	Gosford	LGOV
Mona Vale	Frederick Street	East Gosford	Gosford	LGOV
Mrs Pryor's House	24 Railway Crescent	Lisarow	Gosford	LGOV

Mt Penang Training School	Pacific Highway	Kariong	Gosford	LGOV
Mulholland's House	9 Pixie Avenue	Green Point	Gosford	LGOV
Murphys Bay Houses	1 Brisbane Water Drive	Koolewong	Gosford	LGOV
Murphys Bay Houses	3 Brisbane Water Drive	Koolewong	Gosford	LGOV
Murphys Bay Houses	5 Brisbane Water Drive	Koolewong	Gosford	LGOV
Murphys Bay Houses	7 Brisbane Water Drive	Koolewong	Gosford	LGOV
Murphys Bay Houses	9 Brisbane Water Drive	Koolewong	Gosford	LGOV
Murphys Bay Houses	11 Brisbane Water Drive	Koolewong	Gosford	LGOV
Murphys Bay Houses	13 Brisbane Water Drive	Koolewong	Gosford	LGOV
Murphys Bay Houses	15 Brisbane Water Drive	Koolewong	Gosford	LGOV
Murphys Bay Houses	17 Brisbane Water Drive	Koolewong	Gosford	LGOV
Narara Anglican Church (Old)	Corner Pacific Highway and Berrys Head Road	Narara	Gosford	LGOV
Narara Community Hall	Goonak Road	Narara	Gosford	LGOV
Narara Primary School (part)	Pacific Highway	Narara	Gosford	LGOV
Old Administration Building	Research Road	Narara	Gosford	SGOV
Old Glasshouse	Research Road	Narara	Gosford	SGOV
Old Gosford Courthouse	Cnr Mann Street and Georgiana Terrace	Gosford	Gosford	LGOV
Old Great North Road	Old Great North Road between Devine's Hill and Mount Manning	St Albans	Hawkesbury	LGOV
Owen Maloney's Grave	Glenworth Valley Road	Popran Creek	Gosford	LGOV
Parks Bay Houses	Parks Bay		Gosford	LGOV
Parks Bay Houses	Parks Bay		Gosford	LGOV
Patonga Shop	8 Patonga Drive	Patonga	Gosford	LGOV
Pearl Beach Road	Between Mt Ettalong and Coral Crescent	Pearl Beach	Gosford	LGOV
Peats Ridge Club Rooms	Peats Ridge Road (opp. Euloo Road)	Peats Ridge	Gosford	LGOV
Pemberton's Wharf Site	Mangrove Creek Road	Mangrove Creek	Gosford	LGOV

Phegans Bay Houses	16 Phegan's Bay Road	Phegans Bay	Gosford	LGOV
Phegans Bay Houses	14 Phegans Bay Road	Phegans Bay	Gosford	LGOV
Phegans Bay Houses	12 Phegans Bay Road	Phegans Bay	Gosford	LGOV
Picketts Valley Zone Substation	60 Picketts Valley Road	Picketts Valley	Gosford	SGOV
Pioneer Park	Albany Street	Point Frederick	Gosford	LGOV
Punt Bridge (ruins)	Western side of existing Punt Bridge	East Gosford	Gosford	LGOV
Pyrus calleryana Tree D6	Research Road	Narara	Gosford	SGOV
Railway Dams and Environs	off Reeves Street	Narara	Gosford	LGOV
RMS Tollway Office, former	Sydney F3 Freeway (approx. 200 m north of Hawkesbury River Bridge)	Mooney Mooney	Gosford	SGOV
Rock Davis' House	380 Orange Grove Road	Blackwall	Gosford	LGOV
Roma	53 Brickwharf Road	Woy Woy	Gosford	LGOV
Rosemount	36 Steyne Road	Saratoga	Gosford	LGOV
Ruins of Greengrove Creek Wharf		Mangrove Creek	Gosford	GAZ
Site of 'Fairview' and grave of Frances Peat	Located off Pacific Highway	Mooney Mooney	Gosford	SGOV
Site of George Peat's Inn, grave of Frances Peat and public reserve		Mooney Mooney Point	Gosford	GAZ
Sorrento House (part)	9 Sorrento Road	Empire Bay	Gosford	LGOV
Sorrento House (part)	11 Sorrento Road	Empire Bay	Gosford	LGOV
Sorrento Road House	10 Sorrento Road	Empire Bay	Gosford	LGOV
St. David's	120 Blackwall Road	Woy Woy	Gosford	LGOV
St. John the Baptist	96/98 Blackwall Road	Woy Woy	Gosford	LGOV
St. Luke's (Old)	Blackwall Road and Billabong Street	Woy Woy	Gosford	LGOV
St. Paul's Church	Cnr Avoca Drive and Empire Bay Drive	Kincumber	Gosford	LGOV
St. Paul's Graveyard	Cnr Avoca Drive and Empire Bay Drive	Kincumber	Gosford	LGOV

St. Peter's Cemetery	Mangrove Creek Road	Greengrove	Gosford	LGOV
St. Thomas' Cemetery	Ten Mile Hollow Road	Mangrove Creek (Dubbo Gully)	Gosford	LGOV
The Grange	Renwick Street	Wyoming	Gosford	LGOV
Veteran Hall Cemetery	Henderson Road	Saratoga	Gosford	LGOV
Victoria Wharf	End of Victoria Street	East Gosford	Gosford	LGOV
Wamberal Cemetery	Ulamba Avenue	Wamberal	Gosford	LGOV
Wesleyan Chapel	Wisemans Ferry Road	Gunderman	Gosford	GAZ
Wesleyan Chapel (Old)	Wisemans Ferry Road	Gunderman	Gosford	LGOV
Wharf and house		Marlows Creek	Gosford	GAZ
Wiseman's Inn (Ruins)	Ten Mile Hollow	Within Dharug National Park	Gosford	LGOV
Wondabyne Railway Station	Mullet Creek	Woy Woy Bay	Gosford	SGOV
Woodbury House		Tarby Creek, Spencer (near)	Gosford	GAZ
Woy Woy Council Chambers (former)	Blackwall Road	Woy Woy	Gosford	LGOV
Woy Woy Council Office	Blackwall Road	Woy Woy	Gosford	LGOV
Woy Woy Fire Station	Blackwall Road	Woy Woy	Gosford	LGOV
Woy Woy Hotel	The Boulevarde	Woy Woy	Gosford	LGOV
Woy Woy Railway Tunnel	Woy Woy Road	Woy Woy	Gosford	SGOV
Woy Woy Wharf (Old)	West of Woy Woy Railway Station	Woy Woy	Gosford	LGOV
Wyoming Cottage	Corner Pacific Highway and Wyoming Road	Wyoming	Gosford	LGOV
Wyong Police Station	10-12 Alison Road	Wyong	Gosford	SGOV

Appendix F

Construction noise assessment

26 June 2018

Daryl Fidge
Project Manager
Roads and Maritime Services

Our ref: 22/18239/8858
Your ref:

Dear Daryl

Upgrade of the Pacific Highway, between Ourimbah Street and Parsons Road, Lisarow
Addendum REF - Ancillary Facility Construction Noise Assessment

1 Introduction

1.1 Background

Roads and Maritime Services (Roads and Maritime) proposes to modify the Upgrade of the Pacific Highway, between Ourimbah Street and Parsons Road, Lisarow (the project) by making adjustments to the construction compounds for the project (the proposed modification).

Section 2 describes the proposed modification in more detail.

A review of environmental factors (REF) (*Upgrade of the Pacific Highway – Ourimbah Street to Parsons Road, Lisarow review of environmental factors* (Jacobs 2016)) was prepared for the project in June 2016 (the project REF). As part of the project REF, a noise and vibration assessment (*Upgrade of the Pacific Highway – Ourimbah Street to Parsons Road, Lisarow noise and vibration assessment* (Jacobs 2014)) was prepared. The noise and vibration assessment considered potential noise and vibration impacts associated with construction and operation of the project.

The project REF was placed on public display between 18 July 2016 and 19 August 2016 for community and stakeholder comment. The *Pacific Highway Upgrade – Ourimbah Street to Parsons Road, Lisarow – submissions report* (the submissions report), dated October 2016 (Jacobs 2016), was prepared to respond to issues raised. The project REF was determined on 21 February 2017.

An addendum REF (*Upgrade of the Pacific Highway – Ourimbah Street to Parsons Road, Lisarow - Addendum review of environmental factors* (GHD 2017) (Addendum REF 1)) was prepared in October 2017 to assess various detailed design refinements, including changes to construction compounds. As part of Addendum REF 1 a construction noise assessment was carried out. Addendum REF 1 was determined on 9 October 2017.

1.2 Purpose

To assess the potential impacts of the proposed modification, GHD Pty Ltd (GHD) on behalf of Roads and Maritime Greater Sydney Project Office is preparing an addendum REF (Addendum REF 2) for the proposed modification. For the purposes of the proposed modification, Roads and Maritime is the proponent and the determining authority under Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

This construction noise assessment has been prepared to support Addendum REF 2. This construction noise assessment is to be read in conjunction with the project REF (Jacobs 2016), submissions report (Jacobs 2016), noise and vibration assessment (Jacobs 2014) and Addendum REF 1 (GHD 2017). The purpose of this construction noise assessment is to describe the proposed modification, to document and assess the likely impacts of the proposed modification on nearby noise sensitive receivers, and to detail protective measures to be implemented.

2 Proposed modification

The proposed modification includes changes to the ancillary facilities proposed for construction of the project as described in this section.

Key features of the proposed modification are:

- The establishment of potentially two additional construction compounds as follows:
  - Compound 4 is the preferred main compound location, and is located within a large level hardstand area
  - Compound 5 is the alternate main compound location. This compound consists of a grassed paddock area and would be utilised as the main construction compound if compound 4 is unavailable, and as an additional construction compound if compound 4 is available.
- Reduction in the proposed activities at construction compound 2.

A summary of each of the proposed compounds is provided in the following sections.

2.1 Compound 2

This compound is located at 962, 964, 966 and 968 - 974 Pacific Highway, Lisarow. This compound is currently being used as a compound for construction of the adjacent Stage 3A project.

Land use surrounding this compound includes the Pacific Highway to the east, Lisarow Cemetery to the south and residential properties to the west and north. Ourimbah Church is also located immediately to the north west.

Access to the compound would be from Ourimbah Street via the Pacific Highway.

Activities at this compound would include:

- Site offices
- Parking – plant, equipment and light vehicles
- Hard materials (eg concrete pipes) laydown.

2.2 Compound 4

This compound is located at 60 Railway Crescent, Lisarow (Lot 17 DP 241243), and is the preferred main compound location. This compound consists of a large level hardstand area about 55 metres wide by about 75 metre long, with narrow vegetated (grass) boundaries to the south and east.

Commercial and light industrial buildings are located to the west and north and the Main Northern Railway is located to the south of the site. The closest residence to this compound is about 130 metres to the east.

Access to the compound would be from Railway Crescent via the Pacific Highway.

Activities at this compound would include:

- Site offices
- Materials and equipment storage
- Parking – plant, equipment and light vehicles
- Hard materials (eg concrete pipes) laydown
- Stockpiling – spoil, topsoil, mulch and potentially contaminated materials.

2.3 Compound 5

This compound is located at 15 Excelsior Street, Lisarow (Lot 101 DP 1225026), and is the alternate main compound location. This compound site consists of a grassed paddock area with a vegetated windbreak along the eastern boundary, comprised of the exotic species Camphor Laurel. Compound 5 would be constructed and supplemented as required, to provide a stable base (eg coarse aggregate) beneath the entire site and would require construction of a new access off Railway Crescent.

The compound is surrounded by vacant land and industrial land with the Main Northern Railway located to the south. The closest residence to this compound is about 250 metres to the east.

Access to the compound would be from Railway Crescent via the Pacific Highway.

If this compound is established as a main compound, activities would be as described for compound 4.

If this compound is used as a stockpiling compound, activities would include:

- Stockpiling – spoil, topsoil, mulch and potentially contaminated materials.

2.4 Construction hours

The compounds would generally operate during standard construction working hours in accordance with the *Interim Construction Noise Guideline* (DECC, 2009) as follows:

- Monday to Friday: 7 am to 6 pm
- Saturday: 8 am to 1 pm
- Sunday and public holidays: No work.

However, there would be periods when out of hours work would occur including utility cutovers, pavement works and during rail possessions (24 hours per day typically over three to four days). This would minimise disruption to daily traffic and disturbance to surrounding landowners and businesses and for safety purposes for road and rail users and pedestrians.

Where work needs to be carried out outside standard construction working hours, it would be in accordance with the project environment protection licence (EPL 21076), *Interim Construction Noise Guideline* (DECC, 2009) and Roads and Maritime's *Construction Noise and Vibration Guideline* (Roads and Maritime 2016). The construction contractor would give the community prior notice of any work planned to be carried out outside normal construction hours.

3 Sensitive receivers

Noise catchment areas (NCA) and sensitive receivers (residential and non-residential) were identified in the project noise and vibration assessment (Jacobs 2014) and have been adopted in this assessment. A number of additional receivers located in the vicinity of the potential additional compounds have been identified. All sensitive receivers identified for the project (including the proposed modification) are shown on the figures in Attachment C.

4 Construction noise management levels

Construction noise management levels (CNML) are detailed in the project noise and vibration assessment (Jacobs 2014) and are based on the *Interim Construction Noise Guideline* (Department of Environment and Climate Change 2009). The construction noise management levels are summarised in Table 1 for residential receivers and Table 2 for non-residential receivers. The construction noise management levels are based on the rating background levels (RBL) determined by the noise monitoring conducted for the project noise and vibration assessment.

The 'highly noise affected level' represents the point above which there may be strong community reaction to noise. In accordance with the ICNG this level is set at $L_{Aeq(15min)}$ 75 dB(A).

Table 1 Construction noise management levels (residential receivers)

NCA	Daytime (7 am – 6 pm) RBL + 10 dB(A)	Evening (6 pm – 10 pm) RBL + 5 dB(A)	Night (10 pm – 7 am) RBL + 5 dB(A)	Sleep disturbance (screening) RBL + 15 dB(A)
1	68	51	38	48
2	59	49	39	49
3	53	46	39	49
4	61	48	42	52

Table 2 Construction noise management levels (non-residential receivers)

Receiver ID	Description	NCA	CNML (internal)	CNML (external)[1]
162	Lisarow Cemetery	1	-	60
126	Lisarow Public School	3	45	55
94 to 97	Lisarow High School	3	45	55
321	Ourimbah Church	1	45	55
450	Lisarow Church of Christ	2	45	55
495	Pluim Park	1	-	60

Note 1) Most buildings will achieve an internal noise level 10 dB(A) below the external noise level with the windows open

2) Receiver 321 was classified as a residential receiver in the original noise assessment. This receiver has been reclassified as a place of worship

5 Methodology

5.1 Noise source data

Typical equipment proposed for construction compounds are listed in Table 3. Typical equipment and noise emission levels have been adopted from the *Construction Noise and Vibration Guideline* (CNVG) (Roads and Maritime Services 2016).

Table 3 Construction scenario and equipment noise levels

Activity	Typical equipment	Lw dB(A)	Activity Lw L_{Aeq} dB(A)	Activity Lw L_{A1} dB(A)
Construction compounds	Front End Loader	91	114	116
	Excavator 35 tonne	110		
	Road truck	108		
	Compressor	109		
	Welding equipment	105		
	Light vehicles	88		
	Power generator	103		
Compound (reduced activities)	Road truck	108	109	111
	Light vehicles	88		
	Power generator	103		

5.2 Noise prediction methodology

Noise modelling was carried out using SoundPlan (v7.4). SoundPlan is a computer program for the calculation, assessment and prognosis of noise exposure. SoundPlan calculates environmental noise propagation according to *ISO 9613-2 'Acoustics – Attenuation of sound during propagation outdoors'*.

The following noise modelling assumptions were adopted:

- Atmospheric absorption was based on an average temperature of 10 °C and an average humidity of 70%.
- Atmospheric propagation conditions were modelled with noise enhancing wind conditions for noise propagation (downwind conditions) or equivalently a well-developed moderate ground based temperature inversions.
- Modelled scenarios take into account the shielding effect from surrounding buildings and structures on and adjacent to the site.
- The noise contours are the highest level from the construction activity and are not cumulative. As such, where two separate activities (such as simultaneously operating compounds) of similar total noise level are required to be operating in close proximity noise levels may increase by up to 3 dBA in the worst case, however as each activity noise level assumes the simultaneous operation of multiple items of equipment within that activity, noise level predictions are still expected to be conservative.

6 Construction noise predictions

Predicted construction noise level contours are shown on the figures in Attachment A.

Predicted construction noise levels (dBA) and construction noise management level exceedances for all impacted receivers are detailed in Attachment B.

6.1 Compound configurations

Compound 2 was previously assessed as a main compound location. It is proposed to reduce the proposed activities at Compound 2. Two operational configurations have been modelled for compound 2: full compound operations (for comparison purposes only) and restricted compound operations (parking, offices, etc.) as per Table 3.

Compound site 4 is the preferred main compound location, and is located within a large level hardstand area. Compound 5 is the alternate main compound location. This compound consists of a grassed paddock area and would be utilised as the main construction compound if compound 4 is unavailable, and as a stockpiling area if compound 4 is available. Note that the construction equipment required for stockpiling activities and main compound activities results in similar sound power levels as per Table 3.

6.2 Residential receivers- exceedances

6.2.1 Compound 2

The predicted number of exceedances of the construction noise management levels for Compound 2 are presented in Table 4. The table summarises the number of exceedances for both configurations of Compound 2 and the reduction in the number of exceedances for the proposed restricted activities scenario.

Table 4 Predicted number of exceedances (residential receivers) - Compound 2

NCA	Number of Exceedances (full activities)			Number of Exceedances (restricted activities)			Reduction in number of exceedances		
	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
1	11	76	103	11	46	103	0	30	0
2	3	48	87	1	20	61	2	28	26
3	1	19	92	0	1	56	1	18	36
4	0	0	0	0	0	0	0	0	0

6.2.2 Compound 4 and 5

The residential exceedances for Compound 4 and Compound 5 are summarised in Table 5 and Table 6. Note that the construction equipment required for stockpiling activities and main compound activities results in similar sound power levels, therefore Table 6 covers both of these scenarios for Compound 5.

Table 5 Predicted number of exceedances (residential receivers) - Compound 4

NCA	CNML			Number of Exceedances		
	Day	Evening	Night	Day	Evening	Night
1	68	51	38	0	0	15
2	59	49	39	2	42	161
3	53	46	39	0	26	88
4	61	48	42	0	13	108

Table 6 Predicted number of exceedances (residential receivers) - Compound 5

NCA	CNML			Number of Exceedances		
	Day	Evening	Night	Day	Evening	Night
1	68	51	38	0	0	0
2	59	49	39	0	6	242
3	53	46	39	0	0	32
4	61	48	42	0	117	262

6.3 Non-residential receivers

Assessment of predicted construction noise impacts for non-residential receivers considers a typical 10 dBA reduction from external levels. This is based on advice contained in the CNVG which states:

> "*Most buildings will achieve an internal noise level 10 dB(A) below the external noise level with the windows open"*

Predicted internal noise levels at non-residential receivers for construction compound operation are presented in Table 7.

External predicted noise levels indicate compliance with construction noise management levels at all identified sensitive non-residential receivers. The removal of Compound Site 2 as part of the proposed modification results in reduced construction noise levels for non-residential receivers near to this site.

Table 7 Noise management level predictions (non-residential receivers)

Receiver ID	Description	CNML (external)[1]	Predicted compound noise level dB(A) L_{Aeq} (external)			
			Compound 2 (all activities)	Compound 2 (restricted activities)	Compound 4	Compound 5
126	Lisarow Public School	55	45	40	45	37
94 to 97	Lisarow High School	55	38	33	49	42
321	Ourimbah Church	55	82	77	26	23

Receiver ID	Description	CNML (external)[1]	Predicted compound noise level dB(A) L_{Aeq} (external)			
			Compound 2 (all activities)	Compound 2 (restricted activities)	Compound 4	Compound 5
450	Lisarow Church of Christ	55	31	26	52	31
495	Pluim Park	60	53	48	41	30

Note 1) Most buildings will achieve an internal noise level 10 dB(A) below the external noise level with the windows open

6.4 Sleep Disturbance

Sleep disturbance predictions are based on the L_{A1} noise level for typical construction compound operation provided in the CNVG. Sleep disturbance is considered likely when $L_{A1\ (1\text{-minute})}$ noise levels exceed the $L_{A90\ (15\text{-minute})}$ noise levels by more than 15 dB(A).

Predicted number of exceedances of sleep disturbance screening criteria for night time are presented in Table 8.

The predicted night time compound noise levels indicate that residential receivers in all noise catchment areas have the potential to experience sleep disturbance impacts during night time periods.

The restriction of activities at Compound Site 2 as part of the proposed modification results in reduced sleep disturbance impacts at sensitive receivers.

Table 8 Predicted number of residential receivers where sleep disturbance screening criteria are exceeded

NCA	CNML, night dB(A) L_{Aeq}	Sleep disturbance screening level dB(A) L_{A1}	Potential for sleep disturbance impacts, (number of receivers)			
			Compound 2 (all activities)	Compound 2 (restricted activities)	Compound 4	Compound 5
1	38	48	103	76	0	0
2	39	49	140	32	81	8
3	39	49	150	1	12	0
4	42	52	62	0	7	56

6.5 Construction traffic noise impacts

The Road Noise Policy (DECCW, 2011) states that 'for existing residences and other sensitive land uses affected by additional traffic on existing roads generated by land use developments, any increase in the total traffic noise level as a result of the development should be limited to 2 dB above that of the noise level without the development. This increase limit applies wherever the noise level without the development is within 2 dB of, or exceeds, the relevant day or night noise assessment criterion. This is also considered to be applicable for construction noise and therefore if road traffic noise increases due to construction traffic are less than 2 dB(A) then the objectives of the Road Noise Policy are achieved. If the road traffic noise level increases by more than 2 dB due to construction traffic, then further assessment is required using Roads and Maritime's Noise Criteria Guideline with consideration given to noise mitigation measures.

The predicted increase in noise level due to construction traffic on Railway Crescent has been calculated based on the total estimated (worst case) construction vehicle movements relative to the predicted (2021) daily traffic volumes and can be found in Table 9 and Table 10.

Table 9 Construction traffic noise- predicted noise increases-Day

Access Road	Predicted traffic		Construction generated traffic		Predicted increase (dBA)
	Light	Heavy	Light	Heavy	
Railway Crescent	9310	358	300	70	0.3

Table 10 Construction traffic noise- predicted noise increases-Night

Access Road	Predicted traffic		Construction generated traffic		Predicted increase (dBA)
	Light	Heavy	Light	Heavy	
Railway Crescent	1137	95	300	70	1.7

The proposed transportation route was not predicted to increase traffic noise levels by more than 2 dBA. Therefore, impacts from these roads do not trigger consideration of mitigation measures.

6.6 Summary of key findings

The construction noise assessment for the proposed modification predicts the following:

- The restriction of activities at Compound 2 would result in reduced construction noise levels for surrounding receivers.
- Compound 2 activities would exceed the construction noise management level at one non-residential receiver, Ourimbah Church (when in use).
- Activities at Compound 4 are likely to exceed the construction noise management levels for two residential receivers in NCA2 during the day work period.

- Activities at Compound 4 and Compound 5 are likely to exceed the construction noise management levels for nearby residential receivers during evening and night work periods.
- Night time operations at all compounds have the potential to result in sleep disturbance for surrounding sensitive receivers.
- Noise generated from construction traffic is not predicted to trigger consideration of mitigation measures.

7 Mitigation measures

Existing mitigation measures proposed in the construction noise and vibration assessment (Jacobs 2014) will be implemented for the proposed modification. These include the preparation of a noise management plan as part of the construction environmental management plan and notifications and processes for out of hours work.

The additional measures described in Table 11 will be implemented to avoid or minimise potential noise and vibration impacts.

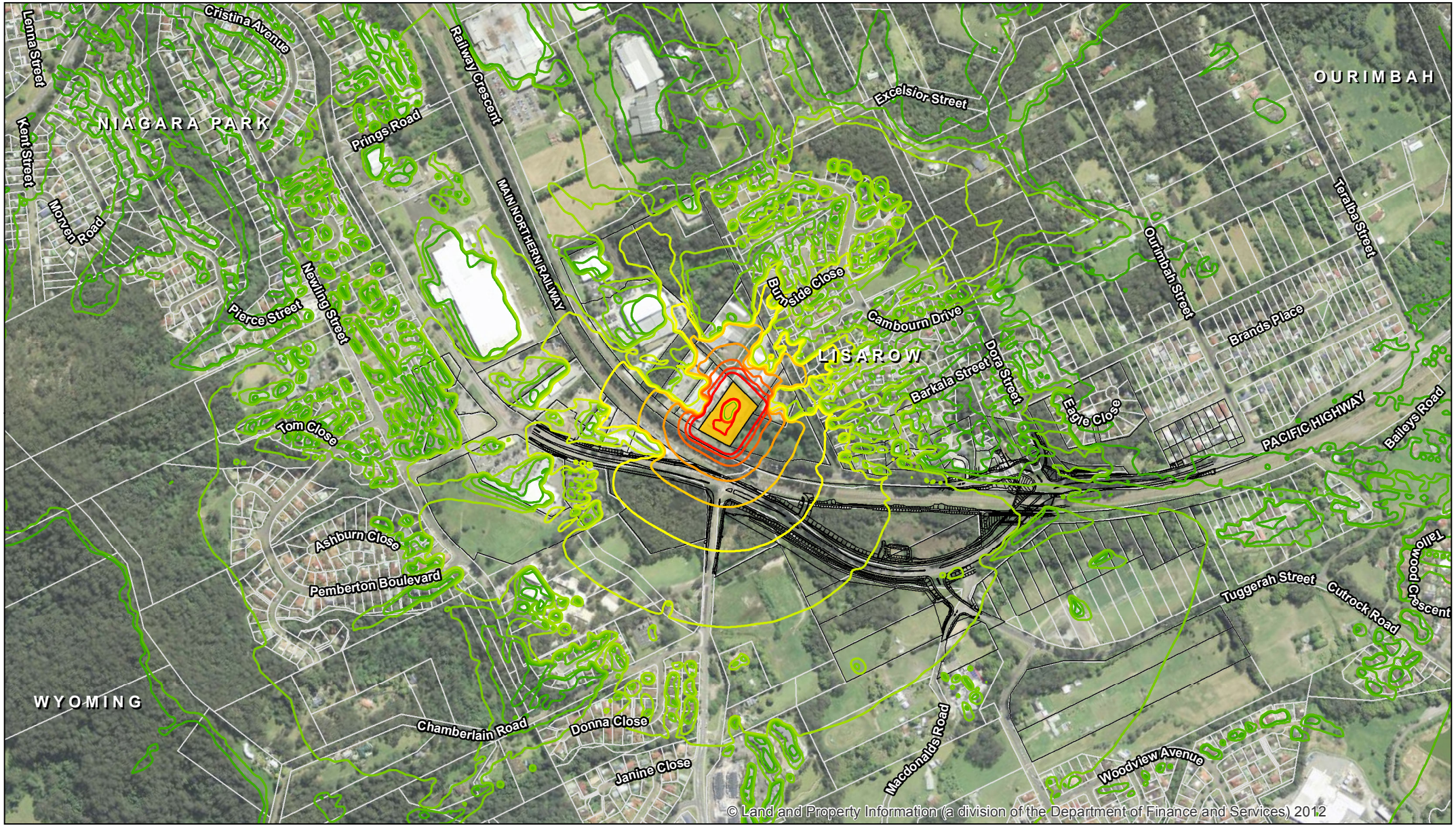
Table 11 Additional safeguards and management measures – noise and vibration

Impact	Environmental safeguards	Responsibility	Timing
Construction noise impacts – construction compounds 2, 4 and 5	The use of construction compounds 2, 4 and 5 outside standard hours of work will be assessed and managed in accordance with the project environment protection licence (EPL 21076), *Interim Construction Noise Guideline* (DECC, 2009) and *Construction Noise and Vibration Guideline* (Roads and Maritime, 2016).	Construction contractor	Construction

Regards
GHD Pty Ltd

Simon Pearce
Technical Director - Environment
61 2 4979 9968

Attachment A
Predicted construction noise contours, compounds



Paper Size A4

0 37.5 75 150 225 300

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

LEGEND

- Design
- Cadastre
- Compound site

Noise level dB(A) $L_{Aeq\ (15\text{-}minute)}$

30 35 40 45 50 55 60 65 70 75 80

Roads and Maritime Services
Pacific Highway Upgrade Stage 3B, Lisarow
Addendum Review of Environmental Factors 2

Job Number 22-18239
Revision 0
Date 26 Jun 2018

Construction noise contours
Site compound 4

Figure A2

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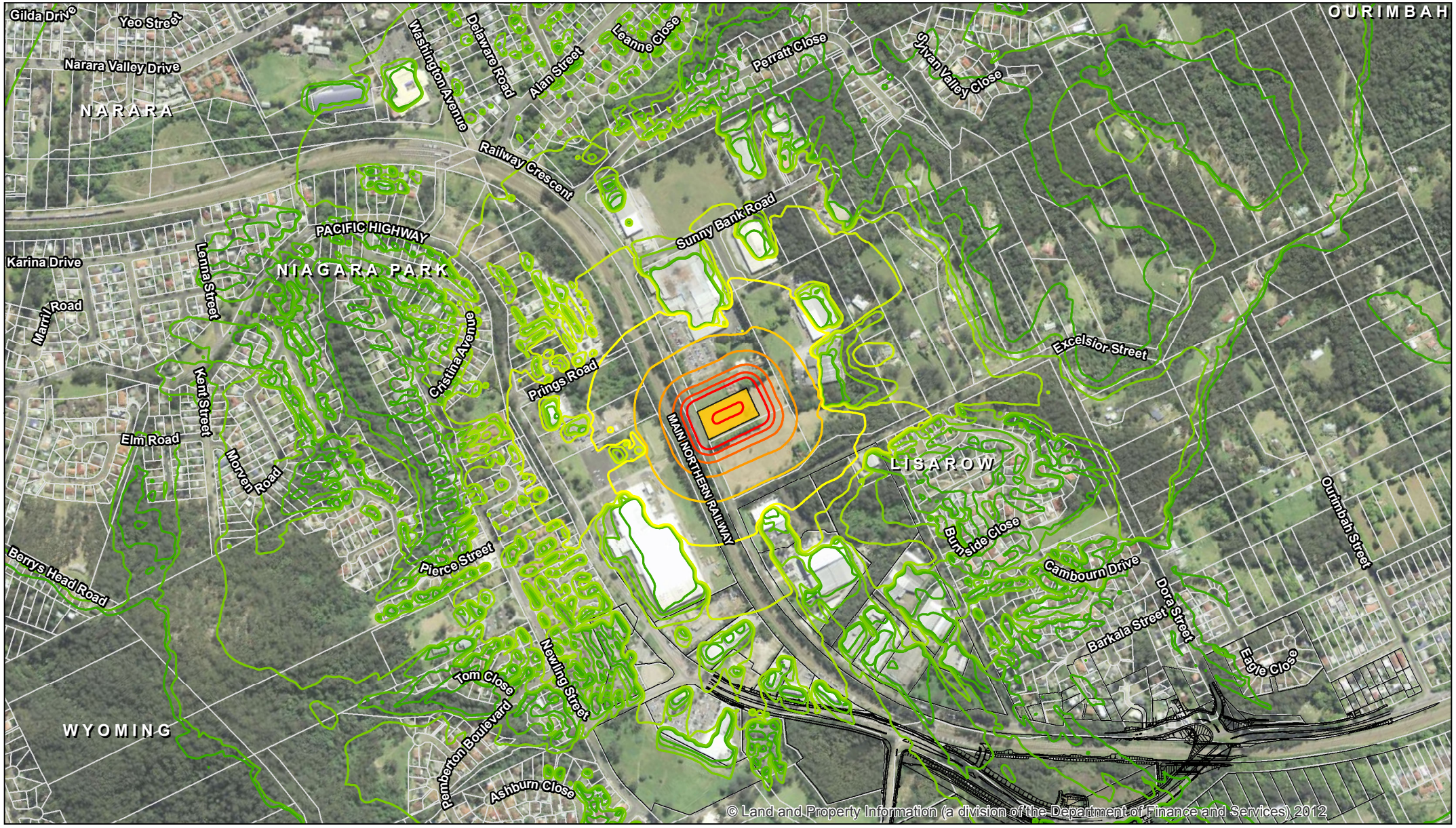
Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 T 61 2 4979 9999 F 61 2 4979 9988 E ntlmail@ghd.com W www.ghd.com.au

Data source: LPI: Aerial imagery, 2015; DTDB/DCDB, 2015. Created by: tmorton, fmackay



Paper Size A4

0 37.5 75 150 225 300

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

LEGEND

- Design
- Cadastre
- Compound site

Noise level dB(A) $L_{Aeq\ (15\text{-}minute)}$

30 35 40 45 50 55 60 65 70 75 80

Roads and Maritime Services
Pacific Highway Upgrade Stage 3B, Lisarow
Addendum Review of Environmental Factors 2

Job Number 22-18239
Revision 0
Date 26 Jun 2018

Construction noise contours
Site compound 5

Figure A3

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Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com **W** www.ghd.com.au

Data source: LPI: Aerial imagery, 2015; DTDB/DCDB, 2015. Created by: tmorton, fmackay

Attachment B
Predicted construction noise levels

Predicted construction noise levels

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
138	RES	3	53	46	39	46	41	42	36
139	RES	3	53	46	39	46	41	41	35
232	RES	3	53	46	39	43	38	32	29
231	RES	3	53	46	39	44	39	32	29
230	RES	3	53	46	39	44	39	30	29
229	RES	3	53	46	39	44	39	30	29
233	RES	3	53	46	39	44	39	31	13
228	RES	3	53	46	39	44	39	30	29
234	RES	1	68	51	38	46	41	31	29
227	RES	3	53	46	39	44	39	31	30
226	RES	3	53	46	39	45	40	31	30
225	RES	3	53	46	39	45	40	34	30
224	RES	3	53	46	39	45	40	34	29
223	RES	3	53	46	39	45	40	34	29
222	RES	3	53	46	39	46	41	35	29
221	RES	3	53	46	39	46	41	34	29
220	RES	3	53	46	39	46	41	34	29
219	RES	3	53	46	39	46	41	35	29
218	RES	1	68	51	38	46	41	35	29

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
217	RES	3	53	46	39	47	42	35	29
216	RES	3	53	46	39	47	42	36	29
215	RES	3	53	46	39	47	42	36	29
214	RES	3	53	46	39	48	43	36	29
213	RES	3	53	46	39	48	43	36	29
212	RES	3	53	46	39	48	43	36	29
211	RES	3	53	46	39	49	44	36	29
210	RES	3	53	46	39	49	44	36	28
209	RES	3	53	46	39	49	44	36	29
208	RES	3	53	46	39	49	44	36	29
207	RES	3	53	46	39	48	43	36	29
206	RES	3	53	46	39	48	43	36	29
205	RES	3	53	46	39	48	43	36	30
200	RES	3	53	46	39	47	42	36	31
201	RES	3	53	46	39	47	42	36	31
202	RES	3	53	46	39	46	41	36	31
203	RES	3	53	46	39	46	41	36	31
204	RES	3	53	46	39	47	42	36	30
235	RES	1	68	51	38	48	43	34	29

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
236	RES	1	68	51	38	50	45	33	28
237	RES	1	68	51	38	53	48	35	27
238	RES	1	68	51	38	55	50	33	26
239	RES	1	68	51	38	55	50	35	27
244	RES	1	68	51	38	54	49	35	27
240	RES	1	68	51	38	54	49	38	27
241	RES	1	68	51	38	52	47	37	28
242	RES	1	68	51	38	51	46	26	25
243	RES	1	68	51	38	52	47	35	27
184	RES	1	68	51	38	57	52	38	25
185	RES	1	68	51	38	56	51	29	22
183	RES	1	68	51	38	58	53	39	25
182	RES	1	68	51	38	58	53	39	25
186	RES	1	68	51	38	56	51	34	26
181	RES	1	68	51	38	58	53	39	25
179	RES	1	68	51	38	58	53	39	25
178	RES	1	68	51	38	56	51	26	17
180	RES	1	68	51	38	58	53	39	25
177	RES	1	68	51	38	56	51	39	18

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
176	RES	1	68	51	38	58	53	39	28
175	RES	1	68	51	38	58	53	31	29
174	RES	1	68	51	38	58	53	40	29
173	RES	3	53	46	39	58	53	40	29
195	RES	3	53	46	39	47	42	37	31
198	RES	3	53	46	39	46	41	35	31
197	RES	3	53	46	39	46	41	36	31
196	RES	3	53	46	39	46	41	36	31
193	RES	3	53	46	39	46	41	37	31
192	RES	3	53	46	39	46	41	37	31
199	RES	3	53	46	39	46	41	37	31
194	RES	3	53	46	39	48	43	37	31
187	RES	1	68	51	38	48	43	38	31
191	RES	3	53	46	39	46	41	37	33
190	RES	3	53	46	39	46	41	37	32
189	RES	3	53	46	39	46	41	37	32
188	RES	3	53	46	39	46	41	38	32
172	RES	3	53	46	39	46	41	38	33
171	RES	3	53	46	39	46	41	38	33

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
170	RES	3	53	46	39	46	41	38	33
169	RES	3	53	46	39	46	41	38	33
168	RES	3	53	46	39	46	41	38	33
167	RES	3	53	46	39	46	41	38	33
166	RES	3	53	46	39	45	40	34	22
165	RES	3	53	46	39	46	41	39	33
164	RES	1	68	51	38	45	40	39	33
148	RES	3	53	46	39	45	40	40	34
163	RES	1	68	51	38	45	40	39	34
154	RES	3	53	46	39	45	40	39	34
153	RES	3	53	46	39	45	40	39	34
152	RES	3	53	46	39	45	40	39	34
151	RES	3	53	46	39	45	40	39	27
147	RES	3	53	46	39	45	40	40	34
146	RES	3	53	46	39	45	40	40	34
145	RES	3	53	46	39	45	40	40	34
140	RES	3	53	46	39	44	39	41	35
141	RES	3	53	46	39	44	39	40	35
142	RES	3	53	46	39	44	39	40	35

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
143	RES	3	53	46	39	44	39	40	35
144	RES	3	53	46	39	44	39	40	35
132	RES	3	53	46	39	43	38	41	35
133	RES	3	53	46	39	43	38	41	35
156	RES	3	53	46	39	43	38	38	23
157	RES	3	53	46	39	43	38	40	35
158	RES	3	53	46	39	43	38	40	34
159	RES	3	53	46	39	43	38	40	34
137	RES	3	53	46	39	42	37	40	34
160	RES	3	53	46	39	42	37	40	34
134	RES	3	53	46	39	42	37	40	35
135	RES	3	53	46	39	42	37	40	34
136	RES	3	53	46	39	42	37	40	34
128	RES	3	53	46	39	42	37	42	35
126	EDU	3	55	-	-	45	40	45	37
161	RES	1	68	51	38	48	43	45	36
127	RES	3	53	46	39	43	38	45	37
131	RES	3	53	46	39	43	38	44	37
130	RES	3	53	46	39	43	38	44	37

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
129	RES	3	53	46	39	42	37	43	36
125	RES	3	53	46	39	41	36	49	40
120	RES	3	53	46	39	40	35	47	39
119	RES	3	53	46	39	40	35	46	38
122	RES	3	53	46	39	40	35	46	38
121	RES	3	53	46	39	41	36	46	38
484	RES	4	61	48	42	37	32	54	34
483	RES	4	61	48	42	37	32	53	37
482	RES	4	61	48	42	36	31	47	45
487	RES	4	61	48	42	37	32	46	45
486	RES	4	61	48	42	37	32	53	42
485	RES	4	61	48	42	38	33	54	34
488	RES	4	61	48	42	38	33	54	43
490	RES	4	61	48	42	38	33	48	43
491	RES	4	61	48	42	29	24	53	34
106	RES	4	61	48	42	39	34	51	41
96	EDU	3	55	-	-	37	32	49	43
94	EDU	3	55	-	-	38	33	49	42
95	EDU	3	55	-	-	37	32	49	42

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
114	RES	3	53	46	39	39	34	45	39
113	RES	3	53	46	39	39	34	46	39
112	RES	3	53	46	39	39	34	47	39
111	RES	3	53	46	39	39	34	47	39
110	RES	3	53	46	39	39	34	47	39
109	RES	3	53	46	39	39	34	48	35
107	RES	3	53	46	39	39	34	49	40
108	RES	3	53	46	39	39	34	48	40
115	RES	3	53	46	39	39	34	48	40
98	RES	3	53	46	39	38	33	47	40
99	RES	3	53	46	39	38	33	47	40
100	RES	3	53	46	39	37	32	46	37
78	RES	3	53	46	39	38	33	48	40
77	RES	3	53	46	39	38	33	48	40
76	RES	3	53	46	39	38	33	48	41
75	RES	3	53	46	39	38	33	49	41
80	RES	3	53	46	39	38	33	48	41
81	RES	3	53	46	39	38	33	48	41
82	RES	3	53	46	39	38	33	48	41

