Appendix A

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

Clause 228(2) Checklist

In addition to the requirements of the *Is an EIS required?* guideline (DUAP 1995/1996) and the *Roads and Related Facilities EIS Guideline* (DUAP 1996) as detailed in the REF, the following factors, listed in clause 228(2) of the *Environmental Planning and Assessment Regulation 2000*, have also been considered to assess the likely impacts of the proposal on the natural and built environment.

Factor	Impact
a. Any environmental impact on a community?	
The proposal would result in short-term negative impacts to the local community as a result of construction noise, visual impacts, dust and traffic disruptions. Safeguards and management measures outlined in section 7.2 would be implemented to minimise these impacts.	Short-term moderate negative
The visual amenity of the surrounding landscape would be affected by the new road. The implementation of the safeguards in section 6.6.3 would reduce visual impacts.	Long-term minor negative
The proposal would benefit the community and regional economy by improving traffic and freight efficiency between Gundagai and Tumut and by improving safety for all road users.	Long-term positive
b. Any transformation of a locality?	
The proposal would result in changes to the visual characteristics of the area in the vicinity of the proposal through the construction of a new road with large embankments in areas of cut and fill earthworks (see section 6.6). The proposed cut and fill embankments would not introduce a new feature in the landscape, as road embankments already exist along Gocup Road. Therefore the proposal would not change the landscape character of the investigation area. The proposed road embankments would be larger than the existing embankments, making these features more prominent along Gocup Road. However, the proposal would be in keeping with the current road environment and would not have a substantial visual impact on any residences in the area.	Long-term minor negative
c. Any environmental impact on the ecosystems of the locality?	
During construction there is an increased risk of impacts such as erosion leading to water quality impacts, chemical and fuel spills, construction noise and spread of pathogens. These risks would be minimised through the implementation of safeguards detailed in sections 6.1.3 and 6.2.3.	Short-term minor negative
The proposal would remove about 1.1 hectares of native vegetation, all of which classifies as TSC Act-listed Box-Gum Woodland. This woodland provides habitat for threatened fauna. Impacts on listed biota are unlikely to be significant, as detailed in section 6.1.3. Detailed design and implementation of safeguards and management measures would aim to minimise biodiversity impacts.	Long term minor negative

Factor	Impact
d. Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality?	
During construction, the proposal would reduce the aesthetic quality of the locality as a result of visual impacts, dust generation and traffic movements. Noise impacts would occur from construction plant, machinery and vehicles. These impacts would be minimised through implementation of safeguards outlined in section 7.2.	Short term minor negative
The proposal would result in changes to the visual characteristics of the area in the vicinity of the proposal through the construction of a new road with large embankments in areas of cut and fill earthworks (see section 6.6). The proposed cut and fill embankments would not introduce a new feature in the landscape, as road embankments already exist along Gocup Road. Therefore the proposal would not change the landscape character of the investigation area. The proposed road embankments would be larger than the existing embankments, making these features more prominent along Gocup Road. However, the proposal would be in keeping with the current road environment and would not have a substantial visual impact on any residences in the area.	Long term minor negative
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 proposal is unlikely to have impacts on sites of heritage value. The heritage impacts of the proposal have therefore been assessed as being low.	Nil
f. Any impact on the habitat of protected fauna (within the meaning of the *National Parks and Wildlife Act* 1974)?	
The proposal would remove about 1.1 hectares of native vegetation, all of which classifies as TSC Act-listed Box-Gum Woodland. This woodland provides habitat for threatened fauna. Impacts on listed biota are unlikely to be significant, as detailed in section 6.1.3. Detailed design and implementation of safeguards and management measures would aim to minimise biodiversity impacts.	Long-term minor negative
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 proposal would remove about 1.1 hectares of native vegetation, all of which classifies as TSC Act-listed Box-Gum Woodland. This woodland provides habitat for threatened fauna. Impacts on listed biota are unlikely to be significant, as detailed in section 6.1.3. Detailed design and implementation of safeguards and management measures would aim to minimise biodiversity impacts.	Long-term minor negative

Factor	Impact
h. Any long-term effects on the environment?	
The proposal would cause long-term ecological impacts as described in (g) above. Detailed design and implementation of safeguards and management measures would aim to minimise biodiversity impacts as described in section 6.1.	Long-term minor negative
Long term visual impacts to the surrounding environment would occur as described in (d) above.	Long-term minor negative
The proposal would benefit the community and regional economy by improving traffic and freight efficiency between Gundagai and Tumut and by improving safety for all road users.	Long-term positive
i. Any degradation of the quality of the environment?	
The proposal would result in short-term negative impacts to the local community as a result of construction noise, visual impacts, dust and traffic disruptions. Safeguards and management measures outlined in section 7.2 would be implemented to minimise these impacts.	Short-term moderate negative
The proposal would cause long-term minor ecological impacts as described in (g) above. Detailed design and implementation of safeguards and management measures would aim to minimise biodiversity impacts as described in section 6.1.	Long-term minor negative
Long-term visual impacts to the surrounding environment would occur as described in (d) above.	Long-term minor negative
j. Any risk to the safety of the environment?	
There is potential for road safety to be affected during construction due to changed traffic conditions near existing roads. Traffic management safeguards described in section 6.3.3, including the preparation of a traffic management plan, would address safety risks.	Short-term minor negative
The proposal would improve the safety of Gocup Road for the community by providing improved road infrastructure meeting current road design standards.	Long-term positive
k. Any reduction in the range of beneficial uses of the environment?	
The proposal would result in minor traffic impacts during construction, including an increase in the volume of heavy vehicles, and interruptions to traffic flow and temporary changes in speed limit. These impacts would be mitigated by the measures outlined in 6.3.	Short-term minor negative
The proposal would acquire about 9.3 hectares of land from rural properties, which is a relatively small proportion of the total agricultural land in the area and is unlikely to substantially affect any property owners. The proposal would not result in a reduction in the range of beneficial uses of the environment.	Long-term minor negative

Factor	Impact
The proposal would increase the range of beneficial uses of the environment by providing access along Gocup Road for high productivity vehicles.	Long-term positive
l. Any pollution of the environment? The proposal would result in short-term pollution impacts as a result of construction noise, visual impacts and dust. Safeguards and management measures outlined in section 7.2 would be implemented to minimise these impacts. Waste generated during construction could pollute the environment. Waste would be managed in line with the safeguards outlined in section 6.11.2. Operation of roads leads to the build-up of contaminants (such as oil and heavy metals) on road surfaces and roadside corridors. General stormwater runoff from the road has the potential to transport these contaminants and impact on the surrounding environment.	 Short-term moderate negative Short-term minor negative Long-term minor negative
m. Any environmental problems associated with the disposal of waste? Waste streams generated during construction are common and would pose no difficulty in their disposal. Waste would be recycled wherever possible. Waste would be managed in line with the safeguards outlined in section 6.11.2.	 Nil
n. Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply? All resources required for the proposal are readily available and are not in short supply.	 Nil
o. Any cumulative environmental effect with other existing or likely future activities? Potential cumulative impacts relate to soil erosion and sedimentation, construction noise, and disruption for local road users. With the implementation of the safeguards detailed in this REF, these impacts are unlikely to be significant.	 Nil
p. Any impact on coastal processes and coastal hazards, including those under projected climate change conditions? The proposal is not located within a coastal area, and would not cause 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 proposal should be referred to the Australian Government Department of the Environment and Energy.

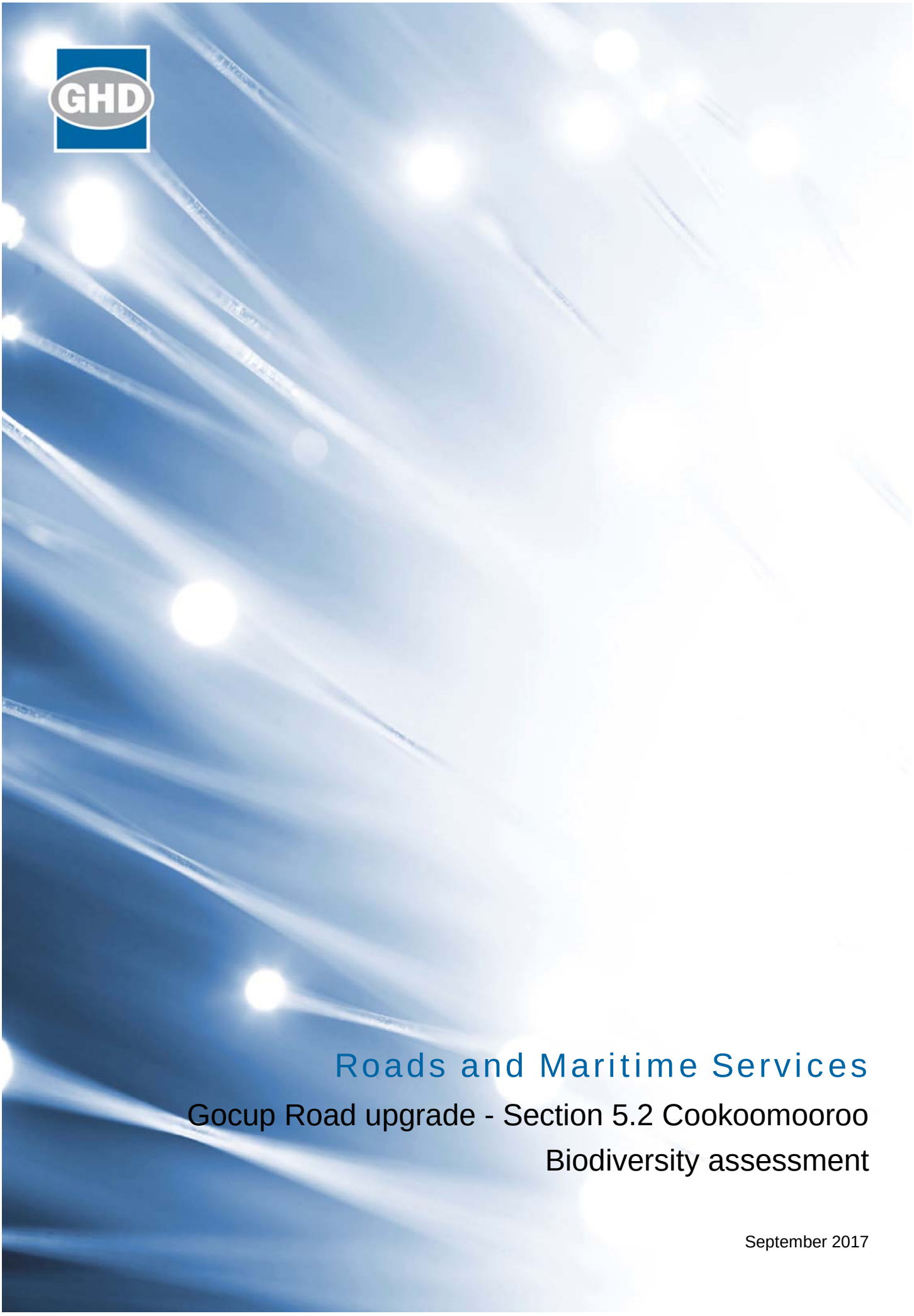
A referral is not required for proposed actions that may affect nationally listed threatened species, populations, endangered ecological communities and migratory species. Impacts on these matters are still assessed as part of the REF in accordance with Australian Government significant impact criteria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

Factor	Impact
a. Any impact on a World Heritage property? The proposal would not have any impact on a World Heritage property. There are no World Heritage properties within 10 kilometres of the investigation area.	No impact
b. Any impact on a National Heritage place? The proposal would not have an impact on a National Heritage place.	No impact
c. Any impact on a wetland of international importance? No wetlands of international importance are located near the investigation area.	No impact
d. Any impact on a listed threatened species or communities? Woodland proposed to be removed provides habitat for fauna listed as threatened under the EPBC Act. The proposed removal of habitat is unlikely to have significant impacts on threatened biota due to the relatively small area of habitat that would be affected by the proposal, the disturbed nature of most of the habitat proposed to be removed, the mobility of the species assessed, the proposal being unlikely to significantly fragment habitat for these species and the low number of hollow-bearing trees proposed to be removed. An assessment of impacts was carried out in section 6.1 and is detailed further in the biodiversity assessment (Appendix B).	Minor
e. Any impacts on listed migratory species? The proposed removal of habitat is unlikely to have substantial impacts on migratory species (see biodiversity assessment in section 6.1 and Appendix B).	Minor
f. Any impact on a Commonwealth marine area? The proposal is not located near a marine area.	No impact

Factor	Impact
g. Does the proposal involve a nuclear action (including uranium mining)? The proposal does not involve a nuclear action (including uranium mining).	No impact
h. Any environmental impact on the Great Barrier Reef Marine Park? The proposal would not result in any impacts to the Great Barrier Reef Marine Park due to its distance from the park.	No impact
i. Any environmental impact on a water resource, in relation to coal seam gas development and large coal mining development? The proposal is not a coal seam gas or large coal mining development.	No impact
j. Any impact (direct or indirect) on Commonwealth land? The proposal would not have an impact (direct or indirect) on Commonwealth land.	No impact
k. The environment, where Commonwealth agencies are proposing to take action? Roads and Maritime is not a Commonwealth agency.	No impact

Appendix B

Biodiversity assessment



Roads and Maritime Services

Gocup Road upgrade - Section 5.2 Cookoomooroo

Biodiversity assessment

September 2017

Executive summary

The proposal

Roads and Maritime Services (Roads and Maritime) proposes to upgrade section 5.2 (Cookoomooroo) of Gocup Road (MR279) (see Figure 1.2). This section is about 1.7 kilometres in length. The proposal involves realignment and widening to improve curve radius and sight distance.

Legislative requirements

The proposal can be assessed under Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Roads and Maritime is the determining authority. A biodiversity assessment is required to consider the effect of the proposal on the items listed under s.111 of the EP&A Act.

Other NSW legislation that has been taken into account in preparing this biodiversity assessment includes the *Threatened Species Conservation Act 1995* and *Noxious Weeds Act 1993*.

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides a mechanism for assessing the environmental impact of activities and developments, where matters of national environmental significance may be affected by the proposal.

In September 2015, a 'strategic assessment' approval was granted by the Federal Minister in accordance with the EPBC Act. The approval applies to Roads and Maritime activities being assessed under Part 5 of the EP&A Act with respect to potential impacts on nationally listed threatened species, ecological communities and migratory species.

Methods

A desktop review was conducted to obtain records of threatened and migratory species, populations and ecological communities listed under the TSC Act and EPBC Act with the potential to occur in the locality. The desktop review included searches of local, state and Commonwealth databases and a review of previous environmental reports prepared in the locality.

Flora and fauna field surveys were conducted in the study area at various times between 8 October 2014 and 7 April 2016. Surveys included:

- Box-Gum Woodland and general flora surveys (in accordance with the BioBanking Assessment Methodology)
- Hollow-bearing tree surveys
- Fauna habitat assessment
- Diurnal bird surveys (for the full length of the Gocup Road works program)
- Anabat detection and analysis (at two other locations on Gocup Road – Smarts Road and Stuckeys Creek)
- Reptile and amphibian searches
- Opportunistic fauna observations
- Rapid assessment of Box-Gum Woodland in the study area for all upgrade sections.

Existing environment

Flora surveys identified the presence of Box-Gum Woodland, a threatened ecological community listed under the TSC Act, in the study area.

Fauna surveys along the full length of the Gocup Road works program identified five threatened bird species and two threatened microchiropteran bat species at Gocup Travelling Stock Reserve, Smarts Road (section 2.1) and Stuckeys Creek (section 3.4). A number of other listed species have also been recorded in the study area and locality.

Potential impacts

The proposal would remove 1.1 hectares of native vegetation, all of which is classified as Box-Gum Woodland listed under the TSC Act. Due to having a degraded understorey, none of this Box-Gum Woodland meets the classification criteria of the EPBC Act form of the ecological community. The proposal would remove seven hollow-bearing trees containing about 37 hollows. The proposal also has the potential to cause the spread of weeds.

The full program of works along Gocup Road would remove 41.6 hectares of the Box-Gum Woodland ecological community. Of this, 12.8 hectares is moderate/good condition woodland, 19.8 hectares is derived grassland and 9.0 hectares is low condition woodland. The derived grassland is modified by grazing and has a relatively low diversity of native flora species. Low condition Box-Gum Woodland and derived grassland represent 69 per cent of all Box-Gum Woodland removal.

The proposal could potentially impact on 16 bird species, four bat species and one ecological community listed under the TSC Act. The proposal could also potentially impact upon two bird species and one bat species listed as threatened under the EPBC Act.

Safeguards and management measures

Roads and Maritime would implement safeguards and management measures to avoid and minimise potential impacts on fauna and flora as much as possible. These include measures such as minimising native vegetation removal, promoting vegetation connectivity, placement of coarse woody debris as habitat, implementation of a weed management plan and water quality control measures.

Biodiversity offsetting

Roads and Maritime would implement a Biodiversity Offset Strategy for the full Gocup Road program of works in line with the Roads and Maritime policy document ‘Guideline for Biodiversity Offsets’.

Conclusion

The proposal is unlikely to have a significant impact on any biota listed under the TSC Act. A species impact statement would not be required. The proposal is unlikely to have a significant impact on any biota listed under the EPBC Act.

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Terms and abbreviations

Definitions

Cumulative impact	The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. Refer to Clause 228(2) of the EP&A Regulation 2000 for cumulative impact assessment requirements.
Direct impact	Where a primary action is a substantial cause of a secondary event or circumstance which has an impact on a protected matter (ref http://www.environment.gov.au/system/files/resources/0b0cfb1e-6e28-4b23-9a97-fdadda0f111c/files/environment-assessment-manual.pdf).
Habitat	An area or areas occupied, or periodically or occasionally occupied, by a species, population or ecological community, including any biotic or abiotic component (OEH 2014).
Indirect impact	Where an event or circumstance is a direct consequence of the action (ref http://www.environment.gov.au/system/files/resources/0b0cfb1e-6e28-4b23-9a97-fdadda0f111c/files/environment-assessment-manual.pdf).
Local occurrence of ecological community	The ecological community that occurs within the study area. However, the local occurrence may include adjacent areas if the ecological community in the study area forms part of a larger contiguous area of that ecological community and the movement of individuals and exchange of genetic material across the boundary of the study area can be clearly demonstrated.
Local population	The population that occurs in the study area. The assessment of the local population may be extended to include individuals beyond the study area if it can be clearly demonstrated that contiguous or interconnecting parts of the population continue beyond the study area, according to the following definitions: • The local population of a threatened plant species comprises those individuals occurring in the study area or the cluster of individuals that extend into habitat adjoining and contiguous with the study area that could reasonably be expected to be cross-pollinating with those in the study area • The local population of resident fauna species comprises those individuals known or likely to occur in the study area, as well as any individuals occurring in adjoining areas (contiguous or otherwise) that are known or likely to utilise habitats in the study area • The local population of migratory or nomadic fauna species comprises those individuals that are likely to occur in the study area from time to time.
Locality	The area within a 10 kilometre radius of the proposal site.
Matters of NES	A matter of national environmental significance (NES) protected by a provision of Part 3 of the EPBC Act
Mitchell landscape	Landscapes with relatively homogeneous geomorphology, soils and broad vegetation types, mapped at a scale of 1:250,000 (OEH 2014).
Mitigation	Action to reduce the severity of an impact (OEH 2014).
Mitigation measure	Any measure that facilitates the safe movement of wildlife and/or prevents wildlife mortality.
Movement habitat	Any form of habitat that may be used by fauna species to aid movement through an area. This may include, for example, remnant native vegetation corridors or permanent and ephemeral streams.
Population	All the individuals that interbreed within a given area.
Proposal site	The area of land that is directly impacted on by the proposal, including access roads, and areas used to store construction materials (OEH 2014).

Study area	Includes the proposal site and any additional areas likely to be affected by the development, either directly or indirectly (OEH 2014). The study area incorporates the land within a 500 metre radius of the proposal site.
Target species	A species that is the focus of a study or intended beneficiary of a conservation action or connectivity measure.

1. Introduction

1.1 Project background

Roads and Maritime Services (Roads and Maritime) is proposing a program of works to upgrade sections of Gocup Road (MR279) to meet modern freight demands and address vehicle safety requirements. Gocup Road is about 31 kilometres in length and runs north from the Snowy Mountains Highway (HW4) at Tumut to the Hume Highway (HW2) at Gundagai (see Figure 1.1).

Heavy vehicles associated with the local timber and milling industry primarily use Gocup Road. The road does not meet current road design standards. It is generally narrow, with tight corners and steep vertical alignment sections. The road surface is deteriorating and is not suitable for existing and future large volumes of heavy vehicles.

Upgrades to Gocup Road are a medium to long-term action in the NSW 'Long Term Transport Master Plan' and the 'Murray –Murrumbidgee Regional Transport Plan'/

The Gocup Road works program has been underway since 2012. To date, eight projects have been completed, with the remaining major works in the development stages. Minor works including shoulder widening and barrier installation at two sections of Gocup Road are also in the development phase (sections 1 and 5.1 minor works).

Table 1.1 summarises the program of works to date, which is also shown in Figure 1.1.

Table 1.1: Gocup Road upgrades program of works

Project Name	Section	Length	Status
Section 1 minor works	1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7	5.2 km	Development Phase
Smarts Road	Section 2.1	2.7 km	Completed
Meadow Creek South	N/A	0.9 km	Completed
Meadow Creek	N/A	1.4 km	Completed
South Minjary	Section 3.1	1.2 km	Completed
Quidong 90	Section 3.2	1.1 km	Completed
Quidong Corner	Section 3.3	0.7 km	Completed
Stuckeys Creek	Section 3.4	1.8 km	Completed
Halfway Hill	Section 4	3.6 km	Development Phase
Doctors Hill	Section 4	2.3 km	Development Phase
Edwardstown Road	Section 5.1	3.5 km	Development Phase
Cookoomooroo	Section 5.2	1.6 km	Development Phase
Abattoir	Section 6.1	2.3 km	Completed

Strategic objectives for the Gocup Road program of works are to:

- Support more efficient high productivity vehicle access
- Provide a safer road environment to reduce the frequency and severity of crashes for all vehicles

- Provide a pavement which will support the needs of current and future freight vehicles and provide good level of service with minimal maintenance cost
- Be sensitive to the area's natural environment, heritage and local communities.

This biodiversity assessment has been prepared for section 5.2 (Cookoomooroo) (hereon referred to as 'the proposal') (see Figure 1.2).

1.2 The proposal

Roads and Maritime proposes to upgrade section 5.2 (Cookoomooroo) of Gocup Road (MR279) (see Figure 1.2). Section 5.2 (Cookoomooroo) is about 1.7 kilometres in length. The proposal involves realignment and widening to improve curve radius and sight distance.

1.2.1 Key features

The existing road is typically nine metres wide, with two 3.5 metre travel lanes and two one metre unsealed shoulders.

Key features of the proposal include:

- Widening the sealed road width to 9.7 metres
- Excavating and trimming cut batters and widening fill batters
- Constructing a major cut section with a length of 420 metres and maximum depth of 18.8 metres
- Constructing a major fill section with a length of 420 metres and a maximum height of 20.6 metres
- Realigning some sections of road. This would include curve alignment changes of up to 115 metres
- Providing three temporary sediment basins
- Installing safety barriers
- Revegetation of decommissioned road sections
- A site compound and stockpile sites (including the existing stockpile site used for the Abattoir project – section 6.1).

1.2.2 Construction activities

Construction is expected to commence in 2018/2019, with an expected duration of between 12 and 15 months.

Staging of work

Work would occur in three stages:

- Stage 1 includes bulk earthworks, drainage and road construction for all sections of new road. A temporary traffic diversion would also be constructed as shown Figure 1.2. The expected duration for this stage of work is about 10 months
- Stage 2 involves building the section of new road where it crosses the existing road in the centre of the proposal site. This stage is expected to take one to two months
- Stage 3 involves work to connect the new realigned road to the existing road at the northern and southern limits of the proposal. Stage 3 work is expected to take about two months.

Pre-construction activities

Pre-construction activities would include:

- Establishing the site (fencing, site compound and stockpile sites)
- Installing environmental control measures and erosion and sediment controls, including clean and dirty water diversions
- Setting up temporary stockpile sites for storing materials
- Establishing the site compound including site office and toilet facilities
- Establishing a turning area for vehicles, plant and equipment
- Setting up temporary traffic controls.

Road construction activities

Road construction activities would include:

- 36.8 hectares of vegetation clearing (primarily groundcover) and tree removal. Of this, 1.1 hectares is native vegetation
- Road work, including:
  - Stripping, stockpiling and management of topsoil
  - Excavating material and placing fill for new sections of road
  - Excavating existing road shoulders and placing earth fill for road widening or realignment
  - Blasting may be required depending on the hardness of the rock
  - Constructing road drainage – agricultural (subsoil) pipes to drain the gravel layers, and surface drains
  - Constructing road including placing and mixing gravel, mixing in lime or other products to improve the gravel, reshaping and compacting gravel
  - Laying a bitumen seal on the new road surface
  - Providing or adjusting safety barriers
  - Replacing existing line marking, raised pavement markers, guideposts and signage.
- Drainage work, including:
  - Removing soil and other debris from culverts
  - Installing three new culverts
  - Extending, realigning or replacing eight culverts. This may include excavating fill around and above culverts, constructing with in situ and precast concrete, placing bedding material, installing pipe culvert or box units, placing and compacting gravel (rock scour protection), and installing concrete headwalls
  - Re-grading table drains where required.
- Using, storing and disposing of excavated material, spoil and unsuitable material including the following:
  - Suitable excavated material would be re-used as fill
  - Excess gravel and other materials that can be re-used would be stockpiled permanently at previously approved locations on site, or permanently off site at Roads and Maritime facilities
  - Unsuitable materials that cannot be re-used would be transported to licensed disposal facilities

- Reinstating property accesses
- Removing about 100 tonnes of asphalt from decommissioned sections of road
- Site clean-up and rehabilitation, including:
  - Removing and revegetating temporary stockpile sites
  - Revegetating disturbed areas
  - Possible landscaping treatments to aid vegetation connectivity, which will form part of the biodiversity offset strategy
  - Removing temporary erosion and sedimentation controls
  - Removing temporary traffic controls.

1.2.3 Earthworks

Proposed earthworks would create cut (excavation) and fill sections in the land surface with a width of up to 100 metres. Cut sections would have a maximum depth of 20.6 metres and fill sections would have a maximum height of 18.8 metres.

Embankment batter slopes would be 4 horizontal: 1 vertical for batters with a height/depth of less than seven metres and generally 2 horizontal: 1 vertical for batters with a height/depth of greater than seven metres. Sections of deep cut (around 21 metres) would have batters of 1.5 horizontal: 1 vertical.

Sections of steeper batters (1.5 to 2 horizontal: 1 vertical) would typically have lengths of about 200 metres. Cut and fill embankments would have benches to restrict the maximum slope length to nine metres.

1.2.4 Ancillary facilities

A site compound would be established at the existing stockpile site from the Abattoir section (section 6.1) of the program of works, north of the proposal site (see Figure 1.2).

The site compound would be used to store plant and equipment, to provide site offices, parking and amenities for construction staff, and to stockpile materials as required. Chemicals and fuels for construction would be stored in appropriate storage areas within the site compound.

Four stockpile sites are proposed for Cookoomooroo, including the existing site from the Abattoir section (section 6.1) north of the proposal site. Other smaller stockpile sites may also be located within the proposal site as required.

Stockpile sites would primarily be used for storing construction materials. One stockpile site may also be used for plant operation

Where required, any additional stockpile sites would be established on already disturbed or cleared flat areas, away from native vegetation and drainage lines. If required, this may include land on private property (by agreement).

1.2.5 Construction environmental management plan

A construction environmental management plan (CEMP) would be prepared to describe the safeguards and management measures identified in this biodiversity assessment, the REF and other specifications. The CEMP would provide a framework for establishing how these measures will be implemented and who would be responsible for their implementation.

1.3 Legislative context

This biodiversity assessment is required to fulfil the requirements of Part 5 of the NSW EP&A Act. The following legislation and State Environmental Planning Policies have been consulted and are relevant to the proposal.

1.3.1 NSW Environmental Planning and Assessment Act 1979

The proposal can be assessed under Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Roads and Maritime is the determining authority.

Under s.111 of the EP&A Act, Roads and Maritime must consider the effect of an activity on:

- Any conservation agreement entered into under the *National Parks and Wildlife Act 1974* (NP&W Act)
- Any plan of management adopted under the NP&W Act for the conservation area to which the agreement relates
- Any joint management agreement entered into under the *Threatened Species Conservation Act 1995* (TSC Act)
- Any BioBanking agreement entered into under Part 7A of the TSC Act
- Any wilderness area (within the meaning of the *Wilderness Act 1987*) in the locality
- Critical habitat
- Threatened species, populations and ecological communities, and their habitats and whether there is likely to be a significant effect
- Any other protected fauna or protected native plants within the meaning of the NP&W Act.

Section 5A of the EP&A Act includes an assessment of significance, which uses seven factors to assist in determining if the proposed activity '*is likely to have a significant effect on the threatened species, populations or ecological communities, or their habitats'.* These seven factors must be taken into account by the determining authority when considering a proposed activity. This enables a decision to be made as to whether there is likely to be a significant impact on the species, population or ecological community, and hence if a species impact statement is required.

1.3.2 NSW Threatened Species Conservation Act 1995

The *Threatened Species Conservation Act 1995* (TSC Act) lists a number of threatened species, populations and ecological communities to be considered when deciding whether there is likely to be a significant impact on threatened biota or their habitats. If a species of flora or fauna listed in Schedule 1 or 2 of the TSC Act is identified, a review must be carried out of the factors set out to establish if there is likely to be a significant impact on that species, population, ecological community or habitat. If any of these could be impacted by the proposal, an assessment of significance that addresses the requirements of section 5A of the EP&A Act must be completed to determine the significance of the impact.

If a significant impact on a threatened species, population or ecological community is likely, a species impact statement must be completed and consultation with the NSW Office of Environment and Heritage (OEH) is required.

1.3.3 Biosecurity Act 2015

The primary object of the *Biosecurity Act 2015* is to provide a framework for the prevention, elimination and minimisation of biosecurity risks posed by biosecurity matter, carriers and potential carriers.

In NSW, all plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.

Priority weeds have been identified for the Cootamundra-Gundagai region. One priority weed species was identified during flora surveys; Blackberry (*Rubus* sp.). The potential impacts of the proposal relating to priority weeds are included in section 4.2.2.

1.3.4 Commonwealth Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides a mechanism for assessing the environmental impact of activities and developments, where matters of national environmental significance may be affected by the proposed activities.

Matters of national environmental significance relevant to ecological assessments include:

- Migratory species protected under international agreements
- Ramsar wetlands of international importance
- Listed threatened species and communities
- Commonwealth land.

In September 2015, a 'strategic assessment' approval was granted by the Federal Minister in accordance with the EPBC Act. The approval applies to Roads and Maritime activities being assessed under Part 5 of the EP&A Act with respect to potential impacts on nationally listed threatened species, ecological communities and migratory species.

As a result, Roads and Maritime projects assessed via an REF:

- Must address and consider potential impacts on nationally listed threatened species, populations, ecological communities and migratory species, including application of the "avoid, minimise, mitigate and offset" hierarchy
- Do not require referral to the Federal Department of the Environment for these matters, even if the activity is likely to have a significant impact.

Roads and Maritime must consider impacts to nationally listed threatened species, ecological communities and migratory species as part of the approval process under the strategic assessment. To assist with this, assessments are required in accordance with the 'Matters of National Environmental Significance: Significant impact guidelines 1.1: Environment Protection and Biodiversity Conservation Act 1999' (DotE 2013).

1.3.5 Gundagai Local Environment Plan 2011

The proposal site is located within the Cootamundra-Gundagai Regional LGA, which was created with the amalgamation of the Cootamundra and Gundagai Shire Councils. Currently, the *Gundagai Local Environmental Plan 2011* is still relevant to the proposal. Under the *Gundagai Local Environmental Plan 2011*, the proposal site is located in the RU1 – Primary Production land use zone.

1.4 Purpose of this report

1.4.1 Purpose

GHD has been engaged by Roads and Maritime to carry out a biodiversity assessment for the upgrade works at section 5.2 (Cookoomooroo) on Gocup Road to assess the potential ecological impacts of the proposal.

The primary objectives of the biodiversity assessment are to:

- Identify potential biodiversity constraints and opportunities, including known or likely presence of species, populations and ecological communities and their habitats listed under the NSW TSC Act, NSW FM Act and Commonwealth EPBC Act
- Identify the potential for any matters of National Environmental Significance (NES) listed under the EPBC Act
- Identify the potential impacts of the proposal on threatened biota and their habitats and advise on potential development design options and specific mitigation/management actions to avoid or minimise impacts on biodiversity values
- Identify, describe and map ecological communities present within the proposal site and study area
- Assess the significance of impacts on threatened biota and matters of NES and identify the likely requirement or otherwise for further approvals under the EP&A Act and/or the EPBC Act
- Recommend safeguards and environmental management measures to avoid, minimise or offset potential impacts on threatened biota and biodiversity values.

1.4.2 Scope and limitations

This report has been prepared by GHD for Roads and Maritime Services and may only be used and relied on by Roads and Maritime Services for the purpose agreed between GHD and Roads and Maritime Services as set out in section 1.4.1 of this report.

GHD otherwise disclaims responsibility to any person other than Roads and Maritime Services arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services carried out 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.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer section 1.4.3 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

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.

1.4.3 Assumptions

The services undertaken by GHD in connection with preparing this biodiversity assessment:

- Were limited to those specifically detailed in section 1.4.1 of this report
- Are based on the footprint presented in this report.

1.5 Proposal site and existing environment

The proposal site is located between chainages 25585 and 27283, north of Tumut. The proposal site includes the area in which road widening and realignment would occur, utility relocations, stockpile sites and a site compound (see Figure 1.2). The proposal site has a total area of about 40 hectares. The proposal site is located in the Cootamundra-Gundagai Regional LGA.

The study area (see Figure 1.2) includes the proposal site and any additional areas that would be affected by the proposal whether directly or indirectly. The study area for the purpose of this report is defined as the area within 500 metres of the proposal site.

The landscape in the study area is dominated by agricultural land with scattered patches of native woodland. The terrain of the study area is hilly to undulating.

Drainage in the study area is shown in Figure 1.2. Two named ephemeral watercourses exist in the study area; Cookoomooroo Creek north of the proposal site and Stony Creek south of the proposal site.

The locality is defined as the area within a 10 kilometre radius of the proposal site.

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GUNDAGAI
Hume Highway
Jessops Lagoon Road
WILLIE PLOMA
Cookoomooroo Creek
Abattoir
6.1
5.2
Cookoomooroo
EDWARDSTOWN
Edwardstown Road
5.1
Edwardstown Road
Slate Quarry Creek
Boons Creek
Tumut River
TARRABANDRA
Snowball Creek
Stony Creek
Brungle Creek
Slaughterhouse Creek
BRUNGLE
Nimbo Creek
Blind Creek
Big Ben Creek
4
Halfway Hill/Doctor's Hill
Quidong Road
Mudjarn Nature Reserve
KILLIMICAT
Stuckeys Creek
3.4
Stuckeys Creek
MINJARY
MIDWAY
Quidong Corner
3.3
3.2
Quidong 90
3.1
Minjary South
Black Spring Gully
Minjary Creek
Meadow Creek
Meadow Creek South
GOCUP
Meadow Creek
Meadow Creek Road
Rocky Gully Road
2.1
Smarts Road
Gocup Farms Road
CALIFAT
Minjary National Park
Califat Creek
West Creek
Donkey Reef Creek
Luffs Gully
Smarts Road
1.7
Gocup TSR
Big Rock Gully
Keefs Gully
1.6
Gocup Creek
BOMBOWLEE
1.5
1.4
1.3
1.2
1.1
Adelong Creek
Golden Gully
Sandy Creek
Snowy Mountains Highway
Gilmore Creek
TUMUT

LEGEND

- Locality
- Stream
- Gocup Travelling Stock Reserve
- Road upgrade
- Road
- NPWS reserve
- Alternate section
- Highway
- Alternate section

Paper Size A3

0 0.5 1 2

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Roads and Maritime Services
Gocup Road upgrade biodiversity assessments

Job Number 23-15356
Revision 0
Date 22 Mar 2017

Program of works overview

Figure 1.1

G:\23\15356\GIS\Maps\Section5_2\Gocup5_2_Fig1-1.mxd

Suite 3, Level 1, 161-169 Baylis Street Wagga Wagga NSW 2650 Australia T 61 2 6923 7400 F 61 2 6971 9565 E wgamail@ghd.com W www.ghd.com

Data source: Roads and Maritime Services: Aerial photograph - 2014; NSW Government (LPI): Localities, streams, roads and NPWS reserves - 2012. Created by:rtrobinson

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Cookoomooroo Creek

Proposed site compound/stockpile site

Proposed sediment basin

Proposed 66kV powerline relocation

Proposed Telstra utilities relocation

Gocup Road

Proposed stockpile site

Proposed stockpile site

Proposed sediment basin

Proposed earth bund

Proposed stockpile site

Proposed sediment basin

Edwardstown Road

Stony Creek

599,500 600,000 600,500 601,000

LEGEND

- Proposed 66kV powerline relocation (assessed separately)
- Proposed Telstra utilities relocation (assessed separately)
- Road design
- Proposed drainage
- Proposed sediment basin
- Proposed temporary road diversion
- Proposed earth bund
- Existing road
- Creek
- Drainage line
- Proposed site compound/stockpile site
- Proposed stockpile site
- Study area

Paper Size A3

0 50 100 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

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Roads and Maritime Services
Gocup Road upgrade biodiversity assessments

Job Number 23-15356
Revision 0
Date 21 Nov 2017

Proposal site and study area

Figure 1.2

G:\23\15356\GIS\Maps\Section5_2\Gocup5_2_Fig1-2.mxd

Suite 3, Level 1, 161-169 Baylis Street Wagga Wagga NSW 2650 Australia T 61 2 6923 7400 F 61 2 6971 9565 E wgamail@ghd.com W www.ghd.com

Data source: Roads and Maritime Services: Aerial photograph - 2014; Road design, proposed drainage, sediment basin, stockpile site and compound site - 2017; proposed temporary road diversion - 2016, ; NSW Government (LPI): Creeks, drainage lines and roads - 2012. Created by:rtrobinson

2. Methods

2.1 Personnel

Two people have been involved in preparing this report (see Table 2.1).

Table 2.1: Personnel and their roles in writing the report

Name	Title	Qualifications	Role
Reuben Robinson	Senior Ecologist	BAppSc (EnvSc) (Hons)	Senior ecologist – technical review
Alexandra Williams	Ecologist	BEnvSc&Mgt	Ecologist and report writing

2.2 Background research

2.2.1 Landscape analysis

A brief landscape analysis was conducted to gauge the landscape value of the vegetation in the study area. The landscape assessment has taken into account the spatial configuration of vegetation, vegetation cover, connectivity and adjacent native vegetation.

Vegetation within a two kilometre radius of the proposal site was viewed using satellite imagery. This analysis is strictly limited to an analysis of the overstorey vegetation. The class and quality of overstorey were not comprehensively assessed for vegetation in the surrounding landscape.

2.2.2 Database review

A search of relevant databases was conducted to obtain records of threatened and migratory species, populations and ecological communities within the region. The search included all species, populations and ecological communities listed under the NSW TSC Act and Commonwealth EPBC Act with the potential to occur in the locality.

The assessment included a review of:

- OEH (2016a) Wildlife Database Atlas – licensed data for Cootamundra-Gundagai LGA. Search of all terrestrial threatened flora and fauna species (within a 20 kilometre radius of proposal site) (searched 18 July 2016)
- OEH (2016b) NSW threatened species, online profiles
- DotEE (2016a) EPBC Act Protected Matters Search Tool – for a 10 kilometre radius around the proposal site (searched 18 July 2016)
- DotEE (2016b) Species profile and threats database, online profiles
- NSW Department of Primary Industries – Fishing and Aquaculture records viewer (DPI 2016) (searched 18 July 2016)
- NSW Department of Primary Industries – priority weed declarations – Cootamundra-Gundagai local government area (DPI 2017) (searched 11 July 2017).

2.2.3 Previous reports

Previous reports prepared for Roads and Maritime for the Gocup Road upgrade project were reviewed for background information, including:

- ‘Preliminary biodiversity investigation: Gocup Road (MR279)’ (EnviroKey 2012)

- ‘Threatened Species Investigations: Selected sections of Gocup Road (MR279)’ (EnviroKey 2013a)
- ‘Biodiversity impact assessment: Gocup Road (MR279) pavement reconstruction, south of Minjary’ (EnviroKey 2013b)
- ‘Biodiversity impact assessment: Gocup Road (MR279) curve realignment, south of Meadow Creek’ (EnviroKey 2013c)
- ‘Silky Swainson-pea management plan: Gocup Road (MR279)’ (EnviroKey 2013d)
- ‘Biodiversity impact assessment: Gocup Road (MR279) – Abattoir widening and quarry realignment’ (EnviroKey 2014a)
- ‘Biodiversity impact assessment: Gocup Road (MR279), Quidong 90 reconstruction’ (EnviroKey 2014b)
- ‘Minor works review of environmental factors: Meadow Creek reconstruction, Gocup Road (MR279)’ prepared by GHD (2011).

2.3 Field survey

Flora and fauna field surveys were carried out by two ecologists at various times between 8 October 2014 and 7 April 2016. Where appropriate, field surveys were conducted with reference to relevant NSW and Commonwealth guidelines including:

- OEH survey guidelines
- BioBanking Assessment Methodology
- ‘Draft Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities’ (DEC 2004).

2.3.1 Survey objective and effort

Primary objectives of field surveys were to:

- Determine the presence and/or potential for threatened flora and fauna species, populations, ecological communities, listed under the NSW TSC Act, NSW FM Act and Commonwealth EPBC Act, and their habitats to occur in the study area
- Determine the value of habitat in the study area for flora and fauna species, particularly for threatened species and species of conservation significance, and describe potential impacts that would result from the proposal
- Describe the flora and fauna species, habitat, populations and ecological communities in the study area in relation to their occurrence and quality in the locality. This included ground-truthing and reference to satellite imagery
- Determine the condition and extent of vegetation removal required for the proposal.

Survey effort specific to section 5.2 (Cookoomooroo) is summarised in Table 2.2. Surveys were also conducted for other sections of work along Gocup Road and are described in the biodiversity assessments for those sections, as well as the corridor assessment for the entire program of works. Due to their relevance to the proposal, the results of the fauna surveys for other sections of Gocup Road are included in section 3 below.

Table 2.2: Survey effort for biodiversity assessment

Survey method	Minimum survey requirements	Surveys completed
Flora		
Box-Gum Woodland and general flora surveys (see Figure 2.1) (in accordance with BioBanking Assessment Methodology) Threatened flora habitat assessment	Requirements specified in Table 3 of the 'Framework for Biodiversity Assessment for number of plots per vegetation zone'	Three plots (20 metres by 50 metres) meeting the requirements of the Framework for Biodiversity Assessment and random meander transects throughout the entire proposal site to record incidental species
Hollow-bearing tree surveys (see Figure 2.1)	N/A	GPS survey of all hollow-bearing trees with the potential to be affected by the proposal
Fauna		
Fauna habitat assessment	N/A	Potential fauna habitat identified within areas of vegetation clearing and adjacent areas
Reptile and amphibian searches	Requirements specified in 'Draft Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities' (DEC 2004) – no specific requirements due to minimal habitats	Opportunistic daytime searches of water habitats and other potential habitat including logs, rocks etc for amphibians and reptiles
Diurnal bird surveys	N/A	Survey transects were completed for other sections of work along Gocup Road, with the nearest at Doctors Hill about 3.5 km south of the proposal site. Due to the small size and degraded quality of the woodland patches in the Cookoomooroo section, targeted bird surveys were not conducted here. The results of all surveys for the program of works are relevant to section 5.2 and are included in section 3 below.
Opportunistic fauna observations	N/A	Opportunistic fauna observations for all fauna species encountered (including birds) during other surveys and habitat assessment

2.3.2 Weather conditions

Surveys were conducted on 7 April 2016. Weather conditions during surveys were fine, with a daytime maximum temperature of 24°C and no rain. Weather observations were obtained from Gundagai, the weather station nearest to the proposal site.

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Cookoomooroo Creek

P21

P20

P19

Stony Creek

Gocup Road

Edwardstown Road

LEGEND

- Flora survey plot
- Hollow-bearing tree
- Remove
- Retain
- Flora survey transect
- Road
- Creek
- Drainage line
- Proposed road upgrade
- Exclusion zone
- Study area

Paper Size A3

0 50 100 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

GHD

Roads and Maritime Services
Gocup Road upgrade biodiversity assessments

Flora and hollow-bearing tree surveys

Job Number 23-15356
Revision 0
Date 21 Nov 2017

Figure 2.1

G:\23\15356\GIS\Maps\Section5_2\Gocup5_2_Fig2-1.mxd

Suite 3, Level 1, 161-169 Baylis Street Wagga Wagga NSW 2650 Australia **T** 61 2 6923 7400 **F** 61 2 6971 9565 **E** wgamail@ghd.com **W** www.ghd.com

Data source: Roads and Maritime Services: Aerial photograph - 2014; NSW Government (LPI): Creeks, drainage lines and roads - 2012. Created by:rtrobinson

2.3.3 Flora

Flora surveys were carried out in the proposal site using transect and plot surveys in accordance with the BioBanking Assessment Methodology (Figure 1.2).

The random meander technique (Cropper 1993) was used for transect surveys. A random search can increase the probability of finding more plant species. A random search effort also encompasses a greater portion of the landscape, as the search is not limited to specific areas (only the stratification unit), and is useful in surveying difficult terrain and irregular shaped search areas.

Three plots (20m x 50m) were surveyed in the proposal site. Within each plot the following vegetation and habitat characteristics were recorded:

- Description of vegetation
- Dominant canopy vegetation
- Dominant understorey vegetation
- Groundcover species and abundance
- Percent native and exotic plant cover
- Number of trees with hollows
- Total length of fallen logs
- Proportion of overstorey regeneration
- Any signs of previous disturbance and grazing.

2.3.4 Vegetation communities

Surveys of vegetation communities in the study area were carried out to characterise vegetation formation, class, structure and condition. Plant community composition is important for areas that have the potential to be a threatened ecological community.

Flora surveys enabled determination of the composition and extent of ecological communities occurring in the study area. The study area was investigated by random meandering transect to identify vegetation communities present and to identify any areas with the potential to be classified as a threatened ecological community.

For areas with the potential to classify as a threatened ecological community, an analysis was carried out using the criteria for classification under the TSC Act and EPBC Act.

Vegetation communities with the potential to be a threatened ecological community were surveyed through characterisation of all vegetation within a plot (20m x 50m) placed randomly within the vegetation community. Plots were surveyed as detailed in section 2.3.3.

Vegetation types within the proposal site and surrounding study area were identified according to the vegetation classes of Keith (2004) and the NSW Plant Community Types database.

2.3.5 Vegetation condition

Condition classes were assigned according to the BioBanking definition of low condition vegetation (OEH 2014):

- Native woody vegetation with an overstorey per cent foliage cover less than 25 per cent of the lower benchmark of over-storey per cent foliage cover for that vegetation type
- Native woody vegetation where less than 50 per cent of vegetation in the ground layer is indigenous species

- Native grassland where less than 50 per cent of vegetation in the ground layer is indigenous species
- Native woody vegetation or grassland where more than 90 per cent is ploughed or fallowed.

Any native vegetation community not in low condition is classed as being in moderate/good condition.

2.3.6 Hollow-bearing tree survey

Surveys of hollow-bearing trees were carried out in the proposal site where work is proposed.

Hollow-bearing trees were surveyed by collecting a GPS position at the location of the tree. For each hollow-bearing tree the following characteristics were recorded:

- Species of tree
- Diameter at breast height (DBH)
- Number of hollows
- Size of hollows.

2.3.7 Fauna

Overview

Fauna surveys comprised habitat assessment for all fauna groups, opportunistic observations of fauna and observations of fauna signs. Targeted surveys were not conducted in the study area due to the relatively small areas of habitat and also due to the substantial data acquired during surveys of other sections of Gocup Road (see below). Fauna habitat resources were assessed to identify areas of potential habitat within the study area. Specific resources such as shelter, basking, roosting, nesting and foraging sites for birds, bats, arboreal mammals, amphibians, ground-dwelling mammals and reptiles were noted.

As part of the full biodiversity assessment project for the entire Gocup Road program of works, fauna surveys were also completed at a number of locations outside the study area. These results are also considered relevant to the proposal. The results of fauna surveys completed for the full program of works along Gocup Road are provided in this report, with reference to the habitat present in the study area (see section 3.4.2).

Habitat assessment

Habitat details recorded included presence or absence of:

- Hollow-bearing trees (arboreal mammals, hollow-nesting birds and microchiropteran bats)
- Feed trees (eg *Allocasuarina* spp. and mistletoe) (birds)
- Roost sites (hollow-bearing trees or caves/rocky outcrops for bats)
- Waterbodies (amphibians)
- Nests (birds)
- Rocky outcrops (reptiles)
- Coarse woody debris (reptiles and birds)
- Other features likely to provide potential habitat for threatened fauna.

Searches for potential mammal, bird, amphibian, and reptile habitat were carried out and recorded during flora surveys.

Opportunistic observations

Any fauna species observed during flora and hollow-bearing tree surveys were recorded as opportunistic observations.

Observations of fauna signs

Any indirect evidence of fauna (eg scats, feathers, fur, tracks, dens, nests, scratches, chew marks and owl wash) was recorded and/or photographed.

2.3.8 Rapid assessment of Box-Gum Woodland in the study area for all upgrade sections

To assist in assessing the cumulative impacts of the removal of Box-Gum Woodland for all upgrade sections of Gocup Road (see section 4.3), a rapid assessment of the woodland in the study area was completed over three days in May 2016.

The rapid assessment involved visiting all woodland patches within 500 metres of Gocup Road, which had been identified from a digital aerial photograph using ArcMap – ArcGIS. The following information was recorded:

- Dominant tree species
- Whether the woodland patch is likely to meet the classification criteria for Box-Gum Woodland (TSC Act and/or EPBC Act listed forms of the community)
- Likely condition of the patch based on initial observations of canopy cover and groundcover vegetation. Condition was assessed according to the condition criteria identified in the BioBanking Assessment Methodology (see section 2.3.5 above).

Due to time constraints, the rapid assessment did not include areas of woodland with sparse canopy cover (therefore in low condition), and did not include areas of derived grassland. Generally, however, large areas of these vegetation types were observed during the surveys.

The rapid assessment did not include mapping of areas of Box-Gum Woodland outside the study area, which are connected to woodland in the study area. These areas were observed from a distance.

To quantify the total area of woodland in the study area, mapping was carried out using ArcMap – ArcGIS.

2.4 Habitat assessment

An assessment of the likelihood of occurrence was completed for listed species, populations and ecological communities with the potential to occur in the study area.

In assessing which of these species, populations and ecological communities are ‘likely’ to occur within the study area (as described in ‘Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities Working Draft)’ (DEC 2004) the following factors were taken into consideration:

- The presence of potential habitat within the study area
- Condition and approximate extent of potential habitat within the study area
- Species occurrence within the locality and region (including results of current and previous surveys and results of database searches and literature review).

Criteria used for assessment of the likelihood of occurrence are as per Appendix B of the Roads and Maritime ‘Biodiversity assessment template for REFs*:* Biodiversity Assessment Practice Note – EIA – N06 – Resource 4’ (2016):

- *Recorded* – The species was observed in the study area during the current survey
- *High* – It is highly likely that a species inhabits the study area and is dependent on identified suitable habitat (ie. for breeding or important life cycle periods such as winter flowering resources), has been recorded recently in the locality (10km) and is known or likely to maintain resident populations in the study area. Also includes species known or likely to visit the study area during regular seasonal movements or migration
- *Moderate* – Potential habitat is present in the study area. Species unlikely to maintain sedentary populations, however may seasonally use resources within the study area opportunistically or during migration. The species is unlikely to be dependent (ie. for breeding or important life cycle periods such as winter flowering resources) on habitat within the study area, or habitat is in a modified or degraded state. Includes cryptic flowering flora species that were not seasonally targeted by surveys and that have not been recorded
- *Low* – It is unlikely that the species inhabits the study area and has not been recorded recently in the locality (within 10 kilometres). It may be an occasional visitor, but habitat similar to the study area is widely distributed in the local area, meaning that the species is not dependent (ie. for breeding or important life cycle periods such as winter flowering resources) on available habitat. Specific habitat is not present in the study area or the species is a non-cryptic perennial flora species that were specifically targeted by surveys and not recorded
- *None* – Suitable habitat is absent from the study area.

For each species, population or ecological community with a likelihood of occurrence category of recorded, high or moderate, and likely to be impacted by the proposal, an EP&A Act 7-Part Test and/or EPBC Act significance assessment was completed.

2.5 Limitations

The timing of flora and fauna surveys for the proposal was suitable for detection of key flora and fauna species. However, some fauna species are mobile and transient in their use of resources. Consequently, it is likely that not all species either resident or transitory at the site would have been recorded during the field surveys. The disadvantage of this limitation was reduced by database searches, and by assessing the habitat value of the study area for threatened and migratory species known to occur in the region, to determine their likelihood of occurrence.

Due to the limited habitat value of the small woodland patches in the study area and the lack of other habitat features, fauna surveys were restricted to opportunistic observations and habitat assessment only. This was considered appropriate, taking into account the results of surveys along other sections of Gocup Road completed for the program of works. Field surveys were not designed to enable all species, either resident or transitory in the study area, to be detected. Instead, they were aimed at identifying the ecological values of the study area, with particular emphasis on threatened and migratory species, to allow an assessment of the potential impacts of the proposal.

For those species of conservation significance that were not detected but likely to occur in the study area, an assessment of the likelihood of their occurrence was made based on known habitat requirements.

Weather conditions during the field surveys were generally fine and did not affect the results of the surveys. Ecologists had full access to the proposal site.

3. Existing environment

3.1 General description

3.1.1 Bioregion

The study area occurs in the South West Slopes Bioregion. This bioregion covers the lower inland slopes of the Great Dividing Range extending from north of Cowra through southern NSW into western Victoria.

3.1.2 Surrounding landuse and vegetation

The surrounding landscape is primarily dominated by agricultural land use, such as grazing. Scattered patches of native woodland exist throughout the study area.

Four unsealed property access roads connect to section 5.2 (Cookoomooroo) of Gocup Road. One access road is located on the eastern side of Gocup Road at the southern end of the proposal site. Two access roads are located each side of Gocup Road at the northern end of the road section. Another private access road is located on the eastern side of the proposal site, about 330 metres south of the northern end of the road section. This road provides access to a residence.

3.1.3 Terrain, geology and drainage

The terrain of the study area is hilly to undulating. The study area occurs in two Mitchell Landscapes:

- Minjary Hills and Ranges
- Murrumbidgee - Tarcutta Channels and Floodplains.

The Minjary Hills and Ranges Mitchell Landscape comprises steep hills and ranges on lower Silurian sandstone, greywacke, quartzite, dacite, tuff and phyllite, and Devonian ignimbrite and sandstone. The general elevation is 300 to 930 metres above sea level, with local relief 400 metres (Mitchell 2002).

The Murrumbidgee – Tarcutta channels and floodplains Mitchell Landscape comprises channels, floodplain and terraces of Murrumbidgee River tributaries on Quaternary alluvium. The general elevation is 200 to 400 metres above sea level, with local relief 25 metres.

The drainage of the study area is shown in Figure 1.2. Two named ephemeral watercourses exist in the study area. Cookoomooroo Creek is a third order stream that passes through the north of the study area and runs along the eastern side of Gocup Road. Stony Creek is a fifth order stream that passes through the south of the study area. Both creeks drain to the Murrumbidgee River three to five kilometres north of the study area.

3.1.4 Soils

The Minjary Hills and Ranges Mitchell Landscape contains rubbly scree with sandy loam matrix on steep slopes, and thin red to yellow texture-contrast soils on lower slopes. The Murrumbidgee – Tarcutta channels and floodplains Mitchell Landscape contains undifferentiated organic sand and loam on the floodplain, and brown gradational loam and yellow texture-contrast soils on higher terraces. (Mitchell 2002).

3.1.5 Climate

The area is classified as warm temperate with a mean annual rainfall of 623.7 millimetres. Summers are generally warm to hot while winters are cold. The highest mean maximum monthly temperature is 32.5°C, occurring in January, while the lowest mean minimum monthly temperature is 2.5°C, occurring in July. Average rainfall is generally highest in November, with an average of 69.4 millimetres (BoM 2016a).

3.2 Plant community types

3.2.1 Classification of plant community types

An ecotone of two plant community types (PCT) is present in the study area (see Figure 3.3).

PCT 266 / PCT 277

Vegetation formation:

Grassy Woodlands (Keith 2004)

Vegetation class:

Western Slopes Grassy Woodlands (Keith 2004)

Plant community type (PCT):

White Box (*Eucalyptus albens*) and Blakely's Red Gum (*Eucalyptus blakelyi*) form an ecotone in the study area of two plant community types:

- 'White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion' (PCT ID 266)
- 'Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion' (PCT ID 277).

Conservation status:

In the study area, both PCTs meet the classification criteria for the ecological community 'White Box Yellow Box Blakely's Red Gum Woodland' (listed as endangered under the TSC Act). Due to not having a native understorey, they do not meet the classification criteria for 'White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland' (listed as critically endangered under the EPBC Act). Both these listed communities are hereon referred to as Box-Gum Woodland.

Estimate of per cent cleared:

Both PCTs are 95 per cent cleared in the Murrumbidgee CMA.

Condition:

Patches of these PCTs in the proposal site are in moderate/good condition and low condition, as defined under the BioBanking Assessment Methodology (OEH 2014) (see section 4.1.1 and Figure 3.3).

Extent in the proposal site:

1.1 hectares (0.7 hectares of moderate/good condition woodland and 0.4 hectares of low condition woodland).

Extent in the study area:

11.8 hectares (moderate/good condition woodland only, not including low condition woodland and derived grassland).

Plots completed in vegetation zone:

Two plots were surveyed in this vegetation zone (one in an area of low condition woodland and one in an area of moderate condition woodland) (see Figure 3.3). A typical vegetation structure of the PCT ID 266/277 ecotone in the study area is provided in Table 3.1.

Table 3.1: Typical vegetation structure in PCT ID 266/277

Structure	Average height and (height range) (m)	Average cover and (cover range)	Typical species
Trees	15 (2-25)	17 (2-30)	White Box, Blakely's Red Gum
Small trees	5 (1-10)	<1 (<1-2)	Kurrajong (*Brachychiton populneus*)
Shrubs	0	0	None
Groundcovers	0.5 (0.05-1)	36 (30-42)	Red-leg Grass (*Bothriochloa macra*), Great Brome (*Bromus diandrus*), Hill Wallaby Grass (*Rytidosperma erianthum*)
Vines and climbers	0	0	None

Description

PCT ID 266 mainly occurs on slopes and crests in hill landform patterns in the NSW South Western Slopes Bioregion. It typically occurs as tall woodland with trees to 25 metres high dominated by White Box often as the only tree species. Kurrajong is often present, particularly on limestone or rocky ground. Apple Box (*Eucalyptus bridgesiana*) or Blakely's Red Gum or Yellow Box (*Eucalyptus melliodora*) may also be present as minor components of the canopy. The shrub layer is usually sparse or absent depending on grazing history or soil type. Wattles are common shrubs. The ground cover is usually mid-dense to dense except during drought and may be very diverse in grass and forb species. Very few areas contain a native ground cover with a rich flora but where this occurs it typically contains grasses such as Kangaroo Grass (*Themeda australis)*, Snow Grass (*Poa sieberiana)*, Common Wheat Grass (*Elymus scaber* var. *scaber)* and a range of *Austrodanthonia* species. In heavily grazed sites fewer native species are present and the sites are dominated by the grasses *Austrostipa* spp, *Aristida* spp. and *Austrodanthonia* spp.. In sites exposed to continuous grazing, soil disturbance and fertilizer application, exotic species dominate the ground cover including *Bromus* spp., *Vulpia* spp., Wild Oats (*Avena fatua)*, Paterson's Curse (*Echium plantagineum)*, Clover (*Trifolium* spp.) and Plantain (*Plantago lanceolata)*. Occurs between 300 - 600 metres altitude in the 500 - 700 millimetre rainfall zone. The soils are mainly red-brown earths, red or yellow podsols with some brown and black earths (OEH 2016c).

PCT ID 277 occurs on flats and on gentle slopes mainly in the upper slopes sub-region. It typically occurs as tall woodland to about 20 metres high dominated by Blakely's Red Gum and Yellow Box. Blakely's Red Gum or Yellow Box vary in their dominance and either can be absent in some places grading into areas with more Apple Box, Long-leaved Box (*Eucalyptus goniocalyx*) and rarely Grey Box (*Eucalyptus microcarpa*). Shrubs are sparse or absent and may include Silver Wattle. The ground cover may be dense to sparse depending on rainfall and is dominated by grass species including *Poa sieberiana*, Red Grass (*Bothriochloa macra*), Purple Wiregrass (*Aristida ramosa*), *Themeda australis*, *Austrodanthonia* spp and *Austrostipa* spp. A very widespread community on fertile deep, loam or clay soils derived from a range of substrates including fine-grained sedimentary and metamorphic rocks but also volcanics and fine-grained granite. Mainly cleared and subjected to nutrification from fertilisers and associated weed invasion (OEH 2016c).

In the study area, the ecotone of PCT ID 266 and PCT ID 277 is typically dominated by White Box and Blakely's Red Gum. Regeneration of eucalypt species is occurring to some extent in all surveyed patches of woodland. Dieback of eucalypt species was observed throughout the study area. The shrub and ground layers are heavily disturbed.

Shrub cover in the vegetation community is absent. The groundcover vegetation is dominated by both introduced and native flora species, such as Red-leg Grass (*Bothriochloa macra*) and Great Brome (*Bromus diandrus*).

Figure 3.1: PCT ID 266/277 in plot 19, looking west

Figure 3.2: PCT ID 266/277 in plot 21, looking north

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Vegetation type and condition

- Ecotonal 266 White Box grassy woodland / 277 Blakelys Red Gum - Yellow Box grassy tall woodland L
- Ecotonal 266 White Box grassy woodland / 277 Blakelys Red Gum - Yellow Box grassy tall woodland M/G
- Non-native vegetation

Cookoomooroo Creek

P21

P20

P19

Gocup Road

Edwardstown Road

599,500 600,000 600,500 601,000

LEGEND

- Flora survey plot
- Hollow-bearing tree
- Remove
- Retain
- Road
- Creek
- Drainage line
- Proposal site
- Exclusion zone
- Study area

Paper Size A3

0 75 150 300

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

GHD

Roads and Maritime Services
Gocup Road upgrade biodiversity assessments

Plant community types and hollow-bearing trees

Job Number	23-15356
Revision	0
Date	21 Nov 2017

Figure 3.3

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Data source: Roads and Maritime Services: Aerial photograph - 2014; NSW Government (LPI): Creeks, drainage lines and roads - 2012. Created by:rtrobinson

Non-native vegetation

Areas of non-native vegetation are located throughout the proposal site (see). These areas occur mostly as introduced grassland dominated by pasture species such as Stinkgrass (*Eragrostis cilianensis*) and Potato Weed (*Heliotropium europaeum*). Introduced tree species that occur in the study area include planted English Elms (*Ulmus procera*) and blossom trees (*Prunus* sp.).

Figure 3.4: Non-native vegetation in plot 20, looking south

3.2.2 Flora survey results and priority weeds

Field surveys identified 54 flora species, including 24 native species and 30 introduced species (see Appendix A).

One flora species listed as a priority weed for the Cootamundra-Gundagai local council area (DPI 2017) was recorded during flora surveys; Blackberry. This was uncommon, with only a few individuals scattered throughout the study area. Under the *Biosecurity Act 2015*, Blackberry is regulated with a 'mandatory measure' duty, with the requirement that it must not be imported into NSW or sold.

Blackberry is also listed as a weed of national significance under the National Weeds Strategy.

3.3 Groundwater dependent ecosystems

Stony Creek in the south of the study area and Cookoomooroo Creek in the north of the study area are identified in the Atlas of Groundwater Dependent Ecosystems (BoM 2016b) as having ecosystems reliant on surface expression of groundwater. The creeks are ephemeral, depending on inflows from groundwater springs and surface runoff during periods of rainfall. The groundwater dependent ecosystem includes narrow strips of woodland along the creeks, generally dominated by Blakely's Red Gum and Yellow Box.

As the groundwater dependent ecosystems in the study area have largely been cleared of native vegetation and are heavily degraded, they do not meet the definition of high ecological

value in the 'Risk assessment guidelines for groundwater dependent ecosystems' (Serov *et al*. 2012).

3.4 Fauna

3.4.1 Fauna habitats

Woodland

Woodland habitat for fauna in the study area includes small patches of Box-Gum Woodland. Woodland habitats provide foraging, movement and potential breeding habitat for a variety of bird species including threatened species that were recorded during recent surveys along Gocup Road (see sections 3.6.3 and 3.6.5).

Mature eucalypt trees exist throughout the study area as isolated paddock trees and within patches of woodland. Regeneration of canopy species is occurring in Box-Gum Woodland patches. The mature trees in the study area would be used for nesting and foraging by a range of woodland birds, arboreal mammals and microchiropteran bats.

Arboreal mammals such as the Common Brushtail Possum (*Trichosurus vulpecula*), which was recorded during surveys, would use trees in the study area for foraging.

Hollow-bearing trees occur in the proposal site (seven trees) and study area. Hollow-bearing trees located in or near the proposal site are shown in Figure 3.3.

Hollow-bearing trees in the study area may provide roosting and nesting habitat for microchiropteran bats, such as the threatened Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*) which was recorded during surveys for the Smarts Road section of Gocup Road; arboreal mammals, such as the Common Brushtail Possum; and a range of woodland birds. Owls such as the Barn Owl (*Tyto alba*), Southern Boobook (*Ninox novaeseelandiae*) and the threatened Barking Owl (*Ninox connivens*), may use hollow-bearing trees for nesting.

Woodland areas with coarse woody debris and leaf litter would provide habitat for reptiles such as snakes and skinks, as well as foraging habitat for threatened woodland birds such as the Brown Treecreeper (*Climacteris picumnus victoriae*).

Native grassland

A few small native grassy areas are present in the study area. These provide foraging habitat for common mammals such as the Eastern Grey Kangaroo (*Macropus giganteus*). Due to their small size, these grassy areas are unlikely to provide foraging habitat for woodland birds. The Golden Sun Moth (*Synemon plana*) and Striped Legless Lizard (*Delma impar*) are considered unlikely to occur in the study area due to the small size and scattered distribution of potential habitat patches dominated by preferred native tussock grasses.

Aquatic habitat

No permanent watercourses occur in the study area. Cookoomooroo Creek is an ephemeral creek in the north of the study area. This creek is mapped as key fish habitat by the Department of Primary Industries (Fishing and Aquaculture) and may provide habitat for fish during periods of flow. Parts of Stuckeys Creek contain fringing vegetation, and have a native canopy cover. Other parts of the creek are highly degraded with no fringing vegetation or with a canopy cover of introduced species such as English Elm.

Isolated pools in the creeks and a number of farm dams retain water for prolonged periods throughout the year. The majority of dams in the study area have little or no fringing aquatic vegetation, and have limited value as habitat for fauna.

The creek, drainage lines, and farm dams in the study area provide potential habitat for frogs such as the Eastern Sign-bearing Froglet (*Crinia parinsignifera*) and Peron's Tree Frog (*Litoria peronii*), both of which were heard calling during spotlighting surveys along Gocup Road.

Aquatic habitat also provides foraging and breeding habitat for wetland birds, such as ducks and herons. A number of bird species that depend on wetland habitats were recorded during field surveys, including the Australian Wood Duck (*Chenonetta jubata*), White-faced Heron (*Egretta novaehollandiae*), Australian White Ibis (*Threskiornis moluccus*) and Straw-necked Ibis (*Threskiornis spinicollis*).

3.4.2 Fauna recorded during current surveys

General description of fauna

As part of biodiversity assessments for other proposals along Gocup Road, fauna surveys were completed at a number of locations outside the study area for this project. These results are considered relevant to this proposal, given the mobility of most of the fauna species assessed (particularly birds). Results of fauna surveys completed for the full program of works along Gocup Road are therefore provided in this report, with reference to habitat present in the study area.

Field surveys for the current survey period (October 2014 to April 2016) along all sections of Gocup Road identified 78 fauna species, of which 75 are native and three are introduced (Appendix A).

Woodland in the study area provides habitat for a number of bird species. Fifty-three bird species were identified during field surveys, one of which is introduced; the Common Starling (*Sturnus vulgaris*). Commonly occurring native species included the Willie Wagtail (*Rhipidura leucophrys*), Magpie-lark (*Grallina cyanoleuca*), White-plumed Honeyeater (*Lichenostomus penicillatus*) and Eastern Rosella (*Platycercus eximius*).

Two amphibian species and five reptile species were recorded during current surveys, including:

- Eastern Sign-bearing Froglet (*Crinia parinsignifera*)
- Peron's Tree Frog (*Litoria peronii*)
- Plain Snake-lizard (*Delma inornata*)
- Boulenger's Morethia (*Morethia boulengeri*)
- Southern Rainbow Skink (*Carlia tetradactyla*)
- Cunningham's Skink (*Egernia cunninghami*)
- Tree Skink (*Egernia striolata*).

No threatened amphibian or reptile species were recorded during previous or current field surveys.

Surveys along Gocup Road identified the following mammal species, including two introduced species:

- Eastern Grey Kangaroo (*Macropus giganteus*)
- Common Ringtail Possum (*Pseudocheirus peregrinus*)
- Yellow-footed Antechinus (*Antechinus flavipes*)
- European Red Fox (*Vulpes vulpes*) (introduced)
- European Rabbit (*Oryctolagus cuniculus*) (introduced).

Eleven species of bats were recorded during Anabat surveys at the Smarts Road and Stuckeys Creek sections of Gocup Road to the south of Cookoomooroo. Anabat survey results are included in Appendix E.

3.5 Wildlife connectivity corridors

The northern half of the proposal site occurs in the Minjary Hills and Ranges Mitchell Landscape, and the southern half occurs in the Murrumbidgee - Tarcutta Channels and Floodplains Mitchell Landscape. The study area is in the Murrumbidgee Catchment Management Authority (CMA) area. Sixty-one percent of the Minjary Hills and Ranges landscape has been cleared within the Murrumbidgee CMA area, therefore it is not considered to be an over-cleared landscape (ie greater than 70 per cent cleared) (DEC 2005). Ninety-one per cent of the Murrumbidgee - Tarcutta Channels and Floodplains Mitchell Landscape has been cleared, therefore it is considered to be an over-cleared landscape.

No well-defined vegetation corridors are present in the vicinity of the proposal site. The nearest remnant native vegetation comprises scattered woodland on the hills to the east of the proposal site. This patch is over 400 hectares in size and would assist movement of some fauna species such as woodland birds.

Minjary National Park is located about 10 kilometres south of the study area. The park has an area of 1,462 hectares and contains remnant Box-Gum Woodland.

The woodland in the study area is highly fragmented. Habitat connectivity in the study area has been largely reduced due to past clearing for agriculture. The existing connectivity of vegetation across Gocup Road in the vicinity of section 5.2 (Cookoomooroo) is very limited due to the lack of adjacent vegetation corridors on either side of the road. It is therefore unlikely that there is substantial movement of fauna across this section of Gocup Road.

3.6 Threatened and migratory biota

3.6.1 Threatened ecological communities

Due to the presence of White Box, Blakely's Red Gum and/or Yellow Box, the ecotone of two plant community types in the study area (PCTID 266 and PCTID 277 – see section 3.2.1) meets the classification criteria for the ecological community 'White Box Yellow Box Blakely's Red Gum Woodland' (listed as endangered under the TSC Act). This community is hereon referred to as Box-Gum Woodland. If a patch also contains a predominantly native understorey (assessed using perennial species only), and other distinguishing characteristics, it also meets the classification criteria for the ecological community 'White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland' (listed as critically endangered under the EPBC Act). No such areas were identified during surveys of the study area. The extent of Box-Gum Woodland in the study area is shown in Figure 3.5.

Many areas of Box-Gum Woodland in the study area have a ground layer dominated by introduced flora species. The highest diversity of native species occurs in the larger patches of woodland, which are not as heavily invaded by introduced flora species.

Assessments against the criteria for Box-Gum Woodland listed under the TSC Act are provided in Appendix F.

3.6.2 Threatened flora

No threatened flora species listed under the TSC Act or EPBC Act were recorded in the study area.

3.6.3 Listed woodland birds

Five threatened bird species were observed during current field surveys along all sections of Gocup Road, identified in Table 3.2.

Table 3.2: Threatened bird species observed during current field surveys

Species	Listing	Section observed
Brown Treecreeper (*Climacteris picumnus victoriae*)	Vulnerable, TSC Act	Section 3.4 (Stuckeys Creek) and Section 2.1 (Smarts Road)
Diamond Firetail (St*agonopleura guttata*)	Vulnerable, TSC Act	Section 2.1 (Smarts Road) and Gocup TSR
Flame Robin (*Petroica phoenicea*)	Vulnerable, TSC Act	Gocup TSR
Gang-gang Cockatoo (*Callocephalon fimbriatum*)	Vulnerable, TSC Act	Section 3.4 (Stuckeys Creek)
Little Eagle (*Hieraaetus morphnoides*)	Vulnerable, TSC Act	Section 2.1 (Smarts Road) and Gocup TSR

The Brown Treecreeper, Diamond Firetail and Flame Robin were all observed in woodland habitats, while the Little Eagle was observed flying over the section 2.1 (Smarts Road) study area. Brown Treecreepers were relatively common in the section 2.1 (Smarts Road) study area, particularly in the private property north of Smarts Road. The Gang-gang Cockatoo was observed flying overhead at section 3.4 (Stuckeys Creek).

The woodland in the Cookoomooroo study area may provide habitat for these species and potential habitat for other threatened bird species (refer to likelihood of occurrence assessment in Appendix B). Woodland habitat in the study area is similar to the habitats in which these species were recorded, although more disturbed and of lower quality.

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Cookoomooroo Creek

P21

P20

P19

Stony Creek

Gocup Road

Edwardstown Road

Readfords Road

LEGEND

- Flora survey plot
- Road
- Creek
- Drainage line
- Proposal site
- Exclusion zone
- Study area
- Threatened ecological community
  - Box-Gum Woodland (TSC Act)

Paper Size A3

0 50 100 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

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GHD

Roads and Maritime Services
Gocup Road upgrade biodiversity assessments

Job Number 23-15356
Revision 0
Date 21 Nov 2017

Threatened ecological communities

Figure 3.5

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Data source: Roads and Maritime Services: Aerial photograph - 2014; NSW Government (LPI): Creeks, drainage lines and roads - 2012. Created by:rtrobinson

3.6.4 Threatened microchiropteran bats

Eleven species of bats were recorded during Anabat surveys at sections 2.1 (Smarts Road) and 3.4 (Stuckeys Creek), including two threatened species; the Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*) and Yellow-bellied Sheathtail-bat. Both species are listed as vulnerable under the TSC Act and were identified to a 'definite' confidence level. The Eastern Bentwing-bat was recorded on three of the four survey nights at both survey locations while the Yellow-bellied Sheathtail-bat was recorded on one night at a private property north of section 2.1 (Smarts Road), south-east of the study area.

The Eastern False Pipistrelle (*Falsistrellus tasmaniensis*), which is listed as vulnerable under the TSC Act, has been recorded (previous to the surveys completed by GHD) about five kilometres south of Gocup Road. The study area contains marginal habitat for this species.

The Yellow-bellied Sheathtail-bat and Eastern False Pipistrelle are known to roost and breed in hollow-bearing trees. The Eastern False Pipistrelle also roosts under loose bark. Trees that may be used by these species for roosting and breeding are present in the study area. The Eastern Bentwing-bat primarily roosts in caves but is also known to roost in structures such as road culverts. Although caves are not present in the study area, these may be present in hills in the locality. Culverts in the proposal site that will be disturbed by the proposal may provide temporary diurnal roost sites for the species.

The study area contains foraging habitat for all three species, which use the tree canopy to forage for insects. The Yellow-bellied Sheathtail-bat also forages in open areas.

3.6.5 Listed fauna recorded during previous surveys

A number of threatened and migratory fauna species have previously been recorded in the study area and locality. The preliminary biodiversity investigation (EnviroKey 2012) and additional assessments by EnviroKey (2012, 2013a, 2013b, 2013c, 2013d, 2014a and 2014b) along Gocup Road identified the following species during field surveys:

- Black-chinned Honeyeater (*Melithreptus gularis*) – vulnerable, TSC Act
- Brown Treecreeper *(Climacteris picumnus)* – vulnerable, TSC Act
- Diamond Firetail *(Stagonopleura guttata)* – vulnerable, TSC Act
- Flame Robin *(Petroica phoenicea)* – vulnerable, TSC Act
- Gang-gang Cockatoo *(Callocephalon fimbriatum)* – vulnerable, TSC Act
- Little Lorikeet (*Glossopsitta pusilla*) – vulnerable, TSC Act
- Varied Sittella (*Daphoenositta chrysoptera*) – vulnerable, TSC Act
- White-fronted Chat (*Epthianura albifrons*) – vulnerable, TSC Act
- Great Egret (*Ardea alba*) – migratory, EPBC Act
- Striped Legless Lizard – vulnerable, TSC Act and EPBC Act.

Other threatened fauna species that have been previously recorded along Gocup Road, or in close proximity include:

- Swift Parrot (*Lathamus discolor*) – endangered, TSC Act and EPBC Act
- Golden Sun Moth – endangered, TSC Act; critically endangered, EPBC Act.

3.6.6 Summary of NSW-listed species, communities and populations

Literature reviews, database searches and field surveys identified 16 bird species, four bat species and one endangered ecological community listed under the TSC Act, which are known or likely to occur in the study area.

Table 3.3 provides a summary of the biota listed under the TSC Act that are known or likely to occur in the study area (see Appendix B). The likelihood of occurrence has been assigned as described in section 2.4.

Table 3.3: Species and communities listed under the TSC Act known or likely to occur in the study area

Species / community	Status	Likelihood of occurrence in study area
Ecological communities		
Box-Gum Woodland	E	Recorded
Birds		
Barking Owl *Ninox connivens*	V	Moderate
Black-chinned Honeyeater (eastern subspecies) *Melithreptus gularis gularis*	V	Moderate
Black Falcon *Falco subniger*	V	Moderate
Brown Treecreeper (eastern subspecies) *Climacteris picumnus victoriae*	V	High
Diamond Firetail *Stagonopleura guttata*	V	Moderate
Flame Robin *Petroica phoenicea*	V	Moderate
Gang-gang Cockatoo *Callocephalon fimbriatum*	V	Moderate
Hooded Robin *Melanodryas cucullata cucullata*	V	Moderate
Little Eagle *Hieraaetus morphnoides*	V	Moderate
Little Lorikeet *Glossopsitta pusilla*	V	Moderate
Scarlet Robin *Petroica boodang*	V	Moderate
Speckled Warbler *Chthonicola sagittata*	V	Moderate
Superb Parrot *Polytelis swainsonii*	V	Moderate
Swift Parrot *Lathamus discolor*	E	Moderate

Species / community	Status	Likelihood of occurrence in study area
Turquoise Parrot *Neophema pulchella*	V	Moderate
Varied Sittella *Daphoenositta chrysoptera*	V	Moderate
Bats		
Eastern Bentwing-bat *Miniopterus schreibersii oceanensis*	V	Moderate
Eastern False Pipistrelle *Falsistrellus tasmaniensis*	V	Moderate
South-eastern Long-eared Bat *Nyctophilus corbeni*	V	Moderate
Yellow-bellied Sheathtail-bat *Saccolaimus flaviventris*	V	Moderate

V – Vulnerable, E – Endangered

For biota listed in Table 3.3, which are known or likely to occur in the study area and for which an impact on them is likely, an assessment of significance (7 part test) was applied under Section 5A of the EP&A Act to assist in determining the significance of the potential impacts of the proposal on threatened biota with reference to DECC (2007) (see section 4.4 and Appendix D).

3.6.7 Summary of matters of national environmental significance (MNES)

Listed species

Matters of national environmental significance (MNES) are listed and protected under the EPBC Act. The act identifies three MNES relevant to this ecological assessment:

- Threatened species and ecological communities
- Migratory species
- Ramsar wetlands of international importance.

Literature reviews, database searches and field surveys identified two bird species and one bat species listed under the EPBC Act, which are considered likely to occur in the section 5.2 study area.

Table 3.4 provides a summary of the biota listed under the EPBC Act that are considered likely to occur in the study area (see Appendix B). The likelihood of occurrence has been assigned as described in section 2.4.

Table 3.4: Matters of national environmental significance known or likely to occur in the study area

Species / community	Status	Likelihood of occurrence in study area
Birds		
Superb Parrot *Polytelis swainsonii*	V	Moderate
Swift Parrot	E	Moderate

Species / community	Status	Likelihood of occurrence in study area
Lathamus discolor		
Bats		
South-eastern Long-eared Bat *Nyctophilus corbeni*	V	Moderate

V – Vulnerable, E – Endangered, CE – Critically Endangered, Mi – Migratory

For biota listed in Table 3.4, which are known or likely to occur in the study area and for which an impact is likely, the EPBC Act Policy Statement 'Matters of National Environmental Significance: Significant impact guidelines 1.1' (DotE 2013) was used to assist in determining the significance of the potential impacts of the proposal on threatened biota (see section 4.4 and Appendix D).

Migratory species assessment

Migratory species are protected under the international agreements to which Australia is a signatory, including the *Japan-Australia Migratory Bird Agreement* (JAMBA), the *China-Australia Migratory Bird Agreement* (CAMBA), the *Republic of Korea-Australia Migratory Bird Agreement* (RoKAMBA) and the *Bonn Convention on the Conservation of Migratory Species of Wild Animals.* Migratory species are considered matters of NES and are protected under the EPBC Act.

No migratory bird species were recorded or are considered likely to occur in the study area.

Ramsar wetlands of international importance

No internationally important wetlands occur in the locality of the study area. As such, the proposal is not likely to have an adverse effect on any Ramsar Wetland either directly or indirectly.

4. Impact assessment

4.1 Direct impacts

4.1.1 Removal of native vegetation

The proposal would remove about 17.5 hectares of vegetation, of which 1.1 hectares is native (Table 4.1). All native vegetation proposed to be removed is classified as Box-Gum Woodland and derived grassland listed under the TSC Act (Table 4.2).