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
83	RES	3	53	46	39	38	33	47	41
84	RES	3	53	46	39	38	33	47	41
79	RES	3	53	46	39	38	33	42	33
86	RES	3	53	46	39	38	33	46	36
87	RES	3	53	46	39	32	27	43	38
88	RES	3	53	46	39	37	32	41	29
89	RES	3	53	46	39	37	32	39	32
90	RES	3	53	46	39	37	32	35	33
91	RES	3	53	46	39	37	32	38	37
85	RES	3	53	46	39	37	32	47	40
92	RES	3	53	46	39	37	32	46	40
93	RES	3	53	46	39	37	32	45	40
1	RES	4	61	48	42	31	26	45	49
4	RES	4	61	48	42	31	26	45	49
2	RES	4	61	48	42	31	26	44	50
3	RES	4	61	48	42	31	26	43	49
8	RES	4	61	48	42	31	26	45	48
7	RES	4	61	48	42	31	26	45	49
5	RES	4	61	48	42	19	14	44	49

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
9	RES	4	61	48	42	31	26	46	48
10	RES	4	61	48	42	31	26	46	48
28	RES	4	61	48	42	20	15	42	42
27	RES	4	61	48	42	21	16	44	47
26	RES	4	61	48	42	19	14	37	49
29	RES	4	61	48	42	21	16	40	45
11	RES	4	61	48	42	31	26	46	48
12	RES	4	61	48	42	32	27	47	47
13	RES	4	61	48	42	32	27	46	48
18	RES	4	61	48	42	32	27	47	47
16	RES	4	61	48	42	32	27	46	40
17	RES	4	61	48	42	32	27	35	32
19	RES	4	61	48	42	35	30	47	46
20	RES	4	61	48	42	35	30	46	43
21	RES	4	61	48	42	25	20	44	42
23	RES	4	61	48	42	23	18	39	36
24	RES	4	61	48	42	21	16	31	33
25	RES	4	61	48	42	20	15	33	46
30	RES	4	61	48	42	33	28	40	46

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
31	RES	4	61	48	42	33	28	38	40
32	RES	4	61	48	42	33	28	35	37
33	RES	4	61	48	42	34	29	46	34
34	RES	4	61	48	42	34	29	46	40
38	RES	4	61	48	42	35	30	46	45
37	RES	4	61	48	42	35	30	46	43
35	RES	4	61	48	42	35	30	45	43
42	RES	4	61	48	42	34	29	44	45
43	RES	4	61	48	42	34	29	45	44
44	RES	4	61	48	42	24	19	40	39
45	RES	4	61	48	42	26	21	39	38
46	RES	4	61	48	42	34	29	45	41
36	RES	4	61	48	42	35	30	39	43
48	RES	4	61	48	42	34	29	45	35
49	RES	4	61	48	42	34	29	45	42
52	RES	4	61	48	42	34	29	43	32
51	RES	4	61	48	42	25	20	43	37
50	RES	4	61	48	42	24	19	37	39
53	RES	4	61	48	42	24	19	42	35

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
54	RES	4	61	48	42	34	29	43	44
55	RES	3	53	46	39	35	30	45	43
56	RES	3	53	46	39	35	30	45	43
57	RES	3	53	46	39	35	30	45	43
58	RES	3	53	46	39	36	31	46	43
59	RES	3	53	46	39	36	31	46	42
61	RES	3	53	46	39	36	31	45	42
66	RES	3	53	46	39	35	30	45	43
62	RES	3	53	46	39	35	30	44	41
63	RES	3	53	46	39	35	30	37	39
64	RES	3	53	46	39	27	22	44	31
65	RES	3	53	46	39	29	24	44	32
67	RES	3	53	46	39	35	30	45	41
69	RES	3	53	46	39	35	30	43	39
68	RES	3	53	46	39	30	25	45	39
70	RES	3	53	46	39	25	20	43	43
71	RES	3	53	46	39	35	30	45	43
72	RES	3	53	46	39	35	30	44	43
73	RES	3	53	46	39	34	29	44	43

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
74	RES	3	53	46	39	35	30	44	42
116	RES	3	53	46	39	38	33	47	39
117	RES	3	53	46	39	38	33	47	39
118	RES	3	53	46	39	38	33	46	39
105	RES	3	53	46	39	39	34	45	39
104	RES	3	53	46	39	39	34	46	37
101	RES	3	53	46	39	38	33	47	39
102	RES	3	53	46	39	38	33	47	39
103	RES	3	53	46	39	38	33	46	39
272	RES	2	59	49	39	42	37	21	15
273	RES	2	59	49	39	51	46	20	15
274	RES	2	59	49	39	51	46	20	16
275	RES	2	59	49	39	52	47	20	16
276	RES	2	59	49	39	52	47	20	16
277	RES	2	59	49	39	53	48	24	17
286	RES	2	59	49	39	52	47	23	16
287	RES	1	68	51	38	53	48	27	16
288	RES	2	59	49	39	53	48	27	17
256	RES	1	68	51	38	52	47	21	27

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
305	RES	2	59	49	39	52	47	29	26
306	RES	1	68	51	38	53	48	29	26
307	RES	1	68	51	38	54	49	29	26
308	RES	1	68	51	38	53	48	21	15
309	RES	1	68	51	38	55	50	28	26
310	RES	1	68	51	38	56	51	27	26
311	RES	1	68	51	38	56	51	27	26
289	RES	2	59	49	39	54	49	27	17
290	RES	1	68	51	38	54	49	27	17
291	RES	1	68	51	38	55	50	27	18
292	RES	1	68	51	38	55	50	27	18
278	RES	2	59	49	39	53	48	27	17
279	RES	2	59	49	39	54	49	27	18
280	RES	2	59	49	39	54	49	19	18
281	RES	2	59	49	39	55	50	24	18
282	RES	2	59	49	39	55	50	21	21
283	RES	2	59	49	39	55	50	23	23
284	RES	2	59	49	39	55	50	26	17
285	RES	2	59	49	39	56	51	23	20

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
303	RES	1	68	51	38	57	52	22	18
304	RES	2	68	51	38	56	51	24	25
298	RES	2	59	49	39	57	52	26	18
297	RES	1	68	51	38	54	49	23	19
296	RES	1	68	51	38	56	51	22	18
295	RES	1	68	51	38	57	52	26	18
294	RES	1	68	51	38	57	52	27	17
293	RES	1	68	51	38	56	51	27	18
299	RES	2	59	49	39	57	52	22	17
300	RES	1	68	51	38	56	51	26	17
312	RES	1	68	51	38	56	51	27	26
313	RES	1	68	51	38	58	53	25	25
318	RES	1	68	51	38	58	53	26	25
317	RES	1	68	51	38	58	53	26	25
316	RES	1	68	51	38	58	53	26	24
301	RES	1	68	51	38	66	61	25	24
302	RES	1	68	51	38	67	62	26	24
360	RES	2	59	49	39	53	48	26	26
358	RES	2	59	49	39	55	50	23	23

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
359	RES	2	59	49	39	54	49	24	24
354	RES	2	59	49	39	55	50	27	26
353	RES	2	59	49	39	54	49	25	25
350	RES	2	59	49	39	56	51	23	25
351	RES	2	59	49	39	58	53	23	25
352	RES	2	59	49	39	57	52	25	20
355	RES	2	59	49	39	57	52	22	17
356	RES	2	59	49	39	57	52	24	24
357	RES	2	59	49	39	57	52	24	23
349	RES	1	68	51	38	60	55	26	18
339	RES	1	68	51	38	62	57	26	18
338	RES	1	68	51	38	63	58	22	16
340	RES	1	68	51	38	63	58	22	17
341	RES	1	68	51	38	66	61	22	21
342	RES	1	68	51	38	66	61	24	21
343	RES	1	68	51	38	66	61	24	21
348	RES	1	68	51	38	61	56	24	22
321	WOR	1	55	55	-	82	77	26	23
337	RES	1	68	51	38	79	74	25	22

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
336	RES	1	68	51	38	77	72	23	22
335	RES	1	68	51	38	80	75	25	21
334	RES	1	68	51	38	83	78	23	20
320	RES	1	68	51	38	83	78	25	23
319	RES	1	68	51	38	99	94	26	23
324	RES	1	68	51	38	96	91	27	21
327	RES	1	68	51	38	97	92	28	20
333	RES	1	68	51	38	79	74	24	19
344	RES	1	68	51	38	67	62	22	19
345	RES	1	68	51	38	66	61	22	18
346	RES	1	68	51	38	66	61	22	17
347	RES	1	68	51	38	65	60	24	17
332	RES	1	68	51	38	85	80	23	18
331	RES	1	68	51	38	80	75	23	19
363	RES	2	59	49	39	60	55	23	18
362	RES	1	68	51	38	62	57	25	21
361	RES	2	59	49	39	65	60	26	19
366	RES	2	59	49	39	64	59	28	19
367	RES	1	68	51	38	62	57	31	23

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
364	RES	2	59	49	39	56	51	25	21
365	RES	2	59	49	39	56	51	29	22
368	RES	1	68	51	38	61	56	33	23
369	RES	1	68	51	38	59	54	27	23
371	RES	1	68	51	38	56	51	41	32
370	RES	1	68	51	38	57	52	41	31
372	RES	1	68	51	38	48	43	42	32
373	RES	1	68	51	38	55	50	41	33
374	RES	2	59	49	39	53	48	44	34
375	RES	2	59	49	39	52	47	43	35
376	RES	2	59	49	39	50	45	43	36
380	RES	2	59	49	39	53	48	36	29
381	RES	2	59	49	39	52	47	33	29
382	RES	2	59	49	39	51	46	31	31
383	RES	2	59	49	39	51	46	30	33
384	RES	2	59	49	39	50	45	30	32
385	RES	2	59	49	39	49	44	30	27
386	RES	2	59	49	39	49	44	37	25
378	RES	2	59	49	39	50	45	35	28

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
390	RES	2	59	49	39	50	45	36	29
389	RES	2	59	49	39	49	44	38	29
388	RES	2	59	49	39	46	41	33	28
377	RES	2	59	49	39	47	42	43	35
379	RES	2	59	49	39	39	34	45	35
391	RES	2	59	49	39	41	36	44	35
392	RES	2	59	49	39	41	36	36	34
393	RES	2	59	49	39	41	36	35	33
394	RES	2	59	49	39	38	33	35	32
395	RES	2	59	49	39	39	34	35	30
396	RES	2	59	49	39	31	26	31	26
397	RES	2	59	49	39	29	24	29	25
398	RES	2	59	49	39	31	26	30	23
399	RES	2	59	49	39	33	28	31	27
400	RES	2	59	49	39	34	29	32	26
401	RES	2	59	49	39	38	33	30	26
406	RES	2	59	49	39	31	26	32	27
427	RES	2	59	49	39	33	28	37	31
407	RES	2	59	49	39	31	26	33	26

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
426	RES	2	59	49	39	35	30	38	32
428	RES	2	59	49	39	40	35	39	32
429	RES	2	59	49	39	42	37	39	30
412	RES	2	59	49	39	41	36	37	27
413	RES	2	59	49	39	35	30	32	21
417	RES	2	59	49	39	36	31	31	20
430	RES	2	59	49	39	38	33	37	24
431	RES	2	59	49	39	33	28	37	28
411	RES	2	59	49	39	42	37	37	27
416	RES	2	59	49	39	35	30	30	22
418	RES	2	59	49	39	35	30	30	20
419	RES	2	59	49	39	31	26	32	23
420	RES	2	59	49	39	37	32	32	23
421	RES	2	59	49	39	32	27	30	22
422	RES	2	59	49	39	40	35	32	22
423	RES	2	59	49	39	41	36	31	20
424	RES	2	59	49	39	45	40	44	25
437	RES	2	59	49	39	43	38	37	26
436	RES	2	59	49	39	36	31	37	24

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
435	RES	2	59	49	39	37	32	33	25
434	RES	2	59	49	39	41	36	34	25
456	RES	2	59	49	39	41	36	38	25
438	RES	2	59	49	39	43	38	50	34
425	RES	2	59	49	39	44	39	34	34
454	RES	2	59	49	39	42	37	49	30
453	RES	2	59	49	39	34	29	49	28
458	RES	2	59	49	39	43	38	49	30
455	RES	2	59	49	39	42	37	42	28
457	RES	2	59	49	39	43	38	48	28
402	RES	2	59	49	39	42	37	32	30
403	RES	2	59	49	39	39	34	44	31
404	RES	2	59	49	39	41	36	45	31
405	RES	2	59	49	39	41	36	46	32
451	RES	2	59	49	39	40	35	50	30
478	RES	2	59	49	39	42	37	38	34
477	RES	2	59	49	39	37	32	38	35
476	RES	2	59	49	39	32	27	39	36
475	RES	2	59	49	39	33	28	40	37

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
452	RES	2	59	49	39	36	31	49	26
474	RES	2	59	49	39	33	28	40	36
472	RES	2	59	49	39	32	27	42	38
473	RES	2	59	49	39	32	27	47	42
439	RES	2	59	49	39	45	40	49	32
440	RES	2	59	49	39	30	25	49	27
441	RES	2	59	49	39	30	25	51	29
444	RES	2	59	49	39	34	29	48	30
445	RES	2	59	49	39	37	32	50	27
446	RES	2	59	49	39	32	27	41	27
447	RES	2	59	49	39	30	25	40	25
448	RES	2	59	49	39	30	25	49	26
459	RES	2	59	49	39	35	30	50	26
442	RES	2	59	49	39	36	31	50	28
443	RES	2	59	49	39	31	26	50	31
449	RES	2	59	49	39	31	26	52	27
465	RES	2	59	49	39	34	29	51	27
466	RES	2	59	49	39	35	30	55	34
468	RES	2	59	49	39	31	26	50	36

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
471	RES	2	59	49	39	37	32	42	32
467	RES	2	59	49	39	40	35	50	43
450	WOR	2	55	55	-	31	26	52	31
464	RES	2	59	49	39	32	27	54	35
463	RES	2	59	49	39	35	30	57	39
462	RES	2	59	49	39	37	32	56	43
461	RES	2	59	49	39	30	25	60	44
469	RES	2	59	49	39	29	24	57	44
470	RES	2	59	49	39	29	24	58	44
245	RES	1	68	51	38	48	43	21	20
247	RES	2	59	49	39	48	43	20	20
246	RES	2	59	49	39	47	42	22	20
267	RES	1	68	51	38	49	44	18	19
268	RES	2	59	49	39	49	44	21	19
269	RES	2	59	49	39	49	44	21	17
270	RES	2	59	49	39	50	45	19	15
271	RES	2	59	49	39	50	45	21	16
265	RES	1	68	51	38	49	44	24	20
266	RES	2	59	49	39	49	44	28	20

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
257	RES	1	68	51	38	49	44	28	21
258	RES	1	68	51	38	48	43	24	21
250	RES	1	68	51	38	49	44	30	27
249	RES	1	68	51	38	49	44	20	27
248	RES	2	59	49	39	49	44	31	27
251	RES	1	68	51	38	50	45	30	26
252	RES	1	68	51	38	50	45	30	27
253	RES	1	68	51	38	49	44	30	26
254	RES	1	68	51	38	50	45	30	27
255	RES	1	68	51	38	51	46	20	27
264	RES	1	68	51	38	52	47	29	26
263	RES	1	68	51	38	51	46	28	20
262	RES	1	68	51	38	51	46	28	20
261	RES	1	68	51	38	50	45	28	20
260	RES	1	68	51	38	50	45	27	20
259	RES	1	68	51	38	49	44	28	21
150	RES	3	53	46	39	44	39	39	30
149	RES	3	53	46	39	44	39	40	30
155	RES	3	53	46	39	44	39	39	27

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0001	RES	4	61	48	42			40	46
R_Add_0002	RES	4	61	48	42			32	39
R_Add_0003	RES	4	61	48	42			39	43
R_Add_0004	RES	4	61	48	42			39	48
R_Add_0005	RES	4	61	48	42			39	45
R_Add_0006	RES	4	61	48	42			41	49
R_Add_0007	RES	4	61	48	42			29	35
R_Add_0008	RES	4	61	48	42			42	50
R_Add_0009	RES	4	61	48	42			37	39
R_Add_0010	RES	4	61	48	42			40	48
R_Add_0011	RES	4	61	48	42			41	48
R_Add_0012	RES	4	61	48	42			32	37
R_Add_0013	RES	4	61	48	42			42	49
R_Add_0014	RES	4	61	48	42			37	46
R_Add_0015	RES	4	61	48	42			38	46
R_Add_0016	RES	4	61	48	42			33	33
R_Add_0017	RES	4	61	48	42			31	36
R_Add_0018	RES	4	61	48	42			40	48
R_Add_0019	RES	4	61	48	42			43	50

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0020	RES	4	61	48	42			42	49
R_Add_0021	RES	4	61	48	42			43	49
R_Add_0022	RES	4	61	48	42			39	47
R_Add_0023	RES	4	61	48	42			39	48
R_Add_0024	RES	4	61	48	42			42	51
R_Add_0025	RES	4	61	48	42			36	34
R_Add_0026	RES	4	61	48	42			41	49
R_Add_0027	RES	4	61	48	42			43	51
R_Add_0028	RES	4	61	48	42			41	50
R_Add_0029	RES	4	61	48	42			42	51
R_Add_0030	RES	4	61	48	42			41	46
R_Add_0031	RES	4	61	48	42			42	51
R_Add_0032	RES	4	61	48	42			36	40
R_Add_0033	RES	4	61	48	42			42	51
R_Add_0034	RES	4	61	48	42			39	45
R_Add_0035	RES	4	61	48	42			35	40
R_Add_0036	RES	4	61	48	42			42	50
R_Add_0037	RES	4	61	48	42			25	41
R_Add_0038	RES	4	61	48	42			43	50

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0039	RES	4	61	48	42			31	36
R_Add_0040	RES	4	61	48	42			32	41
R_Add_0041	RES	4	61	48	42			33	40
R_Add_0042	RES	4	61	48	42			36	38
R_Add_0043	RES	4	61	48	42			41	49
R_Add_0044	RES	4	61	48	42			26	40
R_Add_0045	RES	4	61	48	42			39	45
R_Add_0046	RES	4	61	48	42			34	34
R_Add_0047	RES	4	61	48	42			37	35
R_Add_0048	RES	4	61	48	42			36	36
R_Add_0049	RES	4	61	48	42			32	28
R_Add_0050	RES	4	61	48	42			23	28
R_Add_0051	RES	4	61	48	42			43	48
R_Add_0052	RES	4	61	48	42			24	28
R_Add_0053	RES	4	61	48	42			28	31
R_Add_0054	RES	4	61	48	42			35	40
R_Add_0055	RES	4	61	48	42			30	29
R_Add_0056	RES	4	61	48	42			42	48
R_Add_0057	RES	4	61	48	42			35	36

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0058	RES	4	61	48	42			30	32
R_Add_0059	RES	4	61	48	42			30	33
R_Add_0060	RES	4	61	48	42			35	40
R_Add_0061	RES	4	61	48	42			30	32
R_Add_0062	RES	4	61	48	42			32	30
R_Add_0063	RES	4	61	48	42			35	39
R_Add_0064	RES	4	61	48	42			28	27
R_Add_0065	RES	4	61	48	42			36	34
R_Add_0066	RES	4	61	48	42			29	30
R_Add_0067	RES	4	61	48	42			31	33
R_Add_0068	RES	4	61	48	42			33	32
R_Add_0069	RES	4	61	48	42			43	49
R_Add_0070	RES	4	61	48	42			37	36
R_Add_0071	RES	4	61	48	42			34	34
R_Add_0072	RES	4	61	48	42			32	29
R_Add_0073	RES	4	61	48	42			37	32
R_Add_0074	RES	4	61	48	42			37	36
R_Add_0075	RES	4	61	48	42			40	48
R_Add_0076	RES	4	61	48	42			43	50

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0077	RES	4	61	48	42			34	32
R_Add_0078	RES	4	61	48	42			35	40
R_Add_0079	RES	4	61	48	42			26	36
R_Add_0080	RES	4	61	48	42			42	49
R_Add_0081	RES	4	61	48	42			42	48
R_Add_0082	RES	4	61	48	42			41	48
R_Add_0083	RES	4	61	48	42			38	40
R_Add_0084	RES	4	61	48	42			42	49
R_Add_0085	RES	4	61	48	42			26	33
R_Add_0086	RES	4	61	48	42			38	37
R_Add_0087	RES	4	61	48	42			38	38
R_Add_0088	RES	4	61	48	42			33	33
R_Add_0089	RES	4	61	48	42			42	49
R_Add_0090	RES	4	61	48	42			35	39
R_Add_0091	RES	4	61	48	42			24	28
R_Add_0092	RES	4	61	48	42			36	43
R_Add_0093	RES	4	61	48	42			41	52
R_Add_0094	RES	4	61	48	42			38	47
R_Add_0095	RES	4	61	48	42			41	52

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0096	RES	4	61	48	42			39	47
R_Add_0097	RES	4	61	48	42			35	42
R_Add_0098	RES	4	61	48	42			40	47
R_Add_0099	RES	4	61	48	42			41	52
R_Add_0100	RES	4	61	48	42			41	51
R_Add_0101	RES	4	61	48	42			41	52
R_Add_0102	RES	4	61	48	42			36	43
R_Add_0103	RES	4	61	48	42			35	42
R_Add_0104	RES	4	61	48	42			37	45
R_Add_0105	RES	4	61	48	42			36	42
R_Add_0106	RES	4	61	48	42			33	33
R_Add_0107	RES	4	61	48	42			41	51
R_Add_0108	RES	4	61	48	42			38	46
R_Add_0109	RES	4	61	48	42			38	46
R_Add_0110	RES	4	61	48	42			38	46
R_Add_0111	RES	4	61	48	42			38	45
R_Add_0112	RES	4	61	48	42			39	48
R_Add_0113	RES	4	61	48	42			42	32
R_Add_0114	RES	4	61	48	42			40	51

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0115	RES	4	61	48	42			38	43
R_Add_0116	RES	4	61	48	42			40	51
R_Add_0117	RES	4	61	48	42			39	49
R_Add_0118	RES	4	61	48	42			38	46
R_Add_0119	RES	4	61	48	42			43	49
R_Add_0120	RES	4	61	48	42			39	49
R_Add_0121	RES	4	61	48	42			40	51
R_Add_0122	RES	4	61	48	42			41	53
R_Add_0123	RES	4	61	48	42			39	42
R_Add_0124	RES	4	61	48	42			39	43
R_Add_0125	RES	4	61	48	42			38	51
R_Add_0126	RES	4	61	48	42			41	53
R_Add_0127	RES	4	61	48	42			39	49
R_Add_0128	RES	4	61	48	42			40	51
R_Add_0129	RES	4	61	48	42			36	43
R_Add_0130	RES	4	61	48	42			41	52
R_Add_0131	RES	4	61	48	42			43	34
R_Add_0132	RES	4	61	48	42			37	43
R_Add_0133	RES	4	61	48	42			38	49

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0134	RES	4	61	48	42			40	51
R_Add_0135	RES	4	61	48	42			36	43
R_Add_0136	RES	4	61	48	42			42	40
R_Add_0137	RES	4	61	48	42			42	39
R_Add_0138	RES	4	61	48	42			23	39
R_Add_0139	RES	4	61	48	42			36	35
R_Add_0140	RES	4	61	48	42			39	48
R_Add_0141	RES	4	61	48	42			34	40
R_Add_0142	RES	4	61	48	42			41	50
R_Add_0143	RES	4	61	48	42			28	30
R_Add_0144	RES	4	61	48	42			29	33
R_Add_0145	RES	4	61	48	42			40	48
R_Add_0146	RES	4	61	48	42			40	49
R_Add_0147	RES	4	61	48	42			39	47
R_Add_0148	RES	4	61	48	42			36	39
R_Add_0149	RES	4	61	48	42			41	34
R_Add_0150	RES	4	61	48	42			40	49
R_Add_0151	RES	4	61	48	42			39	46
R_Add_0152	RES	4	61	48	42			43	51

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0153	RES	4	61	48	42			42	42
R_Add_0154	RES	4	61	48	42			42	50
R_Add_0155	RES	4	61	48	42			42	50
R_Add_0156	RES	4	61	48	42			39	45
R_Add_0157	RES	4	61	48	42			36	31
R_Add_0158	RES	4	61	48	42			36	42
R_Add_0159	RES	4	61	48	42			39	47
R_Add_0160	RES	4	61	48	42			35	40
R_Add_0161	RES	4	61	48	42			36	42
R_Add_0162	RES	4	61	48	42			40	48
R_Add_0163	RES	4	61	48	42			27	34
R_Add_0164	RES	4	61	48	42			38	46
R_Add_0165	RES	4	61	48	42			36	37
R_Add_0166	RES	4	61	48	42			41	33
R_Add_0167	RES	4	61	48	42			33	43
R_Add_0168	RES	4	61	48	42			41	29
R_Add_0169	RES	4	61	48	42			36	42
R_Add_0170	RES	4	61	48	42			39	48
R_Add_0171	RES	4	61	48	42			33	39

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0172	RES	4	61	48	42			34	38
R_Add_0173	RES	4	61	48	42			37	44
R_Add_0174	RES	4	61	48	42			40	49
R_Add_0175	RES	4	61	48	42			36	35
R_Add_0176	RES	4	61	48	42			39	47
R_Add_0177	RES	4	61	48	42			39	47
R_Add_0178	RES	4	61	48	42			35	32
R_Add_0179	RES	4	61	48	42			40	48
R_Add_0180	RES	4	61	48	42			38	46
R_Add_0181	RES	4	61	48	42			38	46
R_Add_0182	RES	4	61	48	42			29	37
R_Add_0183	RES	4	61	48	42			29	35
R_Add_0184	RES	4	61	48	42			44	50
R_Add_0185	RES	4	61	48	42			44	50
R_Add_0186	RES	4	61	48	42			43	48
R_Add_0187	RES	4	61	48	42			43	48
R_Add_0188	RES	4	61	48	42			43	48
R_Add_0189	RES	4	61	48	42			44	50
R_Add_0190	RES	4	61	48	42			44	48

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0191	RES	4	61	48	42			44	48
R_Add_0192	RES	4	61	48	42			44	48
R_Add_0193	RES	4	61	48	42			44	49
R_Add_0194	RES	4	61	48	42			44	48
R_Add_0195	RES	4	61	48	42			44	51
R_Add_0196	RES	4	61	48	42			43	50
R_Add_0197	RES	4	61	48	42			43	51
R_Add_0198	RES	4	61	48	42			41	50
R_Add_0199	RES	4	61	48	42			43	50
R_Add_0200	RES	4	61	48	42			42	50
R_Add_0201	RES	4	61	48	42			43	49
R_Add_0202	RES	4	61	48	42			44	48
R_Add_0203	RES	4	61	48	42			43	49
R_Add_0204	RES	4	61	48	42			43	50
R_Add_0205	RES	4	61	48	42			43	49
R_Add_0206	RES	4	61	48	42			44	49
R_Add_0207	RES	4	61	48	42			41	46
R_Add_0208	RES	4	61	48	42			43	35
R_Add_0209	RES	4	61	48	42			37	36

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0210	RES	4	61	48	42			45	40
R_Add_0211	RES	4	61	48	42			39	37
R_Add_0212	RES	4	61	48	42			45	47
R_Add_0213	RES	4	61	48	42			44	46
R_Add_0214	RES	4	61	48	42			44	46
R_Add_0215	RES	4	61	48	42			45	40
R_Add_0216	RES	4	61	48	42			45	43
R_Add_0217	RES	4	61	48	42			45	45
R_Add_0218	RES	4	61	48	42			44	47
R_Add_0219	RES	4	61	48	42			44	48
R_Add_0220	RES	4	61	48	42			43	48
R_Add_0221	RES	4	61	48	42			45	48
R_Add_0222	RES	4	61	48	42			45	48
R_Add_0223	RES	4	61	48	42			43	47
R_Add_0224	RES	4	61	48	42			44	47
R_Add_0225	RES	4	61	48	42			40	42
R_Add_0226	RES	4	61	48	42			44	47
R_Add_0227	RES	4	61	48	42			43	47
R_Add_0228	RES	4	61	48	42			44	47

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0229	RES	4	61	48	42			43	50
R_Add_0230	RES	4	61	48	42			30	41
R_Add_0231	RES	4	61	48	42			37	40
R_Add_0232	RES	2	59	49	39			34	39
R_Add_0233	RES	4	61	48	42			38	43
R_Add_0234	RES	2	59	49	39			34	39
R_Add_0235	RES	2	59	49	39			34	39
R_Add_0236	RES	4	61	48	42			29	35
R_Add_0237	RES	4	61	48	42			36	39
R_Add_0238	RES	4	61	48	42			36	43
R_Add_0239	RES	4	61	48	42			39	43
R_Add_0240	RES	4	61	48	42			28	41
R_Add_0241	RES	2	59	49	39			34	40
R_Add_0242	RES	2	59	49	39			34	40
R_Add_0243	RES	2	59	49	39			34	40
R_Add_0244	RES	2	59	49	39			35	40
R_Add_0245	RES	2	59	49	39			33	40
R_Add_0246	RES	2	59	49	39			34	40
R_Add_0247	RES	2	59	49	39			34	40

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0248	RES	2	59	49	39			34	40
R_Add_0249	RES	2	59	49	39			35	40
R_Add_0250	RES	2	59	49	39			34	40
R_Add_0251	RES	2	59	49	39			34	40
R_Add_0252	RES	4	61	48	42			34	36
R_Add_0253	RES	4	61	48	42			40	44
R_Add_0254	RES	4	61	48	42			37	40
R_Add_0255	RES	4	61	48	42			39	44
R_Add_0256	RES	4	61	48	42			37	40
R_Add_0257	RES	4	61	48	42			37	40
R_Add_0258	RES	4	61	48	42			37	40
R_Add_0259	RES	2	59	49	39			34	39
R_Add_0260	RES	4	61	48	42			42	49
R_Add_0261	RES	2	59	49	39			34	39
R_Add_0262	RES	2	59	49	39			34	39
R_Add_0263	RES	2	59	49	39			34	39
R_Add_0264	RES	4	61	48	42			37	40
R_Add_0265	RES	4	61	48	42			36	40
R_Add_0266	RES	4	61	48	42			32	40

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0267	RES	4	61	48	42			39	44
R_Add_0268	RES	4	61	48	42			34	31
R_Add_0269	RES	4	61	48	42			39	44
R_Add_0270	RES	4	61	48	42			37	40
R_Add_0271	RES	4	61	48	42			34	30
R_Add_0272	RES	4	61	48	42			37	40
R_Add_0273	RES	4	61	48	42			30	41
R_Add_0274	RES	2	59	49	39			34	39
R_Add_0275	RES	4	61	48	42			30	33
R_Add_0276	RES	4	61	48	42			38	42
R_Add_0277	RES	4	61	48	42			36	34
R_Add_0278	RES	4	61	48	42			36	34
R_Add_0279	RES	4	61	48	42			32	39
R_Add_0280	RES	4	61	48	42			35	33
R_Add_0281	RES	4	61	48	42			36	35
R_Add_0282	RES	4	61	48	42			35	42
R_Add_0283	RES	4	61	48	42			41	46
R_Add_0284	RES	4	61	48	42			36	34
R_Add_0285	RES	4	61	48	42			35	36

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0286	RES	4	61	48	42			36	39
R_Add_0287	RES	4	61	48	42			36	39
R_Add_0288	RES	4	61	48	42			42	46
R_Add_0289	RES	4	61	48	42			36	38
R_Add_0290	RES	4	61	48	42			37	37
R_Add_0291	RES	4	61	48	42			31	33
R_Add_0292	RES	4	61	48	42			42	47
R_Add_0293	RES	4	61	48	42			29	40
R_Add_0294	RES	4	61	48	42			41	46
R_Add_0295	RES	4	61	48	42			43	45
R_Add_0296	RES	4	61	48	42			31	33
R_Add_0297	RES	4	61	48	42			42	47
R_Add_0298	RES	4	61	48	42			35	39
R_Add_0299	RES	4	61	48	42			35	38
R_Add_0300	RES	4	61	48	42			36	36
R_Add_0301	RES	4	61	48	42			35	30
R_Add_0302	RES	4	61	48	42			41	47
R_Add_0303	RES	4	61	48	42			35	36
R_Add_0304	RES	4	61	48	42			30	37

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0305	RES	4	61	48	42			35	40
R_Add_0306	RES	4	61	48	42			41	47
R_Add_0307	RES	4	61	48	42			35	39
R_Add_0308	RES	4	61	48	42			38	41
R_Add_0309	RES	4	61	48	42			35	39
R_Add_0310	RES	4	61	48	42			36	39
R_Add_0311	RES	4	61	48	42			36	38
R_Add_0312	RES	4	61	48	42			22	25
R_Add_0313	RES	4	61	48	42			42	41
R_Add_0314	RES	4	61	48	42			37	44
R_Add_0315	RES	4	61	48	42			42	47
R_Add_0316	RES	4	61	48	42			35	36
R_Add_0317	RES	4	61	48	42			42	48
R_Add_0318	RES	4	61	48	42			36	39
R_Add_0319	RES	4	61	48	42			35	35
R_Add_0320	RES	4	61	48	42			43	46
R_Add_0321	RES	4	61	48	42			36	39
R_Add_0322	RES	4	61	48	42			39	44
R_Add_0323	RES	4	61	48	42			33	33

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0324	RES	4	61	48	42			36	40
R_Add_0325	RES	4	61	48	42			30	44
R_Add_0326	RES	4	61	48	42			36	42
R_Add_0327	RES	4	61	48	42			31	38
R_Add_0328	RES	4	61	48	42			36	40
R_Add_0329	RES	4	61	48	42			39	43
R_Add_0330	RES	4	61	48	42			41	45
R_Add_0331	RES	4	61	48	42			29	34
R_Add_0332	RES	4	61	48	42			44	41
R_Add_0333	RES	4	61	48	42			44	41
R_Add_0334	RES	4	61	48	42			44	46
R_Add_0335	RES	4	61	48	42			44	46
R_Add_0336	RES	4	61	48	42			44	46
R_Add_0337	RES	4	61	48	42			43	43
R_Add_0338	RES	4	61	48	42			37	40
R_Add_0339	RES	4	61	48	42			34	42
R_Add_0340	RES	4	61	48	42			36	40
R_Add_0341	RES	4	61	48	42			30	34
R_Add_0342	RES	4	61	48	42			36	40

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0343	RES	4	61	48	42			38	42
R_Add_0344	RES	4	61	48	42			31	33
R_Add_0345	RES	4	61	48	42			43	46
R_Add_0346	RES	4	61	48	42			33	39
R_Add_0347	RES	4	61	48	42			41	45
R_Add_0348	RES	4	61	48	42			37	39
R_Add_0349	RES	4	61	48	42			37	38
R_Add_0350	RES	4	61	48	42			35	45
R_Add_0351	RES	4	61	48	42			43	46
R_Add_0352	RES	4	61	48	42			37	36
R_Add_0353	RES	4	61	48	42			32	28
R_Add_0354	RES	4	61	48	42			37	37
R_Add_0355	RES	4	61	48	42			32	33
R_Add_0356	RES	4	61	48	42			39	44
R_Add_0357	RES	4	61	48	42			38	43
R_Add_0358	RES	4	61	48	42			39	44
R_Add_0359	RES	4	61	48	42			38	41
R_Add_0360	RES	4	61	48	42			28	34
R_Add_0361	RES	4	61	48	42			44	46

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0362	RES	4	61	48	42			39	44
R_Add_0363	RES	4	61	48	42			37	39
R_Add_0364	RES	4	61	48	42			39	44
R_Add_0365	RES	4	61	48	42			37	38
R_Add_0366	RES	2	59	49	39			37	43
R_Add_0367	RES	2	59	49	39			36	43
R_Add_0368	RES	2	59	49	39			36	42
R_Add_0369	RES	2	59	49	39			36	42
R_Add_0370	RES	2	59	49	39			35	41
R_Add_0371	RES	2	59	49	39			37	44
R_Add_0372	RES	2	59	49	39			35	41
R_Add_0373	RES	2	59	49	39			35	41
R_Add_0374	RES	2	59	49	39			37	43
R_Add_0375	RES	2	59	49	39			36	43
R_Add_0376	RES	2	59	49	39			36	42
R_Add_0377	RES	2	59	49	39			37	44
R_Add_0378	RES	2	59	49	39			34	40
R_Add_0379	RES	2	59	49	39			38	46
R_Add_0380	RES	2	59	49	39			35	41

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0381	RES	2	59	49	39			38	46
R_Add_0382	RES	2	59	49	39			32	40
R_Add_0383	RES	2	59	49	39			36	42
R_Add_0384	RES	2	59	49	39			29	43
R_Add_0385	RES	2	59	49	39			37	43
R_Add_0386	RES	2	59	49	39			37	44
R_Add_0387	RES	2	59	49	39			35	43
R_Add_0388	RES	2	59	49	39			32	46
R_Add_0389	RES	2	59	49	39			28	36
R_Add_0390	RES	2	59	49	39			35	42
R_Add_0391	RES	2	59	49	39			36	42
R_Add_0392	RES	2	59	49	39			37	43
R_Add_0393	RES	2	59	49	39			35	41
R_Add_0394	RES	2	59	49	39			36	44
R_Add_0395	RES	2	59	49	39			38	46
R_Add_0396	RES	2	59	49	39			35	41
R_Add_0397	RES	2	59	49	39			36	42
R_Add_0398	RES	2	59	49	39			37	44
R_Add_0399	RES	2	59	49	39			36	42

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0400	RES	2	59	49	39			36	42
R_Add_0401	RES	2	59	49	39			35	41
R_Add_0402	RES	2	59	49	39			36	42
R_Add_0403	RES	2	59	49	39			36	42
R_Add_0404	RES	2	59	49	39			37	43
R_Add_0405	RES	2	59	49	39			38	46
R_Add_0406	RES	2	59	49	39			38	45
R_Add_0407	RES	2	59	49	39			37	44
R_Add_0408	RES	2	59	49	39			36	42
R_Add_0409	RES	2	59	49	39			36	42
R_Add_0410	RES	2	59	49	39			35	42
R_Add_0411	RES	2	59	49	39			35	41
R_Add_0412	RES	2	59	49	39			37	43
R_Add_0413	RES	2	59	49	39			37	44
R_Add_0414	RES	2	59	49	39			37	44
R_Add_0415	RES	2	59	49	39			32	37
R_Add_0416	RES	2	59	49	39			36	42
R_Add_0417	RES	2	59	49	39			35	42
R_Add_0418	RES	2	59	49	39			38	45

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0419	RES	2	59	49	39			35	41
R_Add_0420	RES	2	59	49	39			38	46
R_Add_0421	RES	2	59	49	39			37	43
R_Add_0422	RES	2	59	49	39			33	40
R_Add_0423	RES	2	59	49	39			37	45
R_Add_0424	RES	2	59	49	39			38	46
R_Add_0425	RES	2	59	49	39			34	40
R_Add_0426	RES	2	59	49	39			36	42
R_Add_0427	RES	2	59	49	39			32	43
R_Add_0428	RES	2	59	49	39			34	41
R_Add_0429	RES	2	59	49	39			20	28
R_Add_0430	RES	2	59	49	39			21	29
R_Add_0431	RES	2	59	49	39			32	41
R_Add_0432	RES	2	59	49	39			30	42
R_Add_0433	RES	2	59	49	39			24	29
R_Add_0434	RES	2	59	49	39			35	41
R_Add_0435	RES	2	59	49	39			35	41
R_Add_0436	RES	2	59	49	39			23	33
R_Add_0437	RES	2	59	49	39			30	40

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0438	RES	2	59	49	39			28	42
R_Add_0439	RES	2	59	49	39			25	33
R_Add_0440	RES	2	59	49	39			31	42
R_Add_0441	RES	2	59	49	39			22	29
R_Add_0442	RES	2	59	49	39			23	30
R_Add_0443	RES	2	59	49	39			23	33
R_Add_0444	RES	2	59	49	39			21	31
R_Add_0445	RES	2	59	49	39			23	30
R_Add_0446	RES	2	59	49	39			23	30
R_Add_0447	RES	2	59	49	39			23	31
R_Add_0448	RES	2	59	49	39			24	31
R_Add_0449	RES	2	59	49	39			24	32
R_Add_0450	RES	2	59	49	39			27	30
R_Add_0451	RES	2	59	49	39			34	40
R_Add_0452	RES	2	59	49	39			32	41
R_Add_0453	RES	2	59	49	39			23	29
R_Add_0454	RES	2	59	49	39			25	27
R_Add_0455	RES	2	59	49	39			32	41
R_Add_0456	RES	2	59	49	39			25	29

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0457	RES	2	59	49	39			20	30
R_Add_0458	RES	2	59	49	39			23	29
R_Add_0459	RES	2	59	49	39			32	41
R_Add_0460	RES	2	59	49	39			22	33
R_Add_0461	RES	2	59	49	39			34	42
R_Add_0462	RES	2	59	49	39			31	43
R_Add_0463	RES	2	59	49	39			26	39
R_Add_0464	RES	2	59	49	39			27	43
R_Add_0465	RES	2	59	49	39			34	42
R_Add_0466	RES	2	59	49	39			23	45
R_Add_0467	RES	2	59	49	39			28	43
R_Add_0468	RES	2	59	49	39			26	45
R_Add_0469	RES	2	59	49	39			32	46
R_Add_0470	RES	2	59	49	39			28	44
R_Add_0471	RES	2	59	49	39			26	42
R_Add_0472	RES	2	59	49	39			28	43
R_Add_0473	RES	2	59	49	39			35	41
R_Add_0474	RES	2	59	49	39			36	42
R_Add_0475	RES	2	59	49	39			33	43

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0476	RES	2	59	49	39			34	40
R_Add_0477	RES	2	59	49	39			35	42
R_Add_0478	RES	2	59	49	39			25	32
R_Add_0479	RES	2	59	49	39			28	43
R_Add_0480	RES	2	59	49	39			29	42
R_Add_0481	RES	2	59	49	39			30	42
R_Add_0482	RES	2	59	49	39			25	33
R_Add_0483	RES	2	59	49	39			34	40
R_Add_0484	RES	2	59	49	39			22	31
R_Add_0485	RES	2	59	49	39			28	43
R_Add_0486	RES	2	59	49	39			29	42
R_Add_0487	RES	2	59	49	39			24	42
R_Add_0488	RES	2	59	49	39			23	33
R_Add_0489	RES	2	59	49	39			29	42
R_Add_0490	RES	2	59	49	39			35	42
R_Add_0491	RES	2	59	49	39			34	40
R_Add_0492	RES	2	59	49	39			35	41
R_Add_0493	RES	4	61	48	42			41	52
R_Add_0494	RES	4	61	48	42			41	53

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0495	RES	4	61	48	42			41	53
R_Add_0496	RES	4	61	48	42			41	52
R_Add_0497	RES	4	61	48	42			40	51
R_Add_0498	RES	4	61	48	42			40	51
R_Add_0499	RES	4	61	48	42			41	52
R_Add_0500	RES	4	61	48	42			41	54
R_Add_0501	RES	4	61	48	42			40	50
R_Add_0502	RES	4	61	48	42			41	55
R_Add_0503	RES	4	61	48	42			40	51
R_Add_0504	RES	4	61	48	42			39	50
R_Add_0505	RES	4	61	48	42			40	49
R_Add_0506	RES	4	61	48	42			41	54
R_Add_0507	RES	4	61	48	42			28	49
R_Add_0508	RES	4	61	48	42			40	51
R_Add_0509	RES	2	59	49	39			35	41
R_Add_0510	RES	2	59	49	39			35	41
R_Add_0511	RES	2	59	49	39			37	43
R_Add_0512	RES	2	59	49	39			35	41
R_Add_0513	RES	2	59	49	39			35	41

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0514	RES	2	59	49	39			37	43
R_Add_0515	RES	2	59	49	39			35	41
R_Add_0516	RES	2	59	49	39			35	41
R_Add_0517	RES	2	59	49	39			32	40
R_Add_0518	RES	2	59	49	39			36	42
R_Add_0519	RES	4	61	48	42			40	50
R_Add_0520	RES	2	59	49	39			37	43
R_Add_0521	RES	2	59	49	39			36	42
R_Add_0522	RES	2	59	49	39			36	42
R_Add_0523	RES	2	59	49	39			36	42
R_Add_0524	RES	4	61	48	42			40	51
R_Add_0525	RES	4	61	48	42			41	54
R_Add_0526	RES	4	61	48	42			41	54
R_Add_0527	RES	4	61	48	42			40	49
R_Add_0528	RES	4	61	48	42			40	53
R_Add_0529	RES	4	61	48	42			40	52
R_Add_0530	RES	4	61	48	42			41	54
R_Add_0531	RES	4	61	48	42			41	52
R_Add_0532	RES	4	61	48	42			40	51

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0533	RES	4	61	48	42			39	47
R_Add_0534	RES	4	61	48	42			39	49
R_Add_0535	RES	4	61	48	42			35	46
R_Add_0536	RES	4	61	48	42			40	51
R_Add_0537	RES	4	61	48	42			30	50
R_Add_0538	RES	4	61	48	42			39	48
R_Add_0539	RES	4	61	48	42			41	53
R_Add_0540	RES	4	61	48	42			40	51
R_Add_0541	RES	4	61	48	42			40	54
R_Add_0542	RES	4	61	48	42			39	48
R_Add_0543	RES	4	61	48	42			40	52
R_Add_0544	RES	4	61	48	42			40	52
R_Add_0545	RES	4	61	48	42			40	51
R_Add_0546	RES	4	61	48	42			41	55
R_Add_0547	RES	4	61	48	42			29	52
R_Add_0548	RES	4	61	48	42			39	49
R_Add_0549	RES	4	61	48	42			40	50
R_Add_0550	RES	4	61	48	42			40	51
R_Add_0551	RES	4	61	48	42			41	54

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0552	RES	4	61	48	42			39	49
R_Add_0553	RES	4	61	48	42			41	55
R_Add_0554	RES	4	61	48	42			41	53
R_Add_0555	RES	4	61	48	42			39	49
R_Add_0556	RES	2	59	49	39			37	43
R_Add_0557	RES	2	59	49	39			37	44
R_Add_0558	RES	2	59	49	39			38	45
R_Add_0559	RES	2	59	49	39			36	42
R_Add_0560	RES	2	59	49	39			30	42
R_Add_0561	RES	2	59	49	39			35	40
R_Add_0562	RES	2	59	49	39			35	43
R_Add_0563	RES	2	59	49	39			35	40
R_Add_0564	RES	2	59	49	39			30	41
R_Add_0565	RES	2	59	49	39			37	44
R_Add_0566	RES	2	59	49	39			35	41
R_Add_0567	RES	2	59	49	39			35	41
R_Add_0568	RES	2	59	49	39			34	40
R_Add_0569	RES	2	59	49	39			36	43
R_Add_0570	RES	2	59	49	39			34	40

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0571	RES	2	59	49	39			36	42
R_Add_0572	RES	2	59	49	39			38	46
R_Add_0573	RES	2	59	49	39			36	43
R_Add_0574	RES	2	59	49	39			35	41
R_Add_0575	RES	2	59	49	39			37	44
R_Add_0576	RES	2	59	49	39			35	42
R_Add_0577	RES	2	59	49	39			37	43
R_Add_0578	RES	2	59	49	39			30	44
R_Add_0579	RES	2	59	49	39			35	41
R_Add_0580	RES	2	59	49	39			37	43
R_Add_0581	RES	2	59	49	39			36	42
R_Add_0582	RES	2	59	49	39			36	42
R_Add_0583	RES	2	59	49	39			37	44
R_Add_0584	RES	2	59	49	39			37	43
R_Add_0585	RES	2	59	49	39			35	41
R_Add_0586	RES	2	59	49	39			37	44
R_Add_0587	RES	2	59	49	39			36	42
R_Add_0588	RES	2	59	49	39			34	41
R_Add_0589	RES	2	59	49	39			37	45

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0590	RES	2	59	49	39			36	42
R_Add_0591	RES	2	59	49	39			35	41
R_Add_0592	RES	2	59	49	39			35	40
R_Add_0593	RES	2	59	49	39			35	41
R_Add_0594	RES	2	59	49	39			35	41
R_Add_0595	RES	2	59	49	39			35	41
R_Add_0596	RES	2	59	49	39			37	43
R_Add_0597	RES	2	59	49	39			37	45
R_Add_0598	RES	2	59	49	39			38	45
R_Add_0599	RES	2	59	49	39			33	43
R_Add_0600	RES	2	59	49	39			36	44
R_Add_0601	RES	2	59	49	39			36	43
R_Add_0602	RES	2	59	49	39			38	45
R_Add_0603	RES	2	59	49	39			37	45
R_Add_0604	RES	2	59	49	39			35	41
R_Add_0605	RES	2	59	49	39			35	41
R_Add_0606	RES	2	59	49	39			37	43
R_Add_0607	RES	2	59	49	39			32	41
R_Add_0608	RES	2	59	49	39			37	45

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0609	RES	2	59	49	39			35	42
R_Add_0610	RES	2	59	49	39			37	44
R_Add_0611	RES	2	59	49	39			38	47
R_Add_0612	RES	2	59	49	39			31	43
R_Add_0613	RES	2	59	49	39			36	43
R_Add_0614	RES	2	59	49	39			36	43
R_Add_0615	RES	2	59	49	39			36	42
R_Add_0616	RES	2	59	49	39			34	42
R_Add_0617	RES	2	59	49	39			36	42
R_Add_0618	RES	2	59	49	39			38	45
R_Add_0619	RES	2	59	49	39			41	42
R_Add_0620	RES	2	59	49	39			49	30
R_Add_0621	RES	2	59	49	39			44	41
R_Add_0622	RES	2	59	49	39			45	41
R_Add_0623	RES	2	59	49	39			49	37
R_Add_0624	RES	2	59	49	39			46	28
R_Add_0625	RES	2	59	49	39			48	37
R_Add_0626	RES	2	59	49	39			49	37
R_Add_0627	RES	2	59	49	39			46	33

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0628	RES	2	59	49	39			48	43
R_Add_0629	RES	2	59	49	39			46	43
R_Add_0630	RES	2	59	49	39			39	33
R_Add_0631	RES	2	59	49	39			38	43
R_Add_0632	RES	2	59	49	39			41	43
R_Add_0633	RES	2	59	49	39			39	42
R_Add_0634	RES	2	59	49	39			36	42
R_Add_0635	RES	2	59	49	39			45	33
R_Add_0636	RES	2	59	49	39			39	42
R_Add_0637	RES	2	59	49	39			48	40
R_Add_0638	RES	2	59	49	39			50	33
R_Add_0639	RES	2	59	49	39			47	40
R_Add_0640	RES	2	59	49	39			47	40
R_Add_0641	RES	2	59	49	39			50	35
R_Add_0642	RES	2	59	49	39			48	32
R_Add_0643	RES	2	59	49	39			43	37
R_Add_0644	RES	2	59	49	39			50	35
R_Add_0645	RES	2	59	49	39			50	34
R_Add_0646	RES	2	59	49	39			47	42

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0647	RES	2	59	49	39			48	39
R_Add_0648	RES	2	59	49	39			47	32
R_Add_0649	RES	2	59	49	39			48	33
R_Add_0650	RES	2	59	49	39			48	38
R_Add_0651	RES	2	59	49	39			47	39
R_Add_0652	RES	2	59	49	39			47	38
R_Add_0653	RES	2	59	49	39			49	38
R_Add_0654	RES	2	59	49	39			48	38
R_Add_0655	RES	2	59	49	39			47	35
R_Add_0656	RES	2	59	49	39			52	36
R_Add_0657	RES	2	59	49	39			52	42
R_Add_0658	RES	2	59	49	39			40	37
R_Add_0659	RES	2	59	49	39			54	41
R_Add_0660	RES	2	59	49	39			46	36
R_Add_0661	RES	2	59	49	39			41	36
R_Add_0662	RES	2	59	49	39			53	42
R_Add_0663	RES	2	59	49	39			54	39
R_Add_0664	RES	2	59	49	39			48	31
R_Add_0665	RES	2	59	49	39			45	35

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0666	RES	2	59	49	39			49	35
R_Add_0667	RES	2	59	49	39			48	33
R_Add_0668	RES	2	59	49	39			50	37
R_Add_0669	RES	2	59	49	39			48	43
R_Add_0670	RES	2	59	49	39			42	52
R_Add_0671	RES	2	59	49	39			49	49
R_Add_0672	RES	2	59	49	39			48	53
R_Add_0673	RES	2	59	49	39			50	37
R_Add_0674	RES	2	59	49	39			44	32
R_Add_0675	RES	2	59	49	39			42	43
R_Add_0676	RES	2	59	49	39			51	43
R_Add_0677	RES	2	59	49	39			42	32
R_Add_0678	RES	2	59	49	39			45	31
R_Add_0679	RES	2	59	49	39			42	31
R_Add_0680	RES	2	59	49	39			45	32
R_Add_0681	RES	2	59	49	39			43	28
R_Add_0682	RES	2	59	49	39			57	39
R_Add_0683	RES	2	59	49	39			56	44
R_Add_0684	RES	2	59	49	39			46	33

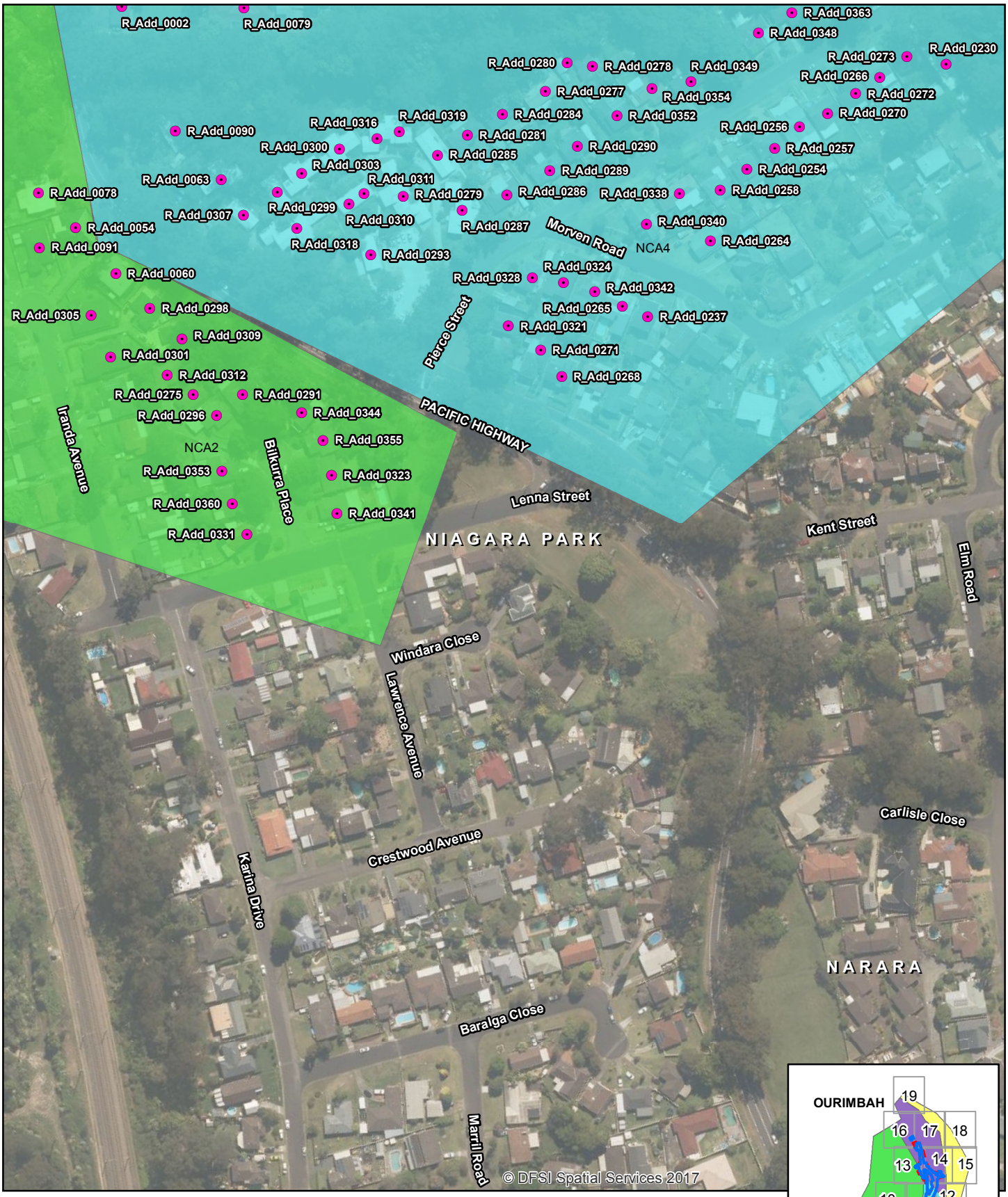
Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0685	RES	2	59	49	39			58	44
R_Add_0686	RES	2	59	49	39			44	28
R_Add_0687	RES	2	59	49	39			41	42
R_Add_0688	RES	2	59	49	39			48	43
R_Add_0689	RES	2	59	49	39			55	43
R_Add_0690	RES	2	59	49	39			52	43
R_Add_0691	RES	2	59	49	39			51	35
R_Add_0692	RES	2	59	49	39			43	40
R_Add_0693	RES	2	59	49	39			47	49
R_Add_0694	RES	2	59	49	39			43	50
R_Add_0695	RES	2	59	49	39			44	41
R_Add_0696	RES	2	59	49	39			47	41
R_Add_0697	RES	2	59	49	39			34	28
R_Add_0698	RES	2	59	49	39			47	50
R_Add_0699	RES	2	59	49	39			43	40
R_Add_0700	RES	2	59	49	39			47	51
R_Add_0701	RES	2	59	49	39			47	51
R_Add_0702	RES	2	59	49	39			34	30
R_Add_0703	RES	2	59	49	39			35	22

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0704	RES	2	59	49	39			43	40
R_Add_0705	RES	2	59	49	39			35	41
R_Add_0706	RES	2	59	49	39			35	33
R_Add_0707	RES	2	59	49	39			32	31
R_Add_0708	RES	2	59	49	39			32	30
R_Add_0709	RES	2	59	49	39			42	38
R_Add_0710	RES	2	59	49	39			41	41
R_Add_0711	RES	2	59	49	39			33	26
R_Add_0712	RES	2	59	49	39			42	40
R_Add_0713	RES	2	59	49	39			43	40
R_Add_0714	RES	2	59	49	39			43	31
R_Add_0715	RES	2	59	49	39			31	24
R_Add_0716	RES	2	59	49	39			43	38
R_Add_0717	RES	2	59	49	39			43	38
R_Add_0718	RES	2	59	49	39			47	41
R_Add_0719	RES	2	59	49	39			41	33
R_Add_0720	RES	2	59	49	39			46	34
R_Add_0721	RES	2	59	49	39			47	34
R_Add_0722	RES	2	59	49	39			41	33

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0723	RES	2	59	49	39			48	30
R_Add_0724	RES	2	59	49	39			49	32
R_Add_0725	RES	2	59	49	39			48	30
R_Add_0726	RES	2	59	49	39			51	29
R_Add_0727	RES	2	59	49	39			42	30
R_Add_0728	RES	2	59	49	39			41	29
R_Add_0729	RES	2	59	49	39			40	30
R_Add_0730	RES	2	59	49	39			44	32
R_Add_0731	RES	2	59	49	39			50	37
R_Add_0732	RES	2	59	49	39			46	36
R_Add_0733	RES	2	59	49	39			46	35
R_Add_0734	RES	2	59	49	39			42	35
R_Add_0735	RES	2	59	49	39			48	42
R_Add_0736	RES	2	59	49	39			48	38
R_Add_0737	RES	2	59	49	39			49	32
R_Add_0738	RES	2	59	49	39			49	34
R_Add_0739	RES	2	59	49	39			47	33
R_Add_0740	RES	2	59	49	39			49	33
R_Add_0741	RES	2	59	49	39			48	29

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0742	RES	2	59	49	39			48	35
R_Add_0743	RES	2	59	49	39			49	29
R_Add_0744	RES	2	59	49	39			48	30
R_Add_0745	RES	2	59	49	39			59	41
R_Add_0746	RES	2	59	49	39			58	44
R_Add_0747	RES	2	59	49	39			58	40

Attachment C
Noise catchment areas and sensitive receivers



LEGEND

- Additional identified sensitive receivers
- NCA4

Noise catchment areas

- NCA2

Paper Size A4

0 12.5 25 50 75

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

Roads and Maritime Services
Pacific Highway Upgrade Stage 3B, Lisarow
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Noise sensitive receivers and noise monitoring locations - Sheet 1 of 19

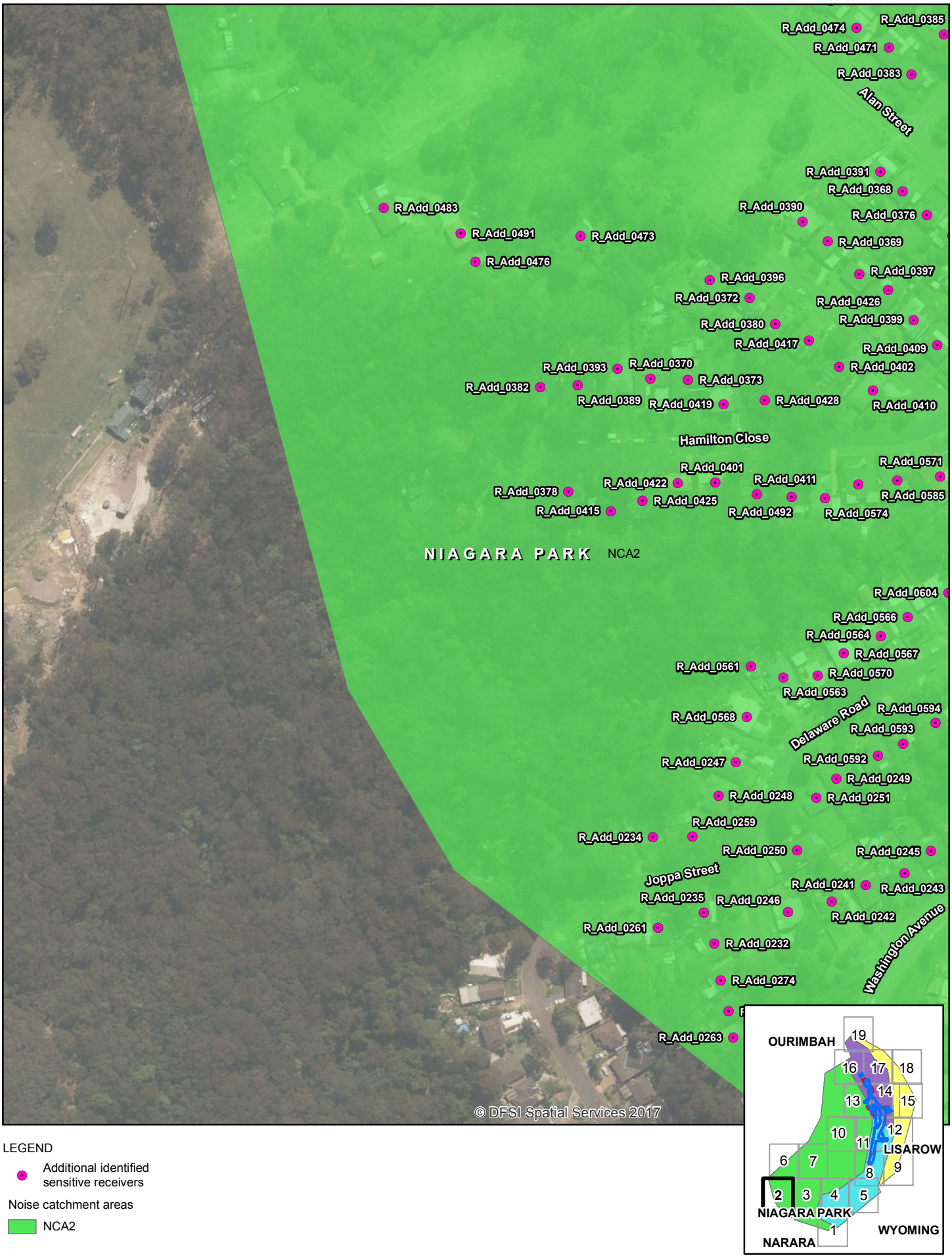
Job Number	22-18239
Revision	0
Date	26 Jun 2018

Figure A2

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com **W** www.ghd.com.au

G:\22\18239\GIS\Maps\Deliverables\AddendumREF2_Compounds\Noise\2218239_A201_SensitiveReceivers_NoiseMonitoring_0.mxd

Data source: LPI: Aerial imagery, 2015; DTDB, 2015. Created by: tmorton



LEGEND

- Additional identified sensitive receivers

Noise catchment areas

- NCA2

Paper Size A4

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Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

Roads and Maritime Services
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Noise sensitive receivers and noise monitoring locations - Sheet 2 of 19

Job Number	22-18239
Revision	0
Date	26 Jun 2018

Figure A1

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com **W** www.ghd.com.au

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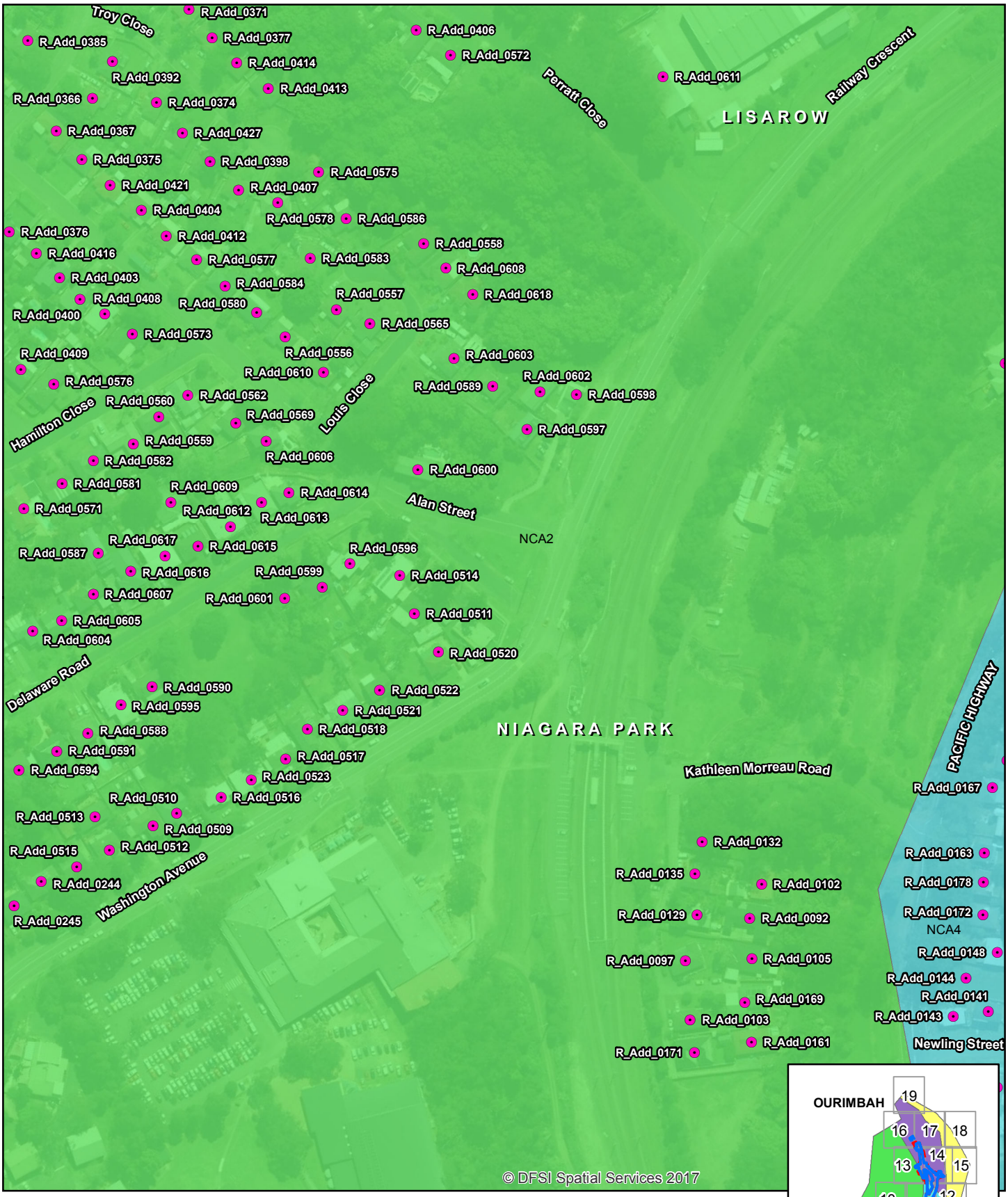

LEGEND

- Additional identified sensitive receivers
- NCA4

Noise catchment areas

- NCA2

Paper Size A4

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Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

Roads and Maritime Services
Pacific Highway Upgrade Stage 3B, Lisarow
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Job Number 22-18239
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Date 26 Jun 2018

Noise sensitive receivers and noise monitoring locations - Sheet 3 of 19

Figure A2

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 T 61 2 4979 9999 F 61 2 4979 9988 E ntlmail@ghd.com W www.ghd.com.au

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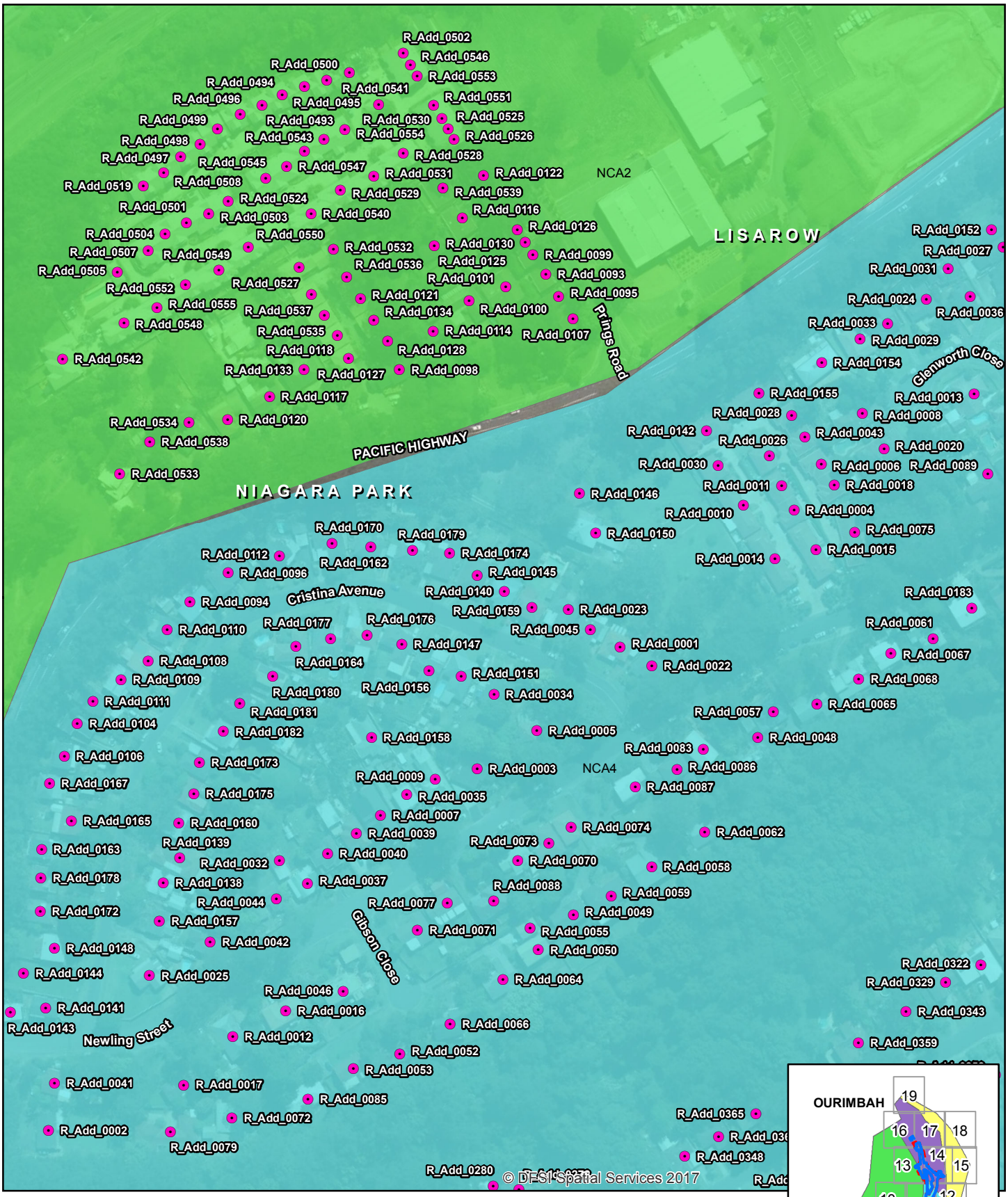

LEGEND

Additional identified sensitive receivers

Noise catchment areas

NCA2

NCA4

Paper Size A4

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Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

Roads and Maritime Services
Pacific Highway Upgrade Stage 3B, Lisarow
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Noise sensitive receivers and noise monitoring locations - Sheet 4 of 19

Job Number	22-18239
Revision	0
Date	26 Jun 2018

Figure A1

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 T 61 2 4979 9999 F 61 2 4979 9988 E ntlmail@ghd.com W www.ghd.com.au

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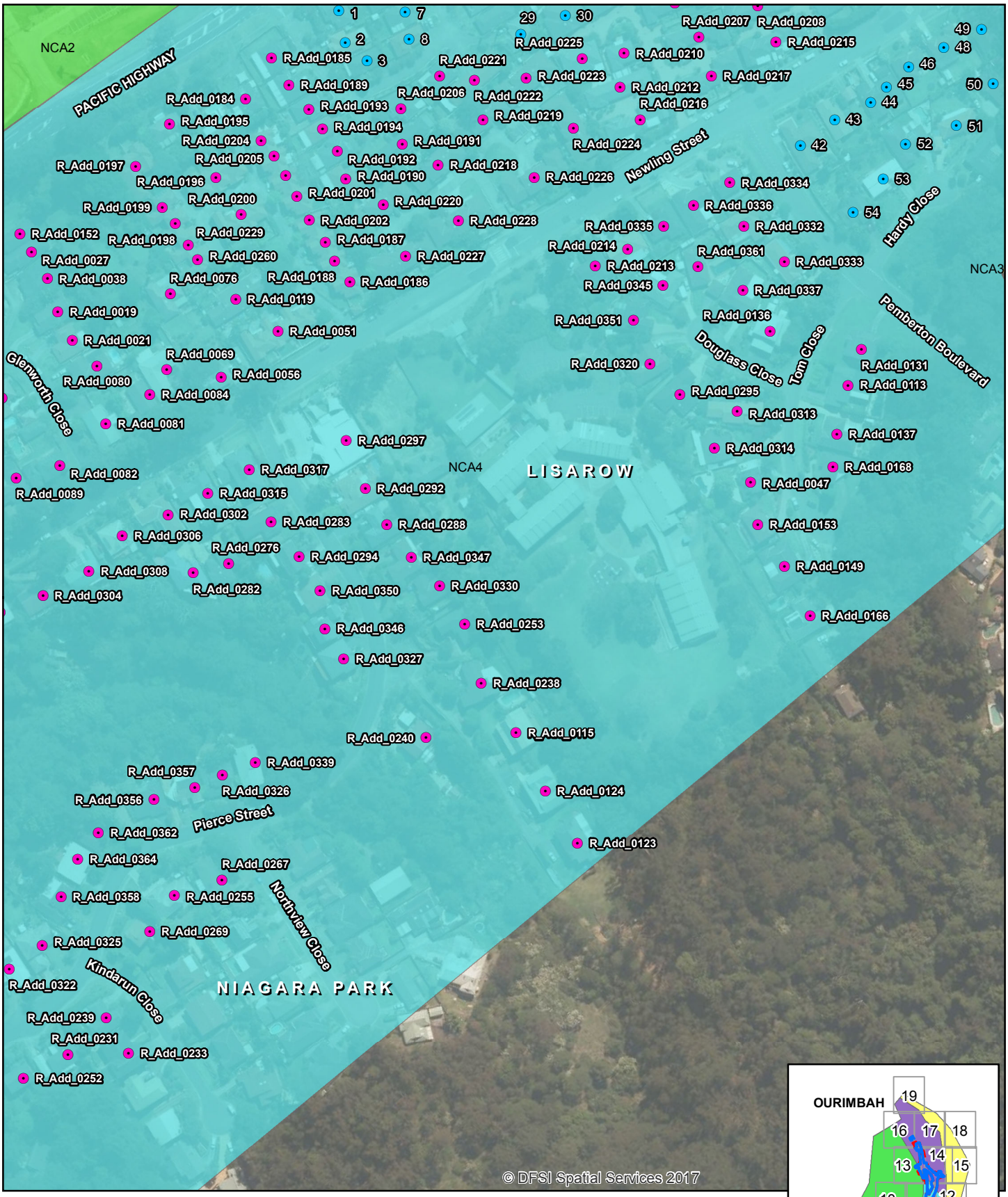

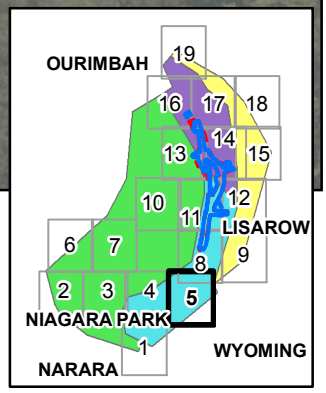

LEGEND

- Sensitive receiver
- Additional identified sensitive receivers

Noise catchment areas

- NCA2
- NCA3
- NCA4

Paper Size A4

0 12.5 25 50 75

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

Roads and Maritime Services
Pacific Highway Upgrade Stage 3B, Lisarow
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Noise sensitive receivers and noise monitoring locations - Sheet 5 of 19

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Revision 0
Date 26 Jun 2018

Figure A2

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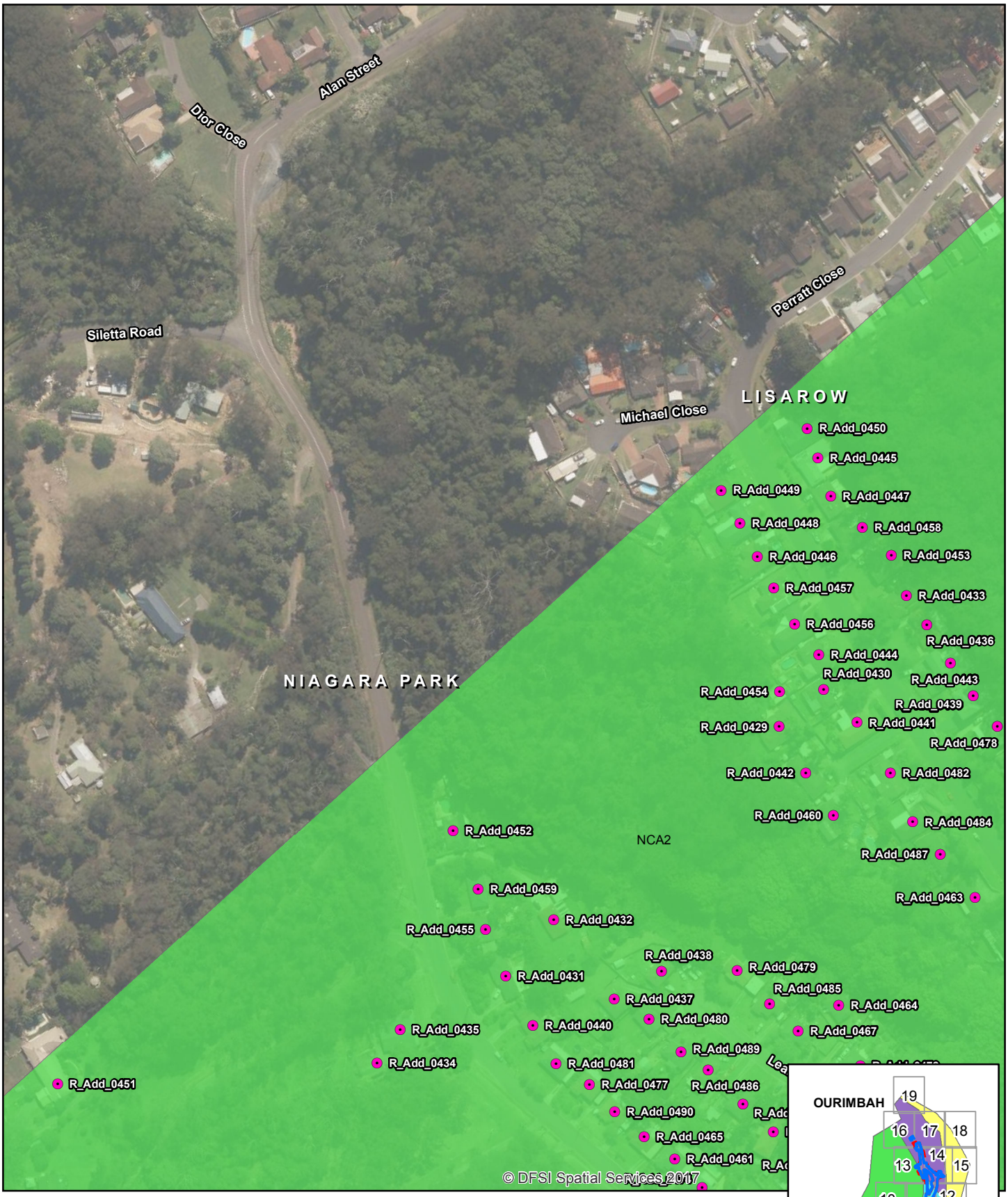