Table 4.1: Impacts on vegetation

Plant community type (PCT)	Status	Removal area (ha)	Per cent cleared in CMA
PCT ID 266/277 **White Box / Blakely's Red Gum woodland**	Endangered – TSC Act		95
Woodland		1.1	
Derived grassland		0	

The proposed removal of Box-Gum Woodland for section 5.2 (Cookoomooroo) is shown in Table 4.2.

Of the 1.1 hectares of Box-Gum Woodland proposed to be removed, 0.7 hectares is moderate/good condition woodland and 0.4 hectares is low condition woodland. Low condition Box-Gum Woodland represents 36 per cent of all Box-Gum Woodland removal.

The proposal would remove six per cent of Box-Gum Woodland of moderate/good condition in the study area (not including derived grassland). Due to having a degraded understorey, none of this Box-Gum Woodland meets the classification criteria of the EPBC Act form of the ecological community.

The removal of Box-Gum Woodland for the entire Gocup Road program of works has been assessed in relation to the amount of Box-Gum Woodland in the study area (see section 4.3.1).

Table 4.2: Assessment of Box-Gum Woodland removal from the study area

	Box-Gum Woodland (meeting TSC Act criteria only) (ha)			Box-Gum Woodland (meeting both TSC Act and EPBC Act criteria) (ha)	Total Box-Gum Woodland (ha) (mod/good condition only, not incl derived grassland)
	Low condition (woodland)	**Mod/good condition** (woodland)	**Derived grassland** (mod/good)	**Mod/good condition** (woodland)	
Box-Gum Woodland removal	0.4 (36%)	**0.7 (64%)**	0	**0**	**0.06**
Box-Gum Woodland in study area	Not assessed	**11.8**	Not assessed	**0**	**11.8**
Percentage removed		**1%**			**1%**

The removal of native woodland and derived grassland is classed as a key threatening process – clearing of native vegetation.

4.1.1 Removal of threatened fauna species habitat

Woodland habitat removal

The woodland proposed to be removed comprises mature trees and juvenile trees and is known or likely to provide habitat for a range of woodland birds, reptiles and mammals. These species include threatened species identified in section 3.6. The removal of small areas of woodland would marginally reduce habitat used by fauna for foraging, breeding, shelter and movement.

Table 4.3: Impacts on threatened fauna and habitat

Species	Potential occurrence	Woodland removal (ha)
Birds		
Barking Owl *Ninox connivens*	Moderate	1.1
Black-chinned Honeyeater (eastern subspecies) *Melithreptus gularis gularis*	Moderate	1.1
Black Falcon *Falco subniger*	Moderate	1.1
Brown Treecreeper (eastern subspecies) *Climacteris picumnus victoriae*	High	1.1
Diamond Firetail *Stagonopleura guttata*	Moderate	1.1

Species	Potential occurrence	Woodland removal (ha)
Flame Robin *Petroica phoenicea*	Moderate	1.1
Gang-gang Cockatoo *Callocephalon fimbriatum*	Moderate	1.1
Hooded Robin *Melanodryas cucullata cucullata*	Moderate	1.1
Little Eagle *Hieraaetus morphnoides*	Moderate	1.1
Little Lorikeet *Glossopsitta pusilla*	Moderate	1.1
Scarlet Robin *Petroica boodang*	Moderate	1.1
Speckled Warbler *Chthonicola sagittata*	Moderate	1.1
Superb Parrot *Polytelis swainsonii*	Moderate	1.1
Swift Parrot *Lathamus discolor*	Moderate	1.1
Turquoise Parrot *Neophema pulchella*	Moderate	1.1
Varied Sittella *Daphoenositta chrysoptera*	Moderate	1.1
Bats		
Eastern Bentwing-bat *Miniopterus schreibersii oceanensis*	Moderate	1.1
Eastern False Pipistrelle *Falsistrellus tasmaniensis*	Moderate	1.1
South-eastern Long-eared Bat *Nyctophilus corbeni*	Moderate	1.1
Yellow-bellied Sheathtail-bat *Saccolaimus flaviventris*	Moderate	1.1

Hollow-bearing tree removal

Surveys identified that seven hollow-bearing trees would likely be removed by the proposal (Figure 3.3). The characteristics of the hollow-bearing trees to be removed are listed in Appendix C, including tree diameter at breast height (dbh) and number and estimated diameter of hollows. The seven hollow-bearing trees likely to be removed contain about 37 hollows (see Table 4.4).

Hollow-bearing trees to be removed include:

- Two White Box
- Three Blakely's Red Gum
- One Yellow Box
- One dead tree.

Table 4.4: Estimate of number of hollows to be removed and size

Hollow size (cm)	No. to be removed
<5	9
5-10	13
10-20	14
20-30	1
>30	0
Total	**37**

Hollow-bearing trees are a vital habitat component for many fauna species in the study area. They are likely to provide roosting and nesting habitat for microchiropteran bats, arboreal mammals and woodland birds, including threatened species such as the Yellow-bellied Sheathtail-bat and Brown Treecreeper.

Hollow-bearing trees proposed to be removed may provide habitat for Brown Treecreepers, which were recorded along Gocup Road and are relatively common in the area. Brown Treecreepers use hollows for breeding, and have small home ranges of 1.1 hectares to 10.7 hectares. Hollows in standing dead or live trees and tree stumps are essential for nesting (OEH 2016b). Hollows less than six centimetres in diameter are unlikely to be used by this species. About 28 hollows to be removed by the proposal would be suitable nesting habitat for this species. The loss of these hollows would reduce the amount of breeding habitat of the Brown Treecreeper in the study area.

Due to the long timeframe it takes for hollows to form in eucalypts (usually greater than 150 years) (Gibbons *et al* 2000), the loss of these hollows represents a long-term reduction in habitat resources for fauna within the study area. There are, however, a large number of hollow-bearing trees in the study area and the locality and the hollows proposed to be removed are unlikely to represent a significant reduction in habitat for these species.

The loss of hollow-bearing trees is classed as a key threatening process.

The impacts of hollow-bearing tree removal would occur during construction.

Removal of dead wood and dead trees

Dead wood is an important habitat component for threatened species such as the Brown Treecreeper, which uses it for foraging. Dead wood would typically be relocated outside the proposal site and would not be removed from the study area.

Dead trees are also important for a range of threatened species. Birds such as the Little Eagle use them as a vantage point for perching while foraging, and Brown Treecreepers use them for foraging. The Eastern False Pipistrelle may use loose bark on dead trees for roosting.

The removal of dead wood and dead trees is classed as a key threatening process.

4.1.2 Injury and mortality

During construction, death or injury may occur to fauna present during clearing of trees and vegetation. If birds are present but not nesting during construction they will generally move away from the proposal site to escape disturbance. Clearing of hollow-bearing trees carries the risk of injury to hollow dependent fauna that may be utilising hollows at the time of clearing.

Potential impacts to fauna would be avoided through the implementation of pre-clearing safeguards outlined in section 5.2.

The proposal has the potential to result in increased impacts to fauna movements during the operation of the road through collisions. These impacts are likely to be greater than existing because of the increased width of the road and a likely increase in traffic speed due to improved road geometry. Species at greatest risk of impact are likely to be ground-dwelling mammals such as the Eastern Grey Kangaroo. Fauna collisions would be unlikely to cause substantial impacts to any threatened fauna species.

4.1.3 Disturbance of fauna

The proposal has the potential to temporarily affect the use of the study area by fauna as a result of increased disturbance during construction. The use of machinery may temporarily deter some fauna species from using potential habitat in the study area during construction.

Culverts may be used as temporary roosting habitat by bat species such as the Eastern Bentwing-bat. Unmanaged construction works have the potential to result in stress, injury or mortality of microbats within a roosting colony. Disturbance of roosting individuals through noise, light or vibration, which may cause them to leave the roost during daylight hours, would increase energy expenditure and stress levels, and increase the risk of predation by diurnal birds.

Noise can cause change in behaviours such as foraging, requiring additional energy expenditure if fauna need to forage further afield. Impacts during construction would be short-term and temporary, and would be unlikely to deter fauna from using the study area in the long term.

With the implementation of safeguards in section 5.2 including culvert inspections and bat exclusion measures, if required, the proposal would be unlikely to substantially affect fauna in the study area.

4.1.4 Groundwater dependent ecosystems

The proposal is located in the catchment of the groundwater dependent ecosystems identified in section 3.3. Cut sections for the proposal would have a maximum depth of 20.6 metres. Geotechnical investigations for the proposal have indicated that groundwater would not be intercepted at this depth. It is anticipated that cut sections for the proposal would be unlikely to have any impacts on groundwater dependent ecosystems.

4.1.5 Changes in surface hydrology

Construction of the proposal is likely to affect surface runoff characteristics near the proposal site through cut and fill earthworks and construction of roadside drainage. No drainage lines would be permanently redirected. The increase in the impermeable surface of the road would be likely to generate an increase in surface runoff. This would be directed to existing drainage lines, with measures installed to control scouring and sedimentation during operation. The

proposal is unlikely to cause any long-term changes in surface hydrology that would adversely impact biota in the study area.

4.2 Indirect impacts

4.2.1 Wildlife connectivity and habitat fragmentation

The woodland in the study area is highly fragmented. The existing connectivity of vegetation across Gocup Road in the vicinity of section 5.2 (Cookoomooroo) is very limited due to a lack of adjacent vegetation corridors on either side of the road. It is unlikely that there is substantial movement of fauna across this section of Gocup Road.

Fragmentation of vegetation in the study area has previously occurred through construction of Gocup Road and other local roads and clearing for agriculture and residential properties. These developments have created barriers to movement for some fauna species, particularly those that are limited by dispersal abilities and habitat preferences.

Proposed earthworks would create cut (excavation) and fill sections in the land surface with a width of up to 100 metres. Cut sections would have a maximum depth of 20.6 metres and fill sections would have a maximum height of 18.8 metres. Embankment batter slopes would be 4 horizontal: 1 vertical for batters with a height/depth of less than seven metres and generally 2 horizontal: 1 vertical for batters with a height/depth of greater than seven metres. Sections of high cut would have batters of 1.5 horizontal: 1 vertical. Sections of steeper batters would typically have lengths of about 200 metres and would not prevent fauna from moving through the study area. The main sections of cut and fill are located in areas that have already been cleared of woodland, and contain very few trees. The proposed earthworks are unlikely to cause substantial fragmentation of habitat.

The proposal would also remove scattered paddock trees. Paddock trees are important for the movement of a number of species through the landscape, including the Brown Treecreeper, Diamond Firetail and Flame Robin. As the proposal is mainly located in areas that have been cleared of trees, the extent of paddock tree removal relative to the number of trees in the study area is minimal. It is unlikely that the proposed removal of paddock trees would substantially affect the movement of threatened woodland bird species through the landscape.

The small amount of vegetation removal from the ecological community is unlikely to result in significant additional fragmentation to that which has already occurred. The proposal would not remove any large areas of native vegetation, sever any important corridors or otherwise isolate any areas of habitat.

To minimise impacts on vegetation connectivity, sections of decommissioned road would be revegetated to improve connectivity of roadside vegetation.

4.2.2 Invasion and spread of weeds

Groundcover vegetation in the study area is heavily affected by introduced species. The proposal has the potential to further introduce and spread weeds in the study area by movement of machinery and light vehicle traffic during construction of the proposal.

One priority weed species was identified during the surveys; Blackberry, which is present at a few scattered locations. The proposal has the potential to cause further spread of weeds such as Blackberry in the proposal site and study area.

The highest potential for spread of weeds would occur during construction. Due to the proposed widening and realignment of Gocup Road, there is also the potential for spread of weeds into new areas as a result of the operation of the road.

The spread of weeds would be managed by implementing safeguards identified in section 5.2.

4.2.3 Sedimentation

Sedimentation of creeks and drainage lines in the study area may result from vegetation removal and earthworks. These works have the potential to erode channels and deposit sediment, impacting on water quality during periods of flow.

Sedimentation has the potential to affect flora and fauna, including fish, frogs, turtles and macroinvertebrates.

Fish normally move away from highly turbid water; however, sedimentation may block fish passage, having detrimental impacts during times of migration. More extreme impacts on fish species, as a result of sedimentation and accompanying turbidity increases in the creek can include:

- Smothering of gill surfaces with sediment leading to asphyxiation
- Swallowing of large amounts of sediment leading to illness
- Inhibition of light penetration into the water column which can affect predator-prey interactions
- Impacts on habitat diversity in the immediate area and downstream by smothering and filling of interstitial spaces inhabited by fish.

Erosion and sedimentation have the potential to occur during construction.

An erosion and sediment control plan would be prepared as part of the CEMP to manage potential erosion and sedimentation issues during construction. Potential impacts from sedimentation would be managed by implementing safeguards identified in section 5.2.

4.2.4 Contamination

The proposal has the potential to cause impacts to native flora and fauna through spills of fuels and chemicals. This may occur during refuelling operations or during preparation and use of chemicals for weed management. Spills could potentially enter waterways and affect water quality, contaminating habitat for species dependent on habitat in creeks and drainage lines. Spills could also have localised impacts on terrestrial fauna.

Contamination impacts have the potential to occur during construction. Operational risk would not be greater than the current risk and may be less due to the proposed improvement in road design standard.

These impacts would be unlikely to be substantial due to the limited area of impact and the implementation of safeguards detailed in section 5.2.

4.2.5 Invasion and spread of pathogens and disease

The proposal has the potential to result in the spread of pathogens such as bacteria and fungi. This could occur through the spread of soils on vehicle tyres and operatives' footwear. Impacts of pathogens include spread of known diseases that are detrimental to fauna such as the amphibian chytrid fungus.

Invasion and spread of pathogens and disease have the potential to occur during construction. Due to the proposed widening and realignment of Gocup Road, there is also the potential for spread of pathogens and disease into new areas as a result of the operation of the road.

The potential spread of pathogens would be minimised through the implementation of safeguards outlined in section 5.2.

4.2.6 Bushfire

The proposal has the potential to cause bushfire during construction. Impacts of bushfires may include death and injury to fauna, loss of woodland habitat including hollow bearing trees and loss of feed resources. In addition, bushfires may result in changes to structure and function of woodland communities including changes to groundcover composition. This would be unlikely provided a bushfire management plan is developed and implemented, as detailed in section 5.2.

4.3 Cumulative impacts

The cumulative impacts of all Gocup Road upgrade sections have been assessed in the 'Gocup Road upgrade corridor assessment' completed for the entire program of works (GHD 2016). A summary of this assessment is provided below.

4.3.1 Removal of Box-Gum Woodland (program of works)

Upgrade works have been carried out, or are planned for a number of other sections of Gocup Road, as described in section 1.1 and shown in Figure 1.1. Total Box-Gum Woodland removal for all road upgrade sections is shown in Table 4.5 below.

The full program of works along Gocup Road would remove 41.6 hectares of the Box-Gum Woodland ecological community. Of this, 12.8 hectares is moderate/good condition woodland, 19.8 hectares is derived grassland and 9.0 hectares is low condition woodland. The derived grassland is modified by grazing and has a relatively low diversity of native flora species. Low condition Box-Gum Woodland and derived grassland represent 69 per cent of all Box-Gum Woodland removal.

Table 4.5: Box-Gum Woodland removal for all Gocup Road upgrade sections

Section name	Works section	Status / confidence on extent of vegetation removal	Source	Box-Gum Woodland removal (meeting TSC Act criteria only)			Box-Gum Woodland removal (meeting both TSC Act and EPBC Act criteria)	Total Box-Gum Woodland removal (ha)
				Low condition (woodland)	**Mod/good condition** (woodland)	**Derived grassland** (mod/good)	**Mod/good condition** (woodland)	
Section 1 Minor Works	1.1	Proposed / area of vegetation removal known	GHD					0
	1.2	Proposed / area of vegetation removal known	GHD					0
	1.3	Proposed / area of vegetation removal known	GHD					0
	1.4	Proposed / area of vegetation removal known	GHD					0
	1.5	Proposed / area of vegetation removal uncertain	GHD	0.24				0.24
	1.6	Proposed / area of vegetation removal uncertain	GHD	0.06				0.06
	1.7	Proposed / area of vegetation removal uncertain	GHD				1.3	1.3
Smarts Road	2.1	Being constructed / area of vegetation removal known	GHD	1.2			1.7	2.9
Meadow Creek South	Meadow Creek South	Completed / area of vegetation removal known	EnviroKey (2013c)				0.58	0.58

Section name	Works section	Status / confidence on extent of vegetation removal	Source	Box-Gum Woodland removal (meeting TSC Act criteria only)			Box-Gum Woodland removal (meeting both TSC Act and EPBC Act criteria)	Total Box-Gum Woodland removal (ha)
				Low condition (woodland)	**Mod/good condition** (woodland)	**Derived grassland** (mod/good)	**Mod/good condition** (woodland)	
Meadow Creek	Meadow Creek	Completed / area of vegetation removal known	GHD (2011)		0.09		0.5	0.59
Minjary South	3.1	Completed / area of vegetation removal known	EnviroKey (2013b)		0.22		0.62	0.84
Quidong 90	3.2	Completed / area of vegetation removal known	EnviroKey (2014b)	0.08				0.08
Quidong Corner/ Stuckeys Creek	3.3	Being constructed / area of vegetation removal known	GHD	0.9			0.2	1.1
	3.4	Being constructed / area of vegetation removal known	GHD	1.6			1.2	2.8
Doctor's Hill/ Halfway Hill	4	Proposed / area of vegetation removal known	GHD	4.0	4.8	19.8	0.9	29.5
Edwardstown Road	5.1	Proposed / area of vegetation removal uncertain	EnviroKey (2012)/GHD	0.19				0.19
Cookoomooroo	5.2	Proposed / area of vegetation removal known	GHD	0.4	0.7			1.1
Abattoir	6.1	Completed / area of vegetation removal known	EnviroKey (2014a)	0.32				0.32
Total				**8.99**	**5.81**	**19.8**	**7.00**	**41.60**

The study area for the full program of works contains about 212 hectares of moderate/good condition Box-Gum Woodland (not including derived grassland). The program of works would therefore remove six per cent of this moderate/good condition Box-Gum Woodland in the study area (see Table 4.6).

Low condition woodland and derived grassland forms of the community were not mapped within the wider study area; however large areas of both forms of the community were observed during surveys.

Table 4.6: Assessment of Box-Gum Woodland removal from the study area (full program of works)

	Box-Gum Woodland (meeting TSC Act criteria only)			**Box-Gum Woodland (meeting both TSC Act and EPBC Act criteria)**	**Total Box-Gum Woodland (ha)** (mod/good condition only, not incl derived grassland)
	Low condition (woodland)	**Mod/good condition** (woodland)	**Derived grassland** (mod/good)	**Mod/good condition** (woodland)	
Box-Gum Woodland removal	8.99 (22%)	**5.81 (14%)**	19.8 (48%)	**7.00 (17%)**	**12.81 (31%)**
Box-Gum Woodland in study area	Not assessed	**57.3**	Not assessed	**155.1**	**212.4**
Percentage removed		**10%**		**5%**	**6%**

In addition, other areas of Box-Gum Woodland are present outside the study area, which are connected to woodland in the study area. These areas were observed on private properties from a distance during surveys, and have been recorded in Minjary National Park, which is about 1.8 kilometres from the Gocup program of works (NPWS 2004). The program of works would therefore remove only a minor fraction of the adjacent connected Box-Gum Woodland in the locality. It is therefore unlikely that the program of works would have a significant cumulative impact.

Compensatory measures would be implemented to offset the cumulative residual impacts of the upgrade of Gocup Road (see chapter 8).

4.3.2 Removal of woodland habitat for threatened fauna (program of works)

The program of works would remove 25.0 hectares of native woodland, including 16.0 hectares of moderate/good condition native woodland and 9.0 hectares of low condition woodland. This comprises a large number of mature and juvenile trees, including 75 hollow-bearing trees.

The study area for the program of works contains about 358 hectares of moderate/good condition native woodland (Box-Gum Woodland and Red Box/Long-leaved Box woodland). The program of works would therefore remove 4.5 per cent of the moderate/good condition woodland in the study area and a much smaller proportion of the connected woodland habitat in the locality.

For nearly all hollow-bearing trees identified for removal, many other hollow-bearing trees were observed nearby in the study area, indicating that the trees to be removed do not form a large proportion of the hollow-bearing trees in the study area.

Woodland in the study area is connected to larger areas of woodland in the locality, including in Minjary National Park 1.8 kilometres from the proposal site, and in woodland remnants on private properties. The proposal would remove only a minor fraction of the adjacent connected woodland in the locality.

The removal of a relatively small area of woodland would be unlikely to have a significant cumulative impact on any threatened biota.

4.4 Assessments of significance

The assessment of likelihood of occurrence found that the proposal may potentially impact on 16 bird species, four bat species and one ecological community listed under the TSC Act (Appendix B). The 'Threatened species assessment guidelines: the assessment of significance' (DECC 2007) was reviewed when determining if a significant impact is likely on state-listed threatened species, populations or ecological communities. Assessments of significance under Section 5A of the EP&A Act (Appendix D) concluded that the proposal is unlikely to have a significant impact on these biota. The preparation of a species impact statement is not required.

The assessment of likelihood of occurrence found that the proposal may potentially impact upon two bird species and one bat species listed as threatened under the EPBC Act (Appendix B). The EPBC Act Policy Statement Statement 'Matters of National Environmental Significance: Significant impact guidelines 1.1' (DotE 2013) was reviewed when determining if a significant impact is likely on MNES (Appendix D). The significance assessments concluded that the proposal is unlikely to have a significant impact on any fauna species or threatened ecological community listed under the EPBC Act that occur, or have the potential to occur in the study area.

The assessments of significance found that the proposal would be unlikely to have a significant impact on the species and ecological community assessed primarily due to:

- The relatively small area of habitat proposed to be removed from the study area and connected habitat outside the study area
- The disturbed nature of the habitat proposed to be removed
- The proposal being unlikely to significantly fragment habitat
- The relatively low number of isolated hollow-bearing trees proposed to be removed compared to those present in the study area and in habitat outside the study area.

Table 4.7: Summary of NSW and Commonwealth assessment of significance outcomes

Species	Significance assessment question							Likely significant impact?
	a	b	c	d	e	f	g	
Ecological communities								
Box-Gum Woodland	X	X	No	No	No	Yes	Yes	No
Birds								
Barking Owl	No	X	X	No	No	Yes	Yes	No
Black-chinned Honeyeater (eastern subspecies)	No	X	X	No	No	Yes	Yes	No
Black Falcon	No	X	X	No	No	Yes	Yes	No

Species	Significance assessment question							Likely significant impact?
	a	b	c	d	e	f	g	
Brown Treecreeper (eastern subspecies)	No	X	X	No	No	Yes	Yes	No
Diamond Firetail	No	X	X	No	No	Yes	Yes	No
Flame Robin	No	X	X	No	No	Yes	Yes	No
Gang-gang Cockatoo	No	X	X	No	No	Yes	Yes	No
Hooded Robin	No	X	X	No	No	Yes	Yes	No
Little Eagle	No	X	X	No	No	Yes	Yes	No
Little Lorikeet	No	X	X	No	No	Yes	Yes	No
Scarlet Robin	No	X	X	No	No	Yes	Yes	No
Speckled Warbler	No	X	X	No	No	Yes	Yes	No
Superb Parrot	No	X	X	No	No	Yes	Yes	No
Swift Parrot	No	X	X	No	No	Yes	Yes	No
Turquoise Parrot	No	X	X	No	No	Yes	Yes	No
Varied Sittella	No	X	X	No	No	Yes	Yes	No
Bats								
Eastern Bentwing-bat	No	X	X	No	No	Yes	Yes	No
Eastern False Pipistrelle	No	X	X	No	No	Yes	Yes	No
South-eastern Long-eared Bat	No	X	X	No	No	Yes	Yes	No
Yellow-bellied Sheathtail-bat	No	X	X	No	No	Yes	Yes	No

Species	EPBC Act assessments	
	Important population / habitat critical to the survival of ecological community	Likely significant impact?
Birds		
Superb Parrot	Yes	No
Swift Parrot	Yes	No
Bats		
South-eastern Long-eared Bat	Yes	No

Notes: X= not applicable.

1. Significance Assessment Questions as set out in the *Environmental Planning and Assessment Act 1979.*
   - a in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,
   - b in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,
   - c in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:
     - (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or
     - (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.
   - d in relation to the habitat of a threatened species, population or ecological community:
     - (iii) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and
     - (iv) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and
     - (v) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival

of the species, population or ecological community in the locality

e whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

f whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

g whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

2. A 'population of a species' as determined by the *Environment Protection and Biodiversity Conservation Act 1999* is an occurrence of the species in a particular area. In relation to critically endangered, endangered or vulnerable threatened species, occurrences include but are not limited to:

   a a geographically distinct regional population, or collection of local populations, or

   b a population, or collection of local populations, that occurs within a particular bioregion.

Note: Important Population as determined by the *Environment Protection and Biodiversity Conservation Act 1999*, is one that for a vulnerable species:

a is likely to be key source populations either for breeding or dispersal

b is likely to be necessary for maintaining genetic diversity

c is at or near the limit of the species range.

4.5 Impact summary

A summary of the impacts of the proposal is provided in Table 4.8.

Table 4.8: Summary of impacts

Impact	Biodiversity values	Nature of impact	Extent of impact	Duration	Key threatening process	Confidence in assessment
Removal of native vegetation	Native vegetation and threatened ecological communities	Direct	Site-based	Long term	Clearing of native vegetation	Sufficient
Removal of fauna habitat	Woodland fauna, including threatened species	Direct	Site-based	Long term	Clearing of native vegetation Loss of hollow-bearing trees Removal of dead wood and dead trees	Sufficient
Injury and mortality	Woodland fauna	Direct	Site-based	Short term		Sufficient
Disturbance of bats	Microchiropteran bats	Direct	Site-based	Short term		Sufficient
Impacts to groundwater dependent ecosystems	Groundwater dependent ecosystems	Direct/indirect	Unlikely	Unlikely		Sufficient
Habitat fragmentation	Flora and fauna, including threatened species	Indirect	Site-based	Long term	Clearing of native vegetation	Sufficient
Invasion and spread of weeds	Vegetation communities	Indirect	Site-based	Long term	Invasion of native plant communities by exotic perennial grasses	Sufficient
Sedimentation	Flora and fauna dependent on creeks and drainage lines	Indirect	Local	Short term		Sufficient

Impact	Biodiversity values	Nature of impact	Extent of impact	Duration	Key threatening process	Confidence in assessment
Invasion and spread of pathogens and disease	Vegetation and frogs	Indirect	Local	Long term	Infection of native plants by *Phytophthora cinnamomi* Infection of frogs by amphibian chytrid causing the disease chytridiomycosis	Sufficient

5. Avoid, minimise and mitigate impacts

Development of the proposal has incorporated a hierarchy of avoiding, minimising and mitigating impacts wherever possible.

5.1 Avoidance and minimisation

To minimise impacts on Box-Gum Woodland and threatened species habitat, the design process incorporated vegetation mapping that had been carried out along the Gocup Road corridor. This process involved avoiding the threatened ecological community wherever possible.

Stockpile sites, site compounds and other features of the proposal have been located to avoid impacts to woodland areas wherever possible and have been placed in areas that have been cleared of woodland.

5.2 Safeguards and management measures

The safeguards and management measures detailed in Table 5.1 would be implemented to minimise the impacts of the proposal on the ecology of the study area. These safeguards and management measures would be incorporated into a construction environmental management plan (CEMP) to be implemented during construction.

Table 5.1: Safeguards and management measures

Impact	Safeguards and management measures	Timing	Likely efficacy of mitigation	Residual impacts
Impacts to biodiversity	• A detailed flora and fauna management plan will be prepared in line with Roads and Maritime's Biodiversity Guidelines: Protecting and Managing Biodiversity on RTA Projects (RTA, 2011) and implemented as part of the CEMP to minimise the ecological impacts of the proposal. It will address terrestrial and aquatic matters and include, but not necessarily be limited to the safeguards and management measures detailed below.	After award pre-construction	Effective	Loss of 1.1 ha of Box-Gum Woodland Loss of seven hollow-bearing trees Loss of 1.1 ha of woodland habitat for fauna
Loss of native vegetation and fauna habitat	• Plans will be prepared for the proposal site and adjoining area showing native vegetation, flora and fauna habitat, threatened species and endangered ecological communities	After award pre-construction	Effective	
	• Plans will be prepared showing areas to be cleared and areas to be protected, including exclusion zones and protected habitat features (eg hollow-bearing trees)	After award pre-construction	Effective	
	• Where practicable, hollow-bearing tree removal will occur outside the main fauna breeding season (August to January) to avoid potential fauna breeding disturbance	After award pre-construction	Effective	
	• The pre-clearing process detailed in RTA (2011) – 'Biodiversity Guidelines Guide 1: Pre-clearing process', will be implemented before start of work	After award pre-construction	Proven	
	• Exclusion fencing and signage will be erected to ensure that environmentally sensitive areas are protected as detailed in RTA (2011) 'Biodiversity guidelines: Guide 2 – Exclusion Zones' (RTA 2011) and map these sites on sensitive areas plans. This will include locations of hollow-bearing trees to be retained and trees in the vicinity of stockpile sites	After award pre-construction	Effective	
	• Large and hollow-bearing trees to be retained will be defined by survey before clearing and protected by a physical barrier or fence	After award pre-construction	Effective	

Impact	Safeguards and management measures	Timing	Likely efficacy of mitigation	Residual impacts
	• The limits of the proposal will be defined by survey before clearing and grubbing	After award pre-construction	Effective	
	• To the extent practicable, during detailed design, implement design measures (such as road realignment and safety barriers) that minimise the footprint and avoid native vegetation	Pre-construction	Effective	
	• Where possible, minimise removal of mature trees, including hollow-bearing trees, while still meeting operational objectives for road safety and design	Pre-construction	Effective	
	• Where possible, avoid disturbing native vegetation when building temporary access tracks to stockpile sites or establishing temporary facilities	Pre-construction	Effective	
	• A hollow replacement strategy will be investigated to compensate for removal of hollow-bearing trees for the full works program	Pre-construction	Proven	
	• Felled hollow-bearing trees will be left on site for at least 24 hours after felling to allow any resident fauna to relocate	Construction	Effective	
	• All staff working on site will complete a site-specific environmental induction. This will include the limits of vegetation clearing and the areas of vegetation to be retained	Construction	Effective	
	• All construction vehicles and equipment will follow the traffic management plan, including the vehicle movement plan	Construction	Effective	
	• Native vegetation will be re-established in line with the Roads and Maritime 'Biodiversity Guidelines Guide 3: Re-establishment of native vegetation' (RTA 2011) • Locally native species will be used for revegetation. Species will be consistent with those for the Commonwealth scientific committee determination of Box-Gum Woodland	Post-construction	Effective	

Impact	Safeguards and management measures	Timing	Likely efficacy of mitigation	Residual impacts
	• The removal of native vegetation, particularly the areas of Box-Gum Woodland and threatened species habitat impacted for the project, will be offset in line with the Roads and Maritime 'Guideline for Biodiversity Offsets'.	Post-construction	Proven	
Impacts to microbats using culverts	• Culverts will be inspected for roosting bats before culvert extension works are undertaken. Inspections will be carried out in line with 'Biodiversity Guidelines Guide 1: Pre-clearing process' and 'Biodiversity Guidelines Guide 9: Fauna handling' (RTA 2011)	After award pre-construction and construction	Proven	Unlikely
	• If bats are found to inhabit the culverts, an ecologist will relocate the bats and implement exclusion measures before culvert works start.	After award pre-construction and construction	Proven	
Loss of woody debris and bush rock habitat	• All existing woody debris and any bush rock encountered on the ground will be relocated in line with the Roads and Maritime 'Biodiversity Guidelines Guide 4: Clearing of vegetation and removal of bush rock' and 'Biodiversity Guidelines Guide 5: Re-use of woody debris and bushrock' (RTA 2011)	Pre-construction	Effective	Unlikely
	• Some of the coarse woody debris generated by removing vegetation will be relocated outside the proposal site and retained as habitat on the ground. The retained woody debris will be spread in a fashion that replicates the natural occurrence of woody debris in the environment and will not be stacked.	Construction	Effective	
Loss of mature trees, including hollow-bearing trees	• Pruning or lopping of limbs will be conducted in preference to tree removal wherever possible.	Construction	Effective	Loss of seven hollow-bearing trees
Impacts to fauna	• Clearing of vegetation will be carried out as detailed in RTA (2011) – 'Biodiversity Guidelines Guide 4: Clearing of vegetation and removal of bushrock'	Construction	Effective	Loss of 1.1 ha of woodland habitat for fauna
	• Fauna handling during vegetation removal will be carried out by a licensed fauna ecologist or wildlife carer, as detailed in RTA (2011) – 'Biodiversity Guidelines Guide 9: Fauna handling'.	Construction	Effective	Unlikely

Impact	Safeguards and management measures	Timing	Likely efficacy of mitigation	Residual impacts
Impacts to threatened species	• If unexpected threatened fauna, flora or ecological communities are discovered, works will stop immediately in the vicinity of the find and the Roads and Maritime 'Unexpected Threatened Species Find Procedure' in RTA (2011) – 'Biodiversity Guidelines Guide 1: Pre-clearing process' will be followed. This will include notifying the Roads and Maritime environment officer immediately and commissioning an assessment of the likely impacts of the proposal on the threatened species.	Construction	Proven	Unlikely
Impacts to groundwater dependent ecosystems	• Interruptions to water flows associated with groundwater dependent ecosystems will be minimised through detailed design.	Detailed design	Effective	Unlikely
Changes to hydrology	• Changes to existing surface water flows will be minimised through detailed design.	Detailed design	Effective	Unlikely
Fragmentation of habitat corridors	• To minimise impacts on vegetation connectivity, sections of decommissioned road will be revegetated to improve connectivity of roadside vegetation.	Post-construction	Effective	Unlikely
Spread of weeds	• A weed management plan will include measures to prevent the spread of weeds, particularly into areas of Box-Gum Woodland as detailed in RTA (2011) – 'Biodiversity Guidelines Guide 6: Weed management'	After award pre-construction	Effective	Unlikely
	• Declared priority weeds will be managed in line with the requirements of the NSW *Biosecurity Act 2015*	After award pre-construction	Effective	
	• Weed infested topsoil will be disposed of or treated and will not be stockpiled near any areas of native vegetation.	Construction	Effective	
Sedimentation	• A site specific erosion and sediment control plan (ESCP) will be prepared, and implemented as part of the Soil and Water Management Plan (SWMP)	Pre-construction	Effective	Unlikely
	• Sediment fencing will be installed downstream of works in drainage lines.	Construction	Effective	

Impact	Safeguards and management measures	Timing	Likely efficacy of mitigation	Residual impacts
Water quality, chemical and fuel impacts on flora and fauna	• The SWMP will include a site-specific emergency spill plan, which will include spill management measures in line with the Roads and Maritime Code of Practice for Water Management (RTA 1999) and relevant EPA guidelines. The plan will address measures to be implemented in the event of a spill, including initial response and containment, notification of emergency services and relevant authorities (including Roads and Maritime and EPA officers)	Pre-construction and construction	Effective	Unlikely
	• All fuels, chemicals, fertilisers and liquids will be stored at least 50 metres away from any waterway or drainage line and will be stored in an impervious bunded area within the compound site	Construction	Effective	
	• Refuelling of plant and planned maintenance of machinery and plant will be carried out 50 metres away from waterways and drainage lines.	Construction	Effective	
Pathogen spread and establishment	• Measures for preventing the introduction and/or spread of disease-causing agents such as bacteria and fungi will be implemented, as detailed in RTA (2011) – 'Biodiversity Guidelines Guide 7: Pathogen management'.	Construction	Effective	Unlikely
Bushfire	• The CEMP will include provisions to minimise the potential for ignition or spread of fire. This will include the preparation of a bushfire management plan. The local Rural Fire Service will be consulted during preparation of the plan.	Pre-construction	Effective	Unlikely

6. Offset strategy

6.1 Quantification of impacts – program of works

To determine if the proposal requires biodiversity offsets, the Roads and Maritime (2016) Guideline for biodiversity offsets was applied to all sections of work along Gocup Road as a whole. Offsets are required for the full program of works (see Table 6.1).

Table 6.1: Roads and Maritime guidelines for requirement of biodiversity offsets

Description of activity or impact	Consider offsets or supplementary measures
Activities in accordance with Roads and Maritime Services *Environmental assessment procedure: Routine and Minor Works* (RTA 2011).	Not applicable. The program of works is not routine or minor works.
Works on cleared land, plantations, exotic vegetation where there are no threatened species or habitat present	Not applicable. The program of works is located in areas of native vegetation that provide habitat for threatened biota.
Works involving clearing of vegetation planted as part of a road corridor landscaping program (this includes where threatened species or species comprising listed ecological communities have been used for landscaping purposes)	Not applicable. The program of works would not involve clearing of vegetation planted as part of a road corridor landscaping program (where threatened species or species comprising listed ecological communities have been used for landscaping purposes).
Works involving clearing of national or NSW listed critically endangered ecological communities (CEEC)	Where there is any clearing of a CEEC in moderate to good condition. Applicable. The program of works would involve clearing of 7.0 ha of Box-Gum Woodland listed as a CEEC under the EPBC Act.
Works involving clearing of a nationally listed threatened ecological community (TEC) or nationally listed threatened species habitat	Where there is clearing of >1 ha of a TEC or habitat in moderate to good condition. Applicable. The program of works would involve clearing 12.8 ha of moderate to good condition woodland habitat for species listed as threatened under the EPBC Act.

Description of activity or impact	Consider offsets or supplementary measures
Works involving clearing of a NSW endangered or vulnerable ecological community	Where clearing > 5 ha or where the ecological community is subject to an SIS. Applicable. The program of works would involve clearing 41.6 ha of Box-Gum Woodland and derived grassland listed as endangered under the TSC Act.
Works involving clearing of NSW listed threatened species habitat where the species is a species credit species as defined in the OEH Threatened Species Profile Database (TSPD)	Where clearing > 1 ha or where the species is the subject of an SIS. Applicable. The program of works would involve clearing 25 ha of woodland habitat for NSW listed threatened species. This includes two ecosystem credit species – the Gang-gang Cockatoo and the Little Eagle.
Works involving clearing of NSW listed threatened species habitat and the species is an ecosystem credit species as defined in OEH's Threatened Species Profile Database (TSPD)	Where clearing > 5 ha or where the species is the subject of an SIS. Applicable. The program of works would involve clearing 25 ha of woodland habitat for NSW listed threatened species. This includes 16 ecosystem credit species.
Type 1 or Type 2 key fish habitats (as defined by NSW Fisheries)	Where there is any net loss of habitat. Not applicable. The program of works would not result in any net loss of Type 1 or Type 2 key fish habitats.

6.2 Biodiversity offset strategy

Given the potential cumulative impacts of the full program of works along Gocup Road, Roads and Maritime would implement a biodiversity offset strategy in line with the Roads and Maritime policy document 'Guideline for Biodiversity Offsets'.

In accordance with the guideline, an approved methodology would be used to calculate the required biodiversity offset for the entire program of works along Gocup Road.

Offsets would be sought for the total area of Box-Gum Woodland impacted by the full program of works for Gocup Road. Offsets would:

- Be located wherever practicable close to the affected habitat, so that the local, regional or catchment biodiversity is maintained
- Be located adjacent to other areas of habitat and shaped so as to enhance their ability to be protected

- Contain or provide habitat for specific threatened species affected by the project.

Offsets would be managed to improve and protect biodiversity. Management actions may include:

- Improved security of tenure (where the land tenure is secured for the purposes of conservation)
- Fencing to protect threatened flora
- Stock removal or management
- Strategic revegetation activities
- Weed and pest control
- Replacement of habitat features e.g. tree hollows or placement of hollow logs in adjacent vegetation
- A management plan would be prepared for each offset site to demonstrate how the management actions would be implemented.

7. Conclusion

The study area has generally been modified by agricultural development, with large areas cleared of native vegetation. Small remnant patches of native woodland occur in the road reserve, with larger patches on the hills to the east of the proposal site. These areas of woodland are known or likely to provide habitat for a range of fauna species and an ecological community listed under the TSC Act.

The proposal has the potential to affect 16 bird species, four bat species and one ecological community listed under the TSC Act, and two bird species and one bat species listed under the EPBC Act.

The proposal would remove 1.1 hectares of native vegetation. All of this is classified as Box-Gum Woodland under the TSC Act. None of the Box-Gum Woodland meets the classification criteria for Box-Gum Woodland listed under the EPBC Act. Of the 1.1 hectares of Box-Gum Woodland proposed to be removed, 0.7 hectares is moderate/good condition woodland and 0.4 hectares is low condition woodland. Seven hollow-bearing trees, containing 37 hollows, are also likely to be removed by the proposal.

A number of safeguards and management measures are proposed to minimise the impacts of the proposal on native flora and fauna, particularly biota listed under the TSC Act and EPBC Act. A biodiversity offset strategy would be developed for the full program of works to protect similar woodland to that which is being removed, including Box-Gum Woodland.

Assessments of significance were completed with reference to Section 5A of the EP&A Act and the EPBC Act 'Significant Impact Guidelines 1.1 Matters of National Environmental Significance'. The assessments conclude that the proposal is unlikely to have a significant impact on any biota listed under the TSC Act and therefore a species impact statement is not required. The proposal is also unlikely to have a significant impact on any biota listed under the EPBC Act.

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Appendices

Appendix A – Species recorded

FLORA LIST

* Introduced species

✓ Species present in nearby transect

All numbers are per cent cover

r Less than one per cent cover, few individuals

+ Less than one per cent cover, numerous individuals

Scientific Name	Common Name	Section 5.2			
		P19	P20	P21	Incidental
Asperula conferta	Common Woodruff			+	
Austrostipa bigeniculata	Yanganbil			r	
Austrostipa scabra subsp. *scabra*	Speargrass	r			
Avena sp.*	Oats	r		+	
Boerhavia dominii	Tarvine	+	r		
Bothriochloa macra	Red-leg Grass	30	5	+	
Brachychiton populneus	Kurrajong	2		r	
*Bromus diandrus**	Great Brome	+		30	
*Bromus hordeaceus**	Soft Brome	r	+		
*Carthamus lanatus**	Saffron Thistle	r	+		
Chamaesyce drummondii	Caustic Weed	r	r		
Cynodon dactylon	Couch		r		
Dysphania pumilio		r	+		
*Echium plantagineum**	Paterson's Curse	+			
Elymus scaber	Wheatgrass			r	
Enneapogon nigricans	Niggerheads	r			
*Eragrostis cilianensis**	Stinkgrass	+	15		
*Erodium cicutarium**	Common Crowfoot	r	+		
Eucalyptus albens	White Box	5	2	30	
Eucalyptus blakelyi	Blakely's Red Gum				✓
Eucalyptus melliodora	Yellow Box				✓
Geranium homeanum				r	
Geranium solanderi	Native Geranium	r			
*Heliotropium europaeum**	Potato Weed		20		
Holcus lanatus *	Yorkshire Fog	+			
*Hordeum leporinum**	Barley Grass	r	+		
*Hypericum perforatum**	St John's Wort			+	
*Hypochaeris radicata**	Catsear	r	+		

Scientific Name	Common Name	Section 5.2			
		P19	P20	P21	Incidental
*Lactuca serriola**	Prickly Lettuce			r	
Lomandra multiflora subsp. *multiflora*	Many-flowered Mat-rush			+	
*Malva parviflora**	Small-flowered Mallow	r			
*Medicago minima**	Woolly Burr Medic		+		
*Modiola caroliniana**	Red-flowered Mallow		r		
Oxalis perennans		r	+		
Paspalidium distans		r			
*Paspalum dilatatum**	Paspalum		+		
*Phalaris aquatica**	Phalaris			+	
*Plantago lanceolata**	Lamb's Tongues	r		+	
Poa sieberiana	Snowgrass			2	
Poaceae *		+			
*Polygonum aviculare**	Wireweed	+	+		
Prunus sp.*					✓
Romulea rosea var. *australis**	Onion Grass			+	
Rubus sp.*	Blackberry		r		
Rumex brownii	Swamp Dock	r	r	r	
Rytidosperma erianthum	Hill Wallaby Grass			10	
*Salvia verbenaca**	Vervain	+	r		
*Sida rhombifolia**	Paddy's Lucerne	r			
*Silybum marianum**	Variegated Thistle	+			
*Trifolium angustifolium**	Narrow-leaved Clover	+		+	
*Ulmus procera**	English Elm				✓
Wahlenbergia communis	Tufted Bluebell		r	+	
Wahlenbergia stricta subsp. *stricta*	Tall Bluebell			+	
*Xanthium spinosum**	Bathurst Burr	r	+		

FAUNA LIST – *Species that were recorded during current surveys for the full program of works along Gocup Road by GHD*

* Introduced species

Bold denotes listed species

Class/Species	Common Name	Status	
		TSC Act	EPBC Act
BIRDS			
Tachybaptus novaehollandiae	Australasian Grebe		
Anthus novaeseelandiae	Australasian Pipit		
Gymnorhina tibicen	Australian Magpie		
Corvus coronoides	Australian Raven		
Threskiornis moluccus	Australian White Ibis		
Chenonetta jubata	Australian Wood Duck		
Coracina novaehollandiae	Black-faced Cuckoo-shrike		
Cincloramphus cruralis	Brown Songlark		
Climacteris picumnus victoriae	**Brown Treecreeper**	**V**	
*Sturnus vulgaris**	Common Starling		
Falcunculus frontatus	Crested Shrike-tit		
Platycercus elegans	Crimson Rosella		
Stagonopleura guttata	**Diamond Firetail**	**V**	
Artamus cyanopterus	Dusky Woodswalllow		
Platycercus eximius	Eastern Rosella		
Petroica phoenicea	**Flame Robin**	**V**	
Eolophus roseicapillus	Galah		
Rhipidura albiscapa	Grey Fantail		
Colluricincla harmonica	Grey Shrike-thrush		
Microeca fascinans	Jacky Winter		
Dacelo novaeguineae	Laughing Kookaburra		
Cacatua sanguinea	Little Corella		
Hieraaetus morphnoides	**Little Eagle**	**V**	
Philemon citreogularis	Little Friarbird		
Grallina cyanoleuca	Magpie-lark		
Philemon corniculatus	Noisy Friarbird		
Geopelia placida	Peaceful Dove		
Strepera graculina	Pied Currawong		
Merops ornatus	Rainbow Bee-eater		
Neochmia temporalis	Red-browed Finch		
Petroica goodenovii	Red-capped Robin		
Psephotus haematonotus	Red-rumped Parrot		

Class/Species	Common Name	Status	
		TSC Act	EPBC Act
Anthochaera carunculata	Red Wattlebird		
Myiagra inquieta	Restless Flycatcher		
Pachycephala rufiventris	Rufous Whistler		
Todiramphus sanctus	Sacred Kingfisher		
Zosterops lateralis	Silvereye		
Threskiornis spinicollis	Straw-necked Ibis		
Pardalotus striatus	Striated Pardalote		
Cacatua galerita	Sulphur-crested Cockatoo		
Malurus cyaneus	Superb Fairy-wren		
Hirundo neoxena	Welcome Swallow		
Gerygone fusca	Western Gerygone		
Lichenostomus leucotis	White-eared Honeyeater		
Egretta novaehollandiae	White-faced Heron		
Lichenostomus penicillatus	White-plumed Honeyeater		
Cormobates leucophaeus	White-throated Treecreeper		
Corcorax melanorhamphos	White-winged Chough		
Lalage tricolor	White-winged Triller		
Rhipidura leucophrys	Willie Wagtail		
Lichenostomus chrysops	Yellow-faced Honeyeater		
Acanthiza chrysorrhoa	Yellow-rumped Thornbill		
Acanthiza nana	Yellow Thornbill		
MAMMALS			
Trichosurus vulpecula	Common Brushtail Possum		
Pseudocheirus peregrinus	Common Ringtail Possum		
Macropus giganteus	Eastern Grey Kangaroo		
*Vulpes vulpes**	European Red Fox		
*Oryctolagus cuniculus**	European Rabbit		
Antechinus flavipes	Yellow-footed Antechinus		
BATS (all definite call confidence of Anabat detection)			
Chalinolobus morio	Chocolate Wattled Bat		
Miniopterus schreibersii oceanensis	**Eastern Bentwing-bat**	**V**	
Chalinolobus gouldii	Gould's Wattled Bat		
Vespadelus darlingtoni	Large Forest Bat		
Vespadelus vulturnus	Little Forest Bat		
Vespadelus regulus	Southern Forest Bat		
Scotorepens balstoni	Western Broad-nosed bat		
Tadarida australis	White-striped Freetail-bat		

Class/Species	Common Name	Status	
		TSC Act	EPBC Act
Saccolaimus flaviventris	**Yellow-bellied Sheathtail-bat**	**V**	
Mormopterus species 2			
Mormopterus species 4			
AMPHIBIANS			
Crinia parinsignifera	Eastern Sign-bearing Froglet		
Litoria peronii	Peron's Tree Frog		
REPTILES			
Morethia boulengeri	Boulenger's Morethia		
Egernia cunninghami	Cunningham's Skink		
Varanus varius	Lace Monitor		
Delma inornata	Plain Snake-lizard		
Carlia tetradactyla	Southern Rainbow Skink		
Egernia striolata	Tree Skink		

V – Vulnerable, E – Endangered, CE – Critically Endangered, Mi – Migratory

Appendix B Assessment of likelihood of occurrence

An evaluation of the likelihood and extent of impact to threatened and migratory fauna recorded from within the Cootamundra-Gundagai Council LGA (TSC Act threatened species); and within a 10 km radius of the proposal site (EPBC Act threatened and migratory species). Records are from a search of the Office of Environment and Heritage (OEH) Wildlife Atlas, and the EPBC Environmental Reporting Tool available from the Department of the Environment and Energy (DotEE) website. Ecology information has been obtained from the Threatened Species Profiles on the NSW OEH website (http://www.environment.nsw.gov.au/threatenedspecies/) and from the Species Profiles and Threats Database on the Commonwealth DotEE website (http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl).

Status

National *Commonwealth Environment Protection and Biodiversity Conservation Act 1999*.

NSW NSW *Threatened Species Conservation Act 1995* and *Fisheries Management Act 1994*.

E: Endangered

CE: Critically Endangered

V: Vulnerable

Mi: Migratory

Likelihood of Occurrence in Study Area

- **Recorded –** The species was observed in the study area during the current survey
- **High –** It is highly likely that a species inhabits the study area and is dependent on identified suitable habitat (ie. for breeding or important life cycle periods such as winter flowering resources), has been recorded recently in the locality (10 km) and is known or likely to maintain resident populations in the study area. Also includes species known or likely to visit the study area during regular seasonal movements or migration
- **Moderate –** Potential habitat is present in the study area. Species unlikely to maintain sedentary populations, however may seasonally use resources within the study area opportunistically or during migration. The species is unlikely to be dependent (ie. for breeding or important life cycle periods such as winter flowering resources) on habitat within the study area, or habitat is in a modified or degraded state. Includes cryptic flowering flora species that were not seasonally targeted by surveys and that have not been recorded
- **Low –** It is unlikely that the species inhabits the study area and has not been recorded recently in the locality (10 km). It may be an occasional visitor, but habitat similar to the study area is widely distributed in the local area, meaning that the species is not dependent (ie. for breeding or important life cycle periods such as winter flowering resources) on available habitat. Specific habitat is not present in the study area or the species is a non-cryptic perennial flora species that was specifically targeted by surveys and not recorded
- **None** – Suitable habitat is absent from the study area.

Assessment of significance

- **Recorded, high and moderate likelihood of occurrence and likely to be impacted -** An EP&A Act 7-Part Test and/or EPBC Act significance assessment is required for this species, population or ecological community.

FLORA

Species / Communities	Status		Habitat requirements	Likelihood of occurrence in study area and likelihood of impact
	National	NSW		
Ecological communities				
Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	E	E	Inland Grey Box Woodland includes those woodlands in which the most characteristic tree species, *Eucalyptus microcarpa* (Inland Grey Box), is often found in association with *E. populnea* subsp. *bimbil* (Bimble or Poplar Box), *Callitris glaucophylla* (White Cypress Pine), *Brachychiton populneus* (Kurrajong), *Allocasuarina luehmannii* (Bulloak) or *E. melliodora* (Yellow Box), and sometimes with *E. albens* (White Box). Shrubs are typically sparse or absent, although this component can be diverse and may be locally common, especially in drier western portions of the community. A variable ground layer of grass and herbaceous species is present at most sites. At severely disturbed sites the ground layer may be absent.	**None** – Grey Box does not occur in the study area and is not known to have previously occurred. The ecological community does not occur within the study area or locality.
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Box-Gum Woodland)	CE	E	Characterised by the presence or prior occurrence of White Box, Yellow Box and/or Blakely's Red Gum. The trees may occur as pure stands, mixtures of the three species or in mixtures with other trees, including wattles. Commonly co-occurring eucalypts include *Eucalyptus bridgesiana, E. polyanthemos, E. rubida, E. pauciflora, E. cinerea, E. mannifera, E. macrorhyncha, E. microcarpa* and others.	**Recorded –** The TSC Act form of the community is present in the study area due to the presence of two key indicator tree species and other distinguishing characteristics. The woodland does not meet the classification criteria for the EPBC Act form of the community. The proposal would remove trees and groundcover from within the community.
Plants				
Austral Toadflax *Thesium australe*	V	V	Occurs in grassland or grassy woodland. Often found in damp sites in association with Kangaroo Grass (*Themeda australis*).	**Low -** The species has not been recorded in the locality. Due to the dominance of introduced groundcover vegetation species in the study area, there is very limited potential habitat. Despite targeted surveys, the species was not identified in the study area. It is unlikely that the species would be impacted by the proposal.

Species / Communities	Status		Habitat requirements	Likelihood of occurrence in study area and likelihood of impact
	National	NSW		
Crimson Spider Orchid *Caladenia concolor*	V	E	Populations in NSW are known from a private property near Bethungra, in Burrinjuck Nature reserve and the Nail Can Hill Crown Reserve near Albury. Habitat is regrowth woodland on granite ridge country that has retained a high diversity of plant species, including other orchids. The dominant trees are Blakely's Red Gum (*Eucalyptus blakelyi*), Red Stringybark (*E. macrorhyncha*), Red Box (*E. polyanthemos*) and White Box (*E. albens*). The diverse understorey includes Silver Wattle (*Acacia dealbata*), Hop Bitter-pea (*Daviesia latifolia*), Common Beard-heath (*Leucopogon virgatus*), Spreading Flax-lily (*Dianella revoluta*) and Poa Tussock (*Poa sieberiana*).	**Low -** The species has not been recorded in the locality. Due to the dominance of introduced groundcover vegetation species in the study area, there is very limited potential habitat. Despite targeted surveys, the species was not identified in the study area. It is unlikely that the species would be impacted by the proposal.
Dwarf Bush-pea *Pultenaea humilis*	-	V	The species is rare in NSW and currently known from three confirmed localities in the South Western Slopes bioregion. It is found in isolated remnants of native woodland and forest communities that occur in extensively cleared agricultural landscapes. Occurs on a variety of soils ranging from sandy loams to clays. Flowering from October to December; fruiting from November to December.	**Low -** The species has been recorded once in the locality, about three kilometres south of Gocup Road in Wereboldera State Conservation Area in 2004. Due to the dominance of introduced groundcover vegetation species in the study area, there is very limited potential habitat. Despite targeted surveys, the species was not identified in the study area. It is unlikely that the species would be impacted by the proposal.
Pine Donkey Orchid *Diuris tricolor*	-	V	Sporadically distributed on the western slopes of NSW, extending from south of Narrandera all the way to the north of NSW. Localities in the south include Red Hill north of Narrandera, Coolamon, and several sites west of Wagga Wagga. Disturbance regimes are not known, although the species is usually recorded from disturbed habitats. Associated species include *Callitris glaucophylla, Eucalyptus populnea, Eucalyptus intertexta*, Ironbark and *Acacia* shrubland. The understorey is often grassy with herbaceous plants such as *Bulbine* species. The species grows in sclerophyll forest among grass, often with native Cypress Pine (Callitris spp.). It is found in sandy soils, either on flats or small rises.	**Low -** The species has been recorded once in the wider locality, about 13 kilometres south-west of Gocup Road in 1917. Due to the dominance of introduced groundcover vegetation species in the study area, there is very limited potential habitat. Despite targeted surveys, the species was not identified in the study area. It is unlikely that the species would be impacted by the proposal.

Species / Communities	Status		Habitat requirements	Likelihood of occurrence in study area and likelihood of impact
	National	NSW		
Sand-hill Spider Orchid *Caladenia arenaria*	E	E	The species is found mostly on the south west plains and western south west slopes. It is currently only known to occur in the Riverina between Urana and Narrandera. Occurs in woodland with sandy soil, especially that dominated by White Cypress Pine (*Callitris glaucophylla*). The flowers appear between September and November.	**Low -** The species has been recorded once in the wider locality, about 13 kilometres south-west of Gocup Road on an unknown date. Due to the dominance of introduced groundcover vegetation species in the study area, there is very limited potential habitat. Despite targeted surveys, the species was not identified in the study area. It is unlikely that the species would be impacted by the proposal.
Silky Swainson-pea *Swainsona sericea*	-	V	Silky Swainson-pea has been recorded from the Northern Tablelands to the Southern Tablelands and further inland on the slopes and plains. Its stronghold is on the Monaro. The species is found in Box-Gum Woodland in the Southern Tablelands and South West Slopes. Sometimes found in association with cypress-pines *Callitris* spp.	**Low -** A small population of the species has been recorded in Box-Gum Woodland in the Gocup Road reserve at 'South Meadow Creek' about 14 km south-east of the proposal site. Due to the dominance of introduced groundcover vegetation species in the study area, there is very limited potential habitat. Despite targeted surveys, the species was not identified in the study area. It is unlikely that the species would be impacted by the proposal.
Small Purple-pea *Swainsona recta*	E	E	Before European settlement, Small Purple-pea occurred in the grassy understorey of woodlands and open-forests dominated by Blakely's Red Gum *Eucalyptus blakelyi*, Yellow Box *E. melliodora*, Candlebark Gum *E. rubida* and Long-leaf Box *E. goniocalyx.* Grows in association with understorey dominants that include Kangaroo Grass *Themeda australis*, Poa tussocks *Poa* spp. and spear-grasses *Austrostipa* spp.	**Low -** The species has not been recorded in the locality. Due to the dominance of introduced groundcover vegetation species in the study area, there is very limited potential habitat. Despite targeted surveys, the species was not identified in the study area. It is unlikely that the species would be impacted by the proposal.

Species / Communities	Status		Habitat requirements	Likelihood of occurrence in study area and likelihood of impact
	National	NSW		
Small Scurf-pea *Cullen parvum*	-	E	In recent years, two populations have been recorded in travelling stock reserves south-west of Wagga Wagga, and a population reputedly exists on a roadside near Galong. Another population has recently been discovered on private land near Young. Large populations have been recorded in grassy gaps in the Red Gum Woodlands of Barmah State Park, just across the border in Victoria. In known populations in Victoria and NSW, plants are found in grassland, River Red Gum (*Eucalyptus camaldulensis*) Woodland or Box-Gum Woodland, sometimes on grazed land and usually on table drains or adjacent to drainage lines or watercourses, in areas with rainfall of between 450 and 700 mm. Flowers and fruits October to April.	**Low -** The species has not been recorded in the locality. Due to the dominance of introduced groundcover vegetation species in the study area, there is very limited potential habitat. Despite targeted surveys, the species was not identified in the study area. It is unlikely that the species would be impacted by the proposal.
Tarengo Leek Orchid *Prasophyllum petilum*	E	E	Natural populations are known from a total of four sites in NSW. These are at Boorowa, Captains Flat, Ilford and Delegate. Grows in open sites within Natural Temperate Grassland at the Boorowa and Delegate sites. Also grows in grassy woodland in association with River Tussock *Poa labillardieri*, Black Gum *Eucalyptus aggregata* and tea-trees *Leptospermum* spp. at Captains Flat and within the grassy groundlayer dominated by Kangaroo Grass under Box-Gum Woodland at Ilford. Apparently highly susceptible to grazing, being retained only at little-grazed travelling stock reserves (Boorowa & Delegate) and in cemeteries (Captains Flat and Ilford).	**Low -** The species has not been recorded in the locality. Due to the dominance of introduced groundcover vegetation species in the study area, there is very limited potential habitat. Despite targeted surveys, the species was not identified in the study area. It is unlikely that the species would be impacted by the proposal.
Tumut Grevillea *Grevillea wilkinsonii*	E	E	The species has a highly restricted distribution on the NSW south-west slopes. Its main occurrence is along a six kilometre stretch of the Goobarragandra River approximately 20 kilometres east of Tumut where about 800 plants are known. The other site is a small population on private land near Gundagai where only seven mature plants survive. The associated native vegetation includes remnant riverine shrub communities adjacent to open-forest, with the most common tree species being Blakely's Red Gum (*Eucalyptus blakelyi*), Apple Box (*E. bridgesiana*), Yellow Box (*E. melliodora*), and Red Stringybark (*E. macrorhyncha*) and with Kurrajongs (Brachychiton populneus) growing in nearby paddocks. Flowers from September to November.	**Low -** The Goobarragandra River population is about 14 kilometres south-east of Gocup Road. Due to the dominance of introduced groundcover vegetation species in the study area, there is very limited potential habitat. Despite targeted surveys, the species was not identified in the study area. It is unlikely that the species would be impacted by the proposal.

Species / Communities	Status		Habitat requirements	Likelihood of occurrence in study area and likelihood of impact
	National	NSW		
Yass Daisy *Ammobium craspedioides*	V	V	The species is found from near Crookwell on the Southern Tablelands to near Wagga Wagga on the South Western Slopes. Most populations are in the Yass region. Found in moist or dry forest communities, Box-Gum Woodland and secondary grassland derived from clearing of these communities. Grows in association with a large range of eucalypts (*Eucalyptus blakelyi*, *E. bridgesiana*, *E. dives*, *E. goniocalyx*, *E. macrorhyncha*, *E. mannifera*, *E. melliodora*, *E. polyanthemos*, *E. rubida*).	**Low -** The species has been recorded a number of times in the wider locality, about 12.5 kilometres east of Gocup Road. Due to the dominance of introduced groundcover vegetation species in the study area, there is very limited potential habitat. Despite targeted surveys, the species was not identified in the study area. It is unlikely that the species would be impacted by the proposal.

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Species	Status		Habitat requirements	Likelihood of occurrence in study area and likelihood of impact
	National	NSW		
Birds				
Australasian Bittern *Botaurus poiciloptilus*	E	E	This species favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (*Typha* spp.) and spikerushes (*Eleocharis* spp.). Hides during the day among dense reeds or rushes and feed mainly at night on frogs, fish, yabbies, spiders, insects and snails.	**Low** – The species has not been recorded in the locality. The study area does not contain suitable wetland habitat for the species and it is unlikely to occur.
Australian Painted Snipe *Rostratula australis*	V, Mi	E	Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber. Nests on the ground among tall vegetation, such as grasses, tussocks or reeds. Forages nocturnally on mud-flats and in shallow water.	**Low** – The species has not been recorded in the locality. The study area does not contain suitable wetland habitat for the species and it is unlikely to occur.

Species	Status		Habitat requirements	Likelihood of occurrence in study area and likelihood of impact
	National	NSW		
Barking Owl *Ninox connivens*	-	V	Inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. It is flexible in its habitat use, and hunting can extend in to closed forest and more open areas. Sometimes able to successfully breed along timbered watercourses in heavily cleared habitats (e.g. western NSW) due to the higher density of prey on these fertile soils.	**Moderate** – The species has been recorded about 4.7 kilometres east of Gocup Road, and may inhabit eucalypt woodland in the study area with large tree hollows in old eucalypts available for nesting. The removal of trees, from the study area may reduce roosting, nesting and foraging habitat for the species.
Black-chinned Honeyeater (eastern subspecies) *Melithreptus gularis gularis*	-	V	Occupies mostly upper levels of drier open forests or woodlands dominated by box and ironbark eucalypts, especially Mugga Ironbark (*Eucalyptus sideroxylon*), White Box (*Eucalyptus albens*), Grey Box (*Eucalyptus microcarpa*), Yellow Box (*Eucalyptus melliodora*) and Forest Red Gum (*Eucalyptus tereticornis*). Also inhabits open forests of smooth-barked gums, stringybarks, ironbarks and tea-trees.	**Moderate** – The species was recorded about 5 km south-east of the proposal site by EnviroKey in 2013. The study area contains woodland dominated by White Box, a preferred habitat tree for the species. The removal of trees from the study area may reduce roosting and foraging habitat for the species.
Black Falcon *Falco subniger*	-	V	The Black Falcon is widely, but sparsely, distributed in New South Wales, mostly occurring in inland regions. In New South Wales there is assumed to be a single population that is continuous with a broader continental population, given that falcons are highly mobile, commonly travelling hundreds of kilometres (Marchant & Higgins 1993).	**Moderate** – The species has been recorded once in the locality, 2.4 km north of Gocup Road in 1997. The species may utilise woodland in the study area as foraging, roosting and nesting habitat. The removal of trees from the study area may reduce roosting, nesting and foraging habitat for the species.

Species	Status		Habitat requirements	Likelihood of occurrence in study area and likelihood of impact
	National	NSW		
Brown Treecreeper (eastern subspecies) *Climacteris picumnus victoriae*	-	V	Found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range. The species mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species, and is also found in mallee and River Red Gum Forest bordering wetlands with an open understorey of acacias, saltbush, lignum, cumbungi and grasses. They are usually not found in woodlands with a dense shrub layer.	**High** – The species was recorded along Gocup Road on numerous occasions during current surveys. The removal of trees, groundcover and woody debris from the study area may reduce roosting, nesting and foraging habitat for the species.
Cattle Egret *Ardea ibis*	Mi	-	The Cattle Egret is found in grasslands, woodlands and wetlands, and is not common in arid areas. It also uses pastures and croplands, especially where drainage is poor. Will also forage at garbage dumps, and is often seen with cattle and other stock.	**Low** – The species has not been recorded in the locality. The species may inhabit grasslands in the study area on occasion. Loss of a relatively small area of grassland habitat in the study area is unlikely to affect the species.
Diamond Firetail *Stagonopleura guttata*	-	V	Found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum *Eucalyptus pauciflora* Woodlands. Also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities. Often found in riparian areas (rivers and creeks), and sometimes in lightly wooded farmland. Feeds exclusively on the ground, on ripe and partly-ripe grass and herb seeds and green leaves, and on insects.	**Moderate** – The species was recorded in eucalypt woodland along Gocup Road during current surveys. The species may occasionally forage in limited native groundcover vegetation in the study area. The removal of trees and groundcover from the study area may reduce roosting, nesting and foraging habitat for the species.
Flame Robin *Petroica phoenicea*	-	V	Prefer forests and woodlands up to about 1800 metres above sea level but are often recorded in fragmented landscapes foraging in open farmland adjoining box-gum woodlands.	**Moderate** – The species was recorded along other sections of Gocup Road during current surveys. The removal of trees, from the study area may reduce roosting, nesting and foraging habitat for the species.

Species	Status		Habitat requirements	Likelihood of occurrence in study area and likelihood of impact
	National	NSW		
Fork-tailed Swift *Apus pacificus*	Mi	-	Migratory marine visitor to eastern Australia. It is a highly nomadic and dispersive species which feeds on insects in the air.	**Low** – The species may occasionally use the woodland in the study area as roosting habitat. The proposal is unlikely to have an impact on the aerial resources of the species.
Gang-gang Cockatoo *Callocephalon fimbriatum*	-	V	In summer, generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In winter, may occur at lower altitudes in drier more open eucalypt forests and woodlands, and often found in urban areas. Move to lower altitudes in winter, preferring more open eucalypt forests and woodlands, particularly in box-ironbark assemblages. Favours old growth attributes for nesting and roosting.	**Moderate** – The species was recorded along Gocup Road during current and previous surveys. The species may use eucalypt woodland in the study area as foraging, roosting and nesting habitat. The removal of trees from the study area may reduce roosting, nesting and foraging habitat for the species.
Great Egret *Ardea alba*	Mi	-	Reported in a wide range of wetland habitats including swamps and marshes, margins of rivers and lakes, damp or flooded grasslands, pastures or agricultural lands, reservoirs, sewage treatment ponds, and drainage channels.	**Low** – The species was recorded at a farm dam in open farmland near the southern end of the proposal site during previous surveys. The proposal is unlikely to impact on preferred wetland habitats where the species is likely to occur.
Hooded Robin *Melanodryas cucullata cucullata*	-	V	Prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas. Requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses.	**Moderate** – The species has been recorded twice in the locality, the nearest record about 4.5 kilometres west of Gocup Road in Minjary National Park. The study area contains eucalypt woodland with woody debris and native grasses that may provide habitat for the species. The removal of trees, groundcover and woody debris from the study area may reduce roosting, nesting and foraging habitat for the species.

Species	Status		Habitat requirements	Likelihood of occurrence in study area and likelihood of impact
	National	NSW		
Latham's Snipe *Gallinago hardwickii*	Mi	-	Occurs in permanent and ephemeral wetlands. The species usually inhabits open, freshwater wetlands with low, dense vegetation.	**Low** – The species has been recorded once in the locality, about 10 km south of Gocup Road in 1979. It is unlikely to inhabit the study area due to a lack of suitable wetland habitats. The species is unlikely to inhabit the study area due to a lack of suitable wetland habitats.
Little Eagle *Hieraaetus morphnoides*	-	V	Occupies open eucalypt forest, woodland or open woodland. Sheoak or Acacia woodlands and riparian woodlands of interior NSW are also used. Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter.	**Moderate** – The species was recorded flying over the south of Gocup Road during current surveys. The removal of trees from the study area may reduce roosting, nesting and foraging habitat for the species.
Little Lorikeet *Glossopsitta pusilla*	-	V	Mostly occur in dry, open eucalypt forests and woodlands. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity. They have been recorded from both old-growth and logged forests in the eastern part of their range, and in remnant woodland patches and roadside vegetation on the western slopes. On the western slopes and tablelands White Box and Yellow Box are particularly important food sources for pollen and nectar and mistletoe is also a common habitat feature.	**Moderate** – The species was recorded about 5 km south-east of the proposal site by EnviroKey in 2013. The species may utilise eucalypt woodland in the study area as foraging, roosting and nesting habitat. The removal of trees from the study area may reduce roosting, nesting and foraging habitat for the species.
Painted Honeyeater *Grantiella picta*	-	V	Inhabits Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests. A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Insects and nectar from mistletoe or eucalypts are occasionally eaten. Also eats saltbush fruit, berries, seed and flowers. Migratory species.	**Low** – The species has not been recorded within the Snowy Valleys or Gundagai LGAs. While potential habitat exists in the study area, the species is unlikely to occur due its absence of records within the locality. The species is unlikely to inhabit the study area.

Species	Status		Habitat requirements	Likelihood of occurrence in study area and likelihood of impact
	National	NSW		
Regent Honeyeater *Anthochaera phrygia*	E	E	The species inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. Regent Honeyeaters inhabit woodlands that support a significantly high abundance and species richness of bird species. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes.	**Low** – The species has not been recorded in the locality. The study area does not have significantly large numbers of mature trees. The species is unlikely to inhabit the study area due to a lack of suitable habitat.
Rufous Fantail *Rhipidura rufifrons*	Mi	-	Occurs in wet forests, and less often open forests.	**Low** – The species has not been recorded in the locality and is unlikely to occur in the study area due to a lack of suitable forest habitat. The species is unlikely to inhabit the study area due to a lack of suitable forest habitat.
Satin Flycatcher *Myiagra cyanoleuca*	Mi	-	Satin Flycatchers are mainly recorded in eucalypt forests, especially wet sclerophyll forest, often dominated by eucalypts such as Brown Barrel, *Eucalypt fastigata*, Mountain Gum, *E. dalrympleana*, Mountain Grey Gum, Narrow-leaved Peppermint, Messmate or Manna Gum, or occasionally Mountain Ash, *E. regnans*. Such forests usually have a tall shrubby understorey of tall acacias, for example Blackwood, *Acacia melanoxylon*. The species may also occur in woodlands such as Box-Gum Woodland.	**Low** – The species has not been recorded in the locality and is likely to utilise preferred, higher quality habitat outside the study area.
Scarlet Robin *Petroica boodang*	-	V	Primarily a resident in dry forests and woodlands, but some adults and young birds disperse to more open habitats after breeding.	**Moderate** – The species has been recorded numerous times in the locality, the nearest record 4.6 km east of Gocup Road in Minjary National Park. The species may utilise eucalypt woodland in the study area as potential habitat. The removal of trees from the study area may reduce roosting, nesting and foraging habitat for the species.

Species	Status		Habitat requirements	Likelihood of occurrence in study area and likelihood of impact
	National	NSW		
Speckled Warbler *Chthonicola sagittata*	-	V	The Speckled Warbler lives in a wide range of *Eucalyptus* dominated communities that have a grassy understorey, often on rocky ridges or in gullies. Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy. Large, relatively undisturbed remnants are required for the species to persist in an area.	**Moderate** – The species has been recorded 3.5 km south of Gocup Road. It may utilise eucalypt woodland in the study area as potential habitat. The removal of trees, from the study area may reduce roosting, nesting and foraging habitat for the species.
Square-tailed Kite *Lophoictinia isura*	-	V	In NSW, scattered records of the species throughout the state indicate that the species is a regular resident in the north, north-east and along the major west-flowing river systems. Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses.	**Low** – The species has not been recorded in the locality. While the species may occasionally use the woodland in the study area for roosting and foraging it is more likely to inhabit the woodland along Tumut River to the east or the Murrumbidgee River to the north. The species is likely to utilise preferred habitat outside the study area.
Superb Parrot *Polytelis swainsonii*	V	V	The species inhabits Box-Gum, Box-Cypress-pine and Boree Woodlands and River Red Gum Forest. In the Riverina the birds nest in the hollows of large trees (dead or alive) mainly in tall riparian River Red Gum Forest or Woodland. On the South West Slopes nest trees can be in open Box-Gum Woodland or isolated paddock trees. Species known to be used are Blakely's Red Gum, Yellow Box, Apple Box and Red Box. May forage up to 10 kilometres from nesting sites, primarily in grassy box woodland.	**Moderate** – The species has been recorded about 1 km south of Gocup Road. The species may inhabit Box-Gum Woodland in the study area and the proposal is located within known habitat of the species as mapped by OEH. The removal of trees and groundcover from the study area may reduce roosting, nesting and foraging habitat for the species.

Species	Status		Habitat requirements	Likelihood of occurrence in study area and likelihood of impact
	National	NSW		
Swift Parrot *Lathamus discolor*	E	E	The species occurs in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as Swamp Mahogany *Eucalyptus robusta*, Spotted Gum *Corymbia maculata,* Red Bloodwood *C. gummifera*, Mugga Ironbark *E. sideroxylon*, and White Box *E. albens*. Commonly used lerp infested trees include Grey Box *E. microcarpa*, Grey Box E*. moluccana* and Blackbutt *E. pilularis*.	**Moderate** – The species has been recorded in the vicinity of Doctors Hill in 2001 and 2002. The species is likely to use White Box trees (a preferred feed tree) in the study area for foraging and roosting. The species only breeds in Tasmania. The removal of trees from the study area may reduce roosting and foraging habitat for the species.
Turquoise Parrot *Neophema pulchella*	-	V	Lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland. Prefers to feed in the shade of a tree and spends most of the day on the ground searching for the seeds or grasses and herbaceous plants, or browsing on vegetable matter	**Moderate** – The species has been recorded about 3.5 km south of Gocup Road at its nearest. It may utilise eucalypt woodland and the adjoining clearings in the study area as potential habitat. The removal of trees and groundcover, from the study area may reduce roosting, nesting and foraging habitat for the species.
Varied Sittella *Daphoenositta chrysoptera*	-	V	Occurs in eucalypt woodlands and forests throughout their range. They prefer rough-barked trees e.g. stringybarks and ironbarks	**Moderate** – The species was recorded in the northern road reserve in the study area by EnviroKey in 2012. The species may utilise eucalypt woodland in the study area as foraging, roosting and nesting habitat. The removal of trees, from the study area may reduce roosting, nesting and foraging habitat for the species.
White-bellied Sea-Eagle *Haliaeetus leucogaster*	Mi	V	Characterised by the presence of large areas of open water (larger rivers, swamps, lakes, and the sea). Birds have been recorded in (or flying over) a variety of terrestrial habitats.	**Low** – Very limited habitat occurs for this species in the study area due to a lack of open water habitats. The species is unlikely to inhabit the study area due to a lack of open water habitats.

Species	Status		Habitat requirements	Likelihood of occurrence in study area and likelihood of impact
	National	NSW		
White-fronted Chat *Epthianura albifrons*	-	V	The White-fronted Chat lives in salt marsh and other damp areas with low vegetation such as swampy farmland and roadside verges. Sometimes occurs on beaches and the edges of lakes.	**Low** – The species was recorded along Gocup Road during previous surveys. The species may utilise open areas with low vegetation in the study area as foraging, roosting and nesting habitat. The proposal would be unlikely to impact any marsh or damp habitats.
White-throated Needletail *Hirundapus caudacutus*	Mi	-	This is a highly nomadic and dispersive species, which follows low pressure atmospheric pockets where it feeds on insects. The species is generally found in eastern New South Wales and occasionally in inland NSW.	**Low** – The species may occasionally forage above the study area and use trees as roosting habitat. The proposal is unlikely to have an impact on the aerial resources of the species.
Mammals				
Koala *Phascolarctos cinereus*	V	V	In NSW it mainly occurs on the central and north coasts with some populations in the western region. Inhabits eucalypt woodlands and forests.	**None** – The species has only been recorded in the locality once, in the 1980's. No evidence of the species was detected during surveys. The species is unlikely to inhabit the study area due to a lack of records in the locality.
Spotted-tailed Quoll *Dasyurus maculatus maculatus (SE mainland population)*	E	V	Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Individual animals use hollow-bearing trees, fallen logs, small caves, rock crevices, boulder fields and rocky-cliff faces as den sites.	**Low** – The species has been recorded three times in the locality, with the most recent observation from 1980. The proposal site provides only marginal foraging habitat for the species, and has a paucity of breeding and shelter habitat, including large hollow logs, rock outcrops and suitably-sized hollow-bearing trees in areas of connected vegetation. The species is unlikely to inhabit the study area due to lack of records in the locality and only marginal habitat availability.

Species	Status		Habitat requirements	Likelihood of occurrence in study area and likelihood of impact
	National	NSW		
Squirrel Glider *Petaurus norfolcensis*	-	V	Inhabits a wide range of open forest, woodland and riverine forest habitats. Utilise remnants of various sizes, including small remnants and even small stands of trees within Travelling Stock Reserves, roadside reserves or private land. Often utilise linear remnant vegetation along roadsides or rivers and streams. Eucalypt species known to provide suitable denning and foraging resources include (but are not restricted to): Blakely's Red Gum, Grey Box, Red Box, Mugga Ironbark, River Red Gum, White Box and Yellow Box.	**Low** – The species has not been recorded in the locality and was not recorded during targeted surveys, however, it may utilise eucalypt woodland in the study area as potential habitat with tree hollows available for denning. The trees proposed to be removed are unlikely to provide habitat for the species due to the lack of connectivity for the species.
Greater Glider *Petauroides volans*	V	-	The Greater Glider occurs in eucalypt forests and woodlands along the east coast of Australia from noth east Queensland to the Central Highlands of Victoria. The species feeds exclusively on eucalypt leaves, buds, flowers and mistletoe. It shelters during the day in tree hollows and will use up to 18 hollows in its home range.	**Low** – The species has been recorded about 17 km south-east of the proposal site in Wereboldera State Conservation Area. The habitat (vegetation and topography) in the state conservation area is substantially different to that present in the study area and it is unlikely that the species would occur in the study area. The trees proposed to be removed are unlikely to provide habitat for the species due to the lack of connectivity for the species.
Bats				
Eastern Bentwing-bat *Miniopterus schreibersii oceanensis*	-	V	Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. Hunt in forested and woodland areas, catching moths and other flying insects above the tree tops.	**Moderate** – The species was recorded along Gocup Road using echolocation surveys. The species may use the woodland in the study area for foraging and possibly road culverts for roosting. The removal of trees from the study area may impact on foraging habitat for the species.

Species	Status		Habitat requirements	Likelihood of occurrence in study area and likelihood of impact
	National	NSW		
Eastern False Pipistrelle *Falsistrellus tasmaniensis*	-	V	The Eastern False Pipistrelle is found on the south-east coast and ranges of Australia, from southern Queensland to Victoria and Tasmania. Prefers moist habitats, with trees taller than 20 metres. Generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings.	**Moderate** – The species has been recorded about 5 km south of Gocup Road, and may utilise eucalypt woodland in the study area as potential habitat. The removal of trees from the study area, including those with hollows, may reduce roosting and foraging habitat for the species.
Grey-headed Flying-fox *Pteropus poliocephalus*	V	V	Occurs in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. Feeds on the nectar and pollen of native trees, in particular Eucalyptus, Melaleuca and Banksia, and fruits of rainforest trees and vines. Also forages in cultivated gardens and fruit crops.	**Low** – The species has been recorded in 2013, adjacent to Big Ben Creek to the south. The species is only occasionally observed in the region. While the species may be an occasional visitor to the study area, better quality habitat is present along creeks in the local area. The species is unlikely to be dependent on the habitats in the study area.
Little Pied Bat *Chalinolobus picatus*	-	V	Occurs in dry open forest, open woodland, mulga woodlands, chenopod shrublands, cypress-pine forest, mallee, Bimbil box. Roosts in caves, rock outcrops, mine shafts, tunnels, tree hollows and buildings.	**Low** – The species has not been recorded within the Gundagai LGA, and is generally known from further inland to the west. The nearest record of the species is near Yass, about 80 kilometres north-east, which is an outlier record. The species is unlikely to inhabit the study area as it is generally found further to the west.