LEGEND

Additional identified sensitive receivers

Noise catchment areas

NCA2

Paper Size A4

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Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

Roads and Maritime Services
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Noise sensitive receivers and noise monitoring locations - Sheet 6 of 19

Job Number	22-18239
Revision	0
Date	26 Jun 2018

Figure A1

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Data source: LPI: Aerial imagery, 2015; DTDB, 2015. Created by: tmorton

LEGEND

Additional identified sensitive receivers

Noise catchment areas

NCA2

Paper Size A4

0 12.5 25 50 75

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

Roads and Maritime Services
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Noise sensitive receivers and noise monitoring locations - Sheet 7 of 19

Job Number	22-18239
Revision	0
Date	26 Jun 2018

Figure A2

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com **W** www.ghd.com.au

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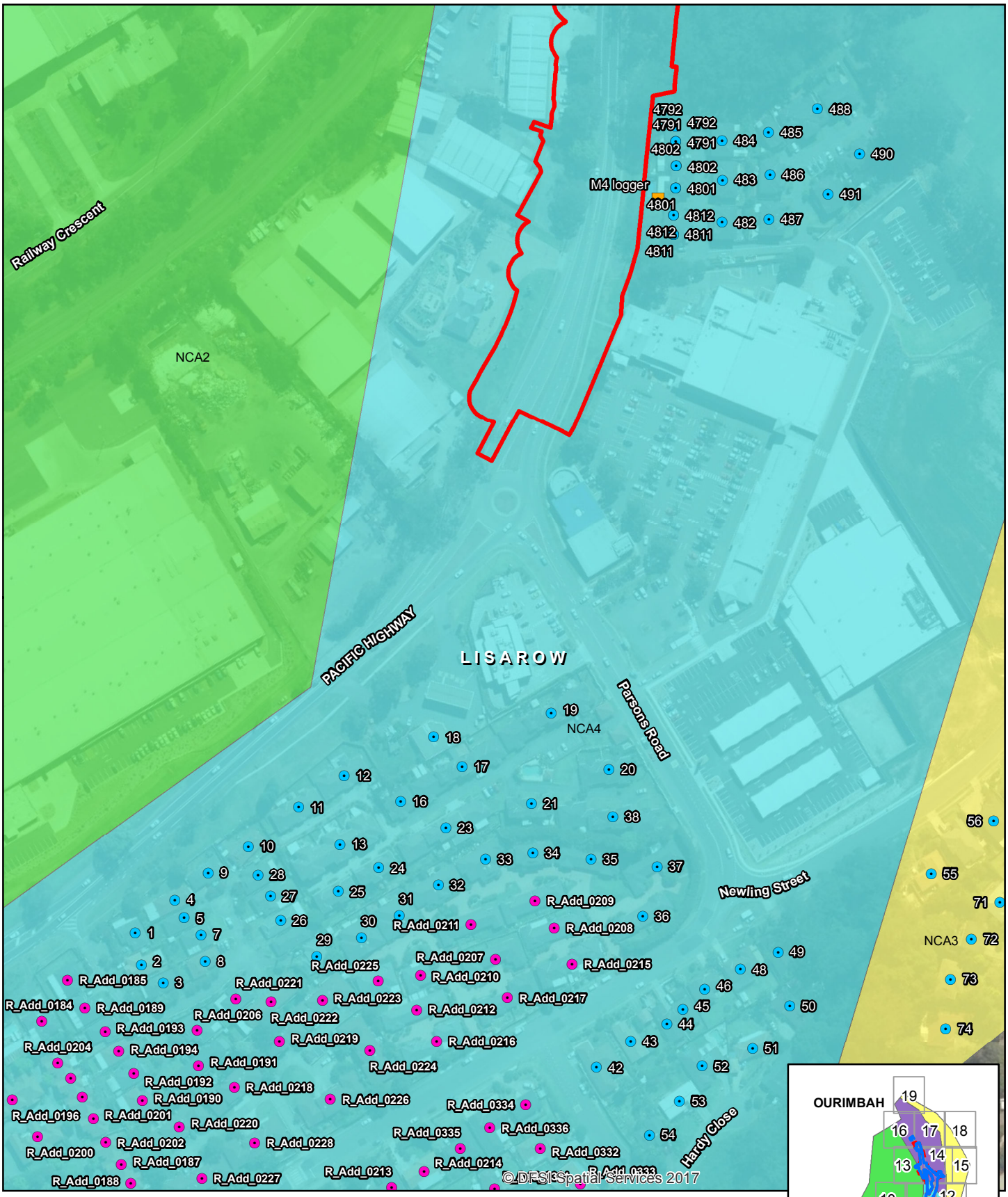

LEGEND

- Logger location
- Sensitive receiver
- Additional identified sensitive receivers

Noise catchment areas

- NCA2
- NCA3
- NCA4

Approved project boundary (Addendum REF 1)

Paper Size A4

0 12.5 25 50 75

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

Roads and Maritime Services
Pacific Highway Upgrade Stage 3B, Lisarow
Addendum Review of Environmental Factors 2

Noise sensitive receivers and noise monitoring locations - Sheet 8 of 19

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Date	26 Jun 2018

Figure A1

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 T 61 2 4979 9999 F 61 2 4979 9988 E ntlmail@ghd.com W www.ghd.com.au

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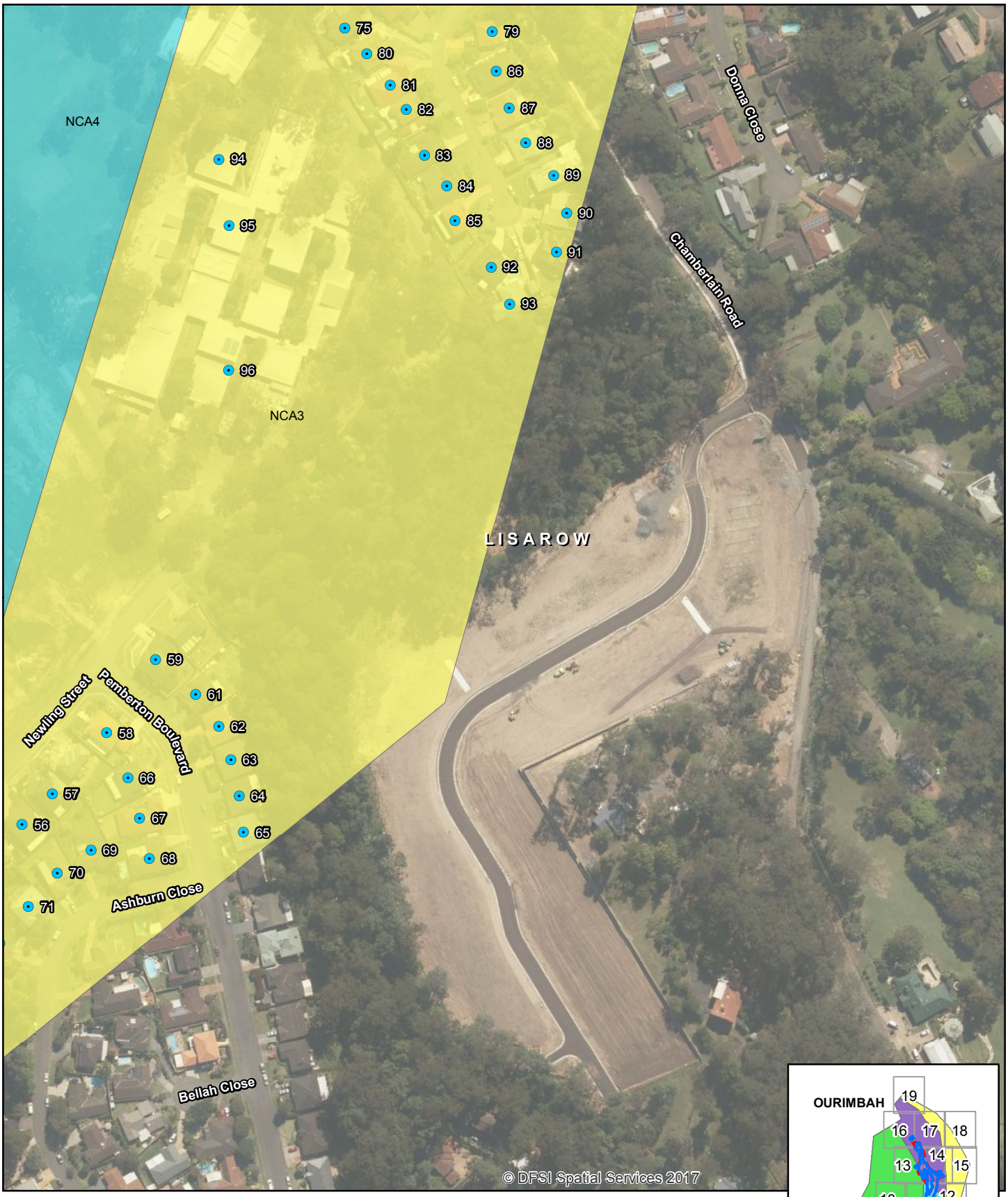
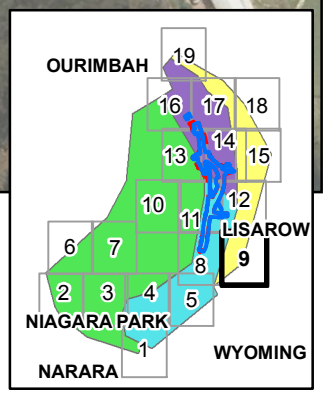
Data source: LPI: Aerial imagery, 2015; DTDB, 2015. Created by: tmorton





LEGEND

- Sensitive receiver

Noise catchment areas

- NCA3
- NCA4

Paper Size A4

0 12.5 25 50 75

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

Roads and Maritime Services
Pacific Highway Upgrade Stage 3B, Lisarow
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Noise sensitive receivers and noise monitoring locations - Sheet 9 of 19

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Date	26 Jun 2018

Figure A2

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Data source: LPI: Aerial imagery, 2015; DTDB, 2015. Created by: tmorton

LEGEND

Additional identified sensitive receivers

Noise catchment areas

NCA2

Paper Size A4

0 12.5 25 50 75

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

Roads and Maritime Services
Pacific Highway Upgrade Stage 3B, Lisarow
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Job Number 22-18239
Revision 0
Date 26 Jun 2018

Noise sensitive receivers and noise monitoring locations - Sheet 10 of 19

Figure A2

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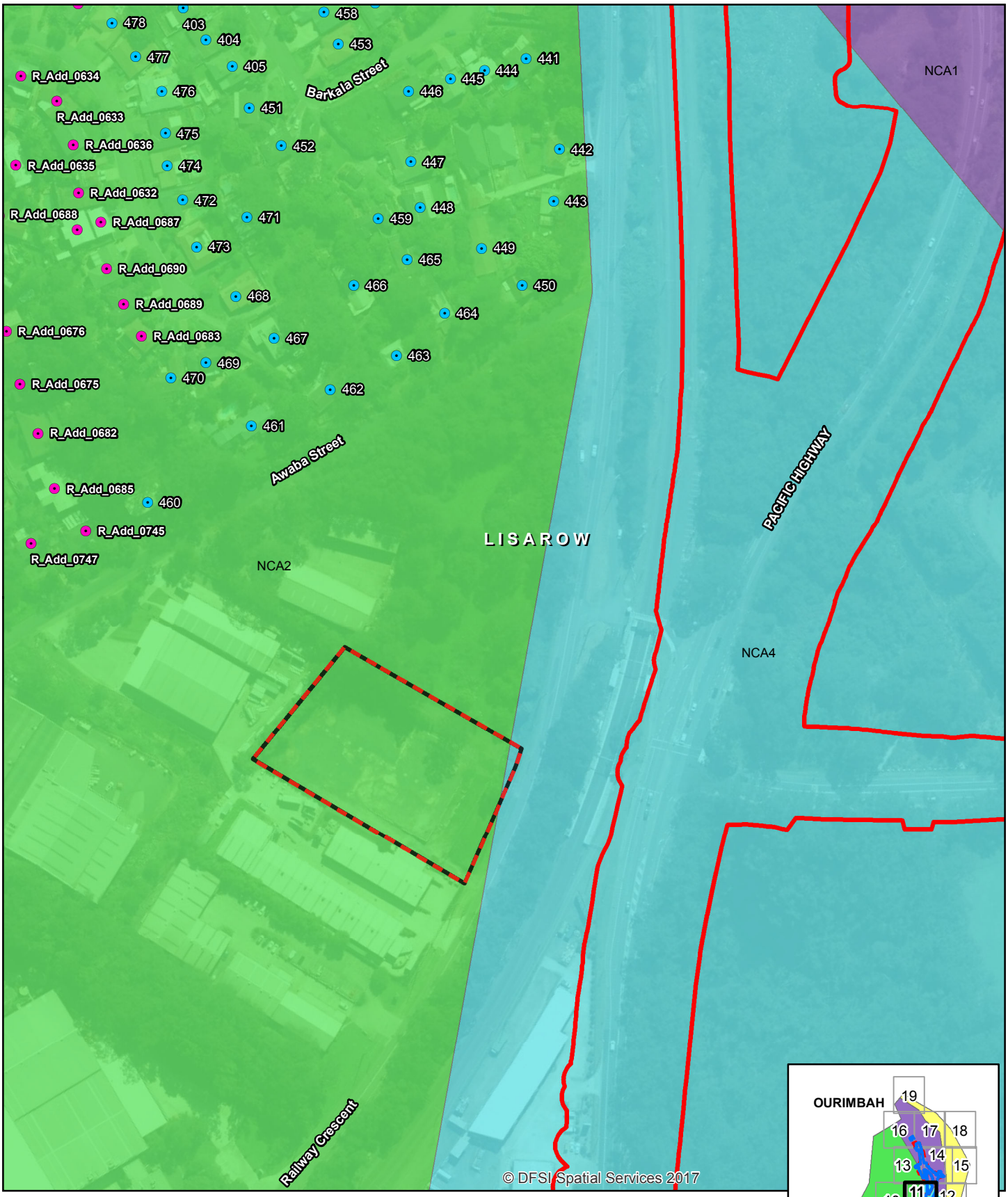

LEGEND

- Sensitive receiver
- Additional identified sensitive receivers

Noise catchment areas

- NCA1
- NCA2
- NCA4

- Approved project boundary (Addendum REF 1)
- Proposed modification (Addendum REF 2)

Paper Size A4

0 12.5 25 50 75

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

Roads and Maritime Services
Pacific Highway Upgrade Stage 3B, Lisarow
Addendum Review of Environmental Factors 2

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Noise sensitive receivers and noise monitoring locations - Sheet 11 of 19

Figure A3

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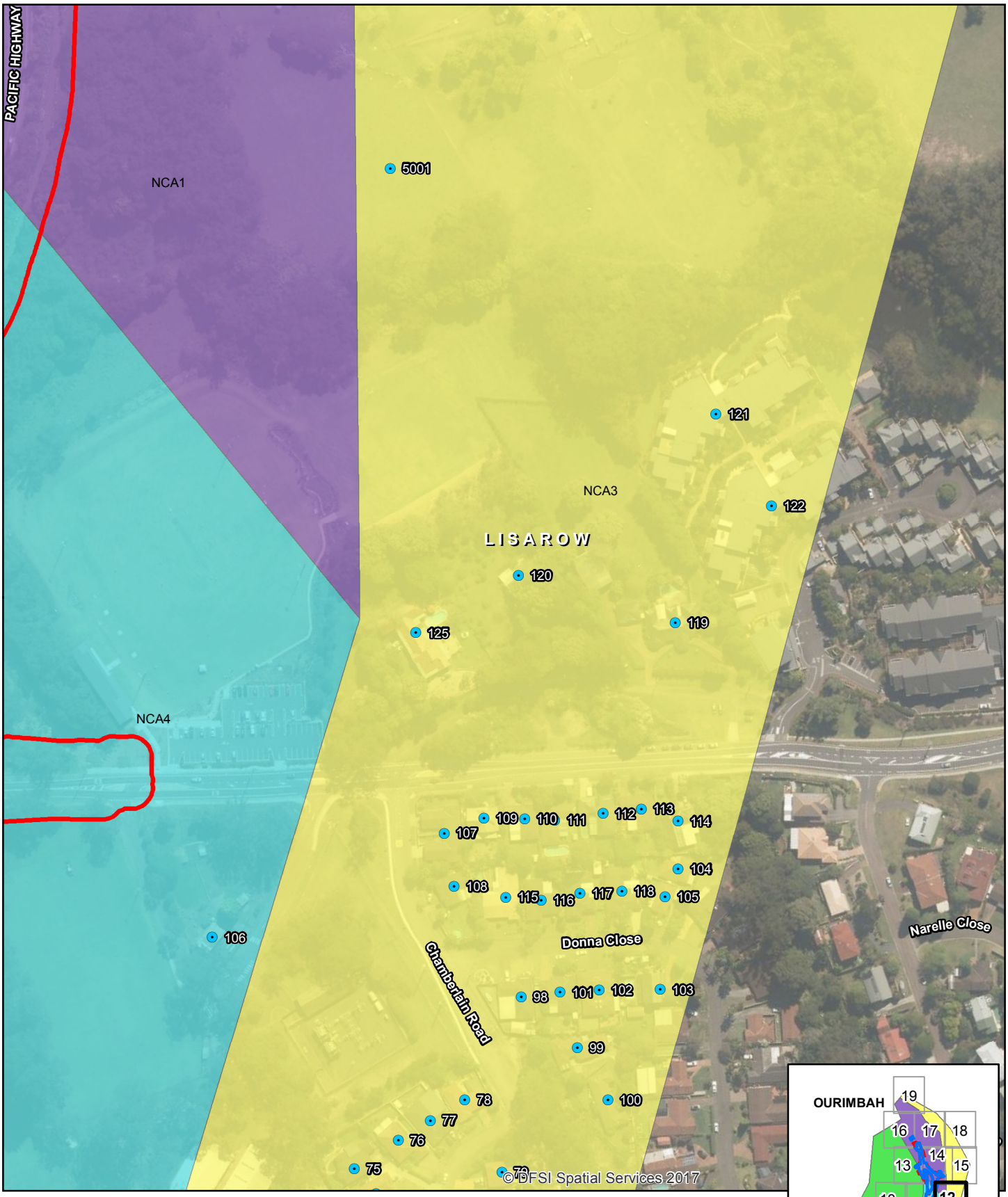

LEGEND

- Sensitive receiver
- Noise catchment areas
  - NCA1
  - NCA3
  - NCA4
- Approved project boundary (Addendum REF 1)

Paper Size A4

0 12.5 25 50 75

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

Roads and Maritime Services
Pacific Highway Upgrade Stage 3B, Lisarow
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Date 26 Jun 2018

Noise sensitive receivers and noise monitoring locations - Sheet 12 of 19

Figure A4

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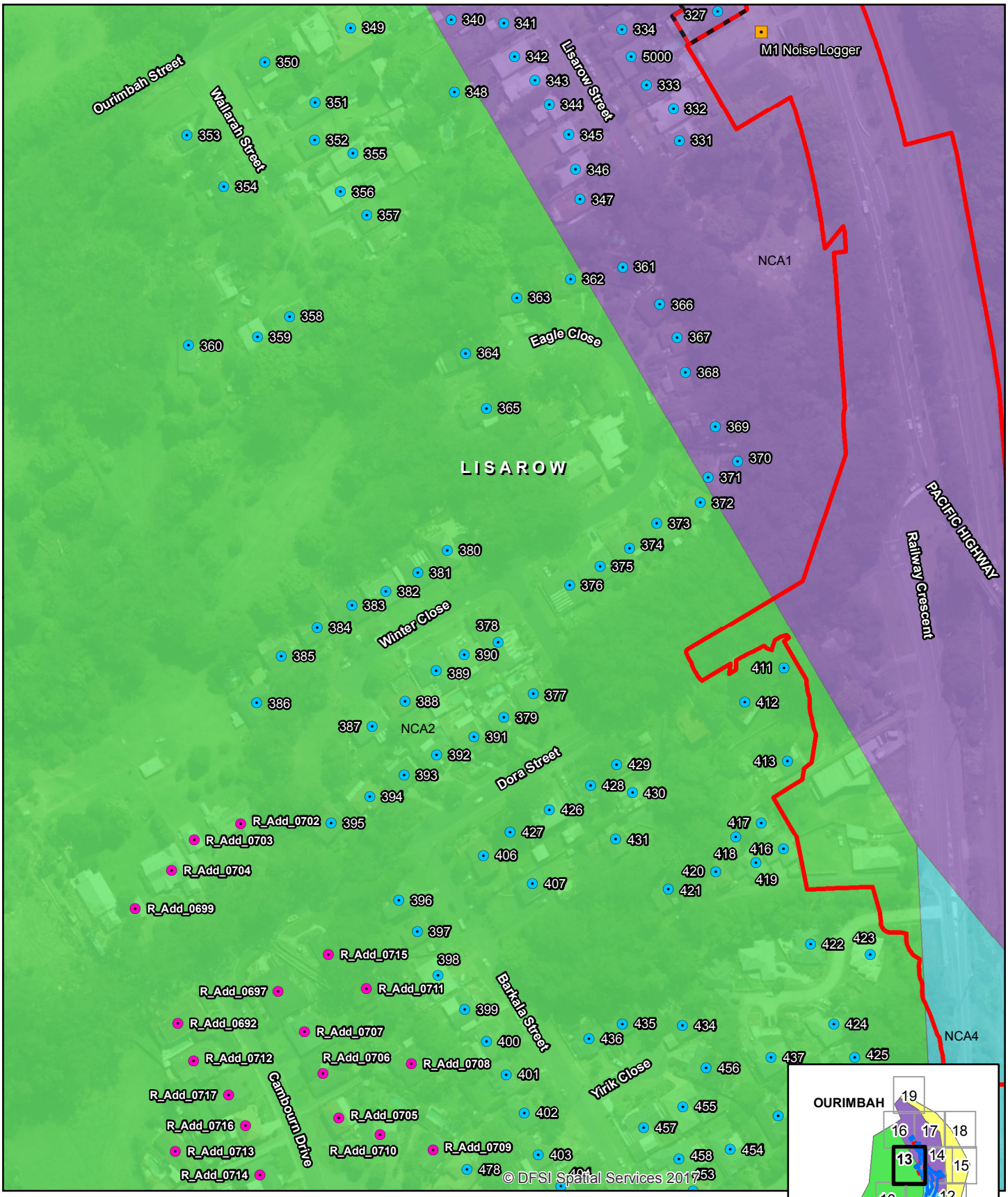

LEGEND

- Logger location
- Sensitive receiver
- Additional identified sensitive receivers

Noise catchment areas

- NCA1
- NCA2
- NCA4

- Approved project boundary (Addendum REF 1)
- Proposed modification (Addendum REF 2)

Paper Size A4

0 12.5 25 50 75

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

Roads and Maritime Services
Pacific Highway Upgrade Stage 3B, Lisarow
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Noise sensitive receivers and noise monitoring locations - Sheet 13 of 19

Figure A5

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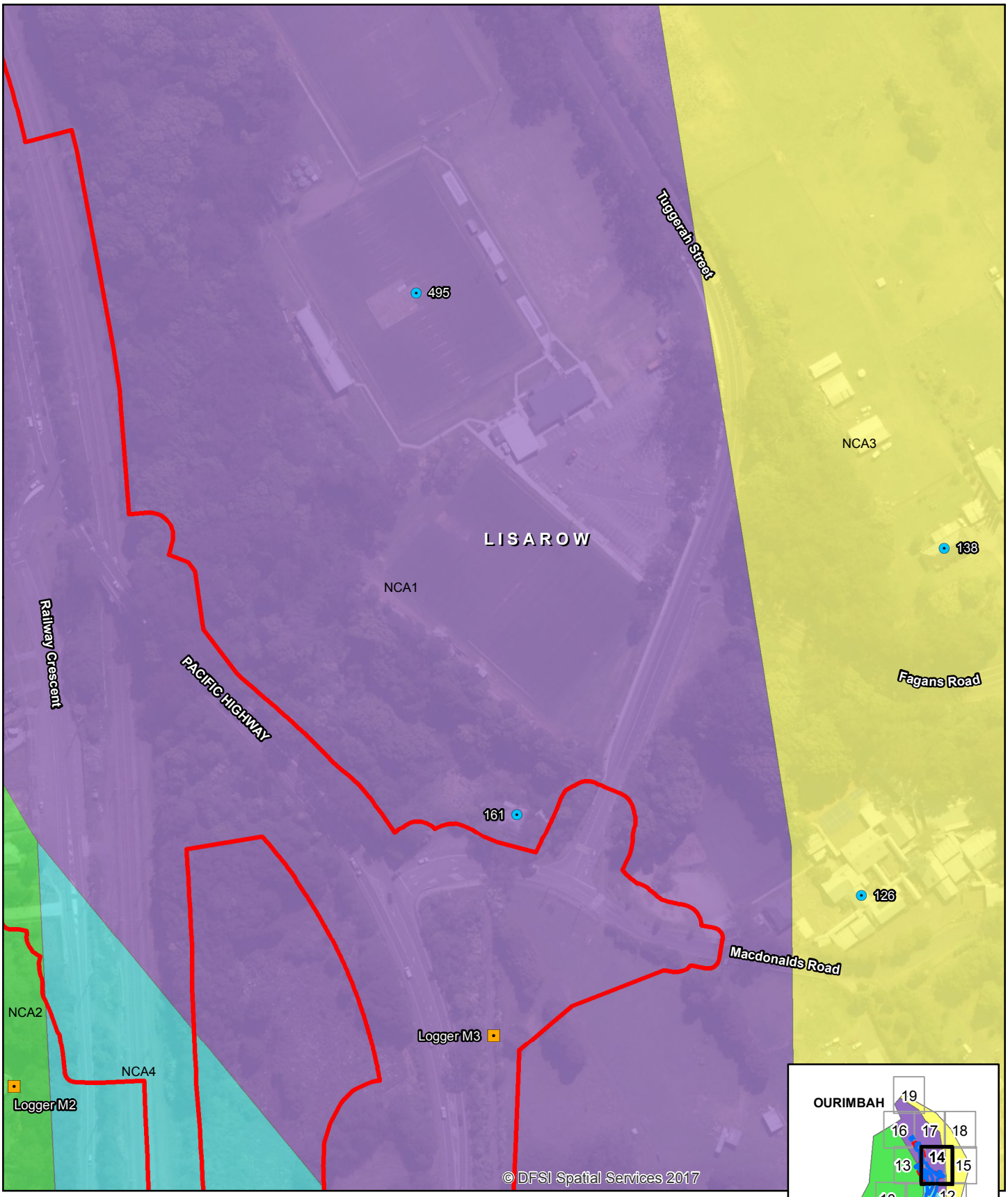

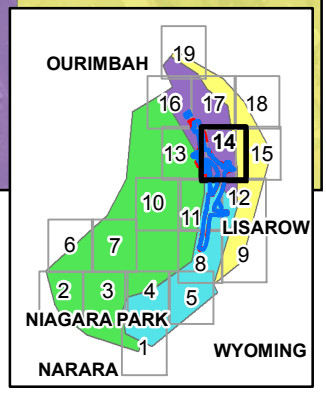

LEGEND

- Logger location
- Sensitive receiver

Noise catchment areas

- NCA1
- NCA2
- NCA3
- NCA4

Approved project boundary (Addendum REF 1)

Paper Size A4

0 12.5 25 50 75

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

Roads and Maritime Services
Pacific Highway Upgrade Stage 3B, Lisarow
Addendum Review of Environmental Factors 2

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Revision 0
Date 26 Jun 2018

Noise sensitive receivers and noise monitoring locations - Sheet 14 of 19

Figure A6

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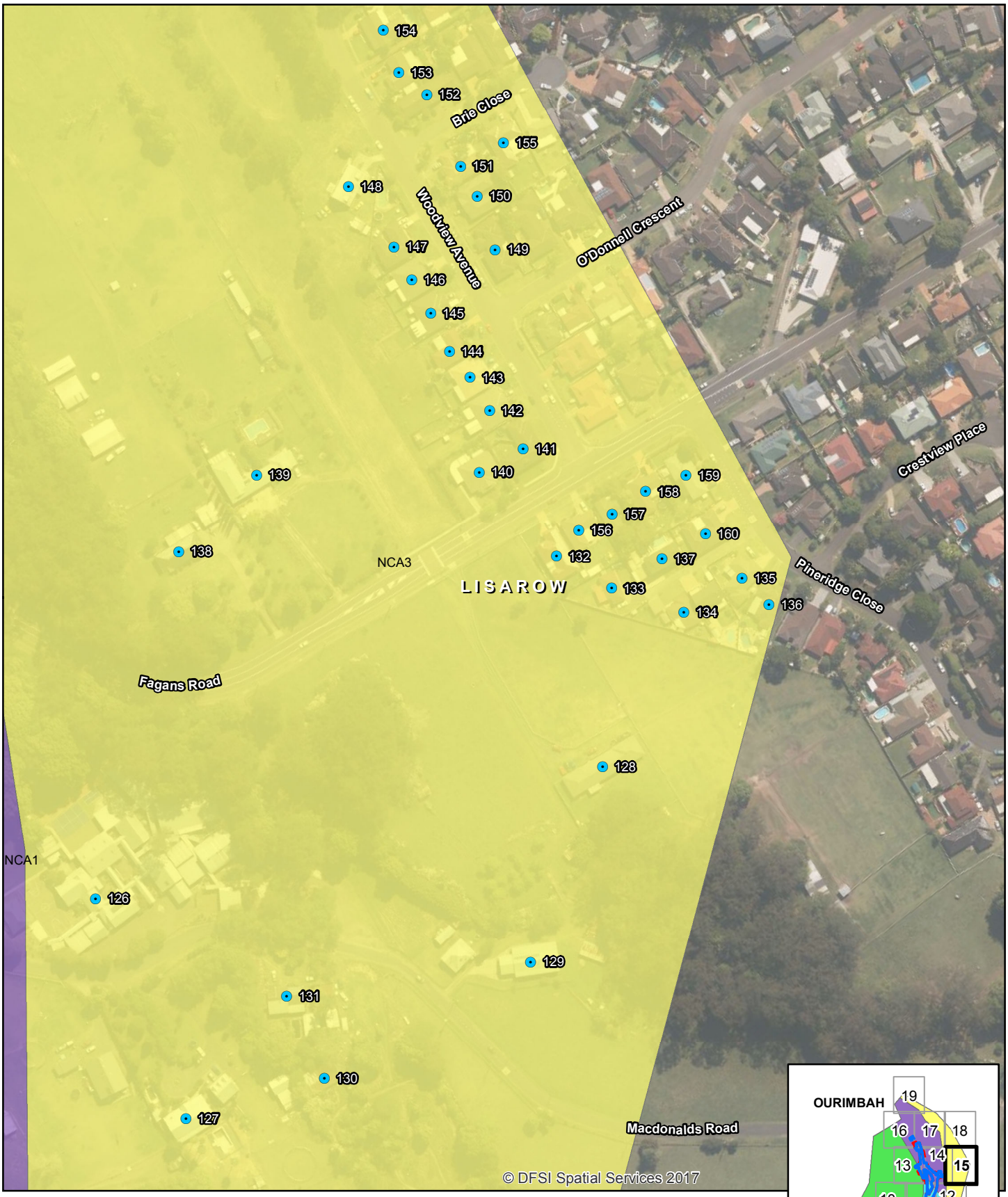

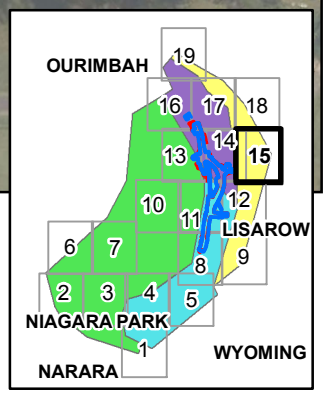

LEGEND

- Sensitive receiver

Noise catchment areas

- NCA1
- NCA3

Paper Size A4

0 12.5 25 50 75

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

Roads and Maritime Services
Pacific Highway Upgrade Stage 3B, Lisarow
Addendum Review of Environmental Factors 2

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Noise sensitive receivers and noise monitoring locations - Sheet 15 of 19

Figure A7

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com **W** www.ghd.com.au

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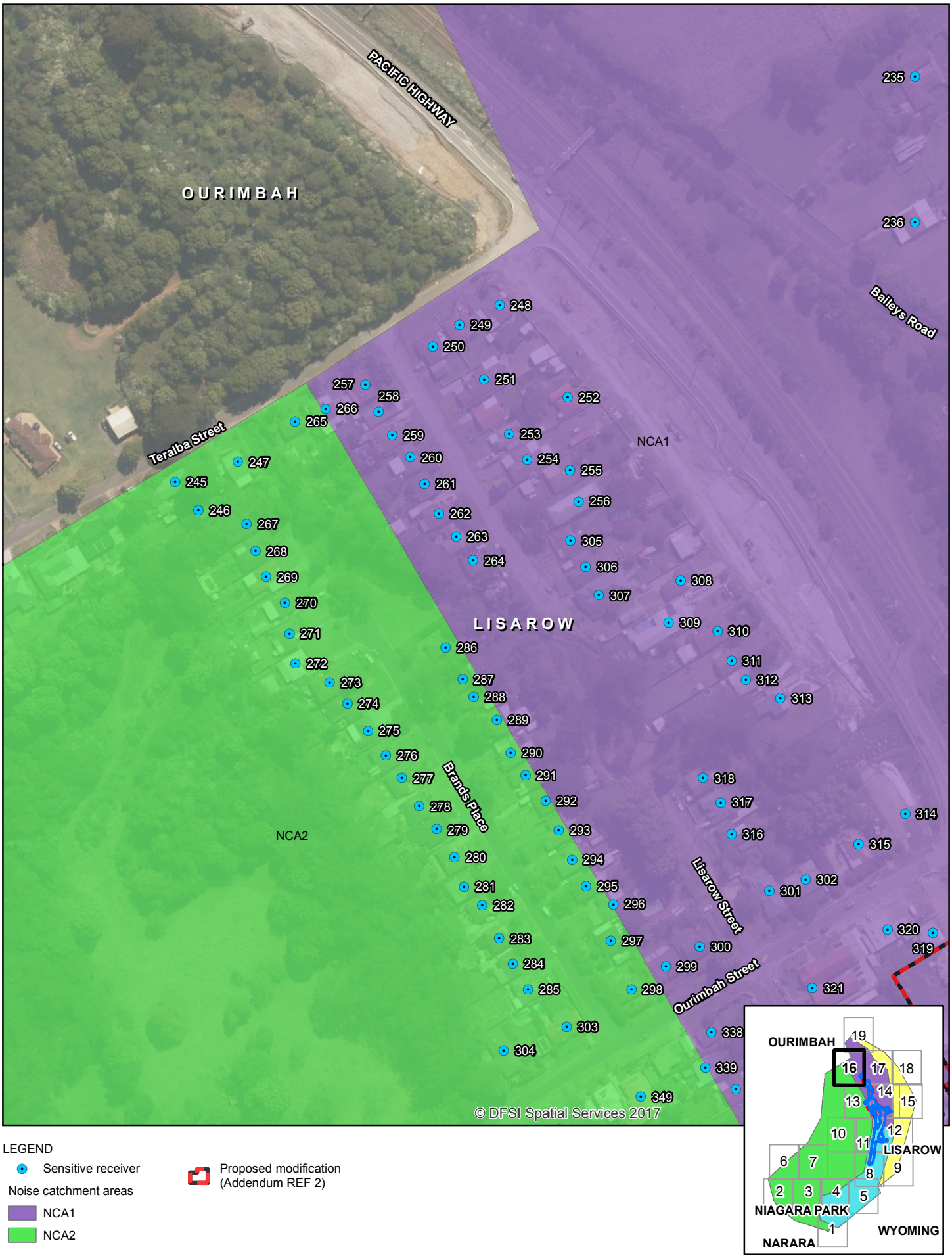

LEGEND

- Sensitive receiver
- Proposed modification (Addendum REF 2)

Noise catchment areas

- NCA1
- NCA2

Paper Size A4

0 12.5 25 50 75

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

Roads and Maritime Services
Pacific Highway Upgrade Stage 3B, Lisarow
Addendum Review of Environmental Factors 2

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Noise sensitive receivers and noise monitoring locations - Sheet 16 of 19

Figure A8

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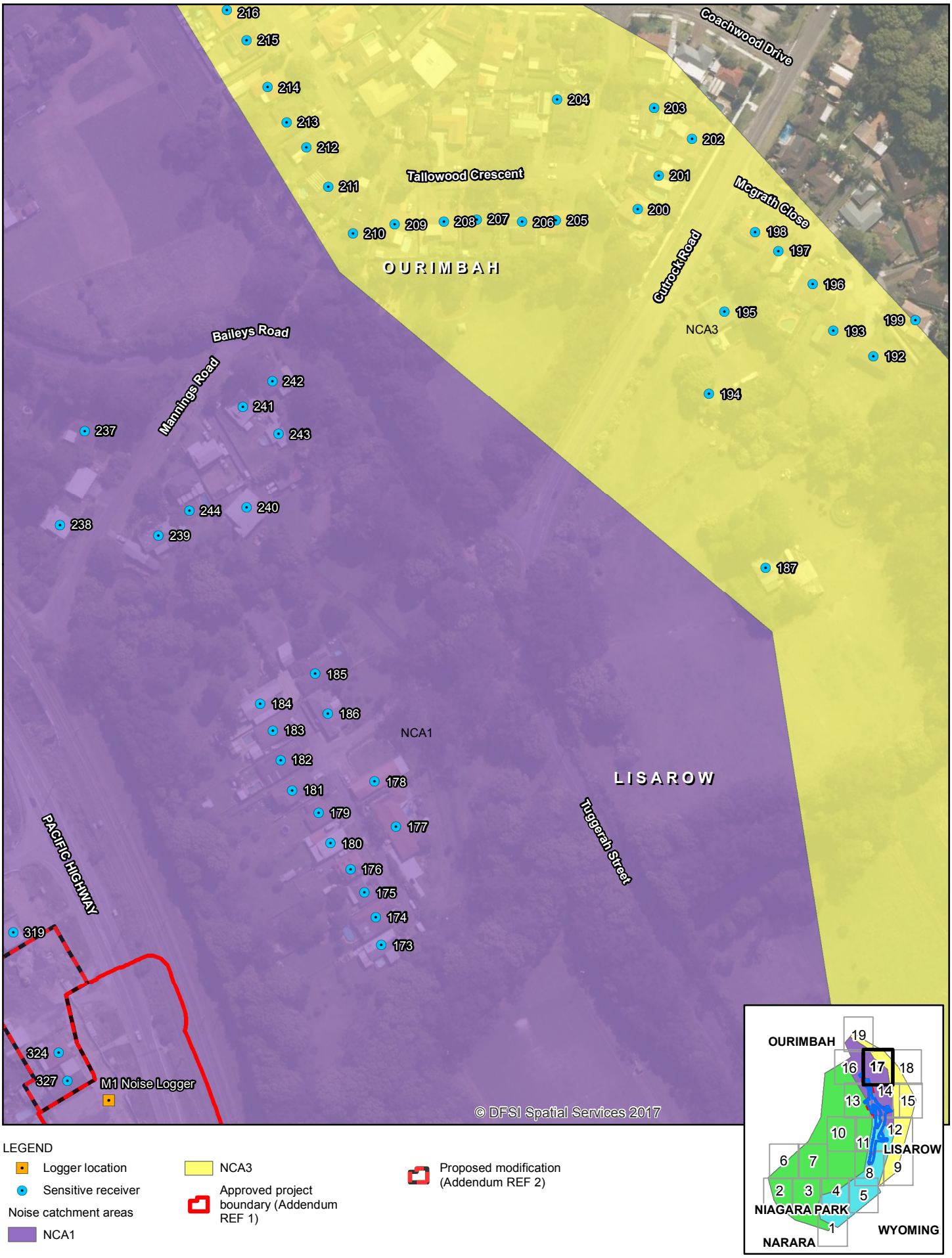

LEGEND

- Logger location
- Sensitive receiver

Noise catchment areas

- NCA1
- NCA3
- Approved project boundary (Addendum REF 1)
- Proposed modification (Addendum REF 2)

Paper Size A4

0 12.5 25 50 75

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

Roads and Maritime Services
Pacific Highway Upgrade Stage 3B, Lisarow
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Noise sensitive receivers and noise monitoring locations - Sheet 17 of 19

Figure A9

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 T 61 2 4979 9999 F 61 2 4979 9988 E ntlmail@ghd.com W www.ghd.com.au

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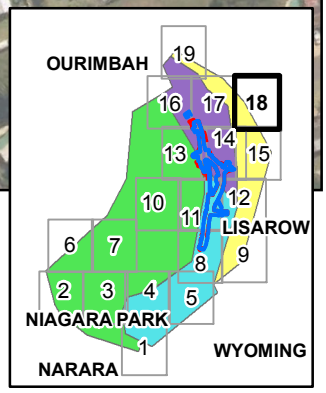

LEGEND

- Sensitive receiver

Noise catchment areas

- NCA3

Paper Size A4

0 12.5 25 50 75

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

Roads and Maritime Services
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Noise sensitive receivers and noise monitoring locations - Sheet 18 of 19

Figure A10

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com **W** www.ghd.com.au

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Data source: LPI: Aerial imagery, 2015; DTDB, 2015. Created by: tmorton

LEGEND

- Sensitive receiver

Noise catchment areas

- NCA1
- NCA3

Paper Size A4

0 12.5 25 50 75

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

Roads and Maritime Services
Pacific Highway Upgrade Stage 3B, Lisarow
Addendum Review of Environmental Factors 2

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Revision	0
Date	26 Jun 2018

Noise sensitive receivers and noise monitoring locations - Sheet 19 of 19

Figure A11

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com **W** www.ghd.com.au

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Data source: LPI: Aerial imagery, 2015; DTDB, 2015. Created by: tmorton

Appendix G

Construction noise assessment

26 June 2018

Daryl Fidge
Project Manager
Roads and Maritime Services

Our ref: 22/18239/8858
Your ref:

Dear Daryl

Upgrade of the Pacific Highway, between Ourimbah Street and Parsons Road, Lisarow
Addendum REF - Ancillary Facility Construction Noise Assessment

1 Introduction

1.1 Background

Roads and Maritime Services (Roads and Maritime) proposes to modify the Upgrade of the Pacific Highway, between Ourimbah Street and Parsons Road, Lisarow (the project) by making adjustments to the construction compounds for the project (the proposed modification).

Section 2 describes the proposed modification in more detail.

A review of environmental factors (REF) (*Upgrade of the Pacific Highway – Ourimbah Street to Parsons Road, Lisarow review of environmental factors* (Jacobs 2016)) was prepared for the project in June 2016 (the project REF). As part of the project REF, a noise and vibration assessment (*Upgrade of the Pacific Highway – Ourimbah Street to Parsons Road, Lisarow noise and vibration assessment* (Jacobs 2014)) was prepared. The noise and vibration assessment considered potential noise and vibration impacts associated with construction and operation of the project.

The project REF was placed on public display between 18 July 2016 and 19 August 2016 for community and stakeholder comment. The *Pacific Highway Upgrade – Ourimbah Street to Parsons Road, Lisarow – submissions report* (the submissions report), dated October 2016 (Jacobs 2016), was prepared to respond to issues raised. The project REF was determined on 21 February 2017.

An addendum REF (*Upgrade of the Pacific Highway – Ourimbah Street to Parsons Road, Lisarow - Addendum review of environmental factors* (GHD 2017) (Addendum REF 1)) was prepared in October 2017 to assess various detailed design refinements, including changes to construction compounds. As part of Addendum REF 1 a construction noise assessment was carried out. Addendum REF 1 was determined on 9 October 2017.

1.2 Purpose

To assess the potential impacts of the proposed modification, GHD Pty Ltd (GHD) on behalf of Roads and Maritime Greater Sydney Project Office is preparing an addendum REF (Addendum REF 2) for the proposed modification. For the purposes of the proposed modification, Roads and Maritime is the proponent and the determining authority under Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

This construction noise assessment has been prepared to support Addendum REF 2. This construction noise assessment is to be read in conjunction with the project REF (Jacobs 2016), submissions report (Jacobs 2016), noise and vibration assessment (Jacobs 2014) and Addendum REF 1 (GHD 2017). The purpose of this construction noise assessment is to describe the proposed modification, to document and assess the likely impacts of the proposed modification on nearby noise sensitive receivers, and to detail protective measures to be implemented.

2 Proposed modification

The proposed modification includes changes to the ancillary facilities proposed for construction of the project as described in this section.

Key features of the proposed modification are:

- The establishment of potentially two additional construction compounds as follows:
  - Compound 4 is the preferred main compound location, and is located within a large level hardstand area
  - Compound 5 is the alternate main compound location. This compound consists of a grassed paddock area and would be utilised as the main construction compound if compound 4 is unavailable, and as an additional construction compound if compound 4 is available.
- Reduction in the proposed activities at construction compound 2.

A summary of each of the proposed compounds is provided in the following sections.

2.1 Compound 2

This compound is located at 962, 964, 966 and 968 - 974 Pacific Highway, Lisarow. This compound is currently being used as a compound for construction of the adjacent Stage 3A project.

Land use surrounding this compound includes the Pacific Highway to the east, Lisarow Cemetery to the south and residential properties to the west and north. Ourimbah Church is also located immediately to the north west.

Access to the compound would be from Ourimbah Street via the Pacific Highway.

Activities at this compound would include:

- Site offices
- Parking – plant, equipment and light vehicles
- Hard materials (eg concrete pipes) laydown.

2.2 Compound 4

This compound is located at 60 Railway Crescent, Lisarow (Lot 17 DP 241243), and is the preferred main compound location. This compound consists of a large level hardstand area about 55 metres wide by about 75 metre long, with narrow vegetated (grass) boundaries to the south and east.

Commercial and light industrial buildings are located to the west and north and the Main Northern Railway is located to the south of the site. The closest residence to this compound is about 130 metres to the east.

Access to the compound would be from Railway Crescent via the Pacific Highway.

Activities at this compound would include:

- Site offices
- Materials and equipment storage
- Parking – plant, equipment and light vehicles
- Hard materials (eg concrete pipes) laydown
- Stockpiling – spoil, topsoil, mulch and potentially contaminated materials.

2.3 Compound 5

This compound is located at 15 Excelsior Street, Lisarow (Lot 101 DP 1225026), and is the alternate main compound location. This compound site consists of a grassed paddock area with a vegetated windbreak along the eastern boundary, comprised of the exotic species Camphor Laurel. Compound 5 would be constructed and supplemented as required, to provide a stable base (eg coarse aggregate) beneath the entire site and would require construction of a new access off Railway Crescent.

The compound is surrounded by vacant land and industrial land with the Main Northern Railway located to the south. The closest residence to this compound is about 250 metres to the east.

Access to the compound would be from Railway Crescent via the Pacific Highway.

If this compound is established as a main compound, activities would be as described for compound 4.

If this compound is used as a stockpiling compound, activities would include:

- Stockpiling – spoil, topsoil, mulch and potentially contaminated materials.

2.4 Construction hours

The compounds would generally operate during standard construction working hours in accordance with the *Interim Construction Noise Guideline* (DECC, 2009) as follows:

- Monday to Friday: 7 am to 6 pm
- Saturday: 8 am to 1 pm
- Sunday and public holidays: No work.

However, there would be periods when out of hours work would occur including utility cutovers, pavement works and during rail possessions (24 hours per day typically over three to four days). This would minimise disruption to daily traffic and disturbance to surrounding landowners and businesses and for safety purposes for road and rail users and pedestrians.

Where work needs to be carried out outside standard construction working hours, it would be in accordance with the project environment protection licence (EPL 21076), *Interim Construction Noise Guideline* (DECC, 2009) and Roads and Maritime's *Construction Noise and Vibration Guideline* (Roads and Maritime 2016). The construction contractor would give the community prior notice of any work planned to be carried out outside normal construction hours.

3 Sensitive receivers

Noise catchment areas (NCA) and sensitive receivers (residential and non-residential) were identified in the project noise and vibration assessment (Jacobs 2014) and have been adopted in this assessment. A number of additional receivers located in the vicinity of the potential additional compounds have been identified. All sensitive receivers identified for the project (including the proposed modification) are shown on the figures in Attachment C.

4 Construction noise management levels

Construction noise management levels (CNML) are detailed in the project noise and vibration assessment (Jacobs 2014) and are based on the *Interim Construction Noise Guideline* (Department of Environment and Climate Change 2009). The construction noise management levels are summarised in Table 1 for residential receivers and Table 2 for non-residential receivers. The construction noise management levels are based on the rating background levels (RBL) determined by the noise monitoring conducted for the project noise and vibration assessment.

The 'highly noise affected level' represents the point above which there may be strong community reaction to noise. In accordance with the ICNG this level is set at $L_{Aeq(15min)}$ 75 dB(A).

Table 1 Construction noise management levels (residential receivers)

NCA	Daytime (7 am – 6 pm) RBL + 10 dB(A)	Evening (6 pm – 10 pm) RBL + 5 dB(A)	Night (10 pm – 7 am) RBL + 5 dB(A)	Sleep disturbance (screening) RBL + 15 dB(A)
1	68	51	38	48
2	59	49	39	49
3	53	46	39	49
4	61	48	42	52

Table 2 Construction noise management levels (non-residential receivers)

Receiver ID	Description	NCA	CNML (internal)	CNML (external)[1]
162	Lisarow Cemetery	1	-	60
126	Lisarow Public School	3	45	55
94 to 97	Lisarow High School	3	45	55
321	Ourimbah Church	1	45	55
450	Lisarow Church of Christ	2	45	55
495	Pluim Park	1	-	60

Note 1) Most buildings will achieve an internal noise level 10 dB(A) below the external noise level with the windows open

2) Receiver 321 was classified as a residential receiver in the original noise assessment. This receiver has been reclassified as a place of worship

5 Methodology

5.1 Noise source data

Typical equipment proposed for construction compounds are listed in Table 3. Typical equipment and noise emission levels have been adopted from the *Construction Noise and Vibration Guideline* (CNVG) (Roads and Maritime Services 2016).

Table 3 Construction scenario and equipment noise levels

Activity	Typical equipment	Lw dB(A)	Activity Lw L_{Aeq} dB(A)	Activity Lw L_{A1} dB(A)
Construction compounds	Front End Loader	91	114	116
	Excavator 35 tonne	110		
	Road truck	108		
	Compressor	109		
	Welding equipment	105		
	Light vehicles	88		
	Power generator	103		
Compound (reduced activities)	Road truck	108	109	111
	Light vehicles	88		
	Power generator	103		

5.2 Noise prediction methodology

Noise modelling was carried out using SoundPlan (v7.4). SoundPlan is a computer program for the calculation, assessment and prognosis of noise exposure. SoundPlan calculates environmental noise propagation according to *ISO 9613-2 'Acoustics – Attenuation of sound during propagation outdoors'*.

The following noise modelling assumptions were adopted:

- Atmospheric absorption was based on an average temperature of 10 °C and an average humidity of 70%.
- Atmospheric propagation conditions were modelled with noise enhancing wind conditions for noise propagation (downwind conditions) or equivalently a well-developed moderate ground based temperature inversions.
- Modelled scenarios take into account the shielding effect from surrounding buildings and structures on and adjacent to the site.
- The noise contours are the highest level from the construction activity and are not cumulative. As such, where two separate activities (such as simultaneously operating compounds) of similar total noise level are required to be operating in close proximity noise levels may increase by up to 3 dBA in the worst case, however as each activity noise level assumes the simultaneous operation of multiple items of equipment within that activity, noise level predictions are still expected to be conservative.

6 Construction noise predictions

Predicted construction noise level contours are shown on the figures in Attachment A.

Predicted construction noise levels (dBA) and construction noise management level exceedances for all impacted receivers are detailed in Attachment B.

6.1 Compound configurations

Compound 2 was previously assessed as a main compound location. It is proposed to reduce the proposed activities at Compound 2. Two operational configurations have been modelled for compound 2: full compound operations (for comparison purposes only) and restricted compound operations (parking, offices, etc.) as per Table 3.

Compound site 4 is the preferred main compound location, and is located within a large level hardstand area. Compound 5 is the alternate main compound location. This compound consists of a grassed paddock area and would be utilised as the main construction compound if compound 4 is unavailable, and as a stockpiling area if compound 4 is available. Note that the construction equipment required for stockpiling activities and main compound activities results in similar sound power levels as per Table 3.

6.2 Residential receivers- exceedances

6.2.1 Compound 2

The predicted number of exceedances of the construction noise management levels for Compound 2 are presented in Table 4. The table summarises the number of exceedances for both configurations of Compound 2 and the reduction in the number of exceedances for the proposed restricted activities scenario.

Table 4 Predicted number of exceedances (residential receivers) - Compound 2

NCA	Number of Exceedances (full activities)			Number of Exceedances (restricted activities)			Reduction in number of exceedances		
	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
1	11	76	103	11	46	103	0	30	0
2	3	48	87	1	20	61	2	28	26
3	1	19	92	0	1	56	1	18	36
4	0	0	0	0	0	0	0	0	0

6.2.2 Compound 4 and 5

The residential exceedances for Compound 4 and Compound 5 are summarised in Table 5 and Table 6. Note that the construction equipment required for stockpiling activities and main compound activities results in similar sound power levels, therefore Table 6 covers both of these scenarios for Compound 5.

Table 5 Predicted number of exceedances (residential receivers) - Compound 4

NCA	CNML			Number of Exceedances		
	Day	Evening	Night	Day	Evening	Night
1	68	51	38	0	0	15
2	59	49	39	2	42	161
3	53	46	39	0	26	88
4	61	48	42	0	13	108

Table 6 Predicted number of exceedances (residential receivers) - Compound 5

NCA	CNML			Number of Exceedances		
	Day	Evening	Night	Day	Evening	Night
1	68	51	38	0	0	0
2	59	49	39	0	6	242
3	53	46	39	0	0	32
4	61	48	42	0	117	262

6.3 Non-residential receivers

Assessment of predicted construction noise impacts for non-residential receivers considers a typical 10 dBA reduction from external levels. This is based on advice contained in the CNVG which states:

> "*Most buildings will achieve an internal noise level 10 dB(A) below the external noise level with the windows open"*

Predicted internal noise levels at non-residential receivers for construction compound operation are presented in Table 7.

External predicted noise levels indicate compliance with construction noise management levels at all identified sensitive non-residential receivers. The removal of Compound Site 2 as part of the proposed modification results in reduced construction noise levels for non-residential receivers near to this site.

Table 7 Noise management level predictions (non-residential receivers)

Receiver ID	Description	CNML (external)[1]	Predicted compound noise level dB(A) L_{Aeq} (external)			
			Compound 2 (all activities)	Compound 2 (restricted activities)	Compound 4	Compound 5
126	Lisarow Public School	55	45	40	45	37
94 to 97	Lisarow High School	55	38	33	49	42
321	Ourimbah Church	55	82	77	26	23

Receiver ID	Description	CNML (external)[1]	Predicted compound noise level dB(A) L_{Aeq} (external)			
			Compound 2 (all activities)	Compound 2 (restricted activities)	Compound 4	Compound 5
450	Lisarow Church of Christ	55	31	26	52	31
495	Pluim Park	60	53	48	41	30

Note 1) Most buildings will achieve an internal noise level 10 dB(A) below the external noise level with the windows open

6.4 Sleep Disturbance

Sleep disturbance predictions are based on the L_{A1} noise level for typical construction compound operation provided in the CNVG. Sleep disturbance is considered likely when $L_{A1\ (1\text{-minute})}$ noise levels exceed the $L_{A90\ (15\text{-minute})}$ noise levels by more than 15 dB(A).

Predicted number of exceedances of sleep disturbance screening criteria for night time are presented in Table 8.

The predicted night time compound noise levels indicate that residential receivers in all noise catchment areas have the potential to experience sleep disturbance impacts during night time periods.

The restriction of activities at Compound Site 2 as part of the proposed modification results in reduced sleep disturbance impacts at sensitive receivers.

Table 8 Predicted number of residential receivers where sleep disturbance screening criteria are exceeded

NCA	CNML, night dB(A) L_{Aeq}	Sleep disturbance screening level dB(A) L_{A1}	Potential for sleep disturbance impacts, (number of receivers)			
			Compound 2 (all activities)	Compound 2 (restricted activities)	Compound 4	Compound 5
1	38	48	103	76	0	0
2	39	49	140	32	81	8
3	39	49	150	1	12	0
4	42	52	62	0	7	56

6.5 Construction traffic noise impacts

The Road Noise Policy (DECCW, 2011) states that 'for existing residences and other sensitive land uses affected by additional traffic on existing roads generated by land use developments, any increase in the total traffic noise level as a result of the development should be limited to 2 dB above that of the noise level without the development. This increase limit applies wherever the noise level without the development is within 2 dB of, or exceeds, the relevant day or night noise assessment criterion. This is also considered to be applicable for construction noise and therefore if road traffic noise increases due to construction traffic are less than 2 dB(A) then the objectives of the Road Noise Policy are achieved. If the road traffic noise level increases by more than 2 dB due to construction traffic, then further assessment is required using Roads and Maritime's Noise Criteria Guideline with consideration given to noise mitigation measures.

The predicted increase in noise level due to construction traffic on Railway Crescent has been calculated based on the total estimated (worst case) construction vehicle movements relative to the predicted (2021) daily traffic volumes and can be found in Table 9 and Table 10.

Table 9 Construction traffic noise- predicted noise increases-Day

Access Road	Predicted traffic		Construction generated traffic		Predicted increase (dBA)
	Light	Heavy	Light	Heavy	
Railway Crescent	9310	358	300	70	0.3

Table 10 Construction traffic noise- predicted noise increases-Night

Access Road	Predicted traffic		Construction generated traffic		Predicted increase (dBA)
	Light	Heavy	Light	Heavy	
Railway Crescent	1137	95	300	70	1.7

The proposed transportation route was not predicted to increase traffic noise levels by more than 2 dBA. Therefore, impacts from these roads do not trigger consideration of mitigation measures.

6.6 Summary of key findings

The construction noise assessment for the proposed modification predicts the following:

- The restriction of activities at Compound 2 would result in reduced construction noise levels for surrounding receivers.
- Compound 2 activities would exceed the construction noise management level at one non-residential receiver, Ourimbah Church (when in use).
- Activities at Compound 4 are likely to exceed the construction noise management levels for two residential receivers in NCA2 during the day work period.

- Activities at Compound 4 and Compound 5 are likely to exceed the construction noise management levels for nearby residential receivers during evening and night work periods.
- Night time operations at all compounds have the potential to result in sleep disturbance for surrounding sensitive receivers.
- Noise generated from construction traffic is not predicted to trigger consideration of mitigation measures.

7 Mitigation measures

Existing mitigation measures proposed in the construction noise and vibration assessment (Jacobs 2014) will be implemented for the proposed modification. These include the preparation of a noise management plan as part of the construction environmental management plan and notifications and processes for out of hours work.

The additional measures described in Table 11 will be implemented to avoid or minimise potential noise and vibration impacts.

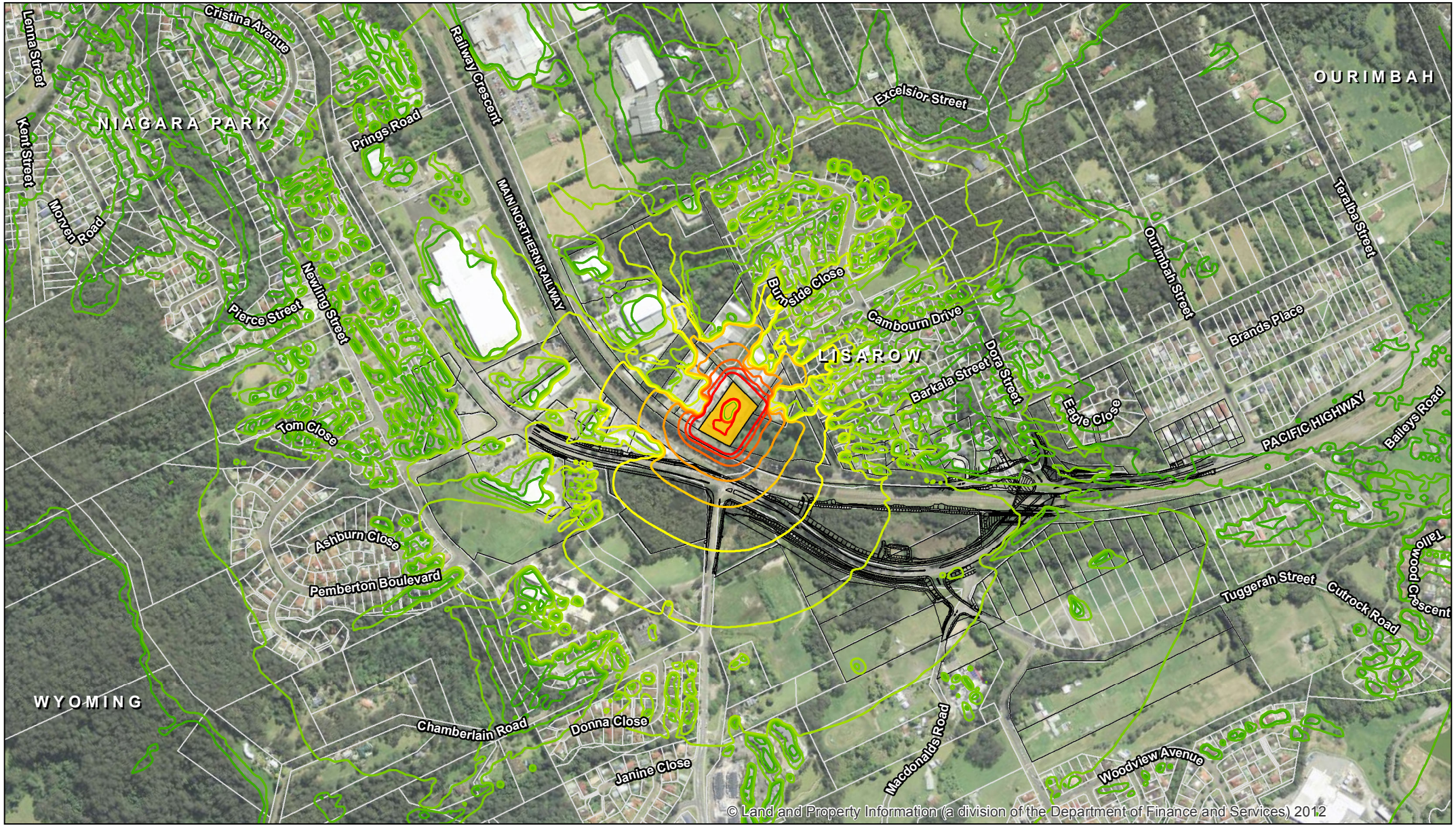
Table 11 Additional safeguards and management measures – noise and vibration

Impact	Environmental safeguards	Responsibility	Timing
Construction noise impacts – construction compounds 2, 4 and 5	The use of construction compounds 2, 4 and 5 outside standard hours of work will be assessed and managed in accordance with the project environment protection licence (EPL 21076), *Interim Construction Noise Guideline* (DECC, 2009) and *Construction Noise and Vibration Guideline* (Roads and Maritime, 2016).	Construction contractor	Construction

Regards
GHD Pty Ltd

Simon Pearce
Technical Director - Environment
61 2 4979 9968

Attachment A
Predicted construction noise contours, compounds



Paper Size A4

0 37.5 75 150 225 300

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

LEGEND

- Design
- Cadastre
- Compound site

Noise level dB(A) $L_{Aeq\ (15\text{-}minute)}$

30 35 40 45 50 55 60 65 70 75 80

Roads and Maritime Services
Pacific Highway Upgrade Stage 3B, Lisarow
Addendum Review of Environmental Factors 2

Job Number 22-18239
Revision 0
Date 26 Jun 2018

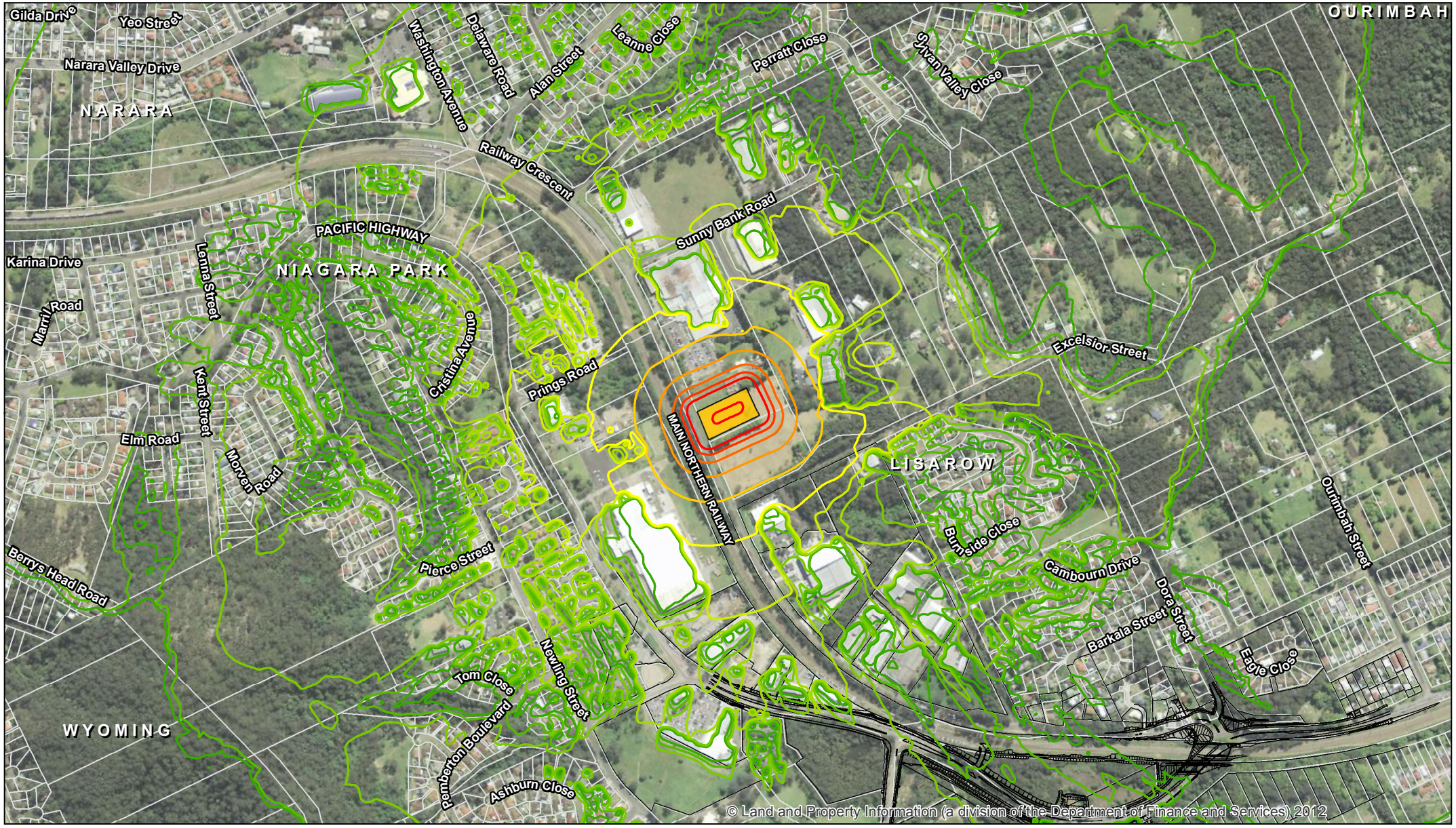
Construction noise contours
Site compound 4

Figure A2

G:\22\18239\GIS\Maps\Deliverables\AddendumREF2_Compounds\Noise\2218239_A202_NoiseContours_Compounds_DDP_0.mxd

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 T 61 2 4979 9999 F 61 2 4979 9988 E ntlmail@ghd.com W www.ghd.com.au

Data source: LPI: Aerial imagery, 2015; DTDB/DCDB, 2015. Created by: tmorton, fmackay



Paper Size A4

0 37.5 75 150 225 300

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

LEGEND

- Design
- Cadastre
- Compound site

Noise level dB(A) $L_{Aeq\ (15\text{-}minute)}$

30 35 40 45 50 55 60 65 70 75 80

Roads and Maritime Services
Pacific Highway Upgrade Stage 3B, Lisarow
Addendum Review of Environmental Factors 2

Job Number 22-18239
Revision 0
Date 26 Jun 2018

Construction noise contours
Site compound 5

Figure A3

G:\22\18239\GIS\Maps\Deliverables\AddendumREF2_Compounds\Noise\2218239_A202_NoiseContours_Compounds_DDP_0.mxd

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com **W** www.ghd.com.au

Data source: LPI: Aerial imagery, 2015; DTDB/DCDB, 2015. Created by: tmorton, fmackay

Attachment B
Predicted construction noise levels

Predicted construction noise levels

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
138	RES	3	53	46	39	46	41	42	36
139	RES	3	53	46	39	46	41	41	35
232	RES	3	53	46	39	43	38	32	29
231	RES	3	53	46	39	44	39	32	29
230	RES	3	53	46	39	44	39	30	29
229	RES	3	53	46	39	44	39	30	29
233	RES	3	53	46	39	44	39	31	13
228	RES	3	53	46	39	44	39	30	29
234	RES	1	68	51	38	46	41	31	29
227	RES	3	53	46	39	44	39	31	30
226	RES	3	53	46	39	45	40	31	30
225	RES	3	53	46	39	45	40	34	30
224	RES	3	53	46	39	45	40	34	29
223	RES	3	53	46	39	45	40	34	29
222	RES	3	53	46	39	46	41	35	29
221	RES	3	53	46	39	46	41	34	29
220	RES	3	53	46	39	46	41	34	29
219	RES	3	53	46	39	46	41	35	29
218	RES	1	68	51	38	46	41	35	29

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
217	RES	3	53	46	39	47	42	35	29
216	RES	3	53	46	39	47	42	36	29
215	RES	3	53	46	39	47	42	36	29
214	RES	3	53	46	39	48	43	36	29
213	RES	3	53	46	39	48	43	36	29
212	RES	3	53	46	39	48	43	36	29
211	RES	3	53	46	39	49	44	36	29
210	RES	3	53	46	39	49	44	36	28
209	RES	3	53	46	39	49	44	36	29
208	RES	3	53	46	39	49	44	36	29
207	RES	3	53	46	39	48	43	36	29
206	RES	3	53	46	39	48	43	36	29
205	RES	3	53	46	39	48	43	36	30
200	RES	3	53	46	39	47	42	36	31
201	RES	3	53	46	39	47	42	36	31
202	RES	3	53	46	39	46	41	36	31
203	RES	3	53	46	39	46	41	36	31
204	RES	3	53	46	39	47	42	36	30
235	RES	1	68	51	38	48	43	34	29

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
236	RES	1	68	51	38	50	45	33	28
237	RES	1	68	51	38	53	48	35	27
238	RES	1	68	51	38	55	50	33	26
239	RES	1	68	51	38	55	50	35	27
244	RES	1	68	51	38	54	49	35	27
240	RES	1	68	51	38	54	49	38	27
241	RES	1	68	51	38	52	47	37	28
242	RES	1	68	51	38	51	46	26	25
243	RES	1	68	51	38	52	47	35	27
184	RES	1	68	51	38	57	52	38	25
185	RES	1	68	51	38	56	51	29	22
183	RES	1	68	51	38	58	53	39	25
182	RES	1	68	51	38	58	53	39	25
186	RES	1	68	51	38	56	51	34	26
181	RES	1	68	51	38	58	53	39	25
179	RES	1	68	51	38	58	53	39	25
178	RES	1	68	51	38	56	51	26	17
180	RES	1	68	51	38	58	53	39	25
177	RES	1	68	51	38	56	51	39	18

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
176	RES	1	68	51	38	58	53	39	28
175	RES	1	68	51	38	58	53	31	29
174	RES	1	68	51	38	58	53	40	29
173	RES	3	53	46	39	58	53	40	29
195	RES	3	53	46	39	47	42	37	31
198	RES	3	53	46	39	46	41	35	31
197	RES	3	53	46	39	46	41	36	31
196	RES	3	53	46	39	46	41	36	31
193	RES	3	53	46	39	46	41	37	31
192	RES	3	53	46	39	46	41	37	31
199	RES	3	53	46	39	46	41	37	31
194	RES	3	53	46	39	48	43	37	31
187	RES	1	68	51	38	48	43	38	31
191	RES	3	53	46	39	46	41	37	33
190	RES	3	53	46	39	46	41	37	32
189	RES	3	53	46	39	46	41	37	32
188	RES	3	53	46	39	46	41	38	32
172	RES	3	53	46	39	46	41	38	33
171	RES	3	53	46	39	46	41	38	33

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
170	RES	3	53	46	39	46	41	38	33
169	RES	3	53	46	39	46	41	38	33
168	RES	3	53	46	39	46	41	38	33
167	RES	3	53	46	39	46	41	38	33
166	RES	3	53	46	39	45	40	34	22
165	RES	3	53	46	39	46	41	39	33
164	RES	1	68	51	38	45	40	39	33
148	RES	3	53	46	39	45	40	40	34
163	RES	1	68	51	38	45	40	39	34
154	RES	3	53	46	39	45	40	39	34
153	RES	3	53	46	39	45	40	39	34
152	RES	3	53	46	39	45	40	39	34
151	RES	3	53	46	39	45	40	39	27
147	RES	3	53	46	39	45	40	40	34
146	RES	3	53	46	39	45	40	40	34
145	RES	3	53	46	39	45	40	40	34
140	RES	3	53	46	39	44	39	41	35
141	RES	3	53	46	39	44	39	40	35
142	RES	3	53	46	39	44	39	40	35

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
143	RES	3	53	46	39	44	39	40	35
144	RES	3	53	46	39	44	39	40	35
132	RES	3	53	46	39	43	38	41	35
133	RES	3	53	46	39	43	38	41	35
156	RES	3	53	46	39	43	38	38	23
157	RES	3	53	46	39	43	38	40	35
158	RES	3	53	46	39	43	38	40	34
159	RES	3	53	46	39	43	38	40	34
137	RES	3	53	46	39	42	37	40	34
160	RES	3	53	46	39	42	37	40	34
134	RES	3	53	46	39	42	37	40	35
135	RES	3	53	46	39	42	37	40	34
136	RES	3	53	46	39	42	37	40	34
128	RES	3	53	46	39	42	37	42	35
126	EDU	3	55	-	-	45	40	45	37
161	RES	1	68	51	38	48	43	45	36
127	RES	3	53	46	39	43	38	45	37
131	RES	3	53	46	39	43	38	44	37
130	RES	3	53	46	39	43	38	44	37

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
129	RES	3	53	46	39	42	37	43	36
125	RES	3	53	46	39	41	36	49	40
120	RES	3	53	46	39	40	35	47	39
119	RES	3	53	46	39	40	35	46	38
122	RES	3	53	46	39	40	35	46	38
121	RES	3	53	46	39	41	36	46	38
484	RES	4	61	48	42	37	32	54	34
483	RES	4	61	48	42	37	32	53	37
482	RES	4	61	48	42	36	31	47	45
487	RES	4	61	48	42	37	32	46	45
486	RES	4	61	48	42	37	32	53	42
485	RES	4	61	48	42	38	33	54	34
488	RES	4	61	48	42	38	33	54	43
490	RES	4	61	48	42	38	33	48	43
491	RES	4	61	48	42	29	24	53	34
106	RES	4	61	48	42	39	34	51	41
96	EDU	3	55	-	-	37	32	49	43
94	EDU	3	55	-	-	38	33	49	42
95	EDU	3	55	-	-	37	32	49	42

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
114	RES	3	53	46	39	39	34	45	39
113	RES	3	53	46	39	39	34	46	39
112	RES	3	53	46	39	39	34	47	39
111	RES	3	53	46	39	39	34	47	39
110	RES	3	53	46	39	39	34	47	39
109	RES	3	53	46	39	39	34	48	35
107	RES	3	53	46	39	39	34	49	40
108	RES	3	53	46	39	39	34	48	40
115	RES	3	53	46	39	39	34	48	40
98	RES	3	53	46	39	38	33	47	40
99	RES	3	53	46	39	38	33	47	40
100	RES	3	53	46	39	37	32	46	37
78	RES	3	53	46	39	38	33	48	40
77	RES	3	53	46	39	38	33	48	40
76	RES	3	53	46	39	38	33	48	41
75	RES	3	53	46	39	38	33	49	41
80	RES	3	53	46	39	38	33	48	41
81	RES	3	53	46	39	38	33	48	41
82	RES	3	53	46	39	38	33	48	41

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
83	RES	3	53	46	39	38	33	47	41
84	RES	3	53	46	39	38	33	47	41
79	RES	3	53	46	39	38	33	42	33
86	RES	3	53	46	39	38	33	46	36
87	RES	3	53	46	39	32	27	43	38
88	RES	3	53	46	39	37	32	41	29
89	RES	3	53	46	39	37	32	39	32
90	RES	3	53	46	39	37	32	35	33
91	RES	3	53	46	39	37	32	38	37
85	RES	3	53	46	39	37	32	47	40
92	RES	3	53	46	39	37	32	46	40
93	RES	3	53	46	39	37	32	45	40
1	RES	4	61	48	42	31	26	45	49
4	RES	4	61	48	42	31	26	45	49
2	RES	4	61	48	42	31	26	44	50
3	RES	4	61	48	42	31	26	43	49
8	RES	4	61	48	42	31	26	45	48
7	RES	4	61	48	42	31	26	45	49
5	RES	4	61	48	42	19	14	44	49

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
9	RES	4	61	48	42	31	26	46	48
10	RES	4	61	48	42	31	26	46	48
28	RES	4	61	48	42	20	15	42	42
27	RES	4	61	48	42	21	16	44	47
26	RES	4	61	48	42	19	14	37	49
29	RES	4	61	48	42	21	16	40	45
11	RES	4	61	48	42	31	26	46	48
12	RES	4	61	48	42	32	27	47	47
13	RES	4	61	48	42	32	27	46	48
18	RES	4	61	48	42	32	27	47	47
16	RES	4	61	48	42	32	27	46	40
17	RES	4	61	48	42	32	27	35	32
19	RES	4	61	48	42	35	30	47	46
20	RES	4	61	48	42	35	30	46	43
21	RES	4	61	48	42	25	20	44	42
23	RES	4	61	48	42	23	18	39	36
24	RES	4	61	48	42	21	16	31	33
25	RES	4	61	48	42	20	15	33	46
30	RES	4	61	48	42	33	28	40	46

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
31	RES	4	61	48	42	33	28	38	40
32	RES	4	61	48	42	33	28	35	37
33	RES	4	61	48	42	34	29	46	34
34	RES	4	61	48	42	34	29	46	40
38	RES	4	61	48	42	35	30	46	45
37	RES	4	61	48	42	35	30	46	43
35	RES	4	61	48	42	35	30	45	43
42	RES	4	61	48	42	34	29	44	45
43	RES	4	61	48	42	34	29	45	44
44	RES	4	61	48	42	24	19	40	39
45	RES	4	61	48	42	26	21	39	38
46	RES	4	61	48	42	34	29	45	41
36	RES	4	61	48	42	35	30	39	43
48	RES	4	61	48	42	34	29	45	35
49	RES	4	61	48	42	34	29	45	42
52	RES	4	61	48	42	34	29	43	32
51	RES	4	61	48	42	25	20	43	37
50	RES	4	61	48	42	24	19	37	39
53	RES	4	61	48	42	24	19	42	35

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
54	RES	4	61	48	42	34	29	43	44
55	RES	3	53	46	39	35	30	45	43
56	RES	3	53	46	39	35	30	45	43
57	RES	3	53	46	39	35	30	45	43
58	RES	3	53	46	39	36	31	46	43
59	RES	3	53	46	39	36	31	46	42
61	RES	3	53	46	39	36	31	45	42
66	RES	3	53	46	39	35	30	45	43
62	RES	3	53	46	39	35	30	44	41
63	RES	3	53	46	39	35	30	37	39
64	RES	3	53	46	39	27	22	44	31
65	RES	3	53	46	39	29	24	44	32
67	RES	3	53	46	39	35	30	45	41
69	RES	3	53	46	39	35	30	43	39
68	RES	3	53	46	39	30	25	45	39
70	RES	3	53	46	39	25	20	43	43
71	RES	3	53	46	39	35	30	45	43
72	RES	3	53	46	39	35	30	44	43
73	RES	3	53	46	39	34	29	44	43