Species	Status		Habitat requirements	Likelihood of occurrence in study area and likelihood of impact
	National	NSW		
Southern Myotis *Myotis macropus*	-	V	Preferred habitat is riparian. Roosts in caves, mines, tree hollows, aqueduct tunnels and under bridges and in dense vegetation in the vicinity of bodies of slow-flowing or still water (including estuaries).	**Low** – The species has not been recorded in the locality. As the species prefers to forage over water and roost in riparian habitat, it is more likely to occupy areas on the Murrumbidgee River to the north or Tumut River to the east, and is unlikely to occur in the study area due to a lack of riverine habitats.
South-eastern Long-eared Bat *Nyctophilus corbeni*	V	V	Occurs in a range of inland woodland vegetation types, including box, ironbark and cypress pine woodlands. Also known to occupy man-made structures such as timber bridges.	**Moderate** – The species has not been recorded in the locality, however, it may utilise eucalypt woodland in the study area as potential habitat. The removal of trees, from the study area may reduce roosting and foraging habitat for the species.
Yellow-bellied Sheathtail-bat *Saccolaimus flaviventris*	-	V	In the most southerly part of its range - most of Victoria, south-western NSW and adjacent South Australia - it is a rare visitor in late summer and autumn. Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory.	**Moderate** – The species was recorded along Gocup Road using echolocation surveys. The species may use the eucalypt woodland in the study area as potential habitat or forage aerially above the study area. The removal of trees from the study area, including those with hollows, may reduce roosting and foraging habitat for the species.

Species	Status		Habitat requirements	Likelihood of occurrence in study area and likelihood of impact
	National	NSW		
Insects				
Golden Sun Moth *Synemon plana*	CE	E	The species occurs in Natural Temperate Grasslands and grassy Box-Gum Woodlands in which groundlayer is dominated by wallaby grasses *Austrodanthonia* spp. Grasslands dominated by wallaby grasses are typically low and open - the bare ground between the tussocks is thought to be an important microhabitat feature for the Golden Sun Moth, as it is typically these areas on which the females are observed displaying to attract males. Habitat may contain several wallaby grass species, which are typically associated with other grasses particularly spear-grasses *Austrostipa* spp. or Kangaroo Grass *Themeda australis*.	**Low** – The species was not recorded during targeted surveys but was recorded in the Gocup TSR, east of Gocup Road in 2000. Potential habitat for the species is not present in the study area.
Reptiles				
Pink-tailed Worm Lizard *Aprasia parapulchella*	V	V	Inhabits sloping, open woodland areas with predominantly native grassy groundlayer, particularly those dominated by Kangaroo Grass (*Themeda australis*). Sites are typically well-drained, with rocky outcrops or scattered, partially-buried rocks.	**None** – The species has not been recorded in the locality and is unlikely to occur due to lack of suitable rocky habitats.
Striped Legless Lizard *Delma impar*	V	V	The species is found mainly in Natural Temperate Grassland but has also been captured in grasslands that have a high exotic component. Also found in secondary grassland near Natural Temperate Grassland and occasionally in open Box-Gum Woodland. Habitat is where grassland is dominated by perennial, tussock-forming grasses such as Kangaroo Grass *Themeda australis*, spear-grasses *Austrostipa* spp. and poa tussocks *Poa* spp., and occasionally wallaby grasses *Austrodanthonia* spp. Sometimes present in modified grasslands with a significant content of exotic grasses. Sometimes found in grasslands with significant amounts of surface rocks, which are used for shelter.	**Low** – The species was not recorded during targeted surveys but has been recorded during previous surveys along Gocup Road in grassland dominated by Kangaroo Grass. It is considered unlikely to occur in the proposal site due to the dominance of introduced groundcover species. There are no patches of habitat similar to the location where the species was recorded previously. The species is unlikely to be impacted by the proposal.

Species	Status		Habitat requirements	Likelihood of occurrence in study area and likelihood of impact
	National	NSW		
Amphibians				
Booroolong Frog *Litoria booroolongensis*	E	E	This species lives along permanent streams with some fringing vegetation cover such as ferns, sedges or grasses. Adults occur on or near cobble banks and other rock structures within stream margins. Shelter under rocks or amongst vegetation near the ground on the stream edge. Sometimes bask in the sun on exposed rocks near flowing water during summer. Eggs are laid in submerged rock crevices and tadpoles grow in slow-flowing connected or isolated pools.	**None** – The species has not been recorded in the locality since 1999 and the study area does not contain suitable stream habitats. The species is unlikely to inhabit the study area.
Southern Bell Frog *Litoria raniformis*	V	E	Found in or around permanent or ephemeral Black Box/Lignum/Nitre Goosefoot swamps, Lignum/Typha swamps and River Red Gum swamps or billabongs along floodplains and river valleys. They are also found in irrigated rice crops, particularly where there is no available natural habitat.	**None** – The species has not been recorded in the locality and the study area does not contain suitable wetland habitats. The species is unlikely to inhabit the study area.
Fish				
Macquarie Perch *Macquaria australasica*	E	V	Habitat for the species is bottom or mid-water in slow-flowing rivers with deep holes, typically in the upper reaches of forested catchments with intact riparian vegetation. They also do well in some upper catchment lakes. In some parts of its range, the species is reduced to taking refuge in small pools which persist in midland–upland areas through the drier summer periods.	**None** – The species has not been recorded in the locality. River habitat for the species is not present in the study area and it is unlikely to be impacted.
Murray Cod *Maccullochella peelii*	V	-	Occurs in the waterways of the Murray–Darling Basin in a wide range of warm water habitats that range from clear, rocky streams to slow flowing turbid rivers and billabongs.	**None** – The species has not been recorded in the locality. Habitat for the species is unlikely to occur in the study area and it is unlikely to be impacted.
Southern Pygmy Perch *Nannoperca australis*	-	E	The species was once widely distributed throughout the Murrumbidgee and Murray River systems, as well as coastal streams in South Australia and Victoria, north-eastern Tasmania and King and Flinders Islands in Bass Strait. There have been large-scale reductions in their range since European settlement, particularly in inland regions. Populations of Southern Pygmy Perch have recently been discovered in tributaries of the upper Lachlan and upper Murray River catchments. The population appears to be restricted to one small area in the Lachlan, and several small creeks and billabongs near Albury and Holbrook.	**None –** The species has been recorded once in the locality, in the Tumut River in 1976. The proposal would not impact on any potential habitat of the species.

Species	Status		Habitat requirements	Likelihood of occurrence in study area and likelihood of impact
	National	NSW		
Trout Cod *Maccullochella macquariensis*	E	E	The species is endemic to the southern Murray-Darling river system, including the Murrumbidgee and Murray Rivers, and the Macquarie River in central NSW. They are often found close to cover and in relatively fast currents, especially in fairly deep water close to the bank, and often congregate around large woody debris (snags).	**None** – The species has previously been recorded in the Gundagai LGA in the Murrumbidgee River. River habitat for the species is not present in the study area and it is unlikely to be impacted.

Appendix C Hollow-bearing tree removal list

Species	DBH (cm)	No. of hollows/diameter (cm)				
		<5	5-10	10-20	20-30	>30
Section 5.2 - Cookoomooroo						
White Box	100		1	3		
Blakely's Red Gum	110	4				
Yellow Box	120	2	1			
Dead	140	3	3	2		
Blakely's Red Gum	190		4	4		
Blakely's Red Gum	150		1	1		
White Box	120		3	4	1	
Total		**9**	**13**	**14**	**1**	

Appendix D Significance assessments

EP&A Act assessments of significance

Ecological communities

- White Box Yellow Box Blakely's Red Gum Woodland

a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction

A threatened species is not the subject of this assessment of significance.

b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction

An endangered population is not the subject of this assessment of significance.

c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

The proposal would remove 1.1 hectares of Box-Gum Woodland. Of this, 0.7 hectares is moderate/good condition woodland and 0.4 hectares is low condition woodland. The Box-Gum Woodland proposed to be removed comprises mature and juvenile trees, including seven hollow-bearing trees.

Areas of low quality Box-Gum Woodland contain an understorey dominated by introduced groundcover flora species and low canopy cover. Moderate/good condition Box-Gum Woodland areas contain either a predominantly native understorey or a better canopy cover (more than 25 per cent of the lower benchmark for the ecological community). All areas of Box-Gum Woodland have been degraded to different degrees by introduced weed species, which are prevalent throughout the study area.

Low condition Box-Gum Woodland represents 36 per cent of all Box-Gum Woodland removal. The proposal would remove six per cent of Box-Gum Woodland of moderate/good condition in the study area (not including derived grassland).

Box-Gum Woodland in the study area is connected to larger areas of woodland in the locality, including in Minjary National Park 2.4 kilometres south of the proposal site, and in woodland remnants on private properties surrounding the study area. At least some of this woodland is likely to comprise Box-Gum Woodland. The proposal would remove a minor fraction of the adjacent connected Box-Gum Woodland in the locality.

The proposed removal of Box-Gum Woodland, which has been degraded by surrounding land use, would be unlikely to have an adverse effect on the extent of Box-Gum Woodland such that its local occurrence would be likely to be placed at risk of extinction.

ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

The proposal has the potential to modify the composition of the ecological community by creating conditions conducive to the spread of weed species. This could occur through general disturbance from machinery, vehicles and foot traffic. These conditions could lead to the spread of invasive species such as St. John's Wort.

The majority of the Box-Gum Woodland in the study area is already degraded by introduced groundcover flora species, likely to have been caused through adjacent agricultural land use and disturbance created by the development of Gocup Road. Management measures would be implemented to reduce the spread of weeds, particularly into those areas that are in moderate/good condition and dominated by native species. It is unlikely that the proposal would substantially and adversely modify the composition of the ecological community such that its local occurrence would be placed at risk of extinction.

d) in relation to the habitat of a threatened species, population or ecological community:

i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

The proposal would remove 1.1 hectares of Box-Gum Woodland. Of this, 0.7 hectares is moderate/good condition woodland and 0.4 hectares is low condition woodland. The patches to be disturbed are already modified and subject to edge effects and fragmentation.

The Box-Gum Woodland proposed to be removed comprises mature and juvenile trees, including hollow-bearing trees. The proposal would also remove groundcover vegetation generally dominated by introduced flora species.

Low condition Box-Gum Woodland represents 36 per cent of all Box-Gum Woodland removal. The proposal would remove six per cent of Box-Gum Woodland of moderate/good condition in the study area (not including derived grassland).

The proposal would remove only a minor fraction of the adjacent connected Box-Gum Woodland in the locality.

ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

The woodland in the study area is highly fragmented. The existing connectivity of vegetation across Gocup Road in the vicinity of section 5.2 (Cookoomooroo) is very limited due to the lack of adjacent vegetation corridors on either side of the road. It is unlikely that there is substantial movement of fauna across this section of Gocup Road.

Fragmentation of the vegetation in the study area has previously occurred through construction of Gocup Road and other local roads and clearing for agriculture and residential properties. These developments have created barriers to movement for some fauna species, particularly those that are limited by dispersal abilities and habitat preferences.

Proposed earthworks would create cut (excavation) and fill sections in the land surface with a width of up to 100 metres. Cut sections would have a maximum depth of 20.6 metres and fill sections would have a maximum height of 18.8 metres. Embankment batter slopes would be 4 horizontal: 1 vertical for batters with a height/depth of less than seven metres and generally 2 horizontal: 1 vertical for batters with a height/depth of greater than seven metres. Sections of deep cut (around 21 metres) would be 1.5 to 2 horizontal: 1 vertical. Sections with 1.5 to 2

horizontal: 1 vertical batters would typically have lengths of about 200 metres and would not prevent fauna from moving through the study area. The main sections of cut and fill are located in areas that have already been cleared of woodland, and contain very few trees. The proposed earthworks are unlikely to cause substantial fragmentation of habitat.

The proposal would also remove scattered paddock trees. Paddock trees are important for the movement of a number of species through the landscape, including species such as the Brown Treecreeper, Diamond Firetail and Flame Robin. As the proposal is mainly located in areas that have been cleared of trees, the extent of paddock tree removal relative to the number of trees in the study area is minimal. It is unlikely that the proposed removal of paddock trees would substantially affect the movement of fauna through the landscape.

The small amount of vegetation removal from the ecological community is unlikely to result in significant additional fragmentation to that which has already occurred. The proposal would not remove any large areas of native vegetation, sever any important corridors or otherwise isolate any areas of habitat.

To minimise impacts on vegetation connectivity, sections of decommissioned road would be revegetated to improve connectivity of roadside vegetation.

iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality

The proposal would remove Box-Gum Woodland along Gocup Road, which is important as habitat for fauna that depend on the ecological community. Box-Gum Woodland in the proposal site is of moderate/good to low quality, including 0.7 hectares of moderate/good condition woodland and 0.4 hectares of low condition woodland.

Areas of low quality contain an understorey dominated by introduced groundcover flora species and low canopy cover. Moderate/good quality areas contain either a predominantly native understorey or a better canopy cover (more than 25 per cent of the lower benchmark for the ecological community). All areas of Box-Gum Woodland have been degraded to different degrees by introduced weed species, which are prevalent throughout the study area.

Although being of moderate/good condition, the derived grassland is modified by grazing and has a relatively low diversity of native flora species. Low condition Box-Gum Woodland represents 36 per cent of all Box-Gum Woodland removal.

The area of Box-Gum Woodland proposed to be removed is relatively small compared to the extent of the ecological community in the study area and locality. The proposal would not therefore put the long-term survival of the ecological community in the locality at risk.

e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)

The proposal would not affect any habitat listed on the critical habitat register.

f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan

There is no state recovery plan for Box-Gum Woodland. The OEH (2016b) Threatened Species website identifies a number of actions that need to occur to recover the community, which are relevant to the proposal:

- Protect all sites from further clearing and disturbance
- Leave fallen timber on the ground
- Ensure remnants remain connected or linked to each other
- Undertake weed control (taking care to spray or dig out only target species).

The proposal would conflict with the recommended recovery actions due to the requirement for removing vegetation within the Box-Gum Woodland ecological community. The area of Box-Gum Woodland proposed to be removed is relatively small compared to the extent of the ecological community in the study area and locality. The proposal is unlikely to significantly conflict with the recommended recovery action of protecting sites from clearing and disturbance.

The proposal would conflict with the recovery actions by contributing to the existing fragmentation of the woodland through the removal of vegetation along the road and increasing existing gaps in the vegetation. As discussed above, additional fragmentation caused by the proposal is unlikely to be significant.

The proposal would be consistent with the recovery actions by relocating woody debris from the proposal site to other parts of the study area and by placing additional woody debris generated by removing trees in the study area.

g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process

The proposed action constitutes three listed key threatening processes relevant to the Box-Gum Woodland ecological community:

- *Clearing of native vegetation* – the proposal would remove 1.1 hectares of Box-Gum Woodland. This is unlikely to represent a significant loss of the Box-Gum Woodland ecological community, as described above
- *Loss of hollow-bearing trees* – the proposal would remove up to seven hollow-bearing trees from the Box-Gum Woodland ecological community. The removal of these trees has the potential to affect hollow-dependent fauna that depend on the ecological community but only represent a minor fraction of the hollow-bearing trees in the study area
- *Removal of dead wood and dead trees* – the proposal would remove dead trees from within the ecological community, but these represent a minor fraction of the dead trees in the study area.

Conclusion

The proposal would be unlikely to have a significant effect on the endangered Box-Gum Woodland ecological community as:

- *Only a small area of vegetation representative of the community would be removed compared to the extent of the community in the study area and locality (no more than six per cent of its occurrence in the study area and only a minor fraction of the adjacent connected Box-Gum Woodland in the locality)*
- *The small amount of woodland removal from the ecological community is unlikely to result in significant additional fragmentation to that which has already occurred.*

Woodland birds – cockatoos, lorikeets and parrots

- Gang-gang Cockatoo (*Callocephalon fimbriatum*) – Vulnerable
- Little Lorikeet (*Glossopsitta pusilla*) – Vulnerable
- Superb Parrot (*Polytelis swainsonii*) – Vulnerable
- Swift Parrot (*Lathamus discolor*) – Endangered
- Turquoise Parrot (*Neophema pulchella*) – Vulnerable.

a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction

Woodland along Gocup Road is known to provide habitat for the threatened Gang-gang Cockatoo, Little Lorikeet and Swift Parrot. The Gang-gang Cockatoo was recorded during current surveys, while the Little Lorikeet and Swift Parrot have been recorded in the locality previously. Based on resources present and records in the locality, woodland in the study area is likely to provide habitat for the Superb Parrot and may also provide habitat for the Turquoise Parrot.

Trees provide nectar and pollen during periods of flowering for the Little Lorikeet and Swift Parrot. The grassy understorey and shrubs in the woodland provide foraging resources for the Little Lorikeet, Superb Parrot and Turquoise Parrot. Fruits and seeds of trees and shrubs provide foraging resources for the Gang-gang Cockatoo.

Hollow-bearing trees could potentially be used by the Little Lorikeet, Superb Parrot and Turquoise Parrot for nesting. The Gang-gang Cockatoo and Swift Parrot are unlikely to breed in the study area. The study area is not located in a montane area typically used by the Gang-gang Cockatoo for breeding and Swift Parrots only breed in Tasmania.

The woodland in the study area also provides potential movement habitat for all these species.

The proposed removal of woodland would reduce the amount of nesting, roosting, movement and foraging habitat for the Gang-gang Cockatoo, Little Lorikeet, Superb Parrot, Swift Parrot and Turquoise Parrot in the study area. The proposal would remove 1.1 hectares of native woodland habitat, comprising mature and juvenile trees. This represents up to six per cent of the moderate/good condition woodland in the study area and a minor fraction of the adjacent connected habitat in the locality.

Up to seven hollow-bearing trees would be removed from the proposal site. Removal of these trees is unlikely to substantially affect the life cycle of the Little Lorikeet, Superb Parrot and Turquoise Parrot due to the presence of many more habitat trees in the study area and locality. The proposal would not remove a significant proportion of the hollow-bearing tree resources within the potential home ranges of these birds.

The proposed removal of woodland habitat would be unlikely to significantly affect the life cycle of any of these species due to the relatively small amount of habitat to be affected compared to the amount of habitat present in the study area and locality.

Good quality habitat for these species is present in other parts of the study area and the locality. Due to their mobility, it is unlikely that the proposal would have an adverse effect on the life cycle of the Gang-gang Cockatoo, Little Lorikeet, Superb Parrot, Swift Parrot and Turquoise Parrot such that a viable local population of the species is likely to be placed at risk of extinction.

b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction

An endangered population of the Gang-gang Cockatoo, Little Lorikeet, Superb Parrot, Swift Parrot or Turquoise Parrot does not occur in the study area.

c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

> **i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
>
> **ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction**

Ecological communities are not the subject of this assessment of significance.

d) in relation to the habitat of a threatened species, population or ecological community:

> **i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and**

The proposed removal of trees would reduce the amount of nesting, roosting, movement and foraging habitat for the Gang-gang Cockatoo, Little Lorikeet, Superb Parrot, Swift Parrot and Turquoise Parrot in the study area. The proposal would remove 1.1 hectares of native woodland. This represents up to six per cent of the woodland in the study area and a minor fraction of the adjacent connected habitat in the locality. Due to the mobility of the Gang-gang Cockatoo, Little Lorikeet, Superb Parrot, Swift Parrot and Turquoise Parrot, it is unlikely that the proposal would remove a significant amount of habitat for these species.

Up to seven hollow-bearing trees would be removed from the proposal site. These trees could potentially provide breeding habitat for the Little Lorikeet, Superb Parrot and Turquoise Parrot. The removal of these trees is unlikely to significantly affect the life cycle of these birds due to the presence of many more habitat trees in the study area and locality. The proposal would not remove a significant proportion of the hollow-bearing tree resources within the home ranges of these birds. The Gang-gang Cockatoo and Swift Parrot are unlikely to breed in the study area. The study area is not located in a montane area typically used by the Gang-gang Cockatoo for breeding and Swift Parrots only breed in Tasmania.

The proposal would remove groundcover vegetation, which would provide foraging habitat for the Little Lorikeet, Superb Parrot and Turquoise Parrot.

> **ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**

Woodland in the study area is highly fragmented. Connectivity of vegetation across Gocup Road in the vicinity of section 5.2 (Cookoomooroo) is very limited due to the lack of adjacent vegetation corridors on either side of the road. It is unlikely that there is substantial movement of fauna across this section of Gocup Road.

Fragmentation of the vegetation in the study area has previously occurred through construction of Gocup Road and other local roads and clearing for agriculture and residential properties.

These developments have created barriers to movement for some fauna species, particularly those that are limited by dispersal abilities and habitat preferences.

Proposed earthworks would create cut (excavation) and fill sections in the land surface with a width of up to 100 metres. Cut sections would have a maximum depth of 20.6 metres and fill sections would have a maximum height of 18.8 metres. Embankment batter slopes would be 4 horizontal: 1 vertical for batters with a height/depth of less than seven metres and generally 2 horizontal: 1 vertical for batters with a height/depth of greater than seven metres. Sections of deep cut (Around 21 metres) would be 1.5 to 2 horizontal: 1 vertical. Sections with 1.5 to 2 horizontal: 1 vertical batters would typically have lengths of about 200 metres and would not prevent woodland birds from moving through the study area. The main sections of cut and fill are located in areas that have already been cleared of woodland, and contain very few trees. The proposed earthworks are unlikely to cause substantial fragmentation of habitat.

The proposal would also remove scattered paddock trees. Paddock trees are important for the movement of a number of species through the landscape. As the proposal is mainly located in areas that have been cleared of trees, the extent of paddock tree removal relative to the number of trees in the study area is minimal. It is unlikely that the proposed removal of paddock trees would substantially affect the movement of threatened woodland bird species through the landscape.

The small amount of woodland removal is unlikely to result in significant additional fragmentation to that which has already occurred. The proposal would not remove any large areas of native vegetation, sever any important corridors or otherwise isolate any areas of habitat.

To minimise impacts on vegetation connectivity, sections of decommissioned road would be revegetated to improve connectivity of roadside vegetation.

Due to the mobility of the Gang-gang Cockatoo, Little Lorikeet, Superb Parrot, Swift Parrot and Turquoise Parrot, the proposal is unlikely to create any substantial barriers to movement for these species or isolate them from other areas of habitat.

iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality

The proposal would remove 1.1 hectares of native woodland. Many of the trees to be removed are mature and possess old growth characteristics favoured by the Gang-gang Cockatoo, Little Lorikeet, Superb Parrot, Swift Parrot and Turquoise Parrot, and therefore provide potential habitat for these species. All areas of Box-Gum Woodland have been degraded to different degrees by introduced weed species, which are prevalent throughout the study area. Nevertheless, the proposal would remove potential nesting, roosting, movement and foraging habitat for these species.

The area of habitat for these species proposed to be removed is relatively small. Areas of high quality habitat value exist in patches connected to the study area.

The proposed removal of vegetation does not represent habitat critical to any of the threatened bird species. It is unlikely that the relatively small area of habitat to be removed would be of significant importance to any of these species.

e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)

The proposal would not affect any habitat listed on the critical habitat register.

f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan

Specific recovery plans have not been prepared for the Gang-gang Cockatoo, Little Lorikeet and Turquoise Parrot. However, in the profiles for these species on the OEH (2016b) Threatened Species website, a number of actions are identified that need to occur to recover these species. An important action is the prevention of habitat loss, including loss of woodland habitat and hollow-bearing trees.

Another action identified is to ensure recruitment of trees into the mature age class so that there is not a future lag period of decades between the death of old trees and hollow formation in younger trees.

National recovery plans have been developed for the Superb Parrot and Swift Parrot. Action 3.6 of the Superb Parrot plan includes protection of known and potential habitat. Action 2.1 of the Swift Parrot plan includes retaining and expanding mature and mixed age habitat. The proposal is inconsistent with these actions due to the requirement for vegetation removal the species may use as habitat.

The proposal would remove potential habitat for the Gang-gang Cockatoo, Little Lorikeet, Superb Parrot, Swift Parrot and Turquoise Parrot. The proposal would remove 1.1 hectares of native woodland habitat, including up to seven hollow-bearing trees.

Due to the proposed removal of habitat, the proposal is not consistent with the recovery actions identified on the OEH (2016b) Threatened Species website or the national recovery plans for Superb Parrot and Swift Parrot. The proposed removal of habitat is however relatively small and unlikely to significantly affect the Gang-gang Cockatoo, Little Lorikeet, Superb Parrot, Swift Parrot and Turquoise Parrot, as described above.

g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process

The proposal constitutes three listed key threatening processes relevant to the Gang-gang Cockatoo, Little Lorikeet, Superb Parrot, Swift Parrot and Turquoise Parrot:

- Clearing of native vegetation – the proposal would remove 1.1 hectares of native woodland habitat. This is unlikely to represent a significant loss of habitat, as described above
- Loss of hollow-bearing trees – the proposal would remove up to seven hollow-bearing trees from the proposal site. The removal of these trees has the potential to affect the Little Lorikeet, Superb Parrot and Turquoise Parrot which may use them for nesting but only represent a minor fraction of the hollow-bearing trees in the study area
- Removal of dead wood and dead trees – the proposal would remove dead trees, which represent only a minor fraction of the dead trees in the study area.

Conclusion

The proposal would be unlikely to have a significant effect on the Gang-gang Cockatoo, Little Lorikeet, Superb Parrot, Swift Parrot or Turquoise Parrot as:

- *Only a small area of woodland habitat would be removed compared to the extent of woodland in the study area and locality (up to six per cent of the moderate/good condition woodland in the study area and only a minor fraction of the adjacent connected woodland in the locality)*
- *There are areas of high quality habitat value in patches connected to the study area*
- *Only a small number of hollow-bearing trees would be removed compared to what is available in the study area and locality*
- *The small amount of vegetation to be removed is unlikely to result in significant additional fragmentation to that which has already occurred. These species are highly mobile and capable of traversing the study area to other areas of habitat.*

Other woodland birds

- Black-chinned Honeyeater (eastern subspecies) (*Melithreptus gularis gularis*) – Vulnerable
- Brown Treecreeper (eastern subspecies) (*Climacteris picumnus victoriae*) – Vulnerable
- Diamond Firetail (*Stagonopleura guttata*) – Vulnerable
- Flame Robin (*Petroica phoenicea*) – Vulnerable
- Hooded Robin (*Melanodryas cucullata cucullata*) – Vulnerable
- Scarlet Robin (*Petroica boodang*) – Vulnerable
- Speckled Warbler (*Pyrrholaemus saggitatus*) – Vulnerable
- Varied Sittella (*Daphoenositta chrysoptera*) – Vulnerable.

a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction

Woodland along Gocup Road is known to provide habitat for the Brown Treecreeper, Diamond Firetail and Flame Robin, all of which were recorded during surveys in other upgrade sections. The grassy understorey and shrubs of the woodland provide foraging resources for these species.

The woodland along the length of Gocup Road is known to provide habitat for the Black-chinned Honeyeater, and Varied Sittella which have been recorded during previous surveys of the wider area.

Woodland in the study area is similar to that where these species have been recorded and therefore likely to provide habitat for these species to occur.

Trees provide nectar and pollen during periods of flowering, as well as invertebrates for the Black-chinned Honeyeater, Brown Treecreeper and Varied Sittella.

Based on resources present and records in the locality, the woodland in the study area may also provide habitat for three other threatened woodland bird species not recorded during surveys. The grassy understorey and shrubs of the woodland providing potential foraging resources for the Hooded Robin, Speckled Warbler and Scarlet Robin.

Hollow-bearing trees in the study area may be used by the Brown Treecreeper for breeding. The Black-chinned Honeyeater, Diamond Firetail, Flame Robin, Hooded Robin, Scarlet Robin, Speckled Warbler and Varied Sittella may build nests in the branches of the trees in the study area.

The woodland in the study area provides movement habitat for all of the species.

The proposed removal of woodland would reduce the amount of nesting, roosting, movement and foraging habitat for woodland birds in the study area. The proposal would remove 1.1 hectares of native woodland habitat, comprising mature and juvenile trees. This represents up to six per cent of the moderate/good condition woodland in the study area and a minor fraction of the adjacent connected habitat in the locality.

Up to seven hollow-bearing trees would be removed from the proposal site. The removal of these trees is unlikely to significantly affect the life cycle of the Brown Treecreeper due to the presence of many more habitat trees in the study area and locality. The proposal would not remove a significant proportion of the hollow-bearing tree resources within the potential home range of the Brown Treecreeper.

The proposed removal of woodland habitat would be unlikely to significantly affect the life cycle of any of these species due to the relatively small amount of habitat to be affected compared to the amount of habitat present in the study area and locality.

Good quality habitat for these species is present in other parts of the study area and the locality. Due to their mobility, it is unlikely that the proposal would have an adverse effect on the life cycle of these woodland birds such that a viable local population of the species is likely to be placed at risk of extinction.

b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction

An endangered population of a woodland bird species does not occur in the study area.

c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

> **i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
>
> **ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction**

Ecological communities are not the subject of this assessment of significance.

d) in relation to the habitat of a threatened species, population or ecological community:

> **i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and**

The proposed removal of trees would reduce the amount of nesting, roosting, movement and foraging habitat for woodland birds in the study area. The proposal would remove 1.1 hectares of native woodland. This represents up to six per cent of the woodland in the study area and a

minor fraction of the adjacent connected habitat in the locality. Due to the mobility of the woodland birds assessed, it is unlikely that the proposal would remove a significant amount of habitat for these species.

Up to seven hollow-bearing trees would be removed from the proposal site. The removal of these trees is unlikely to significantly affect the life cycle of the Brown Treecreeper due to the presence of many more habitat trees in the study area and locality. The proposal would not remove a significant proportion of the hollow-bearing tree resources within the potential home range of the Brown Treecreeper.

The proposal would remove groundcover vegetation, which would provide foraging habitat for the Brown Treecreeper, Diamond Firetail, Flame Robin, Hooded Robin, Speckled Warbler and Scarlet Robin.

ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

Woodland in the study area is highly fragmented. The existing connectivity of vegetation across Gocup Road in the vicinity of section 5.2 (Cookoomooroo) is very limited due to the lack of adjacent vegetation corridors on either side of the road. It is unlikely that there is substantial movement of fauna across this section of Gocup Road.

Fragmentation of the vegetation in the study area has previously occurred through construction of Gocup Road and other local roads and clearing for agriculture and residential properties. These developments have created barriers to movement for some fauna species, particularly those that are limited by dispersal abilities and habitat preferences.

Proposed earthworks would create cut (excavation) and fill sections in the land surface with a width of up to 100 metres. Cut sections would have a maximum depth of 20.6 metres and fill sections would have a maximum height of 18.8 metres. Embankment batter slopes would be 4 horizontal: 1 vertical for batters with a height/depth of less than seven metres and generally 2 horizontal: 1 vertical for batters with a height/depth of greater than seven metres. Sections of deep cut (around 21 metres) would be 1.5 to 2 horizontal: 1 vertical. Sections with 1.5 to 2 horizontal: 1 vertical batters would typically have lengths of about 200 metres and would not prevent woodland birds from moving through the study area. The main sections of cut and fill are located in areas that have already been cleared of woodland, and contain very few trees. The proposed earthworks are unlikely to cause substantial fragmentation of habitat.

The proposal would also remove scattered paddock trees. Paddock trees are important for the movement of a number of species through the landscape, including species such as the Brown Treecreeper, Diamond Firetail and Flame Robin. As the proposal is mainly located in areas that have been cleared of trees, the extent of paddock tree removal relative to the number of trees in the study area is minimal. It is unlikely that the proposed removal of paddock trees would substantially affect the movement of threatened woodland bird species through the landscape.

The small amount of woodland removal is unlikely to result in significant additional fragmentation to that which has already occurred. The proposal would not remove any large areas of native vegetation, sever any important corridors or otherwise isolate any areas of habitat.

To minimise impacts on vegetation connectivity, sections of decommissioned road would be revegetated to improve connectivity of roadside vegetation.

Due to the mobility of the woodland birds assessed, the proposal is unlikely to create any substantial barriers to movement for these species or isolate them from other areas of habitat.

iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality

The proposal would remove 1.1 hectares of woodland. Many of the trees to be removed are mature. The proposal would remove potential nesting, roosting, movement and foraging habitat for the woodland bird species assessed.

The area of habitat for these species proposed to be removed is relatively small. Areas of high quality habitat value exist in patches connected to the study area.

The proposed removal of vegetation does not represent habitat critical to any of the threatened bird species. It is unlikely that the relatively small area of habitat to be removed would be of significant importance to any of these species.

e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)

The proposal would not affect any habitat listed on the critical habitat register.

f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan

Specific recovery plans have not been prepared for the woodland bird species assessed. However, in the profiles for these species on the OEH (2016b) Threatened Species website, a number of actions are identified that need to occur to recover these species. For all the woodland bird species, an important action is the prevention of habitat loss, including loss of woodland habitat, hollow-bearing trees and woody debris. Prevention of weed invasion is also identified as an important action for some species.

The proposal would remove potential habitat for the woodland bird species assessed. The proposal would remove 1.1 hectares of woodland habitat, including seven hollow-bearing trees.

Due to the proposed removal of habitat, the proposal is not consistent with the recovery actions identified on the OEH (2016b) Threatened Species website. The proposed removal of habitat is however relatively small and unlikely to significantly affect any of the threatened woodland birds, as described above.

g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process

The proposed action constitutes three listed key threatening processes relevant to the threatened woodland birds listed above:

- Clearing of native vegetation – the proposal would remove 1.1 hectares of native woodland habitat. This is unlikely to represent a significant loss of habitat, as described above
- Loss of hollow-bearing trees – the proposal would remove up to seven hollow-bearing trees from the proposal site. The removal of these trees has the potential to affect the Brown Treecreeper which may use hollows for nesting but only represent a minor fraction of the hollow-bearing trees in the study area

- Removal of dead wood and dead trees – the proposal would remove dead trees, which represent only a minor fraction of the dead trees in the study area.

Conclusion

The proposal would be unlikely to have a significant effect on any threatened woodland bird species as:

- *Only a small area of woodland habitat would be removed compared to the extent of woodland in the study area and locality (up to six per cent of the moderate/good condition woodland in the study area and only a minor fraction of the adjacent connected woodland in the locality)*
- *There are areas of high quality habitat value in patches connected to the study area*
- *Only a small number of hollow-bearing trees would be removed compared to what is available in the study area and locality*
- *The small amount of vegetation removal is unlikely to result in significant additional fragmentation to that which has already occurred. The species are sufficiently mobile and capable of traversing the study area to other areas of habitat.*

Predatory woodland birds

- Barking Owl (*Ninox connivens*) – Vulnerable.
- Black Falcon (*Falco subniger*) – Vulnerable
- Little Eagle (*Hieraaetus morphnoides*) – Vulnerable

a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction

Woodland along Gocup Road is known to provide habitat for the Little Eagle, which was recorded during current surveys in section 2.1 (Smarts Road). The Barking Owl and Black Falcon have not been recorded in the study area but are likely to occur due to the presence of suitable eucalypt habitat. The removal of vegetation from areas of suitable habitat has the potential to impact on these species.

Barking Owls require large (greater than 20 centimetres diameter and greater than four metres above the ground) hollows for breeding. One hollow-bearing tree with a large hollow is present in the proposal site. Others may be present in the study area.

Little Eagles prefer open eucalypt forest, woodland or open woodland and nest in living eucalypt trees. No stick or twig nests were observed in the proposal site or study area, although potential breeding habitat is present. Black Falcons prefer to nest along tree-lined creeks and rivers and so are more likely to nest outside the proposal site.

Woodland in the study area may also provide suitable foraging, nesting, movement and roosting habitat for all three threatened predatory species.

As the proposal would remove habitat resources for prey species (eg Common Brushtail Possum), the proposal could also reduce the abundance of prey for these predatory woodland bird species.

The proposal would remove 1.1 hectares of native woodland habitat, comprising mature and juvenile trees. This represents up to six per cent of the moderate/good condition woodland in the study area and a minor fraction of the adjacent connected habitat in the locality.

The Barking Owl, Little Eagle and Black Falcon have large home ranges and are unlikely to rely solely on woodland in the proposal site or study area for breeding and foraging. Patches of remnant woodland in the locality are likely to provide alternative habitat to that to be removed in the proposal site.

The proposal would remove up to seven hollow-bearing trees; one of which contains a hollow suitable for the nesting requirements of the Barking Owl. The removal of these trees is unlikely to significantly affect the life cycle of the Barking Owl due to the presence of many more habitat trees in the study area and locality. The proposal would not remove a significant proportion of the hollow-bearing tree resources within the potential home range of the Barking Owl.

The proposed removal of woodland habitat would be unlikely to significantly affect the life cycle of any of these species due to the relatively small amount of habitat to be affected compared to the amount of habitat present in the study area and locality.

Good quality habitat for these species is present in other parts of the study area and the locality. Due to their mobility and large home ranges, it is unlikely that the proposal would have an adverse effect on the life cycle of these predatory woodland birds such that a viable local population of the species is likely to be placed at risk of extinction.

b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction

An endangered population of Barking Owl, Little Eagle or Black Falcon does not occur in the study area.

c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

> **i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
>
> **ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction**

Ecological communities are not the subject of this assessment of significance.

d) in relation to the habitat of a threatened species, population or ecological community:

> **i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and**

The proposed removal of trees would reduce the amount of nesting, roosting, movement and foraging habitat for predatory woodland birds in the study area. The proposal would remove 1.1 hectares of native woodland habitat, comprising mature and juvenile trees. This represents up to six per cent of the moderate/good condition woodland in the study area and a minor fraction of the adjacent connected habitat in the locality. Due to the mobility of the predatory woodland

birds assessed, it is unlikely that the proposal would remove a significant amount of habitat for these species.

Up to seven hollow-bearing trees would be removed from the proposal site. The removal of these trees is unlikely to affect the life cycle of the Barking Owl, as only one tree containing a hollow suitable for the species would be removed. Many more potential habitat trees are present in the study area and locality. The proposal would not remove a significant proportion of the hollow-bearing tree resources within the potential home range of the Barking Owl.

The Barking Owl, Little Eagle and Black Falcon all have large home ranges and are unlikely to rely solely on woodland in the proposal site or study area for breeding and foraging. Patches of remnant woodland in the locality are likely to provide alternative habitat to that to be removed in the proposal site.

ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

Woodland in the study area is highly fragmented. Existing connectivity of vegetation across Gocup Road in the vicinity of section 5.2 (Cookoomooroo) is very limited due to the lack of adjacent vegetation corridors on either side of the road. It is unlikely that there is substantial movement of fauna across this section of Gocup Road.

Fragmentation of the vegetation in the study area has previously occurred through construction of Gocup Road and other local roads and clearing for agriculture and residential properties. These developments have created barriers to movement for some fauna species, particularly those that are limited by dispersal abilities and habitat preferences.

The proposal would also remove scattered paddock trees. Paddock trees are important for the movement of a number of species through the landscape. As the proposal is mainly located in areas that have been cleared of trees, the extent of paddock tree removal relative to the number of trees in the study area is minimal. It is unlikely that the proposed removal of paddock trees would substantially affect movement of predatory woodland birds through the landscape.

The small amount of woodland removal is unlikely to result in significant additional fragmentation to that which has already occurred. The proposal would not remove any large areas of native vegetation, sever any important corridors or otherwise isolate any areas of habitat.

To minimise impacts on vegetation connectivity, sections of decommissioned road would be revegetated to improve connectivity of roadside vegetation.

Due to the mobility and large home ranges of the predatory woodland birds assessed, the proposal is unlikely to create any substantial barriers to movement for these species or isolate them from other areas of habitat.

iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality

The proposal would remove 1.1 hectares of woodland. Many of the trees to be removed are mature. The proposal would remove potential nesting, roosting, movement and foraging habitat for the predatory woodland bird species assessed.

The area of habitat for these species proposed to be removed is relatively small. Areas of high quality habitat value exist in patches connected to the study area.

The proposed removal of vegetation does not represent habitat critical to any of the threatened predatory woodland bird species. It is unlikely that the relatively small area of habitat to be removed would be of significant importance to any of these species.

e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)

The proposal would not affect any habitat listed on the critical habitat register.

f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan

A recovery plan exists for the Barking Owl. One of the objectives of this recovery plan is *Action 3.1 Protect known Barking Owl nest sites and surrounding habitat*. The proposal would remove one hollow the Barking Owl may potentially use as a nest site and could potentially remove trees with the potential to form nest sites in future, as well as woodland used by the species as foraging and movement habitat.

A recovery plan has not been developed for the Little Eagle. However, in the profile for this species on the OEH (2016b) Threatened Species website, a number of actions are identified that need to occur to recover these species. An important action is the prevention of habitat loss, including loss of woodland habitat.

There is no recovery plan for the Black Falcon and no recovery actions are identified in the profile for the species on the Threatened Species website.

Due to the proposed removal of habitat, the proposal is not consistent with the recovery actions for the Barking Owl and Little Eagle. The proposed removal of habitat is however relatively small and unlikely to significantly affect any of the threatened woodland birds, as described above.

g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process

The proposed action constitutes three listed key threatening processes relevant to the threatened woodland birds listed above:

- Clearing of native vegetation – the proposal would remove 1.1 hectares of native woodland habitat. This is unlikely to represent a significant loss of habitat, as described above
- Loss of hollow-bearing trees – the proposal would remove up to seven hollow-bearing trees from the proposal site, with only two of these trees containing hollows suitable as breeding habitat for the Barking Owl. There is also the potential that the other hollow-bearing trees could provide future nesting habitat for the species as they grow and develop larger hollows
- Removal of dead wood and dead trees – the proposal would remove dead trees, which represent only a minor fraction of the dead trees in the study area.

Conclusion

The proposal would be unlikely to have a significant effect on the Little Eagle, Barking Owl or Black Falcon as:

- *Only a small area of woodland habitat would be removed compared to the extent of woodland in the study area and locality (up to six per cent of the moderate/good condition woodland in the study area and only a minor fraction of the adjacent connected woodland in the locality)*
- *There are areas of high quality habitat value in patches connected to the study area*
- *Only a small number of hollow-bearing trees would be removed compared to what is available in the study area and locality*
- *The small amount of vegetation removal is unlikely to result in significant additional fragmentation to that which has already occurred. The species are highly mobile and capable of traversing the study area to other areas of habitat.*

Microchiropteran bats

- Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*) – Vulnerable
- Eastern False Pipistrelle (*Falsistrellus tasmaniensis*) – Vulnerable
- South-eastern Long-eared Bat (*Nyctophilus corbeni*) – Vulnerable
- Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*) – Vulnerable.

a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction

Woodland along Gocup Road is known to provide habitat for the Eastern Bentwing-bat and Yellow-bellied Sheathtail-bat, which were both recorded during current surveys. Based on resources present and records in the locality, woodland in the study area may also provide habitat for the Eastern False Pipistrelle and South-eastern Long-eared Bat.

The woodland in the study area provides potential foraging habitat for all four bat species.

Trees in the study area provide potential roosting and breeding habitat for the Eastern False Pipistrelle, South-eastern Long-eared Bat and Yellow-bellied Sheathtail-bat in hollows or under loose bark. The Eastern Bentwing-bat primarily roosts in caves and other man-made structures as roosting habitat. Culverts in the study area may provide temporary roosting habitat for this species.

Woodland in the study area provides potential movement habitat for all these species.

The proposed removal of woodland would reduce the amount of foraging, roosting, movement and breeding habitat for threatened bats in the study area. The proposal would remove 1.1 hectares of native woodland habitat, comprising mature and juvenile trees. This represents up to six per cent of the moderate/good condition woodland in the study area and a minor fraction of the adjacent connected habitat in the locality.

Up to seven hollow-bearing trees would be removed from the proposal site. The removal of these trees is unlikely to affect the life cycle of microchiropteran bats due to the presence of many more habitat trees in the study area and locality. The removal of these trees would be unlikely to represent a significant loss of potential breeding habitat.

The Eastern Bentwing-bat may use culverts as temporary roosting habitat. About eight culverts would require extension or reconstruction for the proposal which may cause disturbance of any

roosting individuals of the species. Culverts would be inspected for bats before commencement of any works.

The proposed removal of woodland habitat would be unlikely to significantly affect the life cycle of any of these bat species due to the relatively small amount of habitat to be impacted compared to the amount of habitat present in the study area and locality.

Good quality habitat for these species is present in other parts of the study area and the locality. Due to their mobility, it is unlikely that the proposal would have an adverse effect on the life cycle of these bat species such that a viable local population of the species is likely to be placed at risk of extinction.

b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction

An endangered population of a bat species does not occur in the study area.

c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

> **i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
>
> **ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction**

Ecological communities are not the subject of this assessment of significance.

d) in relation to the habitat of a threatened species, population or ecological community:

> **i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and**

The proposed removal of trees would reduce the amount of nesting, roosting, movement and foraging habitat for predatory threatened bats in the study area. The proposal would remove 1.1 hectares of native woodland habitat, comprising mature and juvenile trees. This represents up to six per cent of the moderate/good condition woodland in the study area and a minor fraction of the adjacent connected habitat in the locality. Due to the mobility of the bats assessed, it is unlikely that the proposal would remove a significant amount of habitat for these species.

Up to seven hollow-bearing trees would be removed from the proposal site. The removal of these trees is unlikely to significantly affect the life cycle of the threatened bats due to the presence of many more habitat trees in the study area and locality. The proposal would not remove a significant proportion of hollow-bearing tree resources for the threatened bats.

The Eastern Bentwing-bat may use culverts as temporary roosting habitat. About eight culverts would require extension or reconstruction for the proposal, which may cause disturbance of any roosting individuals of the species. The proposal would be unlikely to remove any potential culvert habitat in the long term. Culverts would be inspected for bats before commencement of any works.

ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

Woodland in the study area is highly fragmented. The existing connectivity of vegetation across Gocup Road in the vicinity of section 5.2 (Cookoomooroo) is very limited due to the lack of adjacent vegetation corridors on either side of the road. It is unlikely that there is substantial movement of fauna across this section of Gocup Road.

Fragmentation of the vegetation in the study area has previously occurred through construction of Gocup Road and other local roads and clearing for agriculture and residential properties. These developments have created barriers to movement for some fauna species, particularly those that are limited by dispersal abilities and habitat preferences.

Proposed earthworks would create cut (excavation) and fill sections in the land surface with a width of up to 100 metres. Cut sections would have a maximum depth of 20.6 metres and fill sections would have a maximum height of 18.8 metres. Embankment batter slopes would be 4 horizontal: 1 vertical for batters with a height/depth of less than seven metres and generally 2 horizontal: 1 vertical for batters with a height/depth of greater than seven metres. Sections of deep cut (around 21 metres) would be 1.5 to 2 horizontal: 1 vertical. Sections with 1.5 to 2 horizontal: 1 vertical batters would typically have lengths of about 200 metres and would not prevent bats from moving through the study area. The main sections of cut and fill are located in areas that have already been cleared of woodland, and contain very few trees. The proposed earthworks are unlikely to cause substantial fragmentation of habitat.

The proposal would also remove scattered paddock trees. Paddock trees are important for the movement of a number of species through the landscape. As the proposal is mainly located in areas that have been cleared of trees, the extent of paddock tree removal relative to the number of trees in the study area is minimal. It is unlikely that the proposed removal of paddock trees would substantially affect the movement of threatened bat species through the landscape.

The small amount of woodland removal is unlikely to result in significant additional fragmentation to that which has already occurred. The proposal would not remove any large areas of native vegetation, sever any important corridors or otherwise isolate any areas of habitat.

To minimise impacts on vegetation connectivity, sections of decommissioned road would be revegetated to improve connectivity of roadside vegetation.

Due to the mobility of the threatened bats assessed, and their relatively large home ranges, the proposal is unlikely to create any substantial barriers to movement for these species or isolate them from other areas of habitat.

iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality

The proposal would remove 1.1 hectares of woodland. Many of the trees to be removed are mature and possess old growth characteristics favoured by the Eastern False Pipistrelle, South-eastern Long-eared Bat and Yellow-bellied Sheathtail-bat.

The Eastern Bentwing-bat may use culverts as temporary roosting habitat. About eight culverts would require extension or reconstruction for the proposal. While the proposal has the potential to disturb bats roosting in culverts, the proposal would be unlikely to remove any potential culvert habitat in the long term.

The proposal would remove foraging, roosting, movement and breeding habitat for threatened bats.

The area of habitat for these species proposed to be removed is relatively small. Areas of high quality habitat value exist in patches connected to the study area.

The proposed removal of vegetation does not represent habitat critical to any of the threatened bat species. It is unlikely that the relatively small area of habitat to be removed would be of significant importance to the long-term survival of any of these species.

e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)

The proposal would not affect any habitat listed on the critical habitat register.

f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan

A recovery plan has not been prepared for any of the threatened bat species. However, the OEH Threatened Species website (OEH 2016b) identifies a number of actions relevant to the proposal that need to occur to recover these species:

- Retain remnant woodland
- Retain hollow-bearing trees and provide for hollow tree recruitment
- Protect roosting sites from damage or disturbance
- Retain native vegetation that is floristically and structurally diverse.

Due to the proposed removal of woodland and hollow-bearing trees, and the disturbance of culverts, the proposal is not consistent with the recovery actions identified on the Threatened Species website. The proposed removal of habitat is however relatively small and unlikely to significantly affect any of the threatened bat species, as described above.

g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process

The proposed action constitutes three listed key threatening processes relevant to the proposal:

- Clearing of native vegetation – the proposal would remove 1.1 hectares of native woodland habitat. This is unlikely to represent a significant loss of habitat, as described above
- Loss of hollow-bearing trees – the proposal would remove up to seven hollow-bearing trees from the proposal site. The removal of these trees has the potential to affect the threatened bats which may use them for roosting but only represent a minor fraction of the hollow-bearing trees in the study area.
- Removal of dead wood and dead trees – the proposal would remove dead trees, which represent only a minor fraction of the dead trees in the study area.

Conclusion

The proposal would be unlikely to have a significant effect any threatened bat species as:

- *Only a small area of woodland habitat would be removed compared to the extent of woodland in the study area and locality (up to six per cent of the moderate/good condition woodland in the study area and only a minor fraction of the adjacent connected woodland in the locality)*
- *There are areas of high quality habitat value in patches connected to the study area*
- *Only a small number of hollow-bearing trees would be removed compared to what is available in the study area and locality*
- *The small amount of vegetation removal is unlikely to result in significant additional fragmentation to that which has already occurred. The species are highly mobile and capable of traversing the study area to other areas of habitat*

EPBC Act significance assessments

1) Are there any matters of national environmental significance located in the area of the proposed action?

The following matters of national environmental significance are known or likely to occur in the area of the proposed action and have the potential to be affected by the proposed action:

- Superb Parrot (*Polytelis swainsonii*) (Vulnerable)
- Swift Parrot (*Lathamus discolor*) (Endangered)
- South-eastern Long-eared Bat (*Nyctophilus corbeni*) (Vulnerable).

2) Considering the proposed action at its broadest scope, is there potential for impacts on matters of national environmental significance?

The proposal would remove 1.1 hectares of native vegetation. Up to seven hollow-bearing trees would be removed from the proposal site. The removal of these trees has the potential to affect hollow-dependent fauna in the study area, including the South-eastern Long-eared Bat and Superb Parrot. Trees to be removed provide roosting, movement and foraging habitat for a range of fauna species, including threatened species that may use the study area for foraging (Superb Parrot and Swift Parrot). White Box trees are likely to provide foraging habitat for the Swift Parrot during their winter migration period on mainland Australia. The removal of a relatively small area of habitat is unlikely to substantially affect any matters of NES due to the presence of much greater areas of habitat in the study area and locality.

The proposal would remove groundcover vegetation where the road is widened, which may remove foraging and movement habitat for a range of fauna species.

The proposal would remove woodland that is known or likely to provide habitat for the threatened biota listed above and is likely to have impacts on these biota.

3) Are there any proposed measures to avoid or reduce impacts on matters of national environmental significance?

Safeguards and mitigation measures have been prepared with the aim of minimising impacts of the proposal on the ecology of the study area and on matters of NES. These are detailed in section 5.2 of this report.

4) Are any impacts of the proposed action on matters of national environmental significance likely to be significant impacts?

Endangered Species – Swift Parrot

An action is likely to have a significant impact on an endangered species if there is a real chance or possibility that it will:

- **Lead to a long-term decrease in the size of a population;**

The woodland in the study area may provide movement and foraging habitat for the Swift Parrot.

Eucalypt trees provide nectar and pollen during periods of flowering, as well as lerp for the Swift Parrot during winter when the species migrates to the mainland from Tasmania.

The proposed removal of woodland would reduce the amount of movement and foraging habitat for the species in the study area. The proposal would remove 1.1 hectares of native woodland habitat, comprising mature and juvenile trees. This represents up to six per cent of the moderate/good condition woodland in the study area and a minor fraction of the adjacent connected habitat in the locality.

Due to the mobility and large range of the species, and the relatively small amount of habitat to be affected compared to that present in the study area and locality, it is unlikely that the proposal would lead to a long-term decrease in the size of a population of the Swift Parrot.

- **Reduce the area of occupancy of the species;**

The proposal would remove 1.1 hectares of woodland that may provide potential movement and foraging habitat for the Swift Parrot. The proposal would remove foraging, roosting and movement habitat for the species.

The proposal would not remove areas of habitat to the extent that habitat would be eliminated from the study area. The areas of habitat to be removed are small in relation to the areas of surrounding habitat in the locality. The proposal would not reduce the area of occupancy of the Swift Parrot.

- **Fragment an existing population into two or more populations;**

Woodland in the study area is highly fragmented. The existing connectivity of vegetation across Gocup Road in the vicinity of section 5.2 (Cookoomooroo) is very limited due to the lack of adjacent vegetation corridors on either side of the road. It is unlikely that there is substantial movement of fauna across this section of Gocup Road.

Fragmentation of the vegetation in the study area has previously occurred through construction of Gocup Road and other local roads and clearing for agriculture and residential properties.

These developments have created barriers to movement for some fauna species, particularly those that are limited by dispersal abilities and habitat preferences.

The small amount of woodland removal is unlikely to result in significant additional fragmentation to that which has already occurred. The proposal would not remove any large areas of native vegetation, sever any important corridors or otherwise isolate any areas of habitat.

Due to the mobility of the Swift Parrot and its large range, the proposal is unlikely to create any significant barriers to movement for the species.

The proposal would not fragment a population of this species into two or more populations.

- **Adversely affect habitat critical to the survival of a species;**

In accordance with the Significant Impact Guidelines (DoE 2013), 'Habitat critical to the survival of a species or ecological community' refers to areas that are necessary:

- for activities such as foraging, breeding, roosting, or dispersal
- for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators)
- to maintain genetic diversity and long term evolutionary development, or
- for the reintroduction of populations or recovery of the species or ecological community.

The national recovery plan for the Swift Parrot identifies White Box and Yellow Box as important foraging habitat for the species in the region in which the proposal is located. Woodland habitats containing these tree species are important to the survival of the Swift Parrot. The species only breeds in Tasmania, therefore, the proposal would not remove breeding habitat for the species.

The area of habitat for the species proposed to be removed is relatively small. Areas of high quality habitat value exist in patches outside the study area and in the locality, including Minjary National Park to the south. Given the mobility of the species, it is unlikely that the relatively small area of habitat to be removed would be important to the Swift Parrot. The species is capable of traversing the study area to other areas of habitat and would not solely rely on the habitat in the study area for its foraging, roosting and dispersal requirements.

- **Disrupt the breeding cycle of a population;**

The Swift Parrot only breeds in Tasmania and so breeding habitat is not present within the proposal site. The proposal would not disrupt the breeding cycle of a population of the species.

- **Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;**

Habitat for the Swift Parrot would be removed as described above. Areas of high quality habitat value exist in patches outside the study area and in the locality. The proposal would be unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

- **Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat;**

The proposal has the potential to introduce and spread invasive weed species to the woodland habitat. However, the Swift Parrot would be unlikely to be directly affected by this due to its dependence on winter-flowering eucalypts.

- **Introduce disease that may cause the species to decline; or**

All machinery and equipment would be cleaned prior to the proposed works commencing. The proposal would be unlikely to introduce disease that may cause the Swift Parrot to decline.

- **Interfere with the recovery of the species.**

The relatively small amount of vegetation to be removed by the proposal, compared to the area of habitat in the locality, would be unlikely to significantly interfere with the recovery of the species.

Conclusion

The proposal would be unlikely to have a significant effect on the endangered Swift Parrot as:

- *Only a small area of woodland habitat would be removed compared to the extent of woodland in the study area and locality (up to six per cent of the moderate/good condition woodland in the study area and only a minor fraction of the adjacent connected woodland in the locality)*
- *There are areas of high quality habitat value in patches connected to the study area*
- *The proposal would not remove breeding habitat for the species*
- *The small amount of vegetation removal is unlikely to result in significant additional fragmentation to that which has already occurred. The species is highly mobile and capable of traversing the study area to other areas of habitat*

Vulnerable Species – South-eastern Long-eared Bat, Superb Parrot

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

- **Lead to a long-term decrease in the size of an important population of a species;**

In accordance with the Significant Impact Guidelines (DoE 2013), an 'important population' is a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are:

- Key source populations either for breeding or dispersal
- Populations that are necessary for maintaining genetic diversity, and/or
- Populations that are near the limit of the species range.

In the absence of specific information on whether important populations of these species are likely to occur in the study area, it is assumed that important populations of these species are likely to occur.

The woodland in the study area provides potential foraging habitat for the South-eastern Long-eared Bat and Superb Parrot.

Trees in the study area also provide potential roosting and breeding habitat for the South-eastern Long-eared Bat in hollows or under loose bark. Superb Parrots are known to breed in Box-Gum Woodland in the South Western Slopes and may use hollow-bearing trees in the study area for breeding.

The woodland in the study area provides potential movement habitat for both of these species.

The proposed removal of woodland would reduce the amount of foraging, roosting, movement and breeding habitat for the South-eastern Long-eared Bat and Superb Parrot in the study area. The proposal would remove 1.1 hectares of native woodland habitat. This represents up to six per cent of the moderate/good condition woodland in the study area and a minor fraction of the adjacent connected habitat in the locality.

Up to seven hollow-bearing trees would be removed from the proposal site. The removal of these trees is unlikely to affect the life cycle of the South-eastern Long-eared Bat or Superb Parrot due to the presence of many more habitat trees in the study area and locality. The removal of these trees would be unlikely to represent a significant loss of potential breeding habitat.

Good quality habitat for these species is present in other parts of the study area and the locality. Due to the mobility and relatively large ranges of these species, it is unlikely that the proposal would lead to a long-term decrease in the size of a population of the South-eastern Long-eared Bat or Superb Parrot.

- **Reduce the area of occupancy of an important population;**

The proposal would remove 1.1 hectares of woodland habitat. Many of the trees to be removed are mature and possess old growth characteristics favoured by the South-eastern Long-eared Bat and Superb Parrot. The proposal would remove foraging, roosting, movement and breeding habitat for the South-eastern Long-eared Bat and Superb Parrot.

The proposal would not remove areas of habitat to the extent that habitat would be eliminated from the study area. The areas of habitat to be removed are small in relation to the areas of surrounding habitat in the locality. The proposal would not therefore reduce the area of occupancy of an important population of the South-eastern Long-eared Bat or Superb Parrot.

- **Fragment an existing important population into two or more populations;**

Woodland in the study area is highly fragmented. The existing connectivity of vegetation across Gocup Road in the vicinity of section 5.2 (Cookoomooroo) is very limited due to the lack of adjacent vegetation corridors on either side of the road. It is unlikely that there is substantial movement of fauna across this section of Gocup Road.

Fragmentation of the vegetation in the study area has previously occurred through construction of Gocup Road and other local roads and clearing for agriculture and residential properties. These developments have created barriers to movement for some fauna species, particularly those that are limited by dispersal abilities and habitat preferences.

Proposed earthworks would create cut (excavation) and fill sections in the land surface with a width of up to 100 metres. Cut sections would have a maximum depth of 20.6 metres and fill sections would have a maximum height of 18.8 metres. Embankment batter slopes would be 4 horizontal: 1 vertical for batters with a height/depth of less than seven metres and generally 2 horizontal: 1 vertical for batters with a height/depth of greater than seven metres. Sections of deep cut (around 21 metres) would be 1.5 to 2 horizontal: 1 vertical. Sections with 1.5 to 2 horizontal: 1 vertical batters would typically have lengths of about 200 metres and would not prevent the South-eastern Long-eared Bat or Superb Parrot from moving through the study area. The main sections of cut and fill are located in areas that have already been cleared of woodland, and contain very few trees. The proposed earthworks are unlikely to cause substantial fragmentation of habitat.

The proposal would also remove scattered paddock trees. Paddock trees are important for the movement of a number of species through the landscape. As the proposal is mainly located in areas that have been cleared of trees, the extent of paddock tree removal relative to the number of trees in the study area is minimal. It is unlikely that the proposed removal of paddock trees would substantially affect the movement of the South-eastern Long-eared Bat or the Superb Parrot through the landscape.

The small amount of woodland removal is unlikely to result in significant additional fragmentation to that which has already occurred. The proposal would not remove any large areas of native vegetation, sever any important corridors or otherwise isolate any areas of habitat.

To minimise impacts on vegetation connectivity, sections of decommissioned road would be revegetated to improve connectivity of roadside vegetation.

Due to the mobility of the South-eastern Long-eared Bat and Superb Parrot, and their relatively large home ranges, the proposal is unlikely to create any substantial barriers to movement for the species or isolate them from other areas of habitat.

The proposal would not fragment a population of the species into two or more populations.

- **Adversely affect habitat critical to the survival of a species;**

Woodland habitats are important to the survival of the South-eastern Long-eared Bat and Superb Parrot. The national recovery plan for the Superb Parrot identifies breeding and foraging habitat types that are critical to the survival of the species. Box-Gum Woodland is identified as breeding habitat critical to the survival of the species, which is present in the study area.

There is no identified critical habitat for the South-eastern Long-eared Bat. The species is known to use a variety of vegetation types, including box eucalypt habitat, which is present in the study area.

The woodland to be removed provides potential habitat for both species. The South-eastern Long-eared Bat could potentially use hollow-bearing trees and loose bark in the study area for breeding. Vegetation in the study area is providing potential breeding and foraging habitat for this species by providing habitat suitable for its prey (eg invertebrates). The Superb Parrot may also use hollow-bearing trees for nesting. The loss of this vegetation represents a loss of potential foraging, breeding and movement habitat for these species.

The area of habitat for these species proposed to be removed is relatively small. Areas of high quality habitat value exist in patches connected to the study area, including Minjary National Park to the south. Given the mobility of the species, it is unlikely that the relatively small area of habitat to be removed would be important to the South-eastern Long-eared Bat or Superb Parrot. In addition, there is no important population of either species present in the study area.

The proposal is unlikely to adversely affect habitat critical to the survival of the South-eastern Long-eared Bat or Superb Parrot.

- **Disrupt the breeding cycle of an important population;**

Roosting and breeding habitat for the South-eastern Long-eared Bat may be present in the form of tree hollows and loose bark. The Superb Parrot may also use hollow-bearing trees for nesting.

Up to seven hollow-bearing trees would be removed from the proposal site. The removal of these hollow-bearing trees is unlikely to substantially affect the life cycle of the South-eastern Long-eared Bat and Superb Parrot due to the presence of many more habitat trees in the study area and in the locality.

The removal of a relatively small amount of vegetation and low number of habitat trees would be unlikely to significantly disrupt the breeding cycle of the South-eastern Long-eared Bat or Superb Parrot.

- **Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;**

The proposed removal of trees would reduce the amount of potential foraging, roosting, breeding and movement habitat for the South-eastern Long-eared Bat and Superb Parrot in the study area. Habitat would be removed as described in 2) above. Areas of high quality habitat value exist in patches outside the study area and in the locality. The proposal would be unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the South-eastern Long-eared Bat and Superb Parrot are likely to decline.

- **Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;**

The South-eastern Long-eared Bat would be unlikely to be directly affected by the spread of introduced weed species in the study area, although indirect impacts could occur if an insect prey species was substantially affected.

The Superb Parrot could potentially be affected by the spread of introduced weed species in the study area by leading to a decline in the native flora species present. This would reduce foraging habitat for the Superb Parrot.

Due to the species' large home ranges and mobility, and implementation of safeguards to minimise the spread of weeds, the effects of weed introduction to the study area would be unlikely to significantly affect the species.

- **Introduce disease that may cause the species to decline; or**

All machinery and equipment would be cleaned prior to conducting the proposed works. The proposal would be unlikely to introduce disease that may cause the South-eastern Long-eared Bat and Superb Parrot to decline.

- **Interfere substantially with the recovery of the species.**

The relatively small amount of vegetation to be removed by the proposal, compared to the area of habitat in the study area and locality would be unlikely to significantly interfere with the recovery of the South-eastern Long-eared Bat or Superb Parrot.

Conclusion

The proposal would be unlikely to have a significant effect on the vulnerable South-eastern Long-eared Bat or Superb Parrot as:

- *Only a small area of woodland habitat would be removed compared to the extent of woodland in the study area and locality (up to six per cent of the moderate/good condition woodland in the study area and only a minor fraction of the adjacent connected woodland in the locality)*
- *There are areas of high quality habitat value in patches connected to the study area*
- *Only a small number of hollow-bearing trees would be removed compared to what is available in the study area and locality*
- *The small amount of vegetation removal is unlikely to result in significant additional fragmentation to that which has already occurred. The species are highly mobile and capable of traversing the study area to other areas of habitat.*

Appendix E – Targeted microchiropteran bat survey results

(Targeted surveys from within Gocup Road program of works study area)

Anabat survey results											
Species	Unit 1 27/10/2014	28/10/2014	29/10/2014	30/10/2014	Unit 1 Total	Unit 2 27/10/2014	28/10/2014	29/10/2014	30/10/2014	Unit 2 Total	Grand Total
Chalinolobus gouldii D	7	14	12	5	38	10	8	15	7	40	78
Chalinolobus gouldii PR	29	57	14	1	101	13	7	20		40	141
Chalinolobus gouldii/ *Mormopterus* sp.	17	38	20	8	83	15	35	38	11	99	182
Chalinolobus gouldii/ *Scotorepens balstoni*	12	62	31	1	106	34	27	26	16	103	209
Chalinolobus morio D	1	4	9	2	16	1	1		1	3	19
Miniopterus schreibersii oceanensis (v) D	7	1		1	9	1		2	1	4	13
Miniopterus schreibersii oceanensis (v) PR	12	5	1	2	20	25	4	12	13	54	74
Miniopterus schreibersii oceanensis (v)/ *Vespadelus* species	64	25	7	14	110	149	60	44	51	304	414
Mormopterus sp.	4				4	1	4	1	1	7	11
Mormopterus species 2 D	1				1						1
Mormopterus species 4 D	4	12	8	3	27	2	6	5	5	18	45
Multiple species	77	47	6	4	134	16	20	19	13	68	202
Saccolaimus flaviventris (v) D			1		1						1
Scotorepens balstoni D		2	2		4	1	1			2	6
Scotorepens balstoni PR	3	3	1		7	2	1	3	1	7	14
Tadarida australis D	3	2			5						5
Vespadelus darlingtoni D	4				4	6	2	4	1	13	17
Vespadelus darlingtoni PR	2		1		3	3	1	4	3	11	14
Vespadelus darlingtoni/ *regulus*	3		2	1	6	71	19	42	16	148	154

Vespadelus regulus D	5				5	1				1	6
Vespadelus regulus PR						10		1		11	11
Vespadelus regulus/darlingtoni/vulturnus				1	1			2	3	5	6
Vespadelus vulturnus / Chalinolobus morio				2	2	2		2	1	5	7
Vespadelus vulturnus D	1	1		3	5	4	5		19	28	33
Vespadelus vulturnus PR	2	4		1	7	5	2		1	8	15
#N/A			1		1						1
Grand Total	**258**	**277**	**116**	**49**	**700**	**372**	**203**	**240**	**164**	**979**	**1679**

D definite call confidence
PR probable call confidence
Numbers are calls/passes for the survey period
Species containing two or more species names are considered difficult in differentiating calls between individual species

Appendix F – Box-Gum Woodland assessment criteria

EPBC Act Box-Gum Woodland

The following assessment applies to White Box woodland in section 5.2 (Cookoomooroo) where plots 19 and 21 were surveyed. No areas of EPBC Act Box-Gum Woodland were identified in the study area.

Criterion	Description	Does site meet the criterion?	The community?
1	Does the site contain or previously have contained White Box, Yellow Box or Blakely's Red Gum? *If no – not the community.*	**Yes**	
2	Does the site have a predominantly native understorey? This is assessed using perennial species only. *If no – not the community.*	**Yes**	
3	Is the patch 0.1 ha or greater in size? *If no – not the community.*	**Yes**	
4	Is the shrub cover typically less than 30 per cent? *If no – not the community.*	**Yes**	
5	Is there 12 or more native understorey species present in **the patch** (excluding grasses)? *If no – go to 7.*	**No**	
6	Does the site contain at least one important species? *If no – go to 7.*	**No**	
Outcome- the patch qualifies as the community if answers to 1-6 are yes.			**No**
7	Is the patch 2 ha or greater in size? *If no – not the community.*	**No**	
8	Does 2 ha of the patch have 40 or more trees with a dbh>40cm? (i.e. 20 per hectare)? *If no – go to 9.*	**No**	
Outcome – the patch qualifies as the community if answers to 7 & 8 are yes.			**No**
9	In the patch, are there mature trees (>40cm DBH) and natural generation (>5cm dbh) of dominant overstorey eucalypts (WB, YB, BRG)? *If no – not the community.*	N/A – patches are not large enough	
Outcome – the patch qualifies as the community if the answer to 9 is yes.			

TSC Act Box-Gum Woodland

The following assessment applies to White Box woodland in section 5.2 (Cookoomooroo) where plots 19 and 21 were surveyed.

Number	Question	Result	Decision/ Outcome
1	The site is in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands or NSW South Western Slopes Bioregions.	**Yes – South Western Slopes**	Go to 2
1*	The site is outside the above bioregions.		Not Box-Gum Woodland
2	There are no native species in the understorey, and the site is unlikely to respond to assisted natural regeneration.		Not Box-Gum Woodland
2*	The understorey is otherwise.	**Yes – understorey contains natives**	Go to 3
3	The site has trees.	**Yes – site has trees**	Go to 4
3*	The site is treeless, but is likely to have supported White Box, Yellow Box or Blakely's Red Gum prior to clearing		Go to 5
4	White Box, Yellow Box or Blakely's Red Gum or a combination of these species, are or were present.	**Yes – all three species present**	Go to 5
4*	White Box, Yellow Box or Blakely's Red Gum have never been present		Not Box-Gum Woodland
5	The site is predominantly grassy	**Yes – site is predominantly grassy**	Is Box-Gum Woodland
5*	The understorey of the site is dominated by shrubs excluding pioneer species		Not Box-Gum Woodland

The White Box woodland patches in section 5.2 (Cookoomooroo) meet the criteria for Box-Gum Woodland listed under the TSC Act.

Appendix G – Database searches

Australian Government

Department of the Environment

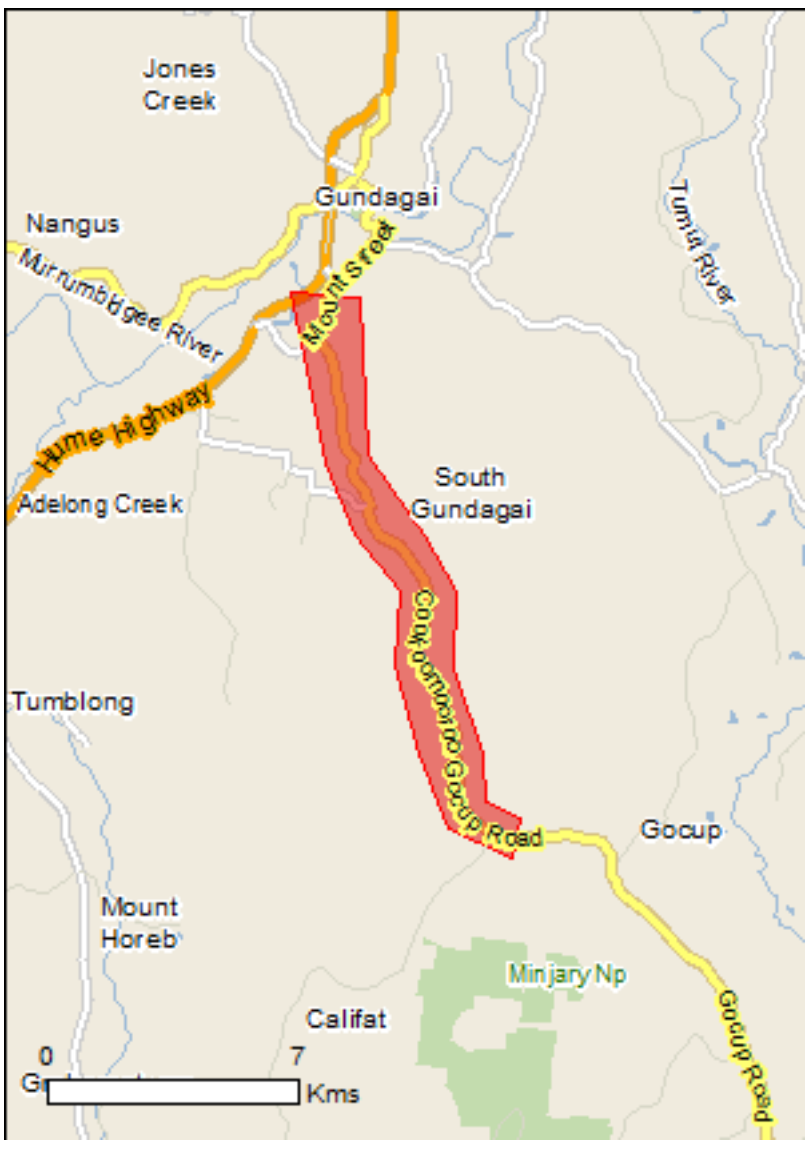
EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

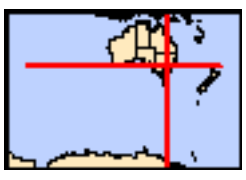
Report created: 18/07/16 12:30:18



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates

Buffer: 10.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	4
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	3
Listed Threatened Species:	23
Listed Migratory Species:	6

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	12
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	2
Regional Forest Agreements:	1
Invasive Species:	32
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar) [Resource Information]

Name	Proximity
Banrock station wetland complex	700 - 800km upstream
Hattah-kulkyne lakes	500 - 600km upstream
Riverland	600 - 700km upstream
The coorong, and lakes alexandrina and albert wetland	700 - 800km upstream

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Endangered	Community likely to occur within area
Natural Temperate Grassland of the South Eastern Highlands	Critically Endangered	Community likely to occur within area
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Anthochaera phrygia		
Regent Honeyeater [82338]	Critically Endangered	Foraging, feeding or related behaviour likely to occur within area
Botaurus poiciloptilus		
Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area
Grantiella picta		
Painted Honeyeater [470]	Vulnerable	Species or species habitat known to occur within area
Lathamus discolor		
Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
Polytelis swainsonii		
Superb Parrot [738]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Rostratula australis		
Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Fish		
Maccullochella macquariensis		
Trout Cod [26171]	Endangered	Species or species habitat may occur within area
Maccullochella peelii		
Murray Cod [66633]	Vulnerable	Species or species habitat may occur within

Name	Status	Type of Presence
		area
Macquaria australasica		
Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area
Frogs		
Litoria booroolongensis		
Booroolong Frog [1844]	Endangered	Species or species habitat likely to occur within area
Litoria raniformis		
Growling Grass Frog, Southern Bell Frog, Green and Golden Frog, Warty Swamp Frog [1828]	Vulnerable	Species or species habitat may occur within area
Insects		
Synemon plana		
Golden Sun Moth [25234]	Critically Endangered	Species or species habitat known to occur within area
Mammals		
Dasyurus maculatus maculatus (SE mainland population)		
Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat may occur within area
Nyctophilus corbeni		
Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat likely to occur within area
Petauroides volans		
Greater Glider [254]	Vulnerable	Species or species habitat may occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)		
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat may occur within area
Pteropus poliocephalus		
Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Plants		
Ammobium craspedioides		
Yass Daisy [20758]	Vulnerable	Species or species habitat likely to occur within area
Caladenia concolor		
Crimson Spider-orchid, Maroon Spider-orchid [5505]	Vulnerable	Species or species habitat likely to occur within area
Grevillea wilkinsonii		
Tumut Grevillea [56396]	Endangered	Species or species habitat known to occur within area
Thesium australe		
Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat may occur within area
Reptiles		
Aprasia parapulchella		
Pink-tailed Worm-lizard, Pink-tailed Legless Lizard [1665]	Vulnerable	Species or species habitat likely to occur within area
Delma impar		
Striped Legless Lizard [1649]	Vulnerable	Species or species habitat likely to occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		

Name	Threatened	Type of Presence
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Hirundapus caudacutus		
White-throated Needletail [682]		Species or species habitat likely to occur within area
Motacilla flava		
Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca		
Satin Flycatcher [612]		Species or species habitat likely to occur within area
Rhipidura rufifrons		
Rufous Fantail [592]		Species or species habitat likely to occur within area
Migratory Wetlands Species		
Gallinago hardwickii		
Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land - Australian Telecommunications Commission

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Gallinago hardwickii		
Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Haliaeetus leucogaster		
White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Hirundapus caudacutus		
White-throated Needletail [682]		Species or species habitat likely to occur within area
Lathamus discolor		
Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat likely to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat likely to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Minjary	NSW
Mudjarn	NSW

Regional Forest Agreements	[Resource Information]

Note that all areas with completed RFAs have been included.

Name	State
Southern RFA	New South Wales

Invasive Species	[Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Cytisus scoparius Broom, English Broom, Scotch Broom, Common Broom, Scottish Broom, Spanish Broom [5934]		Species or species habitat likely to occur within area
Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat likely to occur

Name	Status	Type of Presence within area
Genista linifolia Flax-leaved Broom, Mediterranean Broom, Flax Broom [2800]		Species or species habitat likely to occur within area
Nassella neesiana Chilean Needle grass [67699]		Species or species habitat likely to occur within area
Nassella trichotoma Serrated Tussock, Yass River Tussock, Yass Tussock, Nassella Tussock (NZ) [18884]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Senecio madagascariensis Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
Solanum elaeagnifolium Silver Nightshade, Silver-leaved Nightshade, White Horse Nettle, Silver-leaf Nightshade, Tomato Weed, White Nightshade, Bull-nettle, Prairie-berry, Satansbos, Silver-leaf Bitter-apple, Silverleaf-nettle, Trompillo [12323]		Species or species habitat likely to occur within area
Ulex europaeus Gorse, Furze [7693]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-35.085155 148.085376,-35.085998 148.102199,-35.11858 148.104602,-35.134866 148.118335,-35.146377 148.126918,-35.162097 148.126231,-35.179777 148.133098,-35.189879 148.133784,-35.192965 148.142367,-35.201101 148.140651,-35.195209 148.124515,-35.179777 148.116962,-35.161535 148.111468,-35.146658 148.112498,-35.135147 148.101169,-35.119984 148.093616,-35.100886 148.088809,-35.100886 148.088809,-35.085155 148.085376

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Parks and Wildlife Commission NT, Northern Territory Government
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Atherton and Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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Priority weeds for the Riverina

Note: this region includes the local council areas of Bland, Carrathool (lower), Coolamon, Cootamundra-Gundagai, Griffith, Hay (lower), Hilltops (western), Junee, Leeton, Murrumbidgee (upper), Narrandera, Snowy Valleys (upper), Temora, Wagga Wagga, Lockhart Shire Council

Select another region

Weed	Duty
All plants	**General Biosecurity Duty** *All plants are regulated with a **general biosecurity duty** to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.*
African boxthorn *Lycium ferocissimum*	**Mandatory Measure** *Must not be imported into the State or sold*
Alligator weed *Alternanthera philoxeroides*	**Mandatory Measure** *Must not be imported into the State or sold*
Alligator weed *Alternanthera philoxeroides*	**Biosecurity Zone** The Alligator Weed Biosecurity Zone is established for all land within the state except land in the following regions: Greater Sydney; Hunter (but only in the local government areas of City of Lake Macquarie, City of Maitland, City of Newcastle or Port Stephens). *Within the Biosecurity Zone this weed must be eradicated where practicable, or as much of the weed destroyed as practicable, and any remaining weed suppressed. The local control authority must be notified of any new infestations of this weed within the Biosecurity Zone*
Alligator weed *Alternanthera philoxeroides*	**Regional Recommended Measure** *Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.*

Anchored water hyacinth *Eichhornia azurea*	**Prohibited Matter** *A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries*
Athel pine *Tamarix aphylla*	**Mandatory Measure** *Must not be imported into the State or sold*
Bellyache bush *Jatropha gossypiifolia*	**Mandatory Measure** *Must not be imported into the State or sold*
Bitou bush *Chrysanthemoides monilifera* subsp. *rotundata*	**Mandatory Measure** *Must not be imported into the State or sold*
Bitou bush *Chrysanthemoides monilifera* subsp. *rotundata*	**Biosecurity Zone** The Bitou Bush Biosecurity Zone is established for all land within the State except land within 10 kilometres of the mean high water mark of the Pacific Ocean between Cape Byron in the north and Point Perpendicular in the south. *Within the Biosecurity Zone this weed must be eradicated where practicable, or as much of the weed destroyed as practicable, and any remaining weed suppressed. The local control authority must be notified of any new infestations of this weed within the Biosecurity Zone*
Bitou bush *Chrysanthemoides monilifera* subsp. *rotundata*	**Regional Recommended Measure** *Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.*
Black knapweed *Centaurea X moncktonii*	**Prohibited Matter** *A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries*
Black willow *Salix nigra*	**Mandatory Measure** *Must not be imported into the State or sold*

Black willow *Salix nigra*	**Regional Recommended Measure** *Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. Notify local control authority if found.*
Blackberry *Rubus fruticosus* species aggregate	**Mandatory Measure** *Must not be imported into the State or sold* **All species in the *Rubus fruiticosus* species aggregate have this requirement, except for the varietals Black Satin, Chehalem, Chester Thornless, Dirksen Thornless, Loch Ness, Murrindindi, Silvan, Smooth Stem, and Thornfree**
Boneseed *Chrysanthemoides monilifera* subsp. *monilifera*	**Mandatory Measure** *Must not be imported into the State or sold*
Boneseed *Chrysanthemoides monilifera* subsp. *monilifera*	**Control Order** Bonseed Control Zone: Whole of NSW *Boneseed Control Zone (Whole of NSW): Owners and occupiers of land on which there is boneseed must notify the local control authority of new infestations; immediately destroy the plants; ensure subsequent generations are destroyed; and ensure the land is kept free of the plant. A person who deals with a carrier of boneseed must ensure the plant (and any seed and propagules) is not moved from the land; and immediately notify the local control authority of the presence of the plant.*
Boxing glove cactus *Cylindropuntia fulgida* var. *mamillata*	**Mandatory Measure** *Must not be imported into the State or sold*
Bridal creeper *Asparagus asparagoides*	**Mandatory Measure** *Must not be imported into the State or sold* ***this requirement also applies to the Western Cape form of bridal creeper**
Bridal veil creeper *Asparagus declinatus*	**Prohibited Matter** *A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries*

Broomrapes *Orobanche* species	**Prohibited Matter** *A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries* **All species of *Orobanche* are Prohibited Matter in NSW, except the natives *Orobanche cernua* var. *australiana* and *Orobanche minor***
Cabomba *Cabomba caroliniana*	**Mandatory Measure** *Must not be imported into the State or sold*
Cane cactus *Austrocylindropuntia cylindrica*	**Mandatory Measure** *Must not be imported into the State or sold* **All species in the *Austrocylindropuntia* genus have this requirement**
Cane needle grass *Nassella hyalina*	**Regional Recommended Measure** Eradication zone: whole region except for the containment zone of Wagga Wagga City Council *Eradication zone: The plant should be eradicated from the land and the land kept free of the plant. Containment zone: Land managers should prevent spread from their land. Whole region: managers should mitigate the risk of new weeds being introduced to their land. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.*
Cape broom *Genista monspessulana*	**Mandatory Measure** *Must not be imported into the State or sold*
Cape broom *Genista monspessulana*	**Regional Recommended Measure** Whole region excluding Snowy Valleys Council *Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. Notify local control authority if found.*
Cape broom *Genista monspessulana*	**Regional Recommended Measure** Snowy Valleys Council *Land managers should mitigate the risk of new weeds being introduced to their land. Land managers should mitigate spread from their land.*

Cat's claw creeper *Dolichandra unguis-cati*	**Mandatory Measure** *Must not be imported into the State or sold*
Chilean needle grass *Nassella neesiana*	**Mandatory Measure** *Must not be imported into the State or sold*
Chilean needle grass *Nassella neesiana*	**Regional Recommended Measure** *Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. Notify local control authority if found.*
Chinese violet *Asystasia gangetica* subsp. *micrantha*	**Regional Recommended Measure** *Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.*
Climbing asparagus *Asparagus africanus*	**Mandatory Measure** *Must not be imported into the State or sold*
Climbing asparagus fern *Asparagus plumosus*	**Mandatory Measure** *Must not be imported into the State or sold*
Common pear *Opuntia stricta*	**Mandatory Measure** *Must not be imported into the State or sold*
Coolatai grass *Hyparrhenia hirta*	**Regional Recommended Measure** *Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.*
Eurasian water milfoil *Myriophyllum spicatum*	**Prohibited Matter** *A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries*
Fireweed *Senecio madagascariensis*	**Mandatory Measure** *Must not be imported into the State or sold*

Fireweed *Senecio madagascariensis*	**Regional Recommended Measure** *Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. Notify local control authority if found.*
Flax-leaf broom *Genista linifolia*	**Mandatory Measure** *Must not be imported into the State or sold*
Frogbit *Limnobium laevigatum*	**Prohibited Matter** *A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries* **All species of *Limnobium* are Prohibited Matter**
Gamba grass *Andropogon gayanus*	**Prohibited Matter** *A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries*
Gorse *Ulex europaeus*	**Mandatory Measure** *Must not be imported into the State or sold*
Gorse *Ulex europaeus*	**Regional Recommended Measure** *Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. Notify local control authority if found.*
Grey sallow *Salix cinerea*	**Mandatory Measure** *Must not be imported into the State or sold*
Grey sallow *Salix cinerea*	**Regional Recommended Measure** *Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. Notify local control authority if found.*
Ground asparagus *Asparagus aethiopicus*	**Mandatory Measure** *Must not be imported into the State or sold*

Hawkweeds *Hieracium* species	**Prohibited Matter** *A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries* **All species in the genus *Hieracium* are Prohibited Matter**
Horsetails *Equisetum* species	**Regional Recommended Measure** *Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.*
Hudson pear *Cylindropuntia rosea*	**Mandatory Measure** *Must not be imported into the State or sold*
Hydrocotyl *Hydrocotyle ranunculoides*	**Prohibited Matter** *A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries*
Hymenachne *Hymenachne amplexicaulis* and hybrids	**Mandatory Measure** *Must not be imported into the State or sold*
Karroo thorn *Vachellia karroo*	**Prohibited Matter** *A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries*
Kidney-leaf mud plantain *Heteranthera reniformis*	**Regional Recommended Measure** *Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.*

Kochia *Bassia scoparia*	**Prohibited Matter** *A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries* **Excluding the subspecies *trichophylla***
Koster's curse *Clidemia hirta*	**Prohibited Matter** *A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries*
Lagarosiphon *Lagarosiphon major*	**Prohibited Matter** *A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries*
Lantana *Lantana camara*	**Mandatory Measure** *Must not be imported into the State or sold*
Madeira vine *Anredera cordifolia*	**Mandatory Measure** *Must not be imported into the State or sold*
Mesquite *Prosopis* species	**Mandatory Measure** *Must not be imported into the State or sold* **All species in the genus *Prosopis* have this requirement**
Mesquite *Prosopis* species	**Regional Recommended Measure** *Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. Notify local control authority if found.*
Mexican feather grass *Nassella tenuissima*	**Prohibited Matter** *A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries*

Miconia *Miconia* species	**Prohibited Matter** *A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries* **All species of *Miconia* are Prohibited Matter in NSW**
Mikania vine *Mikania micrantha*	**Prohibited Matter** *A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries* ***all species in the genus *Mikania* are Prohibited Matter in NSW**
Mimosa *Mimosa pigra*	**Prohibited Matter** *A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries*
Mother-of-millions *Bryophyllum* species	**Regional Recommended Measure** *Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.*
Ox-eye daisy *Leucanthemum vulgare*	**Regional Recommended Measure** *Land managers should mitigate the risk of the plant being introduced to their land. Land managers should mitigate spread from their land. Notify local control authority if found.*
Parkinsonia *Parkinsonia aculeata*	**Mandatory Measure** *Must not be imported into the State or sold*

Parkinsonia *Parkinsonia aculeata*	**Control Order** Parkinsonia Control Zone: Whole of NSW *Parkinsonia Control Zone (Whole of NSW): Owners and occupiers of land on which there is parkinsonia must notify the local control authority of new infestations; immediately destroy the plants; ensure subsequent generations are destroyed; and ensure the land is kept free of the plant. A person who deals with a carrier of parkinsonia must ensure the plant (and any seed and propagules) is not moved from the land; and immediately notify the local control authority of the presence of the plant.*
Parthenium weed *Parthenium hysterophorus*	**Prohibited Matter** *A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries*
Parthenium weed *Parthenium hysterophorus*	**Mandatory Measure** *The following equipment must not be imported into NSW from Queensland: grain harvesters (including the comb or front), comb trailers (including the comb or front), bins used for holding grain during harvest operations, augers or similar for moving grain, vehicles used to transport grain harvesters, support vehicles driven in paddocks during harvest operations, mineral exploration drilling rigs and vehicles used to transport those rigs, unless set out as an exception in Division 5, Part 2 of the Biosecurity Order (Permitted Activities) 2017*
Perennial ground cherry *Physalis longifolia*	**Regional Recommended Measure** *Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.*
Pond apple *Annona glabra*	**Prohibited Matter** *A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries*

Prairie ground cherry *Physalis hederifolia*	**Regional Recommended Measure** *Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.*
Prickly acacia *Vachellia nilotica*	**Prohibited Matter** *A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries*
Prickly pears - Austrocylindropuntias *Austrocylindropuntia* species	**Mandatory Measure** *Must not be imported into the State or sold* **All species in the *Austrocylindropuntia* genus have this requirement**
Prickly pears - Cylindropuntias *Cylindropuntia species*	**Mandatory Measure** *Must not be imported into the State or sold* **All species in the *Cylindropuntia* genus have this requirement**
Prickly pears - Opuntias *Opuntia* species	**Mandatory Measure** *Must not be imported into the State or sold* **Except for *Opuntia ficus-indica* (Indian fig)**
Ragwort *Senecio jacobaea*	**Regional Recommended Measure** *Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.*
Rope pear *Cylindropuntia imbricata*	**Mandatory Measure** *Must not be imported into the State or sold* **All species in the *Cylindropuntia* genus have this requirement**
Rubber vine *Cryptostegia grandiflora*	**Prohibited Matter** *A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries*

Sagittaria *Sagittaria platyphylla*	**Mandatory Measure** *Must not be imported into the State or sold*
Sagittaria *Sagittaria platyphylla*	**Regional Recommended Measure** *Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. Notify local control authority if found.*
Salvinia *Salvinia molesta*	**Mandatory Measure** *Must not be imported into the State or sold*
Salvinia *Salvinia molesta*	**Regional Recommended Measure** *Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. Notify local control authority if found.*
Scotch broom *Cytisus scoparius* subsp. *scoparius*	**Mandatory Measure** *Must not be imported into the State or sold*
Scotch broom *Cytisus scoparius* subsp. *scoparius*	**Regional Recommended Measure** Whole region excluding Snowy Valleys Council *Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. Notify local control authority if found.*
Scotch broom *Cytisus scoparius* subsp. *scoparius*	**Regional Recommended Measure** Snowy Valleys Council. *Land managers should mitigate the risk of new weeds being introduced to their land. Land managers should mitigate spread from their land.*
Senegal tea plant *Gymnocoronis spilanthoides*	**Regional Recommended Measure** *Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.*
Serrated tussock *Nassella trichotoma*	**Mandatory Measure** *Must not be imported into the State or sold*

Serrated tussock *Nassella trichotoma*	**Regional Recommended Measure** *Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. Notify local control authority if found.*
Siam weed *Chromolaena odorata*	**Prohibited Matter** *A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries*
Silverleaf nightshade *Solanum elaeagnifolium*	**Mandatory Measure** *Must not be imported into the State or sold*
Smooth tree pear *Opuntia monacantha*	**Mandatory Measure** *Must not be imported into the State or sold*
Snakefeather *Asparagus scandens*	**Mandatory Measure** *Must not be imported into the State or sold*
Spongeplant *Limnobium spongia*	**Prohibited Matter** *A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries* **All species of *Limnobium* are Prohibited Matter**
Spotted knapweed *Centaurea stoebe* subsp. *micranthos*	**Prohibited Matter** *A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries*
Tiger pear *Opuntia aurantiaca*	**Mandatory Measure** *Must not be imported into the State or sold*

Tropical soda apple *Solanum viarum*	**Control Order** Tropical Soda Apple Control Zone: Whole of NSW *Tropical Soda Apple Control Zone (Whole of NSW): Owners and occupiers of land on which there is tropical soda apple must notify the local control authority of new infestations; destroy the plants including the fruit; ensure subsequent generations are destroyed; and ensure the land is kept free of the plant. A person who deals with a carrier of tropical soda apple must ensure the plant (and any seed and propagules) is not moved from the land; and immediately notify the local control authority of the presence of the plant on the land, or on or in a carrier.*
Velvety tree pear *Opuntia tomentosa*	**Mandatory Measure** *Must not be imported into the State or sold*
Water caltrop *Trapa* species	**Prohibited Matter** *A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries* **All species in the *Trapa* genus are Prohibited Matter in NSW**
Water hyacinth *Eichhornia crassipes*	**Mandatory Measure** *Must not be imported into the State or sold*
Water hyacinth *Eichhornia crassipes*	**Biosecurity Zone** The Water Hyacinth Biosecurity Zone applies to all land within the State, except for the following regions: Greater Sydney or North Coast, North West (but only the local government area of Moree Plains), Hunter (but only in the local government areas of City of Cessnock, City of Lake Macquarie, MidCoast, City of Maitland, City of Newcastle or Port Stephens), South East (but only in the local government areas of Eurobodalla, Kiama, City of Shellharbour, City of Shoalhaven or City of Wollongong). *Within the Biosecurity Zone this weed must be eradicated where practicable, or as much of the weed destroyed as practicable, and any remaining weed suppressed. The local control authority must be notified of any new infestations of this weed within the Biosecurity Zone*

Water hyacinth *Eichhornia crassipes*	**Regional Recommended Measure** *Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. Notify local control authority if found.*
Water lettuce *Pistia stratiotes*	**Regional Recommended Measure** *Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.*
Water lilies *Nymphaea* species	**Regional Recommended Measure** *Land managers should mitigate the risk of new weeds being introduced to their land. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.* **This Regional Recommended Measure applies to *Nymphaea mexicana* (Mexican water lily)**
Water poppy *Hydrocleys nymphoides*	**Regional Recommended Measure** *Land managers should mitigate the risk of the plant being introduced to their land. Land managers should mitigate spread from their land. Notify local control authority if found.*
Water soldier *Stratiotes aloides*	**Prohibited Matter** *A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries*
Willows *Salix* species	**Mandatory Measure** *Must not be imported into the State or sold* **All species in the *Salix* genus have this requirement, except *Salix babylonica* (weeping willows), *Salix x calodendron* (pussy willow) and *Salix x reichardtii* (sterile pussy willow)**

Witchweeds *Striga* species	**Prohibited Matter** *A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries* **All species in the *Striga* genus are Prohibited Matter in NSW, except the native *Striga parviflora***
Yellow burrhead *Limnocharis flava*	**Prohibited Matter** *A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries*

The content provided here is for information purposes only and is taken from the *Biosecurity Act 2015* and its subordinate legislation, and the Regional Strategic Weed Management Plans (published by each Local Land Services region in NSW). It describes the state and regional priorities for weeds in New South Wales, Australia.

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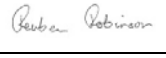
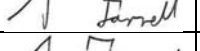
Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	A. Williams	R. Robinson		S. Farrell		8/11/2016
1	R. Robinson	R. Robinson		S. Farrell		28/7/2017
2	R. Robinson	R. Robinson		S. Farrell		4/9/2017

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Appendix C

Noise and vibration assessment

Roads and Maritime Services

Gocup Road Upgrade - Cookoomooroo

Noise and Vibration Impact Assessment

September 2017

This report: has been prepared by GHD for Roads and Maritime Services and *may only be used and relied on by Roads and Maritime Services for the purpose agreed between GHD and the Roads and Maritime Services as set out in section 1.4 of this report.*

GHD otherwise disclaims responsibility to any person other than Roads and Maritime Services arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services carried out 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.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

Executive summary

This noise and vibration impact assessment has been carried out for Roads and Maritime Services (Roads and Maritime) for the section 5.2 (Cookoomooroo) upgrade of Gocup Road (the proposal). It forms part of the Review of Environmental Factors (REF). This report is subject to, and must be read in conjunction with, the limitations set out and the assumptions and qualifications contained throughout the report.

Background monitoring

Sensitive receivers and land uses potentially affected from noise and vibration impacts associated with the proposal were identified. Noise monitoring was carried out at one location along the existing alignment in August 2016 to determine existing background and road traffic noise levels. These levels were used to establish noise and vibration criteria for the surrounding environment.

Traffic volumes were recorded alongside noise monitoring to assess existing road traffic noise levels. Measured traffic volumes were used to predict future traffic volumes used in the operational noise assessment.

Construction impacts

Construction noise impacts were assessed in accordance with the *Interim Construction Noise Guideline* (ICNG) (DECC, 2009) and the *Construction Noise and Vibration Guideline* (CNVG) (Roads and Maritime, 2016). Construction works would be completed during standard construction hours. Any activities that require out-of-hours works would be subject to approval by the relevant authority.

The construction noise levels predicted are conservative as they are based on a worst-case assessment. The predicted noise levels provide an estimate of the maximum noise levels that could be experienced during construction. The actual noise level experienced by the surrounding community would be lower than predicted during most construction works.

All residences within the construction noise study area are expected to experience noise impacts at some stage during construction due to the low existing background noise levels. The major impacts are expected during the clear zone works and bulk earthworks stages. The received noise level would vary as the construction progresses along the proposed road alignment.

Construction blasting vibration and airblast overpressure impact distances have been provided for various blast charge sizes.

No construction vibration impacts are expected from general construction activities as the identified sensitive receivers are located outside the vibration safe buffer distances.

Specific mitigation and additional mitigation measures as outlined by the CNVG have been recommended to reduce the severity of impacts during construction.

Operational noise

Operational noise impacts were assessed in accordance with the Roads and Maritime *Noise Criteria Guideline* (NCG) and *Noise Mitigation Guideline* (NMG).

Predicted noise levels indicate that no sensitive receiver exceeds the day-time controlling criterion and one sensitive receiver exceeds the night-time controlling criterion. Receivers that exceeded the NCG criteria were assessed for mitigation using the NMG mitigation qualifying process. No receivers qualify for mitigation treatments.

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1. Introduction

1.1 Overview

Roads and Maritime Services (Roads and Maritime) is proposing a program of works to upgrade sections of Gocup Road (MR279) to meet modern freight demands and address vehicle safety requirements. Gocup Road is about 31 kilometres in length and runs north from the Snowy Mountains Highway (HW4) at Tumut to the Hume Highway (HW2) at Gundagai.

The Gocup Road program of works has been under way since 2012. To date, three projects have been completed, with another three currently in delivery phase. The remaining major works include the proposed Halfway Hill, Doctors Hill and Cookoomooroo sections.

This Noise and Vibration Impact Assessment (NVIA) addresses noise and vibration impacts on Section 5.2 (Cookoomooroo) (the proposal).

This report has been prepared by GHD as part of the Review of Environmental Factors (REF) to assess environmental impacts on the proposal. Roads and Maritime is the proponent, and the REF is also being prepared by GHD in accordance with the requirements of Part 5 of the *NSW Environmental Planning and Assessment Act 1979* (EP&A Act).

This NVIA assesses and documents the potential operational noise and construction noise and vibration impacts of the proposal and options for mitigation to reduce the severity of impacts.

1.2 Project background

Gocup Road is 31 kilometres in length and runs north from the Snowy Mountains Highway (HW4) at Tumut to the Hume Highway (HW2) at Gundagai. Gocup Road does not meet current road design standards. The road is generally narrow, with tight corners and steep vertical alignment sections. High numbers of heavy vehicles use the road. These heavy vehicles are primarily associated with the local timber and milling industry. No overtaking lanes are present, with overtaking opportunities limited. Travel lanes are below standard widths and numerous hazards exist in clear zones.

Due to these constraints, Gocup Road does not meet road safety standards. Heavy vehicles are forced to travel at slow speeds in areas of steep vertical inclines and tight bends. There are limited opportunities for overtaking, causing delays for traffic.

Gocup Road upgrades are a medium to long-term action in the NSW 'Long Term Transport Master Plan' and the 'Murray-Murrumbidgee Regional Transport Plan'. The NSW Government has committed $70 million over five years to upgrade Gocup Road. The Gocup Road Upgrade would include realigning and widening key sections, adding two overtaking lanes, and provision of road surface able to withstand heavy loads. The strategic objectives of the Gocup Road works program are to:

- Provide a safer road environment to reduce the frequency and severity of crashes for all vehicles
- Support current and future freight vehicle needs and provide a good level of service with minimal maintenance costs
- Support more efficient high productivity vehicle access
- Be sensitive to the area's natural environment, heritage and local communities.

1.3 Proposal outline

The proposal encompasses the Cookoomooroo project area. Key features of the proposal include:

- Widening of the sealed road width to 9.7 metres
- Excavating and trimming cut batters and widening fill batters
- Realigning some sections of road. This would include curve realignment changes of up to 115 metres
- Providing three temporary sediment basins
- Installing safety barriers
- Revegetation of decommissions road sections
- A site compound and stockpile sites (including existing stockpile site from the Abattior project – Section 6.1)
- Utility relocation, including Telstra underground utilities and overhead powerline poles, have been assessed in a separate Minor Works Review of Environmental Factors (MWREF).

1.4 Scope of this assessment

This report documents the assessment of potential noise and vibration impacts associated with construction and operation of the proposal. This report supports the REF for the project and the scope of assessments includes:

- Identification of the existing noise levels in the proposal site
- Assessment of the potential construction noise and vibration impacts based on the proposal description
- Assessment of the potential operational noise impacts of the proposal
- Preparation of a report summarising the findings of the NVIA.

1.5 Report structure

The report comprises the following sections:

- **Section 1 – Introduction:** provides background and an overview of the proposal and this assessment
- **Section 2 – Methodology:** a brief summary of the methods and guidance used for the assessment of the proposal
- **Section 3 – Existing ambient noise environment:** summarises the existing noise conditions and details the noise monitoring methodology
- **Section 4 – Construction noise and vibration assessment:** discusses construction methods and timing, construction noise and vibration criteria, results of the construction noise and vibration assessment and mitigation options
- **Section 5 – Operational noise assessment:** discusses the operational noise assessment criteria, noise modelling scenarios and methodology, traffic data, the assessment of road traffic noise and mitigation options to meet the criteria
- **Section 6 – Conclusion:** presents a summary of the findings and sets out the principal conclusions for the assessment.

2. Methodology

This assessment has been prepared in accordance with the following guidelines:

- *Road Noise Policy* (RNP) (DECCW, 2011)
- *Noise Criteria Guideline* (NCG) (Roads and Maritime, 2014)
- *Noise Mitigation Guideline* (NMG) (Roads and Maritime, 2014)
- *Noise Model Validation Guideline* (NVG) (Roads and Maritime, 2016) (currently in draft form)
- *Preparing an Operational Traffic and Construction Noise and Vibration Assessment Report* (Roads and Maritime, 2016)
- *Environmental Noise Management Manual* (NSW Roads and Traffic Authority, 2001)
- *Interim Construction Noise Guideline* (ICNG) (DECC, 2009)
- *Construction Noise and Vibration Guideline* (CNVG) (Roads and Maritime, 2016)
- *Assessing Vibration: a Technical Guideline* (DEC, 2006).

2.1 Construction noise and vibration assessment

The methodology for the construction noise and vibration assessment included:

- The construction study area was established in accordance with the CNVG
- The rating background levels (RBL) for the proposal were calculated from noise monitoring data obtained from the noise monitoring locations. The RBLs were used to establish the construction noise management levels in accordance with the ICNG
- A list of likely construction activities was sourced from the REF. Typical sound power levels for each activity was sourced from the CNVG
- For each construction activity, the potential noise impacts on the surrounding sensitive receivers have been predicted and assessed against the construction noise management levels and sleep disturbance criteria
- Noise impacts associated with construction traffic impacts were assessed
- For vibratory plant and equipment, a construction vibration assessment was carried out and potential impacted sensitive receivers identified
- Vibratory impacts due to blasting and the impacts on nearby sensitive receivers were assessed
- Construction noise and vibration mitigation measures were considered with reference to the CNVG.

2.2 Operational noise assessment

The methodology for the operational road traffic noise assessment included:

- The noise study area was established in accordance with the NCG
- Road classification changes were assessed for existing side roads
- Analyse the effects on noise levels due to road surface changes
- Models were used to assess potential noise impact against noise criteria and assess any increase in road traffic noise at sensitive receivers.

3. Existing ambient noise environment

The proposal is located about four kilometres south of Gundagai in Roads and Maritime's South West Region. The proposal site is located in the Cootamundra-Gundagai regional local government area (LGA) and is about 1.5 kilometres in length.

Gocup Road provides a link between the Snowy Mountains Highway at Tumut to the Hume Highway at Gundagai. The surrounding landscape is primarily dominated by agriculture land use, such as grazing. Four residences exist in the vicinity of the proposal site. No commercial or non-residential land uses surrounding the proposal have been identified.

The existing noise environment within the proposal site is influenced predominantly by road traffic noise from Gocup Road. Additional contributions to the noise environment can be attributed to agricultural operations from rural land uses, domestic and agriculture animals and natural noise sources.

The existing environment is shown in Figure 3-1. Details of long-term unattended noise monitoring and operator attended measurements are discussed in section 3.2.

Study areas and sensitive receivers for the operational and construction noise assessments are discussed in the relevant sections of the report.

LEGEND

- Site location
- Building
- Noise monitoring location
- Primary production

Paper Size A4

0 40 80 160 240 320

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Roads and Maritime Services
Gocup Road upgrade - Cookoomooroo

Proposal site, noise sensitive receivers and monitoring location

Job Number	23-15894
Revision	A
Date	21 Oct 2016

Figure 3-1

Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

C:\Users\afoddy\Desktop\Cookoomooroo1.mxd

Data source: Data Custodian, Data Set Name/Title, Version/Date. Created by:afoddy

3.1 Noise monitoring methodology

Attended and unattended noise monitoring was carried out to determine existing conditions, existing background noise levels and existing road traffic noise levels. The methodology for the noise monitoring program included:

- Identification of sensitive receivers including residences and other sensitive land uses in the study area
- Noise monitoring was carried out from 11 August to 22 August 2016, at one location along the proposal site (as shown in Figure 3-1) to determine background noise levels for the construction noise assessment and existing road traffic noise levels
- Traffic counts were conducted in conjunction with long-term noise monitoring for the operational noise assessment noise modelling verification process
- Noise monitoring was carried out using a Rion NL-52 environmental noise logger. The noise logger was programmed to accumulate L_{A90}, L_{A10} and L_{Aeq} noise descriptors continuously over the entire monitoring period.
- Operator attended noise monitoring was conducted using an Bruel & Kjær 2250 sound level meter for two 15-minute durations immediately following logger deployment to identify ambient noise sources. Instantaneous noise levels for operator identified sources were observed and noted during measurements.
- A calibration check was performed on the noise monitoring equipment using a sound level calibrator with a sound pressure level of 94 dBA at 1 kHz. At completion of the measurements, the meter's calibration was re-checked to ensure sensitivity of the noise monitoring equipment had not varied. The noise loggers were found to be within the acceptable tolerance of ± 0.5 dBA
- Data collected by the unattended loggers was downloaded and analysed, and any invalid data removed. Invalid data generally refers to periods of time where average wind speeds were greater than 5 m/s, or when rainfall occurred. Meteorological data was sourced from the Bureau of Meteorology's Wagga Wagga Aeronautical Meteorological Office (AMO) automatic weather station, station number 072150.

All noise monitoring activities were carried out and processed in accordance with the *Industrial Noise Policy* (EPA, 2000) long-term monitoring method.

3.2 Summary of noise monitoring results

3.2.1 Attended noise monitoring results

Noise sources identified during attended monitoring include:

- Domestic animals (cows, dogs)
- Wildlife noise
- Wind noise.

Table 3-1 Attended noise monitoring results

Location	Start	End	L_{Aeq}	L_{A90}	L_{Amin}	L_{Amax}
519 Edwardstown Road	14:30	14:45	54.8	50.2	30.6	82.9
519 Edwardstown Road	14:45	15:00	53.9	44.4	28.0	84.0

3.2.2 Unattended noise monitoring results

Unattended noise monitoring was carried out on the eastern fence of 519 Edwardstown Road, South Gundagai about 40 metres from the residential building and 470 metres from Gocup Road. Details of the noise monitoring equipment and location are provided in Table 3-2. Noise monitoring charts are presented in Appendix A. The noise logger data results table including rating background levels (RBL) and road traffic noise descriptors are provided in Table 3-3. Data has been provided for the full noise monitoring period.

Table 3-2 Unattended noise monitoring details

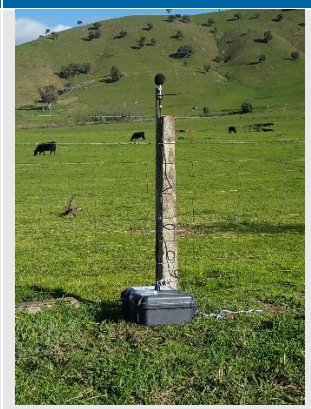
ID	Location and coordinates	Equipment details	Equipment settings	Site photo
1	519 Edwardstown Road, South Gundagai E: 599942 N: 6112381 Distance to road: 470 m	Rion NL-52 Type 1 SN: 410151	A-weighted Fast time response 15 minute intervals Pre-calibration: 94.2 dBA Post-calibration: 94.1 dBA	

Table 3-3 Summary of noise monitoring results, dBA

Date	Background noise descriptors			Road traffic noise descriptors		
	$L_{A90(Day)}$	$L_{A90(Evening)}$	$L_{A90(Night)}$	$L_{Aeq(15hr)}$	$L_{Aeq(9hr)}$	$L_{A10(18hr)}$
	7 am to 6 pm, Monday to Saturday; 8 am to 6 pm Sundays & Public Holidays	6 pm to 10 pm, Monday to Sunday & Public Holidays	10pm to 7am, Monday to Saturday; 10pm to 8am Sunday & public holidays	7 am to 10 pm weekdays	10 pm to 7 am weekdays	6 am to 12 am weekdays
Thursday, 11 August 2016	*(28.6)*	27.3	26.3	49.5	46.3	48.9
Friday, 12 August 2016	26.2	24.6	23.8	55.6	42.2	53.8
Saturday, 13 August 2016	28.2	25.0	23.9	46.5	41.0	45.3
Sunday, 14 August 2016	28.6	28.0	25.0	50.7	43.8	48.9
Monday, 15 August 2016	29.7	26.7	27.9	49.4	46.9	48.2
Tuesday, 16 August 2016	29.9	30.4	29.0	54.1	46.0	52.5
Wednesday, 17 August 2016	31.0	30.5	28.6	50.7	45.3	49.5
Thursday, 18 August 2016	30.8	28.7	31.1	50.5	46.8	49.3
Friday, 19 August 2016	*(39.8)*	*(31.6)*	28.3	55.2	40.7	53.1
Saturday, 20 August 2016	32.1	28.2	24.8	48.0	42.6	46.4
Sunday, 21 August 2016	29.8	29.8	25.2	50.1	45.6	48.5
Monday, 22 August 2016	*(32.0)*			49.4	-	47.4
Summary	**29.9**	**28.2**	**26.3**	**51.7**	**44.8**	**63.0**

Note: *(Italics)* indicates data excluded due to adverse weather conditions as specified in the *Industrial Noise* Policy (INP) (EPA, 2000) Appendix B

4. Construction noise and vibration assessment

Noise levels during the construction phase are generally higher than levels during operation. Higher noise levels can be attributed to the use of heavy machinery which generate high noise and vibration emissions. The allowable noise and vibration emissions during construction are higher than the allowances for operation as construction works are temporary in nature. However, construction noise and vibration emissions can be a source of annoyance for the surrounding community if no adequate management techniques have been implemented.

The following section details the assessment of construction noise and vibration associated with the proposal.

4.1 Study area

Noise emissions from construction have been assessed for receivers in the construction study area during standard construction hours.

A detailed quantitative construction noise assessment has been carried out with consideration to the CNVG as many affected receivers have been identified within the affected distance. Also, the duration of the construction works will be greater than six weeks.

The construction study area has been identified as per the CNVG and includes all sensitive receivers within the affected distance, where the affected distance is defined in the CNVG as the *"the distance up to which noise levels are expected to exceed the Noise Management Level as defined by the EPA's ICNG"*. The noise management levels relevant to this proposal are discussed in Section 4.3.

Sensitive receivers within the construction study area comprise of residential land uses. The sensitive receivers included in this assessment are provided in Appendix B.

4.2 Construction overview

Construction activities would be guided by a construction environmental management plan (CEMP) to ensure work is carried out to Roads and Maritime specifications within the specified work area. Detailed work methodologies would be determined during detailed design and construction planning.

The proposal is anticipated to involve the following work methodology and sequencing provided in Table 4-1.

Table 4-1 General construction methodology

Activity	Description
Stage 1 (10 month duration)	Includes bulk earthworks, drainage and road construction for all sections of new road. A temporary traffic diversion would also be constructed.
Stage 2 (2 month duration)	Involves building the section of new road where it crosses the existing road in the centre of the proposal site.
Stage 3 (2 month duration)	Involves work to connect the new realigned road to the existing road at the northern and southern limits of the proposal.

4.2.1 Proposed working hours

Construction works would be carried out during standard construction hours stated in the *Interim Construction Noise Guideline* (ICNG) (DECC, 2009). Plant and equipment that generate tonal or impulsive noise emissions and blasting activities would be carried out during construction hours stated in the CNVG. Proposed hours for construction activities are provided in Table 4-2.

Table 4-2 Proposed construction hours

Construction hours	Monday to Friday	Saturday	Sunday / Public holidays
Standard construction hours	7 am to 6 pm	8 am to 1 pm	No work
Activities with impulsive or tonal noise emissions[1]	8 am to 5 pm	9 am to 1 pm	No work
Blasting	9 am to 5 pm	9 am to 1 pm	No blasting

Note 1: Continuous activities may be carried out in blocks not exceeding three hours. A minimum respite period of one hour is required between each continuous block of work.

No works are expected to be carried out outside for standard construction hours. However, the ICNG acknowledges that the following activities have justification to be carried out outside the standard construction hours assuming all feasible and reasonable mitigation measures are implemented to minimise impacts to the surrounding sensitive land uses:

- Delivery of oversized plant or structures that police or other authorities determine require special arrangements to transport along public roads
- Emergency work to avoid the loss of life or damage to property, or to prevent environmental harm
- Maintenance and repair of public infrastructure where disruption to essential services or considerations of worker safety do not allow work within standard hours
- Public infrastructure works that shorten the length of the project and are supported by the affected community

- Works where a proponent demonstrates and justifies a need to operate outside the recommended standard construction hours
- Works which maintain noise levels below the noise management levels outside of the recommended standard construction hours.

The construction period is anticipated to take between 12 and 15 months. The works would be carried out in accordance with the ICNG and the CNVG.

4.2.2 Construction site compounds

A site compound would be established at the existing stockpile site from the Abattoir section of the program of works, north of the proposal site.

The site compound would be used to store plant and equipment, to provide site offices, parking and amenities for construction staff, and to stockpile materials as required. Chemicals and fuels for construction would be stored in appropriate storage areas within the site compound.

Four stockpile sites are proposed for Cookoomooroo, including an existing site from the Abattoir section (section 6.1) north of the proposal site

Other smaller stockpile sites may also be located within the proposal site as required. Stockpile sites would primarily be used for storing construction materials. One stockpile site may also be used for plant operation.

The compound and stockpile locations would be located along Gocup Road. The proposed compound and stockpile locations are shown in Figure 4-1.

599,500 600,000 600,500 601,000

6,114,000 6,113,500 6,113,000 6,112,500

Cookoomooroo Creek

Proposed site compound/stockpile site

Proposed sediment basin

Gocup Road

Proposed stockpile site

Proposed stockpile site

Proposed sediment basin

Proposed earth bunds

Proposed stockpile site

Proposed sediment basin

Proposed temporary road diversion

Stony Creek

Edwardstown Road

599,500 600,000 600,500 601,000

LEGEND

- Proposed drainage
- Road design
- Proposed sediment basin
- Proposed temporary road diversion
- Proposed earth bund
- Existing road
- Creek
- Drainage line
- Proposed site compound/stockpile site
- Proposed stockpile site

Paper Size A3

0 50 100 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

GHD

Roads and Maritime Services
Gocup Road upgrade REFs

Proposed compound and stockpile site locations

Job Number 23-15894
Revision 0
Date 04 Sep 2017

Figure 4-1

G:\23\15894\GIS\Maps\Deliverables\Section5_2\Noise\Gocup5_2Noise_Fig4-1.mxd

Suite 3, Level 1, 161-169 Baylis Street Wagga Wagga NSW 2650 Australia T 61 2 6923 7400 F 61 2 6971 9565 E wgamail@ghd.com W www.ghd.com

Data source: Roads and Maritime Services: Aerial photograph - 2014; Road design, proposed drainage, sediment basin, stockpile site and compound site - 2017; proposed temporary road diversion - 2016, ; NSW Government (LPI): Creeks, drainage lines and roads - 2012. Created by:rtrobinson

4.2.3 Noise generating equipment

Plant and equipment needed for the proposal would be determined during the construction planning phase. Likely equipment including typical sound levels are summarised in Table 4-3. Noise level data has been obtained from the Roads and Maritime CNVG and *AS2436 – Guide to noise and vibration control on construction, demolition and maintenance sites* (Australian Standards, 2010). Other equipment may be used, however, it is anticipated that they would produce similar noise emissions.

The magnitude of off-site noise impacts associated with construction is dependent upon a number of factors:

- Intensity and location of construction activities
- Type of equipment used
- Existing background noise levels
- Intervening terrain and structures
- Prevailing weather conditions.

Construction machinery would likely move about the study area altering noise for individual receivers. During any given period, machinery items to be used in the study area 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 that all construction equipment would be operating at their maximum sound power levels at any one time. Certain types of construction machinery would be present in the study area for only brief periods during construction. Therefore, noise predictions are considered conservative.

Table 4-3 Construction plant and equipment sound power levels, dBA

Plant and equipment	Typical sound power level dBA	Source
Excavator	110	CNVG
Trucks	108	CNVG
Graders	113	CNVG
Aggregate spreaders and pavement broom	106	CNVG
Bobcat	107	AS2436
Concrete truck	109	CNVG
Trencher	110	Based on excavator
Spreader	95	AS2436
Rollers	109	CNVG
Water carts	107	CNVG
Bitumen spray truck	106	CNVG
Backhoe	110	CNVG
Light vehicles	88	CNVG
Front end loader	112	CNVG
Line markers	108	CNVG
Vibrating compactors	106	CNVG
Material mixer or milling machine	117	CNVG

4.2.4 Vehicle generation and construction access

Construction vehicles and machinery would access the proposal site using Gocup Road either from Gundagai or Tumut and enter the proposal site at designated access points.

Designated access tracks (haul roads) along the construction corridor would be used. All construction access routes would be included in the traffic management plan.

Construction plant would be restricted as much as possible to access tracks within the proposal site and would be kept isolated from road users during bulk earthworks. Construction vehicles would use Gocup Road to transport base and sub-base materials for road construction and to transport excavated material to fill locations in the proposal site.

For short periods of time during construction of the proposal, traffic may be restricted to one lane on Gocup Road. This would occur during tie-in work at both ends of the proposal. It is likely that traffic barriers would be installed where necessary to separate the construction site from passing traffic. Temporary speed restrictions of 40 km/h would also be implemented.

A temporary road diversion would be implemented during construction at the southern end of the proposal site. The diversion will run on the western side of the existing alignment for about 300 metres. The temporary diversion will allow for two-lane, two-way traffic and heavy vehicles. No major disruptions to traffic are expected. Access to properties along Gocup Road would be maintained throughout construction.

4.3 Construction noise management levels

Construction noise management levels for the proposal are based on the ICNG and the CNVG. Hours for proposed construction works were based on the ICNG and CNVG and were discussed in Section 4.2.

The ICNG outlines a method to determine the construction noise management levels for residential premises. Guidance to determine residential noise management levels during and outside standard construction hours are provided in Table 4-4.

Table 4-4 Noise management levels at residences

Time of day	Noise management level, $L_{Aeq(15min)}$	Application
Recommended standard hours: Monday to Friday 7:00 am to 6:00 pm Saturday 8:00 am to 1:00 pm No work on Sundays or public holidays	Noise affected: RBL+ 10 dBA	The noise affected level represents the point above which there may be some community reaction to noise. • where the predicted or measured $L_{Aeq(15\ min)}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. • the proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected: 75 dBA	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: • times identified by the community when they are less sensitive to noise (such as before and after school) for works near schools, or mid-morning or mid-afternoon for works near residences

Time of day	Noise management level, $L_{Aeq(15min)}$	Application
		• if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times
Outside recommended standard hours	Noise affected: RBL+ 5 dBA	A strong justification would typically be required for works outside the recommended standard hours. The proponent should apply all feasible and reasonable work practices to meet the noise affected level. Where all feasible and reasonable measures have been applied and noise is more than 5 dBA above the noise affected level, the proponent should negotiate with the community.

4.3.1 Sleep disturbance

The ICNG states that where construction works are planned to extend over more than two consecutive nights, the analysis should include maximum noise levels and the extent and number of times the maximum exceeds the rating background levels. The *Industrial Noise Policy* (INP) application notes regarding sleep disturbance recommend that where the $L_{A1(1\ minute)}$ exceeds the $L_{A90(15\ minute)}$ by more than 15 dBA, a more detailed analysis is required. Further guidance for sleep disturbance is provided in the *Road Noise Policy* (DECCW, 2011) which concludes, based on the research to date, that:

- Maximum internal noise levels below 50 to 55 dBA are unlikely to awaken people from sleep
- One or two noise events per night, with maximum internal noise levels of 65 to 70 dBA, are not likely to affect health and wellbeing significantly
- For sleep disturbance the assessment point is inside the residence's bedroom.

The CNVG recommends a 65 dBA L_{Amax} external noise level for sleep disturbance. This level has been adopted for this assessment.

4.3.2 Proposal noise management levels

Noise management levels for the proposal during and outside standard construction hours at sensitive receivers located inside the study area are summarised in Table 4-5.

Table 4-5 Proposal specific construction noise management level, dBA

Receivers	Construction noise management level, $L_{Aeq(15min)}$				
	Standard recommended hours		Outside of standard recommended hours		
	Noise affected	Highly noise affected	Day	Evening	Night
Residential receivers	40[1]	75	35[1]	35[1]	35[1]

Note 1: Noise management levels are based on a RBL of 30 dBA as the measured background levels were below 30 dBA.

4.4 Construction vibration criteria

The vibration criteria presented below is based on the CNVG which refers to *Assessing Vibration: a Technical Guideline* for human comfort and British Standards *BS 7385 Part 2-1993 Evaluation and measurement for vibration in buildings* for cosmetic damage.

4.4.1 Human comfort

The human comfort criteria in *Assessing Vibration: a Technical Guideline* are sourced from British Standards *BS 6472:-1992 Guide to Evaluation of Human Exposure to Vibration in Buildings (1 Hz to 80 Hz)*.

Typically, construction activities generate ground vibration of an intermittent nature. Intermittent vibration is assessed using the vibration dose value. Acceptable values of vibration dose are presented in Table 4-6 for sensitive receivers.

Whilst the assessment of response to vibration in *BS 6472-1:1992* is based on vibration dose value (refer to Table 4-6) and weighted acceleration, for construction related vibration, it is considered more appropriate to provide guidance in terms of a peak value, since this parameter is likely to be more routinely measured based on the more usual concern over potential building damage.

Humans are capable of detecting vibration at levels which are well below those causing risk of damage to a building. The degrees of perception for humans are suggested by the vibration level categories given in British Standard, *BS 5228.2 – 2009, Code of Practice Part 2 Vibration for noise and vibration on construction and open sites – Part 2: Vibration* and are shown below in Table 4-7. On this basis, a screening level of 1.0 mm/s is considered relevant for establishing human comfort impacts and buffer distances during construction.

Table 4-6 Human comfort intermittent vibration limits (BS 6472-1992)

Receiver type	Period	Intermittent vibration dose value ($m/s^{1.75}$)	
		Preferred value	Maximum value
Residential	Day (7am and 10pm)	0.2	0.4
	Night (10pm and 7am)	0.13	0.26
Offices, schools, educational institutes and places of worship	When in use	0.4	0.8

Table 4-7 Guidance on effects of vibration levels for human comfort (BS 5228.2-2009)

Vibration level	Effect
0.14 mm/s	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction.
0.3 mm/s	Vibration might be just perceptible in residential environments.
1.0 mm/s	It is likely that vibration at this level in residential environments will cause complaints, but can be tolerated if prior warning and explanation has been given to residents.
10 mm/s	Vibration is likely to be intolerable for any more than a very brief exposure.

4.4.2 Structural damage

The CNVG refers to BS 7385 to assess the effects of transient vibration on structures. The criteria provided in BS 7385 are presented in Table 4-8 and should be applied to all structures as BS 7385 states *'a building of historical value should not (unless it is structurally unsound) to be assumed to be more sensitive'*. No structures of significance have been identified within the study area. The cosmetic damage value of 15 mm/s has been used in this assessment.

Table 4-8 Transient vibration guide values – minimal risk of cosmetic damage (BS 7385-2)

Type of building	Peak component particle velocity in frequency range of predominant pulse	
	4 Hz to 15 Hz	15 Hz and above
Reinforced or framed structures. Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	50 mm/s at 4 Hz and above
Unreinforced or light framed structures. Residential or light commercial type buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above.

4.5 Construction noise modelling

4.5.1 Noise model scenarios

Construction noise levels have been predicted based on the potential construction scenarios listed in Table 4-9. The scenarios represent different equipment noise levels and give an idea of how noise levels may change across the proposal area when different construction activities are being carried out.

The noise levels for the construction scenarios have been sourced from the CNVG. It should be noted that the scenario sound power level is a representative worse-case value assigned to the scenario and not the sum of each of the individual equipment pieces operating simultaneously

Table 4-9 Construction noise scenarios

Scenario	Activity	Typical construction equipment	Activity sound power level, dBA	Construction hours
S01	Site establishment	Trucks, scissor lifts, franna crane, light vehicles	115	Standard
S02	Clear zone works	Excavator, chainsaws, trucks, mulcher, trucks	121	Standard
S03	Drainage works	Backhoe, excavator, concrete pump and truck, trucks	115	Standard
S04	Utility, property and service adjustment	Excavator, dump truck, backhoe, generator	116	Standard
S05	Bulk earthworks	Bulldozer, scraper, excavator, grader, compactor, vibratory roller, water cart, trucks	123	Standard
S06	Pavement / asphalting	Pavement machine, asphalt truck and sprayer, concrete pump and truck, dump truck	118	Standard
S07	Compound operation	Front end loader, excavator, trucks, compressors, light vehicles, generators	114	Standard

Scenario	Activity	Typical construction equipment	Activity sound power level, dBA	Construction hours
S08	Site clean-up and rehabilitation	Trucks, scissor lifts, franna crane	115	Standard

4.5.2 Noise model inputs

The noise model inputs and assumptions for the construction assessment are provided in Table 4-10. Standard noise mitigation measures detailed in section 4.10 have been included in the noise modelling.

Table 4-10 Construction noise modelling assumptions

Modelling component	Assumption
Noise model	SoundPLAN v7.4
Prediction algorithm	*ISO 9613 – 2 Acoustics – Attenuation of sound during propagation outdoors.*
Modelling period	Typical worst case 15 minute period of operation where each item of equipment is running at full power
Meteorology	ISO 9613 considers the presence of a well-developed moderate ground based temperature inversion, such as commonly occurs on clear, calm nights or 'downwind' conditions which are favourable to sound propagation
Ground absorption coefficient	G = 0.75 for rural areas
Atmospheric absorption	Based on an average temperature of 10 °C and an average humidity of 70 %
Receiver heights	1.5 m above building ground level (ground floor)

4.6 Construction noise impacts

The modelled construction scenarios were categorised into the following overall construction stages in Table 4-11 and have been used to assess the noise impacts during construction on sensitive receivers.

Table 4-11 Categorised construction scenarios

Construction stage category	Included construction scenarios
Stage 1	S01, S02, S03, S04, S05, S06
Stage 2	S06
Stage 3	S06, S08
Compound operation	S07

4.6.1 Noise impacts during standard construction hours

Predicted noise levels from construction scenarios outlined in Table 4-9 are provided in Appendix C. Noise contours for each construction scenario are presented in Appendix D. The predicted noise levels provide an estimate of the maximum noise levels at each receiver. It is unlikely that the predicted level would be realised over a continuous period as the location of noise sources will vary as construction progresses. Noise levels are predicted to be exceed the noise management levels during standard construction hours.

The level of exceedance above the noise management level is dependent upon the type of equipment operating and the type of construction works being carried out. A discussion of the predicted noise levels for each construction stage category follows. Noise impacts have only

been assessed during standard construction hours as works are not anticipated to occur outside these hours.

4.6.1.1 Stage 1

Noise management levels during stage one works are expected to be exceeded at all sensitive receivers located within 1,100 metres of the proposal site. Noise levels are predicted to exceed the noise management level of 40 dBA by up to 35 dBA at receivers located near the proposal site.

The highly noise affected level of 75 dBA is predicted to be exceeded at on residences (RES03) which is located within 60 metres of the construction works.

4.6.1.2 Stage 2 / 3

Noise management levels during stage two and three are expected to be exceeded at all residences located within 600 metres of the construction study area. Noise levels are predicted to exceed the noise management level of 40 dBA by up to 33 dBA at the receivers located near the proposal site.

The highly noise affected level of 75 dBA is not predicted to be exceeded during stage two and stage three.

The noise impacts on affected residences are expected to vary as works progress along the proposed alignment. The primary contributions to noise levels during clear zone and drainage works can be attributed to the use of excavators and chainsaws.

4.6.1.3 Compound site operation

Noise management levels not predicted to be exceeded at any residential receiver during operation of the compound site.

4.6.1.4 Summary of impacts

The construction noise management levels are predicted to be exceeded at some point during construction. The highest number of exceedances occur during clear-zone works, bulk earthworks and pavement works. These works include removal of vegetation inside the clear zone and formation of the road alignment by excavating and construction of the road pavement.

Construction noise mitigation measures are recommended to reduce noise levels. These are discussed in Section 4.10.

The number of predicted exceedances for each construction scenario is tabulated in Table 4-12.

Table 4-12 Number of receivers exceeding the NML

Time period	Construction scenario and number of receivers exceeding NML							
	S1	S2	S3	S4	S5	S6	S7	S8
Standard construction hours (exceeds NML)	3	4	3	3	4	4	2	3
Standard construction hours (exceeds highly noise affected-residential receivers)	0	1	0	0	0	0	0	0

4.6.2 Sleep disturbance impacts

No sleep disturbance impacts at sensitive receivers are predicted as works are expected to be conducted during standard construction hours.

4.7 Construction traffic noise impacts

The CNVG recommends that, in assessing construction traffic noise impacts, "*an initial screening test should first be applied by evaluation whether noise levels will increase by more than 2 dBA due to construction traffic or a temporary reroute due to a road closure. Where increases are 2 dBA or less then no further assessment is required*".

Construction would generate heavy vehicle movements associated with the transportation of construction machinery, equipment and materials to site. Light vehicle movements would be associated with employees and smaller deliveries. Construction traffic movements and access to the compound site would be limited to along Gocup Road. This is an arterial road with significant existing traffic volumes.

A significant increase in traffic volumes would be required in order to increase road traffic noise by 2 dBA (for example traffic volumes would be required to increase by 58 per cent for a two dBA increase and a doubling in traffic corresponds to about a three dBA increase).

Existing day-time traffic volumes along Gocup Road were obtained during the noise monitoring period and are summarised in Table 4-13.

Table 4-13 Existing traffic volumes

Location	Light vehicles per day	Heavy vehicles per day	Total vehicles per day	% Heavy vehicles
Cookoomooroo	1054	241	1295	18.6

Construction traffic volumes are likely to be insignificant when compared to the existing traffic along Gocup Road. As road traffic noise levels are not expected to increase by 2 dBA due to construction the impacts are not predicted to be significant. If significant construction traffic occurs on any local roads then this is to be assessed and managed in the CEMP.

4.8 Construction vibration impacts

4.8.1 Construction vibration methodology

The methodology for the construction vibration assessment included:

- Minimum working distances for cosmetic damage and human response were sourced from the CNVG.
- Receivers within minimum working distances were identified and listed
- Mitigation measures were provided for residences identified within the safe working distances for cosmetic damage to minimise impacts from construction vibration.

4.8.2 Construction vibration safe working distances

Energy from equipment is transmitted into the ground and transformed into vibration, which attenuates with distance. The magnitude and attenuation of ground vibration is dependent on the following:

- Efficiency of the energy transfer mechanism of the equipment (i.e. impulsive; reciprocating, rolling or rotating equipment)
- Frequency content
- The impact medium stiffness
- Type of wave (surface or body)
- Ground type and topography.

Safe working buffer distances to comply with human comfort and cosmetic damage criteria were sourced from the CNVG and are presented in Table 4-14 for the equipment listed in Table 4-3.

Table 4-14 Vibration safe working buffer distances, m

Activity	Human comfort	Cosmetic damage	
		Heritage building/structure	Standard dwellings
Vibratory roller (1-2 tonnes)	15 to 20 m	10 m	5 m
Vibratory roller (2-4 tonnes)	20 m	12 m	6 m
Vibratory roller (4-6 tonnes)	40 m	24 m	12 m
Vibratory roller (7-13 tonnes)	100 m	30 m	15 m
Vibratory roller (13-18 tonnes)	100 m	40 m	20 m
Vibratory roller (> 18 tonnes)	100 m	50 m	25 m
Small hydraulic hammer	7 m	4 m	2 m
Jackhammer	2 m	2 m (nominal)	1 m (nominal)

4.8.3 Predicted vibration levels for standard dwellings

High vibration generating activities such as vibratory rolling, pavement breaking and pavement milling have the potential to cause cosmetic damage to standard dwellings.

No receivers have been identified within the 100 metres buffer for human comfort and 15 metres for cosmetic damage (based on a vibratory roller between 7 to 13 tonnes). Vibration impacts from blasting are discussed in Section 4.9.

4.9 Construction blasting impacts

There is potential for blasting to be carried out within the study area. Potential blasting locations are shown in Figure 4-2.

Blasting details, such as explosive charge mass or local ground properties are not known at this stage of the proposal. A general blasting assessment has been carried out in accordance with *AS2187.2 Explosives – storage and use*, which provides site exponents for 'average' meteorological attenuation and ground conditions.

4.9.1 Airblast calculations

Airblast radiates outwards from the blast site and attenuates with distance. Airblast levels have been estimated using the following equation.

$$P = K_a \left(\frac{R}{Q^{\frac{1}{3}}} \right)^a$$

Table 4-15 summarises the constants in the equation and the values that have been assumed to estimate airblast levels. Site constants have been assumed in the absence of existing blast monitoring data.

Table 4-15 Airblast parameters

Parameter	Definition	Assumed value
P	Pressure, kPa	Calculated
Q	Explosive charge mass per hole, kg	5 to 100
R	Distance from charge, m	Range: 100 m to 500 m
a	Site exponent	-1.45
K_a	Site constant	50

4.9.2 Ground vibration calculations

Ground vibration radiates outwards from the blast site and gradually reduces in magnitude with distance from the blast.

Factors that affect the level of ground vibration arriving at a point from a blast typically include charge mass fired per hole, distance and ground transmission characteristics.

Ground vibration levels have been estimated using the following equation/

$$V = K_g \left(\frac{R}{Q^{\frac{1}{2}}} \right)^{-B}$$

Table 4-16 summarises the constants in the equation and the values that have been assumed to estimate ground vibration levels. Site constants have been assumed in the absence of existing monitoring results.

Table 4-16 Airblast parameters

Parameter	Definition	Assumed value
V	Ground vibration in vector peak particle velocity, m/s	Calculated
Q	Maximum charge mass, kg	5 to 100
R	Distance from charge, m	Range: 100 m to 500 m
K_g	Site constant	1140
B	Rock properties	1.6

4.9.3 Blasting results

Potential locations for blasting are shown in Figure 4-2. Ground vibration and airblast overpressure levels at various distances from the blasting site have been calculated and are shown in Figure 4-3 and Figure 4-4 for various charge masses. The relevant noise and vibration criteria have also been plotted on the graphs. These figures indicate that the blasting would be restricted by the airblast overpressure rather than the ground vibration levels due to blasting.

Based on the assumed site specific constants, Figure 4-4 shows the noise criteria would be exceeded for all receivers located within 500 m of the proposed blasting sites assuming a blast charge mass of 5 kg. It is recognised that the blast design would be up to the blast contractor and that the site specific constants assumed have been used for assessment only in the absence of specific information regarding the blasting works. Once the exact location and details is blasting is known, the distance to the receiver should be used to estimate the

allowable charge mass. Blast monitoring should then be undertaken to assess compliance, determine the site-specific blast parameters and confirm the predictions.

Depending on the mass of the charge used for the proposal, airblast overpressure and ground vibration levels may be exceeded at some sensitive receivers within the study area. Mitigation measures have been recommended in Section 4.10 to minimise these impacts.

600,000

601,000

6,114,000

RES04

Cookoomooroo Creek

Gocup Road

RES03

6,113,000

Stony Creek

RES02

RES01

Readfords Road

Edwardstown Road

LEGEND

- Existing road
- Creek
- Potential blasting location

Paper Size A3

0 50 100 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

GHD

Roads and Maritime Services
Gocup Road upgrade - Cookoomooroo

Potential construction blasting locations

Job Number 23-15894
Revision 0
Date 03 Aug 2017

Figure 4-2

G:\23\15894\GIS\Maps\Deliverables\Section5_2\Noise\Gocup5_2Noise_Fig4-2.mxd

Suite 3, Level 1, 161-169 Baylis Street Wagga Wagga NSW 2650 Australia T 61 2 6923 7400 F 61 2 6971 9565 E wgamail@ghd.com W www.ghd.com

Data source: Roads and Maritime Services: Aerial photograph - 2014; NSW Government (LPI): Creeks, localities, drainage lines and roads - 2012. Created by:rtrobinson

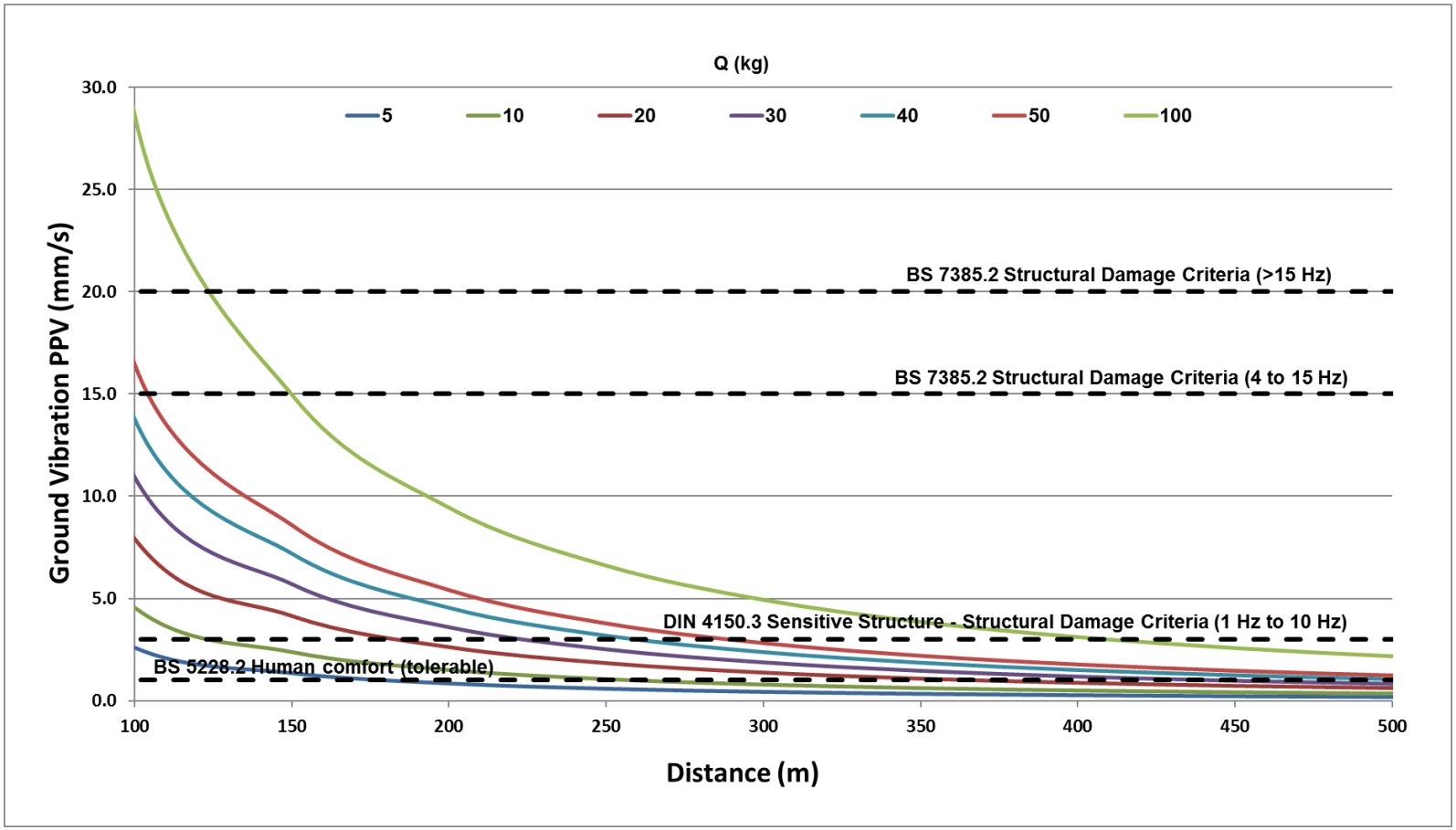


Figure 4-3 Ground vibration overpressure levels for various charge masses with distance

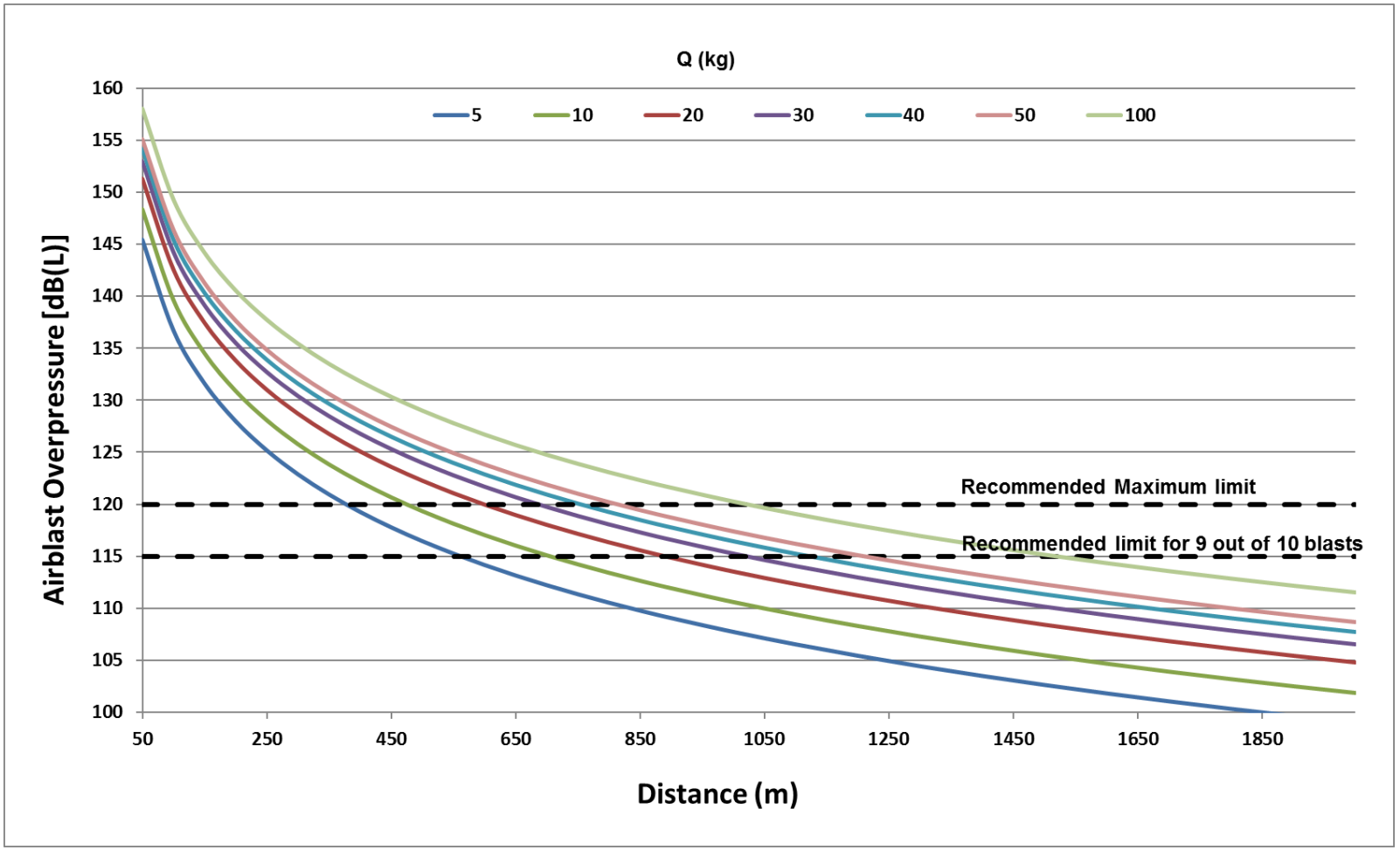


Figure 4-4 Airblast overpressure levels for various charge masses with distance

4.10 Construction noise and vibration mitigation

The construction noise and vibration management levels for the proposal are likely to be exceeded at some time during construction. Where the construction noise management levels for the proposal are predicted to be exceeded, feasible and reasonable mitigation measures should be applied to minimise the impacts experienced by receivers inside the proposal site. Consultation and cooperation with residents would assist in minimising uncertainty, misconceptions and adverse reactions to noise.

It is recommended that the following CNVG standard noise mitigation measures, in Table 4-17, be implemented where feasible and reasonable. A summary of feasible and reasonable mitigation measures that should be applied are as follows:

- All potentially impacted residents should be informed of the nature of works, expected noise levels, duration of works and a point of contact should be provided
- Schedule construction works that have the potential to produce high noise or vibration levels during less sensitive times.

Table 4-17 Standard mitigation measures for construction noise and vibration

Action required	Details
Management measures	
Implement community consultation measures	All potentially impacted residents should be informed of the nature of works, expected noise levels, duration of works and a point of contact should be provided. Notification detailing work activities, dates and hours, impacts and mitigation measures, indication of work schedule over the night-time period, any operational noise benefits from the works (where applicable) and contact telephone number. Notification will be a minimum of five calendar days before the start of works. For projects other than maintenance works more advanced consultation or notification may be required. Roads and Maritime Communication and Stakeholder Engagement should be contacted for further guidance. The following may be implemented: • periodic notification (letterbox drop or equivalent) • website • project info-line • construction response line • email distribution list • community based forums (if required by approval conditions)
Site inductions	All employees, contractors and subcontractors are to receive an environmental induction. The induction must at least include: • all relevant project specific and standard noise and vibration mitigation measures • relevant licence and approval conditions • permissible hours of work • any limitations on high noise generating activities • location of nearest sensitive receivers • construction employee parking areas • designated loading/unloading areas and procedures • construction traffic routes • site opening/closing times (including deliveries) • environmental incident procedures
Update Construction Environmental Management Plans	The CEMP must be regularly updated to account for changes in noise and vibration management issues and strategies.
Building condition surveys	Carry out building condition inspections on all buildings located within 50 metres of blasting activities before commencement of activities with the potential to cause building damage.
Source controls	
Construction hours and scheduling	Where feasible and reasonable, construction works will be carried out during standard daytime working hours. The use of mulchers, rock hammers, concrete saws, rock breakers, compaction or other equipment used in very close proximity to the receivers will be limited where feasible and reasonable to standard construction hours.

Action required	Details
	Schedule construction works that have potential to produce high noise or vibration levels during less sensitive times.
Equipment selection	Use quieter and less vibration emitting construction methods where reasonable and feasible. Ensure plant including the silencer is well maintained.
Plant noise levels	The noise levels of plant and equipment must have operating Sound Power or Sound Pressure Levels compliant with the criteria listed in Appendix H of the CNVG.
Use and siting of plant	Plant used intermittently to be throttled down or shut down. A non-vibratory roller must be used when compacting within 15 metres of a residential receiver.
Plan worksites and activities to minimise noise and vibration	Locate compounds away from sensitive receivers and discourage access from local roads. Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site.
Non-tonal reversing alarms	The use of ambient sensitive alarms that adjust output relative to the ambient noise level should be considered.
Minimise disturbance arising from delivery of goods to construction sites	Loading and unloading of materials/deliveries is to occur as far as possible from sensitive receivers. Avoid or minimise out of hours movements where possible.
Blasting overpressure and ground vibration impacts	Minimise noise and vibration impacts from blasting operations by: • Reducing maximum instantaneous charge size • Choosing appropriate blast charge configurations • Ensuring appropriate blast hole preparation • Optimising blast design, location, orientation and spacing • Selecting appropriate blast times • Considering prevailing meteorological conditions. A detailed blast management plan will be prepared by the construction contractor before carrying out any blasting.
Complaints handling	Complaint monitoring measurements will be taken at the complainant's location for reasonable complaints and the monitoring will cover the time of day when the impacts were reported to occur and the activity.

4.10.1 Proposal specific noise mitigation

Noise mitigation can be categorised into source control, transmission path control or receiver control. Noise control measures at the receiver are not suitable for construction noise as construction noise is temporary in nature. Where possible, source controls should be given priority over transmission path controls as they reduce the noise levels for all receivers in the surrounding environment. A list of typical source and transmission path control measures are provided in Table 4-18.

Table 4-18 Noise control measures

Control measure	Type of control	Typical reduction, dBA	Maximum reduction, dBA	Source
Silencers / mufflers / diffusers	Source	7 - 10	15	AS2436
Acoustic enclosures	Source	15 - 30	50	AS2436
Equipment substitution	Source	5-10	10	AS2436
Distance	Source / transmission path	6 per doubling of distance	6 per doubling of distance	AS2436
Shielding (barriers/mounds)	Transmission path	7 - 10	15	AS2436

Due to the environment and limited space surrounding the proposal it is unlikely that transmission path controls would be feasible during re-surfacing works where the greatest noise impacts are predicted. A combination of source and transmission path controls is likely to yield the greatest reductions in noise levels. However, these controls are unlikely to reduce levels to below the construction noise management levels due to the low existing background levels.

4.10.2 Additional noise mitigation measures

Standard mitigation measures have been incorporated into the noise level predictions where feasible and reasonable. The proposal noise levels are likely to be exceeded during standard construction after implementation of standard mitigation measures detailed in Table 4-17. In these circumstances, the additional mitigation measures recommended in the CNVG and summarised in Table 4-19 should be considered where feasible and reasonable.

Table 4-19 Additional mitigation measures

Predicted airborne $L_{Aeq(15\ min)}$ noise level at receiver			Additional mitigation measures type	Mitigation levels
Perception	dBA above RBL	dBA above NML		
All hours				
75 dBA pr greater	-	-	N, V, PC, RO	75 dBA
Standard Hours: Mon to Fri (7am – 6pm), Sat (8am - 1pm), Sun/Pub Hol (Nil)				
Noticeable	5 to 10	0	-	37 dBA
Clearly audible	10 to 20	< 10	-	47 dBA
Moderately intrusive	20 to 30	10 to 20	N, V	57 dBA
Highly intrusive	> 30	> 20	N, V	67 dBA
OOHW Period 1: Mon to Fri (6pm – 10pm), Sat (7am – 8am, 1pm – 10pm), Sun/Pub Hol (8am – 6pm)				
Noticeable	5 to 10	< 5	-	35 dBA
Clearly audible	10 to 20	5 to 15	N, R1, DR	40 dBA
Moderately intrusive	20 to 30	15 to 25	V, N, R1, DR	50 dBA
Highly intrusive	> 30	> 25	V, IB, N, R1, DR, PC, SN	60 dBA
OOHW Period 1: Mon to Fri (10pm – 7am), Sat (10pm – 8am), Sun/Pub Hol (6pm – 7am)				
Noticeable	5 to 10	< 5	N	35 dBA
Clearly audible	10 to 20	5 to 15	V, N, R2, DR	40 dBA
Moderately intrusive	20 to 30	15 to 25	V, IB, N, PC, SN, R2, DR	50 dBA
Highly intrusive	> 30	> 25	AA, V, IB, N, PC, SN, R2, DR	60 dBA

Notification (N): Notifying the local community potentially affected by the proposed works (outside of standard construction hours). Residents may be informed by letter of the proposed work activities, time periods of which they will occur, potential impacts and mitigation measures. Notification should be made five days prior to commencement of works.

Specific Notifications (SN): Residents that are more highly affected should receiver specific notifications about the construction work activities. Specific notifications should be provided at least seven calendar days prior to commencement of works.

Phone Calls (PC): Phone calls detailing relevant information to affected stakeholders within seven calendar days of proposed works. Phone calls would provide affected stakeholders with personalized contact and tailored advice, with the opportunity to provide comments on the proposed work and specific needs. Where the resident cannot be telephoned then an alternative form of engagement should be used.

Individual Briefings (IB): Individual briefings can be used to inform stakeholders about the impacts of high noise activities and mitigation measures that will be implemented. Project representatives would visit identified stakeholders at least 48 hours ahead of potentially disturbing construction activities.

Respite offers (RO): Respite offers should be considered where there are high noise and vibration generating activities near receivers. Works should be carried out in continuous blocks that do not exceed three hours each with a minimum respite period of one hour between each block. The actual duration of each block of work and respite should be flexible to accommodate the usage of and amenity at nearby receivers.

Respite period 1 (R1): Out of hours construction noise in out of hours period 1 shall be limited to no more than three consecutive evenings per week except where there is a Duration Respite.

Respite period 2 (R2): Night time construction noise in out of hours period 2 shall be limited to two consecutive nights except where there is a Duration Respite. For night work these periods of work should be separated by not less than one week and six nights per month. Where possible, high noise generating works shall be completed before 11pm.

Duration Respite: Respite offers and respite periods 1 and 2 may be counterproductive in reducing the impact on the community for longer duration projects. In this instance and where it can be strongly justified it may be beneficial to increase the work duration, number of evenings or nights worked through Duration Respite so that the project can be completed more quickly.

Alternative accommodation (AA): Alternative accommodation options may be offered to residents living in close proximity to construction works that are likely to experience highly intrusive noise levels. The specifics of the offer will be identified on a project-to-project basis.

Verification (V): Verification of noise and vibration levels would be carried out, including measurement of background and construction noise levels.

Source: *Construction Noise and Vibration Guideline* (Roads and Maritime, 2016)

The predicted noise levels during standard construction hours have been classified into the CNVG 'perception' categories (refer to Table 4-19). For works during the standard construction hours, only the 'moderately intrusive' and 'highly intrusive' perception categories are considered as additional mitigation measures are not triggered for the 'noticeable' and 'clearly audible' perception categories. The number of receivers in each perception category is provided in Table 4-20. The properties identified as 'sheds' have been excluded from these calculations, however, results at these properties are provided in the appendices.

Noise contour plots for each scenario detailing the extents of the noise management zones are provided in Appendix E. The noise management zones illustrate the areas where the construction noise management levels are predicted to be exceeded.

Table 4-20 Number of receivers within CNVG noise mitigation bands

Perception	Mitigation level	Construction scenario and number of receivers exceeding NML							
		S1	S2	S3	S4	S5	S6	S7	S8
All hours									
Highly noise affected	75	0	1	0	0	0	0	0	0
Standard construction hours									
Moderately intrusive	50	1	3	1	1	4	2	0	1
Highly intrusive	60	0	1	0	1	1	1	0	0

The additional mitigation measures required for each receiver located within the study area are provided in Table 4-21 and should be applied for each identified construction scenario.

Table 4-21 Identified additional mitigation measures

Receiver ID	Receiver address	Construction scenario	Mitigation measures
RES01	519 Edwardstown Road	S1, S2, S5, S6, S8	N, V
RES02	Edwardstown Road	S5	N, V
RES03	2708 Gocup Road	S3	N, V
		S2, S4, S5, S6	N, V, PC, RO
RES04	2937 Gocup Road	S2, S5	N, V

Notification (N): Notifying the local community potentially affected by the proposed works (outside of standard construction hours). Residents may be informed by letter of the proposed work activities, time periods of which they will occur, potential impacts and mitigation measures. Notification should be made five days prior to commencement of works.

Phone Calls (PC): Phone calls detailing relevant information to affected stakeholders within seven calendar days of proposed works. Phone calls would provide affected stakeholders with personalized contact and tailored advice, with the opportunity to provide comments on the proposed work and specific needs. Where the resident cannot be telephoned then an alternative form of engagement should be used.

Respite offers (RO): Respite offers should be considered where there are high noise and vibration generating activities near receivers. Works should be carried out in continuous blocks that do not exceed three hours each with a minimum respite period of one hour between each block. The actual duration of each block of work and respite should be flexible to accommodate the usage of and amenity at nearby receivers.

Verification (V): Verification of noise and vibration levels would be carried out, including measurement of background and construction noise levels.

4.10.3 Proposal specific vibration mitigation

A non-vibratory roller must be used when compacting within 15 metres of a residence receiver. In addition the following mitigation measures are also recommended.

4.10.3.1 Building condition inspections and vibration trials

Building condition inspection reports should be provided for buildings located within 50 metres of the blasting works to classify building structures and their susceptibility to damage in accordance with the DIN 4150-3 classifications. The resulting building classifications are to be used for determination of the applicable DIN 4150-3 vibration criteria curves. Condition inspections are to identify high-risk buildings where additional vibration restrictions and more stringent criteria may apply.

4.10.4 Compliance noise and vibration monitoring

Attended compliance noise or vibration monitoring should be carried out to confirm the predicted noise or vibration levels upon receipt of a complaint. The ICNG state that complaint monitoring measurements should be taken at the complainant's location and the monitoring should cover the time of day when the impacts were reported to occur. The CNVG provides further guidance to the location of attended measurements:

- At the most exposed receiver location
- At locations further from the works where there may have lower background noise levels.

In the case that exceedances of the relevant annoyance criteria levels listed in this report are detected in relation to the complaint, the situation should be reviewed in order to identify means to minimise the impacts to residences.

Attended measurements should be repeated on a three-monthly basis as part of the audit cycle to ensure that noise and vibration levels in the community remain consistent with the predicted levels in the noise assessment.

In all cases, noise or vibration monitoring should be carried out by a suitably qualified professional in accordance with the ICNG and CNVG.

5. Operational noise assessment

5.1 Study area and noise sensitive receivers

The study area width for a road proposal is defined by the RNP as '*600 metres from the centre line of the outermost traffic lane on each side of the subject road*'. The NCG provides further guidance on selecting the appropriate study area width.

For rural areas, where the noise criteria may be exceeded beyond 600 metres, residences need to be assessed on a case by case basis.

The noise catchment area for project types classed as 'minor works' spans the region where noise levels are predicted to increase relative to the existing noise levels. Where this is the case, a 600 metre study area may not be required.

Due to the rural nature of the site and isolated residential receivers, a 600 metre study area has been used for the purposes of this assessment.

Sensitive receivers within the noise assessment study area include residential receivers. Non-residential receivers were not identified in the study area.

Details regarding the assessed residential receivers are summarised in Appendix B. This includes a receiver number, property address and whether it is single or double story.

5.2 Operational noise criteria

Noise criteria are assigned to sensitive receivers using the Roads and Maritime *Noise Criteria Guideline* (NCG). The Roads and Maritime NCG provides guidance on how to apply the NSW RNP. The assessment timeframe for the criteria are in the year of opening and 10 years after opening.

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

Residential receivers may be assigned new, redeveloped, transition zone or relative increase criteria depending on how the project will influence noise levels. For each façade of the residential receiver the most stringent applicable criteria will be used in the assessment.

Criteria are based on the road development type which is affecting the residential receiver. In some instances, residential receivers may be exposed to noise from both new and redeveloped roads. In this instance the proportion of noise from each road is used to establish transition zone criteria. A further check is made to prevent large increases in noise level using the relative increase criteria.

The criteria for residences are summarised in Table 5-1. Non-residential land uses have not been identified within the study area.

Table 5-1 NCG assessment criteria for residential land uses, $L_{Aeq(period)}$, dBA

Road category	Type of project	Assessment criteria (external)	
		Day (7 am to 10 pm)	Night (10 pm to 7 am)
Arterial roads / sub-arterial roads	Existing residences affected by noise from new arterial road corridors	$L_{Aeq(15hr)}$ 55 (external)	$L_{Aeq(9hr)}$ 50 (external)
	Existing residences affected by noise from redevelopment of an existing arterial road	$L_{Aeq(15hr)}$ 60 (external)	$L_{Aeq(9hr)}$ 55 (external)

Road category	Type of project	Assessment criteria (external)	
		Day (7 am to 10 pm)	Night (10 pm to 7 am)
	Existing residences affected by both new roads and the redevelopment of existing arterial/sub-arterial roads in a Transition Zone	Between $L_{Aeq(15hr)}$ 55-60 (external)	Between $L_{Aeq(9hr)}$ 50-55 (external)
	Existing residences affected by increases in traffic noise of 12dBA or more from new arterial/sub-arterial roads	Between $L_{Aeq(15hr)}$ 42-55 (external)	Between $L_{Aeq(9hr)}$ 42-50 (external)
	Existing residences affected by increases in traffic noise of 12dBA or more from redevelopment of existing arterial/sub-arterial roads	Between $L_{Aeq(15hr)}$ 42-60 (external)	Between $L_{Aeq(9hr)}$ 42-55 (external)

When the project specific criteria have been exceeded, a receiver may qualify for consideration of noise mitigation. The qualifying process from the Noise Mitigation Guideline (NMG) is discussed in Section 5.10.

5.2.1 Sleep disturbance

The RNP provides a literature review for the assessment of sleep arousal due to traffic noise however does not set a sleep disturbance assessment criterion.

Sleep disturbance impacts are likely to depend on the following:

- Maximum noise level of an event
- Number of occurrences
- Duration of the event
- Level above background or ambient noise levels.

For continuous rather than intermittent traffic flow, the ENMM recommends L_{Amax} noise pass-by events should not exceed $L_{Aeq\ (1hr)}$ noise levels by more than 15 dBA. The ENMM advises that maximum noise levels can be used as a tool to prioritise and rank mitigation strategies, but should not be applied as a decisive criterion in itself.

5.2.2 Proposal specific operational noise criteria

A summary of the road classifications in the study area is provided in Table 5-2. Classification changes have been qualitatively assessed based on the design and expected traffic flows as a result of the proposal.