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
74	RES	3	53	46	39	35	30	44	42
116	RES	3	53	46	39	38	33	47	39
117	RES	3	53	46	39	38	33	47	39
118	RES	3	53	46	39	38	33	46	39
105	RES	3	53	46	39	39	34	45	39
104	RES	3	53	46	39	39	34	46	37
101	RES	3	53	46	39	38	33	47	39
102	RES	3	53	46	39	38	33	47	39
103	RES	3	53	46	39	38	33	46	39
272	RES	2	59	49	39	42	37	21	15
273	RES	2	59	49	39	51	46	20	15
274	RES	2	59	49	39	51	46	20	16
275	RES	2	59	49	39	52	47	20	16
276	RES	2	59	49	39	52	47	20	16
277	RES	2	59	49	39	53	48	24	17
286	RES	2	59	49	39	52	47	23	16
287	RES	1	68	51	38	53	48	27	16
288	RES	2	59	49	39	53	48	27	17
256	RES	1	68	51	38	52	47	21	27

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
305	RES	2	59	49	39	52	47	29	26
306	RES	1	68	51	38	53	48	29	26
307	RES	1	68	51	38	54	49	29	26
308	RES	1	68	51	38	53	48	21	15
309	RES	1	68	51	38	55	50	28	26
310	RES	1	68	51	38	56	51	27	26
311	RES	1	68	51	38	56	51	27	26
289	RES	2	59	49	39	54	49	27	17
290	RES	1	68	51	38	54	49	27	17
291	RES	1	68	51	38	55	50	27	18
292	RES	1	68	51	38	55	50	27	18
278	RES	2	59	49	39	53	48	27	17
279	RES	2	59	49	39	54	49	27	18
280	RES	2	59	49	39	54	49	19	18
281	RES	2	59	49	39	55	50	24	18
282	RES	2	59	49	39	55	50	21	21
283	RES	2	59	49	39	55	50	23	23
284	RES	2	59	49	39	55	50	26	17
285	RES	2	59	49	39	56	51	23	20

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
303	RES	1	68	51	38	57	52	22	18
304	RES	2	68	51	38	56	51	24	25
298	RES	2	59	49	39	57	52	26	18
297	RES	1	68	51	38	54	49	23	19
296	RES	1	68	51	38	56	51	22	18
295	RES	1	68	51	38	57	52	26	18
294	RES	1	68	51	38	57	52	27	17
293	RES	1	68	51	38	56	51	27	18
299	RES	2	59	49	39	57	52	22	17
300	RES	1	68	51	38	56	51	26	17
312	RES	1	68	51	38	56	51	27	26
313	RES	1	68	51	38	58	53	25	25
318	RES	1	68	51	38	58	53	26	25
317	RES	1	68	51	38	58	53	26	25
316	RES	1	68	51	38	58	53	26	24
301	RES	1	68	51	38	66	61	25	24
302	RES	1	68	51	38	67	62	26	24
360	RES	2	59	49	39	53	48	26	26
358	RES	2	59	49	39	55	50	23	23

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
359	RES	2	59	49	39	54	49	24	24
354	RES	2	59	49	39	55	50	27	26
353	RES	2	59	49	39	54	49	25	25
350	RES	2	59	49	39	56	51	23	25
351	RES	2	59	49	39	58	53	23	25
352	RES	2	59	49	39	57	52	25	20
355	RES	2	59	49	39	57	52	22	17
356	RES	2	59	49	39	57	52	24	24
357	RES	2	59	49	39	57	52	24	23
349	RES	1	68	51	38	60	55	26	18
339	RES	1	68	51	38	62	57	26	18
338	RES	1	68	51	38	63	58	22	16
340	RES	1	68	51	38	63	58	22	17
341	RES	1	68	51	38	66	61	22	21
342	RES	1	68	51	38	66	61	24	21
343	RES	1	68	51	38	66	61	24	21
348	RES	1	68	51	38	61	56	24	22
321	WOR	1	55	55	-	82	77	26	23
337	RES	1	68	51	38	79	74	25	22

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
336	RES	1	68	51	38	77	72	23	22
335	RES	1	68	51	38	80	75	25	21
334	RES	1	68	51	38	83	78	23	20
320	RES	1	68	51	38	83	78	25	23
319	RES	1	68	51	38	99	94	26	23
324	RES	1	68	51	38	96	91	27	21
327	RES	1	68	51	38	97	92	28	20
333	RES	1	68	51	38	79	74	24	19
344	RES	1	68	51	38	67	62	22	19
345	RES	1	68	51	38	66	61	22	18
346	RES	1	68	51	38	66	61	22	17
347	RES	1	68	51	38	65	60	24	17
332	RES	1	68	51	38	85	80	23	18
331	RES	1	68	51	38	80	75	23	19
363	RES	2	59	49	39	60	55	23	18
362	RES	1	68	51	38	62	57	25	21
361	RES	2	59	49	39	65	60	26	19
366	RES	2	59	49	39	64	59	28	19
367	RES	1	68	51	38	62	57	31	23

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
364	RES	2	59	49	39	56	51	25	21
365	RES	2	59	49	39	56	51	29	22
368	RES	1	68	51	38	61	56	33	23
369	RES	1	68	51	38	59	54	27	23
371	RES	1	68	51	38	56	51	41	32
370	RES	1	68	51	38	57	52	41	31
372	RES	1	68	51	38	48	43	42	32
373	RES	1	68	51	38	55	50	41	33
374	RES	2	59	49	39	53	48	44	34
375	RES	2	59	49	39	52	47	43	35
376	RES	2	59	49	39	50	45	43	36
380	RES	2	59	49	39	53	48	36	29
381	RES	2	59	49	39	52	47	33	29
382	RES	2	59	49	39	51	46	31	31
383	RES	2	59	49	39	51	46	30	33
384	RES	2	59	49	39	50	45	30	32
385	RES	2	59	49	39	49	44	30	27
386	RES	2	59	49	39	49	44	37	25
378	RES	2	59	49	39	50	45	35	28

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
390	RES	2	59	49	39	50	45	36	29
389	RES	2	59	49	39	49	44	38	29
388	RES	2	59	49	39	46	41	33	28
377	RES	2	59	49	39	47	42	43	35
379	RES	2	59	49	39	39	34	45	35
391	RES	2	59	49	39	41	36	44	35
392	RES	2	59	49	39	41	36	36	34
393	RES	2	59	49	39	41	36	35	33
394	RES	2	59	49	39	38	33	35	32
395	RES	2	59	49	39	39	34	35	30
396	RES	2	59	49	39	31	26	31	26
397	RES	2	59	49	39	29	24	29	25
398	RES	2	59	49	39	31	26	30	23
399	RES	2	59	49	39	33	28	31	27
400	RES	2	59	49	39	34	29	32	26
401	RES	2	59	49	39	38	33	30	26
406	RES	2	59	49	39	31	26	32	27
427	RES	2	59	49	39	33	28	37	31
407	RES	2	59	49	39	31	26	33	26

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
426	RES	2	59	49	39	35	30	38	32
428	RES	2	59	49	39	40	35	39	32
429	RES	2	59	49	39	42	37	39	30
412	RES	2	59	49	39	41	36	37	27
413	RES	2	59	49	39	35	30	32	21
417	RES	2	59	49	39	36	31	31	20
430	RES	2	59	49	39	38	33	37	24
431	RES	2	59	49	39	33	28	37	28
411	RES	2	59	49	39	42	37	37	27
416	RES	2	59	49	39	35	30	30	22
418	RES	2	59	49	39	35	30	30	20
419	RES	2	59	49	39	31	26	32	23
420	RES	2	59	49	39	37	32	32	23
421	RES	2	59	49	39	32	27	30	22
422	RES	2	59	49	39	40	35	32	22
423	RES	2	59	49	39	41	36	31	20
424	RES	2	59	49	39	45	40	44	25
437	RES	2	59	49	39	43	38	37	26
436	RES	2	59	49	39	36	31	37	24

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
435	RES	2	59	49	39	37	32	33	25
434	RES	2	59	49	39	41	36	34	25
456	RES	2	59	49	39	41	36	38	25
438	RES	2	59	49	39	43	38	50	34
425	RES	2	59	49	39	44	39	34	34
454	RES	2	59	49	39	42	37	49	30
453	RES	2	59	49	39	34	29	49	28
458	RES	2	59	49	39	43	38	49	30
455	RES	2	59	49	39	42	37	42	28
457	RES	2	59	49	39	43	38	48	28
402	RES	2	59	49	39	42	37	32	30
403	RES	2	59	49	39	39	34	44	31
404	RES	2	59	49	39	41	36	45	31
405	RES	2	59	49	39	41	36	46	32
451	RES	2	59	49	39	40	35	50	30
478	RES	2	59	49	39	42	37	38	34
477	RES	2	59	49	39	37	32	38	35
476	RES	2	59	49	39	32	27	39	36
475	RES	2	59	49	39	33	28	40	37

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
452	RES	2	59	49	39	36	31	49	26
474	RES	2	59	49	39	33	28	40	36
472	RES	2	59	49	39	32	27	42	38
473	RES	2	59	49	39	32	27	47	42
439	RES	2	59	49	39	45	40	49	32
440	RES	2	59	49	39	30	25	49	27
441	RES	2	59	49	39	30	25	51	29
444	RES	2	59	49	39	34	29	48	30
445	RES	2	59	49	39	37	32	50	27
446	RES	2	59	49	39	32	27	41	27
447	RES	2	59	49	39	30	25	40	25
448	RES	2	59	49	39	30	25	49	26
459	RES	2	59	49	39	35	30	50	26
442	RES	2	59	49	39	36	31	50	28
443	RES	2	59	49	39	31	26	50	31
449	RES	2	59	49	39	31	26	52	27
465	RES	2	59	49	39	34	29	51	27
466	RES	2	59	49	39	35	30	55	34
468	RES	2	59	49	39	31	26	50	36

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
471	RES	2	59	49	39	37	32	42	32
467	RES	2	59	49	39	40	35	50	43
450	WOR	2	55	55	-	31	26	52	31
464	RES	2	59	49	39	32	27	54	35
463	RES	2	59	49	39	35	30	57	39
462	RES	2	59	49	39	37	32	56	43
461	RES	2	59	49	39	30	25	60	44
469	RES	2	59	49	39	29	24	57	44
470	RES	2	59	49	39	29	24	58	44
245	RES	1	68	51	38	48	43	21	20
247	RES	2	59	49	39	48	43	20	20
246	RES	2	59	49	39	47	42	22	20
267	RES	1	68	51	38	49	44	18	19
268	RES	2	59	49	39	49	44	21	19
269	RES	2	59	49	39	49	44	21	17
270	RES	2	59	49	39	50	45	19	15
271	RES	2	59	49	39	50	45	21	16
265	RES	1	68	51	38	49	44	24	20
266	RES	2	59	49	39	49	44	28	20

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
257	RES	1	68	51	38	49	44	28	21
258	RES	1	68	51	38	48	43	24	21
250	RES	1	68	51	38	49	44	30	27
249	RES	1	68	51	38	49	44	20	27
248	RES	2	59	49	39	49	44	31	27
251	RES	1	68	51	38	50	45	30	26
252	RES	1	68	51	38	50	45	30	27
253	RES	1	68	51	38	49	44	30	26
254	RES	1	68	51	38	50	45	30	27
255	RES	1	68	51	38	51	46	20	27
264	RES	1	68	51	38	52	47	29	26
263	RES	1	68	51	38	51	46	28	20
262	RES	1	68	51	38	51	46	28	20
261	RES	1	68	51	38	50	45	28	20
260	RES	1	68	51	38	50	45	27	20
259	RES	1	68	51	38	49	44	28	21
150	RES	3	53	46	39	44	39	39	30
149	RES	3	53	46	39	44	39	40	30
155	RES	3	53	46	39	44	39	39	27

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0001	RES	4	61	48	42			40	46
R_Add_0002	RES	4	61	48	42			32	39
R_Add_0003	RES	4	61	48	42			39	43
R_Add_0004	RES	4	61	48	42			39	48
R_Add_0005	RES	4	61	48	42			39	45
R_Add_0006	RES	4	61	48	42			41	49
R_Add_0007	RES	4	61	48	42			29	35
R_Add_0008	RES	4	61	48	42			42	50
R_Add_0009	RES	4	61	48	42			37	39
R_Add_0010	RES	4	61	48	42			40	48
R_Add_0011	RES	4	61	48	42			41	48
R_Add_0012	RES	4	61	48	42			32	37
R_Add_0013	RES	4	61	48	42			42	49
R_Add_0014	RES	4	61	48	42			37	46
R_Add_0015	RES	4	61	48	42			38	46
R_Add_0016	RES	4	61	48	42			33	33
R_Add_0017	RES	4	61	48	42			31	36
R_Add_0018	RES	4	61	48	42			40	48
R_Add_0019	RES	4	61	48	42			43	50

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0020	RES	4	61	48	42			42	49
R_Add_0021	RES	4	61	48	42			43	49
R_Add_0022	RES	4	61	48	42			39	47
R_Add_0023	RES	4	61	48	42			39	48
R_Add_0024	RES	4	61	48	42			42	51
R_Add_0025	RES	4	61	48	42			36	34
R_Add_0026	RES	4	61	48	42			41	49
R_Add_0027	RES	4	61	48	42			43	51
R_Add_0028	RES	4	61	48	42			41	50
R_Add_0029	RES	4	61	48	42			42	51
R_Add_0030	RES	4	61	48	42			41	46
R_Add_0031	RES	4	61	48	42			42	51
R_Add_0032	RES	4	61	48	42			36	40
R_Add_0033	RES	4	61	48	42			42	51
R_Add_0034	RES	4	61	48	42			39	45
R_Add_0035	RES	4	61	48	42			35	40
R_Add_0036	RES	4	61	48	42			42	50
R_Add_0037	RES	4	61	48	42			25	41
R_Add_0038	RES	4	61	48	42			43	50

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0039	RES	4	61	48	42			31	36
R_Add_0040	RES	4	61	48	42			32	41
R_Add_0041	RES	4	61	48	42			33	40
R_Add_0042	RES	4	61	48	42			36	38
R_Add_0043	RES	4	61	48	42			41	49
R_Add_0044	RES	4	61	48	42			26	40
R_Add_0045	RES	4	61	48	42			39	45
R_Add_0046	RES	4	61	48	42			34	34
R_Add_0047	RES	4	61	48	42			37	35
R_Add_0048	RES	4	61	48	42			36	36
R_Add_0049	RES	4	61	48	42			32	28
R_Add_0050	RES	4	61	48	42			23	28
R_Add_0051	RES	4	61	48	42			43	48
R_Add_0052	RES	4	61	48	42			24	28
R_Add_0053	RES	4	61	48	42			28	31
R_Add_0054	RES	4	61	48	42			35	40
R_Add_0055	RES	4	61	48	42			30	29
R_Add_0056	RES	4	61	48	42			42	48
R_Add_0057	RES	4	61	48	42			35	36

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0058	RES	4	61	48	42			30	32
R_Add_0059	RES	4	61	48	42			30	33
R_Add_0060	RES	4	61	48	42			35	40
R_Add_0061	RES	4	61	48	42			30	32
R_Add_0062	RES	4	61	48	42			32	30
R_Add_0063	RES	4	61	48	42			35	39
R_Add_0064	RES	4	61	48	42			28	27
R_Add_0065	RES	4	61	48	42			36	34
R_Add_0066	RES	4	61	48	42			29	30
R_Add_0067	RES	4	61	48	42			31	33
R_Add_0068	RES	4	61	48	42			33	32
R_Add_0069	RES	4	61	48	42			43	49
R_Add_0070	RES	4	61	48	42			37	36
R_Add_0071	RES	4	61	48	42			34	34
R_Add_0072	RES	4	61	48	42			32	29
R_Add_0073	RES	4	61	48	42			37	32
R_Add_0074	RES	4	61	48	42			37	36
R_Add_0075	RES	4	61	48	42			40	48
R_Add_0076	RES	4	61	48	42			43	50

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0077	RES	4	61	48	42			34	32
R_Add_0078	RES	4	61	48	42			35	40
R_Add_0079	RES	4	61	48	42			26	36
R_Add_0080	RES	4	61	48	42			42	49
R_Add_0081	RES	4	61	48	42			42	48
R_Add_0082	RES	4	61	48	42			41	48
R_Add_0083	RES	4	61	48	42			38	40
R_Add_0084	RES	4	61	48	42			42	49
R_Add_0085	RES	4	61	48	42			26	33
R_Add_0086	RES	4	61	48	42			38	37
R_Add_0087	RES	4	61	48	42			38	38
R_Add_0088	RES	4	61	48	42			33	33
R_Add_0089	RES	4	61	48	42			42	49
R_Add_0090	RES	4	61	48	42			35	39
R_Add_0091	RES	4	61	48	42			24	28
R_Add_0092	RES	4	61	48	42			36	43
R_Add_0093	RES	4	61	48	42			41	52
R_Add_0094	RES	4	61	48	42			38	47
R_Add_0095	RES	4	61	48	42			41	52

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0096	RES	4	61	48	42			39	47
R_Add_0097	RES	4	61	48	42			35	42
R_Add_0098	RES	4	61	48	42			40	47
R_Add_0099	RES	4	61	48	42			41	52
R_Add_0100	RES	4	61	48	42			41	51
R_Add_0101	RES	4	61	48	42			41	52
R_Add_0102	RES	4	61	48	42			36	43
R_Add_0103	RES	4	61	48	42			35	42
R_Add_0104	RES	4	61	48	42			37	45
R_Add_0105	RES	4	61	48	42			36	42
R_Add_0106	RES	4	61	48	42			33	33
R_Add_0107	RES	4	61	48	42			41	51
R_Add_0108	RES	4	61	48	42			38	46
R_Add_0109	RES	4	61	48	42			38	46
R_Add_0110	RES	4	61	48	42			38	46
R_Add_0111	RES	4	61	48	42			38	45
R_Add_0112	RES	4	61	48	42			39	48
R_Add_0113	RES	4	61	48	42			42	32
R_Add_0114	RES	4	61	48	42			40	51

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0115	RES	4	61	48	42			38	43
R_Add_0116	RES	4	61	48	42			40	51
R_Add_0117	RES	4	61	48	42			39	49
R_Add_0118	RES	4	61	48	42			38	46
R_Add_0119	RES	4	61	48	42			43	49
R_Add_0120	RES	4	61	48	42			39	49
R_Add_0121	RES	4	61	48	42			40	51
R_Add_0122	RES	4	61	48	42			41	53
R_Add_0123	RES	4	61	48	42			39	42
R_Add_0124	RES	4	61	48	42			39	43
R_Add_0125	RES	4	61	48	42			38	51
R_Add_0126	RES	4	61	48	42			41	53
R_Add_0127	RES	4	61	48	42			39	49
R_Add_0128	RES	4	61	48	42			40	51
R_Add_0129	RES	4	61	48	42			36	43
R_Add_0130	RES	4	61	48	42			41	52
R_Add_0131	RES	4	61	48	42			43	34
R_Add_0132	RES	4	61	48	42			37	43
R_Add_0133	RES	4	61	48	42			38	49

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0134	RES	4	61	48	42			40	51
R_Add_0135	RES	4	61	48	42			36	43
R_Add_0136	RES	4	61	48	42			42	40
R_Add_0137	RES	4	61	48	42			42	39
R_Add_0138	RES	4	61	48	42			23	39
R_Add_0139	RES	4	61	48	42			36	35
R_Add_0140	RES	4	61	48	42			39	48
R_Add_0141	RES	4	61	48	42			34	40
R_Add_0142	RES	4	61	48	42			41	50
R_Add_0143	RES	4	61	48	42			28	30
R_Add_0144	RES	4	61	48	42			29	33
R_Add_0145	RES	4	61	48	42			40	48
R_Add_0146	RES	4	61	48	42			40	49
R_Add_0147	RES	4	61	48	42			39	47
R_Add_0148	RES	4	61	48	42			36	39
R_Add_0149	RES	4	61	48	42			41	34
R_Add_0150	RES	4	61	48	42			40	49
R_Add_0151	RES	4	61	48	42			39	46
R_Add_0152	RES	4	61	48	42			43	51

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0153	RES	4	61	48	42			42	42
R_Add_0154	RES	4	61	48	42			42	50
R_Add_0155	RES	4	61	48	42			42	50
R_Add_0156	RES	4	61	48	42			39	45
R_Add_0157	RES	4	61	48	42			36	31
R_Add_0158	RES	4	61	48	42			36	42
R_Add_0159	RES	4	61	48	42			39	47
R_Add_0160	RES	4	61	48	42			35	40
R_Add_0161	RES	4	61	48	42			36	42
R_Add_0162	RES	4	61	48	42			40	48
R_Add_0163	RES	4	61	48	42			27	34
R_Add_0164	RES	4	61	48	42			38	46
R_Add_0165	RES	4	61	48	42			36	37
R_Add_0166	RES	4	61	48	42			41	33
R_Add_0167	RES	4	61	48	42			33	43
R_Add_0168	RES	4	61	48	42			41	29
R_Add_0169	RES	4	61	48	42			36	42
R_Add_0170	RES	4	61	48	42			39	48
R_Add_0171	RES	4	61	48	42			33	39

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0172	RES	4	61	48	42			34	38
R_Add_0173	RES	4	61	48	42			37	44
R_Add_0174	RES	4	61	48	42			40	49
R_Add_0175	RES	4	61	48	42			36	35
R_Add_0176	RES	4	61	48	42			39	47
R_Add_0177	RES	4	61	48	42			39	47
R_Add_0178	RES	4	61	48	42			35	32
R_Add_0179	RES	4	61	48	42			40	48
R_Add_0180	RES	4	61	48	42			38	46
R_Add_0181	RES	4	61	48	42			38	46
R_Add_0182	RES	4	61	48	42			29	37
R_Add_0183	RES	4	61	48	42			29	35
R_Add_0184	RES	4	61	48	42			44	50
R_Add_0185	RES	4	61	48	42			44	50
R_Add_0186	RES	4	61	48	42			43	48
R_Add_0187	RES	4	61	48	42			43	48
R_Add_0188	RES	4	61	48	42			43	48
R_Add_0189	RES	4	61	48	42			44	50
R_Add_0190	RES	4	61	48	42			44	48

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0191	RES	4	61	48	42			44	48
R_Add_0192	RES	4	61	48	42			44	48
R_Add_0193	RES	4	61	48	42			44	49
R_Add_0194	RES	4	61	48	42			44	48
R_Add_0195	RES	4	61	48	42			44	51
R_Add_0196	RES	4	61	48	42			43	50
R_Add_0197	RES	4	61	48	42			43	51
R_Add_0198	RES	4	61	48	42			41	50
R_Add_0199	RES	4	61	48	42			43	50
R_Add_0200	RES	4	61	48	42			42	50
R_Add_0201	RES	4	61	48	42			43	49
R_Add_0202	RES	4	61	48	42			44	48
R_Add_0203	RES	4	61	48	42			43	49
R_Add_0204	RES	4	61	48	42			43	50
R_Add_0205	RES	4	61	48	42			43	49
R_Add_0206	RES	4	61	48	42			44	49
R_Add_0207	RES	4	61	48	42			41	46
R_Add_0208	RES	4	61	48	42			43	35
R_Add_0209	RES	4	61	48	42			37	36

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0210	RES	4	61	48	42			45	40
R_Add_0211	RES	4	61	48	42			39	37
R_Add_0212	RES	4	61	48	42			45	47
R_Add_0213	RES	4	61	48	42			44	46
R_Add_0214	RES	4	61	48	42			44	46
R_Add_0215	RES	4	61	48	42			45	40
R_Add_0216	RES	4	61	48	42			45	43
R_Add_0217	RES	4	61	48	42			45	45
R_Add_0218	RES	4	61	48	42			44	47
R_Add_0219	RES	4	61	48	42			44	48
R_Add_0220	RES	4	61	48	42			43	48
R_Add_0221	RES	4	61	48	42			45	48
R_Add_0222	RES	4	61	48	42			45	48
R_Add_0223	RES	4	61	48	42			43	47
R_Add_0224	RES	4	61	48	42			44	47
R_Add_0225	RES	4	61	48	42			40	42
R_Add_0226	RES	4	61	48	42			44	47
R_Add_0227	RES	4	61	48	42			43	47
R_Add_0228	RES	4	61	48	42			44	47

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0229	RES	4	61	48	42			43	50
R_Add_0230	RES	4	61	48	42			30	41
R_Add_0231	RES	4	61	48	42			37	40
R_Add_0232	RES	2	59	49	39			34	39
R_Add_0233	RES	4	61	48	42			38	43
R_Add_0234	RES	2	59	49	39			34	39
R_Add_0235	RES	2	59	49	39			34	39
R_Add_0236	RES	4	61	48	42			29	35
R_Add_0237	RES	4	61	48	42			36	39
R_Add_0238	RES	4	61	48	42			36	43
R_Add_0239	RES	4	61	48	42			39	43
R_Add_0240	RES	4	61	48	42			28	41
R_Add_0241	RES	2	59	49	39			34	40
R_Add_0242	RES	2	59	49	39			34	40
R_Add_0243	RES	2	59	49	39			34	40
R_Add_0244	RES	2	59	49	39			35	40
R_Add_0245	RES	2	59	49	39			33	40
R_Add_0246	RES	2	59	49	39			34	40
R_Add_0247	RES	2	59	49	39			34	40

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0248	RES	2	59	49	39			34	40
R_Add_0249	RES	2	59	49	39			35	40
R_Add_0250	RES	2	59	49	39			34	40
R_Add_0251	RES	2	59	49	39			34	40
R_Add_0252	RES	4	61	48	42			34	36
R_Add_0253	RES	4	61	48	42			40	44
R_Add_0254	RES	4	61	48	42			37	40
R_Add_0255	RES	4	61	48	42			39	44
R_Add_0256	RES	4	61	48	42			37	40
R_Add_0257	RES	4	61	48	42			37	40
R_Add_0258	RES	4	61	48	42			37	40
R_Add_0259	RES	2	59	49	39			34	39
R_Add_0260	RES	4	61	48	42			42	49
R_Add_0261	RES	2	59	49	39			34	39
R_Add_0262	RES	2	59	49	39			34	39
R_Add_0263	RES	2	59	49	39			34	39
R_Add_0264	RES	4	61	48	42			37	40
R_Add_0265	RES	4	61	48	42			36	40
R_Add_0266	RES	4	61	48	42			32	40

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0267	RES	4	61	48	42			39	44
R_Add_0268	RES	4	61	48	42			34	31
R_Add_0269	RES	4	61	48	42			39	44
R_Add_0270	RES	4	61	48	42			37	40
R_Add_0271	RES	4	61	48	42			34	30
R_Add_0272	RES	4	61	48	42			37	40
R_Add_0273	RES	4	61	48	42			30	41
R_Add_0274	RES	2	59	49	39			34	39
R_Add_0275	RES	4	61	48	42			30	33
R_Add_0276	RES	4	61	48	42			38	42
R_Add_0277	RES	4	61	48	42			36	34
R_Add_0278	RES	4	61	48	42			36	34
R_Add_0279	RES	4	61	48	42			32	39
R_Add_0280	RES	4	61	48	42			35	33
R_Add_0281	RES	4	61	48	42			36	35
R_Add_0282	RES	4	61	48	42			35	42
R_Add_0283	RES	4	61	48	42			41	46
R_Add_0284	RES	4	61	48	42			36	34
R_Add_0285	RES	4	61	48	42			35	36

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0286	RES	4	61	48	42			36	39
R_Add_0287	RES	4	61	48	42			36	39
R_Add_0288	RES	4	61	48	42			42	46
R_Add_0289	RES	4	61	48	42			36	38
R_Add_0290	RES	4	61	48	42			37	37
R_Add_0291	RES	4	61	48	42			31	33
R_Add_0292	RES	4	61	48	42			42	47
R_Add_0293	RES	4	61	48	42			29	40
R_Add_0294	RES	4	61	48	42			41	46
R_Add_0295	RES	4	61	48	42			43	45
R_Add_0296	RES	4	61	48	42			31	33
R_Add_0297	RES	4	61	48	42			42	47
R_Add_0298	RES	4	61	48	42			35	39
R_Add_0299	RES	4	61	48	42			35	38
R_Add_0300	RES	4	61	48	42			36	36
R_Add_0301	RES	4	61	48	42			35	30
R_Add_0302	RES	4	61	48	42			41	47
R_Add_0303	RES	4	61	48	42			35	36
R_Add_0304	RES	4	61	48	42			30	37

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0305	RES	4	61	48	42			35	40
R_Add_0306	RES	4	61	48	42			41	47
R_Add_0307	RES	4	61	48	42			35	39
R_Add_0308	RES	4	61	48	42			38	41
R_Add_0309	RES	4	61	48	42			35	39
R_Add_0310	RES	4	61	48	42			36	39
R_Add_0311	RES	4	61	48	42			36	38
R_Add_0312	RES	4	61	48	42			22	25
R_Add_0313	RES	4	61	48	42			42	41
R_Add_0314	RES	4	61	48	42			37	44
R_Add_0315	RES	4	61	48	42			42	47
R_Add_0316	RES	4	61	48	42			35	36
R_Add_0317	RES	4	61	48	42			42	48
R_Add_0318	RES	4	61	48	42			36	39
R_Add_0319	RES	4	61	48	42			35	35
R_Add_0320	RES	4	61	48	42			43	46
R_Add_0321	RES	4	61	48	42			36	39
R_Add_0322	RES	4	61	48	42			39	44
R_Add_0323	RES	4	61	48	42			33	33

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0324	RES	4	61	48	42			36	40
R_Add_0325	RES	4	61	48	42			30	44
R_Add_0326	RES	4	61	48	42			36	42
R_Add_0327	RES	4	61	48	42			31	38
R_Add_0328	RES	4	61	48	42			36	40
R_Add_0329	RES	4	61	48	42			39	43
R_Add_0330	RES	4	61	48	42			41	45
R_Add_0331	RES	4	61	48	42			29	34
R_Add_0332	RES	4	61	48	42			44	41
R_Add_0333	RES	4	61	48	42			44	41
R_Add_0334	RES	4	61	48	42			44	46
R_Add_0335	RES	4	61	48	42			44	46
R_Add_0336	RES	4	61	48	42			44	46
R_Add_0337	RES	4	61	48	42			43	43
R_Add_0338	RES	4	61	48	42			37	40
R_Add_0339	RES	4	61	48	42			34	42
R_Add_0340	RES	4	61	48	42			36	40
R_Add_0341	RES	4	61	48	42			30	34
R_Add_0342	RES	4	61	48	42			36	40

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0343	RES	4	61	48	42			38	42
R_Add_0344	RES	4	61	48	42			31	33
R_Add_0345	RES	4	61	48	42			43	46
R_Add_0346	RES	4	61	48	42			33	39
R_Add_0347	RES	4	61	48	42			41	45
R_Add_0348	RES	4	61	48	42			37	39
R_Add_0349	RES	4	61	48	42			37	38
R_Add_0350	RES	4	61	48	42			35	45
R_Add_0351	RES	4	61	48	42			43	46
R_Add_0352	RES	4	61	48	42			37	36
R_Add_0353	RES	4	61	48	42			32	28
R_Add_0354	RES	4	61	48	42			37	37
R_Add_0355	RES	4	61	48	42			32	33
R_Add_0356	RES	4	61	48	42			39	44
R_Add_0357	RES	4	61	48	42			38	43
R_Add_0358	RES	4	61	48	42			39	44
R_Add_0359	RES	4	61	48	42			38	41
R_Add_0360	RES	4	61	48	42			28	34
R_Add_0361	RES	4	61	48	42			44	46

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0362	RES	4	61	48	42			39	44
R_Add_0363	RES	4	61	48	42			37	39
R_Add_0364	RES	4	61	48	42			39	44
R_Add_0365	RES	4	61	48	42			37	38
R_Add_0366	RES	2	59	49	39			37	43
R_Add_0367	RES	2	59	49	39			36	43
R_Add_0368	RES	2	59	49	39			36	42
R_Add_0369	RES	2	59	49	39			36	42
R_Add_0370	RES	2	59	49	39			35	41
R_Add_0371	RES	2	59	49	39			37	44
R_Add_0372	RES	2	59	49	39			35	41
R_Add_0373	RES	2	59	49	39			35	41
R_Add_0374	RES	2	59	49	39			37	43
R_Add_0375	RES	2	59	49	39			36	43
R_Add_0376	RES	2	59	49	39			36	42
R_Add_0377	RES	2	59	49	39			37	44
R_Add_0378	RES	2	59	49	39			34	40
R_Add_0379	RES	2	59	49	39			38	46
R_Add_0380	RES	2	59	49	39			35	41

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0381	RES	2	59	49	39			38	46
R_Add_0382	RES	2	59	49	39			32	40
R_Add_0383	RES	2	59	49	39			36	42
R_Add_0384	RES	2	59	49	39			29	43
R_Add_0385	RES	2	59	49	39			37	43
R_Add_0386	RES	2	59	49	39			37	44
R_Add_0387	RES	2	59	49	39			35	43
R_Add_0388	RES	2	59	49	39			32	46
R_Add_0389	RES	2	59	49	39			28	36
R_Add_0390	RES	2	59	49	39			35	42
R_Add_0391	RES	2	59	49	39			36	42
R_Add_0392	RES	2	59	49	39			37	43
R_Add_0393	RES	2	59	49	39			35	41
R_Add_0394	RES	2	59	49	39			36	44
R_Add_0395	RES	2	59	49	39			38	46
R_Add_0396	RES	2	59	49	39			35	41
R_Add_0397	RES	2	59	49	39			36	42
R_Add_0398	RES	2	59	49	39			37	44
R_Add_0399	RES	2	59	49	39			36	42

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0400	RES	2	59	49	39			36	42
R_Add_0401	RES	2	59	49	39			35	41
R_Add_0402	RES	2	59	49	39			36	42
R_Add_0403	RES	2	59	49	39			36	42
R_Add_0404	RES	2	59	49	39			37	43
R_Add_0405	RES	2	59	49	39			38	46
R_Add_0406	RES	2	59	49	39			38	45
R_Add_0407	RES	2	59	49	39			37	44
R_Add_0408	RES	2	59	49	39			36	42
R_Add_0409	RES	2	59	49	39			36	42
R_Add_0410	RES	2	59	49	39			35	42
R_Add_0411	RES	2	59	49	39			35	41
R_Add_0412	RES	2	59	49	39			37	43
R_Add_0413	RES	2	59	49	39			37	44
R_Add_0414	RES	2	59	49	39			37	44
R_Add_0415	RES	2	59	49	39			32	37
R_Add_0416	RES	2	59	49	39			36	42
R_Add_0417	RES	2	59	49	39			35	42
R_Add_0418	RES	2	59	49	39			38	45

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0419	RES	2	59	49	39			35	41
R_Add_0420	RES	2	59	49	39			38	46
R_Add_0421	RES	2	59	49	39			37	43
R_Add_0422	RES	2	59	49	39			33	40
R_Add_0423	RES	2	59	49	39			37	45
R_Add_0424	RES	2	59	49	39			38	46
R_Add_0425	RES	2	59	49	39			34	40
R_Add_0426	RES	2	59	49	39			36	42
R_Add_0427	RES	2	59	49	39			32	43
R_Add_0428	RES	2	59	49	39			34	41
R_Add_0429	RES	2	59	49	39			20	28
R_Add_0430	RES	2	59	49	39			21	29
R_Add_0431	RES	2	59	49	39			32	41
R_Add_0432	RES	2	59	49	39			30	42
R_Add_0433	RES	2	59	49	39			24	29
R_Add_0434	RES	2	59	49	39			35	41
R_Add_0435	RES	2	59	49	39			35	41
R_Add_0436	RES	2	59	49	39			23	33
R_Add_0437	RES	2	59	49	39			30	40

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0438	RES	2	59	49	39			28	42
R_Add_0439	RES	2	59	49	39			25	33
R_Add_0440	RES	2	59	49	39			31	42
R_Add_0441	RES	2	59	49	39			22	29
R_Add_0442	RES	2	59	49	39			23	30
R_Add_0443	RES	2	59	49	39			23	33
R_Add_0444	RES	2	59	49	39			21	31
R_Add_0445	RES	2	59	49	39			23	30
R_Add_0446	RES	2	59	49	39			23	30
R_Add_0447	RES	2	59	49	39			23	31
R_Add_0448	RES	2	59	49	39			24	31
R_Add_0449	RES	2	59	49	39			24	32
R_Add_0450	RES	2	59	49	39			27	30
R_Add_0451	RES	2	59	49	39			34	40
R_Add_0452	RES	2	59	49	39			32	41
R_Add_0453	RES	2	59	49	39			23	29
R_Add_0454	RES	2	59	49	39			25	27
R_Add_0455	RES	2	59	49	39			32	41
R_Add_0456	RES	2	59	49	39			25	29

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0457	RES	2	59	49	39			20	30
R_Add_0458	RES	2	59	49	39			23	29
R_Add_0459	RES	2	59	49	39			32	41
R_Add_0460	RES	2	59	49	39			22	33
R_Add_0461	RES	2	59	49	39			34	42
R_Add_0462	RES	2	59	49	39			31	43
R_Add_0463	RES	2	59	49	39			26	39
R_Add_0464	RES	2	59	49	39			27	43
R_Add_0465	RES	2	59	49	39			34	42
R_Add_0466	RES	2	59	49	39			23	45
R_Add_0467	RES	2	59	49	39			28	43
R_Add_0468	RES	2	59	49	39			26	45
R_Add_0469	RES	2	59	49	39			32	46
R_Add_0470	RES	2	59	49	39			28	44
R_Add_0471	RES	2	59	49	39			26	42
R_Add_0472	RES	2	59	49	39			28	43
R_Add_0473	RES	2	59	49	39			35	41
R_Add_0474	RES	2	59	49	39			36	42
R_Add_0475	RES	2	59	49	39			33	43

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0476	RES	2	59	49	39			34	40
R_Add_0477	RES	2	59	49	39			35	42
R_Add_0478	RES	2	59	49	39			25	32
R_Add_0479	RES	2	59	49	39			28	43
R_Add_0480	RES	2	59	49	39			29	42
R_Add_0481	RES	2	59	49	39			30	42
R_Add_0482	RES	2	59	49	39			25	33
R_Add_0483	RES	2	59	49	39			34	40
R_Add_0484	RES	2	59	49	39			22	31
R_Add_0485	RES	2	59	49	39			28	43
R_Add_0486	RES	2	59	49	39			29	42
R_Add_0487	RES	2	59	49	39			24	42
R_Add_0488	RES	2	59	49	39			23	33
R_Add_0489	RES	2	59	49	39			29	42
R_Add_0490	RES	2	59	49	39			35	42
R_Add_0491	RES	2	59	49	39			34	40
R_Add_0492	RES	2	59	49	39			35	41
R_Add_0493	RES	4	61	48	42			41	52
R_Add_0494	RES	4	61	48	42			41	53

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0495	RES	4	61	48	42			41	53
R_Add_0496	RES	4	61	48	42			41	52
R_Add_0497	RES	4	61	48	42			40	51
R_Add_0498	RES	4	61	48	42			40	51
R_Add_0499	RES	4	61	48	42			41	52
R_Add_0500	RES	4	61	48	42			41	54
R_Add_0501	RES	4	61	48	42			40	50
R_Add_0502	RES	4	61	48	42			41	55
R_Add_0503	RES	4	61	48	42			40	51
R_Add_0504	RES	4	61	48	42			39	50
R_Add_0505	RES	4	61	48	42			40	49
R_Add_0506	RES	4	61	48	42			41	54
R_Add_0507	RES	4	61	48	42			28	49
R_Add_0508	RES	4	61	48	42			40	51
R_Add_0509	RES	2	59	49	39			35	41
R_Add_0510	RES	2	59	49	39			35	41
R_Add_0511	RES	2	59	49	39			37	43
R_Add_0512	RES	2	59	49	39			35	41
R_Add_0513	RES	2	59	49	39			35	41

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0514	RES	2	59	49	39			37	43
R_Add_0515	RES	2	59	49	39			35	41
R_Add_0516	RES	2	59	49	39			35	41
R_Add_0517	RES	2	59	49	39			32	40
R_Add_0518	RES	2	59	49	39			36	42
R_Add_0519	RES	4	61	48	42			40	50
R_Add_0520	RES	2	59	49	39			37	43
R_Add_0521	RES	2	59	49	39			36	42
R_Add_0522	RES	2	59	49	39			36	42
R_Add_0523	RES	2	59	49	39			36	42
R_Add_0524	RES	4	61	48	42			40	51
R_Add_0525	RES	4	61	48	42			41	54
R_Add_0526	RES	4	61	48	42			41	54
R_Add_0527	RES	4	61	48	42			40	49
R_Add_0528	RES	4	61	48	42			40	53
R_Add_0529	RES	4	61	48	42			40	52
R_Add_0530	RES	4	61	48	42			41	54
R_Add_0531	RES	4	61	48	42			41	52
R_Add_0532	RES	4	61	48	42			40	51