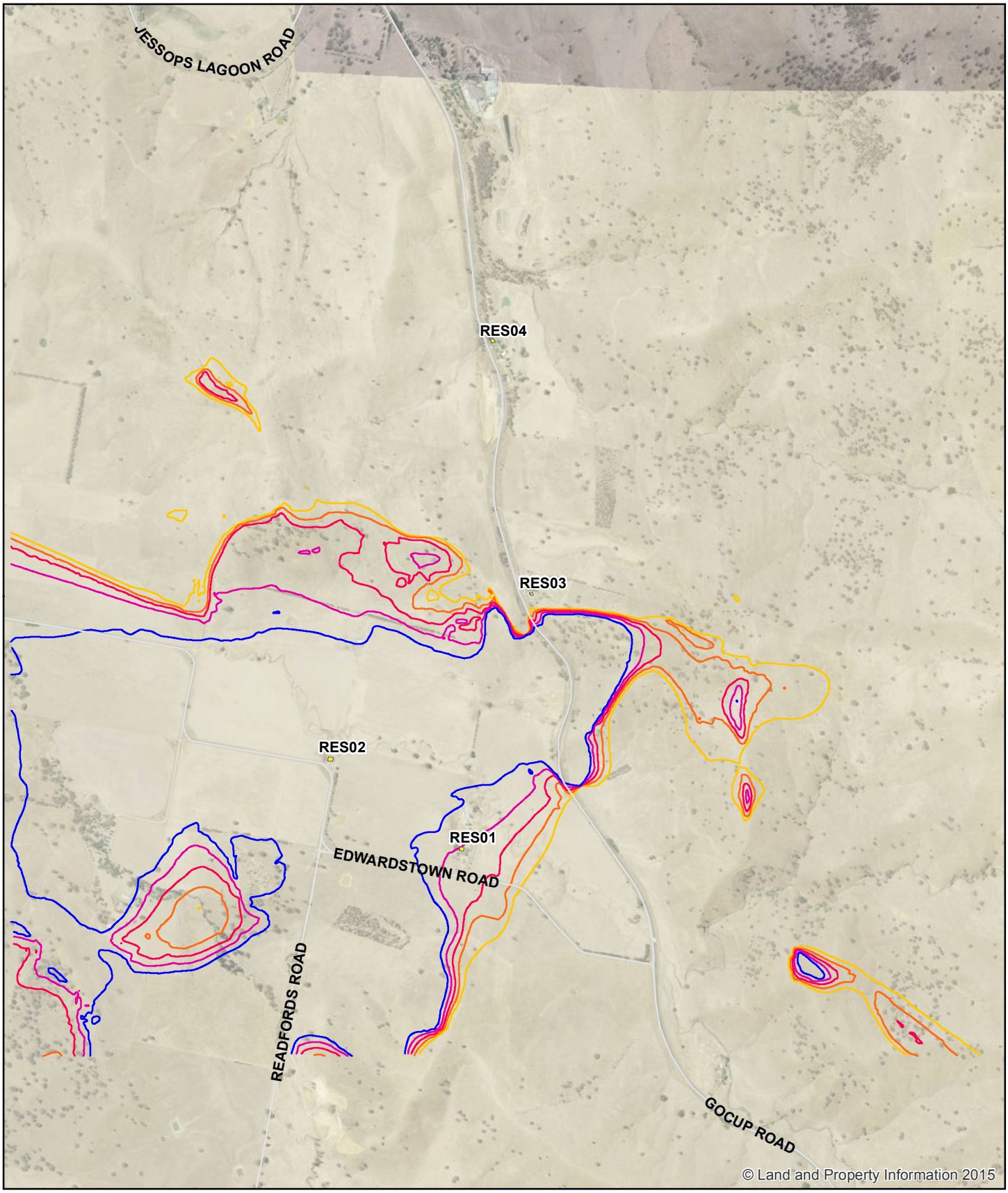
Table 5-2 Road types and classifications

Road name	Road classification	Type of road (as per NCG)	Change in road classification?
Gocup Road	Arterial	Redeveloped	No
Gocup Road	Arterial	New	No

The proposal has been classed within the ‘new’ and ‘redeveloped’ categories. Sections of Gocup Road that have been substantially realigned is classified as ‘new’ whilst sections that involve widening of the corridor have been classified as ‘redeveloped’. Transition zones have been identified at the following road junctions:

- Gocup Road (existing) to Gocup Road (new). There are two transition zones, one located at either end of the Project area. The noise criteria would be between the new and redeveloped NCG noise criteria at residences located within the transition zone.

Noise contribution differences have been calculated and the noise criteria at residential receivers at all identified receivers are summarised in Appendix F and shown in Figure 5-1 and Figure 5-2.



LEGEND

Building

dBA

60

59

58

57

56

Paper Size A4

0 75 150 300 450 600

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Roads and Maritime Services
Gocup Road upgrade - Cookoomooroo

Noise criteria: day, dBA

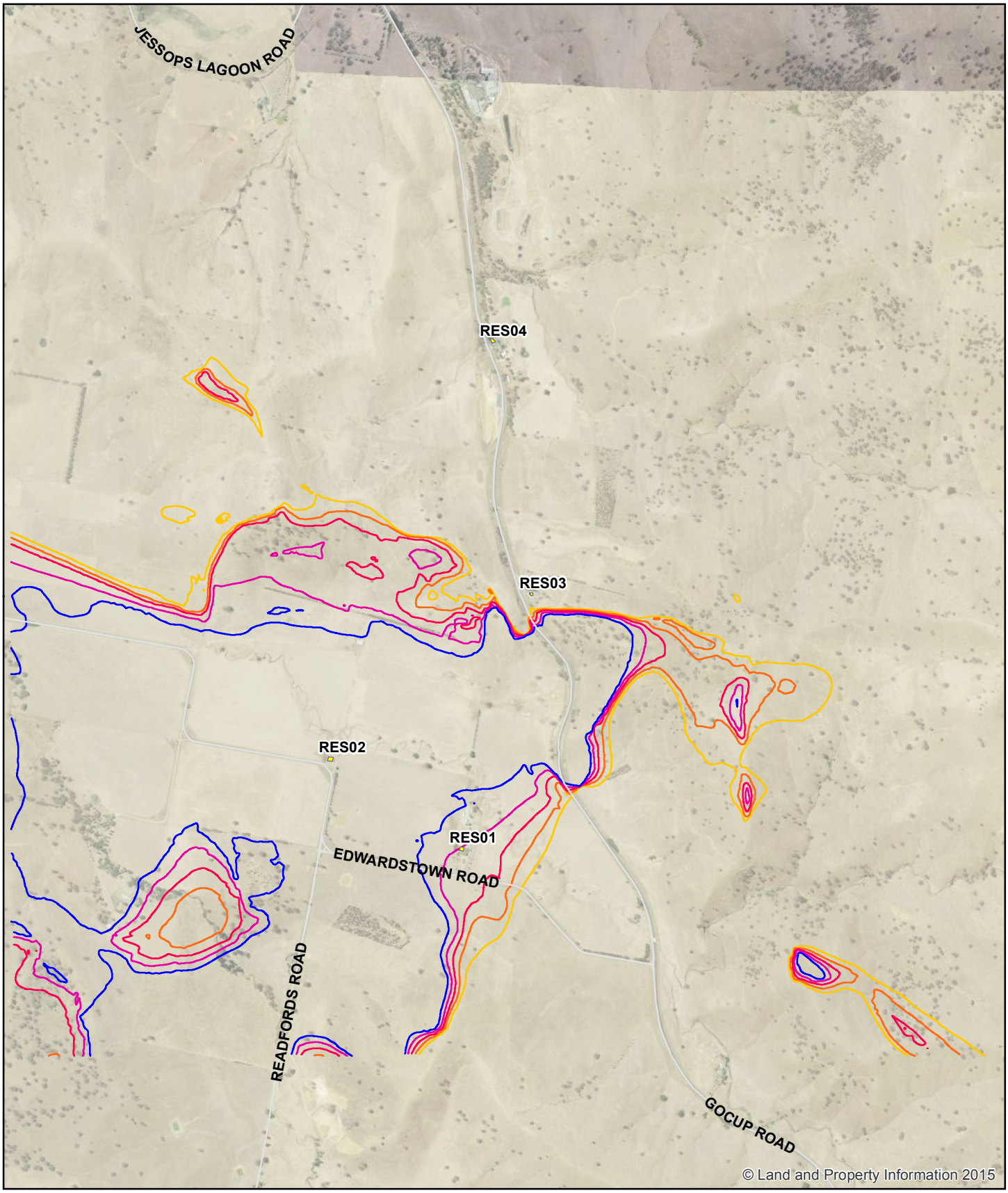
Job Number	23-15894
Revision	A
Date	21 Oct 2016

Figure 5-1

Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

C:\Users\afoddy\Desktop\Cookoomooroo1.mxd

Data source: Data Custodian, Data Set Name/Title, Version/Date. Created by:afoddy



LEGEND

Building

dBA

55

54

53

52

51

Paper Size A4

0 75 150 300 450 600

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Roads and Maritime Services
Gocup Road upgrade - Cookoomooroo

Noise criteria: night, dBA

Job Number	23-15894
Revision	A
Date	21 Oct 2016

Figure 5-2

Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

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Data source: Data Custodian, Data Set Name/Title, Version/Date. Created by:afoddy

5.3 Guidance on the evaluation of noise mitigation measures

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

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

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

- The predicted Build noise level exceeds the NCG controlling criterion and the noise level increase due to the project (i.e. the noise predictions for the Build minus the No Build) is greater than 2 dBA
- The predicted Build noise level is 5 dBA or more above the criteria (exceeds the cumulative limit) and the receiver is significantly influenced by project road noise, regardless of the incremental impact of the project
- Where the cumulative limit does not apply (i.e. most of the noise causing the cumulative limit to be exceeded comes from a road that is not assessed as part of the project), if the noise level contribution from the road project is acute (daytime $L_{Aeq(15\ hour)}$ 65 dB or higher, or night-time $L_{Aeq(9\ hour)}$ 60 dB or higher) then it qualifies for consideration of noise mitigation even if noise levels are dominated by another road.

The NMG mitigation guidance is presented as a flowchart in Figure 5-3.

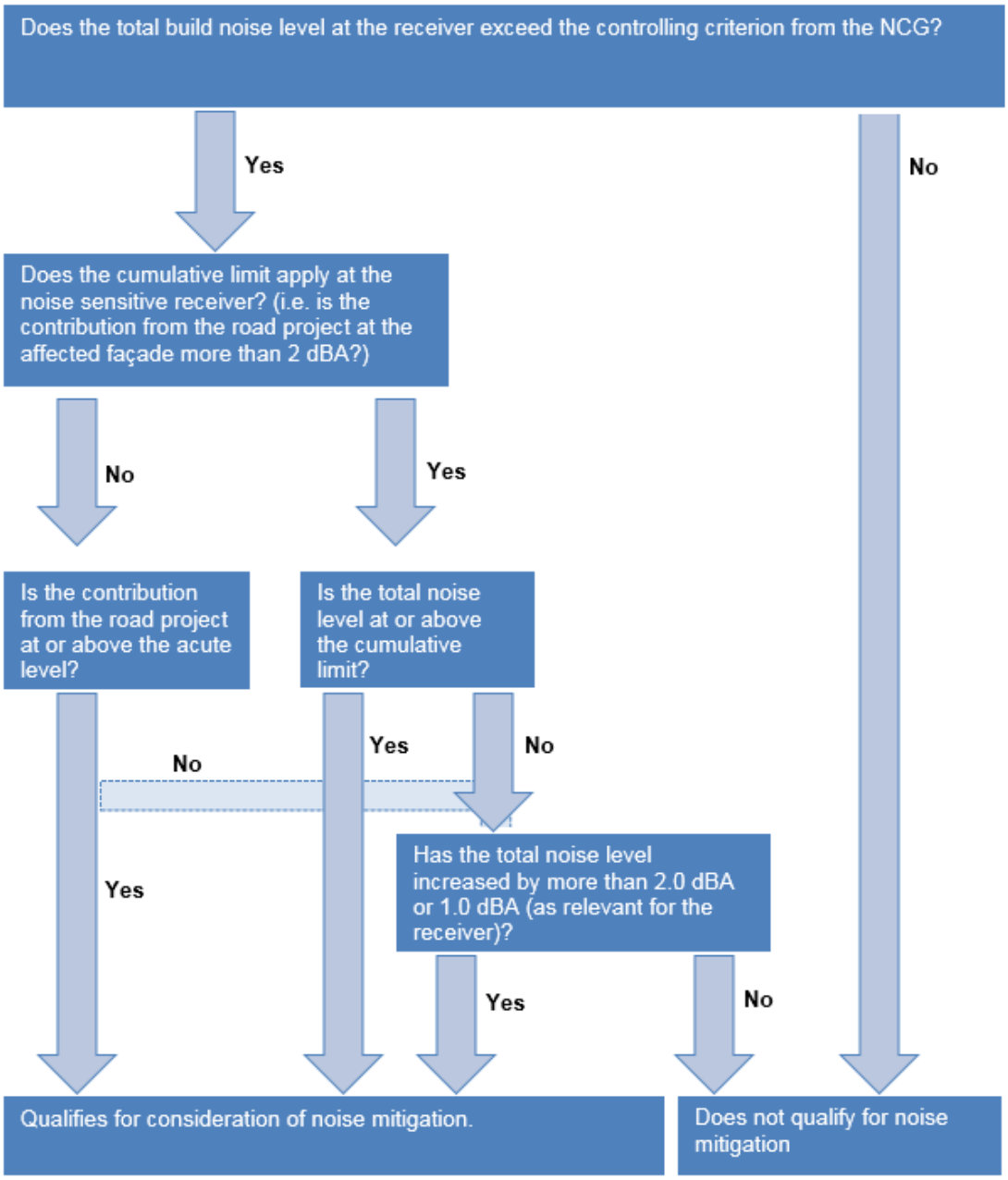

Figure 5-3 Noise mitigation flowchart (derived from the NMG)

5.4 Noise modelling

5.4.1 Modelling inputs and assumptions

The noise model inputs and assumptions for the existing, 2019 and 2029 No Build and Build scenarios are presented in Table 5-3.

Table 5-3 Operational noise model inputs and assumptions

Inputs/assumptions	Data incorporated into noise model
Noise model	SoundPLAN Version 7.4
Prediction algorithm	United Kingdom Department of Transport, Calculation of Road Traffic Noise (CoRTN)
Heavy vehicle %	Day and night heavy vehicle (HV) percentages assumed to be the same as current measured traffic data
Verification model traffic speeds	Speeds for the verification model were based on traffic count data obtained in conjuction with noise monitoring.
Future traffic speeds	Speeds for the future design year assumed to be as sign-posted at 100 km/h
Traffic volumes	Refer to section 5.5
Low traffic flow	Disabled
Road gradient	Taken into account based on the road design
Terrain resolution	1 m
Buildings	4.5 m – single storey buildings
Noise contour grid spacing	20 m
Road surface adjustments	Dense graded asphalt (DGA) – 0 dBA
Façade correction	+2.5 dBA to account for noise reflected from the façade.
CoRTN conversion factors	CoRTN predicts $L_{A10(1hr)}$ noise levels which is converted to the $L_{Aeq(1hr)}$ descriptor with a -3 dBA correction factor
CoRTN factor (Adapted to Australian conditions through research carried out by the Australian Road Research Board)	-1.7 façade -0.7 freefield
Source height	Cars - 0.5 m Truck engines - 1.5 m, Truck exhausts - 3.6 m, includes -8 dBA source correction
Receiver heights	1.5 m above ground level (ground floor), 1 m from building façade
Ground absorption	G = 0.75 for rural areas

5.5 Traffic data

5.5.1 Existing traffic volumes

A traffic survey was taken at the north of Edwardstown Road concurrently with long-term unattended noise monitoring.

Traffic volumes from the survey were used to verify the assumptions used to predict future road traffic noise levels.

The average 15 hour and 9 hour traffic volumes during the traffic surveying period along with the 85th percentile speed used for verification of the noise model are presented in Table 5-4.

Table 5-4 Existing traffic volumes

		Existing traffic volumes							
Road	Direction	Day-time (15 hour) (hourly average)				Night-time (9 hour) (hourly average)			
		LV	HV	%HV	Speed	LV	HV	%HV	Speed
Gocup Road	Northbound	33.8	6.5	16.2	102	8.4	6.4	43.3	103
Gocup Road	Southbound	36.5	9.5	20.7	100	6.0	5.0	45.5	101

5.5.2 Future traffic volumes

Future traffic volumes were predicted based on the measured traffic volumes provided in Table 5-4. A five per cent growth rate was applied based on the traffic growth on Gocup Road between 2010 and 2011 (Traffic Volume Viewer, Roads and Maritime). The forecast traffic volumes for the no-build option are assumed to be the same as the build option, with traffic likely to increase regardless of whether the proposal proceeds.

The future traffic volumes are provided in Table 5-5.

Table 5-5 Predicted future traffic volumes

		Predicted traffic volumes							
Road	Direction	Day-time (15 hour) (hourly average)				Night-time (9 hour) (hourly average)			
		LV	HV	%HV	Speed	LV	HV	%HV	Speed
Opening Year	**2019**								
Gocup Road	Northbound	39.1	7.6	16.2	100	9.8	7.5	43.3	100
Gocup Road	Southbound	42.2	11.0	20.7	100	6.9	5.8	45.5	100
Design Year	**2029**								
Gocup Road	Northbound	63.7	12.3	16.2	100	15.9	12.2	43.3	100
Gocup Road	Southbound	68.8	18.0	20.7	100	11.3	9.4	45.5	100

5.6 Noise modelling verification

5.6.1 Noise modelling verification methodology and results

The purpose of model validation is to demonstrate that the noise model produced for the existing situation is an accurate representation of the real world within the limitations of the prediction algorithm and to identify errors associated with geospatial data and modelling approach. This is to provide greater confidence in the recommendations and assessment completed for the proposed situation which will be validated post construction.

The validation model was generated using traffic survey data and vehicle speeds obtained during the noise monitoring period. A comparison between the measured and modelled results is provided in Table 5-6.

A review of Table 5-6 shows that the predicted noise levels are outside the acceptable tolerance of ± 2 dBA. The discrepancy between the measured and predicted levels can be attributed to the noise monitoring locations setback from the road. Road traffic noise from Gocup Road were observed to blend into the background noise during attended measurements. Average noise levels from traffic on Gocup Road ranged from 38 to 40 dBA during measurements with a maximum level of 55 dBA from a truck accelerating uphill.

The algorithm and assumptions used to generate the existing noise model is considered valid for the noise assessment on the basis of road traffic noise levels identified during attended measurements.

Table 5-6 Noise model verification, dBA

Location	Distance from logger to road	$L_{Aeq(15hr)}$ (Day) dBA (7 am – 10 pm)		Change dBA	$L_{Aeq(9hr)}$ (Night) dBA (7 am – 10 pm)		Change dBA
		Measured	Modelled		Measured	Modelled	
519 Edwardstown Road, South Gundagai	470 m	40.0[1]	41.7	-1.7	Note 2	39.0	-

Note 1: Attended road noise observations were used due to low traffic volumes. Ambient noise sources were identified to dominate the ambient noise levels at the measurement location.

Note 2: Night-time road traffic levels were unable to the determined in the absence of attended night-time noise measurements.

5.7 Predicted noise levels

The day and night-time predicted receiver noise levels at each façade for the 'no-build option' and 'build option' for year 2019 and year 2029 are detailed in Appendix F, including the road traffic noise criteria calculated with consideration to the RNP and NCG.

Day and night-time façade noise maps for the design year 'no build' and 'build' options are provided in Appendix G. All road traffic noise levels include a +2.5 dBA façade correction and a -1.7 dBA ARRB correction for Australian conditions. Noise contours for the day-time and night-time periods are presented as $L_{Aeq(period)}$.

The predicted noise levels indicate that one receiver are expected to exceed the NCG controlling criterion. No receiver qualifies for consideration for additional noise mitigation as the mitigation triggers are not satisfied.

5.8 Assessment of impacts

No residential receivers in the study area qualify for noise mitigation.

Assessment results of the noise impacts have been conducted in accordance with the RNP, NCG and NMG and are as follows:

- The NCG controlling criterion is not predicted to be exceeded during the day-time period
- The NCG controlling criterion is predicted to be exceeded at one sensitive receivers during the night-time period
- No noise levels are predicted to exceed the cumulative limit, defined as the noise level 5 dBA or more above the NCG controlling criterion, during the day-time or night-time period
- The new carriageway does not create a large increase in existing noise levels for any sensitive receiver located within the noise and vibration study area. Therefore, the relative increase criterion is not applicable to any receiver.

Noise exceedances of the NCG controlling criterion during the day-time and night-time periods are due to the receivers' proximity to the road alignment. A summary of receiver's exceeding the criteria is provided in Table 5-7.

Table 5-7 Properties where the NCG controlling criterion is exceeded

Controlling criterion exceeded day		Controlling criterion exceeded night	
-	-	RES04	2937 Gocup Road

The NMG is used to assess whether a receiver that exceeds the controlling criterion qualifies for additional mitigation. The three triggers for qualification are discussed in Section 5.3. No receivers that exceed the controlling criterion qualify for additional mitigation as:

- The increase in noise levels between the no-build and build scenarios in the design year are below 2.0 dBA
- The predicted build levels in the design year are under the cumulative limit

5.9 Maximum noise level / sleep disturbance assessment

For continuous rather than intermittent traffic flow, the ENMM recommends L_{Amax} noise pass-by events may lead to sleep disturbance if the L_{Amax} noise levels exceeds the L_{Aeq} noise level by more than 15 dBA when the L_{Amax} noise levels is greater than 65 dBA.

The ENMM advises that the maximum noise level can be used as a tool to prioritise and rank mitigation strategies, but should not be applied as a decisive noise criterion for selection of mitigation treatments.

One second L_{Amax} data was collected during long-term noise monitoring. The data was processed and compared against the requirements of the ENMM.

The L_{Amax} noise levels greater than 65 dBA and more than 15 dBA over the $L_{Aeq\ (1\ hour)}$ noise levels during the night-time period (10 pm to 7am) at the monitoring locations are summarised in Table 5-8. Detailed L_{Amax} hourly ranges during the night-time period are provided in Appendix H.

Table 5-8 Summary of maximum noise levels (10 pm to 7 am) – dBA

Noise monitoring location	$L_{Amax(1hr)}$ range	$L_{Aeq(1hr)}$	Highest $L_{Amax(1hr)}$ - $L_{Aeq(1hr)}$	$L_{Amax(1hr)}$ - $L_{Aeq(1hr)}$ average	Number of $L_{Amax(1hr)}$ events > 65 dBA and 15 dBA above $L_{Aeq(1hr)}$
Location 1 Edwardstown Road	22-52	33-50	34	19	58

The current maximum noise levels exceed the $L_{Aeq(1hr)}$ noise levels by more than 15 dBA and are above 65 dBA on several occasions per night.

However, in general the road design is likely to reduce the maximum noise levels due to the following:

- An improved road surface which is likely to reduce road irregularities and associated maximum noise level events
- The new vertical road alignment would require less acceleration and deceleration, reducing maximum noise events.

5.10 Operational noise mitigation

No residential properties in the proposal's assessment area qualify for noise mitigation.

6. Conclusion

6.1 Construction

A set of standard mitigation measures for construction noise and vibration have been provided based on anticipated requirements of the proposal, however, a Construction Noise and Vibration Management Plan (CNVMP) which includes requirements for noise monitoring at sensitive receivers and a community consultation program is recommended to be developed as part of a CEMP for the proposal's construction stages.

Noise levels at each identified receiver has been assessed for different construction scenarios during the day-time period. The noise levels received at individual receivers are likely to vary as the works progress along the construction area.

A total of four residential receivers are predicted to exceed the day-time noise affected management level of 40 dBA at some stage of the proposal during standard construction hours. Noise levels at one residential receivers along Gocup Road are expected to exceed the highly noise affected level of 75 dBA during clear-zone works.

Construction traffic including trucks along Gocup Road is not expected to increase noise levels by more than 2 dBA and the objectives of the RNP would be achieved.

Construction blasting vibration and airblast overpressure impact distances have been provided for various blast charge sizes. A detailed blast management plan should be undertaken by the construction contractor prior to undertaking blasting works to minimise blasting impacts on nearby receivers.

No construction vibration impacts are expected from general construction activities as the identified sensitive receivers are located outside the vibration safe buffer distances.

6.2 Operation

Operational noise has been assessed in accordance with the Roads and Maritime NCG and NMG.

The number of receivers that are predicted to exceed the NCG controlling criteria during the day-time and night-time periods are:

- Day-time: no receivers
- Night-time: one receiver by up to 2 dBA.

The NCG cumulative limit is not predicted to be exceeded at any sensitive receiver.

No receivers qualify for consideration of additional mitigation using the mitigation qualifying process provided in the NMG.

Noise levels at residential properties in the proposal area are expected to remain level or decrease when compared to the levels predicted for the no-build scenario. This can be attributed to the road alignment moving further away from the residential properties.

7. References

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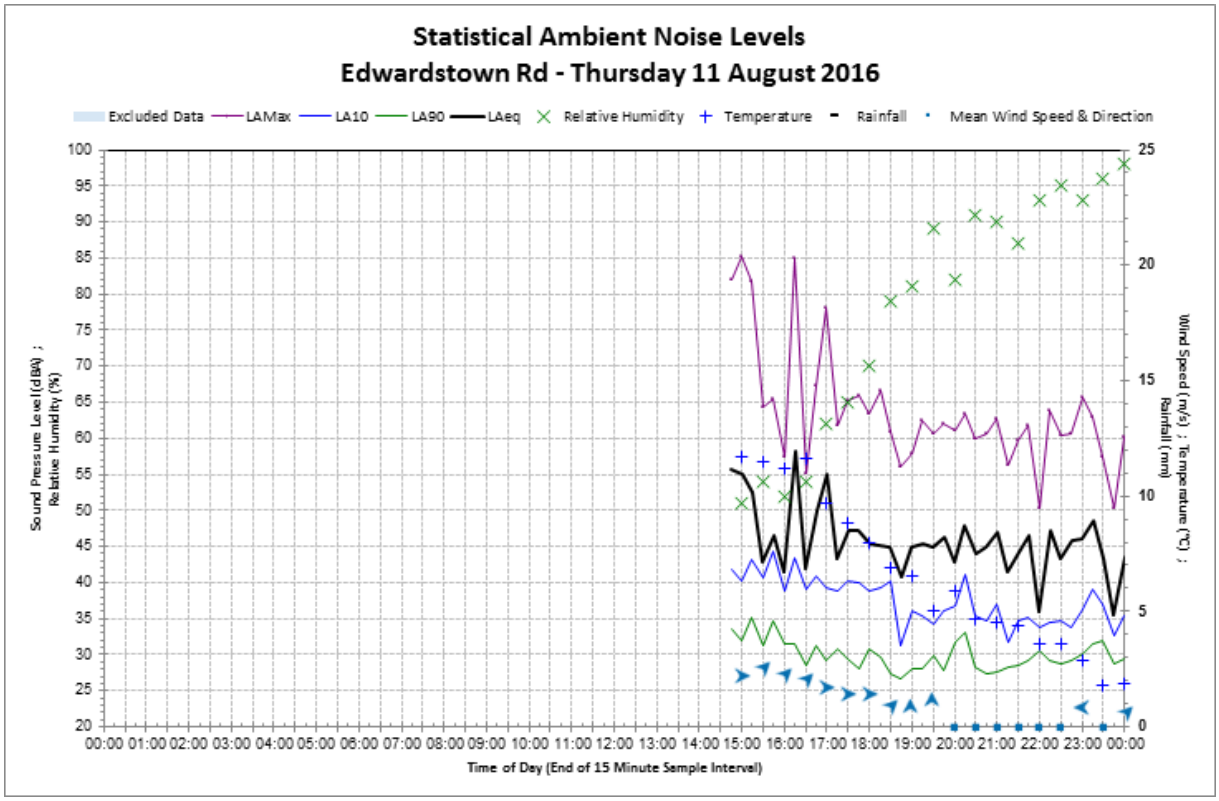
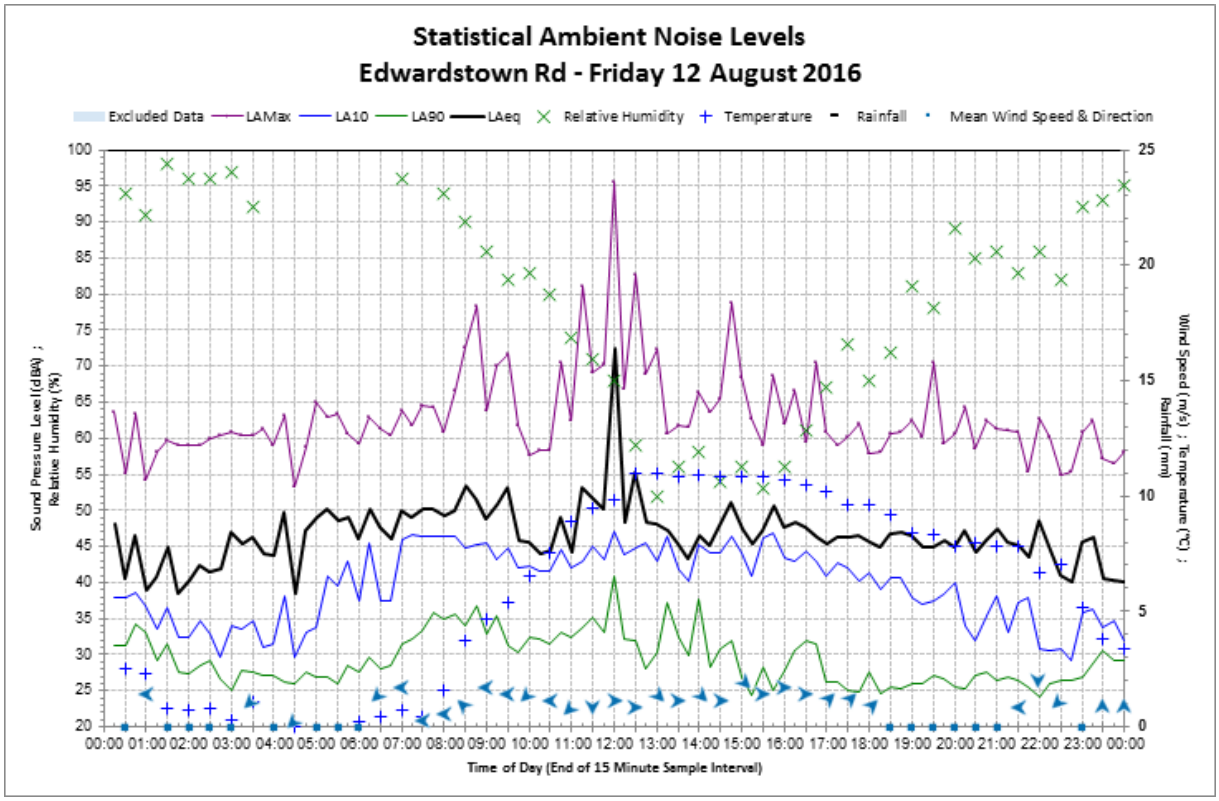
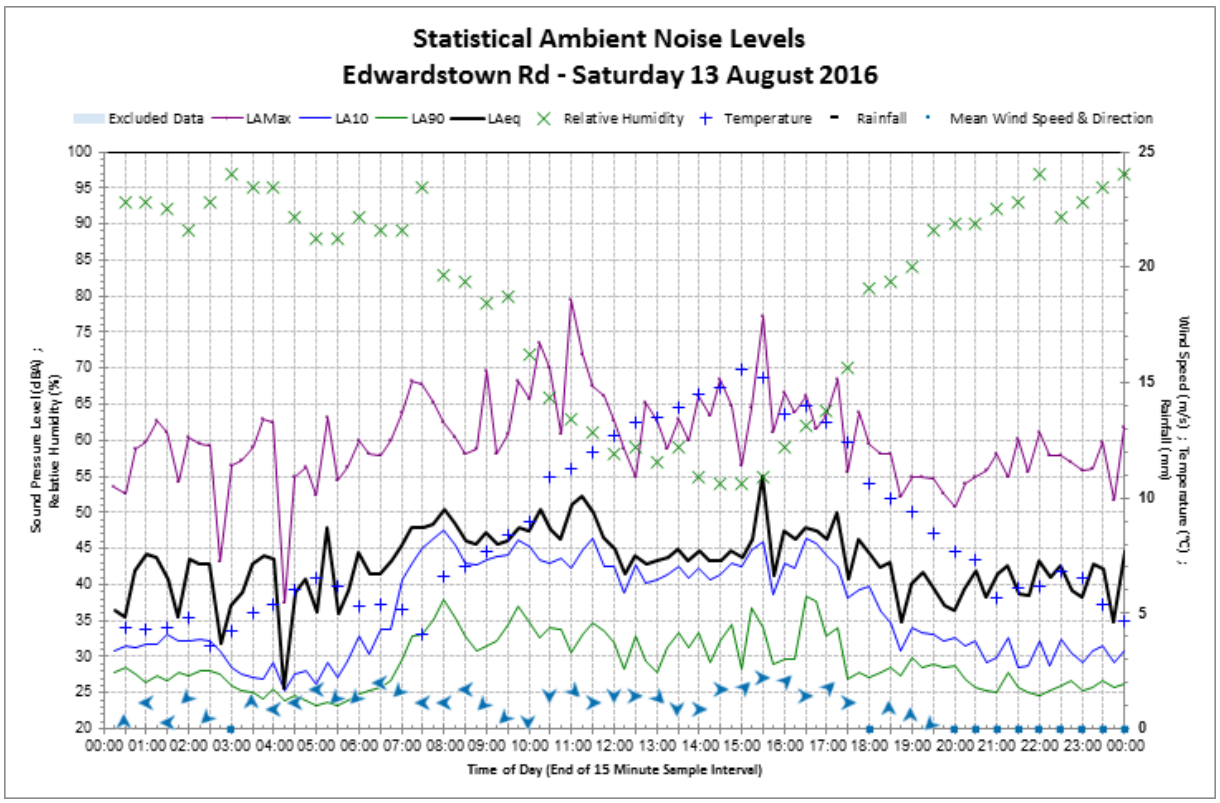
Appendices

Appendix A – Noise monitoring charts



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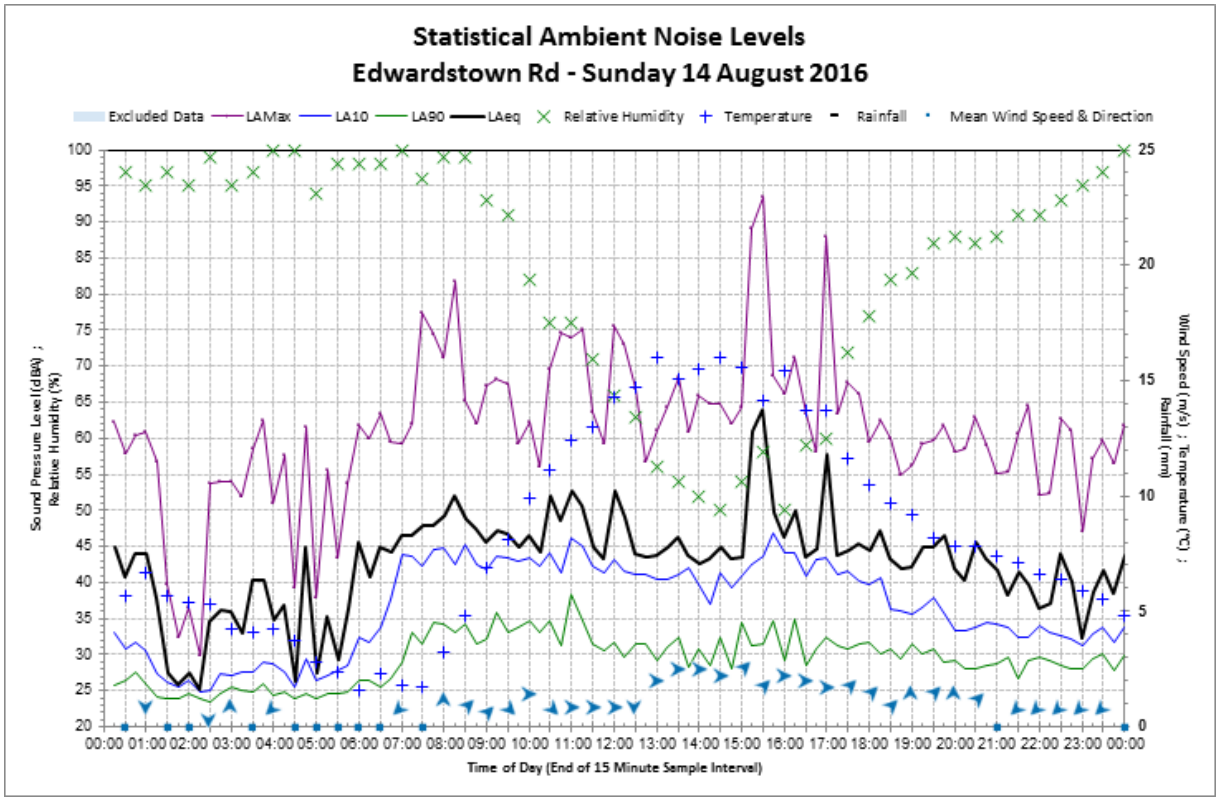
Edwardstown Rd - Saturday 13 August 2016
Excluded Data
LAMax
LA10
LA90
LAeq
Relative Humidity
Temperature
Rainfall
Mean Wind Speed & Direction
Sound Pressure Level (dBA) ; Relative Humidity (%)
Wind Speed (m/s) ; Temperature (°C) ; Rainfall (mm)
Time of Day (End of 15 Minute Sample Interval)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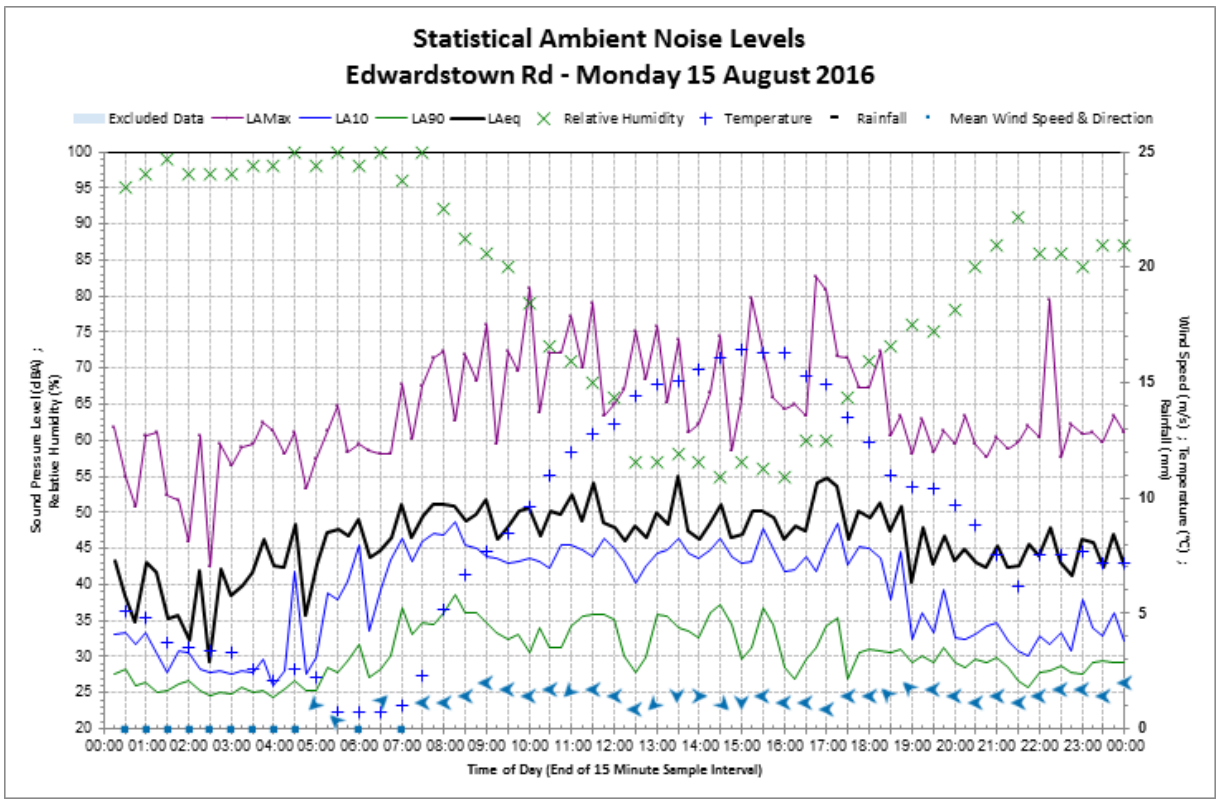
Edwardstown Rd - Sunday 14 August 2016
Excluded Data
LAMax
LA10
LA90
LAeq
Relative Humidity
Temperature
Rainfall
Mean Wind Speed & Direction
Sound Pressure Level (dBA) ; Relative Humidity (%)
Wind Speed (m/s) ; Temperature (°C) ; Rainfall (mm)
Time of Day (End of 15 Minute Sample Interval)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Edwardstown Rd - Monday 15 August 2016
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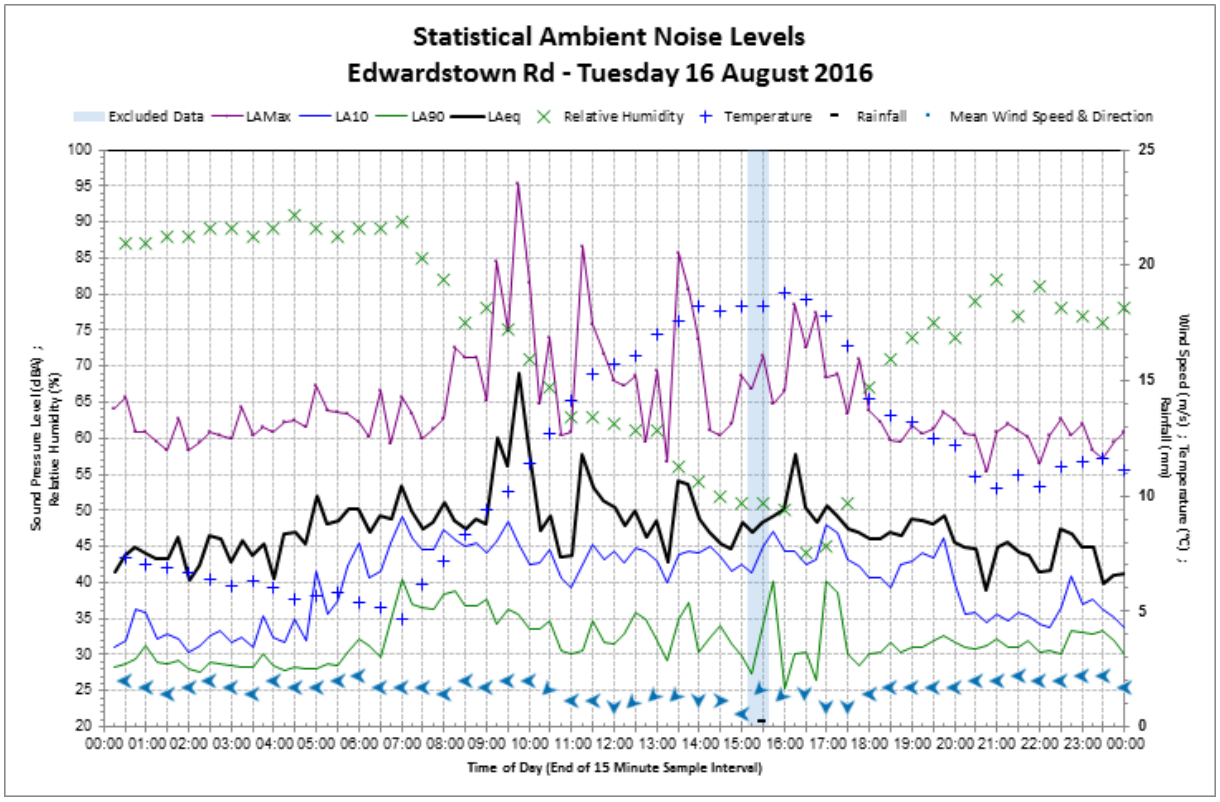
LA90
LAeq
Relative Humidity
Temperature
Rainfall
Mean Wind Speed & Direction
Sound Pressure Level (dBA) ; Relative Humidity (%)
Wind Speed (m/s) ; Temperature (°C) ; Rainfall (mm)
Time of Day (End of 15 Minute Sample Interval)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Edwardstown Rd - Tuesday 16 August 2016
Excluded Data
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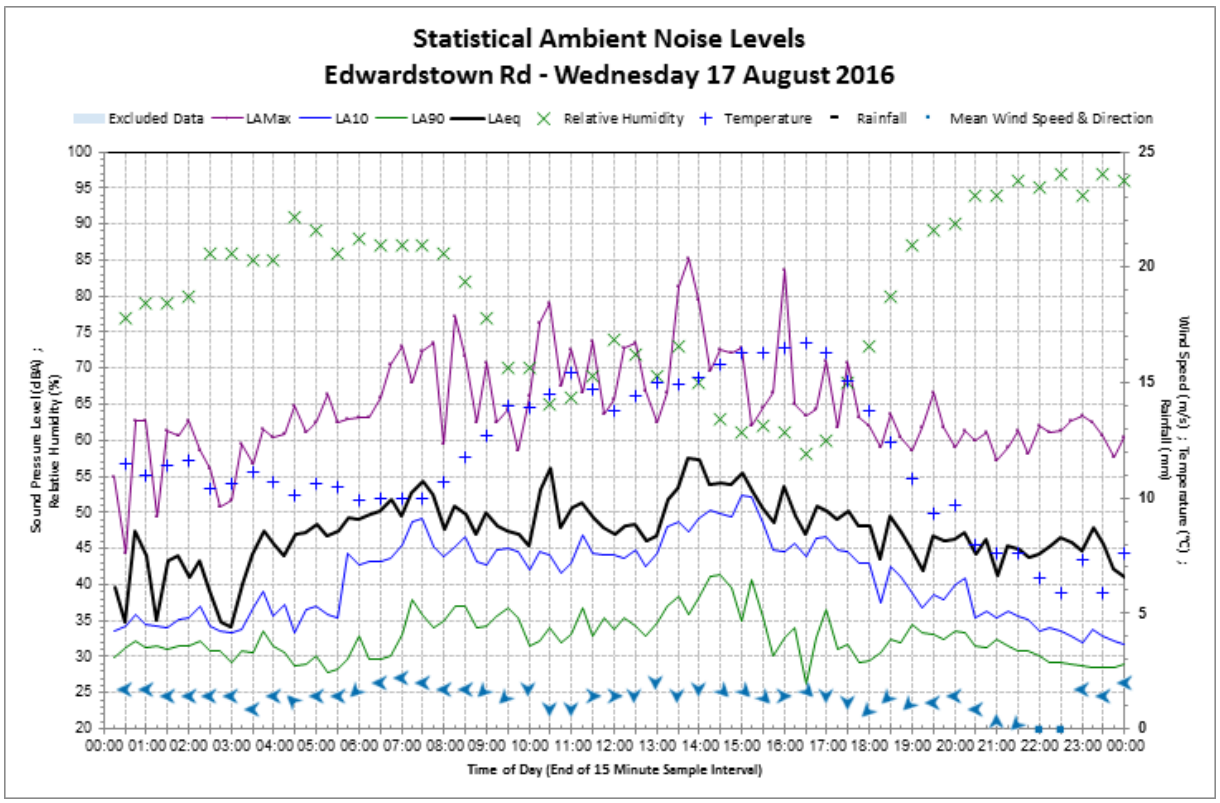
LA10
LA90
LAeq
Relative Humidity
Temperature
Rainfall
Mean Wind Speed & Direction
Sound Pressure Level (dBA) ; Relative Humidity (%)
Wind Speed (m/s) ; Temperature (°C) ; Rainfall (mm)
Time of Day (End of 15 Minute Sample Interval)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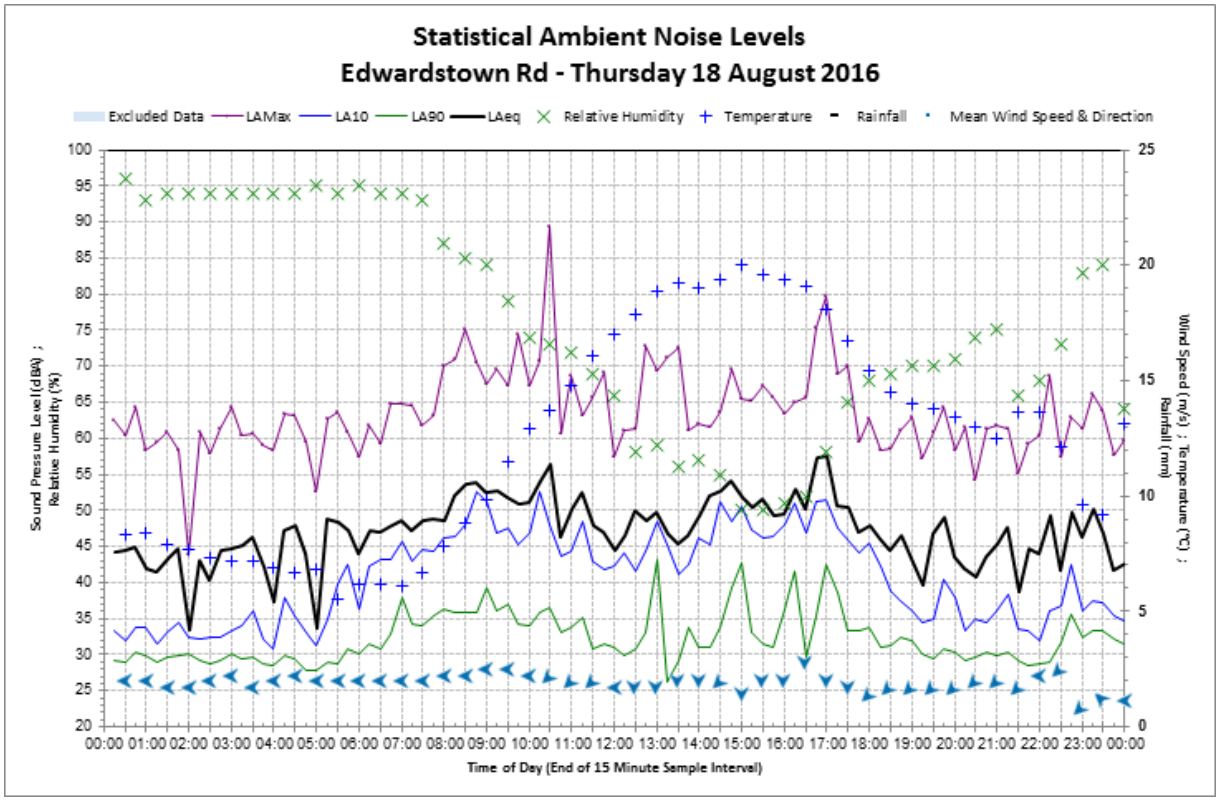
LA10
LA90
LAeq
Relative Humidity
Temperature
Rainfall
Mean Wind Speed & Direction
Sound Pressure Level (dBA) ; Relative Humidity (%)
Wind Speed (m/s) ; Temperature (°C) ; Rainfall (mm)
Time of Day (End of 15 Minute Sample Interval)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Edwardstown Rd - Thursday 18 August 2016
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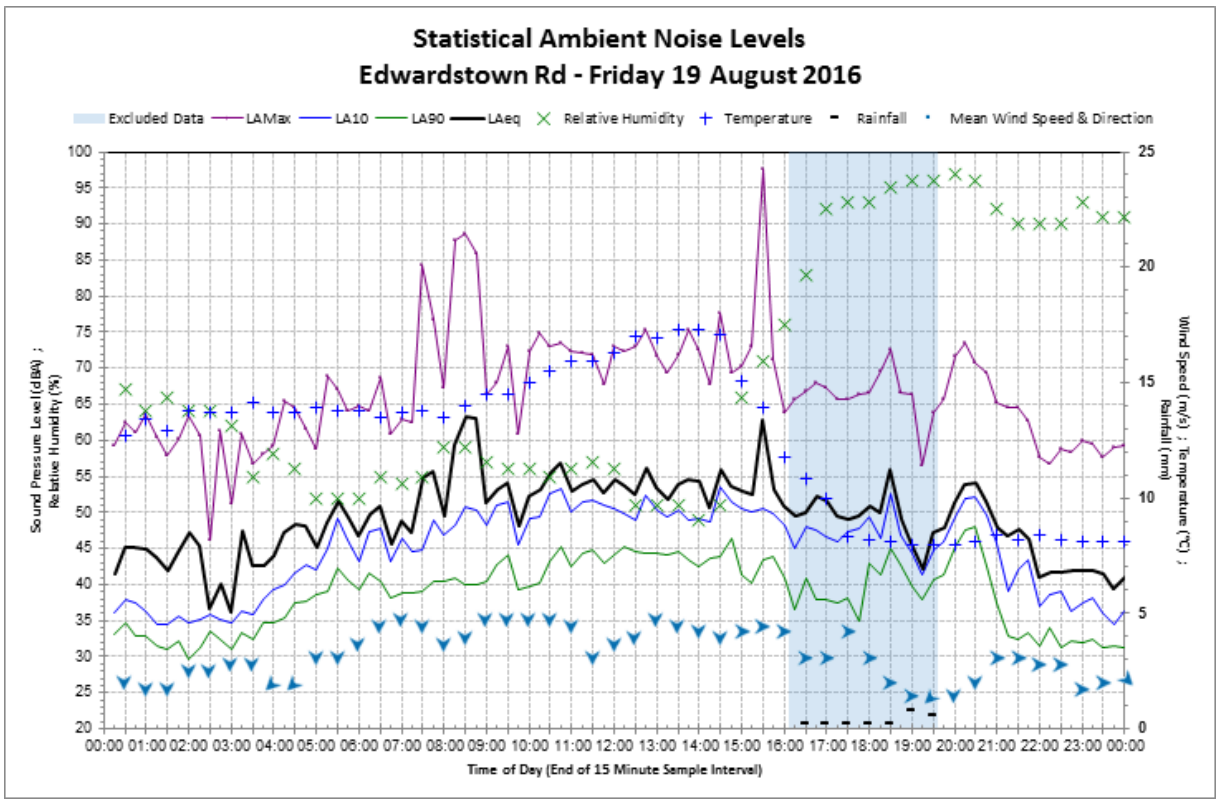
LA10
LA90
LAeq
Relative Humidity
Temperature
Rainfall
Mean Wind Speed & Direction
Sound Pressure Level (dBA) ; Relative Humidity (%)
Wind Speed (m/s) ; Temperature (°C) ; Rainfall (mm)
Time of Day (End of 15 Minute Sample Interval)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Edwardstown Rd - Friday 19 August 2016
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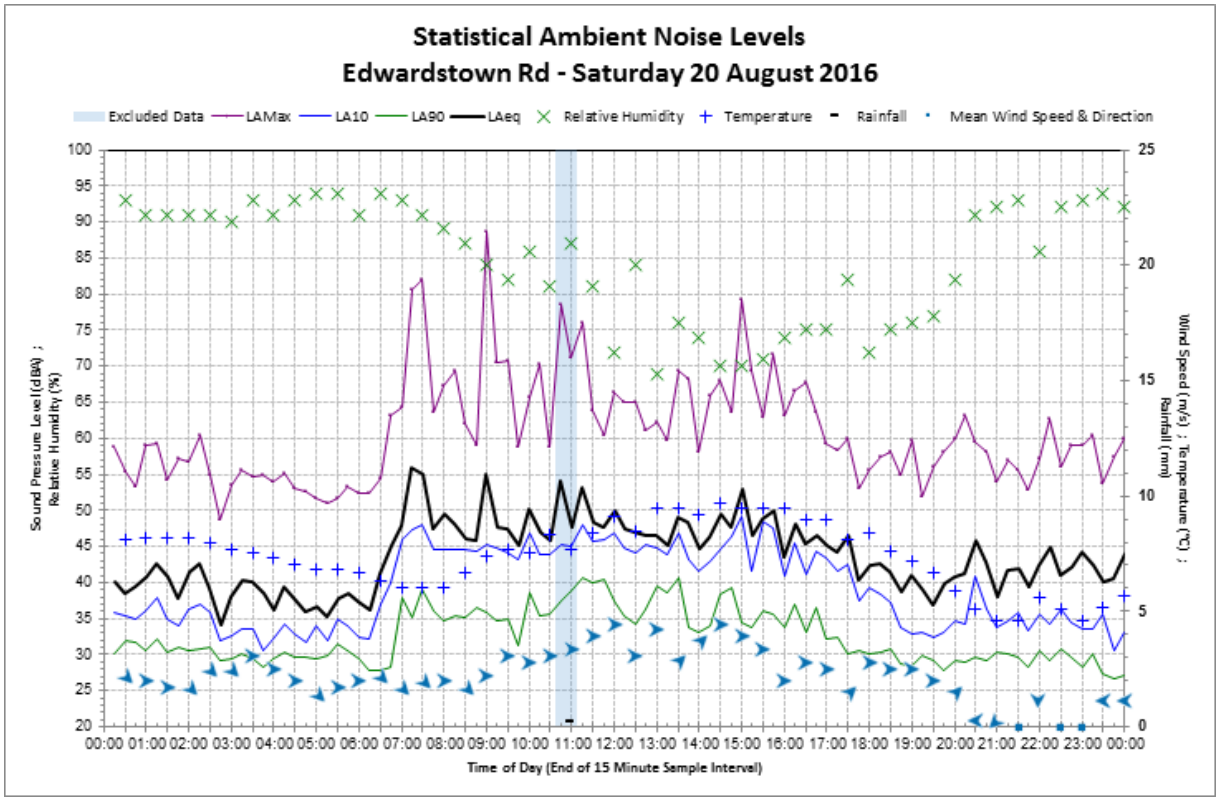
LA90
LAeq
Relative Humidity
Temperature
Rainfall
Mean Wind Speed & Direction
Sound Pressure Level (dBA) ; Relative Humidity (%)
Wind Speed (m/s) ; Temperature (°C) ; Rainfall (mm)
Time of Day (End of 15 Minute Sample Interval)


Statistical Ambient Noise Levels
Edwardstown Rd - Saturday 20 August 2016
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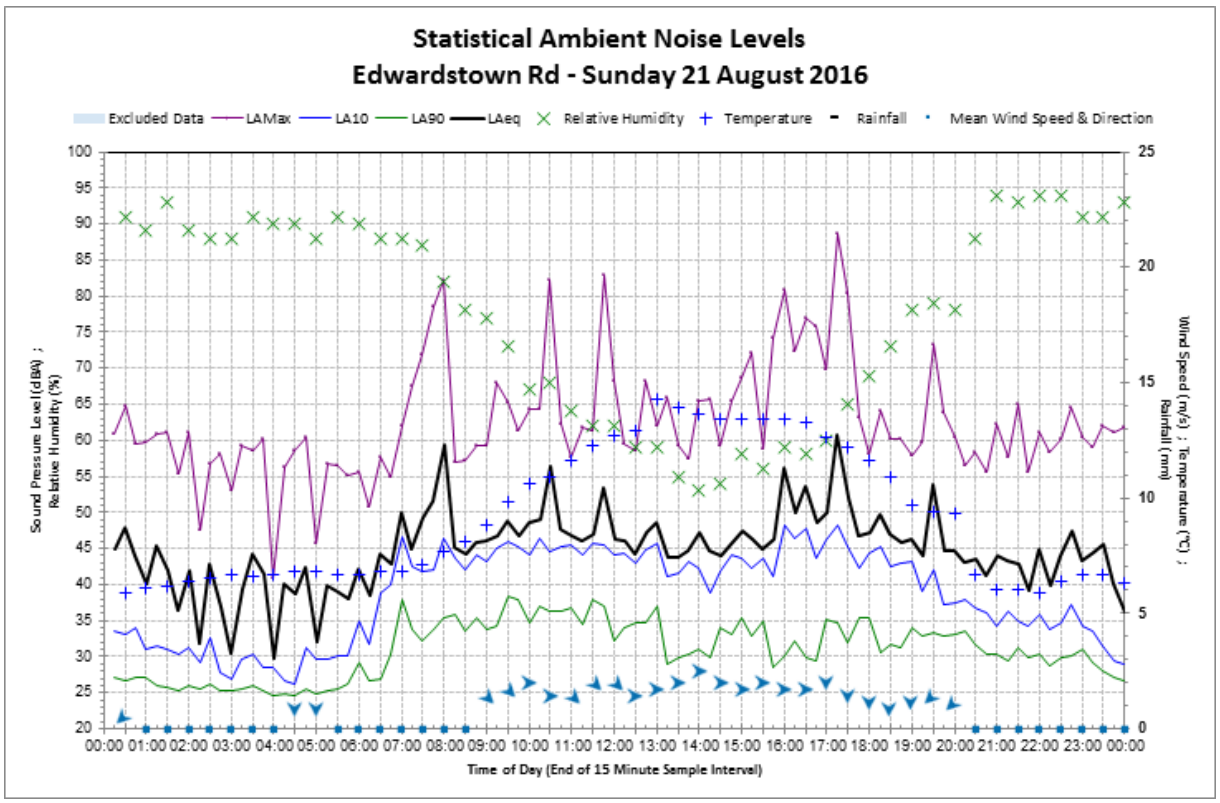
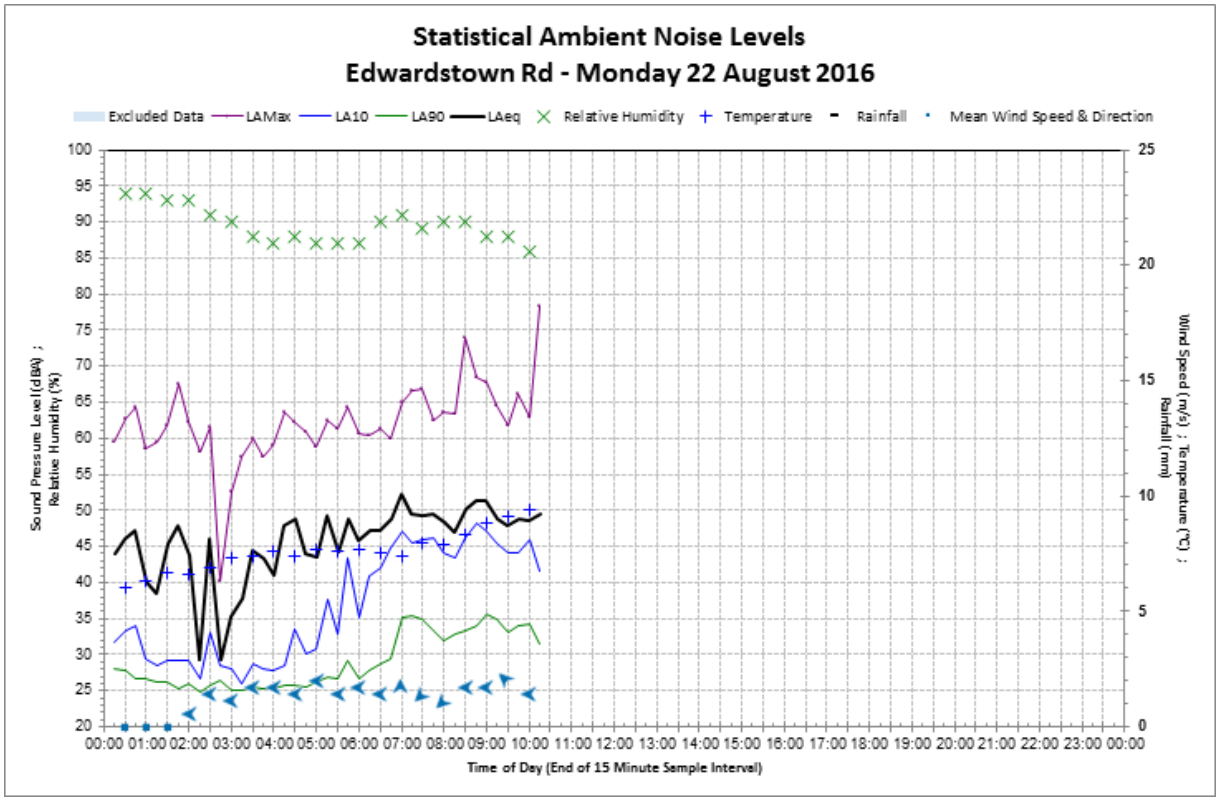
LA90
LAeq
Relative Humidity
Temperature
Rainfall
Mean Wind Speed & Direction
Sound Pressure Level (dBA) ; Relative Humidity (%)
Wind Speed (m/s) ; Temperature (°C) ; Rainfall (mm)
Time of Day (End of 15 Minute Sample Interval)


Statistical Ambient Noise Levels
Edwardstown Rd - Sunday 21 August 2016
Excluded Data
LAMax
LA10
LA90
LAeq
Relative Humidity
Temperature
Rainfall
Mean Wind Speed & Direction
Sound Pressure Level (dBA) ; Relative Humidity (%)
Wind Speed (m/s) ; Temperature (°C) ; Rainfall (mm)
Time of Day (End of 15 Minute Sample Interval)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Edwardstown Rd - Monday 22 August 2016
Excluded Data
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LA90
LAeq
Relative Humidity
Temperature
Rainfall
Mean Wind Speed & Direction
Sound Pressure Level (dBA) ; Relative Humidity (%)
Wind Speed (m/s) ; Temperature (°C) ; Rainfall (mm)
Time of Day (End of 15 Minute Sample Interval)

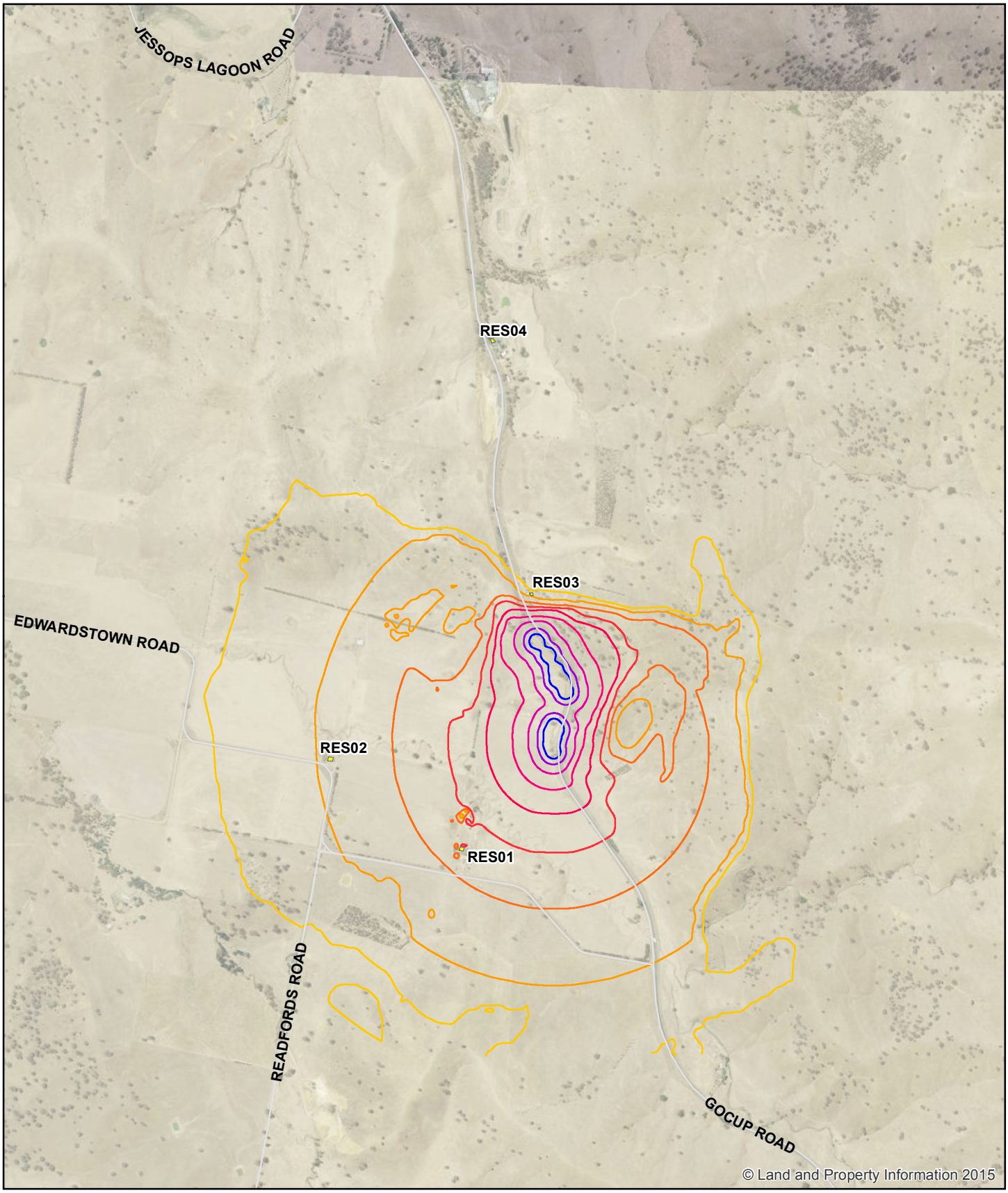
Appendix B – Noise sensitive receivers

Receiver ID	Land use	Receiver address	Structure Type
RES01	Residential	519 Edwardstown Road	Single storey
RES02	Residential	Edwardstown Road	Single storey
RES03	Residential	2708 Gocup Road	Single storey
RES04	Residential	2937 Gocup Road	Single storey

Appendix C – Construction noise levels at sensitive receivers, dBA

Receiver ID	Receiver address	Floor	S01	S02	S03	S04	S05	S06	S07	S08	Mitigation measure
Bold red text incidates exceedance of the 75 dBA Highly Noise Affected Level. **Bold text** indicates exceedance of the 40 dBA Noise affected level											
Green shaded cells incidate exceedance of the 50 dBA Moderately Intrusive level.											
Orange shaded cells indicate exceedance of the 60 dBA Highly Intrusive level.											
RES01	519 Edwardstown Road	GF	**51**	**56**	**46**	39	**58**	**52**	**49**	**51**	N, V
RES02	Edwardstown Road	GF	**43**	**48**	39	**40**	**51**	**45**	**41**	**43**	N, V
RES03	2708 Gocup Road	GF	**41**	**75**	**56**	**60**	**71**	**73**	38	**40**	N, V, PC, RO
RES04	2937 Gocup Road	GF	29	**50**	**40**	**43**	**51**	**46**	27	29	N, V

Appendix D – Predicted construction noise contours, dBA



LEGEND

Building

dBA

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Paper Size A4

0 75 150 300 450 600

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Roads and Maritime Services
Gocup Road upgrade - Cookoomooroo

Scenario 1 Site establishment:
Predicted construction noise levels, dBA

Job Number	23-15894
Revision	A
Date	21 Oct 2016

Figure D-1

Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

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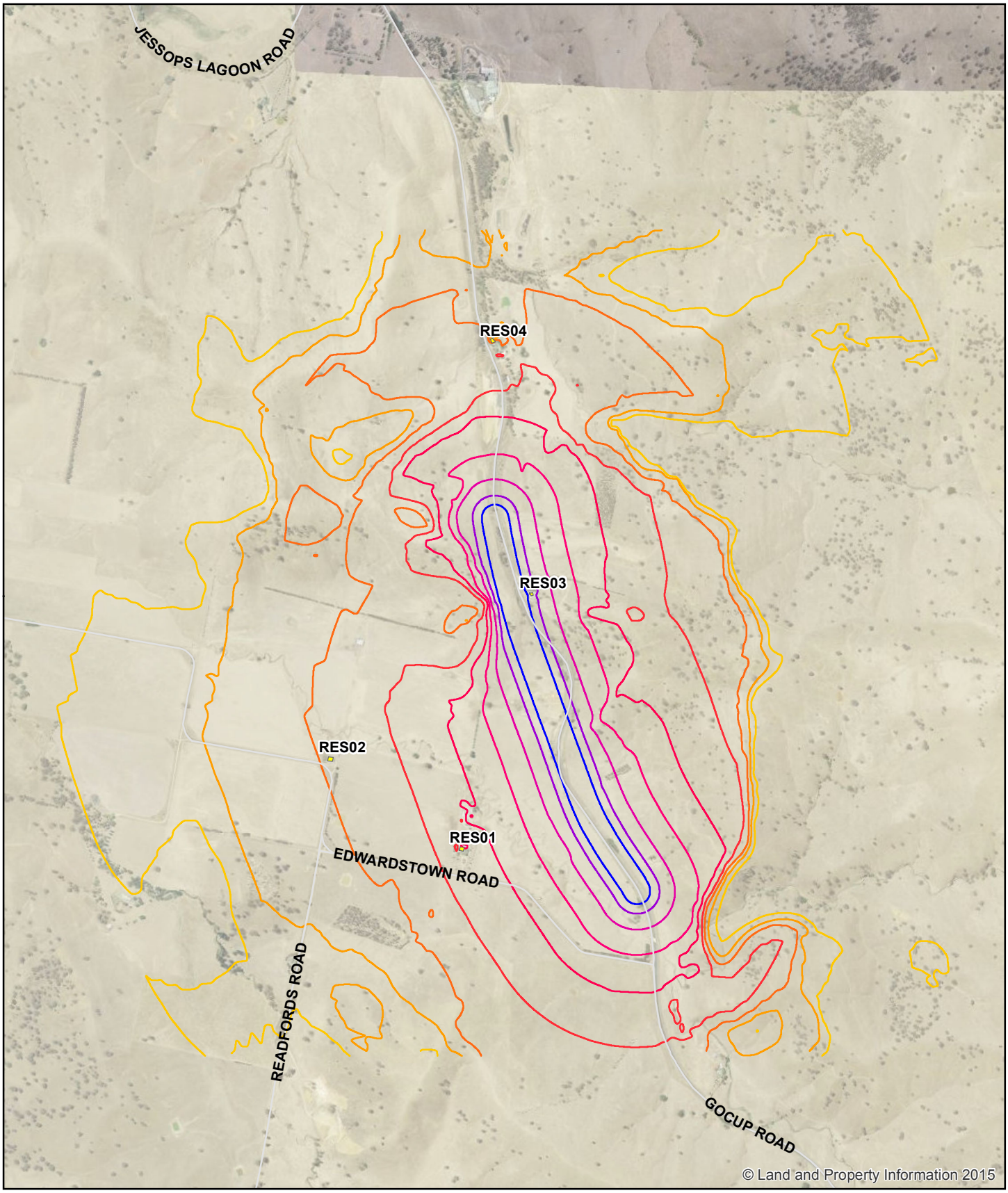

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Building

dBA

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Paper Size A4

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Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Roads and Maritime Services
Gocup Road upgrade - Cookoomooroo

Scenario 2 Clear zone works :
Predicted construction noise levels, dBA

Job Number 23-15894
Revision A
Date 21 Oct 2016

Figure D-2

Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

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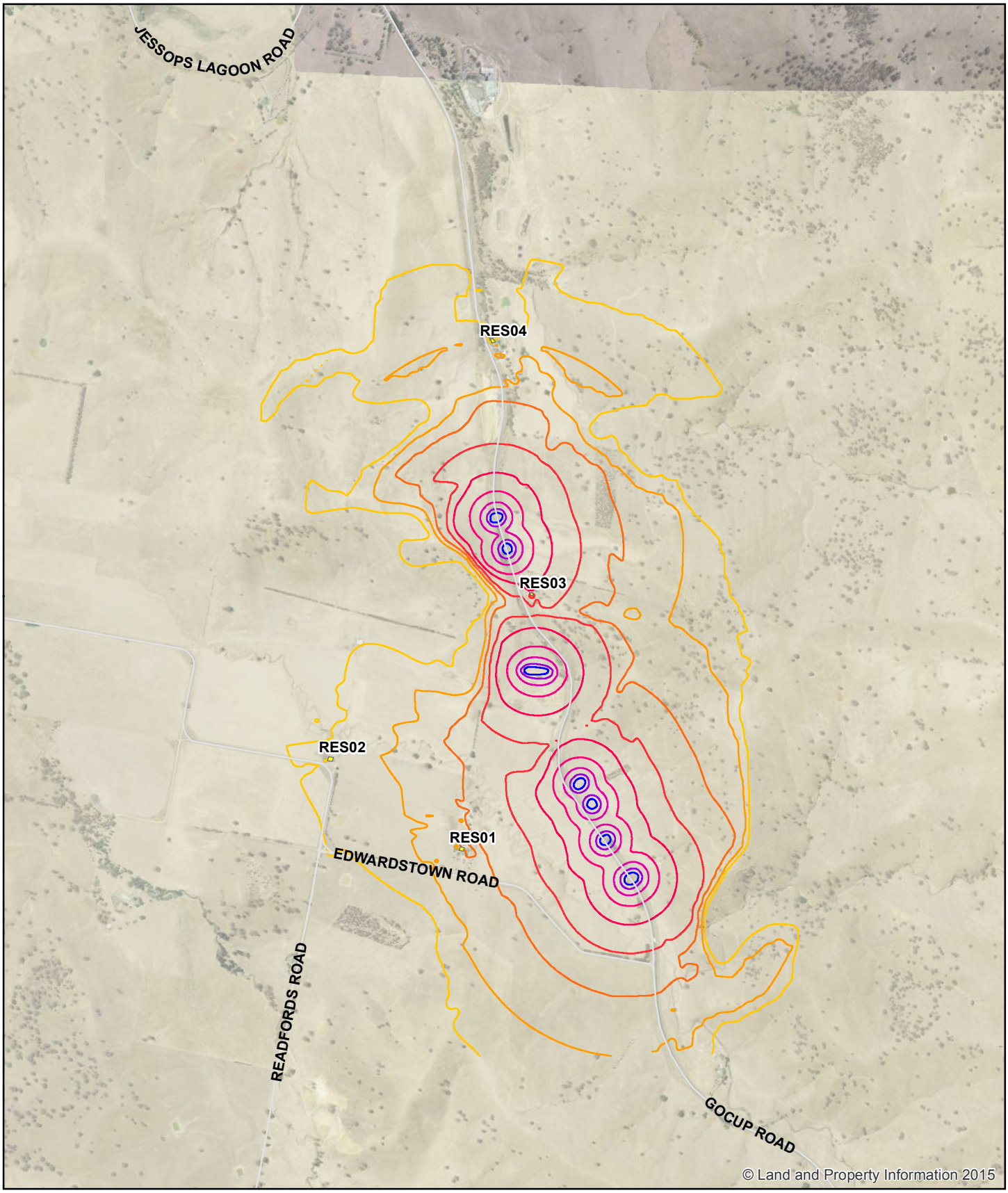

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Building

dBA

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Paper Size A4

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Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Roads and Maritime Services
Gocup Road upgrade - Cookoomooroo

Scenario 3 Drainage works :
Predicted construction noise levels, dBA

Job Number 23-15894
Revision A
Date 21 Oct 2016

Figure D-3

Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

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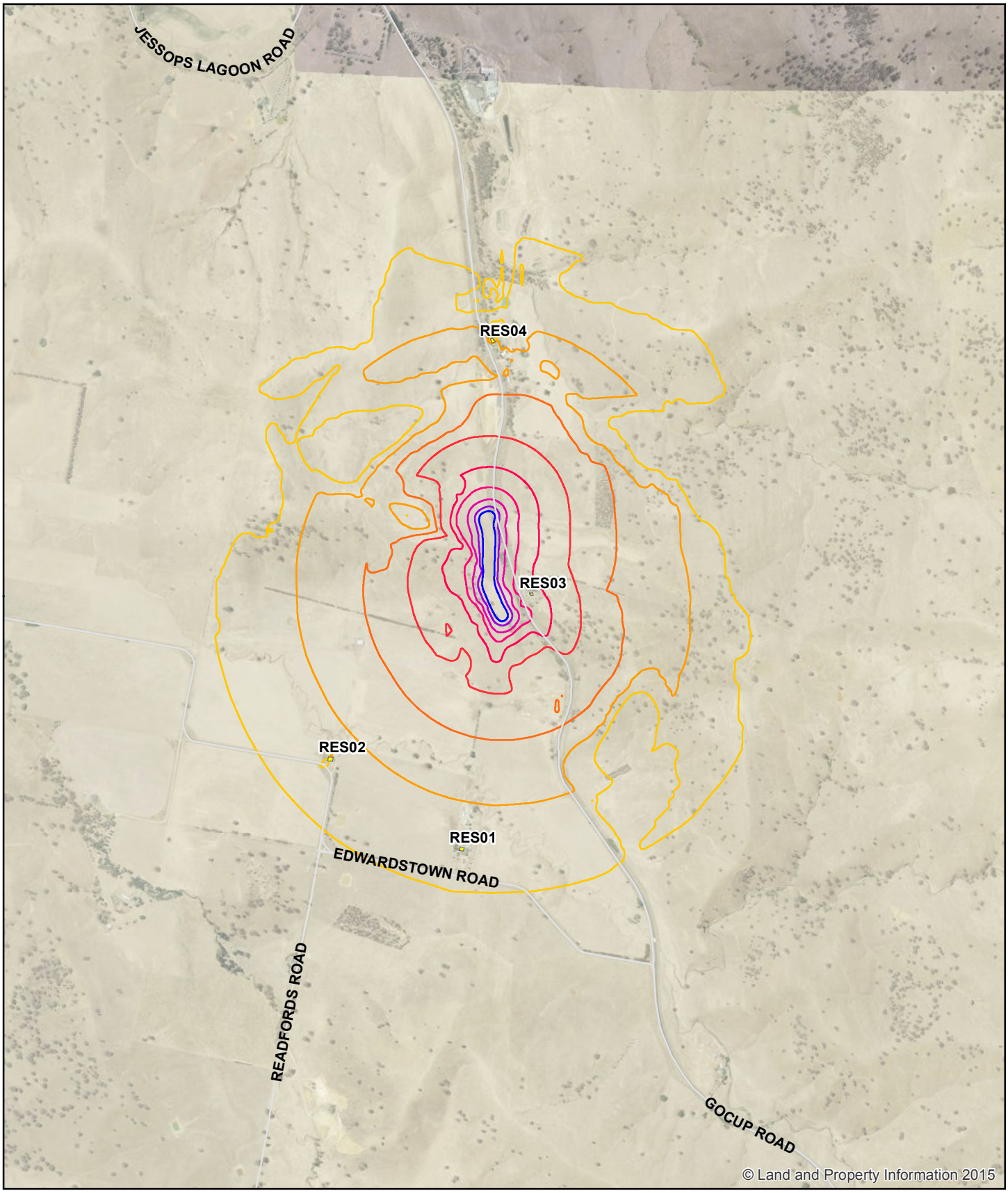

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Building

dBA

35 40 45 50 55 60 65 70 75

Paper Size A4

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Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Roads and Maritime Services
Gocup Road upgrade - Cookoomooroo

Job Number 23-15894
Revision A
Date 21 Oct 2016

Scenario 4 Utility, property and service adjustment
Predicted construction noise levels, dBA

Figure D-4

Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

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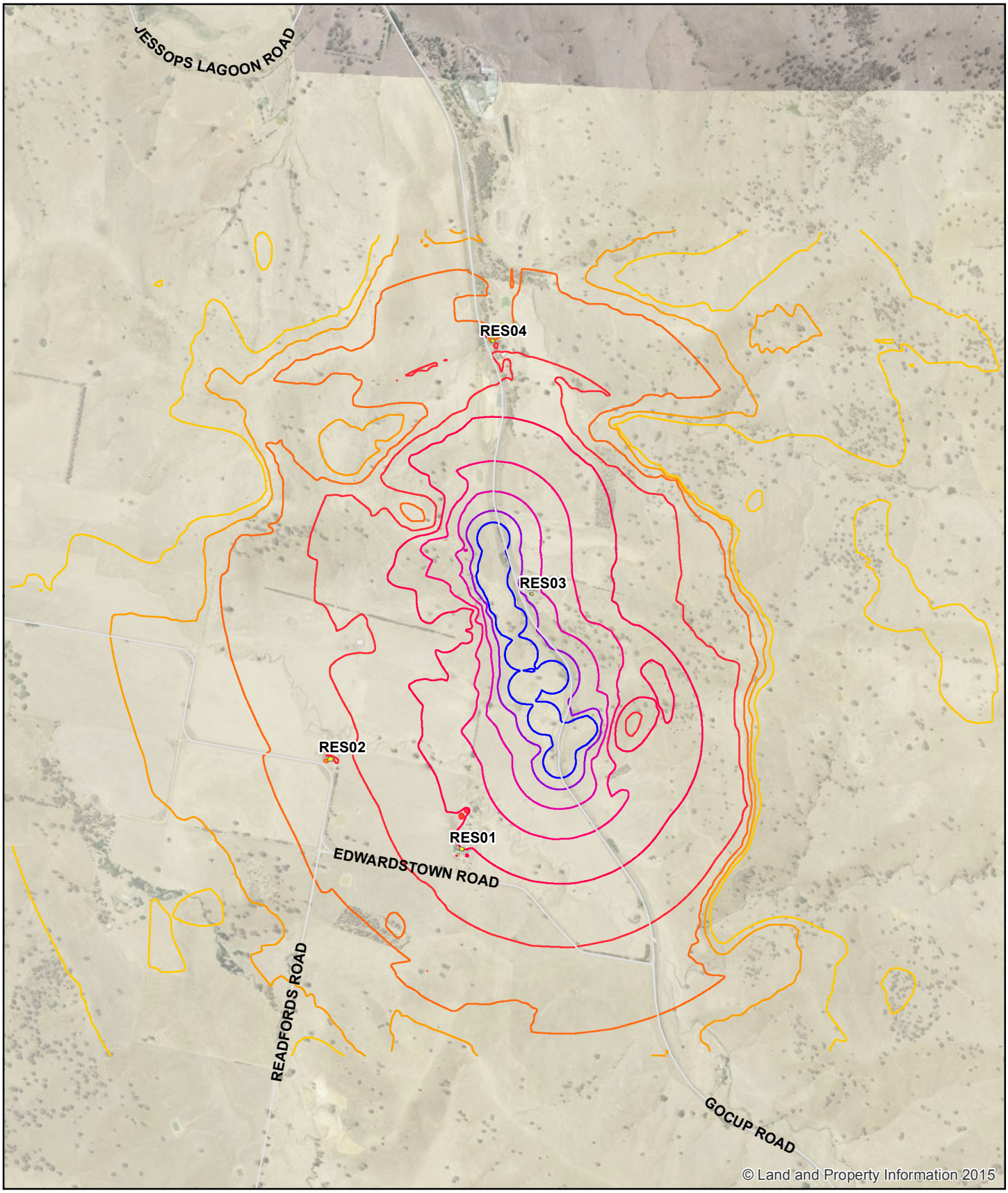

LEGEND

Building

dBA

35 40 45 50 55 60 65 70 75

Paper Size A4

0 75 150 300 450 600

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Roads and Maritime Services
Gocup Road upgrade - Cookoomooroo

Scenario 5 Bulk earthworks :
Predicted construction noise levels, dBA

Job Number 23-15894
Revision A
Date 21 Oct 2016

Figure D-5

Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

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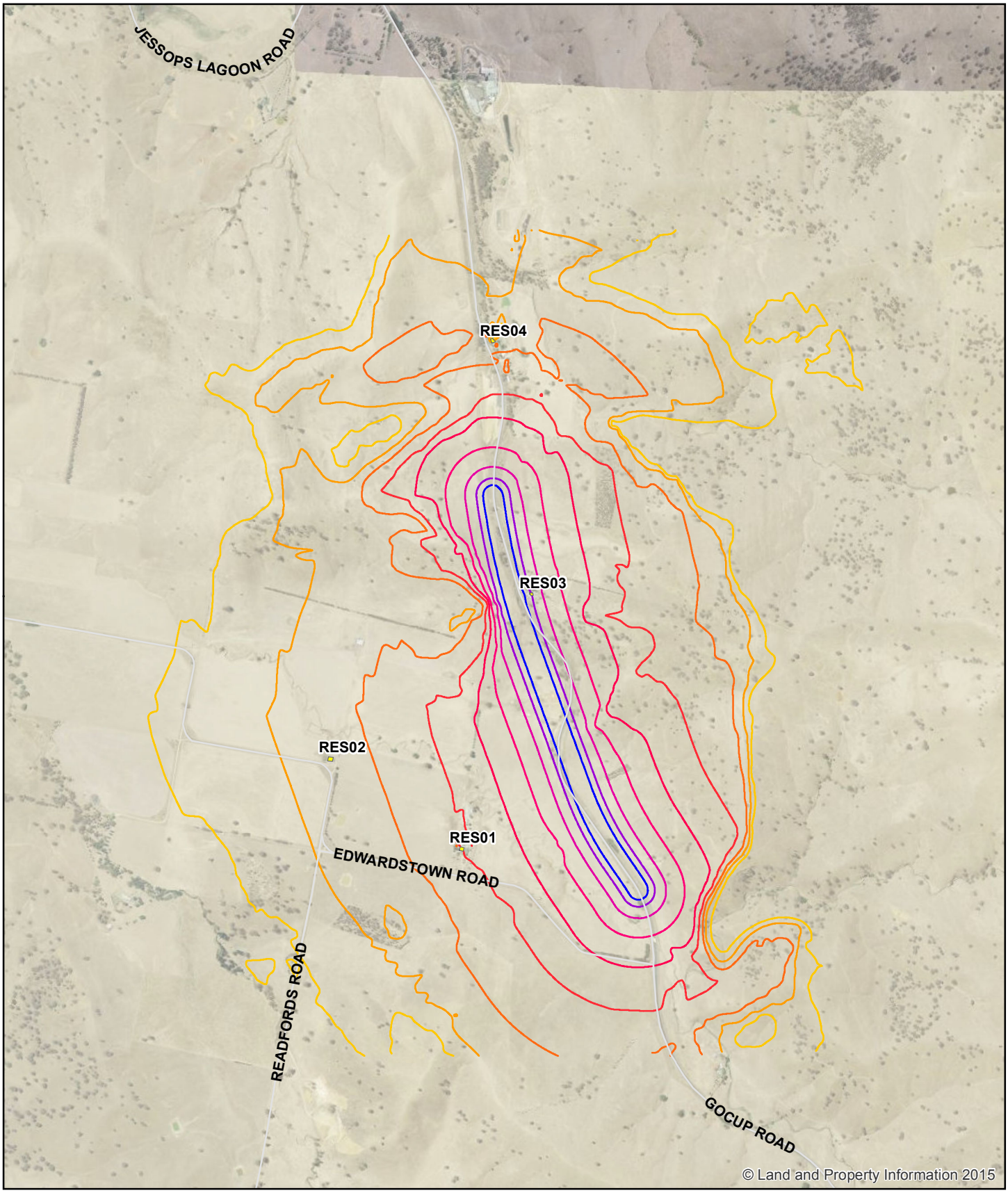

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Building

dBA

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Paper Size A4

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Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Roads and Maritime Services
Gocup Road upgrade - Cookoomooroo

Scenario 6 Pavement / asphalting :
Predicted construction noise levels, dBA

Job Number 23-15894
Revision A
Date 21 Oct 2016

Figure D-6

Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

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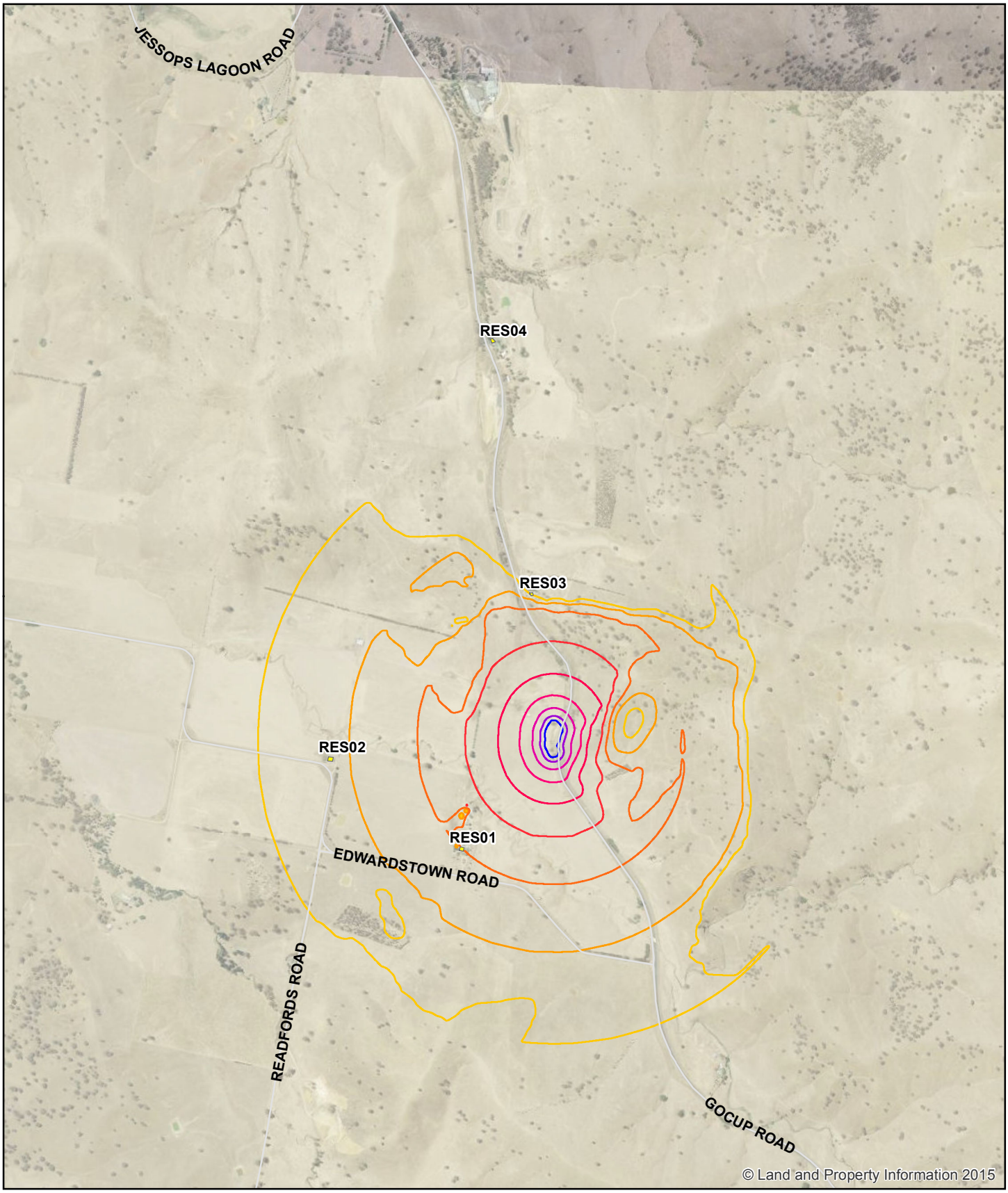

LEGEND

Building

dBA

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Paper Size A4

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Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Roads and Maritime Services
Gocup Road upgrade - Cookoomooroo

Scenario 7 Compound operation
Predicted construction noise levels, dBA

Job Number 23-15894
Revision A
Date 21 Oct 2016

Figure D-7

Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

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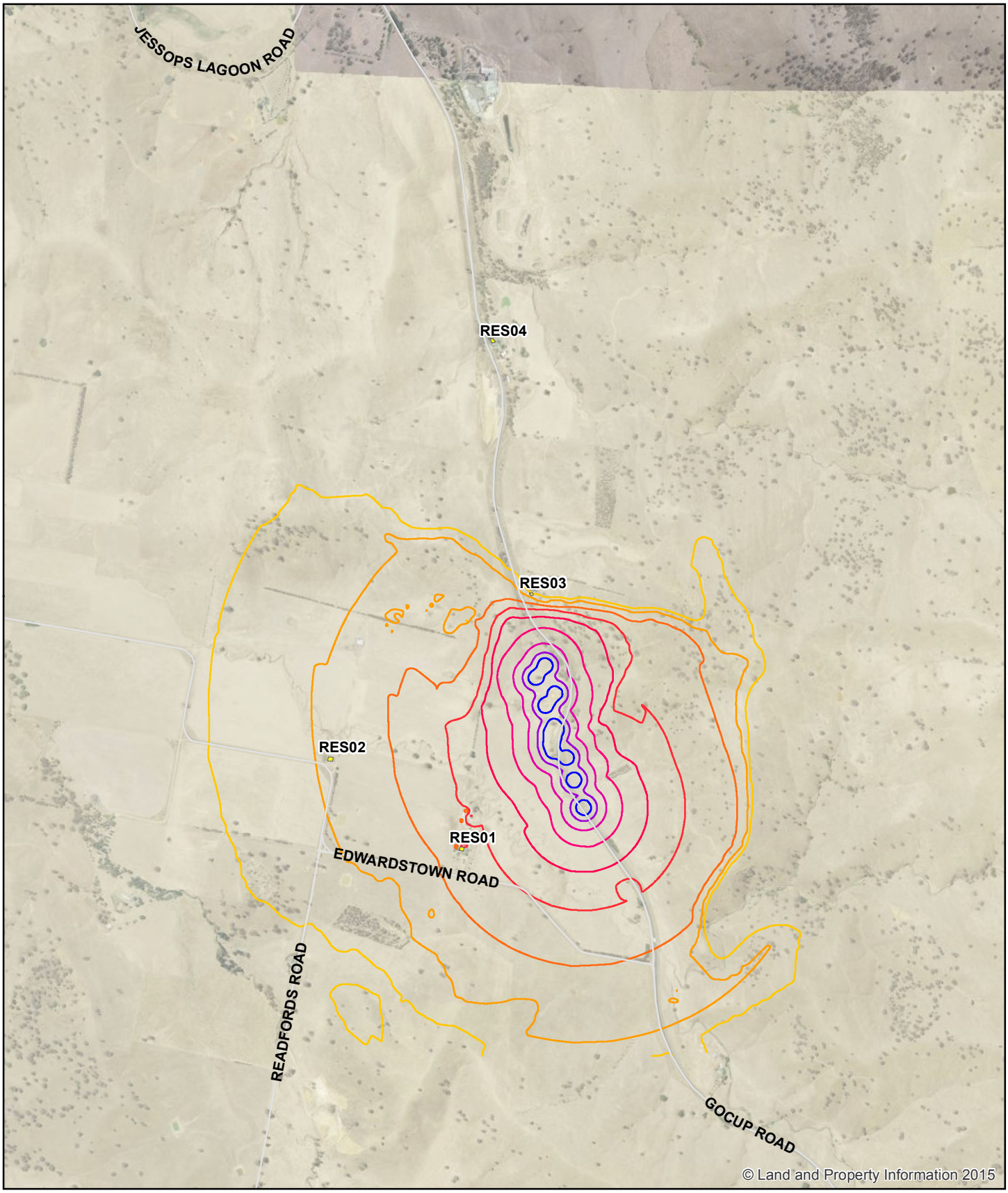

LEGEND

Building

dBA

35 40 45 50 55 60 65 70 75

Paper Size A4

0 75 150 300 450 600

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Roads and Maritime Services
Gocup Road upgrade - Cookoomooroo

Scenario 8 Site clean-up and rehabilitation :
Predicted construction noise levels, dBA

Job Number 23-15894
Revision A
Date 21 Oct 2016

Figure D-8

Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

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Appendix E – Construction noise management zones, dBA

LEGEND

- Building
- Day - Moderately intrusive - [Standard hours (N, V)]; [OOHW Period 1 (V, N, R1, DR)]
- Day - Highly intrusive - [Standard hours (N,V)]; [OOHW Period 1 (V, IB, N, R1, DR, PC, SN)]
- Day - Highly noise affected - [All hours (N, V, PC, RO)]

Paper Size A4

0 75 150 300 450 600

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Roads and Maritime Services
Gocup Road upgrade - Cookoomooroo

Scenario 1 Site establishment:
Noise management zones

Job Number 23-15894
Revision A
Date 21 Oct 2016

Figure E-1

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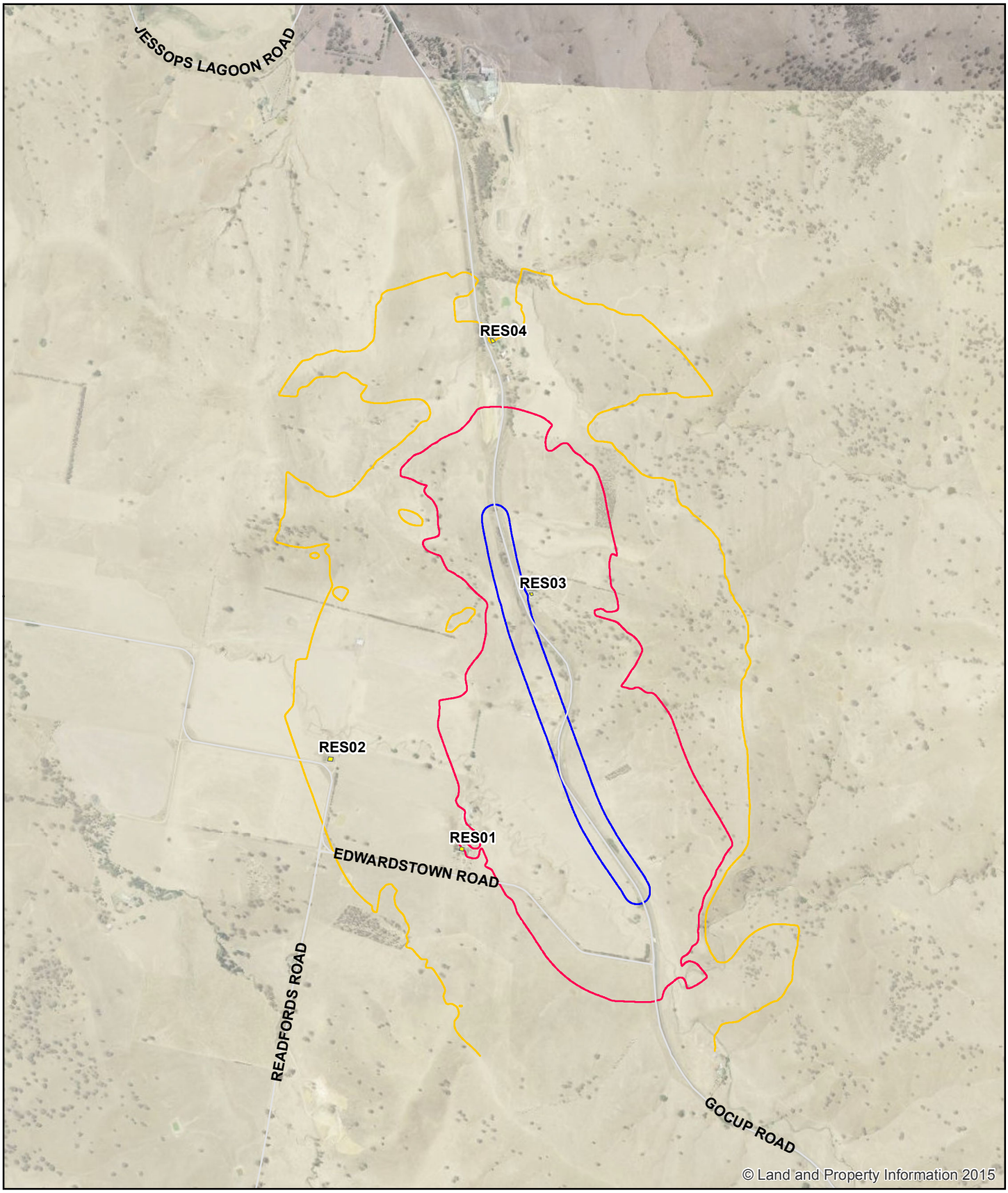

LEGEND

- Building
- Day - Moderately intrusive - [Standard hours (N, V)]; [OOHW Period 1 (V, N, R1, DR)]
- Day - Highly intrusive - [Standard hours (N,V)]; [OOHW Period 1 (V, IB, N, R1, DR, PC, SN)]
- Day - Highly noise affected - [All hours (N, V, PC, RO)]

Paper Size A4

0 75 150 300 450 600

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Roads and Maritime Services
Gocup Road upgrade - Cookoomooroo

Scenario 2 Clear zone works :
Noise management zones

Job Number	23-15894
Revision	A
Date	21 Oct 2016

Figure E-2

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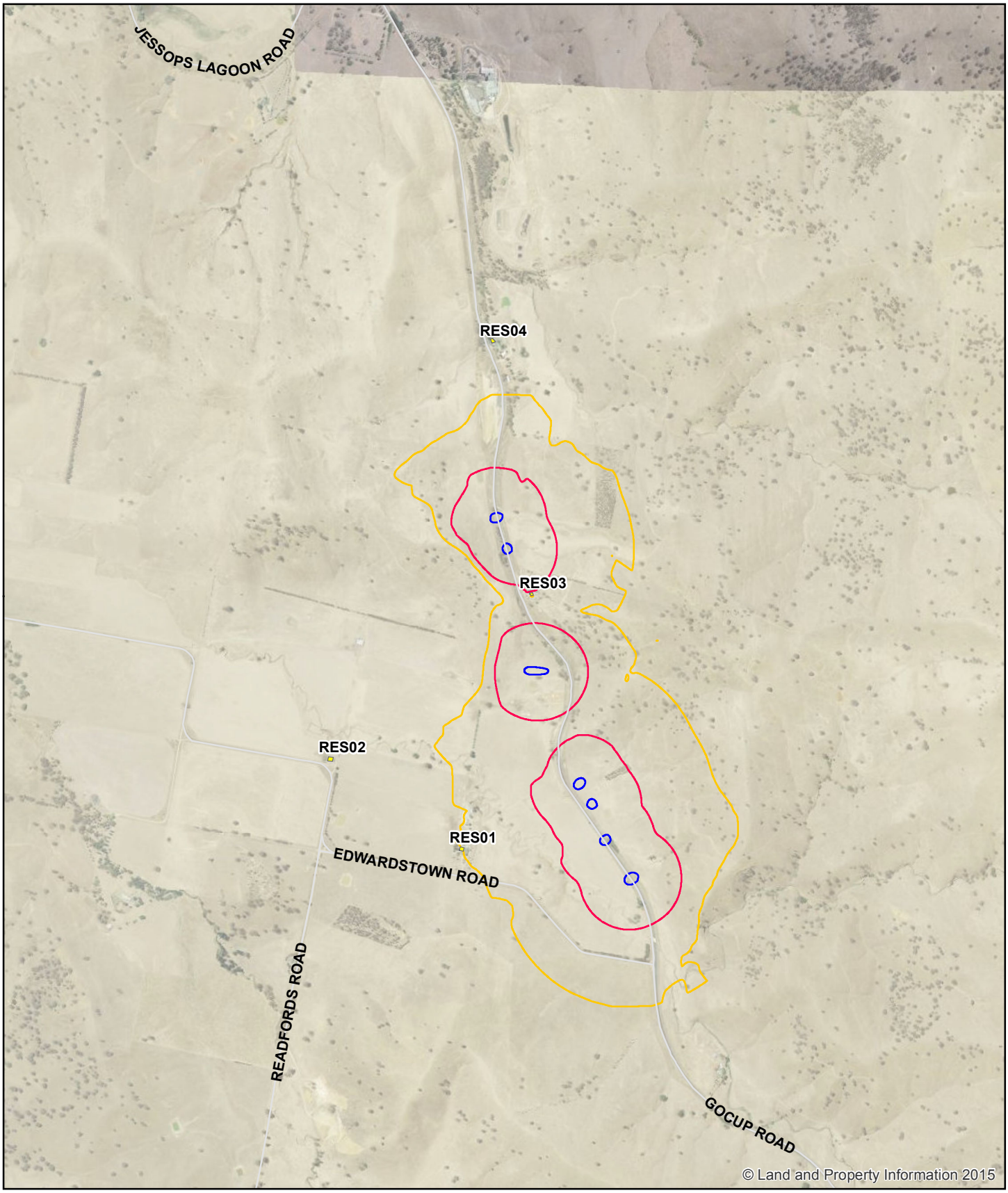

LEGEND

- Building
- Day - Moderately intrusive - [Standard hours (N, V)]; [OOHW Period 1 (V, N, R1, DR)]
- Day - Highly intrusive - [Standard hours (N,V)]; [OOHW Period 1 (V, IB, N, R1, DR, PC, SN)]
- Day - Highly noise affected - [All hours (N, V, PC, RO)]

Paper Size A4

0 75 150 300 450 600

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Roads and Maritime Services
Gocup Road upgrade - Cookoomooroo

Scenario 3 Drainage works :
Noise management zones

Job Number 23-15894
Revision A
Date 21 Oct 2016

Figure E-3

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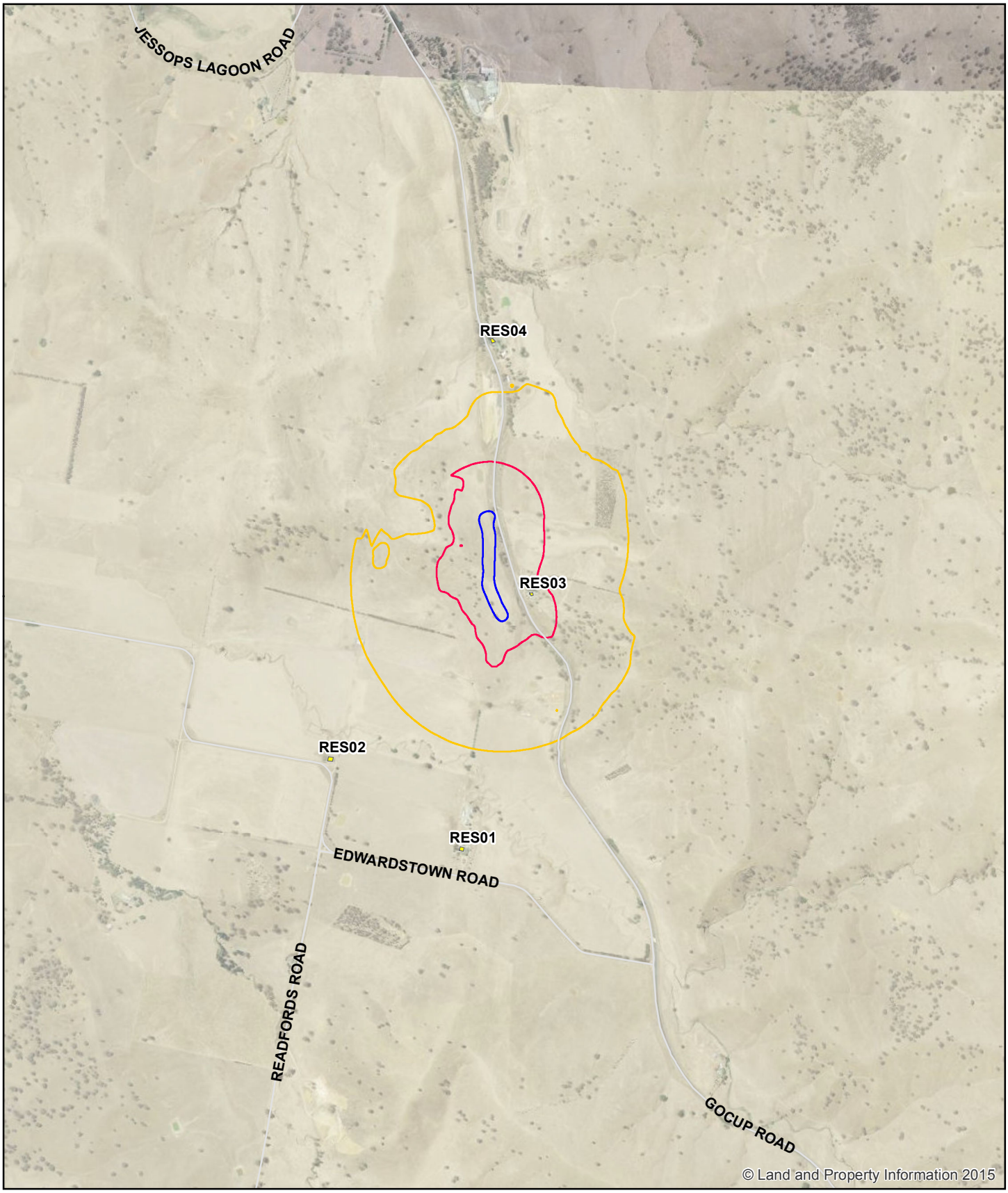

LEGEND

- Building
- Day - Moderately intrusive - [Standard hours (N, V)]; [OOHW Period 1 (V, N, R1, DR)]
- Day - Highly intrusive - [Standard hours (N,V)]; [OOHW Period 1 (V, IB, N, R1, DR, PC, SN)]
- Day - Highly noise affected - [All hours (N, V, PC, RO)]

Paper Size A4

0 75 150 300 450 600

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Roads and Maritime Services
Gocup Road upgrade - Cookoomooroo

Job Number 23-15894
Revision A
Date 21 Oct 2016

Scenario 4 Utility, property and service adjustment:
Noise management zones

Figure E-4

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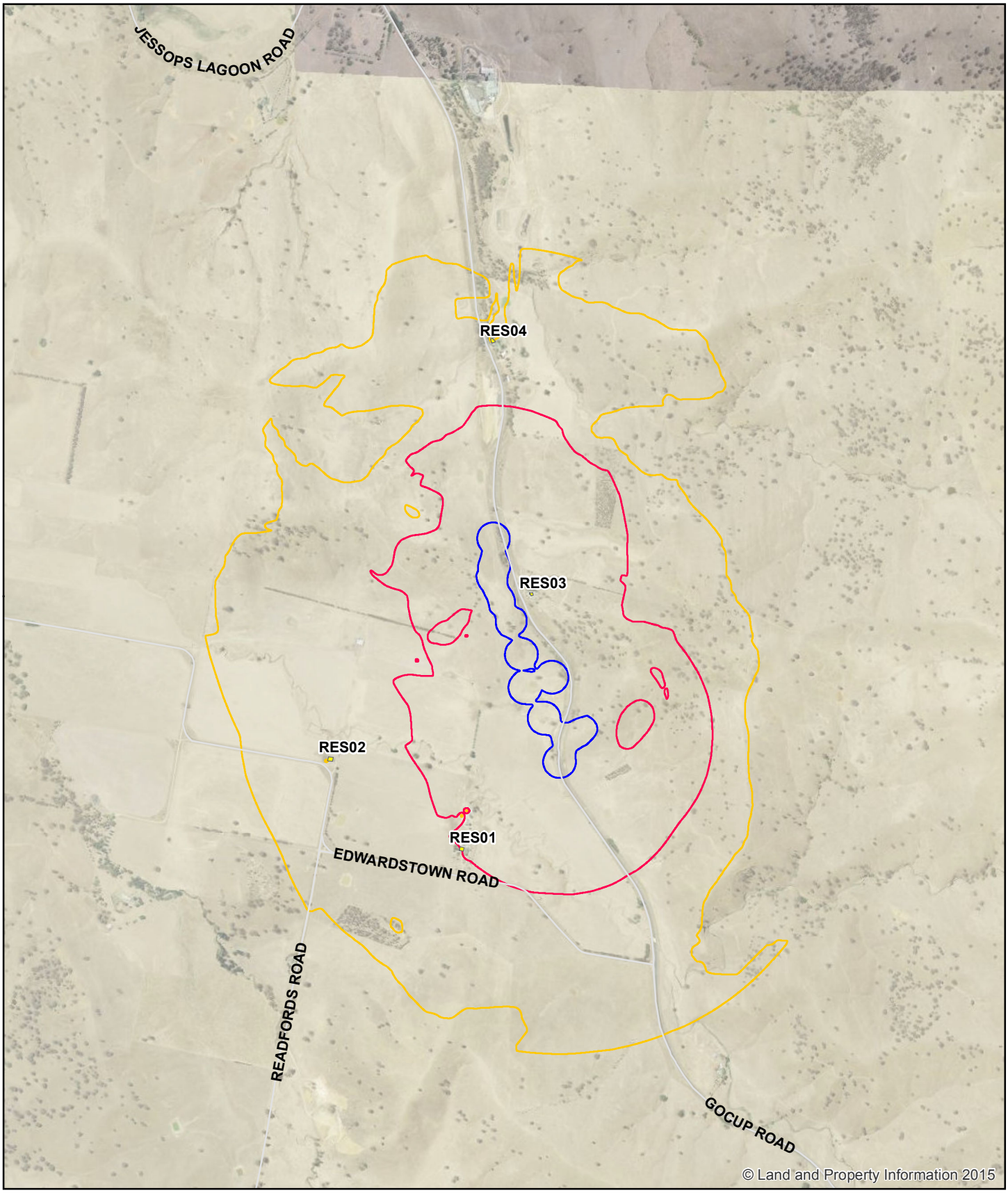

LEGEND

- Building
- Day - Moderately intrusive - [Standard hours (N, V)]; [OOHW Period 1 (V, N, R1, DR)]
- Day - Highly intrusive - [Standard hours (N,V)]; [OOHW Period 1 (V, IB, N, R1, DR, PC, SN)]
- Day - Highly noise affected - [All hours (N, V, PC, RO)]

Paper Size A4

0 75 150 300 450 600

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Roads and Maritime Services
Gocup Road upgrade - Cookoomooroo

Scenario 5 Bulk earthworks :
Noise management zones

Job Number 23-15894
Revision A
Date 21 Oct 2016

Figure E-5

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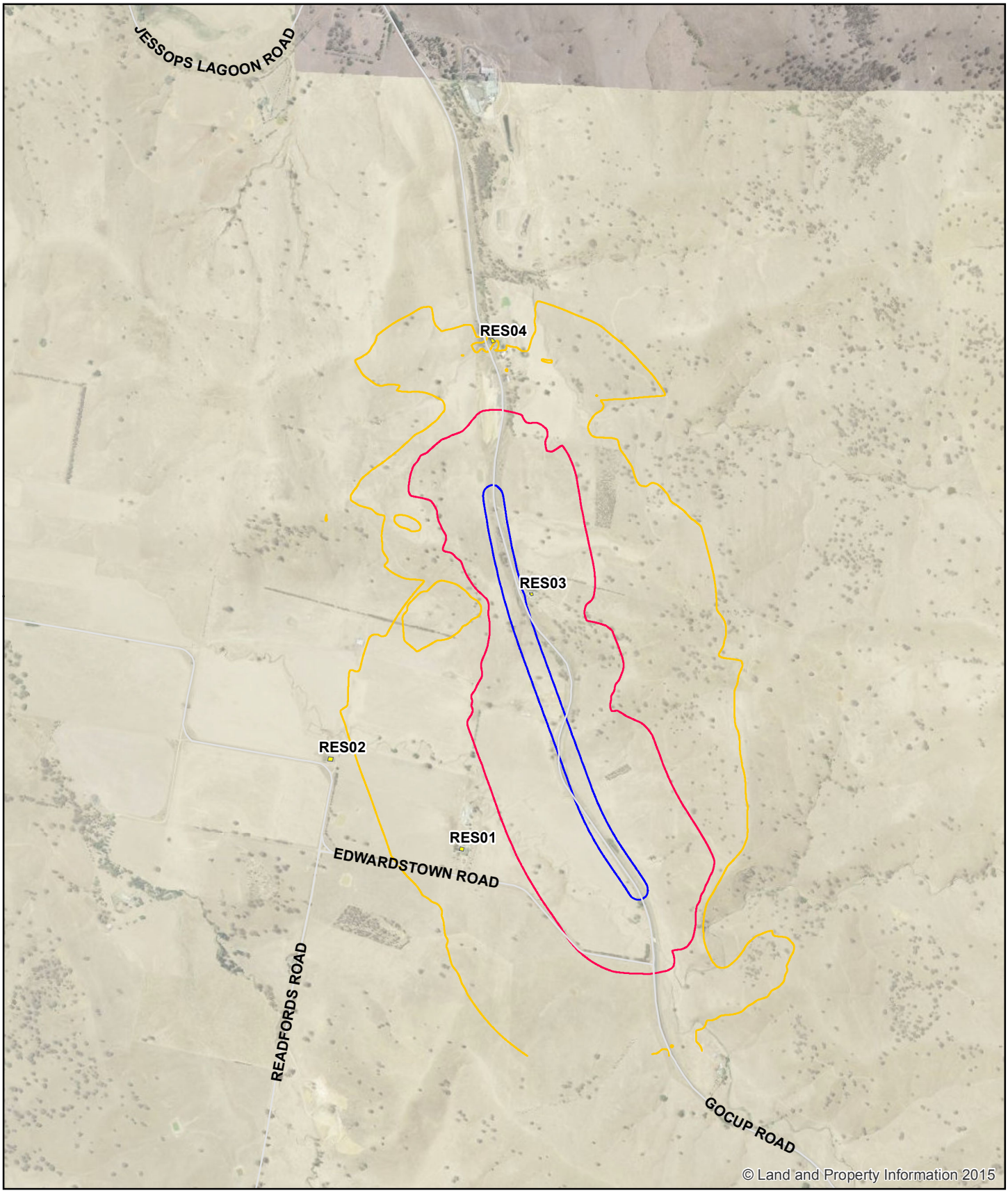

LEGEND

- Building
- Day - Moderately intrusive - [Standard hours (N, V)]; [OOHW Period 1 (V, N, R1, DR)]
- Day - Highly intrusive - [Standard hours (N,V)]; [OOHW Period 1 (V, IB, N, R1, DR, PC, SN)]
- Day - Highly noise affected - [All hours (N, V, PC, RO)]

Paper Size A4

0 75 150 300 450 600

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Roads and Maritime Services
Gocup Road upgrade - Cookoomooroo

Scenario 6 Pavement / asphalting :
Noise management zones

Job Number 23-15894
Revision A
Date 21 Oct 2016

Figure E-6

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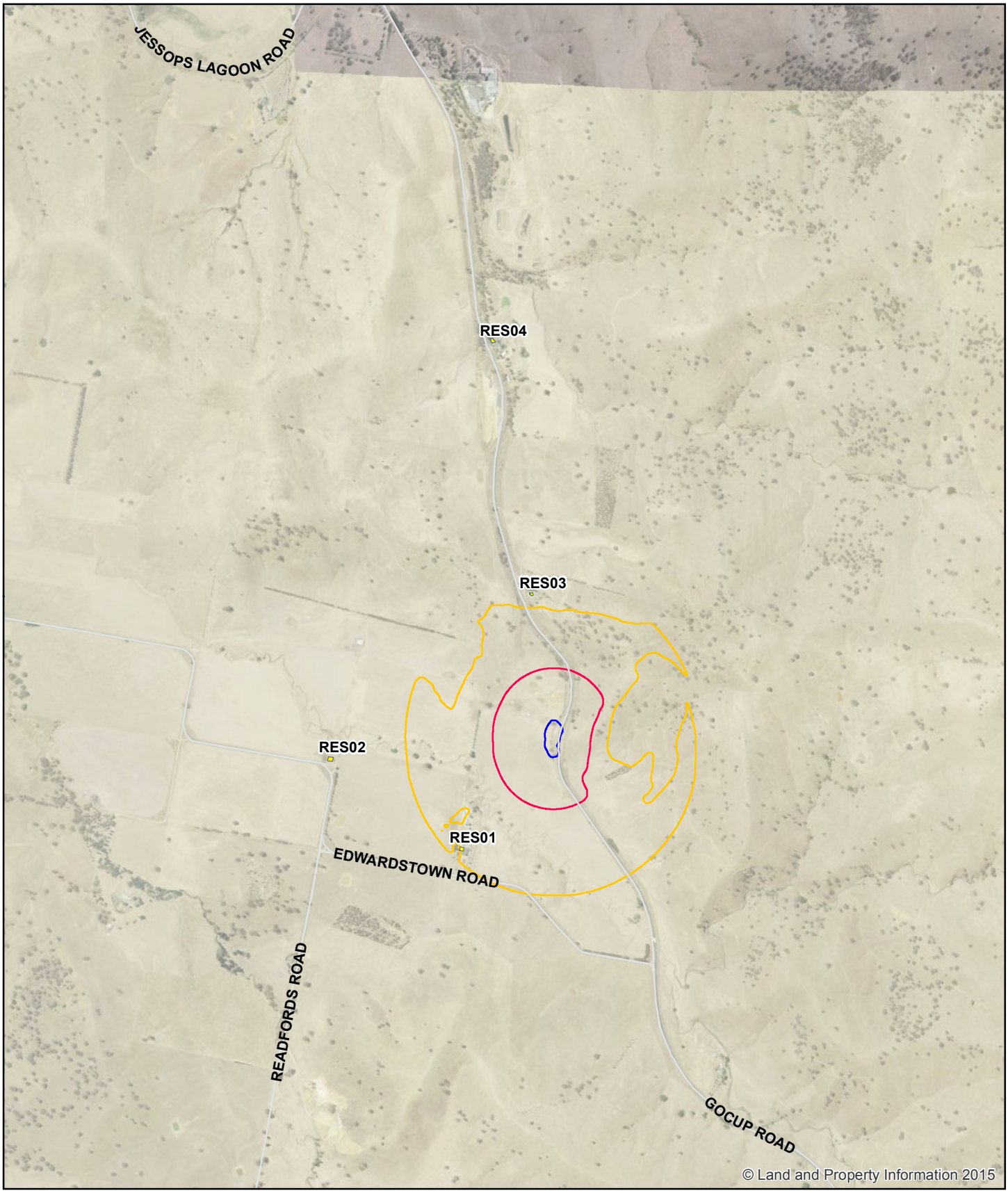

LEGEND

- Building
- Day - Moderately intrusive - [Standard hours (N, V)]; [OOHW Period 1 (V, N, R1, DR)]
- Day - Highly intrusive - [Standard hours (N,V)]; [OOHW Period 1 (V, IB, N, R1, DR, PC, SN)]
- Day - Highly noise affected - [All hours (N, V, PC, RO)]

Paper Size A4

0 75 150 300 450 600

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Roads and Maritime Services
Gocup Road upgrade - Cookoomooroo

Scenario 7 Compound operation
Noise management zones

Job Number 23-15894
Revision A
Date 21 Oct 2016

Figure E-7

Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

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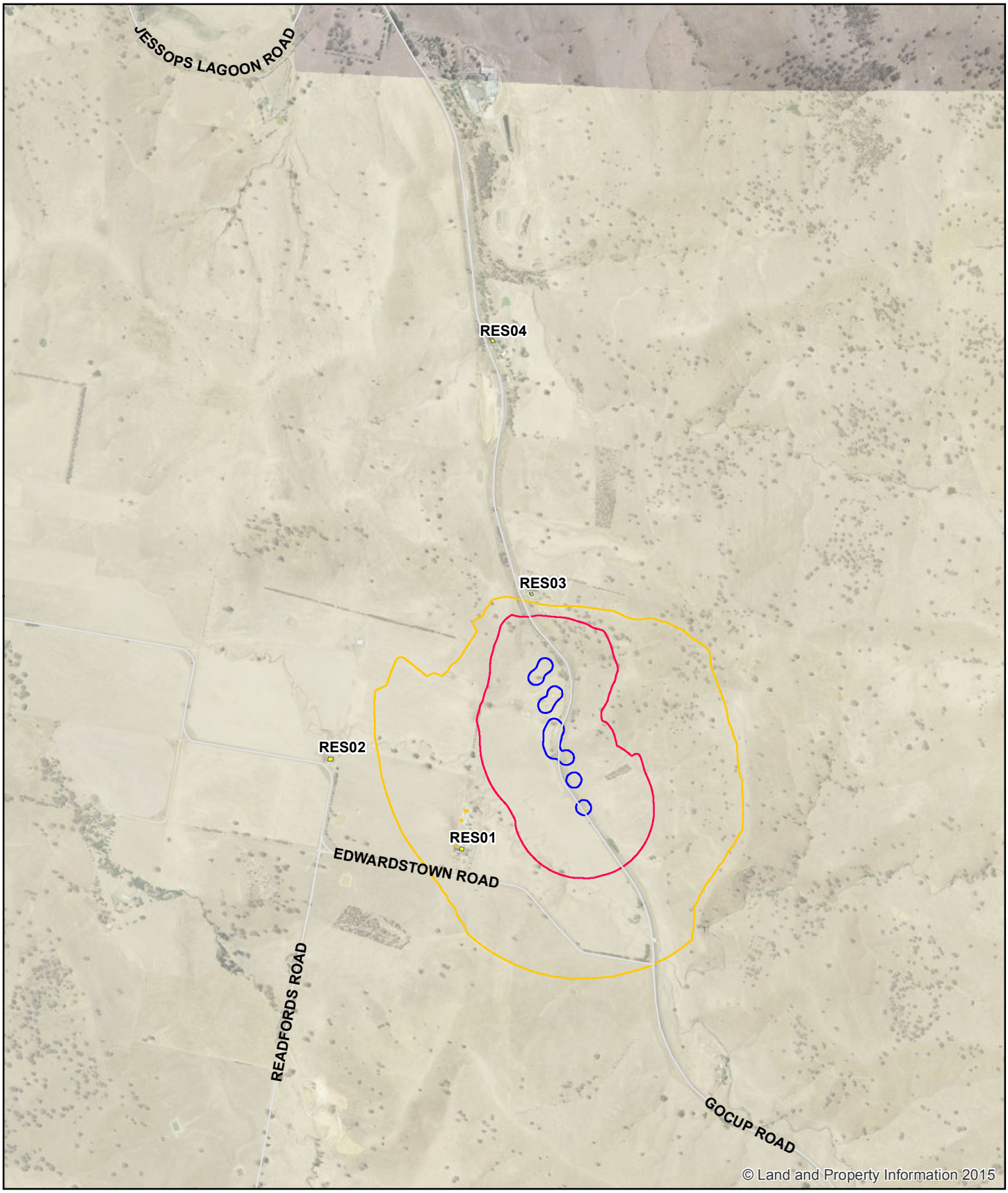

LEGEND

- Building
- Day - Moderately intrusive - [Standard hours (N, V)]; [OOHW Period 1 (V, N, R1, DR)]
- Day - Highly intrusive - [Standard hours (N,V)]; [OOHW Period 1 (V, IB, N, R1, DR, PC, SN)]
- Day - Highly noise affected - [All hours (N, V, PC, RO)]

Paper Size A4

0 75 150 300 450 600

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Roads and Maritime Services
Gocup Road upgrade - Cookoomooroo

Scenario 8 Site clean-up and rehabilitation : Noise management zones

Job Number 23-15894
Revision A
Date 21 Oct 2016

Figure E-8

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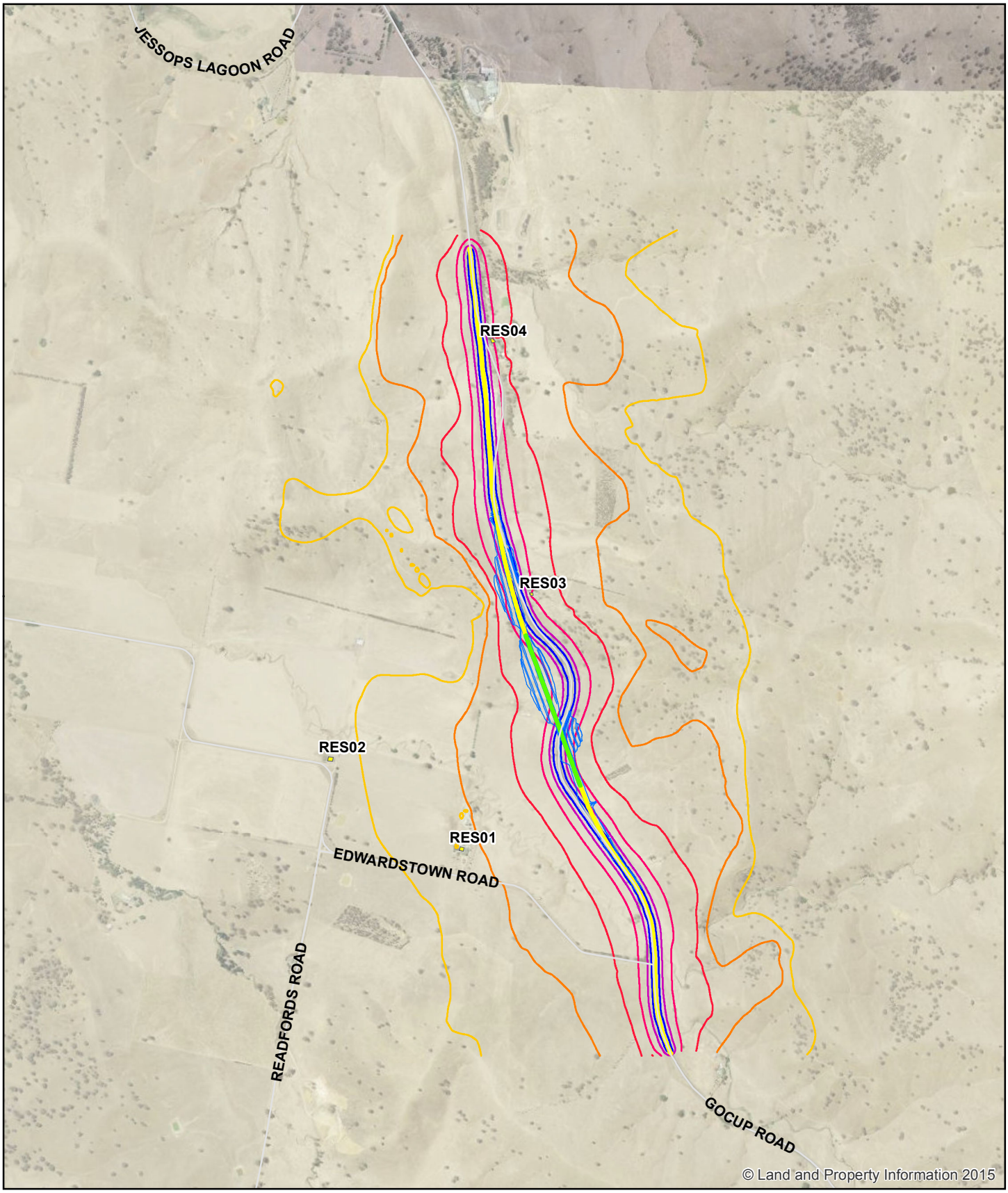
Appendix F – Operational noise levels at sensitive receivers, dBA

Appendix F - Predicted operational noise levels, dBA

Receiver ID	Facade receiver location		Direction	Floor	2019 no build		2019 build		2029 no build		2029 build		Controlling criteria		Exceedance		Is controlling criteria exceeded?		Is cumulative limit exceeded?		Is acute criteria exceeded?		Change in noise level (2029)		Qualifies for noise mitigation?
	x	y			Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	
RES01	599902.091	6112435.84	N	GF	43	40	42	39	45	42	44	42	56	51	-	-	No	No	No	No	-	-	-	-	No
RES02	599386.449	6112785.03	E	GF	39	36	38	35	41	38	40	38	55	50	-	-	No	No	No	No	-	-	-	-	No
RES03	600170.54	6113446.94	W	GF	58	55	49	46	60	57	51	48	60	55	-	-	No	No	No	No	-	-	-	-	No
RES04	600016.353	6114456.36	W	GF	57	54	57	54	59	57	59	56	60	55	-	1	No	Yes	No	No	-	-	-	-0.1	No

Appendix G – Predicted operational noise contours, dBA



LEGEND

- Site location
- Building
- Road - new
- Road - redeveloped

dBA

- 40
- 45
- 50
- 55
- 60
- 65

Paper Size A4

0 75 150 300 450 600

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Roads and Maritime Services
Gocup Road upgrade - Cookoomooroo

2019 No Build Day: Predicted road traffic noise levels (facade corrected), dBA

Job Number 23-15894
Revision A
Date 21 Oct 2016

Figure G-1

Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

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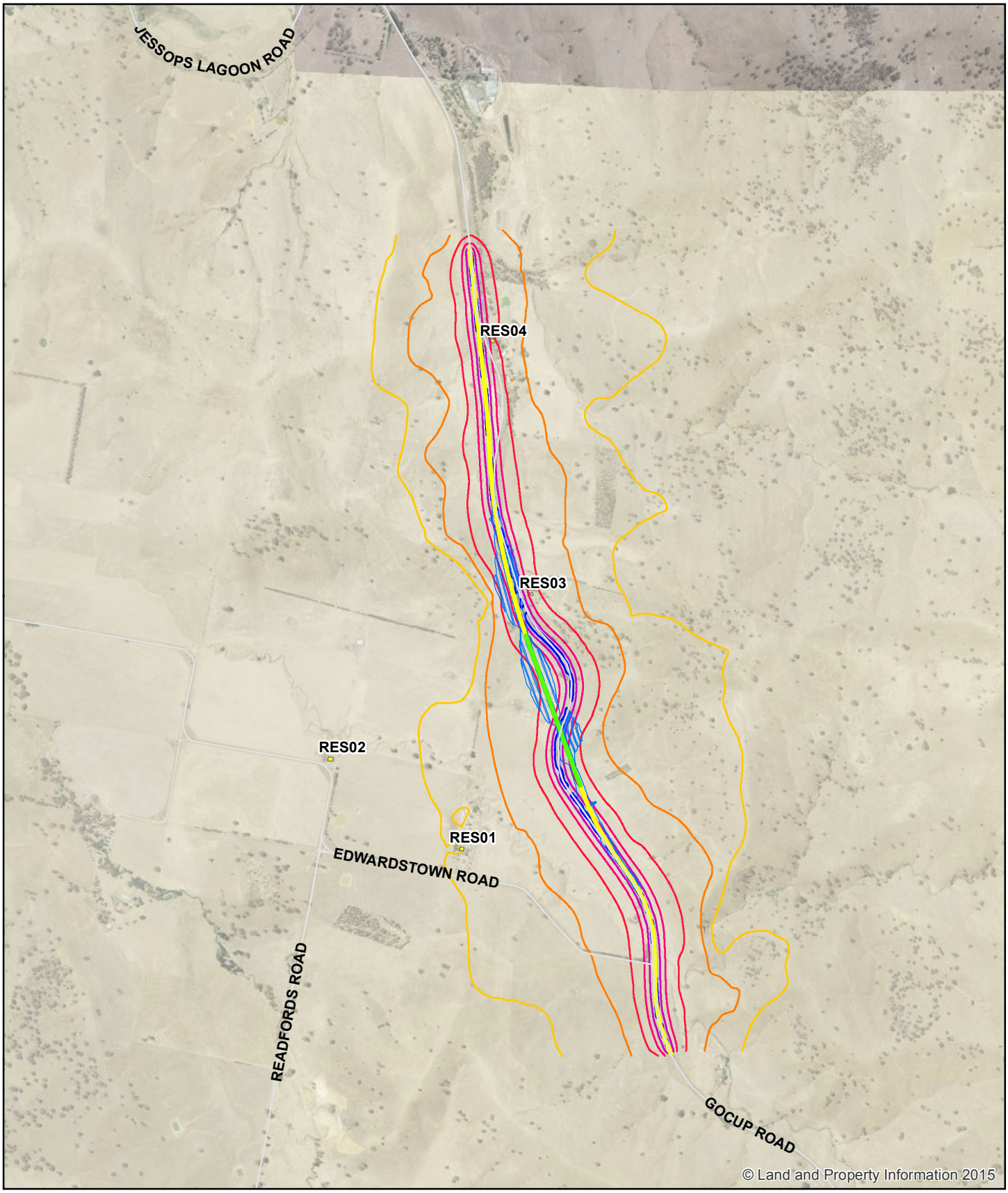
Data source: Data Custodian, Data Set Name/Title, Version/Date. Created by:afoddy



LEGEND

- Site location
- Building
- Road - new
- Road - redeveloped

dBA

- 40
- 45
- 50
- 55
- 60
- 65

Paper Size A4

0 75 150 300 450 600

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

GHD

Roads and Maritime Services
Gocup Road upgrade - Cookoomooroo

2019 No Build Night: Predicted road traffic noise levels (facade corrected), dBA

Job Number 23-15894
Revision A
Date 21 Oct 2016

Figure G-2

Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

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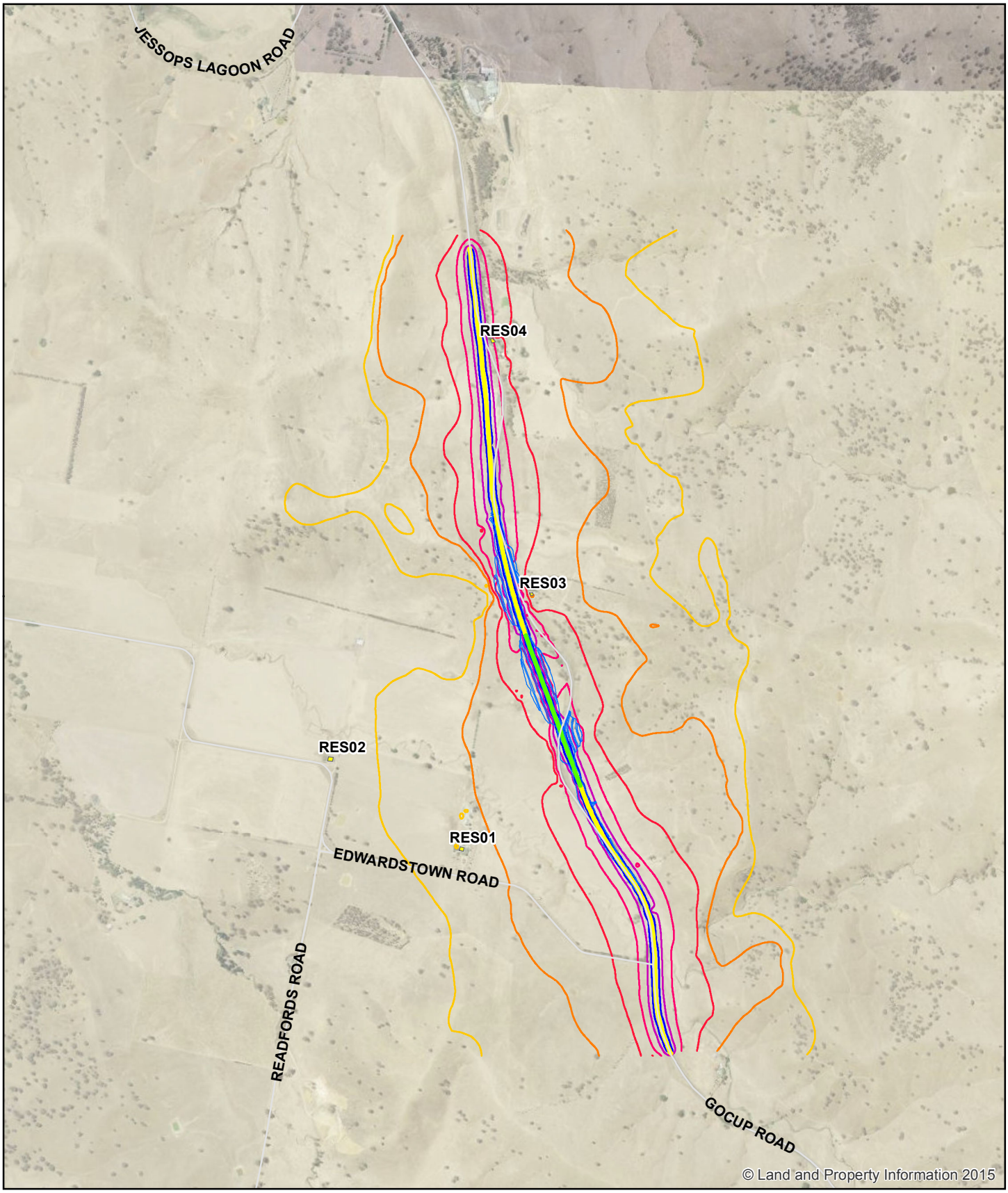

LEGEND

Site location	dBA		55
Building		40	60
Road - new		45	65
Road - redeveloped		50	

Paper Size A4

0 75 150 300 450 600

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Roads and Maritime Services
Gocup Road upgrade - Cookoomooroo

2019 Build Day: Predicted road traffic noise levels (facade corrected), dBA

Job Number	23-15894
Revision	A
Date	21 Oct 2016

Figure G-3

Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

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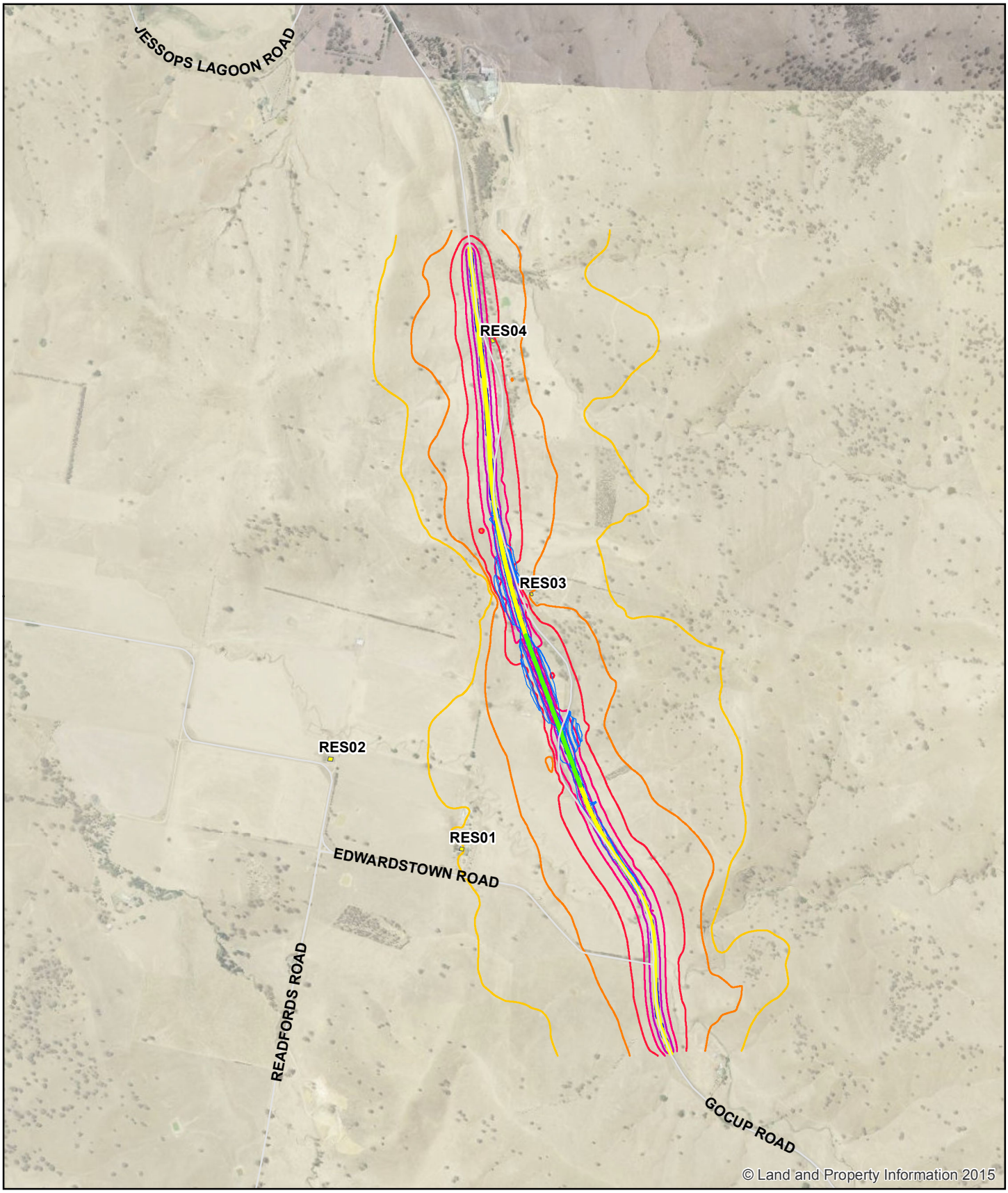

LEGEND

Site location	**dBA**		55
Building		40	60
Road - new		45	65
Road - redeveloped		50	

Paper Size A4

0 75 150 300 450 600

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Roads and Maritime Services
Gocup Road upgrade - Cookoomooroo

2019 Build Night: Predicted road traffic noise levels (facade corrected), dBA

Job Number 23-15894
Revision A
Date 21 Oct 2016

Figure G-4

Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

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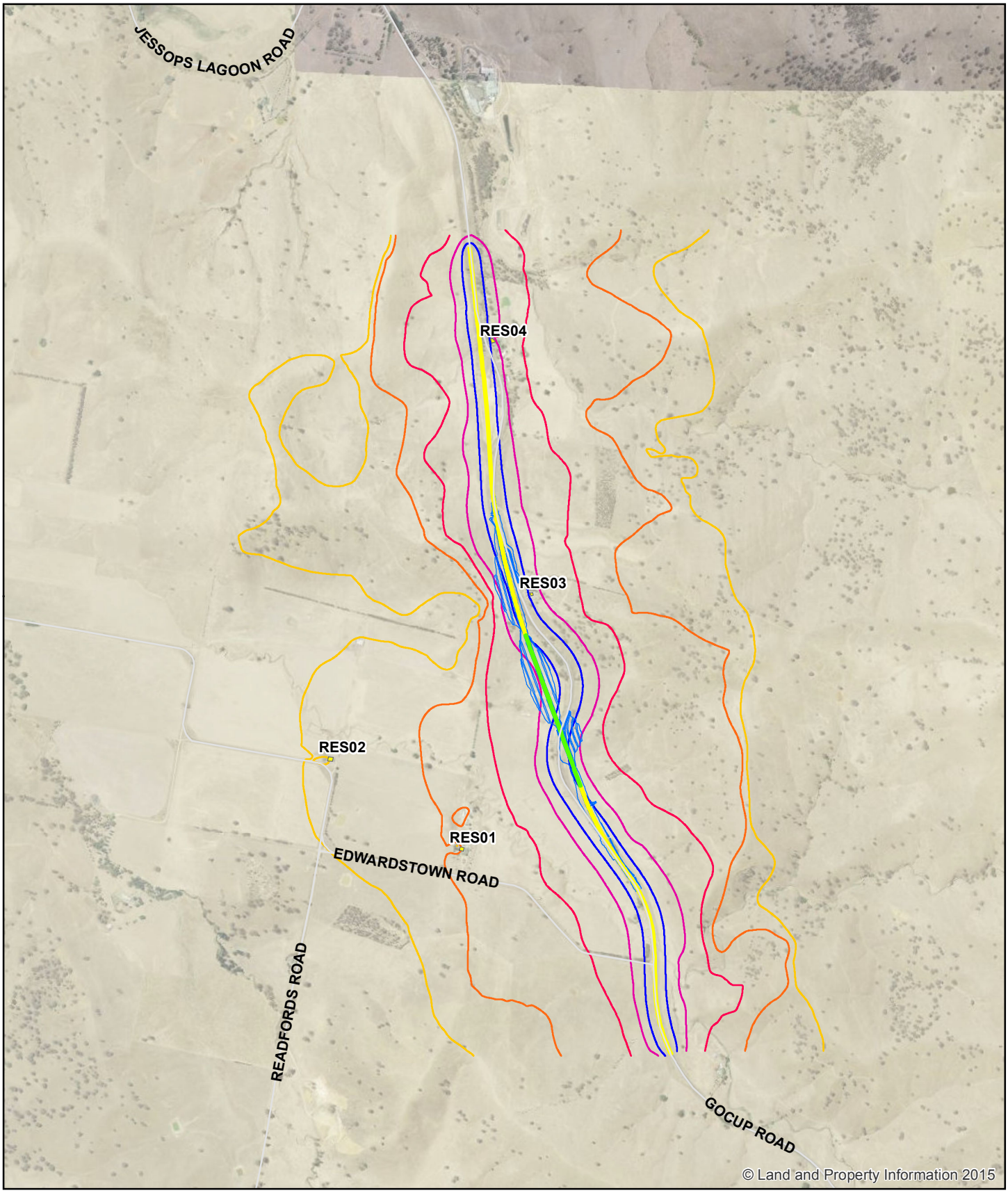

LEGEND

- Site location
- Building
- Road - new
- Road - redeveloped

dBA

- 40
- 45
- 50
- 55
- 60

Paper Size A4

0 75 150 300 450 600

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Roads and Maritime Services
Gocup Road upgrade - Cookoomooroo

2029 No Build Day: Predicted road traffic noise levels (facade corrected), dBA

Job Number 23-15894
Revision A
Date 21 Oct 2016

Figure G-5

Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

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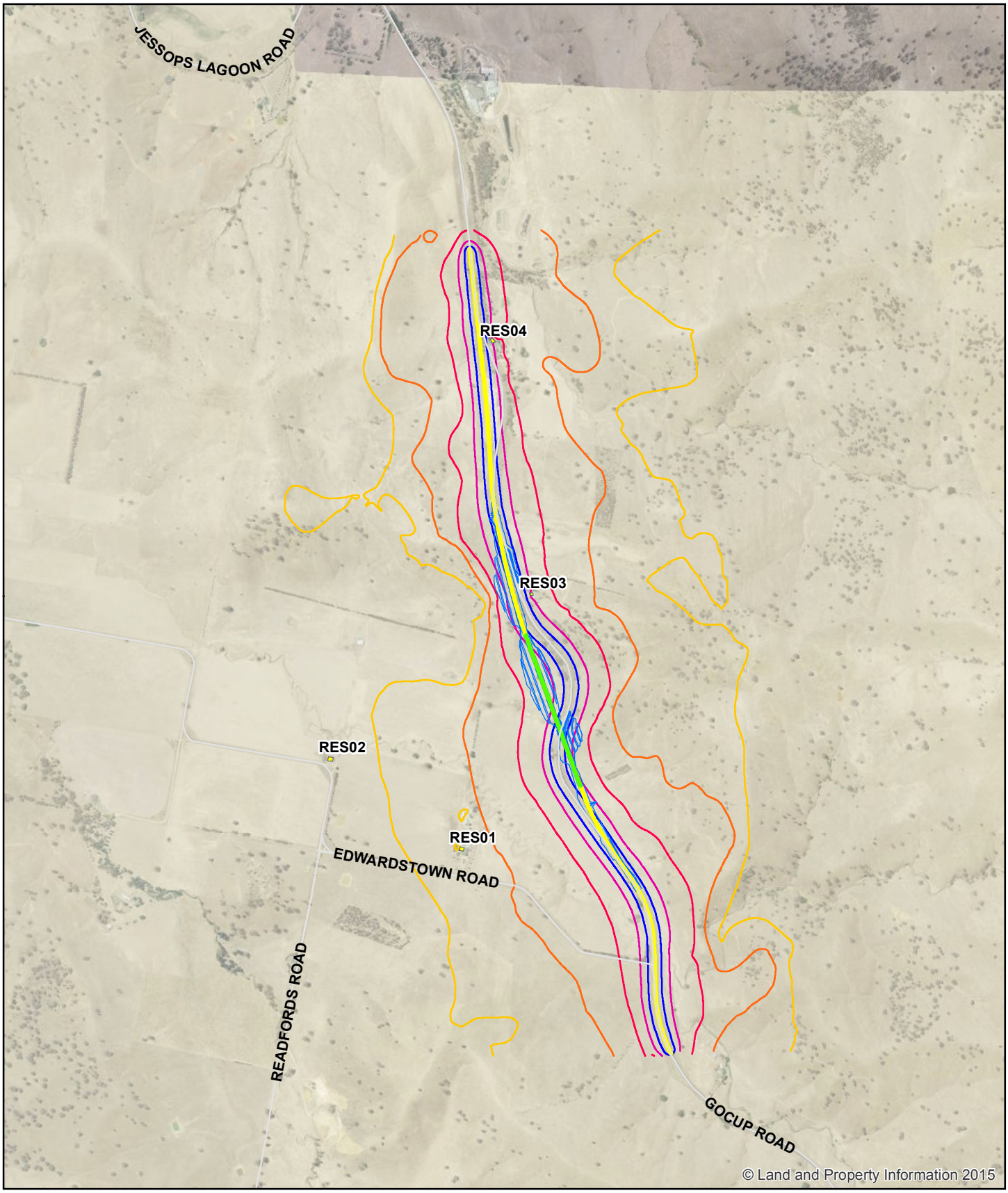

LEGEND

- Site location
- Building
- Road - new
- Road - redeveloped

dBA

- 40
- 45
- 50
- 55
- 60

Paper Size A4

0 75 150 300 450 600

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Roads and Maritime Services
Gocup Road upgrade - Cookoomooroo

2029 No Build Night: Predicted road traffic noise levels (facade corrected), dBA

Job Number 23-15894
Revision A
Date 21 Oct 2016

Figure G-6

Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

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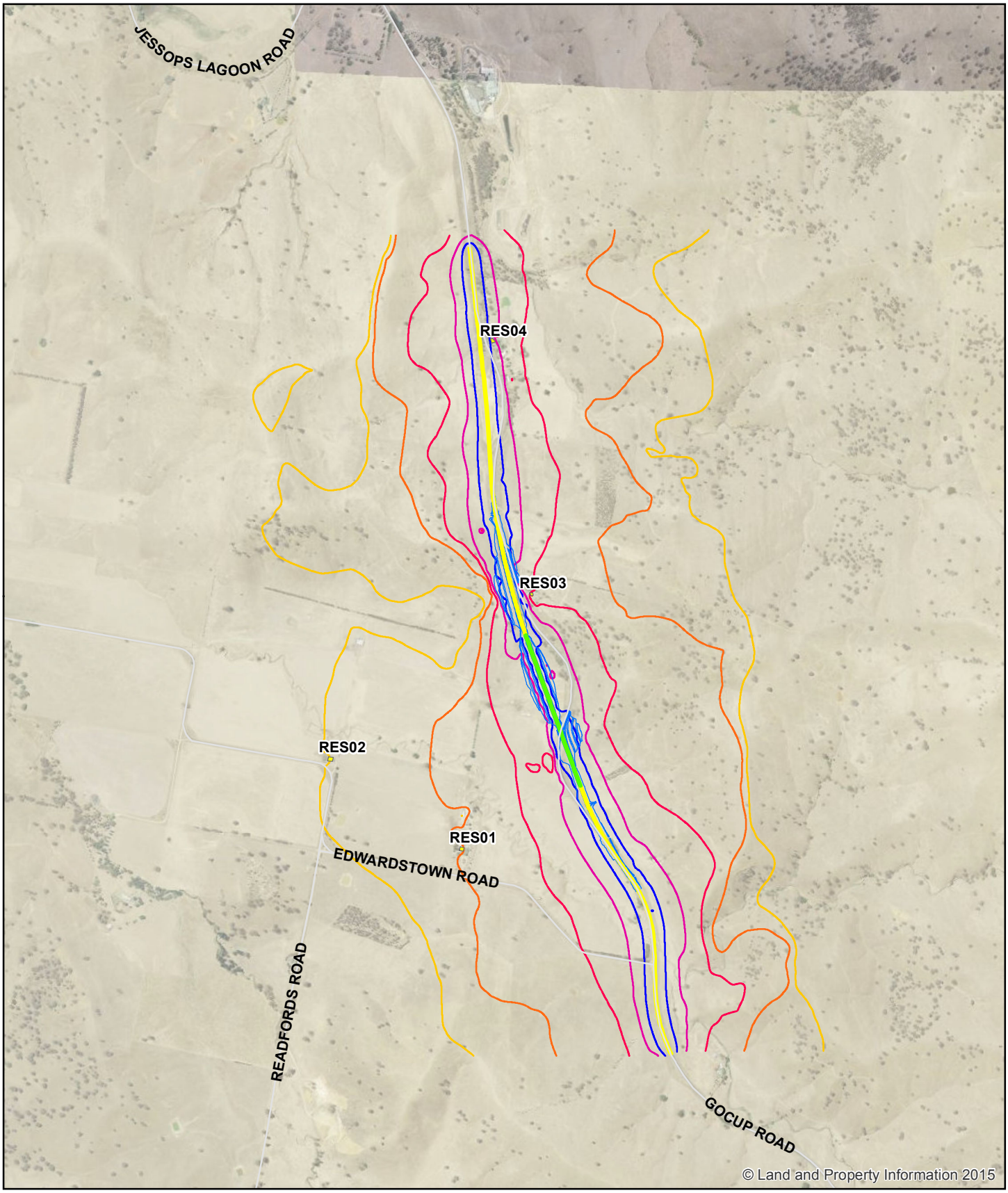

LEGEND

- Site location
- Building
- Road - new
- Road - redeveloped

dBA

- 40
- 45
- 50
- 55
- 60

Paper Size A4

0 75 150 300 450 600

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Roads and Maritime Services
Gocup Road upgrade - Cookoomooroo

2029 Build Day: Predicted road traffic noise levels (facade corrected), dBA

Job Number	23-15894
Revision	A
Date	21 Oct 2016

Figure G-7

Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

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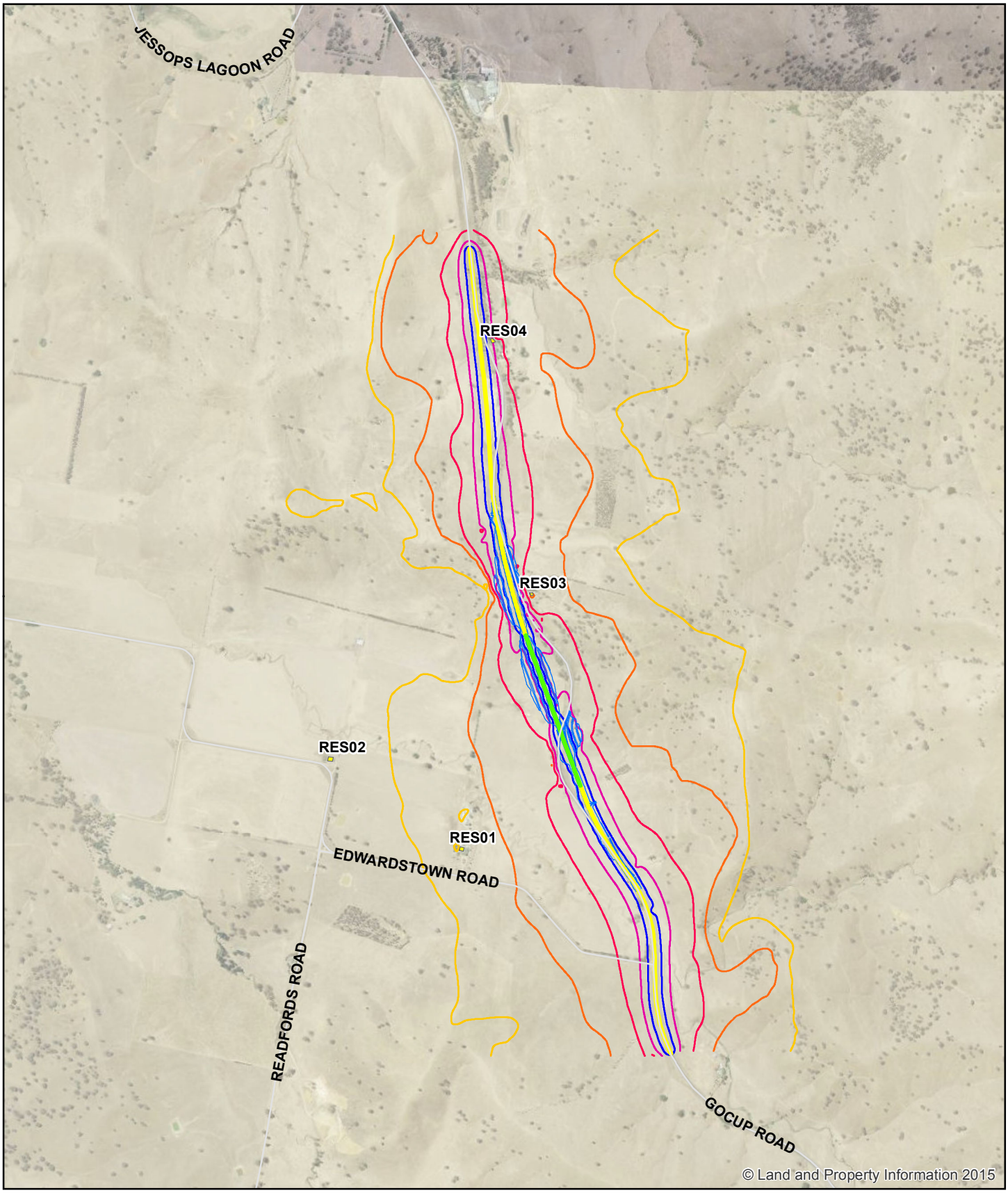

LEGEND

- Site location
- Building
- Road - new
- Road - redeveloped

dBA

- 40
- 45
- 50
- 55
- 60

Paper Size A4

0 75 150 300 450 600

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Roads and Maritime Services
Gocup Road upgrade - Cookoomooroo

2029 Build Night: Predicted road traffic noise levels (facade corrected), dBA

Job Number	23-15894
Revision	A
Date	21 Oct 2016

Figure G-8

Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

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Appendix H – Maximum noise level assessment details

$L_{Aeq(1hr)}$	11pm	12am	1am	2am	3am	4am	5am	6am	7am
Thursday-11-Aug-16	-	-	-	-	-	-	-	45.7	44.7
Friday-12-Aug-16	45.1	41.8	43.9	45.0	47.7	48.8	48.8	43.4	42.8
Saturday-13-Aug-16	41.0	41.9	40.5	42.8	37.9	44.0	43.2	40.6	42.3
Sunday-14-Aug-16	43.7	32.7	34.4	38.2	39.5	40.5	44.6	40.3	41.2
Monday-15-Aug-16	41.1	37.6	40.0	43.3	44.4	47.8	47.5	45.3	44.9
Tuesday-16-Aug-16	43.7	43.8	44.8	44.3	48.6	49.4	50.3	45.7	42.2
Wednesday-17-Aug-16	43.7	41.9	39.5	45.1	46.9	48.3	50.4	45.7	44.9
Thursday-18-Aug-16	44.0	42.2	43.5	43.9	45.5	47.4	47.7	47.7	46.6
Friday-19-Aug-16	44.4	44.8	41.2	44.7	47.4	49.4	49.1	41.9	41.1
Saturday-20-Aug-16	39.7	41.0	39.5	39.1	37.6	37.3	44.5	43.3	42.1
Sunday-21-Aug-16	45.0	42.4	38.3	40.9	39.6	40.0	45.8	44.4	42.9
Monday-22-Aug-16	45.1	45.0	40.5	42.3	46.6	47.5	49.4	-	-

$L_{Amax(1hr)}$	11pm	12am	1am	2am	3am	4am	5am	6am	7am
Thursday-11-Aug-16	-	-	-	-	-	-	-	65.6	62.9
Friday-12-Aug-16	63.6	59.8	60.9	61.3	64.9	63.5	63.8	60.9	62.5
Saturday-13-Aug-16	59.7	62.7	59.4	62.9	56.3	63.2	63.8	57.9	61.8
Sunday-14-Aug-16	62.3	56.8	54.0	62.4	61.6	61.9	63.3	62.7	61.8
Monday-15-Aug-16	61.8	61.1	60.7	62.5	61.0	64.7	67.7	79.5	63.5
Tuesday-16-Aug-16	65.6	62.6	60.8	64.2	67.2	63.8	66.7	62.7	60.8
Wednesday-17-Aug-16	62.8	62.6	58.6	61.6	64.7	66.3	73.0	63.3	62.5
Thursday-18-Aug-16	64.4	60.8	64.2	60.6	63.4	63.7	64.7	68.6	66.2
Friday-19-Aug-16	63.7	63.3	61.4	60.9	65.5	68.8	68.7	60.0	59.5
Saturday-20-Aug-16	59.1	59.3	60.3	55.7	55.1	53.4	64.2	62.6	60.4
Sunday-21-Aug-16	64.7	61.1	58.0	60.1	60.3	56.8	62.0	64.5	62.0
Monday-22-Aug-16	64.4	67.5	61.6	60.0	63.6	64.4	65.1	-	-

Hourly difference: $L_{Amax(1\ hr)} - L_{Aeq(1\ hr)}$	11pm	12am	1am	2am	3am	4am	5am	6am	7am
Thursday-11-Aug-16	-	-	-	-	-	-	-	19.9	18.2
Friday-12-Aug-16	18.5	18.0	17.0	16.3	17.2	14.7	15.0	17.5	19.7
Saturday-13-Aug-16	18.7	20.8	18.9	20.1	18.4	19.2	20.6	17.3	19.5
Sunday-14-Aug-16	18.6	24.1	19.6	24.2	22.1	21.4	18.7	22.4	20.6
Monday-15-Aug-16	20.7	23.5	20.7	19.2	16.6	16.9	20.2	34.2	18.6
Tuesday-16-Aug-16	21.9	18.8	16.0	19.9	18.6	14.4	16.4	17.0	18.6
Wednesday-17-Aug-16	19.1	20.7	19.1	16.5	17.8	18.0	22.6	17.6	17.6
Thursday-18-Aug-16	20.4	18.6	20.7	16.7	17.9	16.3	17.0	20.9	19.6
Friday-19-Aug-16	19.3	18.5	20.2	16.2	18.1	19.4	19.6	18.1	18.4
Saturday-20-Aug-16	19.4	18.3	20.8	16.6	17.5	16.1	19.7	19.3	18.3
Sunday-21-Aug-16	19.7	18.7	19.7	19.2	20.7	16.8	16.2	20.1	19.1
Monday-22-Aug-16	19.3	22.5	21.1	17.7	17.0	16.9	15.7	-	-

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Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
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Appendix D

Aboriginal heritage assessments

GOCUP ROAD (MR297) UPGRADE

Aboriginal Cultural Heritage Assessment Report

Prepared for Roads and Maritime Services

Gundagai and Tumut Local Government Areas

August 2015

Ref. 1416

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Document Summary

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Recipient	Suzette Graham; Andrew Whitton
Issue Date	31 August 2015
Prepared by	Dr Matthew Kelleher; Ben Anderson
Approved by	Dr Matthew Kelleher; Alison Nightingale

Gocup Road (MR297) Upgrade
Aboriginal Cultural Heritage Assessment Report
Portions of this document have been censored for reason of confidentiality to protect sensitive cultural information

Executive Summary

Roads and Maritime Services (RMS) propose to undertake a series of upgrade works along the length of Gocup Road (MR279) between Tumut and Gundagai, NSW. The proposed upgrade works are required to accommodate modern freight demands and address vehicle safety requirements. The program of works along Gocup Road would be assessed by completing five separate Review of Environmental Factors (REFs). In discussions between RMS and the Office of Environment and Heritage (OEH) it was determined that a single Aboriginal Heritage Impact Permit (AHIP) should be sought covering the entire road upgrade to ensure a comprehensive and consistent approach to the management of Aboriginal heritage. RMS engaged Kelleher Nightingale Consulting Pty Ltd (KNC) to prepare an Aboriginal Cultural Heritage Assessment Report (CHAR) for Aboriginal cultural and archaeological sites as part of the environmental assessment process for the proposed upgrades.