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0533	RES	4	61	48	42			39	47
R_Add_0534	RES	4	61	48	42			39	49
R_Add_0535	RES	4	61	48	42			35	46
R_Add_0536	RES	4	61	48	42			40	51
R_Add_0537	RES	4	61	48	42			30	50
R_Add_0538	RES	4	61	48	42			39	48
R_Add_0539	RES	4	61	48	42			41	53
R_Add_0540	RES	4	61	48	42			40	51
R_Add_0541	RES	4	61	48	42			40	54
R_Add_0542	RES	4	61	48	42			39	48
R_Add_0543	RES	4	61	48	42			40	52
R_Add_0544	RES	4	61	48	42			40	52
R_Add_0545	RES	4	61	48	42			40	51
R_Add_0546	RES	4	61	48	42			41	55
R_Add_0547	RES	4	61	48	42			29	52
R_Add_0548	RES	4	61	48	42			39	49
R_Add_0549	RES	4	61	48	42			40	50
R_Add_0550	RES	4	61	48	42			40	51
R_Add_0551	RES	4	61	48	42			41	54

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0552	RES	4	61	48	42			39	49
R_Add_0553	RES	4	61	48	42			41	55
R_Add_0554	RES	4	61	48	42			41	53
R_Add_0555	RES	4	61	48	42			39	49
R_Add_0556	RES	2	59	49	39			37	43
R_Add_0557	RES	2	59	49	39			37	44
R_Add_0558	RES	2	59	49	39			38	45
R_Add_0559	RES	2	59	49	39			36	42
R_Add_0560	RES	2	59	49	39			30	42
R_Add_0561	RES	2	59	49	39			35	40
R_Add_0562	RES	2	59	49	39			35	43
R_Add_0563	RES	2	59	49	39			35	40
R_Add_0564	RES	2	59	49	39			30	41
R_Add_0565	RES	2	59	49	39			37	44
R_Add_0566	RES	2	59	49	39			35	41
R_Add_0567	RES	2	59	49	39			35	41
R_Add_0568	RES	2	59	49	39			34	40
R_Add_0569	RES	2	59	49	39			36	43
R_Add_0570	RES	2	59	49	39			34	40

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0571	RES	2	59	49	39			36	42
R_Add_0572	RES	2	59	49	39			38	46
R_Add_0573	RES	2	59	49	39			36	43
R_Add_0574	RES	2	59	49	39			35	41
R_Add_0575	RES	2	59	49	39			37	44
R_Add_0576	RES	2	59	49	39			35	42
R_Add_0577	RES	2	59	49	39			37	43
R_Add_0578	RES	2	59	49	39			30	44
R_Add_0579	RES	2	59	49	39			35	41
R_Add_0580	RES	2	59	49	39			37	43
R_Add_0581	RES	2	59	49	39			36	42
R_Add_0582	RES	2	59	49	39			36	42
R_Add_0583	RES	2	59	49	39			37	44
R_Add_0584	RES	2	59	49	39			37	43
R_Add_0585	RES	2	59	49	39			35	41
R_Add_0586	RES	2	59	49	39			37	44
R_Add_0587	RES	2	59	49	39			36	42
R_Add_0588	RES	2	59	49	39			34	41
R_Add_0589	RES	2	59	49	39			37	45

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0590	RES	2	59	49	39			36	42
R_Add_0591	RES	2	59	49	39			35	41
R_Add_0592	RES	2	59	49	39			35	40
R_Add_0593	RES	2	59	49	39			35	41
R_Add_0594	RES	2	59	49	39			35	41
R_Add_0595	RES	2	59	49	39			35	41
R_Add_0596	RES	2	59	49	39			37	43
R_Add_0597	RES	2	59	49	39			37	45
R_Add_0598	RES	2	59	49	39			38	45
R_Add_0599	RES	2	59	49	39			33	43
R_Add_0600	RES	2	59	49	39			36	44
R_Add_0601	RES	2	59	49	39			36	43
R_Add_0602	RES	2	59	49	39			38	45
R_Add_0603	RES	2	59	49	39			37	45
R_Add_0604	RES	2	59	49	39			35	41
R_Add_0605	RES	2	59	49	39			35	41
R_Add_0606	RES	2	59	49	39			37	43
R_Add_0607	RES	2	59	49	39			32	41
R_Add_0608	RES	2	59	49	39			37	45

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0609	RES	2	59	49	39			35	42
R_Add_0610	RES	2	59	49	39			37	44
R_Add_0611	RES	2	59	49	39			38	47
R_Add_0612	RES	2	59	49	39			31	43
R_Add_0613	RES	2	59	49	39			36	43
R_Add_0614	RES	2	59	49	39			36	43
R_Add_0615	RES	2	59	49	39			36	42
R_Add_0616	RES	2	59	49	39			34	42
R_Add_0617	RES	2	59	49	39			36	42
R_Add_0618	RES	2	59	49	39			38	45
R_Add_0619	RES	2	59	49	39			41	42
R_Add_0620	RES	2	59	49	39			49	30
R_Add_0621	RES	2	59	49	39			44	41
R_Add_0622	RES	2	59	49	39			45	41
R_Add_0623	RES	2	59	49	39			49	37
R_Add_0624	RES	2	59	49	39			46	28
R_Add_0625	RES	2	59	49	39			48	37
R_Add_0626	RES	2	59	49	39			49	37
R_Add_0627	RES	2	59	49	39			46	33

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0628	RES	2	59	49	39			48	43
R_Add_0629	RES	2	59	49	39			46	43
R_Add_0630	RES	2	59	49	39			39	33
R_Add_0631	RES	2	59	49	39			38	43
R_Add_0632	RES	2	59	49	39			41	43
R_Add_0633	RES	2	59	49	39			39	42
R_Add_0634	RES	2	59	49	39			36	42
R_Add_0635	RES	2	59	49	39			45	33
R_Add_0636	RES	2	59	49	39			39	42
R_Add_0637	RES	2	59	49	39			48	40
R_Add_0638	RES	2	59	49	39			50	33
R_Add_0639	RES	2	59	49	39			47	40
R_Add_0640	RES	2	59	49	39			47	40
R_Add_0641	RES	2	59	49	39			50	35
R_Add_0642	RES	2	59	49	39			48	32
R_Add_0643	RES	2	59	49	39			43	37
R_Add_0644	RES	2	59	49	39			50	35
R_Add_0645	RES	2	59	49	39			50	34
R_Add_0646	RES	2	59	49	39			47	42

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0647	RES	2	59	49	39			48	39
R_Add_0648	RES	2	59	49	39			47	32
R_Add_0649	RES	2	59	49	39			48	33
R_Add_0650	RES	2	59	49	39			48	38
R_Add_0651	RES	2	59	49	39			47	39
R_Add_0652	RES	2	59	49	39			47	38
R_Add_0653	RES	2	59	49	39			49	38
R_Add_0654	RES	2	59	49	39			48	38
R_Add_0655	RES	2	59	49	39			47	35
R_Add_0656	RES	2	59	49	39			52	36
R_Add_0657	RES	2	59	49	39			52	42
R_Add_0658	RES	2	59	49	39			40	37
R_Add_0659	RES	2	59	49	39			54	41
R_Add_0660	RES	2	59	49	39			46	36
R_Add_0661	RES	2	59	49	39			41	36
R_Add_0662	RES	2	59	49	39			53	42
R_Add_0663	RES	2	59	49	39			54	39
R_Add_0664	RES	2	59	49	39			48	31
R_Add_0665	RES	2	59	49	39			45	35

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0666	RES	2	59	49	39			49	35
R_Add_0667	RES	2	59	49	39			48	33
R_Add_0668	RES	2	59	49	39			50	37
R_Add_0669	RES	2	59	49	39			48	43
R_Add_0670	RES	2	59	49	39			42	52
R_Add_0671	RES	2	59	49	39			49	49
R_Add_0672	RES	2	59	49	39			48	53
R_Add_0673	RES	2	59	49	39			50	37
R_Add_0674	RES	2	59	49	39			44	32
R_Add_0675	RES	2	59	49	39			42	43
R_Add_0676	RES	2	59	49	39			51	43
R_Add_0677	RES	2	59	49	39			42	32
R_Add_0678	RES	2	59	49	39			45	31
R_Add_0679	RES	2	59	49	39			42	31
R_Add_0680	RES	2	59	49	39			45	32
R_Add_0681	RES	2	59	49	39			43	28
R_Add_0682	RES	2	59	49	39			57	39
R_Add_0683	RES	2	59	49	39			56	44
R_Add_0684	RES	2	59	49	39			46	33

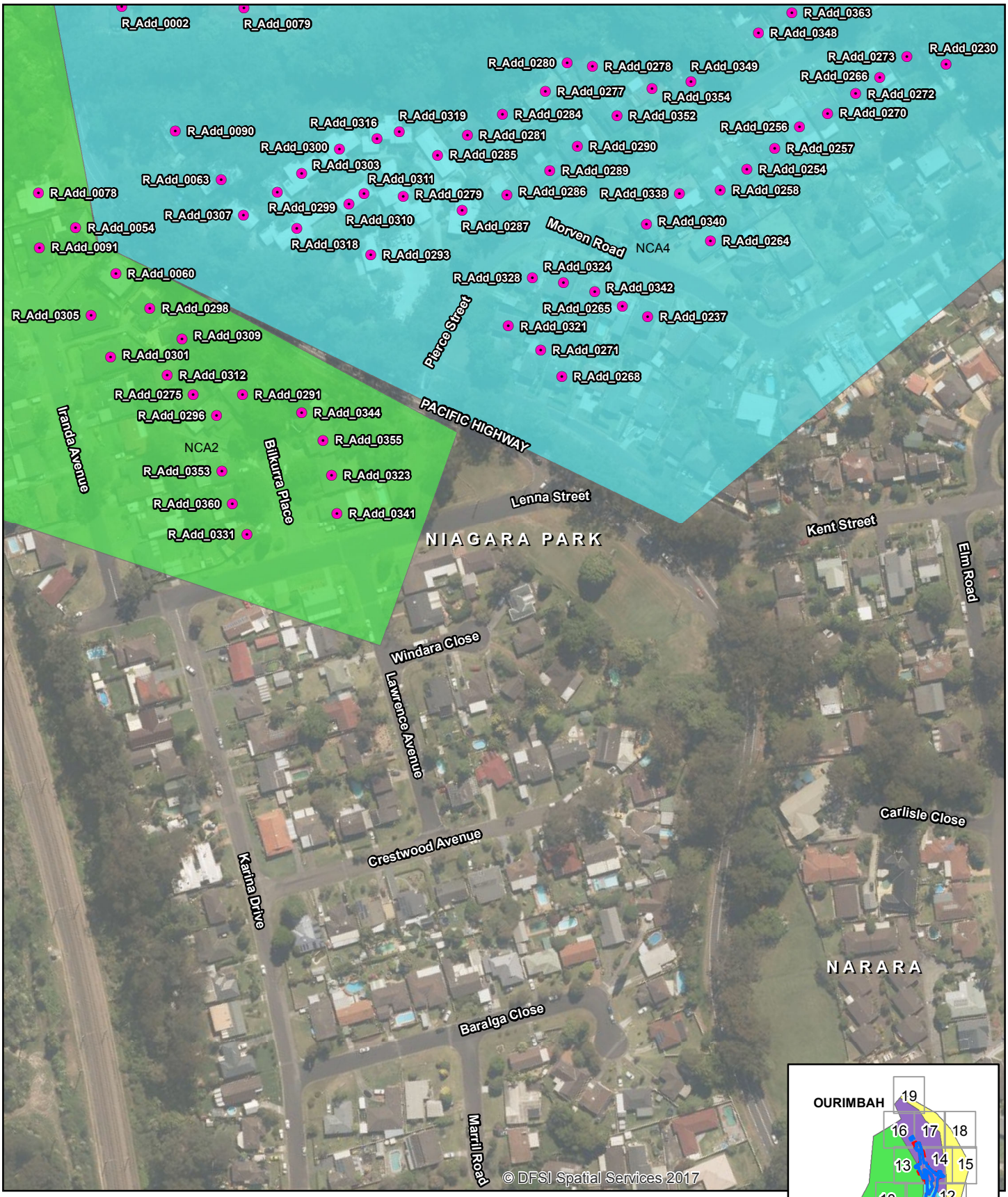
Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0685	RES	2	59	49	39			58	44
R_Add_0686	RES	2	59	49	39			44	28
R_Add_0687	RES	2	59	49	39			41	42
R_Add_0688	RES	2	59	49	39			48	43
R_Add_0689	RES	2	59	49	39			55	43
R_Add_0690	RES	2	59	49	39			52	43
R_Add_0691	RES	2	59	49	39			51	35
R_Add_0692	RES	2	59	49	39			43	40
R_Add_0693	RES	2	59	49	39			47	49
R_Add_0694	RES	2	59	49	39			43	50
R_Add_0695	RES	2	59	49	39			44	41
R_Add_0696	RES	2	59	49	39			47	41
R_Add_0697	RES	2	59	49	39			34	28
R_Add_0698	RES	2	59	49	39			47	50
R_Add_0699	RES	2	59	49	39			43	40
R_Add_0700	RES	2	59	49	39			47	51
R_Add_0701	RES	2	59	49	39			47	51
R_Add_0702	RES	2	59	49	39			34	30
R_Add_0703	RES	2	59	49	39			35	22

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0704	RES	2	59	49	39			43	40
R_Add_0705	RES	2	59	49	39			35	41
R_Add_0706	RES	2	59	49	39			35	33
R_Add_0707	RES	2	59	49	39			32	31
R_Add_0708	RES	2	59	49	39			32	30
R_Add_0709	RES	2	59	49	39			42	38
R_Add_0710	RES	2	59	49	39			41	41
R_Add_0711	RES	2	59	49	39			33	26
R_Add_0712	RES	2	59	49	39			42	40
R_Add_0713	RES	2	59	49	39			43	40
R_Add_0714	RES	2	59	49	39			43	31
R_Add_0715	RES	2	59	49	39			31	24
R_Add_0716	RES	2	59	49	39			43	38
R_Add_0717	RES	2	59	49	39			43	38
R_Add_0718	RES	2	59	49	39			47	41
R_Add_0719	RES	2	59	49	39			41	33
R_Add_0720	RES	2	59	49	39			46	34
R_Add_0721	RES	2	59	49	39			47	34
R_Add_0722	RES	2	59	49	39			41	33

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0723	RES	2	59	49	39			48	30
R_Add_0724	RES	2	59	49	39			49	32
R_Add_0725	RES	2	59	49	39			48	30
R_Add_0726	RES	2	59	49	39			51	29
R_Add_0727	RES	2	59	49	39			42	30
R_Add_0728	RES	2	59	49	39			41	29
R_Add_0729	RES	2	59	49	39			40	30
R_Add_0730	RES	2	59	49	39			44	32
R_Add_0731	RES	2	59	49	39			50	37
R_Add_0732	RES	2	59	49	39			46	36
R_Add_0733	RES	2	59	49	39			46	35
R_Add_0734	RES	2	59	49	39			42	35
R_Add_0735	RES	2	59	49	39			48	42
R_Add_0736	RES	2	59	49	39			48	38
R_Add_0737	RES	2	59	49	39			49	32
R_Add_0738	RES	2	59	49	39			49	34
R_Add_0739	RES	2	59	49	39			47	33
R_Add_0740	RES	2	59	49	39			49	33
R_Add_0741	RES	2	59	49	39			48	29

Receiver	Receiver Type	NCA	NML Day	NML Evening	NML Night	L_{Aeq} Compound 2 All activities	L_{Aeq} Compound 2 Restricted activities	L_{Aeq} Compound 4	L_{Aeq} Compound 5
R_Add_0742	RES	2	59	49	39			48	35
R_Add_0743	RES	2	59	49	39			49	29
R_Add_0744	RES	2	59	49	39			48	30
R_Add_0745	RES	2	59	49	39			59	41
R_Add_0746	RES	2	59	49	39			58	44
R_Add_0747	RES	2	59	49	39			58	40

Attachment C
Noise catchment areas and sensitive receivers



LEGEND

- Additional identified sensitive receivers
- NCA4

Noise catchment areas

- NCA2

Paper Size A4

0 12.5 25 50 75

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

Roads and Maritime Services
Pacific Highway Upgrade Stage 3B, Lisarow
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Noise sensitive receivers and noise monitoring locations - Sheet 1 of 19

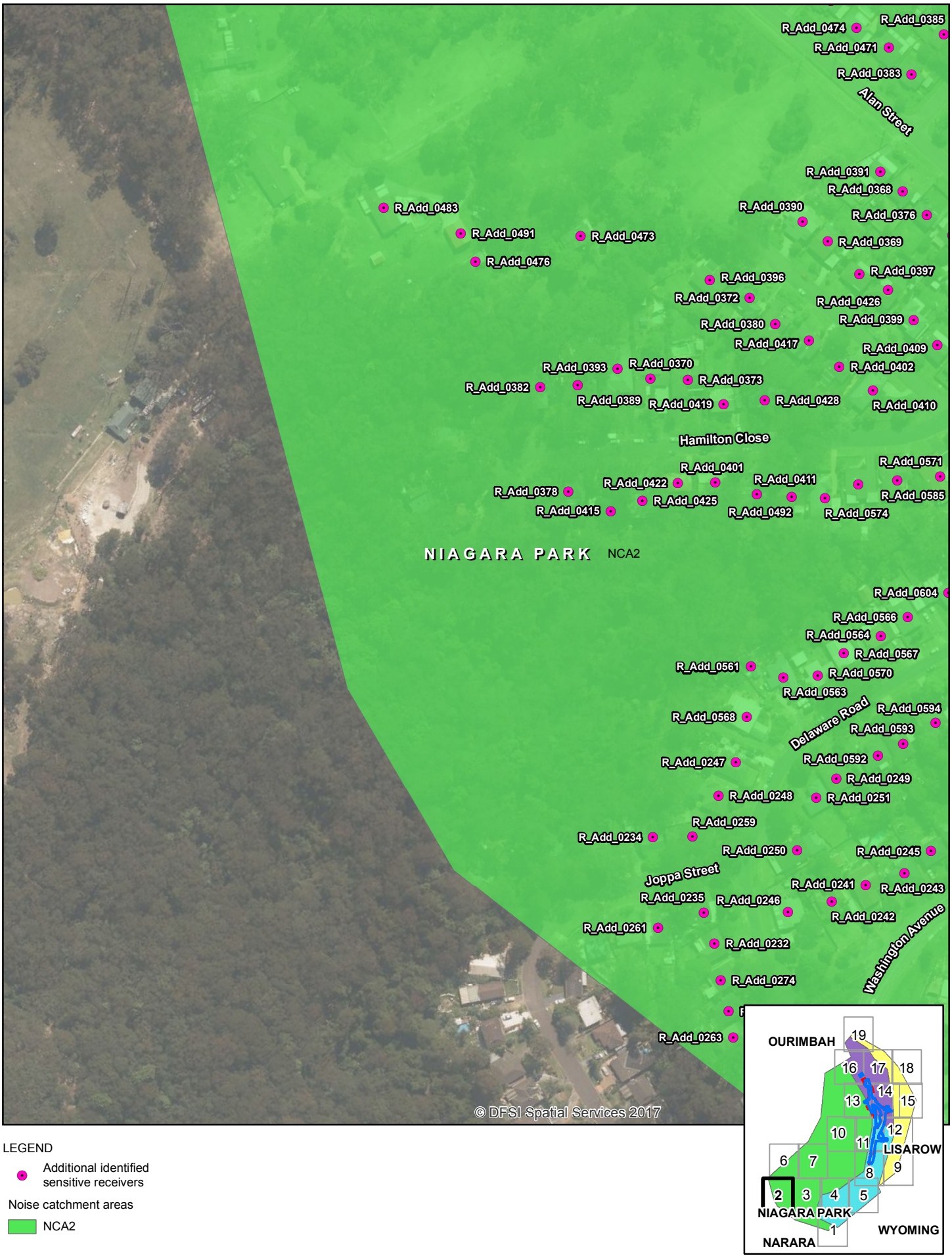
Job Number	22-18239
Revision	0
Date	26 Jun 2018

Figure A2

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com **W** www.ghd.com.au

G:\22\18239\GIS\Maps\Deliverables\AddendumREF2_Compounds\Noise\2218239_A201_SensitiveReceivers_NoiseMonitoring_0.mxd

Data source: LPI: Aerial imagery, 2015; DTDB, 2015. Created by: tmorton



LEGEND

- Additional identified sensitive receivers

Noise catchment areas

- NCA2

Paper Size A4

0 12.5 25 50 75

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

Roads and Maritime Services
Pacific Highway Upgrade Stage 3B, Lisarow
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Noise sensitive receivers and noise monitoring locations - Sheet 2 of 19

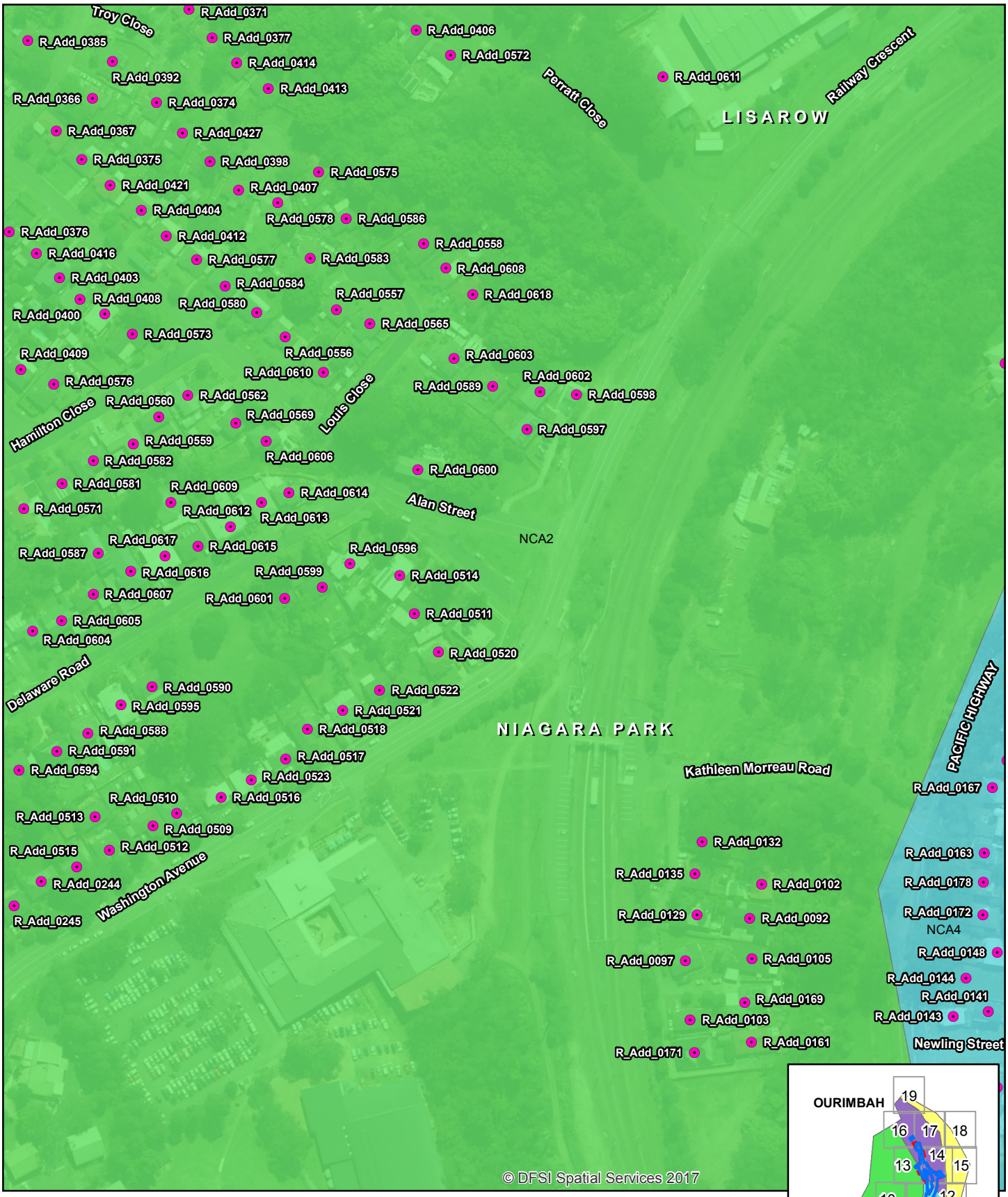
Job Number	22-18239
Revision	0
Date	26 Jun 2018

Figure A1

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com **W** www.ghd.com.au

G:\22\18239\GIS\Maps\Deliverables\AddendumREF2_Compounds\Noise\2218239_A201_SensitiveReceivers_NoiseMonitoring_0.mxd

Data source: LPI: Aerial imagery, 2015; DTDB, 2015. Created by: tmorton



LEGEND

- Additional identified sensitive receivers
- NCA4

Noise catchment areas

- NCA2

Paper Size A4

0 12.5 25 50 75

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

Roads and Maritime Services
Pacific Highway Upgrade Stage 3B, Lisarow
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Job Number 22-18239
Revision 0
Date 26 Jun 2018

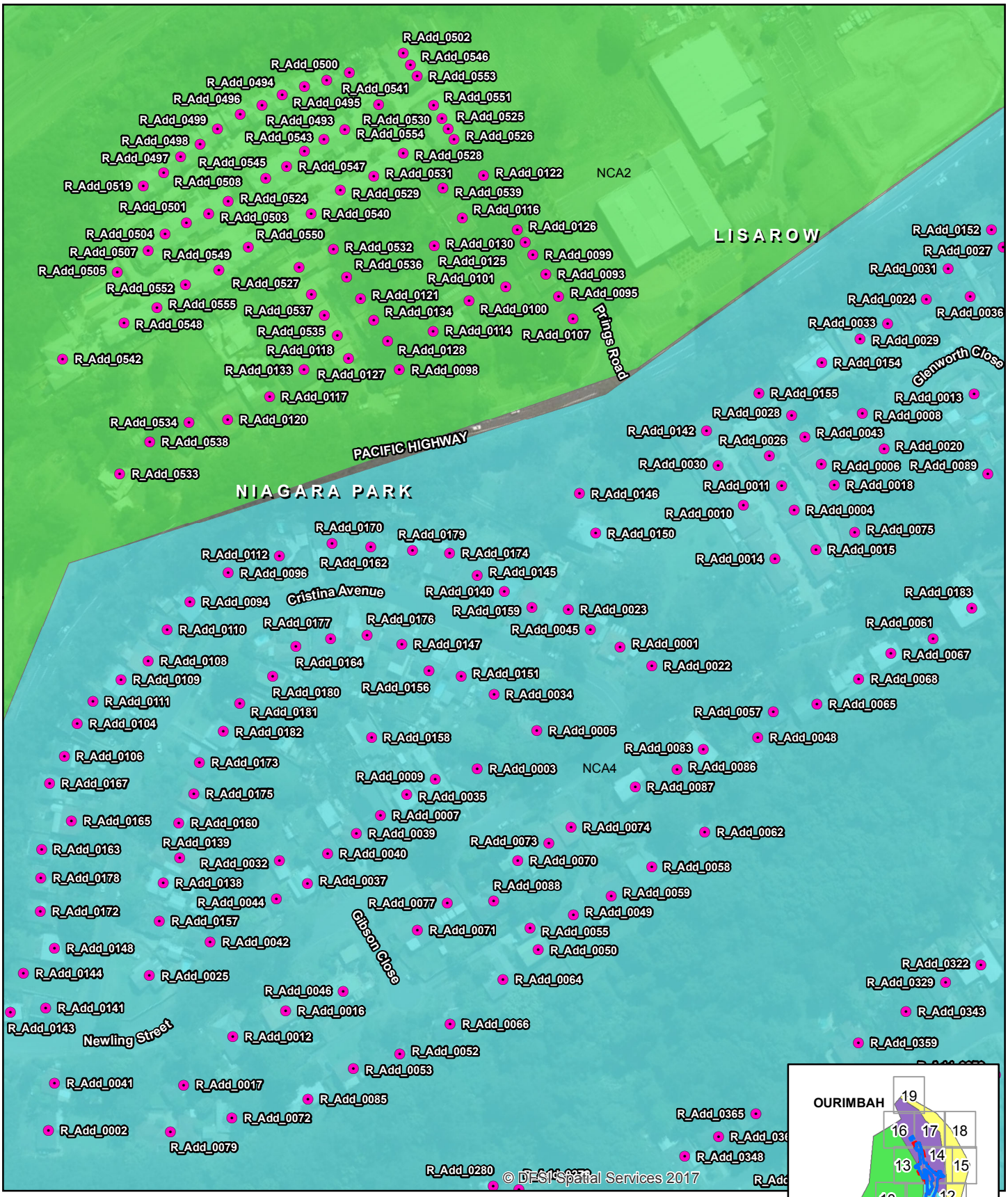
Noise sensitive receivers and noise monitoring locations - Sheet 3 of 19

Figure A2

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 T 61 2 4979 9999 F 61 2 4979 9988 E ntlmail@ghd.com W www.ghd.com.au

G:\22\18239\GIS\Maps\Deliverables\AddendumREF2_Compounds\Noise\2218239_A201_SensitiveReceivers_NoiseMonitoring_0.mxd

Data source: LPI: Aerial imagery, 2015; DTDB, 2015. Created by: tmorton



LEGEND

Additional identified sensitive receivers

Noise catchment areas

NCA2

NCA4

Paper Size A4

0 12.5 25 50 75

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

Roads and Maritime Services
Pacific Highway Upgrade Stage 3B, Lisarow
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Noise sensitive receivers and noise monitoring locations - Sheet 4 of 19

Job Number	22-18239
Revision	0
Date	26 Jun 2018

Figure A1

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 T 61 2 4979 9999 F 61 2 4979 9988 E ntlmail@ghd.com W www.ghd.com.au

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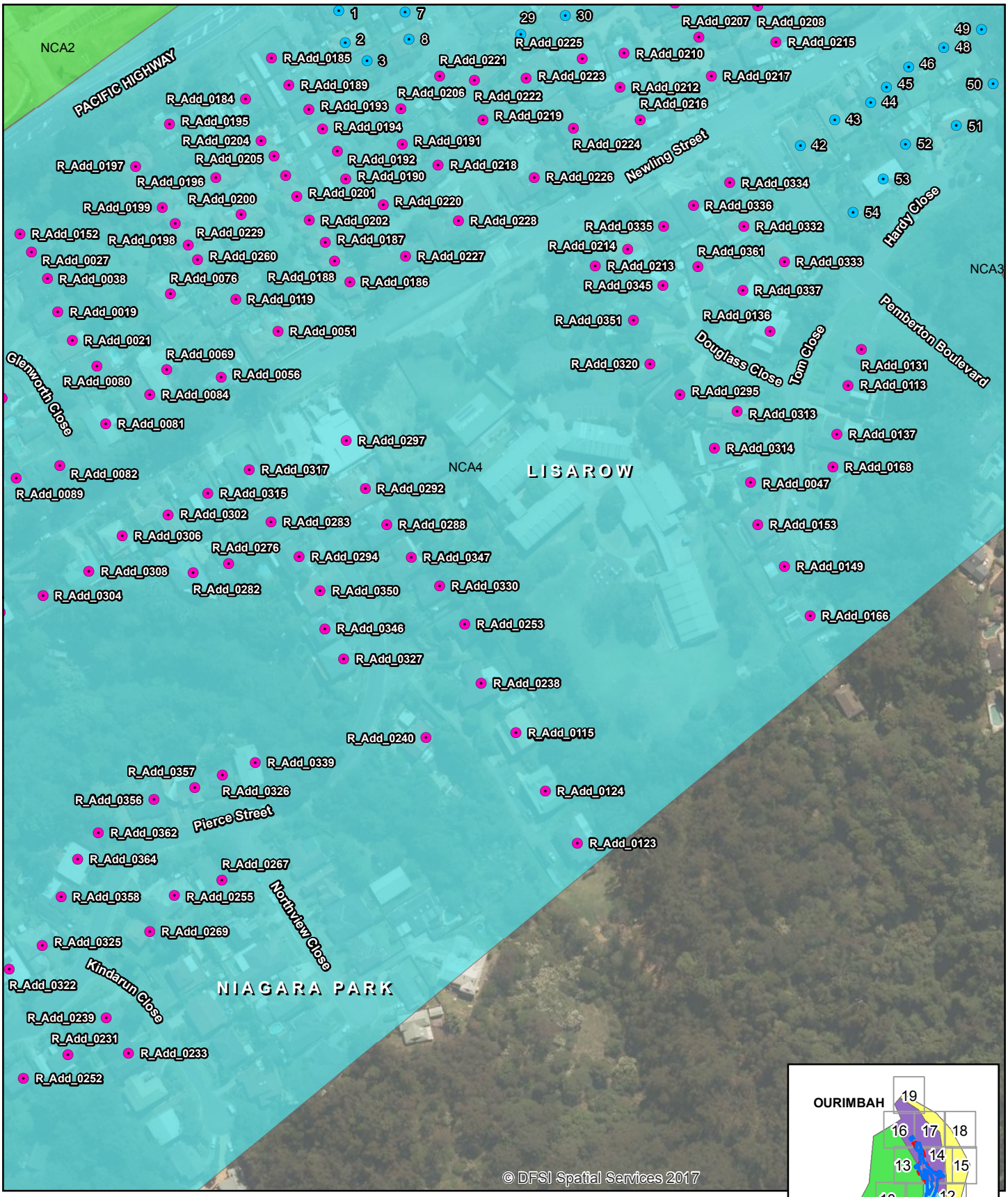
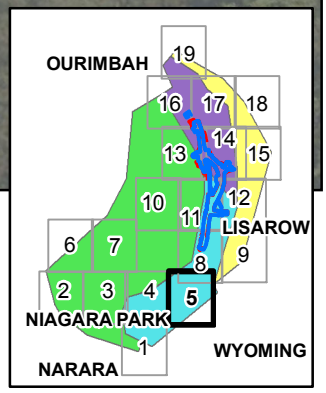
Data source: LPI: Aerial imagery, 2015; DTDB, 2015. Created by: tmorton





LEGEND

- Sensitive receiver
- Additional identified sensitive receivers

Noise catchment areas

- NCA2
- NCA3
- NCA4

Paper Size A4

0 12.5 25 50 75

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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Pacific Highway Upgrade Stage 3B, Lisarow
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Noise sensitive receivers and noise monitoring locations - Sheet 5 of 19

Job Number 22-18239
Revision 0
Date 26 Jun 2018

Figure A2

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 T 61 2 4979 9999 F 61 2 4979 9988 E ntlmail@ghd.com W www.ghd.com.au

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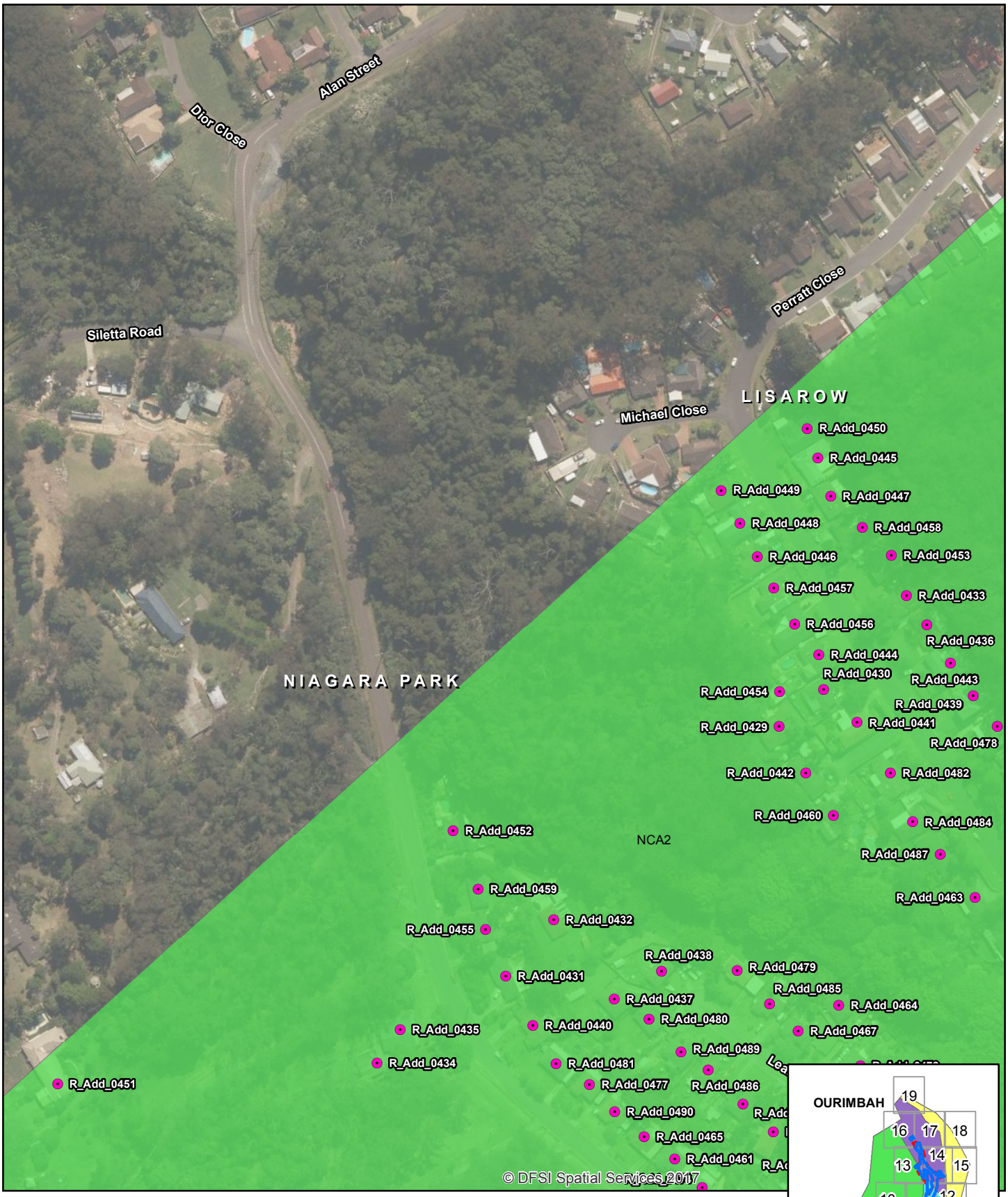

LEGEND

Additional identified sensitive receivers

Noise catchment areas

NCA2

Paper Size A4

0 12.5 25 50 75

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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Pacific Highway Upgrade Stage 3B, Lisarow
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Noise sensitive receivers and noise monitoring locations - Sheet 6 of 19

Job Number	22-18239
Revision	0
Date	26 Jun 2018

Figure A1

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com **W** www.ghd.com.au

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Data source: LPI: Aerial imagery, 2015; DTDB, 2015. Created by: tmorton

LEGEND

Additional identified sensitive receivers

Noise catchment areas

NCA2

Paper Size A4

0 12.5 25 50 75

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

Roads and Maritime Services
Pacific Highway Upgrade Stage 3B, Lisarow
Addendum Review of Environmental Factors 2

Noise sensitive receivers and noise monitoring locations - Sheet 7 of 19

Job Number	22-18239
Revision	0
Date	26 Jun 2018

Figure A2

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com **W** www.ghd.com.au

G:\22\18239\GIS\Maps\Deliverables\AddendumREF2_Compounds\Noise\2218239_A201_SensitiveReceivers_NoiseMonitoring_0.mxd