Six Aboriginal cultural sites (Sites A-F) were identified within the boundaries of the study area during an Aboriginal cultural assessment conducted by Waters Consultancy Pty Ltd. The sites comprised two ceremonial pathways, one seasonal pathway, one meeting place and camping area, one pathway associated with specific resource use and one remnant wetland that constituted a resource gathering area. All six cultural sites would be impacted by the proposed works.

A specific, site based mitigation for Aboriginal Cultural Site E would require the erection of a barrier fence [redacted] for the extent of the site prior to the commencement of construction works to ensure the site is not further affected as a result of construction work. The fencing would be verified prior to construction and maintained throughout the duration of works.

A shared mitigation measure has been developed in relation to the proposed impacts on the six identified Aboriginal cultural sites within the study area. The mitigation measure would involve the development of interpretative signage locating the six Aboriginal cultural sites (Sites A to F) within their broader cultural landscape, to be displayed in an appropriate area. The content of the signage would be developed in consultation with the Aboriginal knowledge holders. The preferred location for the placement of the signage, dependent on consultation with the relevant landholders, would be within the townships of Tumut and Gundagai.

Eleven Aboriginal archaeological sites were identified in the study area. The sites comprised eight artefact scatters, two isolated artefacts and one potential archaeological deposit. Seven of the ten archaeological sites overlap the identified Aboriginal cultural sites.

Early identification of archaeological sites has enabled three sites (Gocup Road 01A, Gocup Road 09 and Gocup Road PAD 01) to be conserved by designing around the sites and the impact to a fourth site (Gocup Road 06) was significantly reduced.

Eight of the identified sites would be impacted by the proposed works. An AHIP is being sought for the entirety of the lands subject to the proposed program of works and specifically for Aboriginal objects associated with sites:

Gocup Road 01B	56-3-0093	Artefact	Moderate	Total Impact
Gocup Road 02	56-3-0094	Artefact	Low	Total Impact
Gocup Road 03	56-3-0095	Artefact	Moderate	Total Impact
Gocup Road 04	56-3-0096	Artefact	Low	Total Impact
Gocup Road 05	56-3-0097	Artefact	Moderate	Total Impact
Gocup Road 06	56-3-0098	Artefact	Low	Partial Impact
Gocup Road 07	56-3-0099	Artefact	Moderate	Total Impact
Gocup Road 08	56-3-0100	Artefact	Low	Total Impact

Significant Aboriginal sites are identified as exhibiting at least moderate archaeological value. A mitigation program comprising archaeological salvage is required, prior to construction, where significant Aboriginal sites are impacted by the road upgrade. Mitigative salvage excavation would be required at Gocup Road 01B, Gocup Road 03, Gocup Road 05 and Gocup Road 07.

The CHAR has been prepared in accordance with the OEH *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH, April 2011) and complies with the RMS *Procedure for Aboriginal Cultural Heritage Consultation and Investigation* (PACHCI) (RMS 2011).

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Tables

1 Introduction

1.1 Proponent and consultants

Roads and Maritime Services (RMS) propose to undertake a series of upgrade works along the length of Gocup Road (MR279) between Tumut and Gundagai, NSW. The proposed upgrade works are required to accommodate modern freight demands and address vehicle safety requirements. The program of works along Gocup Road would be assessed by completing five separate Review of Environmental Factors (REFs). In discussions between RMS and the Office of Environment and Heritage (OEH) it was determined that a single Aboriginal Heritage Impact Permit (AHIP) should be sought covering the entire road upgrade to ensure a comprehensive and consistent approach to the management of Aboriginal heritage. RMS engaged Kelleher Nightingale Consulting Pty Ltd (KNC) to prepare an Aboriginal Cultural Heritage Assessment Report (CHAR) for Aboriginal cultural and archaeological sites as part of the environmental assessment process for the proposed upgrades.

1.2 Location and scope of activity

The proposed upgrade works would be conducted along the approximately 30km length of Gocup Road between the Snowy Mountains Highway (HW4) at Tumut and the Hume Highway (HW2) at South Gundagai (hereafter referred to as the study area). The study area traverses the Tumut and Gundagai local government areas and is located approximately 85km west of Canberra and 315km south west of Sydney (Figure 1).

The proposed upgrade works include:

- reconstruction of existing road pavement
- widening the existing road formation to 9.7 metres (3.5 metre lane widths, sealed shoulders to 1.35 metres wide and unsealed verge to 0.5 metres)
- upgrading of drainage including culverts, table drains and cut-off drains
- removal of hazards within the five metre clear zone, including vegetation, where possible
- utility relocation if required
- establishment of ancillary facilities such as site compounds and stockpile sites
- repairing of outer wheel path failures in the existing alignment through heavy patching
- excavating and trimming cut batters to allow for pavement widening and minor road realignment
- extending existing culverts to accommodate the widened roadway
- revegetation of exposed soils, and
- construction of two overtaking lanes.

1.3 Statutory controls and development context

The proposal is for road infrastructure carried out by RMS and would be assessed under Part 5 of the *Environmental Planning and Assessment Act 1979*. Aboriginal objects will be harmed by the upgrade of Gocup Road and an application for an AHIP is being made under section 90A of the *National Parks and Wildlife Act 1974*.

This Aboriginal CHAR has been prepared to support the AHIP application. It has been prepared in accordance with the OEH *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH, April 2011). The CHAR complies with the RMS *Procedure for Aboriginal Cultural Heritage Consultation and Investigation* (PACHCI) (RMS 2011).

1.4 National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* is the primary statutory control for the protection and regulation of Aboriginal heritage in New South Wales. Items of Aboriginal heritage (Aboriginal objects) or Aboriginal places (declared under section 84) are protected and regulated under the NPW Act.

An “Aboriginal object” is defined under the Act as “any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area that comprises New South Wales, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction and includes Aboriginal remains”. As such, Aboriginal objects are confined to physical evidence and are commonly referred to as Aboriginal sites.

Aboriginal objects and declared Aboriginal places are protected under section 86 of the Act. It is an offence to harm or desecrate an Aboriginal object, either knowingly [section 86 (1)] or unknowingly [section 86 (2)]. Harm includes to destroy, deface, damage or move. Penalties are tiered according to offences, which include:

- a person must not harm or desecrate an Aboriginal object that the person knows is an Aboriginal object
- a person must not harm an Aboriginal object (strict liability offence)
- a person must not harm or desecrate an Aboriginal place (strict liability offence)
- failure to notify OEH of the location of an Aboriginal object (existing offence and penalty)
- contravention of any condition of an AHIP.

Figure 1. Study area location

Under section 87 (1) it is a defence to a prosecution for an offence under section 86 (1), (2) or (4) if "(a) the harm or desecration concerned was authorised by an Aboriginal heritage impact permit and (b) the conditions to which that Aboriginal heritage impact permit was subject were not contravened".

Section 87 (2) of the Act provides a defence against prosecution under section 86 (2) if "the defendant exercised due diligence to determine whether the act or omission constituting the alleged offence would harm an Aboriginal object and reasonably determined that no Aboriginal object would be harmed". This defence appears to specifically relate to Aboriginal objects.

Section 89A of the Act relates to the notification of sites of Aboriginal objects, under which it is an offence if the location of an Aboriginal object is not notified to the Director-General in the prescribed manner within a reasonable time.

Under section 90 (1) of the Act "the Director-General may issue an Aboriginal heritage impact permit". The regulation of Aboriginal heritage impact permits is provided in Part 6 Division 2 of the Act (sections 90 to 90R), including regulations relating to consultation (section 90N).

An Aboriginal heritage impact permit (AHIP) is required for any activity which will harm an Aboriginal object or declared Aboriginal place.

1.5 Objectives of the Aboriginal cultural heritage assessment report

The objectives of the Aboriginal cultural heritage assessment are in accordance with the RMS PACHCI. The results of detailed consultation and assessment are integrated into this report. The report comprises:

- a description of the location and scope of the proposed project, including ancillary works (section 1);
- description and map of the study area (section 1);
- details of Aboriginal stakeholder identification, consultation and participation in the cultural and archaeological assessments (section 2);
- description of the methodologies and results of the cultural and archaeological assessments (sections 3, 4, 5 and 6);
- statement of significance, incorporating assessed cultural and archaeological values (section 7);
- an assessment of the potential impacts of the proposed upgrade works on identified cultural heritage values (section 8); and
- management and mitigation measures recommended for cultural and archaeological values identified through the assessment (section 9).

The study area contains Aboriginal objects (sites) which would be impacted by the proposal. Approval obtained under the *National Parks and Wildlife Act 1974* is required before impacting or harming these Aboriginal objects. The proponent is applying for an AHIP under section 90A of the Act.

In accordance with clause 80D of the *National Parks and Wildlife Regulation 2009* an application for an Aboriginal heritage impact permit is required to be accompanied by a cultural heritage assessment report. The cultural heritage assessment report is to provide information on:

- the significance of the Aboriginal objects or Aboriginal places that are the subject of the application
- the actual or likely harm to those Aboriginal objects or Aboriginal places from the proposal that is the subject of the application
- any practical measures that may be taken to protect and conserve those Aboriginal objects or Aboriginal places
- any practical measures that may be taken to avoid or mitigate any actual or likely harm to those Aboriginal objects or Aboriginal places.

The OEH *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH, April 2011) provides further guidance on the preparation of a cultural heritage assessment report. This report has been prepared in accordance with the requirements of the *National Parks and Wildlife Regulation 2009* and the OEH guide.

This CHAR has been prepared to accompany an application for an AHIP made by RMS for Aboriginal objects within the proposed road upgrade corridor.

2 Aboriginal Community Involvement

2.1 Aboriginal stakeholder consultation

RMS is committed to effective consultation with Aboriginal communities regarding RMS activities and their potential for impact on Aboriginal cultural heritage. The RMS PACHCI was developed to provide a consistent means of effective consultation with Aboriginal communities regarding activities which may impact on Aboriginal cultural heritage and a consistent assessment process for RMS activities across NSW.

The aim of consultation is to integrate cultural and archaeological knowledge and ensure registered stakeholders have information to make decisions on Aboriginal cultural heritage. For the preparation of this CHAR and application for an AHIP for the study area, consultation with Aboriginal people has been undertaken in accordance with the OEH *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (OEH 2010a) and the requirements of Clause 80C of *the National Parks and Wildlife Regulation 2009*.

RMS advertised (Appendix A) and contacted potential Aboriginal stakeholders identified from government agency notification responses. RMS invited Aboriginal people who hold knowledge relevant to determining the cultural heritage significance of Aboriginal objects and Aboriginal places in the area in which the proposed activity was to occur to register an interest in a process of community consultation. Investigations for the Gocup Road (MR279) Upgrade have included consultation with 62 Aboriginal community groups and individuals as listed in Table 1.

Table 1. Registered Aboriginal stakeholders

REGISTERED STAKEHOLDER GROUPS AND INDIVIDUALS		
Groups	**Representative / Contact**	
Brungle/Tumut Local Aboriginal Land Council		
Koomurri Ngunawal Aboriginal Corporation	Glen Freeman	
Ngunawal Heritage Aboriginal Corporation	Dean Delponte	
Waagan Waagan Project Group	Robert Hampton	
Individuals (Representative/Contact)		
Margaret Berg	Melissa Freeman	Peter Minogue
Kelly Caldwell	Nayah Freeman	Tamara Morgan
Enid Clarke	Norma Freeman	Clinton Murphy
Natalie Coe	Peter Freeman	Cheryl Penrith
Lindsay Connolly	Ramsey Freeman	Marty Riley
Steven Connolly	Jason Grovenor	Rick Riley
Douglas Connors	Ronald Grovenor Snr	Rodney Ring
Megan Considine	Ronald Grovenor Jnr	Troy Russell
Arinya Freeman	Robert Herrington	Shirley Tidmarsh
Arthur (Buddy) Freeman	William Herrington	Jared Tompkins
Ben Freeman	Raymond Hickling	Aaron Williams
Brad Freeman	Krystal Ingram	Alice Williams
Bruce Freeman	Shian Kennedy	Cathy Williams
Dean Freeman	Ray Little	Janice Williams
Donna Freeman	Shane Little	Neville Williams
Enid Freeman	Lawrence Marlowe	Nicole Williams
Jermayne Freeman	Mathew Marlowe	Peter Williams
Jerriwa Freeman	Shirley Marlowe	Roxanne Williams
Jirrah Freeman	Daniel McPherson	Sharon Williams
Keith Freeman	George McPherson	Troy Williams
Marney Freeman	Jodie McPherson	

The formal consultation process has included:

- advertising for registered stakeholders in the Gundagai Independent (22/09/2014), the Tumut and Adelong Times (23/09/2014), The Koori Mail (24/09/2014) and the National Indigenous Times (24/09/2014) (refer Appendix A);
- government agency notification letters;
- notification of closing date for registration;
- provision of proposed archaeological assessment methodology (27/10/2014) (allowing 28 day review)
- Aboriginal Focus Group (AFG) meeting held on 21/11/2014, at which the results of the preliminary archaeological assessment was presented and discussed. Registered Aboriginal stakeholders were invited to identify individuals they regarded as knowledge holders for the area;
- provision of proposed cultural assessment methodology (2/03/2015) (allowing 28 day review)
- ongoing compilation of registrants list, through continuing to register individuals and groups for consultation on the project;
- provision of draft CHAR (13/07/2015) (allowing 28 day review);
- Aboriginal Focus Group (AFG) meeting held on 22/07/2017, at which the draft archaeological assessment report and cultural assessment were presented and discussed; and
- ongoing consultation with the local Aboriginal community.

A copy of the draft CHAR was provided to Aboriginal stakeholders for a 28 day review and comment. No comments have been received.

2.2 Aboriginal Stakeholder Comments

Throughout the Aboriginal stakeholder consultation process it has been clearly identified that the study area has cultural heritage value to the local Aboriginal community. Some of the Aboriginal cultural heritage values expressed by stakeholders include:

- strong association with the land;
- responsibility to look after the land, including the heritage sites, plants and animals, creeks and the land itself;
- scarred trees;
- artefact sites and areas of potential;
- landscape features and areas of Aboriginal cultural value identified by knowledge holders;
- creek lines and dry swamps;
- Indigenous plants and animals; and
- general concern for burials, as their locations are not always known and they can be found anywhere.

2.3 Aboriginal knowledge holder identification

As part of the Aboriginal cultural assessment, registered Aboriginal stakeholders were invited to identify individuals they regarded as knowledge holders for the area. Identified knowledge holders have been invited to participate in the cultural assessment process. The methodology and results of the cultural assessment, as considered appropriate for incorporation into the CHAR, are outlined in Section 4.

3 Landscape Context

3.1 Landform, geology and soils

The study area is situated on the lower inland slopes of the Great Dividing Range and is characterised by low hill, hill and mountain landforms that separate the flood plains of the Murrumbidgee River in the north west and Tumut River in the east (Figure 2). The study area is divided into two catchment areas with a series of north west flowing waterways in the north (including Stony Creek and Big Ben Creek) flowing into the Murrumbidgee River and several north east flowing waterways in the south (including Gilmore, Gocup, Meadow, Minjary and Stuckeys Creeks) flowing into the Tumut River.

The northern portion of the study area extends from the flood plain of the Murrumbidgee River, with an elevation of approximately 220m above sea level (ASL), across the lower slopes and creek banks on the western side of a series of hills (including Brummys, Doctors and Halfway Hills) and reaching a maximum height of approximately 450m ASL. The southern portion of the study area continues from Stuckeys Creek south across the eastern slopes of a series of hills and mountains (including Minjary and Tabletop mountains) before crossing the flood plain of Gilmore Creek with a minimum elevation of approximately 260m ASL and finishing on the northern outskirts of Tumut.

The study area lies to the east of the Gilmore Fault Zone and within the south eastern portion of the Lachlan Fold Belt. The Lachlan Fold Belt consists of Cambrian to Early Carboniferous sedimentary and volcanic rocks which form north to north westerly folding bodies (NPWS 2003:120). The underlying geological structures have been instrumental in characterising the types of landform within the study area. Culturally, the geologic features have created natural pathways for past people to traverse the landscape as is evident in the archaeological features and retained cultural knowledge.

The elevated landforms of the study area were formed by the underlying Silurian Period Blowering Formation, Bumbolee Creek Formation and Jackalass Slate geologies. Blowering Formation geology is located between Gocup Creek and Gilmore Creek and comprises shales, siltstones and sandstones with a northern boundary of porphyritic dacite crystal ashfall tuff and subordinate medium grained non-porphyritic dacite crystal tuffs. Bumbolee Creek Formation formed the rugged hilly landforms from Doctors Hill to the Gocup Creek/Gilmore Creek watershed. Bumbolee Creek Formation is characterised by quartz-rich grey slate/shale, siltsone and fine sandstone with minor constituents of lithic and quartzose conglomerates in addition to foliated acid volcanics/dykes.

Jackalass Slate geology formed the steep hills north of Doctors Hill and is visible on the surface in moderate to abundant tombstone shaped outcrops. Jackalass Slate comprises grey or greenish slate and siltstone with common limonite/goethite cubes and quartz veins or pods. Chert beds have been documented within Jackalass Slate geology at Wither Hill approximately 5km east of the study area.

The gentle slopes, flats and floodplains of the Gocup, Meadow, Minjary and Stuckeys Creeks and Murrumbidgee River are formed from Quaternary alluvium. Quaternary alluvium comprises riverine and floodplain clay, silt, sand and gravel.

The soil landscape of the study area is characterised by Kurosols on elevated landforms, Sodosols within drainage channels and alluvial Tenosols along the Gilmore Creek flood plain. Kurosols are soils with distinct A and B horizons with strong acid B horizons. Sodosols are sodic soils with distinct A and B horizons that are not strongly acid. Tenosols are soils with weak soil profile development.

3.2 Sources of lithic raw material

The underlying geology of the region provided a ready source of lithic raw materials for past Aboriginal people. Quartz is the most commonly occurring material suitable for stone tool manufacture within the study area, being found in Jackalass Slate and Bumboleen Creek Formation geologies. Tuff is present in the Blowering Formation geology near Gilmore Creek and chert beds have been identified in Jackalass Slate geology including a deposit at Wither Hill approximately 5km east of the study area.

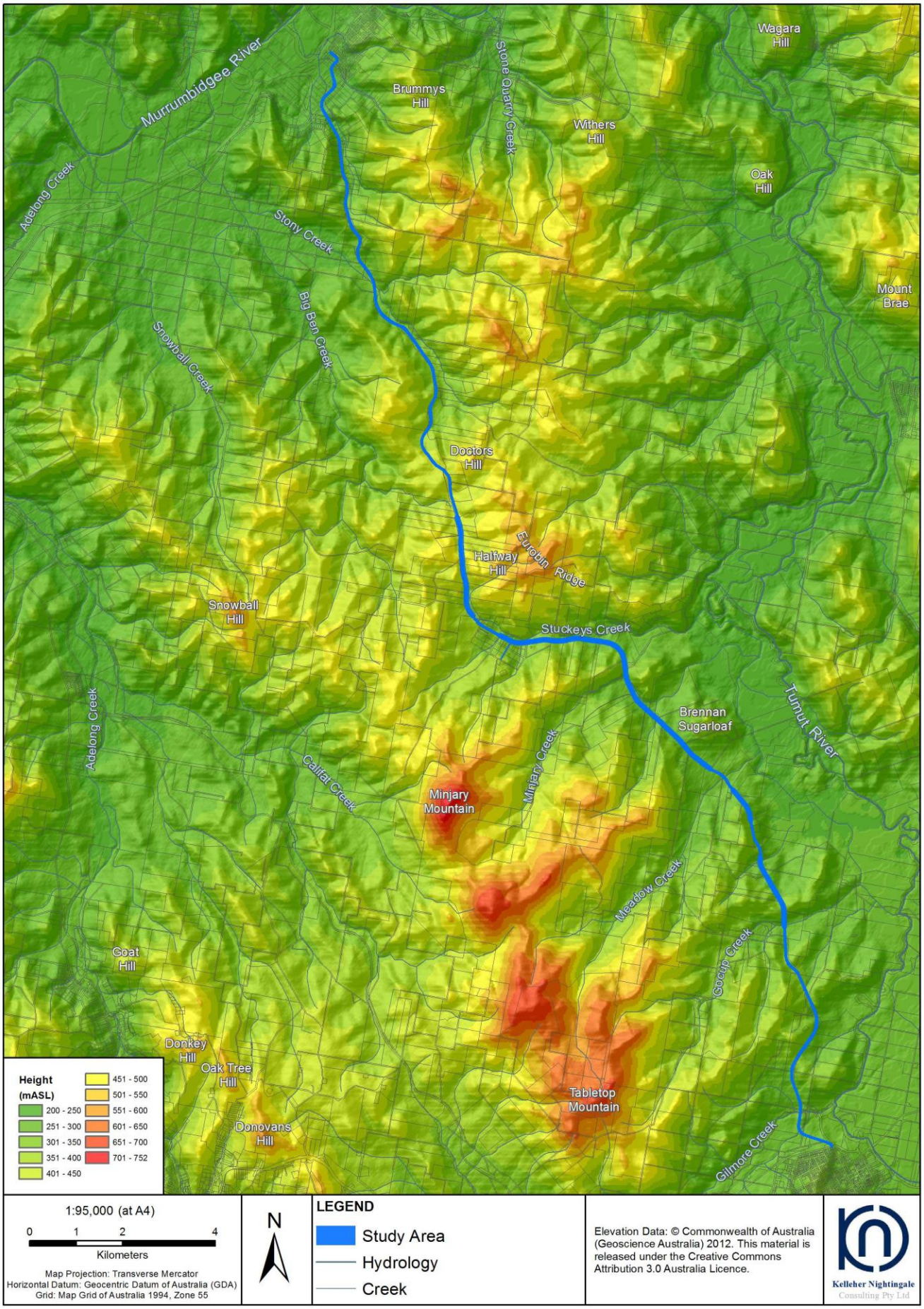

Figure 2. Landforms of the study area

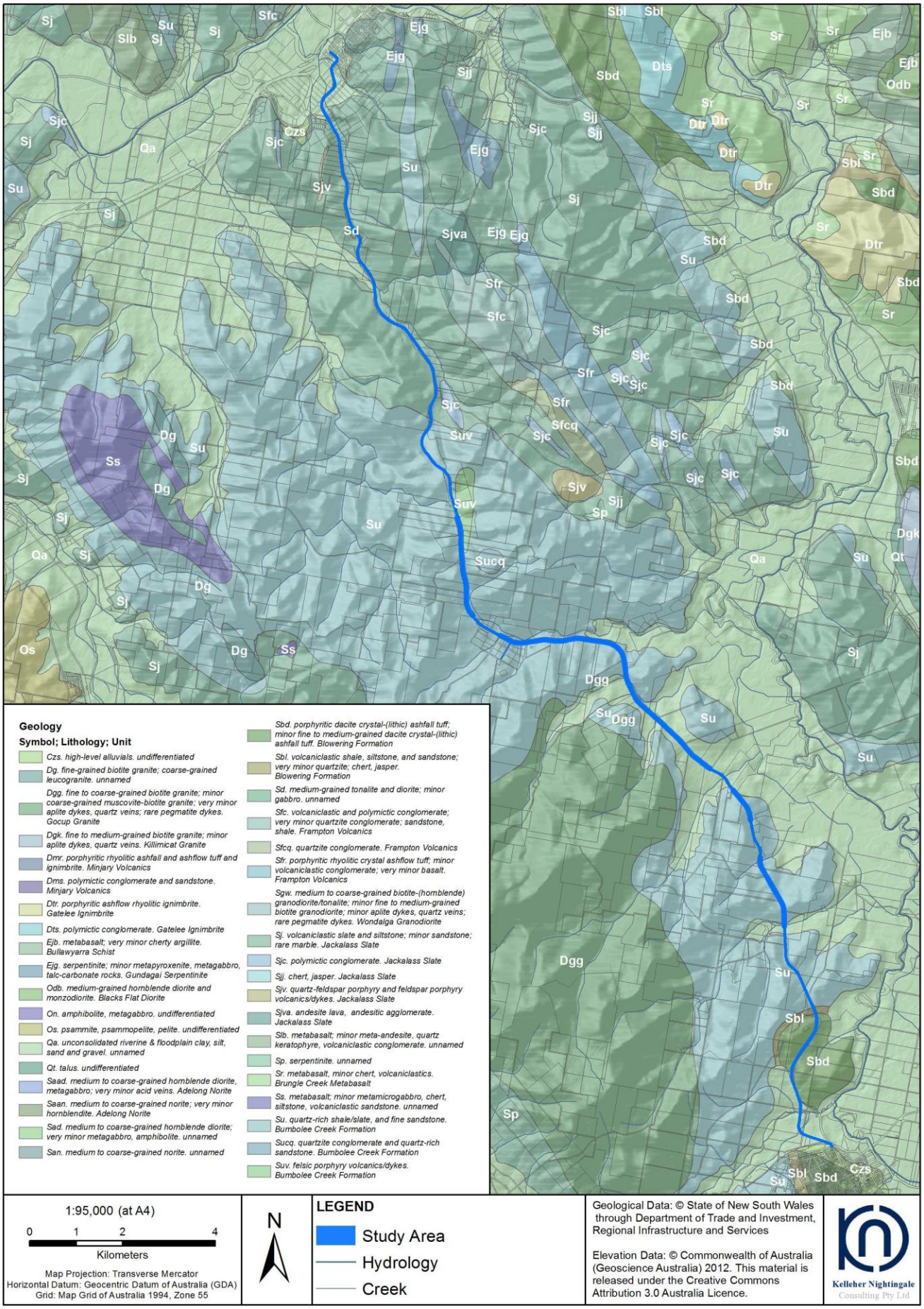

Figure 3. Geology of the study area

3.3 Vegetation and landuse history

The first Europeans to travel through the region were the explorers Hamilton Hume and Captain William Hovell in November 1824. British settlement of the region soon followed and by the time Charles Sturt travelled through the area in 1830 he found settlements at Jugiong, Tumut River and Tumblong. By 1838 a town at the site of present day Gundagai was gazetted. Parish maps from the 1890s show a road between Tumut and Gundagai in the approximate location of present day Gocup Road, with a village at Minjary and the lands adjacent to the road divided into allotments.

Prior to British settlement, vegetation within the study area was predominantly Box-Gum woodlands comprising *Eucalyptus albens* (White Box), *E. melliodora* (Yellow Box) and/or *E. blakelyi* (Blakely's Red Gum) with *E. bridgesiana* (Apple Box), *E. microcarpa* (Grey Box), *E. mannifera* (Brittle Gum), *E. rubida* (Candlebark), *E. cinerea* (Argyle Apple) and *E. macrorrhyncha* (Red Stringybark). British land use practices cleared the majority of Box-Gum woodlands within the study area with only small pockets of remnant woodlands remaining. Construction activities associated with Gocup Road have modified the landscape by creating cuttings and artificial embankments in addition to modifying the course of several waterways. Adjacent properties are currently used for pastoral activities and have been modified by extensive tree clearance and the construction of structures and dams.

3.4 Ethnohistoric context

The study area is situated within Wiradjuri country, a region with boundaries defined by traditional language-speaking areas (MacDonald 1998:169). The Wiradjuri language group is the largest group in NSW encompassing the Macquarie, Lachlan and Murrumbidgee Rivers (NPWS 2003:121).

Early historical sources noted large numbers of Aboriginal people in the Tumut River valley (Hume and Hovell 1824; Sturt 1833). Localised resources would have centred on the Tumut River and associated tributaries, wetlands and billabongs. From the waterways, crayfish, a variety of fish, mussels, eels, tortoises and numerous water birds were available as well as reeds and vegetable shoots, roots, fruits and leaves across the floodplains of the Tumut River (Sams 1982:17). Terrestrial mammals, reptiles and birds including wombats, kangaroos, goannas and bush turkeys were also recorded as being hunted in the region (Sams 1982:16).

Seasonal movement of Aboriginal groups along the Tumut River valley in relation to Bogong moth (*Agrotis infusa*) hunts in the adjacent mountains were observed in post contact times. Flood (1980:73) notes the gathering of people along the Tumut River valley in preparation for moth feasts also functioned as a means of fulfilling social obligations between neighbouring groups such as marriage, ceremonies, trade and initiation.

4 Aboriginal Cultural Assessment

4.1 Cultural assessment methodology

An assessment of the Aboriginal cultural heritage within the study area was undertaken as part of the overall assessment of Aboriginal heritage for the Program of works. A report has been prepared by Waters Consultancy Pty Ltd (2015). The Aboriginal cultural assessment methodology was provided to registered Aboriginal stakeholders for comment on 2 March 2015.

The assessment involved consultation with Aboriginal knowledge holders as identified by registered Aboriginal stakeholders. Registered Aboriginal stakeholders were asked to nominate individuals who they considered held cultural heritage knowledge of the area during the Aboriginal Focus Group (AFG) meeting. Five knowledge holders were nominated at the AFG meeting and an additional knowledge holder was identified during the assessment. Detailed interviews and field surveys were conducted with five of the six identified knowledge holders to identify the cultural heritage values within the study area.

The cultural assessment identified six areas of specific Aboriginal cultural value within the study area. The six Aboriginal cultural sites (labelled as Sites A – F) comprised two ceremonial pathways, one seasonal pathway, one meeting place and camping area, one pathway associated with specific resource use and one remnant wetlands that constituted a resource gathering area. These sites are described in section 4.3 below.

4.2 Cultural landscape

As expressed by the knowledge holders, the identified Aboriginal cultural sites form interlinked elements within a larger cultural landscape that connects a range of ceremonial areas and a significant ancestral being lying within the landscape (Waters Consultancy 2015). The cultural landscape of which the identified places are part was described as containing key areas of ceremonial or spiritual significance: which generally relates to the area of which generally relates to the area of , and .

The mountains at are seen as interconnected and are of the most important cultural features in the local landscape. areas are associated with ceremonial business and the Goolgul, a being connected with the Bogong Moths.

4.3 Identified cultural sites

Six areas of Aboriginal cultural significance have been identified within and around the study area. The cultural significance of the sites has been ranked based on discussion with the relevant cultural knowledge holder/s (see Appendix C). A brief description of the identified cultural places is provided below. The locations of identified cultural places are shown on Figure 4.

Site A: Gilmore Creek Pathway Cultural Site

The site was part of a seasonal pathway . The site was part of a network of pathways that facilitated the movement of people where a wide variety of inter-group social, economic and ceremonial activities occurred as part of the Bogong Moth gatherings (Waters Consultancy 2015:22). The study area encompasses a portion of the site .

The site was assessed as being of moderate cultural significance.

Site B: Resource Gathering Cultural Site

The site encompasses a remnant wetland that was utilised as an area of resource gathering. The site is situated where the . The site is associated with the cultural pathways ( ) that linked ceremonial areas around with ceremonial areas around . The study area encompasses a portion of the site .

The site was assessed as being of moderate cultural significance.

Map removed from public document

Figure 4. Aboriginal cultural sites within the vicinity of the study area

Site C: Brungle to Adelong Pathway Cultural Site

The site is a seasonal pathway that links the mountain ranges . The site also connects ceremonial area with ceremonial area . The site is associated with another cultural site identified as a meeting place and camping area ( ). The site contains archaeological sites .

The site extends from . The site . The site . The study area .

The site was assessed as being of high cultural significance.

Site D: Minjary to Mudjarn Pathway Cultural Site

Cultural Site D is a seasonal pathway that linked ceremonial area with ceremonial area . The site is associated with a cultural site identified as an area of resource gathering ( ). The site contains archaeological site .

The site extends . The study area encompasses .

The site was assessed as being of high cultural significance.

Site E: Black Spring Gully Cultural Site

Cultural Site E was utilised as a meeting place and camping area. The site . The site contains archaeological site . The site is associated with the cultural pathways ( ) that linked the . The study area .

The site was assessed as being of moderate cultural significance.

Site F: Stony Creek Pathway Cultural Site

Cultural Site F is a pathway associated with specific resource use that . The site is associated with the utilisation of grass trees (*Xanthorrhoea* sp.), primarily for the production of spears, and the seasonal movement of Aboriginal people to the Bogon Peaks (Waters Consultancy 2015:33). The dry flower stalks of grass trees were used to make spear butts and fire sticks while the resin was used as an adhesive for the attachment of stone points, hafting stone axe heads and mending wooden implements (Waters Consultancy 2015:33).

The site . The study area .

The site was assessed as being of moderate cultural significance.

5 Archaeological Assessment

5.1 AHIMS web service

The Aboriginal Heritage Information Management System (AHIMS) is a database operated by OEH and regulated under section 90Q of the *National Parks and Wildlife Act 1974*. AHIMS contains information and records related to registered Aboriginal archaeological sites (Aboriginal objects, as defined under the Act) and declared Aboriginal places (as defined under the Act) in NSW.

A search of AHIMS was conducted on 17 November 2014 to identify registered (known) Aboriginal sites or declared Aboriginal places within or in the vicinity of the study area (AHIMS Client Service ID: 154880).

An AHIMS Web Service database search was conducted within the following coordinates (GDA, Zone 55):

Eastings:	598520 to 611513
Northings:	6092581 to 6118143
Buffer:	0 metres (the search coordinates included a buffer around the study area)

The AHIMS search results showed:

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

The distribution of the recorded Aboriginal sites within the AHIMS search area is shown in Figure 5, with site context and features ('site types') listed in Table 2.

Table 2. Frequency of site types from AHIMS database search

Site Context	Site Type	Number	Frequency
Open	Artefact Scatter	22	50%
	Isolated Find (isolated artefact)	10	23%
	Modified Tree (Carved or Scarred)	12	27%
Total		**44**	**100%**

5.2 Gocup Road (MR279) Upgrade: Aboriginal archaeological survey assessment

An Aboriginal archaeological survey assessment was undertaken of the study area (KNC 2012) as part of the Stage 2 PACHCI assessment. A full coverage survey was carried out between 17th and 19th October 2012 by a team of five people comprising two representatives from the Brungle/Tumut Local Aboriginal Land Council (BTLALC), a representative from RMS and two archaeologists from KNC.

Digital and printed maps of the study area were used for reference. Handheld GPS receivers were used to register archaeological sites. The team closely inspected exposed ground, such as unsealed tracks or eroded surfaces, for artefacts and any old growth trees for evidence of Aboriginal bark removal. Generally, surface visibility was poor with a resulting low level of effective coverage. Where surface visibility was high it was usually related to erosional or one off disturbance events (e.g. trenching, dam construction).

As a result of the survey, nine archaeological sites and one potential archaeological deposit were identified within the study area (see section 5.3, Table 3). The sites comprised eight artefact scatters and one isolated artefact. The predominant raw material observed was quartz; however a range of other materials including tuff, chert and fine grained siliceous were also present. Numerous quartz nodules were noted near site Gocup Road 07 which may have been a source of the quartz raw material used at the sites.

Further development of the concept design identified the need for an access road ( ) to facilitate the proposed upgrade. An additional archaeological survey was undertaken on 21st August 2015 to assess the area for a proposed access road. The survey team comprised two representatives from the Brungle/Tumut Local Aboriginal Land Council (BTLALC) and one archaeologist from KNC. Surface visibility was generally low due to dense grass cover; however, several unsealed tracks and exposures were present. One isolated quartz artefact (Gocup Road 09) was identified during the survey.

Map removed from public document

Figure 5. AHIMS search results

5.3 Summary of known Aboriginal archaeological sites within the study area

The archaeological and cultural heritage values of the study area were previously assessed as part of the PACHCI Stage 2 archaeological assessment (see section 5.2). The assessment included a review of background information, including identification of previously recorded Aboriginal sites registered on the AHIMS database, predictive modelling, Aboriginal community consultation and a full coverage archaeological field survey.

The PACHCI Stage 2 archaeological assessment identified ten locations of Aboriginal cultural heritage value containing Aboriginal objects and one location with potential Aboriginal archaeological deposit (Table 3). The locations of these sites are shown on Figures 6-8.

Table 3. Identified Aboriginal cultural heritage values within the study area

Site Name	AHIMS #	Site Features
Gocup Road 01A	56-3-0092	Artefact Scatter
Gocup Road 01B	56-3-0093	Artefact Scatter
Gocup Road 02	56-3-0094	Artefact Scatter
Gocup Road 03	56-3-0095	Artefact Scatter
Gocup Road 04	56-3-0096	Artefact Scatter
Gocup Road 05	56-3-0097	Artefact Scatter
Gocup Road 06	56-3-0098	Artefact Scatter
Gocup Road 07	56-3-0099	Isolated Artefact
Gocup Road 08	56-3-0100	Artefact Scatter
Gocup Road 09		Isolated Artefact
Gocup Road PAD 01		Potential Archaeological Deposit

Gocup Road 01A (AHIMS # 56-3-0092)
Site Gocup Road 01A was situated on a level minimal slope bench overlooking approximately . The archaeological site is located . The site . Gocup Road 01A was .

The survey identified more than 20 artefacts that were observed in exposures along a cattle track and . Identified artefacts included cores, flakes and flake fragments that were constructed from quartz, tuff, a dark possibly volcanic material and a brown fine grained siliceous material. The site was assessed as having moderate archaeological significance due to location and relative intactness of subsurface deposits.

Gocup Road 01B (AHIMS # 56-3-0093)
Site Gocup Road 01B consisted of a surface scatter of artefacts . The archaeological site is . The site had been . The survey identified over 10 artefacts along cattle track exposures and included flakes and broken flakes of quartz, tuff, a dark possibly volcanic material and a brown fine grained siliceous material. The site was assessed as having moderate archaeological significance due to location and relative intactness of subsurface deposits.

Gocup Road 02 (AHIMS # 56-3-0094)
Site Gocup Road 02 was situated on a moderately inclined hill slope between . The site was located approximately . The survey identified six quartz artefacts in exposures along a cattle track and determined that the site had been . The identified artefacts comprised two cores, two bipolar flakes and two broken flakes. The site was assessed as having low archaeological significance due to the impact of modern land use practices.

Gocup Road 03 (AHIMS # 56-3-0095)
Site Gocup Road 03 was located on a level section of a ridge line overlooking and approximately . The archaeological site is located . The site was . The survey identified three quartz artefacts within an exposure on a cattle track. The artefacts consisted of a bipolar flake, a proximal flake and a distal flake. The site was assessed as having moderate archaeological significance due to location and relative intactness of subsurface deposits.

Map removed from public document

Figure 6. Location of archaeological sites Gocup Road 01A to Gocup Road 04

Gocup Road 04 (AHIMS # 56-3-0096)
Site Gocup Road 04 consisted of a minor surface artefact scatter located . The archaeological site is . The site was situated on a broad, gently inclined waning lower slope , approximately . The survey identified four quartz artefacts comprising three cores and one flake. The site was assessed as having low archaeological significance.

Gocup Road 05 (AHIMS # 56-3-0097)
Site Gocup Road 05 was situated on the waning lower slope of a spur . The archaeological site is . The site had been and was approximately . The survey identified three flake fragments of quartz and chert. The site was assessed as having low subsurface disturbance and moderate archaeological significance.

Gocup Road 06 (AHIMS # 56-3-0098)
Site Gocup Road 06 was an artefact scatter situated on the lower slopes of a broad facing spur . The archaeological site is located . The site was located . The survey identified two quartz flake fragments, a fine grained siliceous flake and one volcanic material core. The portion of the site within the study area had been extensively disturbed by erosion and human activity. The portion of the site within the study area was assessed as having low archaeological significance. The portion of the site outside ( ) of the study area near exhibited high archaeological value ( ) and is of moderated significance.

Gocup Road 07 (AHIMS # 56-3-0099)
Site Gocup Road 07 comprised of an isolated bipolar quartz flake located in an exposure on the edge of the valley flat . The site was situated . The survey noted that numerous quartz cobbles were present in the vicinity of the site. The site was assessed as having moderate archaeological significance because of the location of the site and intactness of subsurface deposits.

Gocup Road 08 (AHIMS # 56-3-0100)
Site Gocup Road 08 was situated on the broad waning lower slope of a spur . The site was located . The survey identified three quartz flake fragments eroding . The site was assessed as having low archaeological significance due to extensive subsurface disturbance.

Gocup Road PAD 01 (AHIMS # tbc)
Site Gocup Road PAD 01 consisted of a potential archaeological deposit situated on a bench on the side of a ridge and . The site was located . The site was assessed as having moderate archaeological potential due to location and low subsurface disturbance. .

Gocup Road 09 (AHIMS # tbc)
Site Gocup Road 09 consisted of an isolated quartz multi-platform core that was located in an exposure beneath a tree. The site was located . The artefact was decontextualized and the site was assessed as having low archaeological potential.

Map removed from public document

Figure 7. Location of archaeological sites Gocup Road 05 to Gocup Road 08

Map removed from public document

Figure 8. Location of potential archaeological deposit Gocup Road PAD 01

6 Analysis of Background Information

The study area traverses a cultural landscape of interlinked elements that connect a range of ceremonial areas and significant ancestral beings lying within the landscape. The identified Aboriginal cultural sites in the area are part of a wider network of cultural elements that connect key cultural areas: . The identified pathways near and are part of a network of pathways that facilitated the movement of people into where a wide variety of inter-group social, economic and ceremonial activities occurred as part of the Bogong Moth gatherings.

The spatial distribution of AHIMS registered sites in the region between Tumut and Gundagai illustrate the limited extent of previous archaeological investigations in this area. Where archaeological investigations have occurred, artefact scatters, isolated artefacts and culturally modified trees have been identified.

Artefact scatters and isolated artefacts have generally been found adjacent to creeks or rivers. Water sources would have been focal points for Aboriginal people due to the accessibility of resources at these locations. Culturally modified trees have been documented near creeks and rivers in the region; however, the spatial distribution of this site type may be distorted due to European farming practices.

Intensive pedestrian archaeological surveys of the study area were undertaken as part of the Stage 2 PACHCI and identified eight artefact scatters, two isolated artefact and one potential archaeological deposit within the proposed upgrade corridor. The majority of identified sites were where areas were still present. The majority of stone tools identified during the survey were created from quartz which was locally available.

There is significant overlap in the sites identified during the Aboriginal cultural assessment and archaeological survey. The portion of the study area contains the majority of identified archaeological sites and Aboriginal cultural sites. The Aboriginal cultural assessment identified these sites as being pathways and associated resource, meeting and camping areas. The identification of archaeological material in these areas provides a tangible, physical link to Aboriginal people's use of these landscapes.

Soil landscape, vegetation and modern land use practices have affected the preservation of Aboriginal archaeological sites within the study area. Soil landscapes subject to high levels of erosion would be unlikely to retain Aboriginal objects and areas where sediment is deposited likely contain Aboriginal objects that are without spatial context. Vegetation clearance and modern land use can increase the effects of erosion and are also responsible for varying levels of impact on Aboriginal archaeological sites. These processes distort our perception of Aboriginal land use through the spatial distribution of known sites.

7 Cultural Heritage Values and Statement of Significance

7.1 Significance assessment criteria

One of the primary steps in the process of cultural heritage management is the assessment of significance. Not all sites are equally significant and not all are worthy of equal consideration and management (Sullivan and Bowdler 1984; Pearson and Sullivan 1995:7). The determination of significance can be a difficult process as the social and scientific context within which these decisions are made is subject to change (Sullivan and Bowdler 1984). This does not lessen the value of the heritage approach, but enriches both the process and the long term outcomes for future generations as the nature of what is conserved and why, also changes over time.

The assessment of significance is a key step in the process of impact assessment for a proposed activity as the significance or value of an object, site or place will be reflected in resultant recommendations for conservation, management or mitigation.

The *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010) requires significance assessment according to criteria established in the *Australia ICOMOS Burra Charter*, 1999 (Australia ICOMOS 1999). The *Burra Charter* and its accompanying guidelines are considered best practice standard for cultural heritage management, specifically conservation, in Australia.

Guidelines to the *Burra Charter* set out four criteria for the assessment of cultural significance:

- Aesthetic value - relates to the sense of the beauty of a place, object, site or item;
- Historic value - relates to the association of a place, object, site or item with historical events, people, activities or periods;
- Scientific value - scientific (or research) value relates to the importance of the data available for a place, object, site or item, based on its rarity, quality or representativeness, as well as on the degree to which the place (object, site or item) may contribute further substantial information; and
- Social value - relates to the qualities for which a place, object, site or item has become a focus of spiritual, political, national or other cultural sentiment to a group of people. In accordance with the OEH *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW*, the social or cultural value of a place (object, site or item) may be related to spiritual, traditional, historical or contemporary associations. "Social or cultural value can only be identified though consultation with Aboriginal people" (OEH 2011:8).

The assessment of these values are brought together to form a comprehensive assessment of significance.

7.2 Statement of significance

The study area contains six identified Aboriginal cultural sites and ten identified Aboriginal archaeological features. The significance of the Aboriginal cultural and archaeological sites is listed below.

The six Aboriginal cultural sites were assessed for cultural significance as part of the Aboriginal cultural assessment conducted by Water Consultancy (2015). The cultural significance assessment focused on the cultural and historic values of the identified sites within the landscape.

Aboriginal cultural site significance

Site A: Gilmore Creek Pathway Cultural Site
Cultural Site A is part of a seasonal pathway [redacted]. The site was assessed as being of moderate cultural significance.

Site B: Resource Gathering Cultural Site
Cultural Site B encompasses a remnant wetland that was utilised as an area of resource gathering. The site was assessed as being of moderate cultural significance.

Site C: Brungle to Adelong Pathway Cultural Site
Cultural Site C is a seasonal pathway that links the mountain ranges [redacted]. The site also connects [redacted] ceremonial area [redacted] with [redacted] ceremonial area [redacted]. The site was assessed as being of high cultural significance.

Site D: Minjary to Mudjarn Pathway Cultural Site
Cultural Site D is a seasonal pathway that linked [redacted] ceremonial area [redacted] with [redacted] ceremonial area [redacted]. The site was assessed as being of high cultural significance.

Site E: Black Spring Gully Cultural Site
Cultural Site E was utilised as a meeting place and camping area. The site was assessed as being of moderate cultural significance.

Site F: Stony Creek Pathway Cultural Site
Cultural Site F is a pathway associated with specific resource use. The site was assessed as being of moderate cultural significance.

Aboriginal archaeological site significance
The archaeological significance assessment has focussed on the intactness, representativeness and research potential of the identified sites within the landscape.

Gocup Road 01A (AHIMS # 56-3-0092)
Site Gocup Road 01A is an artefact scatter situated on a level minimal slope bench [redacted]. The site is located [redacted]. The site demonstrated moderate scientific value and it is likely that further investigation could contribute to our understanding of Aboriginal landscape use in the region and the relationship between this site and site Gocup Road 01B. Based on the intactness, representativeness and research potential of the site, Gocup Road 01A is determined to have moderate archaeological significance.

Gocup Road 01B (AHIMS # 56-3-0093)
Site Gocup Road 01B is an artefact scatter located on a saddle [redacted]. The site is [redacted] and contains subsurface deposits with a low level of disturbance. It is likely that further investigation at this site could contribute to our understanding of Aboriginal landscape use in the region. Based on the intactness, representativeness and research potential of the site, Gocup Road 01B is determined to have moderate archaeological significance.

Gocup Road 02 (AHIMS # 56-3-0094)
Site Gocup Road 02 is an artefact scatter situated on a moderately inclined [redacted] hill slope [redacted]. The site has been extensively disturbed by modern land use practices. The site demonstrated low scientific value and it is unlikely that further investigation would contribute to our understanding of Aboriginal landscape use in the region. Based on the intactness, representativeness and research potential of the site, Gocup Road 02 is determined to have low archaeological significance.

Gocup Road 03 (AHIMS # 56-3-0095)
Site Gocup Road 03 is an artefact scatter located on a level section of a [redacted] running ridge line overlooking [redacted]. The site demonstrated moderate scientific value and it is likely that further investigation could contribute to our understanding of Aboriginal landscape use in the region. Based on the intactness, representativeness and research potential of the site, Gocup Road 03 is determined to have moderate archaeological significance.

Gocup Road 04 (AHIMS # 56-3-0096)
Site Gocup Road 04 is an artefact scatter located on a broad, gently inclined waning lower slope. The artefacts were identified within the disturbed context [redacted]. The site demonstrated low scientific value and it is unlikely that further investigation would contribute to our understanding of Aboriginal landscape use in the region. Based on the intactness, representativeness and research potential of the site, Gocup Road 04 is determined to have low archaeological significance.

Gocup Road 05 (AHIMS # 56-3-0097)
Site Gocup Road 05 is an artefact scatter situated on the waning lower slope of a spur [redacted]. The site demonstrated moderate scientific value and it is likely that further investigation could contribute to our understanding of Aboriginal landscape use in the region. Based on the intactness, representativeness and research potential of the site, Gocup Road 04 is determined to have moderate archaeological significance.

Gocup Road 06 (AHIMS # 56-3-0098)
Site Gocup Road 06 is an artefact scatter situated on the lower slopes of a broad [redacted] spur [redacted]. The portion of the site within the proposed AHIP area has been extensively disturbed by natural and human activity. The impacted portion of the site demonstrated low scientific value and it is unlikely that further investigation would contribute to our understanding of Aboriginal landscape use in the region. Based on the intactness, representativeness and research potential of the site, Gocup Road 06 is determined to have low archaeological significance. If additional portions ([redacted]) of the site are impacted, salvage excavation will be required as these portions are archaeologically and culturally significant.

Gocup Road 07 (AHIMS # 56-3-0099)

Site Gocup Road 07 is an isolated flake that was identified on the edge of the valley flat . The site demonstrated moderate scientific value and it is likely that further investigation could contribute to our understanding of Aboriginal landscape use in the region. Based on the intactness, representativeness and research potential of the site, Gocup Road 07 is determined to have moderate archaeological significance.

Gocup Road 08 (AHIMS # 56-3-0100)

Site Gocup Road 08 is an artefact scatter situated on the broad waning lower slope of a spur . The site had been extensively disturbed by the previous construction of Gocup Road. The site demonstrated low scientific value and it is unlikely that further investigation would contribute to our understanding of Aboriginal landscape use in the region. Based on the intactness, representativeness and research potential of the site, Gocup Road 08 is determined to have low archaeological significance.

Gocup Road PAD 01 (AHIMS # tbc)

Site Gocup Road PAD 01 is a potential archaeological deposit situated on a bench on side of a ridge . Gocup Road PAD 01 was determined to have moderate archaeological potential to retain intact Aboriginal objects which could contribute to our understanding of Aboriginal landscape use in the region. This archaeological feature is not being impacted by the proposed upgrade.

Gocup Road 09 (AHIMS # tbc)

Site Gocup Road 09 is an isolated quartz multi-platform core that was located within an exposure beneath a tree. The site was decontextualized and it is unlikely that further investigation would contribute to our understanding of Aboriginal landscape use in the region. Based on the intactness, representativeness and research potential of the site, Gocup Road 09 is determined to have low archaeological significance.

8 Impact Assessment and Mitigation Strategies

8.1 Proposed activity

RMS proposes to undertake a series of upgrade works along the length of Gocup Road (MR279) between Tumut and Gundagai. The proposed works would include:

- reconstruction of existing road pavement
- widening the existing road formation to 9.7 metres (3.5 metre lane widths, sealed shoulders to 1.35 metres wide and unsealed verge to 0.5 metres)
- upgrading of drainage including culverts, table drains and cut-off drains
- removal of hazards within the five metre clear zone, including vegetation, where possible
- utility relocation if required
- establishment of ancillary facilities such as site compounds and stockpile sites
- repairing of outer wheel path failures in the existing alignment through heavy patching
- excavating and trimming cut batters to allow for pavement widening and minor road realignment
- extending existing culverts to accommodate the widened roadway
- revegetation of exposed soils
- construction of two overtaking lanes

Proposed impact to sites identified within the study area are shown in Figure 9 and detailed in Table 4.

8.2 Avoiding and/or mitigating harm

All identified Aboriginal cultural and archaeological sites identified within or near the study area have been considered by RMS in relation to the proposed road upgrade and associated activities. Where significant sites have been identified, where possible the design has been modified to avoid or limit the impact to the identified cultural and archaeological sites. While conservation is the best approach when considering Aboriginal heritage, some level of impact is unfortunately unavoidable due to the requirements of the road upgrade.

The adjustment of the concept design has enabled significant minimisation of the impact to Aboriginal Cultural Site E. In addition, a barrier fence would be erected prior to the commencement of construction works to ensure that the site is not inadvertently affected as a result of construction work (Figure 10). Fencing would be verified prior to the commencement of works and maintained throughout the duration of works.

A shared mitigation measure has been developed in relation to the proposed impacts on the six identified Aboriginal cultural sites within the study area. The mitigation measure would involve development of interpretative signage locating the six Aboriginal cultural sites identified (Sites A to F) within their broader cultural landscape that would be displayed in an appropriate area. The content of the signage would be developed in consultation with the Aboriginal knowledge holders. The preferred location for the placement of the signage, dependent on consultation with the relevant landholders, would be within the townships of Tumut and Gundagai.

The early identification of archaeological sites and adjustment of the concept design has enabled the avoidance of two sites of moderate significance (Gocup Road 01A and Gocup Road PAD 01), one site of low significance (Gocup Road 09) and minimised the impact to one site (Gocup Road 06) thereby reducing the accumulated impact on archaeological heritage and reducing the requirement for salvage excavation.

The scientific value of the archaeological sites is linked to the physical information the sites contain. The loss of intrinsic Aboriginal cultural value of impacted sites cannot be offset, however the salvaged information will increase our understanding, strengthening our interpretation and improve management of Aboriginal heritage in the surrounding area.

Seven archaeological sites will be completely impacted by the proposed road upgrade: Gocup Road 01B, Gocup Road 02, Gocup Road 03, Gocup Road 04, Gocup Road 05, Gocup Road 07 and Gocup Road 08. One archaeological site, Gocup Road 06 will be partially impacted by the proposed road upgrade.

Further mitigation of sites (or portions of sites) with low significance: Gocup Road 02, Gocup Road 04, Gocup Road 06 (partial) and Gocup Road 08) is not warranted as it is unlikely to yield any further information on the Aboriginal landscape of the area.

Four impacted archaeological sites with moderate significance will be totally impacted by the proposed road upgrade: Gocup Road 01B, Gocup Road 03, Gocup Road 05 and Gocup Road 07. Recovery of information through salvage excavation will offset the loss caused by the upgrade works by increasing our understanding, strengthening our interpretation and bettering our recognition of Aboriginal culture and heritage within an area where little previous documented information exists. The recommended mitigation measures for known sites within the study area are shown in Table 4.

Table 4. Impact of project and mitigation measures

Site Name	Site Type	Assessed Significance	Impact Assessment	Mitigation Strategy
Aboriginal Cultural Sites				
Site A	Seasonal Pathway	Moderate	Partial Impact	Development of interpretative signage locating the six Aboriginal cultural sites identified (Sites A to F) within their broader cultural landscape and displayed in an appropriate area. The content of the signage would be developed in consultation with the Aboriginal knowledge holders. The preferred location for the placement of the signage, dependent on consultation with the relevant landholders, would be within the townships of Tumut and Gundagai.
Site B	Resource Gathering Area	Moderate	Partial Impact	Development of interpretative signage locating the six Aboriginal cultural sites identified (Sites A to F) within their broader cultural landscape and displayed in an appropriate area. The content of the signage would be developed in consultation with the Aboriginal knowledge holders. The preferred location for the placement of the signage, dependent on consultation with the relevant landholders, would be within the townships of Tumut and Gundagai.
Site C	Seasonal Pathway	High	Partial Impact	Development of interpretative signage locating the six Aboriginal cultural sites identified (Sites A to F) within their broader cultural landscape and displayed in an appropriate area. The content of the signage would be developed in consultation with the Aboriginal knowledge holders. The preferred location for the placement of the signage, dependent on consultation with the relevant landholders, would be within the townships of Tumut and Gundagai.
Site D	Ceremonial Pathway	High	Partial Impact	Development of interpretative signage locating the six Aboriginal cultural sites identified (Sites A to F) within their broader cultural landscape and displayed in an appropriate area. The content of the signage would be developed in consultation with the Aboriginal knowledge holders. The preferred location for the placement of the signage, dependent on consultation with the relevant landholders, would be within the townships of Tumut and Gundagai.
Site E	Meeting Place and Camping Area	Moderate	Partial Impact	Barrier fencing to be erected for the extent of the site to ensure that no construction impact extends into the conserved portion of the site. No signage identifying the area as having Aboriginal cultural significance to be erected, signage stating 'Significant Environmental Area – No Entry Permitted' acceptable. The placement of the fencing would be confirmed on site by the consultant (Waters Consultancy). Any future work in this area or deviation from the current concept design (as shown in this report) would require further consultation with the knowledge holder. Development of interpretative signage locating the six Aboriginal cultural sites identified (Sites A to F) within their broader cultural landscape and displayed in an appropriate area. The content of the signage would be developed in consultation with the Aboriginal knowledge holders. The preferred location for the placement of the signage, dependent on consultation with the relevant landholders, would be within the townships of Tumut and Gundagai.
Site F	Pathway Associated with Specific Resource Use	Moderate	Partial Impact	Development of interpretative signage locating the six Aboriginal cultural sites identified (Sites A to F) within their broader cultural landscape and displayed in an appropriate area. The content of the signage would be developed in consultation with the Aboriginal knowledge holders. The preferred location for the placement of the signage, dependent on consultation with the relevant landholders, would be within the townships of Tumut and Gundagai.

Site Name	Site Type	Assessed Significance	Impact Assessment	Mitigation Strategy
Aboriginal Archaeological Sites				
Gocup Road 01A	Artefact	Moderate	No Impact	Barrier fencing to be erected for the extent of the site to ensure that no construction impact extends into the site. No signage identifying the area as having Aboriginal cultural significance to be erected, signage stating 'Significant Environmental Area – No Entry Permitted' acceptable.
Gocup Road 01B	Artefact	Moderate	Total Impact	Salvage excavation. AHIP required prior to commencement of works affecting the site.
Gocup Road 02	Artefact	Low	Total Impact	AHIP required prior to commencement of works affecting the site.
Gocup Road 03	Artefact	Moderate	Total Impact	Salvage excavation. AHIP required prior to commencement of works affecting the site.
Gocup Road 04	Artefact	Low	Total Impact	AHIP required prior to commencement of works affecting the site.
Gocup Road 05	Artefact	Moderate	Total Impact	Salvage excavation. AHIP required prior to commencement of works affecting the site.
Gocup Road 06	Artefact	Low	Partial Impact	Barrier fencing to be erected for the extent of the site to ensure that no construction impact extends into the conserved portion of the site. No signage identifying the area as having Aboriginal archaeological or cultural significance to be erected, signage stating 'Significant Environmental Area – No Entry Permitted' acceptable. Any future work in this area or deviation from the current concept design (as shown in this report) would require further consultation with the knowledge holder as per Cultural Site E. AHIP required prior to commencement of works affecting the site. No salvage excavation is required for impacts to the boundary shown in Figure 10. Salvage excavation is required if additional area is impacted based on the boundary shown in Figure 10.
Gocup Road 07	Artefact	Moderate	Total Impact	Salvage excavation. AHIP required prior to commencement of works affecting the site.
Gocup Road 08	Artefact	Low	Total Impact	AHIP required prior to commencement of works affecting the site.
Gocup Road 09	Artefact	Low	No Impact	Barrier fencing to be erected for the extent of the site to ensure that no construction impact extends into the site. No signage identifying the area as having Aboriginal cultural significance to be erected, signage stating 'Significant Environmental Area – No Entry Permitted' acceptable.
Gocup Road PAD 01	Potential Archaeological Deposit	Moderate	No Impact	No impact.

Map removed from public document

Figure 9. Gocup Road (MR279) Upgrade - impacted Aboriginal archaeological sites

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Figure 10. Management measure for Aboriginal Cultural Site E – recommended barrier fence ( )

9 Management Outcomes

The following general management outcomes will be implemented in accordance with the mitigation strategy for the proposal as outlined in Chapter 8.

9.1 Minimisation of impacts to Aboriginal cultural sites impacted by road construction or associated activities

A total of six Aboriginal cultural sites will be partially impacted by the Gocup Road Upgrade project. It is recommended that an Aboriginal Heritage Management Plan should be prepared and implemented as part of the Construction Environmental Management Plan. The Aboriginal Heritage Management Plan should provide specific guidance on measures and controls to be undertaken to avoid and mitigate impacts on Aboriginal cultural heritage during construction. These should include protection measures to be applied during construction, contractor training in general Aboriginal cultural heritage awareness, and any on-going opportunities for Aboriginal community engagement.

The development of interpretative signage locating the six Aboriginal cultural sites within their broader cultural landscape and installation in an appropriate area is recommended to mitigate these impacts. The content of the signage is to be developed in consultation with the Aboriginal knowledge holders. The preferred location for the placement of the signage, dependent on consultation with the relevant landholders, would be within the townships of Tumut and Gundagai.

In addition, site specific mitigation for Site E includes barrier fencing to be erected prior to the commencement of construction works. This will ensure the portion of the site outside the boundary will not be inadvertently impacted by the construction works. Fencing would be maintained throughout the duration of works. Barrier fencing should be installed in accordance with Table 4. Summary of impacts to Aboriginal cultural heritage sites summarised in Table 5.

Table 5. Aboriginal cultural sites partially impacted by proposal

Aboriginal cultural sites partially impacted	
Aboriginal Cultural Sites (requiring interpretive signage)	Site A, Site B, Site C, Site D & Site F
Aboriginal Cultural Sites (requiring interpretive signage and fencing)	Site E

9.2 Aboriginal archaeological sites for which AHIP is being sought

A total of eight archaeological sites comprising Aboriginal objects as defined under the NPW Act are situated within the Gocup Road upgrade area and will be impacted by the proposed activities and are identified in Table 6.

An application for an AHIP should be made under section 90A of the *National Parks and Wildlife Act 1974* for the land and associated objects within the boundaries of the proposed development area (see Figures 11-13). The AHIP should also be sought for specified Aboriginal sites and objects contained within the sites listed below:

Table 6. Aboriginal sites and scope for which an AHIP is being sought

Site Name	AHIMS #	Scope of AHIP
Gocup Road 01B	56-3-0093	Total Impact
Gocup Road 02	56-3-0094	Total Impact
Gocup Road 03	56-3-0095	Total Impact
Gocup Road 04	56-3-0096	Total Impact
Gocup Road 05	56-3-0097	Total Impact
Gocup Road 06	56-3-0098	Partial Impact
Gocup Road 07	56-3-0099	Total Impact
Gocup Road 08	56-3-0100	Total Impact

The single AHIP will cover the five separate REFs, although the majority of the impacted archaeological sites are associated with first of the five REFs.

9.3 Conservation of Aboriginal archaeological sites outside impact area

The archaeological sites in Table 7 will not be impacted by the Gocup Road Upgrade project. Their location should be identified in the Construction Environmental Management Plan, Construction Heritage Sites Map and Project Inductions to ensure they are not inadvertently impacted as a result of construction works. Archaeological sites in close proximity to the construction corridor should be fenced off prior to the commencement of construction works to ensure that they are not inadvertently affected as a result of construction work. Fencing would be maintained throughout the duration of works. Barrier fencing should be installed accordance with Table 4. Aboriginal archaeological sites not impacted are summarised in Table 7.

Table 7. Aboriginal sites not impacted by road construction

Archaeological sites not impacted	
Archaeological Sites (requiring fencing)	Gocup Road 01A
	Gocup Road 09
Archaeological Sites (no fencing required)	Gocup Road PAD 01

9.4 Conservation of portion of Aboriginal archaeological sites outside impact area

The archaeological site in Table 8 would be partially impacted by the Gocup Road Upgrade project. The location of the portion to be conserved should be identified in the Construction Environmental Management Plan, Construction Heritage Sites Map and Project Inductions to ensure they are not inadvertently damaged as a result of construction works.

In addition, the conserved portion should be fenced off prior to the commencement of construction works to ensure that the area is not inadvertently affected as a result of construction work. Fencing would be maintained throughout the duration of works.

No further archaeological mitigation is required for the impacted portion of the site; however, this area can only be impacted after project approval is obtained (see Table 4 and Figure 10).

Table 8. Aboriginal sites not impacted by road construction

Archaeological sites partially impacted	
Archaeological Sites (requiring fencing)	Gocup Road 06

9.5 Mitigation through archaeological salvage excavation

The archaeological sites in Table 9 are of moderate Aboriginal heritage significance and will be impacted by the Gocup Road Upgrade project. These sites require archaeological salvage excavation to mitigate the impacts. All excavation can only occur after project approval is obtained.

Salvage excavation must be completed prior to any activities which may harm Aboriginal objects at these site locations. Salvage excavation activities would be undertaken in accordance with the methodology attached as Appendix C.

Table 9. Aboriginal sites requiring mitigation (salvage excavation)

Archaeological sites requiring mitigation	
Archaeological Sites (requiring salvage)	Gocup Road 1B, Gocup Road 03, Gocup Road 05 & Gocup Road 07

9.6 No further archaeological mitigation required

No further archaeological mitigation is required for the sites in Table 10. Sites can only be impacted after project approval is obtained.

Table 10. Aboriginal sites with no further archaeological mitigation required

No further archaeological mitigation required	
Archaeological Sites (requiring no further archaeological mitigation)	Gocup Road 02, Gocup Road 04 & Gocup Road 08

9.7 Procedure for unexpected archaeological finds

RMS *Unexpected Archaeological Finds Procedure* will be used in the event of uncovering an unexpected archaeological find during RMS activities.

9.8 Management of salvaged Aboriginal objects

The short term management of collected Aboriginal objects is as follows:

- Any Aboriginal objects that are removed from the land by actions authorised by an AHIP, must be moved as soon as practicable to the temporary storage location (see below) pending any agreement reached about the long term management of the Aboriginal objects.
- The temporary storage location would be: Kelleher Nightingale Consulting Pty Ltd, Level 10, 25 Bligh Street, Sydney NSW 2000.
- Any Aboriginal objects stored at the temporary storage location must not be further harmed, except in accordance with the conditions of the AHIP.

The long term management of collected Aboriginal objects is as follows:

- Recovered objects will be lodged with the Australian Museum in the first instance in accordance with the *Australian Museum Archaeological Collection Deposition Policy* (January 2012, available online at: http://australianmuseum.net.au/document/Protocols-for-the-deposition-of-archaeological-materials). If required, a variation will be sought for recovered objects to be held by the Aboriginal community or reburied.
- Requirement 26 "Stone artefact deposition and storage" in the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (24 September 2010, available online at: http://www.environment.nsw.gov.au/resources/cultureheritage/10783FinalArchCoP.pdf) must be complied with.