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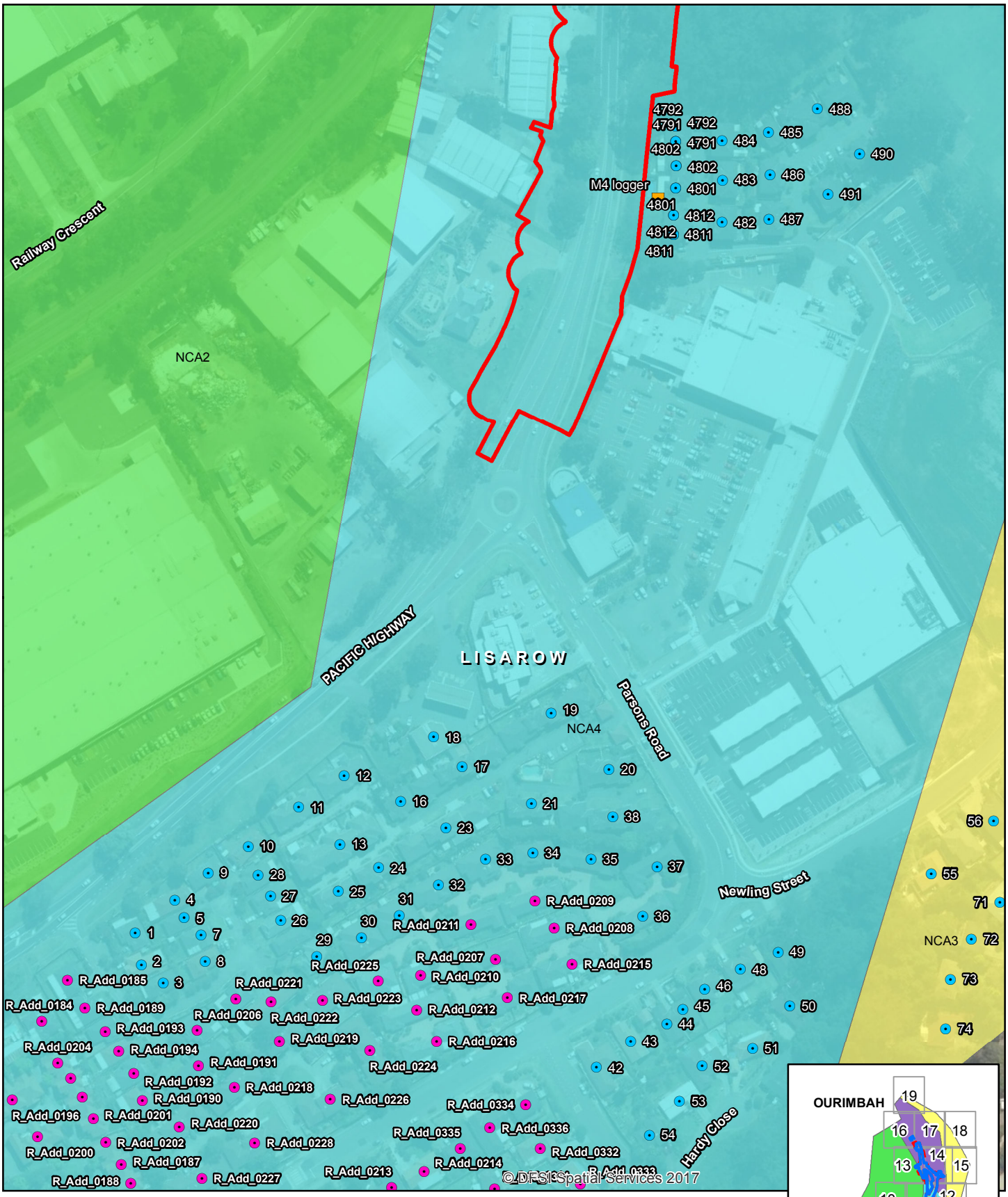

LEGEND

- Logger location
- Sensitive receiver
- Additional identified sensitive receivers

Noise catchment areas

- NCA2
- NCA3
- NCA4

Approved project boundary (Addendum REF 1)

Paper Size A4

0 12.5 25 50 75

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

Roads and Maritime Services
Pacific Highway Upgrade Stage 3B, Lisarow
Addendum Review of Environmental Factors 2

Noise sensitive receivers and noise monitoring locations - Sheet 8 of 19

Job Number	22-18239
Revision	0
Date	26 Jun 2018

Figure A1

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 T 61 2 4979 9999 F 61 2 4979 9988 E ntlmail@ghd.com W www.ghd.com.au

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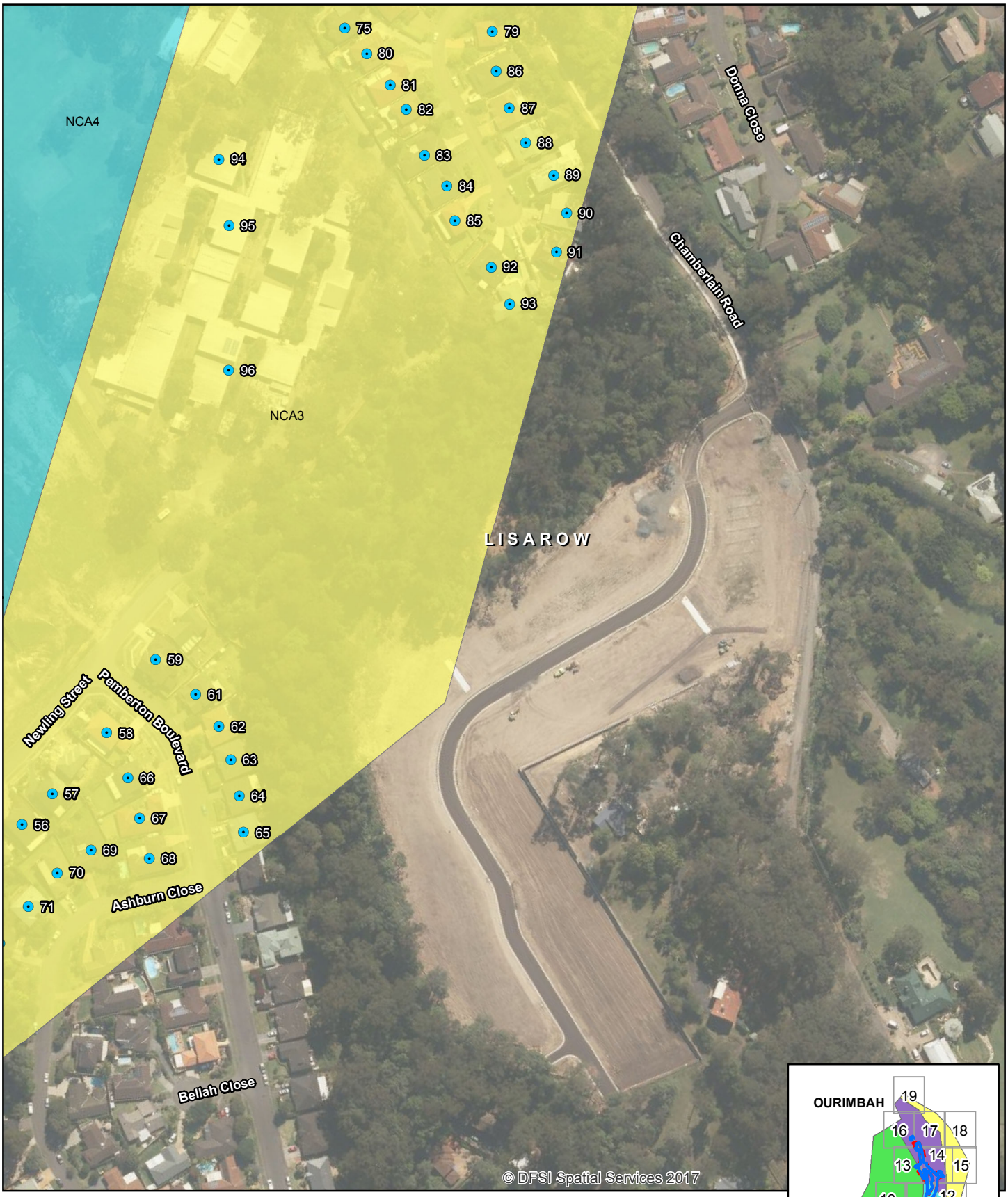

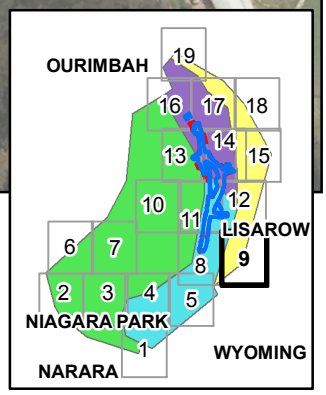

LEGEND

- Sensitive receiver

Noise catchment areas

- NCA3
- NCA4

Paper Size A4

0 12.5 25 50 75

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

Roads and Maritime Services
Pacific Highway Upgrade Stage 3B, Lisarow
Addendum Review of Environmental Factors 2

Noise sensitive receivers and noise monitoring locations - Sheet 9 of 19

Job Number	22-18239
Revision	0
Date	26 Jun 2018

Figure A2

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com **W** www.ghd.com.au

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Data source: LPI: Aerial imagery, 2015; DTDB, 2015. Created by: tmorton

LEGEND

Additional identified sensitive receivers

Noise catchment areas

NCA2

Paper Size A4

0 12.5 25 50 75

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

Roads and Maritime Services
Pacific Highway Upgrade Stage 3B, Lisarow
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Revision 0
Date 26 Jun 2018

Noise sensitive receivers and noise monitoring locations - Sheet 10 of 19

Figure A2

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com **W** www.ghd.com.au

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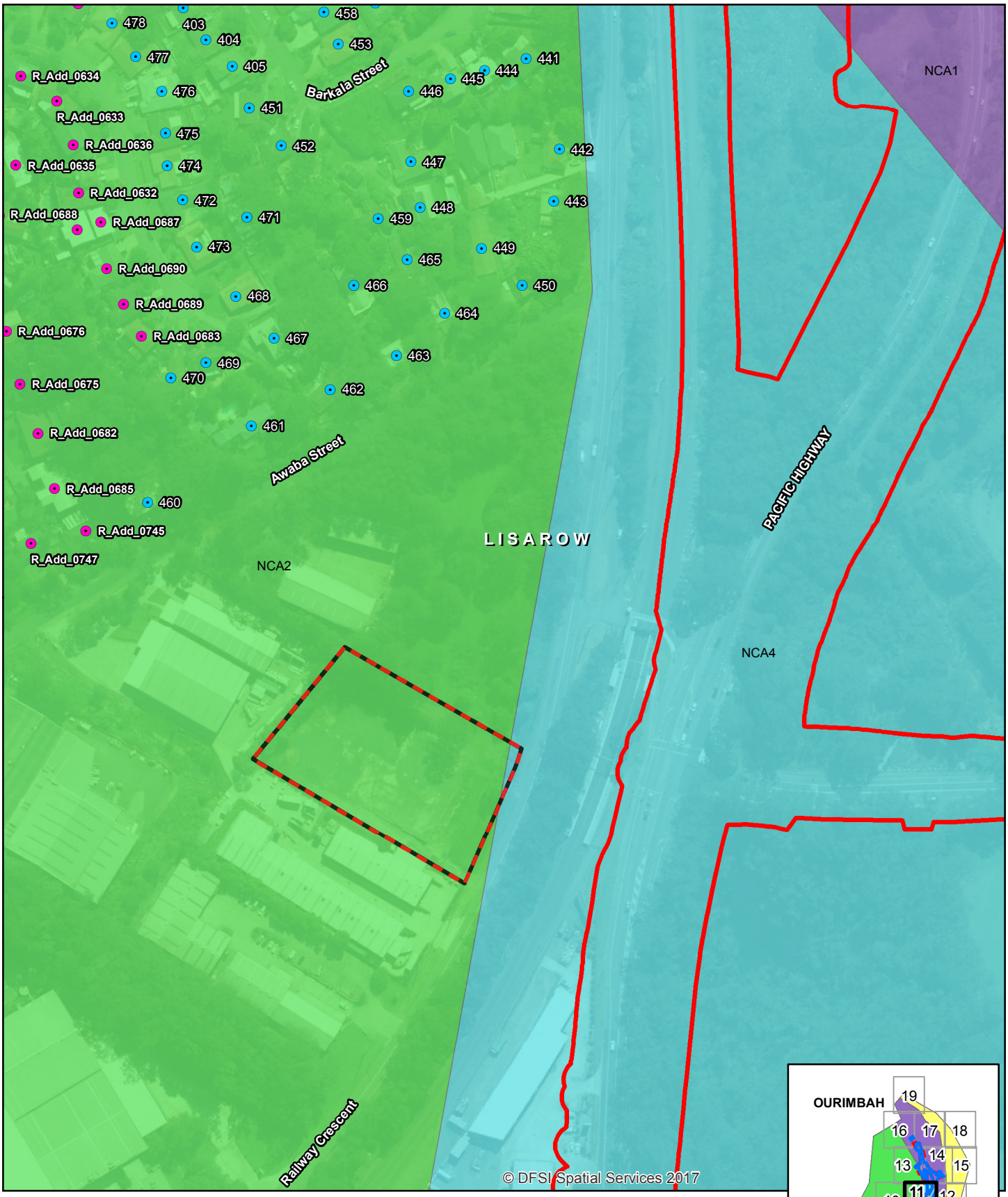

LEGEND

- Sensitive receiver
- Additional identified sensitive receivers

Noise catchment areas

- NCA1
- NCA2
- NCA4

- Approved project boundary (Addendum REF 1)
- Proposed modification (Addendum REF 2)

Paper Size A4

0 12.5 25 50 75

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

Roads and Maritime Services
Pacific Highway Upgrade Stage 3B, Lisarow
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Job Number 22-18239
Revision 0
Date 26 Jun 2018

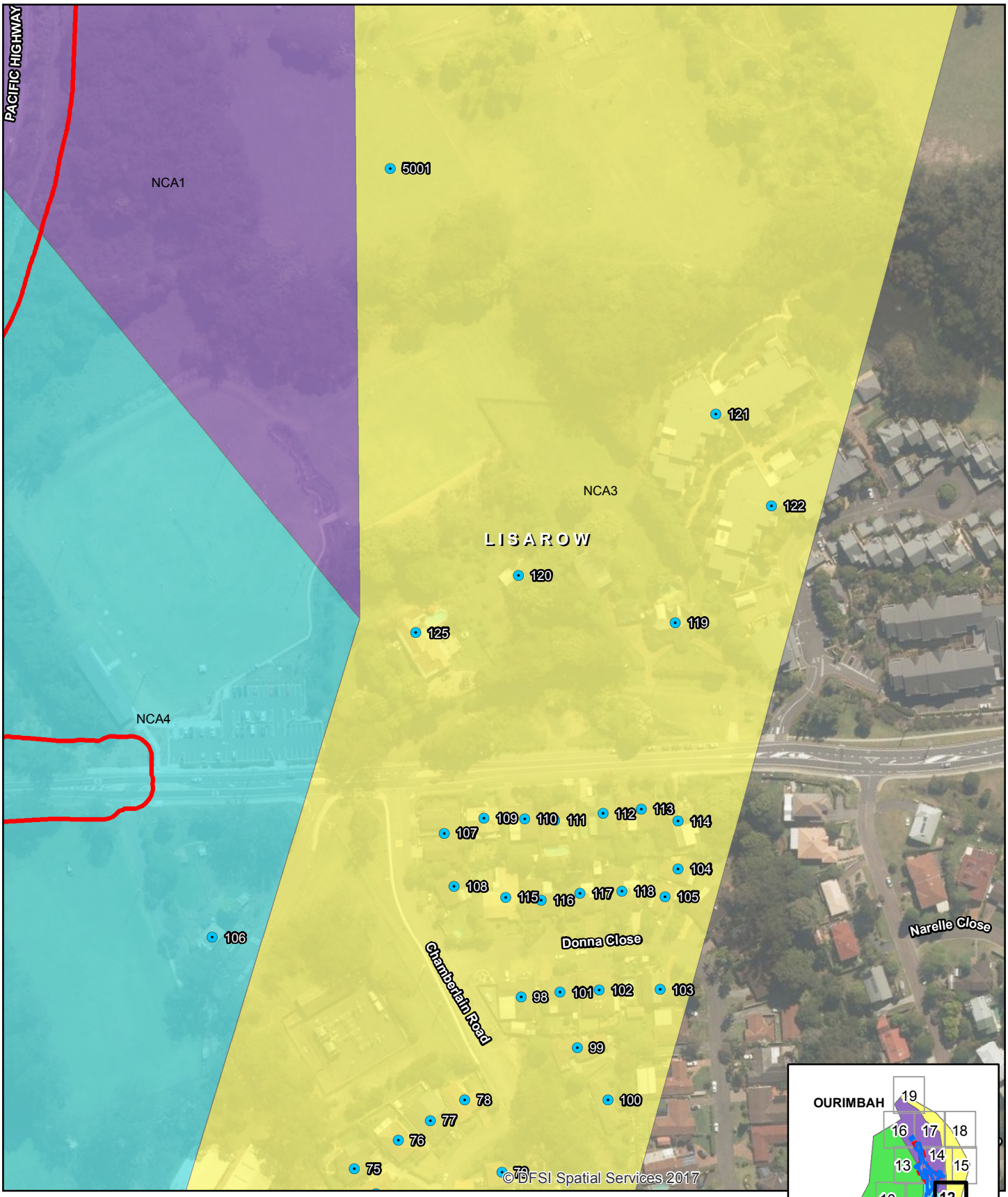
Noise sensitive receivers and noise monitoring locations - Sheet 11 of 19

Figure A3

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com **W** www.ghd.com.au

G:\22\18239\GIS\Maps\Deliverables\AddendumREF2_Compounds\Noise\2218239_A201_SensitiveReceivers_NoiseMonitoring_0.mxd

Data source: LPI: Aerial imagery, 2015; DTDB, 2015. Created by: tmorton



LEGEND

- Sensitive receiver
- Noise catchment areas
  - NCA1
  - NCA3
  - NCA4
- Approved project boundary (Addendum REF 1)

Paper Size A4

0 12.5 25 50 75

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

Roads and Maritime Services
Pacific Highway Upgrade Stage 3B, Lisarow
Addendum Review of Environmental Factors 2

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Revision 0
Date 26 Jun 2018

Noise sensitive receivers and noise monitoring locations - Sheet 12 of 19

Figure A4

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 T 61 2 4979 9999 F 61 2 4979 9988 E ntlmail@ghd.com W www.ghd.com.au

G:\22\18239\GIS\Maps\Deliverables\AddendumREF2_Compounds\Noise\2218239_A201_SensitiveReceivers_NoiseMonitoring_0.mxd

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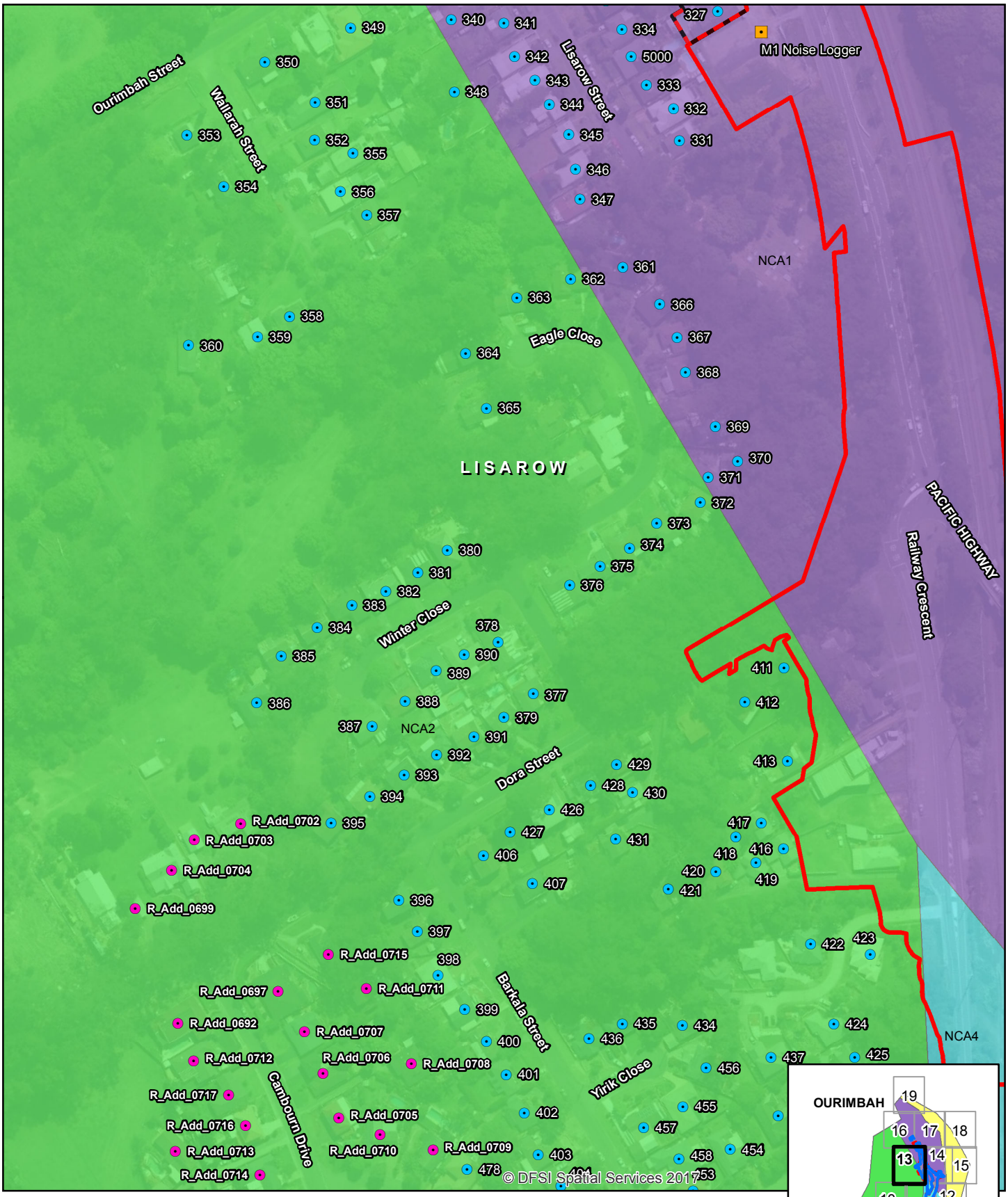

LEGEND

- Logger location
- Sensitive receiver
- Additional identified sensitive receivers

Noise catchment areas

- NCA1
- NCA2
- NCA4

- Approved project boundary (Addendum REF 1)
- Proposed modification (Addendum REF 2)

Paper Size A4

0 12.5 25 50 75

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

Roads and Maritime Services
Pacific Highway Upgrade Stage 3B, Lisarow
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Job Number 22-18239
Revision 0
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Noise sensitive receivers and noise monitoring locations - Sheet 13 of 19

Figure A5

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 T 61 2 4979 9999 F 61 2 4979 9988 E ntlmail@ghd.com W www.ghd.com.au

G:\22\18239\GIS\Maps\Deliverables\AddendumREF2_Compounds\Noise\2218239_A201_SensitiveReceivers_NoiseMonitoring_0.mxd

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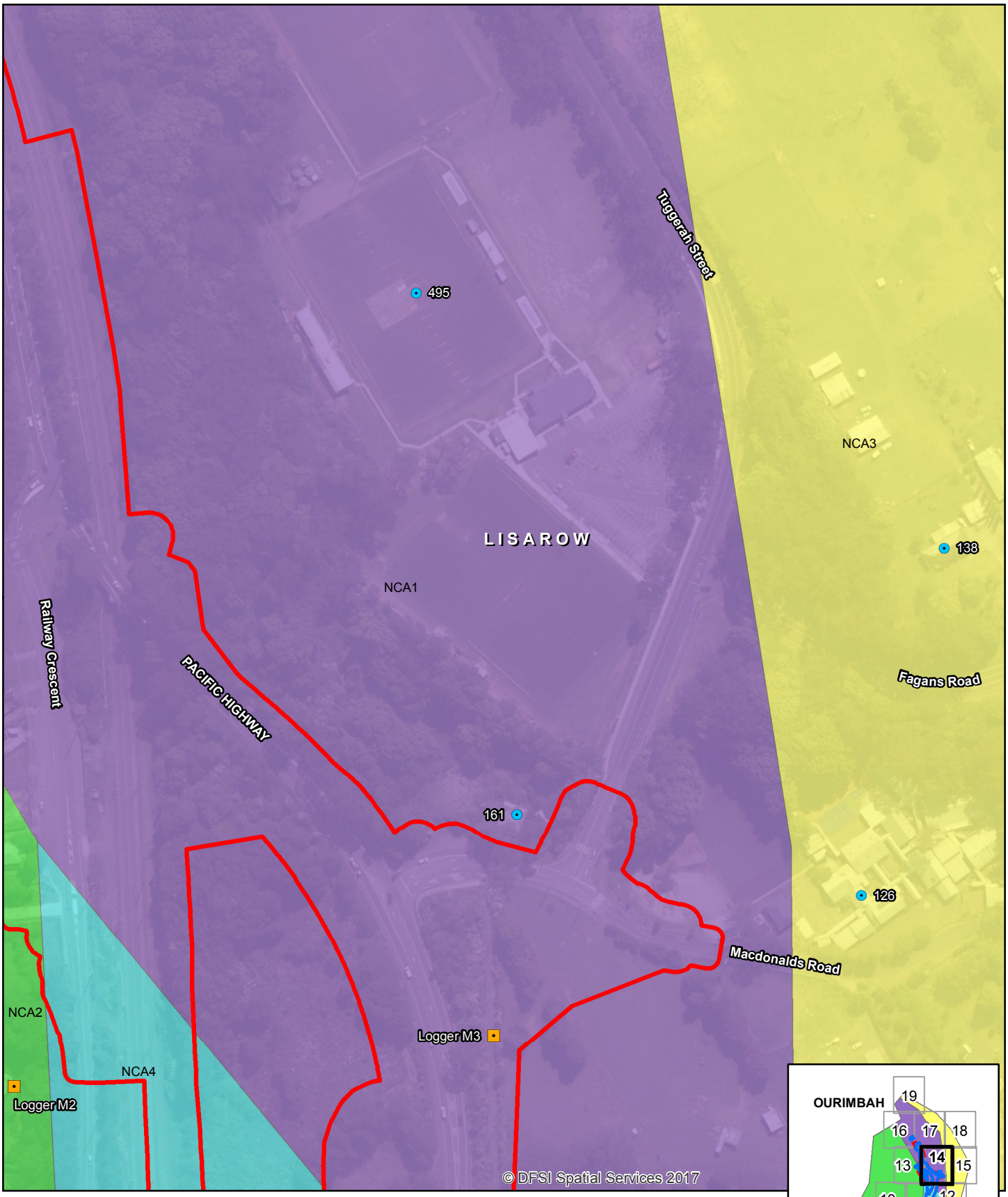

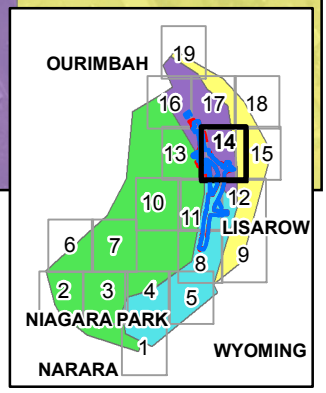

LEGEND

- Logger location
- Sensitive receiver

Noise catchment areas

- NCA1
- NCA2
- NCA3
- NCA4

Approved project boundary (Addendum REF 1)

Paper Size A4

0 12.5 25 50 75

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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Pacific Highway Upgrade Stage 3B, Lisarow
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Revision 0
Date 26 Jun 2018

Noise sensitive receivers and noise monitoring locations - Sheet 14 of 19

Figure A6

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 T 61 2 4979 9999 F 61 2 4979 9988 E ntlmail@ghd.com W www.ghd.com.au

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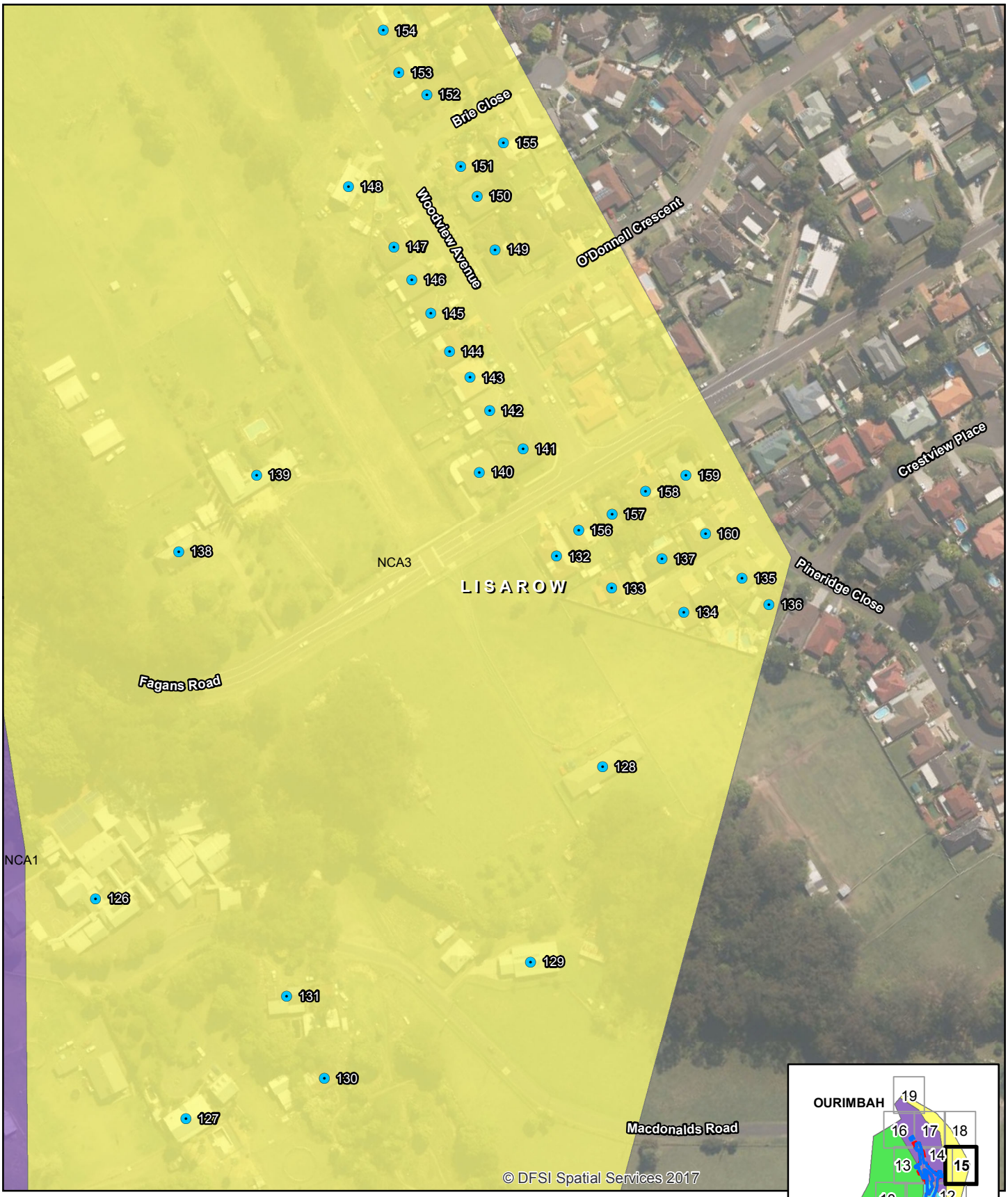

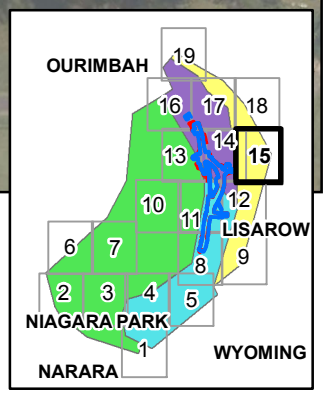

LEGEND

- Sensitive receiver

Noise catchment areas

- NCA1
- NCA3

Paper Size A4

0 12.5 25 50 75

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

Roads and Maritime Services
Pacific Highway Upgrade Stage 3B, Lisarow
Addendum Review of Environmental Factors 2

Job Number 22-18239
Revision 0
Date 26 Jun 2018

Noise sensitive receivers and noise monitoring locations - Sheet 15 of 19

Figure A7

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com **W** www.ghd.com.au

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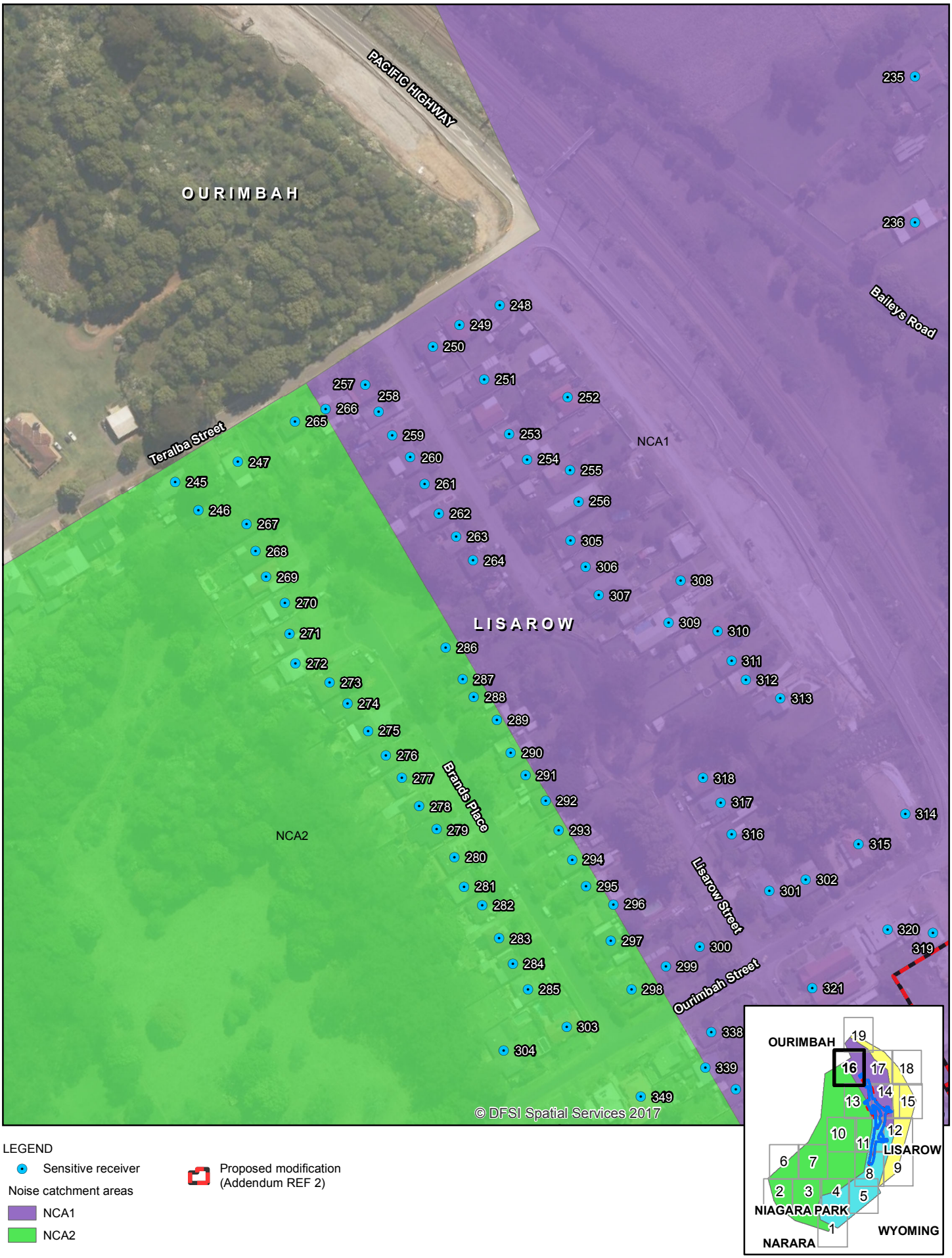

LEGEND

- Sensitive receiver
- Proposed modification (Addendum REF 2)

Noise catchment areas

- NCA1
- NCA2

Paper Size A4

0 12.5 25 50 75

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

Roads and Maritime Services
Pacific Highway Upgrade Stage 3B, Lisarow
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Noise sensitive receivers and noise monitoring locations - Sheet 16 of 19

Figure A8

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 T 61 2 4979 9999 F 61 2 4979 9988 E ntlmail@ghd.com W www.ghd.com.au

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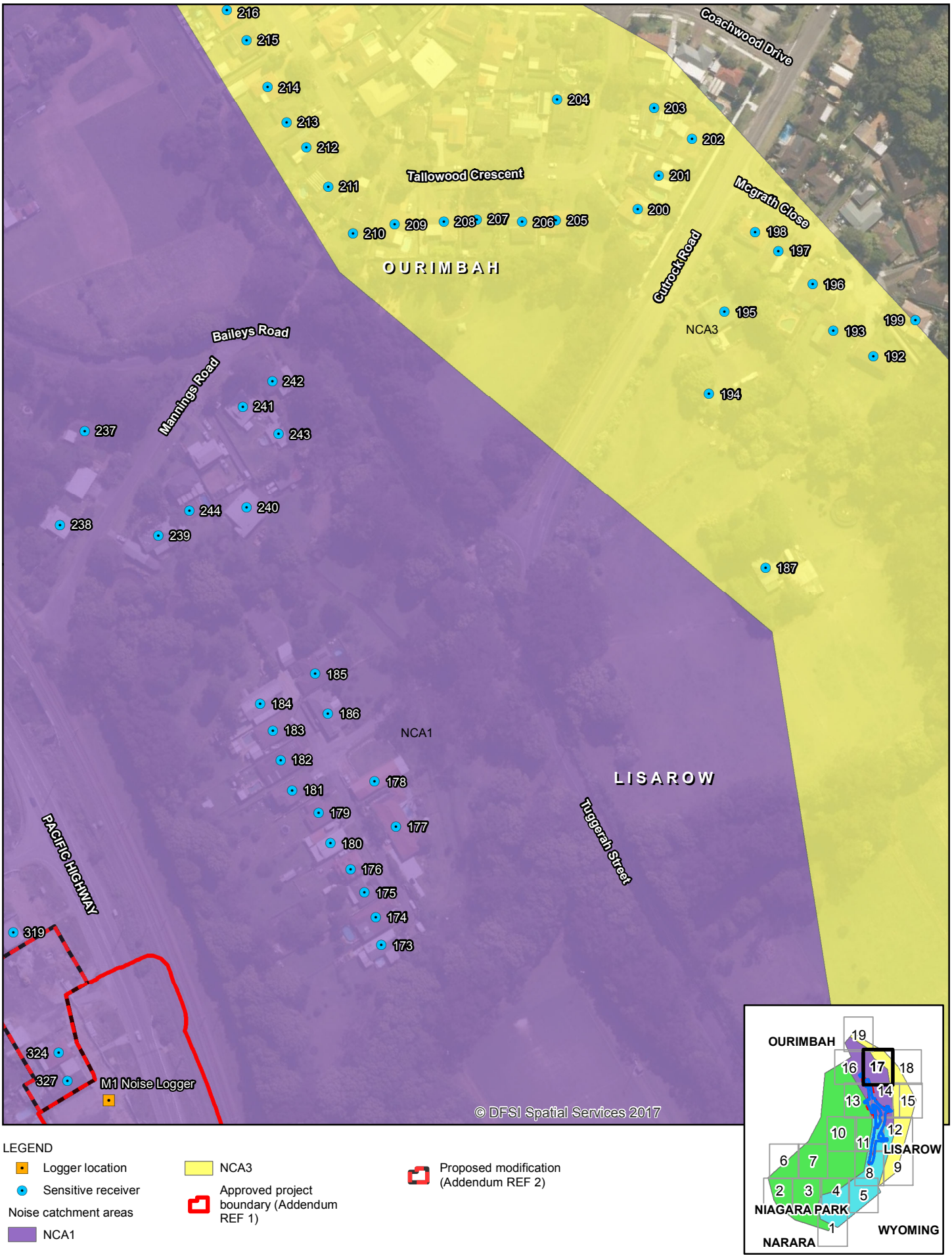
Data source: LPI: Aerial imagery, 2015; DTDB, 2015. Created by: tmorton



LEGEND

- Logger location
- Sensitive receiver

Noise catchment areas

- NCA1
- NCA3
- Approved project boundary (Addendum REF 1)
- Proposed modification (Addendum REF 2)

Paper Size A4

0 12.5 25 50 75

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

Roads and Maritime Services
Pacific Highway Upgrade Stage 3B, Lisarow
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Job Number 22-18239
Revision 0
Date 26 Jun 2018

Noise sensitive receivers and noise monitoring locations - Sheet 17 of 19

Figure A9

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 T 61 2 4979 9999 F 61 2 4979 9988 E ntlmail@ghd.com W www.ghd.com.au

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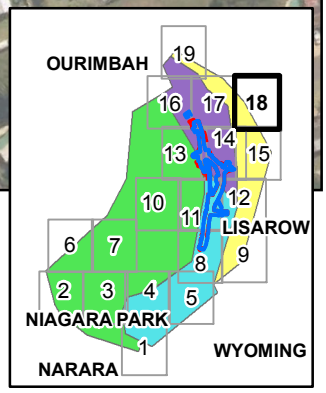

LEGEND

- Sensitive receiver

Noise catchment areas

- NCA3

Paper Size A4

0 12.5 25 50 75

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

Roads and Maritime Services
Pacific Highway Upgrade Stage 3B, Lisarow
Addendum Review of Environmental Factors 2

Job Number 22-18239
Revision 0
Date 26 Jun 2018

Noise sensitive receivers and noise monitoring locations - Sheet 18 of 19

Figure A10

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com **W** www.ghd.com.au

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Data source: LPI: Aerial imagery, 2015; DTDB, 2015. Created by: tmorton

LEGEND

- Sensitive receiver

Noise catchment areas

- NCA1
- NCA3

Paper Size A4

0 12.5 25 50 75

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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Job Number	22-18239
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Noise sensitive receivers and noise monitoring locations - Sheet 19 of 19

Figure A11

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com **W** www.ghd.com.au

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Data source: LPI: Aerial imagery, 2015; DTDB, 2015. Created by: tmorton

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