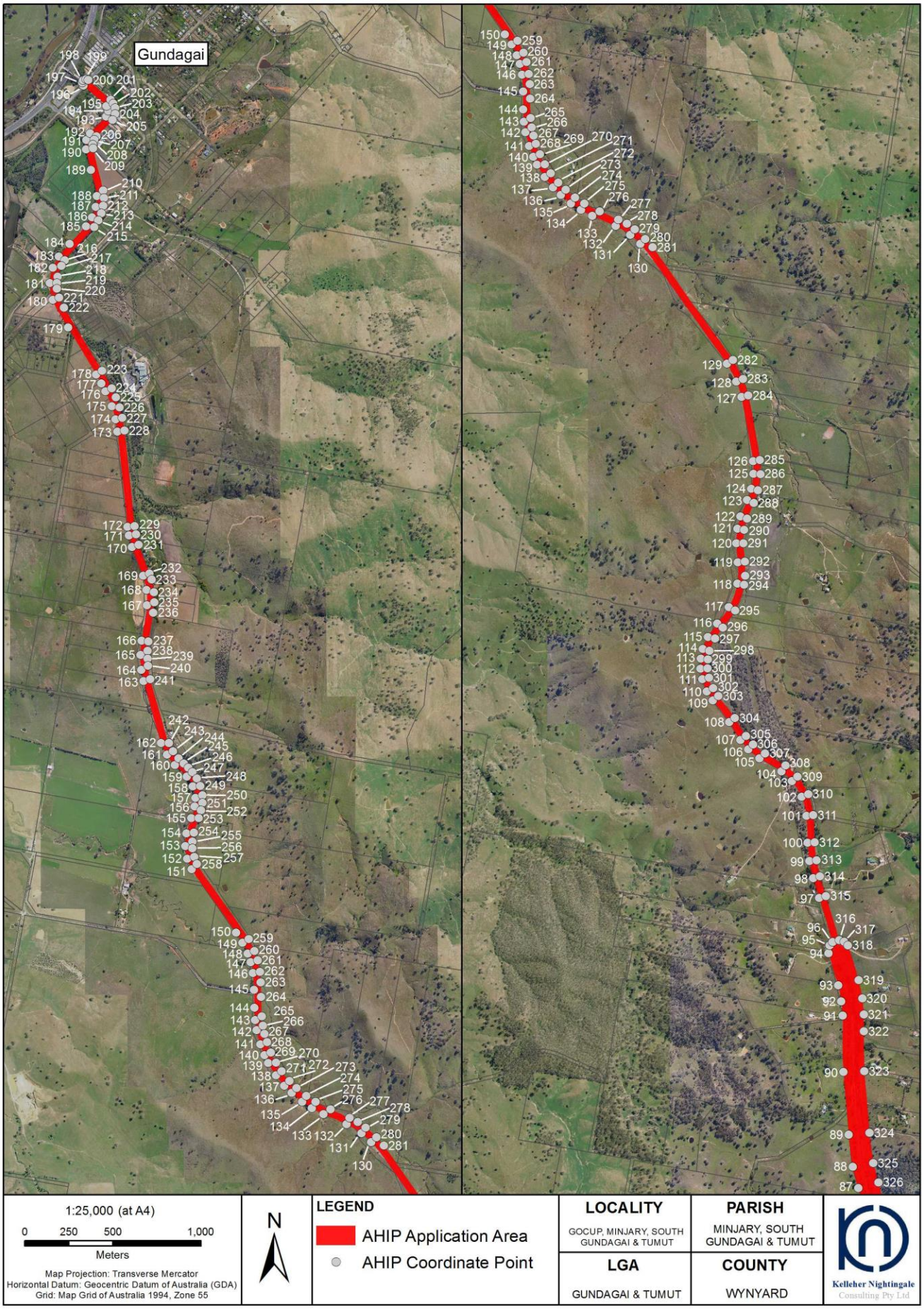

Figure 11. AHIP application boundary map 1

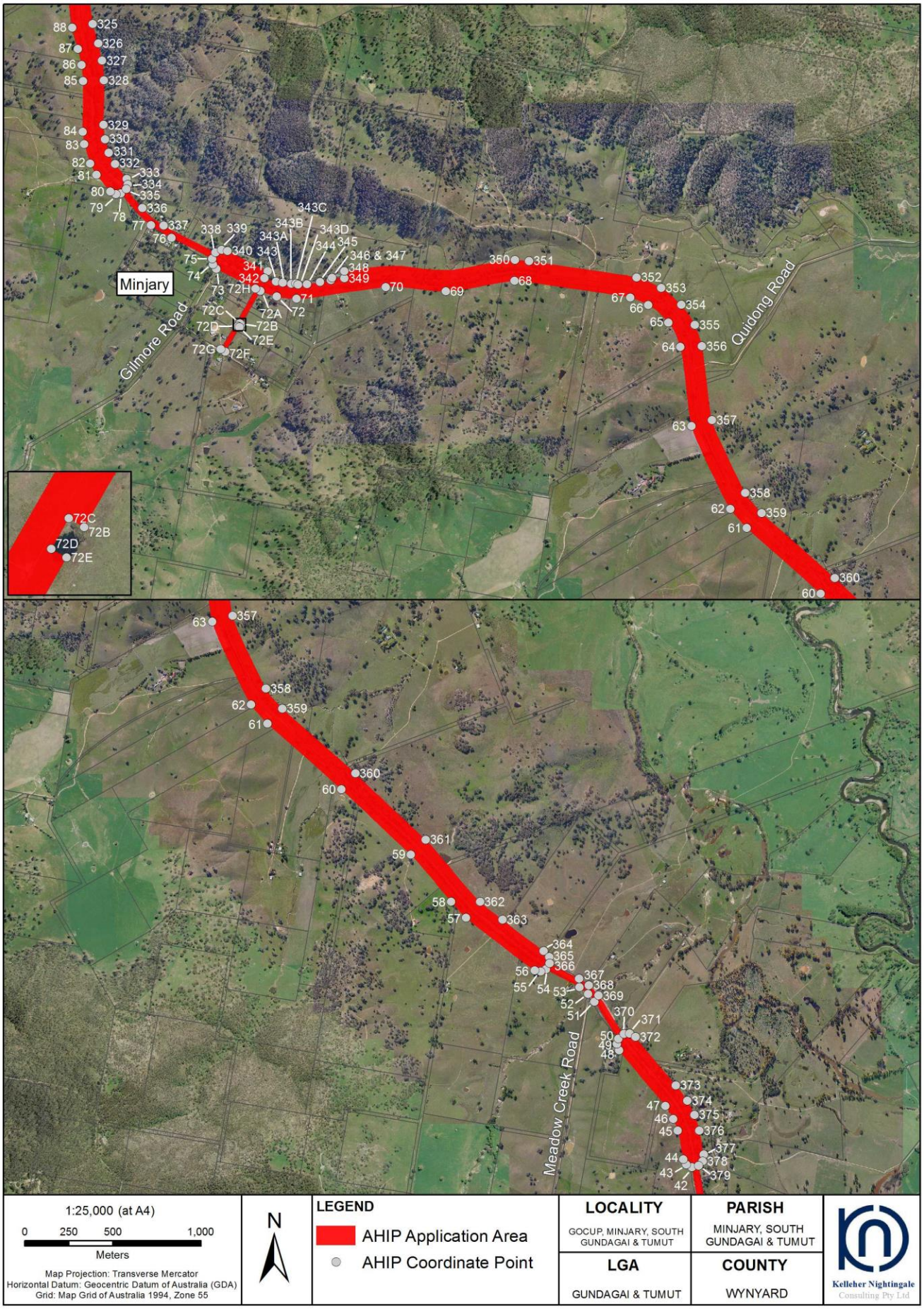

Figure 12. AHIP application boundary map 2

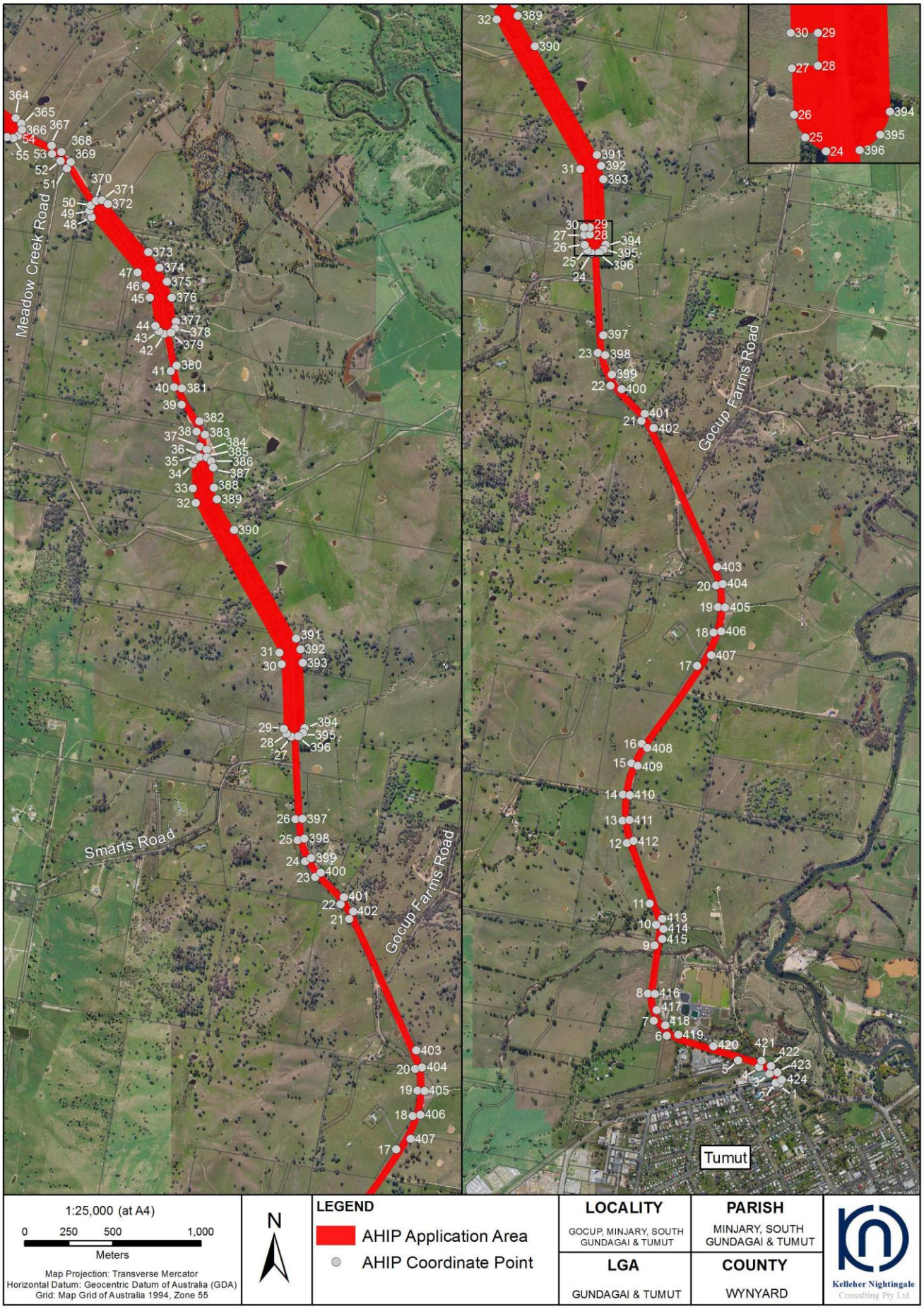

Figure 13. AHIP application boundary map 3

Table 11. AHIP application coordinate points

Point ID	Easting	Northing	Point ID	Easting	Northing	Point ID	Easting	Northing	Point ID	Easting	Northing
1	610540	6093548	102	602232	6107991	211	599799	6116479	320	602576	6106846
2	610518	6093552	103	602177	6108079	212	599796	6116434	321	602585	6106755
3	610482	6093603	104	602117	6108135	213	599786	6116393	322	602585	6106659
4	610423	6093641	105	601992	6108209	214	599769	6116352	323	602588	6106434
5	610303	6093678	106	601928	6108259	215	599745	6116314	324	602617	6106084
6	609899	6093818	107	601885	6108311	216	599577	6116125	325	602639	6105913
7	609825	6093904	108	601820	6108414	217	599558	6116094	326	602669	6105803
8	609793	6094058	109	601728	6108536	218	599536	6116032	327	602691	6105705
9	609830	6094332	110	601695	6108588	219	599533	6115996	328	602702	6105594
10	609839	6094449	111	601668	6108656	220	599534	6115966	329	602699	6105341
11	609803	6094569	112	601658	6108716	221	599547	6115915	330	602707	6105260
12	609673	6094912	113	601659	6108774	222	599574	6115858	331	602729	6105184
13	609648	6095038	114	601671	6108829	223	599790	6115500	332	602765	6105119
14	609650	6095187	115	601699	6108895	224	599844	6115401	333	602831	6105035
15	609698	6095365	116	601753	6108972	225	599867	6115350	334	602837	6105004
16	609757	6095474	117	601819	6109065	226	599888	6115292	335	602829	6104978
17	610071	6095917	118	601867	6109199	227	599904	6115233	336	602920	6104870
18	610165	6096106	119	601870	6109320	228	599916	6115160	337	603041	6104771
19	610191	6096249	120	601861	6109427	229	599974	6114619	338	603335	6104617
20	610179	6096373	121	601867	6109510	230	599981	6114572	339	603368	6104633
21	609755	6097307	122	601885	6109581	231	599997	6114512	340	603403	6104627
22	609580	6097505	123	601923	6109672	232	600059	6114350	341	603632	6104512
23	609508	6097692	124	601946	6109737	233	600070	6114316	342	603612	6104473
24	609474	6098257	125	601958	6109821	234	600084	6114244	343	603677	6104454
25	609448	6098275	126	601956	6109894	235	600085	6114186	343A	603716	6104447
26	609434	6098302	127	601890	6110256	236	600080	6114128	343B	603764	6104440
27	609431	6098363	128	601862	6110344	237	600053	6113964	343C	603791	6104443
28	609464	6098363	129	601808	6110446	238	600048	6113912	343D	603803	6104435
29	609464	6098404	130	601316	6111126	239	600047	6113867	344	603854	6104439
30	609430	6098404	131	601260	6111176	240	600050	6113827	345	603928	6104451
31	609408	6098733	132	601177	6111227	241	600062	6113750	346	603990	6104461
32	608934	6099583	133	601045	6111285	242	600168	6113387	347	603996	6104475
33	608917	6099666	134	600979	6111319	243	600191	6113343	348	604065	6104473
34	608917	6099805	135	600923	6111355	244	600223	6113301	349	604066	6104511
35	608934	6099831	136	600865	6111404	245	600253	6113273	350	605032	6104576
36	608954	6099843	137	600822	6111446	246	600279	6113249	351	605114	6104571
37	608957	6099901	138	600775	6111504	247	600302	6113223	352	605723	6104477
38	608938	6099987	139	600731	6111574	248	600327	6113186	353	605863	6104416
39	608853	6100139	140	600710	6111618	249	600347	6113145	354	605976	6104321
40	608812	6100238	141	600687	6111680	250	600358	6113092	355	606054	6104206
41	608792	6100331	142	600665	6111759	251	600359	6113050	356	606093	6104087
42	608754	6100541	143	600657	6111818	252	600351	6113006	357	606150	6103667
43	608724	6100555	144	600653	6111887	253	600339	6112962	358	606340	6103254
44	608706	6100585	145	600651	6111989	254	600309	6112880	359	606433	6103141

Point ID	Easting	Northing	Point ID	Easting	Northing	Point ID	Easting	Northing	Point ID	Easting	Northing
45	608675	6100748	146	600645	6112085	255	600302	6112830	360	606847	6102773
46	608649	6100814	147	600633	6112146	256	600303	6112792	361	607246	6102398
47	608604	6100888	148	600616	6112195	257	600312	6112743	362	607554	6102045
48	608343	6101203	149	600586	6112257	258	600328	6112702	363	607681	6101943
49	608331	6101240	150	600549	6112314	259	600621	6112276	364	607914	6101766
50	608339	6101270	151	600298	6112672	260	600653	6112210	365	607946	6101733
51	608203	6101479	152	600273	6112733	261	600671	6112157	366	607949	6101696
52	608167	6101522	153	600262	6112803	262	600685	6112090	367	608116	6101609
53	608118	6101561	154	600267	6112876	263	600689	6112032	368	608171	6101572
54	607927	6101663	155	600296	6112962	264	600692	6111949	369	608226	6101515
55	607898	6101651	156	600315	6113029	265	600695	6111840	370	608369	6101296
56	607864	6101656	157	600319	6113077	266	600701	6111786	371	608402	6101298
57	607474	6101955	158	600305	6113142	267	600711	6111740	372	608436	6101279
58	607389	6102046	159	600270	6113199	268	600725	6111692	373	608664	6101005
59	607161	6102312	160	600203	6113263	269	600747	6111634	374	608730	6100917
60	606767	6102684	161	600157	6113322	270	600776	6111576	375	608770	6100838
61	606348	6103056	162	600124	6113389	271	600808	6111526	376	608798	6100747
62	606255	6103163	163	600023	6113741	272	600852	6111473	377	608823	6100611
63	606035	6103634	164	600012	6113803	273	600893	6111433	378	608817	6100574
64	605970	6104082	165	600007	6113887	274	600947	6111387	379	608794	6100549
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66	605788	6104320	167	600044	6114170	276	601086	6111310	381	608855	6100233
67	605688	6104362	168	600042	6114257	277	601193	6111263	382	608954	6100047
68	605030	6104456	169	600021	6114337	278	601240	6111239	383	608986	6099969
69	604641	6104398	170	599959	6114500	279	601285	6111208	384	608998	6099886
70	604300	6104422	171	599942	6114565	280	601345	6111153	385	608997	6099841
71	603793	6104355	172	599934	6114614	281	601387	6111106	386	609024	6099819
72	603681	6104368	173	599876	6115155	282	601842	6110467	387	609034	6099783
72A	603588	6104400	174	599865	6115225	283	601899	6110359	388	609037	6099669
72B	603480	6104212	175	599844	6115298	284	601930	6110265	389	609055	6099604
72C	603472	6104217	176	599808	6115383	285	601995	6109899	390	609152	6099430
72D	603462	6104199	177	599785	6115428	286	601998	6109819	391	609503	6098814
72E	603470	6104194	178	599756	6115479	287	601984	6109727	392	609528	6098752
72F	603389	6104054	179	599596	6115744	288	601960	6109656	393	609541	6098676
72G	603363	6104069	180	599509	6115901	289	601923	6109568	394	609553	6098306
72H	603561	6104413	181	599493	6115997	290	601906	6109503	395	609541	6098278
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75	603316	6104581	184	599605	6116220	293	601912	6109244	398	609551	6097679
76	603084	6104701	185	599697	6116319	294	601906	6109192	399	609589	6097569
77	602968	6104773	186	599733	6116370	295	601854	6109046	400	609643	6097487
78	602798	6104952	187	599754	6116429	296	601785	6108948	401	609775	6097346
79	602769	6104949	188	599759	6116491	297	601740	6108887	402	609826	6097266
80	602737	6104963	189	599726	6116639	298	601709	6108818	403	610185	6096478
81	602660	6105059	190	599698	6116754	299	601699	6108769	404	610218	6096382
82	602624	6105122	191	599701	6116807	300	601698	6108718	405	610231	6096248

Point ID	Easting	Northing	Point ID	Easting	Northing	Point ID	Easting	Northing	Point ID	Easting	Northing
83	602590	6105232	192	599721	6116847	301	601706	6108666	406	610209	6096113
84	602581	6105303	193	599813	6116942	302	601730	6108606	407	610152	6095976
85	602582	6105590	194	599825	6116973	303	601760	6108560	408	609791	6095452
86	602573	6105681	195	599816	6117000	304	601854	6108436	409	609735	6095349
87	602553	6105771	196	599684	6117118	305	601917	6108334	410	609690	6095183
88	602521	6105892	197	599677	6117133	306	601956	6108287	411	609688	6095042
89	602498	6106073	198	599682	6117146	307	602024	6108236	412	609711	6094923
90	602468	6106428	199	599697	6117153	308	602140	6108168	413	609875	6094481
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93	602439	6106920	202	599854	6117015	311	602298	6107886	416	609832	6094056
94	602384	6107102	203	599863	6116990	312	602306	6107731	417	609842	6093965
95	602390	6107147	204	599863	6116956	313	602316	6107631	418	609891	6093879
96	602407	6107166	205	599848	6116922	314	602335	6107538	419	609965	6093825
97	602330	6107416	206	599757	6116828	315	602368	6107427	420	610165	6093761
98	602296	6107529	207	599745	6116810	316	602445	6107177	421	610437	6093678
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100	602266	6107729	209	599738	6116760	318	602494	6107147	423	610526	6093612
101	602258	6107883	210	599796	6116521	319	602555	6106949	424	610552	6093570

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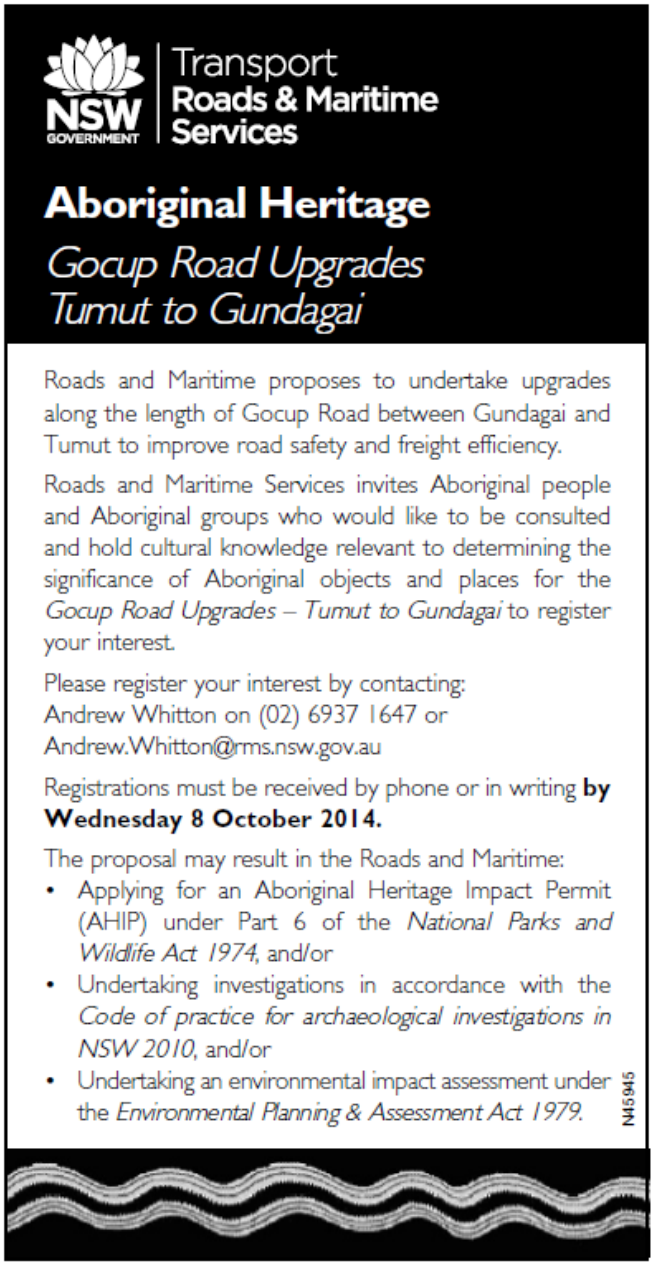
Appendix A Advertisement for registration of interest



Transport Roads & Maritime Services

NSW GOVERNMENT

Aboriginal Heritage

Gocup Road Upgrades
Tumut to Gundagai

Roads and Maritime proposes to undertake upgrades along the length of Gocup Road between Gundagai and Tumut to improve road safety and freight efficiency.

Roads and Maritime Services invites Aboriginal people and Aboriginal groups who would like to be consulted and hold cultural knowledge relevant to determining the significance of Aboriginal objects and places for the *Gocup Road Upgrades – Tumut to Gundagai* to register your interest.

Please register your interest by contacting:
Andrew Whitton on (02) 6937 1647 or
Andrew.Whitton@rms.nsw.gov.au

Registrations must be received by phone or in writing **by Wednesday 8 October 2014.**

The proposal may result in the Roads and Maritime:

- Applying for an Aboriginal Heritage Impact Permit (AHIP) under Part 6 of the *National Parks and Wildlife Act 1974*, and/or
- Undertaking investigations in accordance with the *Code of practice for archaeological investigations in NSW 2010*, and/or
- Undertaking an environmental impact assessment under the *Environmental Planning & Assessment Act 1979*.

N45945

Appeared in: *Gundagai Independent* (22/09/2014, page 3)
Koori Mail (24/09/2014, page 18)
National Indigenous Times (24/09/2014, page 9)
Tumut & Adelong Times (23/09/2014, page 5)

Appendix B Aboriginal Stakeholder Comments

No stakeholder comments have been received during the consultation process. See minutes from two Aboriginal focus group meetings held to discuss the project.

Appendix C Salvage Excavation Methodology

Methodology
Research Aims
The main aims of the proposed salvage excavation program are:

- To salvage a representative sample of the identified archaeological sites prior to construction impact.
- To analyse the salvaged archaeological material to gain and conserve knowledge and understanding of the scientific and cultural information exhibited by the activities associated with landforms along the tributaries of Tumut River (Stuckeys Creek and Minjary Creek).

The further scientific aim of the salvage excavation program would be to determine the subsurface integrity, extent, spatial distribution and nature of the cultural deposit and the specific types of associated archaeological/cultural activities.

- Determining the integrity of the deposit involves assessing the degree of disturbance which is present.
- Determining the statistical extent of the sites and/or activity areas involves identifying the boundaries associated with the identified archaeological deposit.
- Assessing the spatial distribution involves identifying the presence/absence of archaeological material across the identified archaeological sites.
- The nature of the sites refers to the type of activities indicated by the artefactual material (e.g. primary production, domestic knapping, hunting camps). The goal would be to retrieve entire assemblages from specific activities if such activities were present.
- Retrieved assemblages would be compared with the results from other relevant archaeological projects in order to assess significance.

Research Question
The results of the proposed salvage excavation would increase our understanding of subsurface archaeology of the study area, where no systematic archaeological excavations have previously taken place. In particular, research would focus on the creek margins addressing questions about past activity events and survivability of the deposit. Understanding how flooding, erosion and modern land use practices impact on archaeological sites is undeveloped for the Gocup region, yet this information is of critical importance for determining scientific value.

> **Question 1**: What cultural activities are archaeologically identifiable along Stuckeys Creek and Minjary Creek and what is the effect of natural and human disturbance on the preservation of these Aboriginal archaeological sites?

What can we expect?
It is anticipated that differences in stone tool assemblages may be related to different cultural activities (e.g. primary reduction vs maintenance flaking). The science of archaeology is paramount to any research question and it is important to stress that the goal for the salvage program for all excavated sites is straight forward: to retrieve a viable sample for comparative analysis using established techniques (see Field Methods below). In this regard interpretation would not precede data collection. The proposed archaeological program would systematically sample the relevant areas using standard techniques with the outcome being a viable, robust and comparable sample. Analysis of the sample would follow and interpretations would be made distinctly separate from the results.

> **Question 2**: Do the identified cultural activities differ between Aboriginal archaeological sites along Stuckeys Creek and Minjary Creek?

Geoarchaeology
At present the archaeological methods being used for mitigation have become preoccupied with recovering lithic artefact assemblages and analysing these important sources of evidence independent of the environmental and stratigraphic contexts from which the lithic artefacts derive. Many research questions asked of lithic assemblages cannot be answered without ancillary data and evidence e.g. the effects of past geomorphic and soil process on the taphonomy of artefact scatters, and the age of the deposits from which they derive. In this light, field methods used for salvage excavation will aim to establish the relationship between object and deposit, a crucial and basic part of any excavation.

Archaeological Salvage Areas
Salvage excavation would be undertaken on identified archaeological sites: Gocup Road 01B, Gocup Road 03, Gocup Road 05 and Gocup Road 07. Salvage excavation of these sites would focus on the extraction of collections of artefacts related to activity areas and geomorphic information. It is anticipated the program will commence in the last quarter of 2015.

FIELD METHODS

The goal of the field excavation program is to recover significant assemblages of artefacts and investigation of contributing geomorphic processes.

Salvage Program

In order to achieve the most robust and comparable result, KNC advocates an open area salvage excavation. The first phase in open area salvage is to establish the statistical boundaries of the previously identified archaeological deposit. This approach is designed to salvage the spatial properties of the site as shown in the lithic continuum. In other words, recording the spread of activities across the site/landscape.

Phase 1

A series of 1 m^2 squares are excavated on a transect grid overlain on each site to mark the spread of lithics and related geomorphic activity. Phase 1 will include 25 x 1m^2per site, based on excavation in similar landform and size, for a total of 100 x 1m^2.

Geocentric Datum of Australia 1994 (GDA94) coordinates would be recorded for each square to enable three dimensional modelling. Statistical salvage following this method is highly beneficial because it creates a robust inter-site sample, sufficiently random, critical for regional comparative analysis. No other method is as efficient or effective.

Phase 2

Where information bearing deposits are identified at Phase 1, a series of 9 x 1m^2 expansion squares (3 m x 3 m area, includes original test square) would be excavated around those deposits. Information bearing deposits are identified by triggers such as:

- significant quantities of artefacts
- objects exhibiting a range of diagnostic characteristics
- variations in raw material
- unusual artefacts
- soils horizons with good condition and integrity
- chronological material and/or taphonomic indicators.

In this context chronologic material is anything that can be used to date artefacts or deposit: charcoal or charcoal bearing deposit (e.g. hearth ash), sandy deposit, gravels (e.g. aluminium feldspar. As a minimum, a full 9 x 1m^2 area (3 m x 3 m area, includes original test square) would be excavated in all salvage areas, for a total of 32m^2 (additional Phase 2 squares).

Phase 3

Open area salvage of significant deposit follows the Phase 2 expansion squares and would expand to encompass entire activity areas. Phase 3 excavations are required where the Phase 2 triggers are found to extend beyond the 9 x 1m^2. The location of Phase 3 open area investigation would be based on Phase 1 and 2 results.

At least 75 x 1m^2 would be excavated for each of the four salvage location.

Minimum program total is 300 x 1m^2 (75m^2 x four sites = 300m^2). Minimum program total excavation area, includes all squares from Phase 1, Phase 2 and Phase 3. Additional excavation squares beyond the minimum 75m^2 per site may be required if significant archaeological deposit at a site is not fully captured by the minimum total.

Individual excavation squares measuring 1 m^2 would be hand excavated in stratigraphic units (Unit A, Unit B, etc.). Squares would be excavated until the basal layer or culturally sterile deposit is reached (usually 25-35 cm). Previous excavation of the podzolic soils associated with the area indicates no archaeological stratigraphy within units. As such the A1 and A2 soil layers are culturally one layer (suffering from cyclical soil transfer resulting in a mixed cultural profile within the soil) and can be salvaged as one unit where possible. All excavated deposit would be wet sieved using nested 5.0 mm and 2.5 mm sieves (1.0 mm sieves to be used to determine intactness of deposit).

Carbon samples will be collected and analysed for material relating to both the archaeology and geomorphology. Where appropriate cosmogenic and radiometric dating of soils and rock surfaces will be applied (Nishiizumi et al. 1986, 1993). A minimum of four dates (one per site) must be obtained (either by radiocarbon or OSL depending on suitability).

The location of each excavated square would be identified on a surveyed plan of the site. Stratigraphic sections detailing the stratigraphy and features within the excavated deposit would be drawn and all squares would be photographed. Soil samples as well as thin section profiles (where feasible) would also be collected. The stratigraphy of all excavated areas would be fully documented and appropriate records archived.

Core samples measuring at least 1m deep will be collected and archived using a 50mm hand corer to describe a cross section of Stuckeys Creek (around 20 samples will be required). In addition, thin section profiles (where feasible) would also be collected from open areas. The stratigraphy of all areas would be fully documented and appropriate records would be archived.

Analysis

Artefacts would be analysed on a comparable level with previous analyses of excavated assemblages. Information derived from this analysis; in particular the identification of specific artefact types and their distributions and associations; would be used to put together interpretations about how sites were used, where sites were located across the landscape, the age of sites and to assess cultural heritage values. By comparing different areas it would be possible to determine whether there were differences in the kinds of activities carried out and if different activities were related to different landforms.

The geoarchaeological assessment will focus on the integrity of the deposit and the ramifications of geomorphic change for: artefact survivability, interspatial assessments and scientific significance. Output will include a derived archaeological flood model in GIS for the portion of Stuckeys Creek within the project area based on the results of the excavation program.

A range of stone artefacts may be present across the salvage areas and the analysis would expand accordingly to account for artefact variability. All information would be recorded in database form (MS Excel). Various types of evidence would be used to determine the kinds of activities that were carried out. A short description of the proposed analysis is outlined below.

- Field analysis would record basic data, such as material type, number and any significant technological characteristics, such as backing or bipolar techniques; added to this would be any provenance data such as pit ID and spit number. The purpose of the field recording is twofold: 1) establish a basic recording of artefacts retrieved and 2) to allow on-going assessment of the excavation regime (e.g. whether higher stratigraphic resolution is required while digging).
- Detailed (laboratory) analysis would entail recording a larger number of characteristics for each individual artefact. These details would be recorded in matrices suitable for comparative analysis (e.g. multivariate and univariate) of the excavated assemblage on a local and regional basis.
- Lithic characteristics to be recorded cover a range of basic information but are not limited to these categories (see example below). For transparency, terms and category types would in large part be derived from Holdaway and Stern (2004).

Sample Categories		
Record Number	% Cortex	Flake Type
Pit ID	Length	Termination Type
Spit Number	Width	Core Type
Count	Thickness	Number of Scars (Core)
Raw Material	Weight	Scar Type (Core)
Colour	Modification	Shape of Flake
Quality	Reduction Type	Platform Type

- A detailed explanation and glossary would be provided with the final excavation report.
- Minimum Number of Flake (MNF) calculations formulated by Hiscock (2002) would be undertaken where applicable (although past experience indicates MNF calculations would not be required for this excavation program).

The analysis of artefacts recovered during the excavation program would be undertaken in a transparent and replicable fashion so as to permit the comparison of the entire excavated assemblage with data from other areas. This would also allow for an interpretation of the study area's archaeological significance.

Field Team

KNC directors, Dr Matthew Kelleher and Alison Nightingale, would be responsible for the salvage excavation program. Dr Matthew Kelleher would direct the excavation component of the Aboriginal archaeological assessment. Matthew has extensive experience in managing archaeological excavations and research projects. Matthew would also be the principal contact for the overall Aboriginal archaeological assessment for the project. The geoarchaeological assessment will be undertaken by a suitably qualified geomorphologist and Dr Matthew Kelleher.

Number of Site Officers

Best practice is achieved in Aboriginal archaeology by using a 1:1 archaeologist to Aboriginal site officer ratio. A single four person archaeological team will need four Aboriginal site officers each day of the excavation program.

Salvage Excavation Requirements Summary

- 300m^2 total excavation (Phase 1, Phase 2 and Phase 3)
- Hand excavation of all squares
- Hand excavation by stratigraphic unit
- Wet sieving of all deposit
- Sieve size must be nested in three layers: 5mm, 2.5mm and 1mm to capture micro debitage
- Requirement for four chronology samples (radio carbon or OSL)
- 20x1m deep 50mm wide core samples, analysis and archive
- Thin section collection, anaylsis and archive
- Archaeological excavation report
- Geomorphological assessment report
- GIS flood model for Stuckeys Creek

Appendix E

Non-Aboriginal heritage assessments

OnSite Cultural Heritage Management

Non-Aboriginal Heritage Assessment Report

Gocup Road (Main Road 279)
Tumut to Gundagai

A report prepared for Roads and Maritime Services

June 2013

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EXECUTIVE SUMMARY

Roads and Maritime Services (RMS) are developing a route strategy for Gocup Road, known as Main Road 279 (MR 279), that connects the townships of Tumut and Gundagai, to identify projects for development and construction that will improve road user safety, transport efficiency and reduce maintenance costs.

RMS has engaged On Site Cultural Heritage Management to undertake a non-Aboriginal (historic) heritage assessment for Gocup Road extending between the Snowy Mountains Highway (HW4) north from Tumut to the intersection with Eagle Street in South Gundagai (28.5km).

The majority of the study area was along the existing road corridor between roadside and private property fence line (18.4km long). The assessment also included four sections of Gocup Road (totalling 10.1km) extending 50m to either side of Gocup Road which included the existing road corridor and sections of adjacent farm land.

This report presents the results of a strategic historic heritage assessment of Gocup Road. The report has identified sites of heritage value and provided preliminary heritage and impact assessments for use in a more detailed planning process for future upgrade works along Gocup Road.

The objectives of this project, in accordance with the brief were to provide information about the non-Aboriginal archaeological, historical and physical aspects of the study area so as to provide:

- An understanding of the heritage values and the potential archaeology of the study area;
- An assessment of the historical heritage and archaeological values of identified sites within the study area;
- The identification for impact by the proposed project, and of the potential for triggering the relics provisions and statutory permit requirements according to the *NSW Heritage Act 1977*; and
- Appropriate heritage and archaeological management options and strategies

The scope of works and methodology adopted for this project has included:

- Historical research of the study area;
- An onsite inception meeting
- Field survey investigation;

- Preliminary assessment of identified heritage and archaeological sites (built, landscape and sub-surface);
- Preparation of maps or plans showing identified sites and curtilage where applicable;
- Predictive modelling (zoning) for potential archaeological sites (where appropriate), presented as a plan of the study area showing the high, moderate, low zones of archaeological potential;
- A statement of heritage impact, where applicable, for individual sites;
- The provision of recommendations to avoid, minimise or mitigate against any impact; and
- The identification of any legislative requirements under the *NSW Heritage Act 1977*.

This non-Aboriginal heritage assessment study is based around investigations of the archaeological, historical and physical contexts of the study route. Each context has been investigated individually and the information drawn together and analysed with reference to established guidelines of the Office of Environment and Heritage (OEH) and in reference to the RTA Heritage Guidelines of 2004. In brief, the proposed methodology has included:

Research of the archaeological context compiled from records and reports of available heritage and archaeological studies, and from statutory and non-statutory databases such as State and Local inventory listings including relevant Local Environmental Plans;

Research of the historical context was drawn from primary and secondary historical accounts in our own holdings (including historical maps and plans), through information held at local historical societies and the local history section of the library, and through additional research of historical newspapers, and other local sources and archives. In addition, community consultation with a fifth generation resident of the Gocup area was carried out.

Investigation of the physical context through a field survey of the study area and recorded by photography, documentation, mapping and zoning of individual sites, was also conducted where applicable.

OVERVIEW OF STUDY RESULTS

Typical of the establishment and development of regional roads across New South Wales, Gocup Road was in its earliest form a rough track used by travellers and settlers. It crossed hilly terrain between Gundagai and Tumut and was first known as the Gundagai or Tumut Road. Early historical reports dispute the use of the term 'road', claiming it was little more than a bush track and even as late as 1901, local newspaper reports still mention the very poor state of the road given its use as a primary route of travel.

Again typical of regional development, small settlements formed along the road in the mid 1800s. The road became known as the Gocup Road in the late 1800s in response to establishment of the settlement of Gocup. The Minjary settlement was established perhaps a little earlier than Gocup and a formal village was set out although little development took place.

It was a pastoral area supporting both sheep and cattle, and for a time dairy cattle. Historical development along the road included hotels, schools and a post office to support the surrounding properties. Historical reports claim that the road was often impassable during wet weather. Even today the road is subject to flooding. Private contractors tendered to maintain the road in the late 1800s and eventually with the increasing status of the road, this responsibility moved to local authorities, and has now devolved to the State. Road improvements, particularly with the introduction of the motor vehicle, occurred in the 1920s when many of the more reliable creek crossings would have been installed.

The line of the Gocup Road has been altered over the years to improve creek crossings, avoid dangerous corners and to evade steep inclines and declines. It seems that the main road improvement works have occurred in the 1920s, the 1960s and the 1980s.

Statutory heritage registers and inventories show that there are no recognised heritage sites listed along the line of the Gocup Road and in observation, this is likely the result of a lack of a dedicated heritage study and a poor understanding of the local history, rather than an absence of historical items.

This study has revealed twenty-two items of potential heritage significance. These items have been recognised for their ability to contribute meaningful information to the knowledge of the historical development of the Gocup and Minjary areas. Items include works such as culverts, bridges and abandoned road formations along the line of road itself, and include historical development such as schools, hotels and cottages. Some items are wholly archaeological where no surface evidence remains.

In the absence of specific road works plans, each identified item has been assessed in a preliminary fashion and a general assessment of impact provided with guiding recommendations for use in a detailed planning process. Management recommendations include the need to avoid the disturbance of some sites in order to avoid the need for additional detailed study, and the potential for triggering the relic's provisions of the *NSW Heritage Act 1977.* Where alternatives have been considered during the planning process and disturbance is unavoidable, recommendations for additional study and the formulation of detailed heritage/archaeological management strategies have been made.

In summary, Gocup Road has been a vital connection that has bound the communities of Gundagai and Tumut, and the settlements of Gocup and Minjary. This connection is as important today as it was in the 1800s.

Heritage management recommendations have been made based on this understanding of the study route and the concept of upgrade routes proposed by RMS.

HERITAGE MANAGEMENT OVERVIEW

There are three important principles to consider in regard to the management of heritage within a planning process:

1. The legislative obligations under NSW law to take appropriate action to manage heritage items.

2. Heritage significance is based on established assessment criteria. If the value of a heritage item is not clear, a precautionary approach should be adopted until a definitive assessment can be made.

3. Management of an item should be based on the significance of the item and practical realities for its conservation. Management does not preclude adaptive reuse or the installation of modern facilities. It does not preclude demolition where there is no feasible alternative.

STATUTORY CONSIDERATIONS

The NSW Heritage Act 1977 (Section 4) defines "environmental heritage" to mean those places, buildings, works, relics, moveable objects, and precincts, of historical, scientific, cultural, social, archaeological, architectural, natural or aesthetic value that are assessed as significant to the State of New South Wales, significant within the local area.

Ideally, significant heritage resources should remain undisturbed to be conserved *in situ* within the framework of the Burra Charter. Such a course is frequently impossible or impractical and questions are posed by the conflicting interests of heritage on the one hand, and progress and development on the other. Relevant to the parallel issues of site conservation and the need for development, redevelopment and remediation, is NSW heritage legislation and its application within the SEPP (Infrastructure) 2007.

There has been a slight shift in heritage legislation away from the age of the site, and automatic inclusion as a heritage item in this regard, to the assessed significance of a site and the need for justified management to result in the contribution of meaningful information, rather than the duplication of information already known.

Application of statutory considerations and guidelines

The application of statutory considerations to the study site, with reference to the definitions contained in Section 4 of the Heritage Act and with reference to SEPP (Infrastructure) 2007 and the RTA Heritage Guidelines 2004 are discussed below.

1. In reference to the definition of environmental heritage contained in the Heritage Act, a **work** is not further defined by the Act, but dictionary definitions are adopted such that a work is taken to mean *'an engineering structure, such as a building, bridge, dock, etc'*. This definition would extend to cover abandoned road formation and "works" such as bridges and culverts that are associated with road construction.

2. Where a 'work' will be impacted by project works there is no requirement for statutory permit application under the NSW Heritage Act 1977, however the potential for the relics provisions of the Heritage Act to be triggered should be carefully considered.

3. The RTA Guidelines consider the recognition and understanding of the significance of these heritage items is the first step towards their proper care and management.

4. The items identified in this study should be considered as heritage assets and managed according to RTA Heritage Guidelines, particularly in the application of detailed assessment as set out in Section 4.3 of the RTA Heritage Guidelines.

5. Due diligence heritage management and the *NSW Heritage Act 1977* requires that if unexpected **relics** are exposed during any project works, that work is suspended and appropriate RMS heritage personnel consider the need to inform the Heritage Branch of the NSW Office of Environment and Heritage. In this case, additional archaeological assessment and further approvals may be required.

HERITAGE MANAGEMENT RECOMMENDATIONS

Recommendations for each individual site or item are made in **Section 4.0** and are designed to offset potential heritage issues and to inform the selection of suitable options for road upgrade works. Where justifiable, the need for additional study is specified. Recommendations at this concept stage have been based on the potential for disturbance of sites and items by road upgrade works. Further, recommendations are made with a focus upon the elimination and/or reduction of negative impact upon archaeological and/or heritage values. The objective of management recommendations is to provide a reasonable, balanced and precautionary approach that will appropriately address the

potential for the exposure of archaeological resources (relics) as a consequence of project works.

A summary of individual site recommendations is provided in the executive summary table below.

SUMMARY OF SITE RECOMMENDATIONS

Site	Within 50 m zone	Summary of Recommendations
1. Gundagai South Cemetery	No	Avoid any intrusion or disturbance.
2. Small stone culvert	No	Unavoidable disturbance would require management.
3. Large stone culvert	No	Avoid disturbance.
4. Old roadside advertising signs	No	Disturbance acceptable with management.
5. Abandoned cattle yards/section old road	No	Disturbance unlikely, but acceptable with management.
6. Minjary School	No	Disturbance acceptable with due diligence heritage management.
7. Minjary School (relocated)	No	Disturbance acceptable with due diligence heritage management.
8. Minjary Pub	No	Unavoidable disturbance would require archaeological management.
9. Stone culvert	Yes	Unavoidable disturbance would require management.
10. Timber culvert	Yes	Unavoidable disturbance would require management.
11. Survey Tree	Yes	Unavoidable disturbance would require management.
12. Chimney (former cottage)	On western edge of zone	Unavoidable disturbance would require management.
13. Market Garden/Cottage	Yes (western side)	Disturbance acceptable with due diligence heritage management.
14. Tennis court (former)	Yes (western side)	Unavoidable disturbance would require management.
15. Telephone Exchange (former location)	No	Disturbance unlikely, but acceptable with management.
16. Post Office (former)	No	Disturbance unlikely. No management required.
17. Gocup Schoolhouse (former)	On western edge of zone	Avoid any intrusion or disturbance.
18. Section old road and quarry	No	Disturbance acceptable with due diligence heritage management.
19. Remnant stone culvert and old road	Partial (east & west)	Disturbance acceptable with due diligence heritage management.
20. Timber crossing/culvert	On western edge of zone	Unavoidable disturbance would require management.
21. Smarts Road Pub	Yes	Unavoidable disturbance would require archaeological management.
22. Tumut Butter Factory & residence	No	Avoid any intrusion or disturbance.

1.0 INTRODUCTION

Roads and Maritime Services (RMS) are developing a route strategy for Gocup Road, known as Main Road 279, to identify projects for development and construction that will improve road user safety, transport efficiency and reduce maintenance costs.

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This report presents the results of a strategic historic heritage assessment. The report has identified sites of heritage value and provided preliminary heritage and impact assessments for use in a more detailed planning process for future upgrade works along Gocup Road.

1.1 PROJECT OBJECTIVES

The objectives of this project, in accordance with the brief are to provide information about the non-Aboriginal archaeological, historical and physical aspects of the study area so as to provide:

- An understanding of the heritage values and the potential archaeology of the study area;
- An assessment of the historical heritage and archaeological values of identified sites within the study area;
- The identification for impact by the proposed project, and of the potential for triggering the relics provisions and statutory permit requirements according to the *NSW Heritage Act 1977*; and
- Appropriate heritage and archaeological management options and strategies

1.2 PERSONNEL AND AUTHORSHIP

The project was managed by Gerard Niemoeller, Principal Heritage Consultant. Sue Singleton, Archaeologist of Eureka Heritage, undertook the field work with field assistant Phil Williamson. David Tutchener of On Site CHM conducted the majority of the historical and archival research for the project.

Sue Singleton carried out the archaeological context investigation, supplemented the historical context content, analysed the investigation results and prepared the preliminary significance assessment and preliminary assessment of heritage impact for each of the identified items/sites. This report has been prepared collaboratively by Sue Singleton, David Tutchener and Gerard Niemoeller.

1.3 SCOPE AND METHODOLOGY

The scope of works and methodology adopted for the project as per the proposal included:

- Historical research of the study area;
- An onsite inception meeting:
- Field survey investigation;
- Preliminary assessment of identified heritage and archaeological sites (built, landscape and sub-surface);
- Preparation of maps or plans showing identified sites and curtilage where applicable;
- Predictive modelling (zoning) for potential archaeological sites (where appropriate), presented as a plan of the study area showing the high, moderate, low zones of archaeological potential;
- A statement of heritage impact, where applicable, for individual sites;
- The provision of recommendations to avoid, minimise or mitigate against any impact; and
- The identification of any legislative requirements under the *NSW Heritage Act 1977*.

This non-Aboriginal heritage assessment study is based around investigations of the archaeological, historical and physical contexts of the study route. Each context has been investigated individually and the information drawn together and analysed with reference to established guidelines of the Office of Environment and Heritage (OEH) and in reference to the RTA Heritage Guidelines of 2004. In brief, the proposed methodology has included:

Research of the archaeological context was compiled from records and reports of available heritage and archaeological studies, and from statutory and non-statutory databases such as State and Local inventory listings including relevant Local Environmental Plans;

Research of the historical context was drawn from primary and secondary historical accounts in our own holdings (including historical maps and plans), through information held at local historical societies and the local history section of the library, and through additional research of historical newspapers, and other local sources and archives. In addition, community consultation with a fifth generation resident of the Gocup area was carried out.

Investigation of the physical context through a field survey of the study area and recorded by photography, documentation, mapping and zoning of individual sites, where applicable.
These investigations have been carried out in three stages.

Stage 1:
This stage included the inception meeting and a desktop study consisting of investigation into the archaeological and historical contexts. The preparation of the historical and archaeological contexts of the report guided the field survey process and provided an indication of target areas for inspection during Stage 2.

Stage 2:
The site survey was guided by the results of Stage 1 whereby identified target areas were inspected and recorded to the degree required for assessment. A full survey of the entire project area was conducted through a combination of vehicular and pedestrian survey. The survey was recorded by photography and where required, identified heritage sites were recorded by location and extent, and by preliminary surface survey. The need for to investigate sub-surface features and the need for any additional investigation would form part of the recommendations of the report.

Stage 3:
Stage 3 involved reporting and formal assessment of identified and potential archaeological sites in accordance with the standard requirements of the NSW Heritage Manual endorsed by the NSW Heritage Council.

1.4 STATUTORY CONTROLS

Generally RMS road upgrade works would be carried out as development without consent under clause 94 of the SEPP (Infrastructure) 2007, which provides that road works or construction of road infrastructure is development that is permissible without consent. However, the requirements of the NSW Heritage Act 1977 still apply to archaeological relics and the relics provisions of the Heritage Act may be triggered by such works.

Relic's provisions – NSW Heritage Act 1977

Archaeological relics fall within the definition of *environmental heritage* which is protected under the *NSW Heritage Act 1977*. The act provides that environmental heritage may be places, buildings, works, relics, moveable objects, and precincts of State or local heritage significance. The Heritage Act further provides measures for the protection and management of the different types of environmental heritage, and this is dependent upon the type of item under investigation.

The entire Heritage Act serves to protect heritage but historical archaeological remains are additionally protected from being moved or excavated through the operation of the *relic's*

provisions. These provisions protect unidentified relics which may form part of the environmental heritage in NSW, but which may not have been listed on statutory registers or databases.

Section 4(1) of the *NSW Heritage Act 1977* defines a relic as:

Any deposit, artefact, object or material evidence that:

> *relates to the settlement of the area that comprises NSW, not being Aboriginal settlement; and is of State or local heritage significance.*

According to the Act no disturbance or excavation may proceed that may expose or discover relics except with an Excavation Permit and that an excavation permit is required, if a relic is:

> *listed on the State Heritage Register, pursuant to s60 and s63 of the Act; and*
>
> *not listed on the State Heritage Register, pursuant to s140 and s141 of the Act.*

In circumstances where there is little likelihood that relics exist or that such relics are unlikely to have heritage value, and/or that disturbance will result in a minor impact and/or where excavation involves removal of fill only, the Act makes provision for the granting of an exception to an excavation permit under s139 (4).

1.5 REPORT STRUCTURE

Section 2 provides a historical context study. This has been prepared from the review of existing reports, investigation of current statutory and non-statutory heritage databases and historical research.

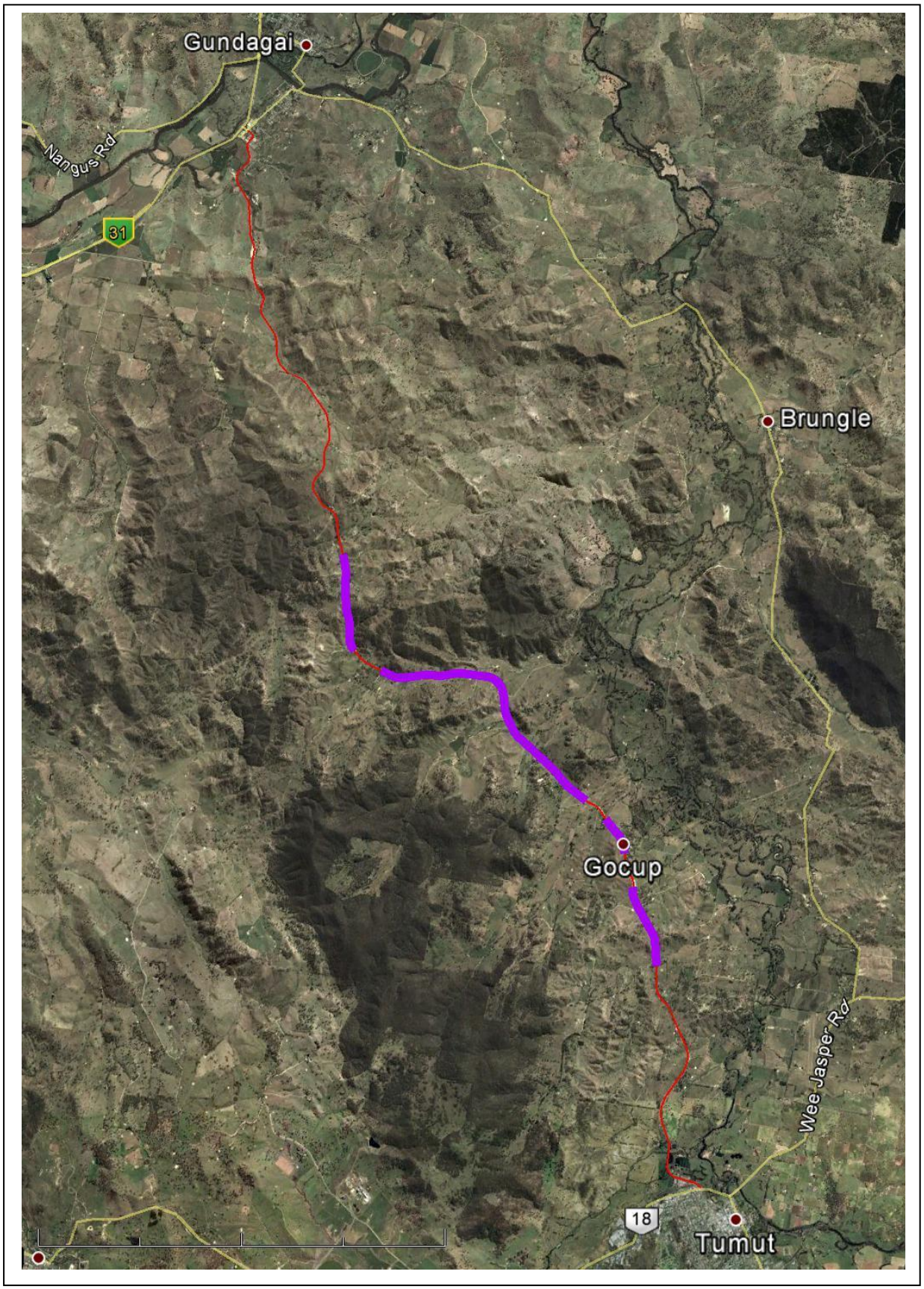
Section 3 gives an overview of the heritage assessment process and the way in which heritage values are derived.

Section 4 presents the results of site survey. It provides an individual site description and a brief historical context (if available). Based on the synthesis of the contextual studies, together with the survey results, a preliminary assessment of heritage significance and preliminary impact assessment is provided.

Section 5 provides the results of inventory searches.

Section 6 focuses on the management of the heritage values of the study area by considering the relevant legislative requirements, the heritage issues that may arise in the event of disturbance or unavoidable destruction of sites, and through the recommendation of appropriate management strategies.

Figure 1.1: Gocup Road (MR 279) highlighted in red between Tumut and Gundagai. Sections assessed to 50 metres each side of the current alignment are shown in purple.



2.0 HISTORICAL CONTEXT

This historical context has been compiled through the combined research of primary source material, secondary source literature and through community consultation.

The history of the study route falls within the broader historical context of the discovery, settlement and development of the Murrumbidgee region during the early-to-mid 19th Century, and within the more local context of the development of the Tumut and Gundagai Local Government Areas.

In overview, the elements considered relevant to the historical context of the study route included:

- exploration and early settlement in the Murrumbidgee region;
- the establishment of the towns of Gundagai and Tumut;
- the establishment of the southern roads from Sydney;
- the development of Regional Road 279 - Gocup Road;
- the settlements at Gocup and Minjary;
- the history of road and drainage construction in the 19th Century; and
- the ongoing maintenance and re-alignment of Gocup Road.

2.1 EXPLORATION AND EARLY SETTLEMENT

In 1824 Andrew Hamilton Hume and Captain William Hovell and a party of six men journeyed from Lake George to Port Phillip (Snowden, 2004). At the time this area of present day NSW and Victoria was unexplored, unmapped and unknown to Europeans. Hume initially rejected a proposal to undertake the journey, but at the request of Sir Thomas Brisbane he suggested an overland route he would be willing to take. Hume requested he be equipped with six packhorses, six men and provisions for the journey. These requests fell on deaf ears, as it was felt that supplies and animals could not be spared. Hume and Hovell were given very basic equipment by the government, but funded the rest of the expedition themselves on the promise they would be reimbursed on their return. Promises of financial reward for the whole group were reneged upon however, and land grants were made only to Hume and Hovell. Hovell needed to sell his grant to cover expenses from the expedition (Clouston, 1924).

On 27th October 1824 Hume and Hovell's party arrived at the Murrumbidgee River, which they had some trouble crossing. After a number of subsequent river crossings, Hovell's journal records crossing a river 'which was by the natives called Tumut' (Clouston 1924: 13). Tumut is

also recorded in early maps of the period as 'Doomut', an Indigenous word for 'camping ground' (French, 1965).

European settlement of the district followed not long after Hume and Hovell's expedition, with the first pioneers of the area most likely travelling down the Murrumbidgee River from Yass in the late 1820's (Clouston, 1924). The journey from Sydney was perilous and it took over two months to reach the Tumut River where the area was populated with 'hordes of blacks, at the time quite wild and uncivilised' (ibid: 15). One member of Hume and Hovell's exploration party, Thomas Boyd, returned in the early 1830's and selected land on Gilmore Creek at "Rosebank" where he reared a large family. Boyd was born in Dublin in 1798 and died at Gilmore on 26th August 1885 (French 1965: 3).

2.2 SQUATTERS AND SELECTORS

The first governor of New South Wales, Arthur Phillip, had the power to make land grants in the new settlement of Port Jackson (Roberts, 1970). These land grants were enacted in an attempt to make the settlement self-sufficient. Pastoralism, rather than agriculture, soon emerged however, as became the dominant land-based industry for over a century in the colony of New South Wales (Harrison, 2004).

The successful exploitation of sheep and wool as a resource was achieved not long after first settlement. This led to the rapid expansion of settlements and pastoral land use into the grasslands of central NSW, often by squatters, in the 1820s and 1830s. This expansion was hastened by strong international demand for Australian wool (Goodall, 1995: 65). Governor Darling commenced making large land grants and, for example in 1828, made 101 grants with a combined total of over 150,000 acres. In the same year, *An Act to restrain the unlawful occupation of Crown Lands* was introduced. This was an attempt to curb the growing numbers of free settlers claiming runs (land) without a valid licence, and was intended to help settle the growing number of disputes among settlers over land (ibid).

As European settlers ventured beyond the 'limits of location' (the nineteen counties), Aboriginal people targeted their stock as a source of food. The settlements beyond the limits of location were considered illegal. Even so, penalties for Aboriginal attacks on stock, or indeed settlers, were in many cases extreme. In 1824, Aboriginal resistance to pastoralism west of the Great Dividing Range was met with a proclamation of martial law, the NSW colonial government's strongest military response to pastoralist complaints (Harrison, 2004). Governor Bourke, who succeeded Governor Darling, took a favourable approach to squatters in NSW as he saw these settlers as crucial to the growth of the state and as a means of supplying Britain with much needed wool (Snowden, 2004). By 1846–49 there were 1,866 squatters' runs in New South Wales and from 1860 to 1890 intensified European land use accompanied the success of the colonies' wool industry (Roberts, 1970: 362).

As the colony grew in the 1860s, so did the need for land and it became apparent that a

relatively small number of squatters held a majority of the land. Some 60 million acres was in the control of only 1,000 squatters, which led to growing resentment among the urban working and middle classes (Spooner, 2010). This precipitated the Crown Lands Alienation Act and Crown Lands Occupation Act, also known as the 'Robertson Land Acts' in 1861. The intention of these Acts was to free up land for settlers, who were eligible to purchase land at £1 an acre (Spooner, 2010). A number of conflicts arose due the fact that between the years 1847 and-1852 many squatters in the then unsettled districts of southern NSW had been guaranteed 14-year leases. Under the Robertson Land Acts squatters were forced to purchase their own land, but could however, exercise pre-emptive purchase rights to the land due to 'improvements' made to the land. These improvements included, fencing, the building of dams, clearing trees (often by ring barking) to increase pasturage, fencing, huts, houses and stockyards (Spooner, 2010: 56). The environmental damage caused in particular by ring barking as an 'improvement' to pasture land was later legislated against in 1881 under the *Ringbarking Act*, however, in many cases the environmental damage had already been done.

As the colony slowly developed infrastructure (railroads, roads, local administration) and the price of wool fell, while government investment and William Farrer's wheat experiments turned wheat into a viable cash crop (Roberts, 1970: 312). For pastoralists, high debt and falling produce prices had damaged the wool industry.

2.3 MURRUMBIDGEE REGIONAL HISTORY

After the first wave of exploration and early settlement, and prior to 1901, the population growth across New South Wales was related to the expansion of Sydney, the founding of specialised mining centres which were accompanied by associated manufacturing and supply industries, and the country towns which served the farming community and travellers on the roads, railways, rivers and oceans.

The Murrumbidgee region as classified by the NSW government currently includes the areas of Gundagai, Tumut, Minjary and Gocup (Heritage Office and Department of Urban Affairs & Planning, 1996). As a region, its history is intertwined with the early expansion of pastoralism in NSW and to a lesser extent the gold rushes of the 19th century.

The area surrounding Gundagai developed quickly as pastoralists who had gained financial means within the settled districts moved further westward. As the prime river frontages were taken up along the Murrumbidgee, the creeks and smaller rivers that fed into it were also settled during the 1820's and 1830's. By 1848-1850 there were 237 pastoral runs gazetted in the Murrumbidgee district (Heritage Office, 1996). With the demand for beef caused by the gold rush, the region boomed, and by the 1870's the Murrumbidgee and Lachlan Pastoral Districts contained approximately 75% of the total pastoral investment in NSW (Heritage Office, 1996).

Travel routes were crucial during this period of expansion and settlement, and the river system was heavy utilised early on. This led centres such as Gundagai and more prominently Wagga Wagga to develop. The major road networks of the early colony were relatively informal until the early 1830s when Surveyor General Major Thomas Mitchell commenced the first government surveys of major roads within the formal limits of the colony. One of the first roads surveyed in southern NSW was the 'Gundagai to Port Phillip' road, a road and stock route later known as the Sydney Road, and later still as the Hume Highway (Spooner, 2010). In 1858 Francis Cadell was the first to reach Gundagai by steamboat from Adelaide and river travel became a significant mode of travel and transport in the region (Quartermaine, 1976). Even so, the road to Wagga Wagga via Dubbo and Albury was later favoured as a southward travelling route as the township of Wagga Wagga grew, while steamboats easily and regularly reached the township from Echuca (Heritage Office, 1996).

In 1852 gold was discovered in the region at Adelong and 1853 at Batlow. Major mines in Batlow were established soon after and the Mayday Mine and the Poverty Mine in the 1860's. Water was brought into the area from a number of different areas including a 32km water race from Gilmore Creek to the north. Although rich loads were found, the industry was relatively small (Heritage Office, 1996).

The mining industry in Adelong preceded the town of Adelong by a number of years, which was not established until 1857. The Adelong area produced a large amount of gold and significant infrastructure was built, including five large stamp batteries. The last mine in Adelong area was closed in 1916 (Heritage Office, 1996). The impact of mining was complex and went well beyond it economic ramifications. Mining also changed the landscape of early NSW as forests were cleared, rivers and streams were silted up and heavy metals were introduced as a by-product of the refinement processes (McGowan, 2001).

The 20th century saw a massive change to the Murrumbidgee region with the establishment of the Snowy Mountains Scheme. The Snowy Mountain Hydro Electric Authority managed a massive damming project designed to supply electricity to the two most populous states (NSW and VIC) in the country. Begun in 1949, it took 25 years to complete. The project was claimed by then Prime Minister Ben Chiefly to be a project that indicated that Australia as a nation was 'on the threshold of a new era of great industrial and rural development' (Snowy Mountains Hydro-Electric Authority, 1949: 5).

The project worked by creating a series of dams along the Snowy River and a number of smaller rivers in the area. This included the Tumut River, which had the Tooma River diverted into it via a large pond above a power station, the overflow from which was diverted down a tunnel to a secondary generator (ibid: 21). In total, three power stations were built on the Tumut River. The project employed a large number of workers who had recently immigrated to Australia (over 70%). In total, the project employed over 100,000 people (Department of the Environment, Water, Heritage and the Arts, 2008). The influx of workers to the region revitalised a number of small towns in the area with people from varied cultural backgrounds.

2.4 THE EXPANSION OF THE ROAD NETWORK

The development of roads south of Sydney began as early as 1819 when a reasonable road had been constructed between Sydney and Camden. By 1821 a cart road had been completed to the south of Camden (to the future site of Goulburn) to access the new southern lands discovered by Hamilton Hume and James Meehan. Thomas Mitchell surveyed a slightly different road route and approval was given for its construction in 1832. Much of this road was convict built and is well known for its heritage values.

In 1839 Assistant Surveyor Thomas Townsend surveyed the southern road, known as the Port Phillip Road, from Yass to Gundagai. By 1847 the road had reached Yass where a low level crossing of the Yass River allowed the road to continue to Gundagai. Although the road southward from Sydney was named the Port Phillip Road, in reality it was little more than a rough bush track that followed the tracks made by bullock drays (Butcher, 2002). River crossings were the main obstruction to travel. Reports indicate that it could take as long as three months to reach Gundagai from Sydney. The journey long and difficult due to mountains, swamps, rivers and creeks which were not yet bridged, and which became impassable during wet weather.

Beyond the County of Cumberland, the provision of tracks and roads filled in the road hierarchy on a number of levels. They connected country settlements with Sydney. It provided a network of roads, which linked regions and localities across the colony of NSW to other colonies such as Victoria and South Australia. Finally, it filled in a finer grid of roads leading from farms, settlements, villages and towns. This road hierarchy would, in time, come into the control of various levels of government or of government agencies responsible for their upkeep and construction.

2.5 HISTORY OF 19TH CENTURY ROAD CONSTRUCTION

Early road construction methods were rather crude, largely due to a lack of road building knowledge in the early colony and a poor understanding of the environmental factors in Australia. Early road building efforts in Sydney involved shaping the road with a table on each side, and a barrel form in the middle which was formed by throwing any available ironstone or gravel into the centre on top of a clay foundation (Kass, 2006).

Roads had a significant impact opening up new country to settlement. Although many roads were built to connect one settlement to another, the country they traversed was made accessible in an era when travel was slow and based upon animal muscle power (Kass, 2006).

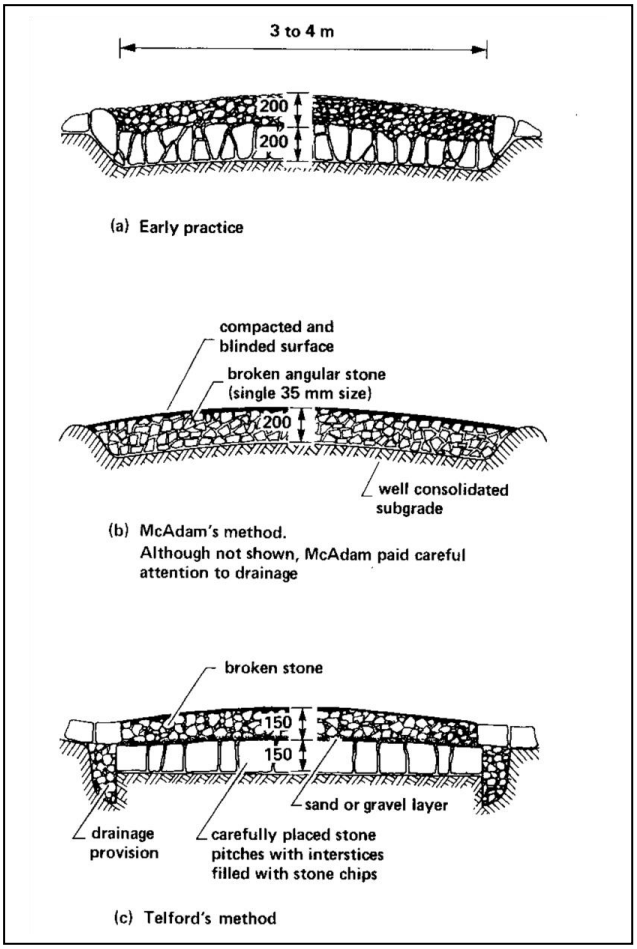
Roads were rarely laid out ahead of settlement. The development of regional roads more often than not lagged behind settlement and largely involved improving tracks which had developed along Aboriginal routes or which had emerged from travellers seeking the easiest route across country to their destination (Kass, 2006).

An engineering approach to road making was first introduced into Australia in 1822 (Tech in Aust, nd). However, most early nineteenth century regional roads were left as a cleared route with only the natural soil as a surface (DMR, 2000). During the latter part of the 19th Century four types of road pavement were introduced into Australian road construction:

Earth or gravel pavement without foundations for country districts;
The McAdam pavement for heavy traffic country roads and suburban streets;
The Telford base with one or two gradings of surface McAdam for heavy traffic roads; and
Experimental and special pavements (eg, wood block and stone sett) (DMR, 2000).

The period from the late 1820s to the 1850s saw the introduction of the McAdam method which consisted of a solid mass of small broken stones laid on a convex well-drained earth bed (refer to drawing (b) **Figure 2.1**), (DMR, 2000). Many roads built using this method fell into disrepair as they were not provided with formed guttering for drainage and the narrow hard wheels of horse drawn vehicles, and the hooves of bullock teams and horses caused the roads to deteriorate quickly. The Telford method consisted of a base of dressed stone which was covered with gravel of appropriate gauge and of varying depths (refer to drawing (c) **Figure 2.1**). These types of road construction required constant maintenance as the narrow, rigid wheels of vehicles carrying heavy loads caused constant damage to the road surface.

Figure 2.1: 19th Century Road Construction Methods *Source: Technology in Australia 1788-1988*



2.5.1 Bridge and culvert design

The earliest recorded timber bridge built in Australia is the Bridge Street bridge over the Tank Stream in Sydney. This bridge was constructed in (October) 1788 but was washed away soon after construction. One manifestation of the unique Australian environment is the behaviour of the rivers and creeks, which is unlike anything experienced in Europe or, indeed, in most other countries of the world. These water courses, like the climate itself, reflect harsh extremes, so that a river channel may be dry for many months of the year, but in flood may carry an extreme volume of water.

With no records of floods to guide them, early settlers in Australia had to grapple with this strange phenomenon. By 1805 there were ten timber bridges on the Sydney to Parramatta Road constructed of Iron bark or Blue Gum stringers and decking. None of these early bridges remain. As the colony expanded, and the need to transport people and commodities increased, there was a need to build bridges with larger spans and greater load capacities. The humble timber stringer beam bridge became a popular choice for water course crossing, with timber trestle substructure with spans ranging from 5 to 12 metres.

In regional areas, timber was sourced locally and bridges constructed by the community. Eucalyptus species proved a suitable hardwood timber with characteristics of durability and strength. Early bridge builders were able to construct basic bridges easily, cheaply with the benefit of strength and long life.

The establishment of the early roads led to the concurrent development of bridge engineering. It is likely that the log girder/timber deck bridges, especially those with split slab decking, predate log girder/earth deck bridges. It is thought that earth decking was introduced along with the mechanisation of the industry and the introduction of earthmoving machinery.

Log girder bridges, key log bridges and timber culverts are representative of early road and bridge construction techniques and provide evidence of a continuity of a process that is rapidly being replaced with modern construction materials such as steel and concrete.

2.6 THE TOWNSHIPS OF GUNDAGAI AND TUMUT

The Gocup Road provided a direct link between the developing townships of Gundagai and Tumut. For this reason a brief overview of the history of these towns has been included. It was usual during the early phase of settlement for towns to become established first with the tracks used by explorers and settlers eventually forming the road networks between the towns. Smaller villages often formed along the major roadways as stopping places, often building around an existing inn.

2.6.1 Gundagai

Gundagai is located on the banks of the Murrumbidgee River and has long been a stopping place on the Hume Highway between Melbourne and Sydney. Pre-European occupation it was a meeting place of the traditional owners, the Wiradjuri. Hume and Hovell were the first European explorers to visit what is now Gundagai when they passed through the region between 23rd October and 15th November 1824. Hovell recorded seeing trees already marked by steel tomahawks (Hovell, 1824).

Charles Sturt travelled through the area in 1829 at the start of his journey through outback Australia. Sturt again passed through Gundagai on the return leg of this journey in 1830, and returned in 1838 (Sturt, 1844). By this time Sturt records settlers in the area beyond the limits of location, and by 1839 a grog shanty marked where the town would first be established (Kean, 2006).

Gundagai has a rich cultural history, as it was the first service town in the Murrumbidgee region, with an inn and a smithy located within the town by 1838 and a general store by 1842 (Quartermaine, 1976). The town was surveyed in 1840 and was located on the alluvial flats on the north side of the river, however a flood in 1844 forced what remained of the town to higher ground; the town was rapidly rebuilt. By 1850 the town had four hotels several stores and a school (ibid: iv). Further floods in 1852 and 1853 destroyed the town and it was relocated a third time to higher ground (Heritage Office, 1996). During the 1852 flood, Yarri a local Aboriginal man rescued 49 of the town's residents in a bark canoe. Today the town remembers his bravery with a plaque on a cairn shared with a plaque commemorating Charles Sturt, near where the rescues took place (Kean, 2006). Despite these floods Gundagai grew to be a flourishing regional town.

Gold was discovered in payable quantities in 1861 near the town at Spring Flat where diggings flourished for at least 15 years. As the town grew so did the need for infrastructure. In 1865 a traffic bridge was constructed to replace the punt that had been used to link the settlements on the north and south banks of the river. While in 1886, a railway line from Cootamundra was established in Gundagai, and in 1903 the line was extended to Tumut (Quartermaine, 1976).

A collection of photos taken by local resident Dr. Charles Louis Gabriel gives us some insight in the character of the town in the 19th century (see **Figure 2.2**).

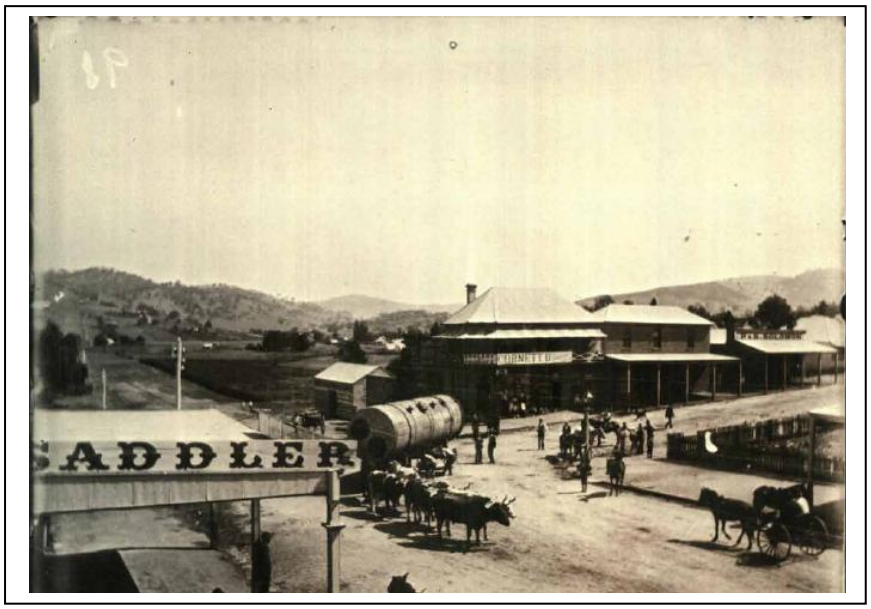


Figure 2.2: Photo of the town of Gundagai, circa 1900. ***Source: Quartermaine, 1976.***

The impact of Gundagai on the cultural heritage of NSW is evident in early Australian poetry and literature, for example, Banjo Patterson's 'The Road to Gundagai' and Jack O'Hagan's song 'Along the road to Gundagai'. It is likely that as a town at a river crossing on the edge of white settlement, Gundagai would have a textured oral history. This is characterized in the work of John Moses and his poem 'Nine miles from Gundagai' which gave birth to the image of a dog on a tucker box. In 1937, a statue of a dog on a tucker box was erected in Gundagai as a memorial to the early pioneers of the district that was unveiled by the Prime minister at the time, Joseph Lyons.

2.6.2 Tumut

It was considered by the government of the time that areas that had been settled beyond the 'limits of location' such as Tumut were illegal and this was the case from approximately 1829 until 1836. The regulations regarding settlement were largely ignored due to the fact that they could not be policed (Snowden, 2004). It is due to the unofficial nature of these early settlements that archival material is limited.

The first record of settlement in the region comes from the diary of Captain Charles Sturt written during his exploration of the Murrumbidgee River. On the morning of 27th November 1828 he visited the station of Mr. Warby at Darbalara on the Tumut River. Thomas McAlister and his wife worked on this station and in 1830 their daughter Elizabeth was the first European child born in the area (Clouston, 1924, French 1956). The first settler at Tumut in 1832 was George Shelly, who took up land at Bombowlee (also known as Bumbowlee), soon after marrying Amelia Waddy in 1835. They moved three years later to a property named Tumut Plains, selling Bombowlee to his brother William (ibid). In 1832, Dr. George Bennett visited Tumut in order to study the flora and fauna of the district. He called at Mr. Warby's

station at Darbalara and noted that butter and cheese were being sent to Sydney. Mr. Keighern at 'Brungul' and Mr. Shelley of 'Bumbowly' are also mentioned (French, 1965: 4). It is clear that by 1832, settlement included at least five stations: Brungle, Bombowlee, Tumut Plains, Goobragandra and Blowering. Tumut would later become known for its fertile soil and cattle runs, along with its agricultural products, in particular wheat and tobacco, which supplied larger towns in the district.

In 1839 a gang of bushrangers herded the occupants of the Tumut region together (approximately 80 people) while they took the provisions that had just arrived from Sydney (Clouston, 1924). Bushrangers and outlaws were very active in this region for sometime as it was only sparsely policed (often only from larger regional centres) for the majority of the 19th century.

The houses of the Tumut region were generally made of slab walls, bark roofs and earth floors, shingle roofs came next, but galvanised corrugated iron roofs did not appear in the area until the 1860s. The kitchens had big open fireplaces with hanging camp ovens, boilers and kettles. While some later homes in the area had a brick oven with an iron door for baking bread (French, 1965).

The township of Tumut was one of the six possible sites for the federal government considered before Canberra was selected. This afforded the township of Tumut particular scrutiny by the media. An article printed in the *Australian Town and Country Journal* of 14th October 1903 gives some insight into the early years of the town and its residents. Of the climate it notes:

> *The climate of the town is variable. It can be hot enough in Tumut to suit the most thin blooded Queenslander, and it can be cold enough to nip a Nova Scotian; but, as a rule, the days are crisp and bright, with cool nights, and at the worst a fairly cold night can always be got by going a little way up the range.*

While of the mountain settlers in the area the article comments that:

> *They are different from any other Australian setters, the isolation, the cold climate, and the constant mountain climbing making them a wiry, hard-featured lot, more active and enterprising than the ordinary Australian. It is said that for its size Tumut sent more men to the [Boer] war than any other part of the world.*

The article then goes on to espouse the virtues of the small town and the healthy life lived by the people within the Tumut area. It also notes that for the people who would populate the potential new capital, urban dwellers such as lawyers and merchants who would find the travel to and from Tumut a considerable drawback.

2.7 GOCUP ROAD HISTORY

Consistent with many of the regional roads across New South Wales, Gocup Road would have been formed from the tracks created by travellers between the towns of Gundagai and Tumut from the time of earliest settlements in the 1830s. In its earliest form, the road was known as the Tumut Road or the Gundagai Road, dependant upon the direction of travel. When Cobb and Co expanded their services into New South Wales in 1861, they were utilising the road between Tumut and Gundagai (Butcher, 2002) for mail delivery and passenger fares. Mr George Fox of Gundagai was a driver for Cobb and Co in 1877, employed for his local knowledge of the tracks "that are sometimes referred to as roads" (Butcher, 2002. p80).

Little specific historical information on Gocup Road has been found during the course of this investigation. This is likely a reflection that little information exists in the historical resources. Indirect information has been found in newspaper archives and reasonable assumptions may be made through the analysis of peripheral historical records and historical maps and plans.

The earliest sourced map showing a track between Gundagai and Tumut is dated 1869, indicating that the track was well known by this time (see **Figure 2.3**). This date corresponds well with the known expansion of settlers and closer settlement to the area, the Robertson Lands Act of 1861, and the need for a reliable route between the two emerging townships of Gundagai and Tumut.

Figure 2.3 Excerpt of map of pastoral runs, squattages, districts, counties, towns and reserves of New South Wales and Queensland that appears to show a track between Gundagai and Tumut (marked in blue) that looks to originate at a crossing of Murrumbidgee River at Gundagai. ***Source: Reuss & Browne, 1869.***

Another historical map dated 1875 (see **Figure 2.4**) shows a road between Gundagai and Tumut and shows the Minjary settlement. Of note is that the closer Gocup settlement does not yet appear on the map.

The Parish Maps series provided some context of the local land holdings that were serviced by the Tumut/Gundagai Road (as it was then known). An excerpt of the Parish Map of Tumut 1898 is reproduced in **Figure 2.5** and the Parish of Minjary of 1894 is reproduced in **Figure 2.6**

The most comprehensive map of Gocup Road appears to be a 1903 General plan of the locality of Tumut. This plan is reproduced as **Figure 2.7**.

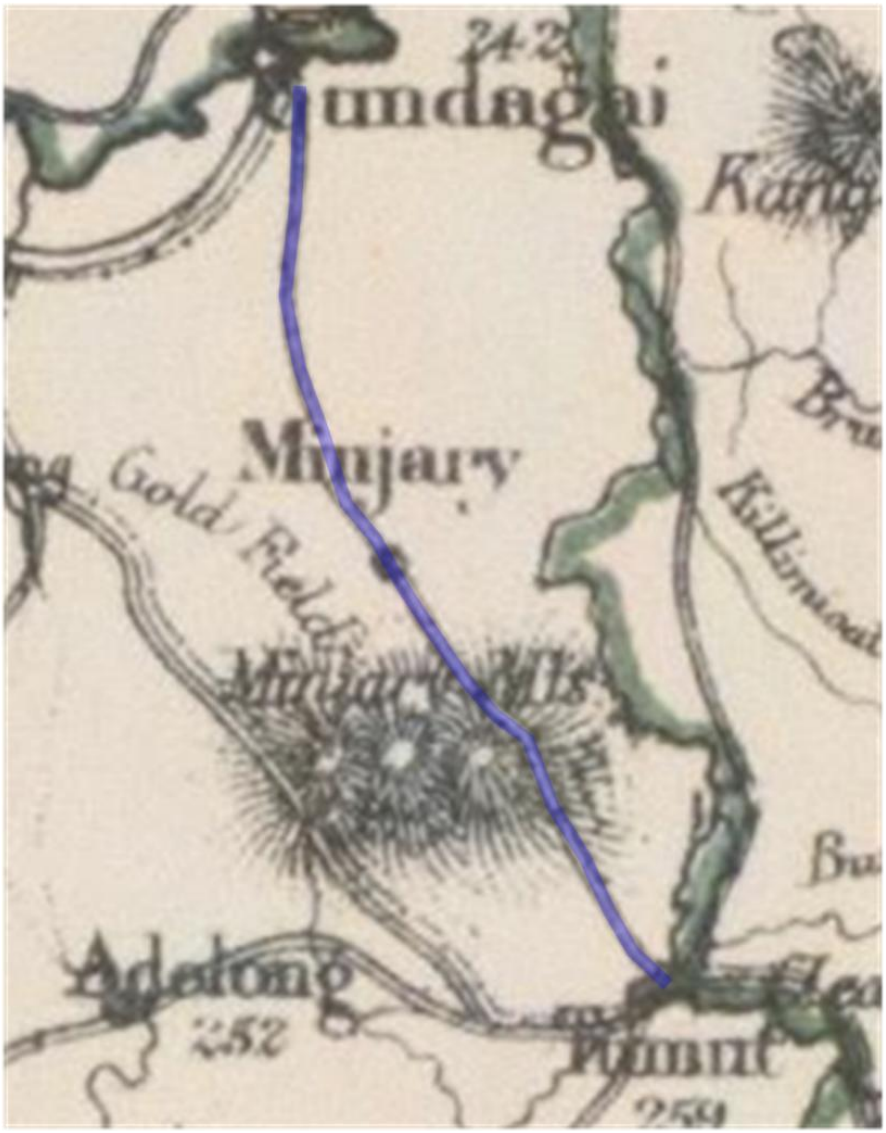


Figure 2.4: By 1875 the road from Tumut to Gundagai via Minjary is clearly marked on the map but this belies the windy nature of the road. ***Source: New South Wales Surveyor General New South Wales cartographic material, 1875.***

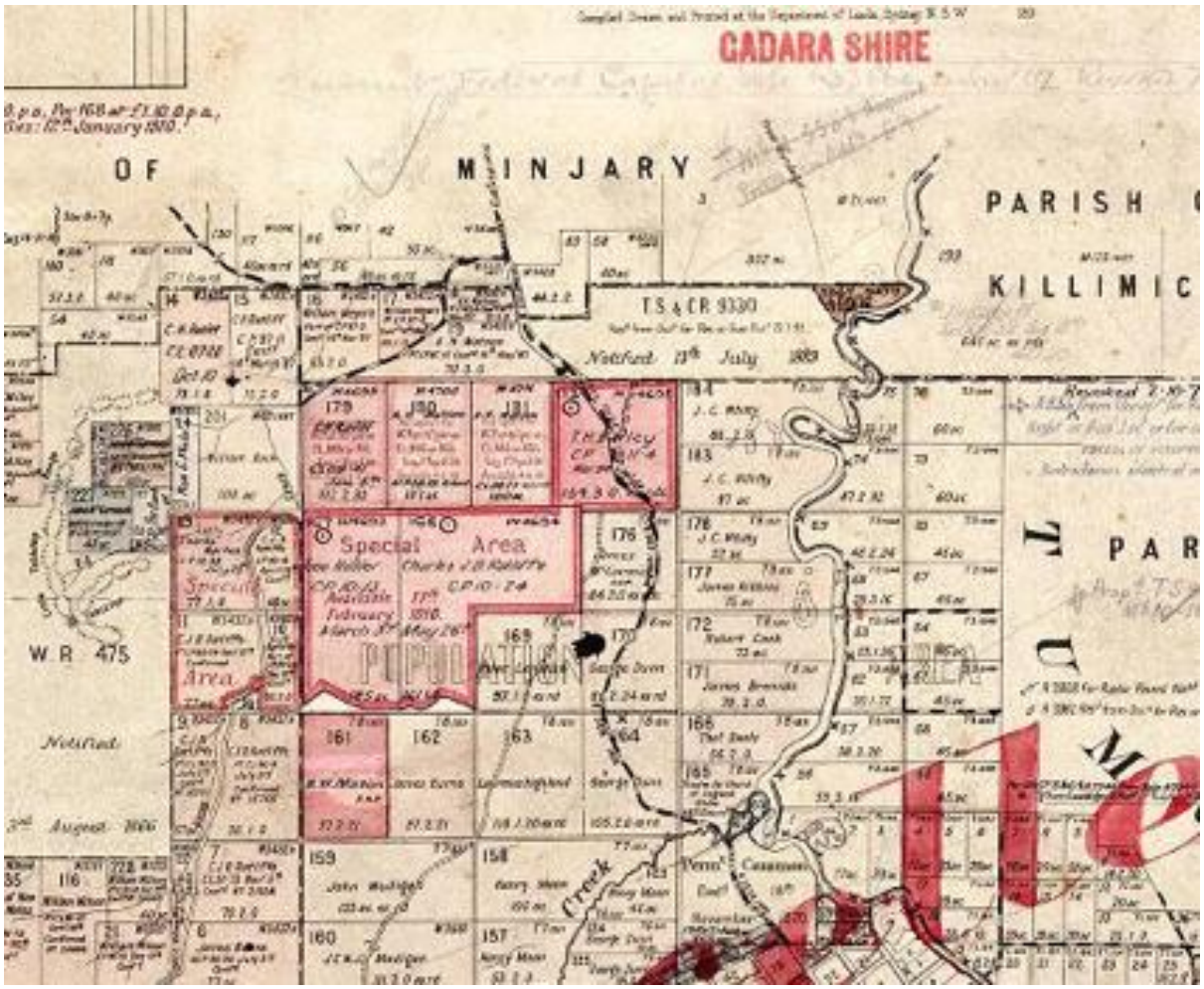


Figure 2.5: The 1898 Parish Map of Tumut shows the parish boundary with Minjary and the road that travels north and is marked 'to Gundagai'. ***Source: LPI Parish Map Series***

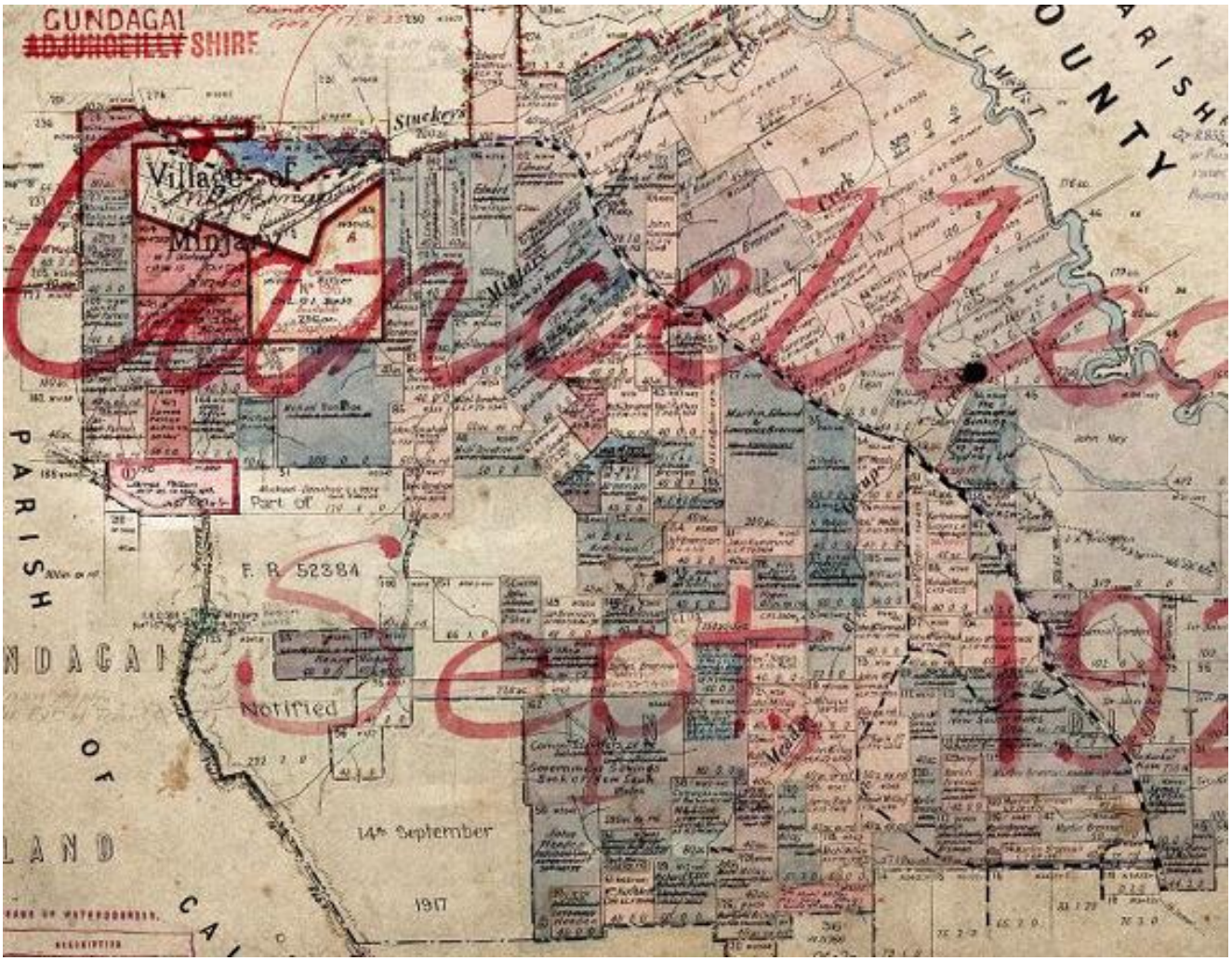


Figure 2.6: The 1894 Parish Map of Minjary clearly shows the road travelling north/south, the township of Gocup and the parish boundaries of Tumut and Gundagai.
Source: LPI Parish Map Series.

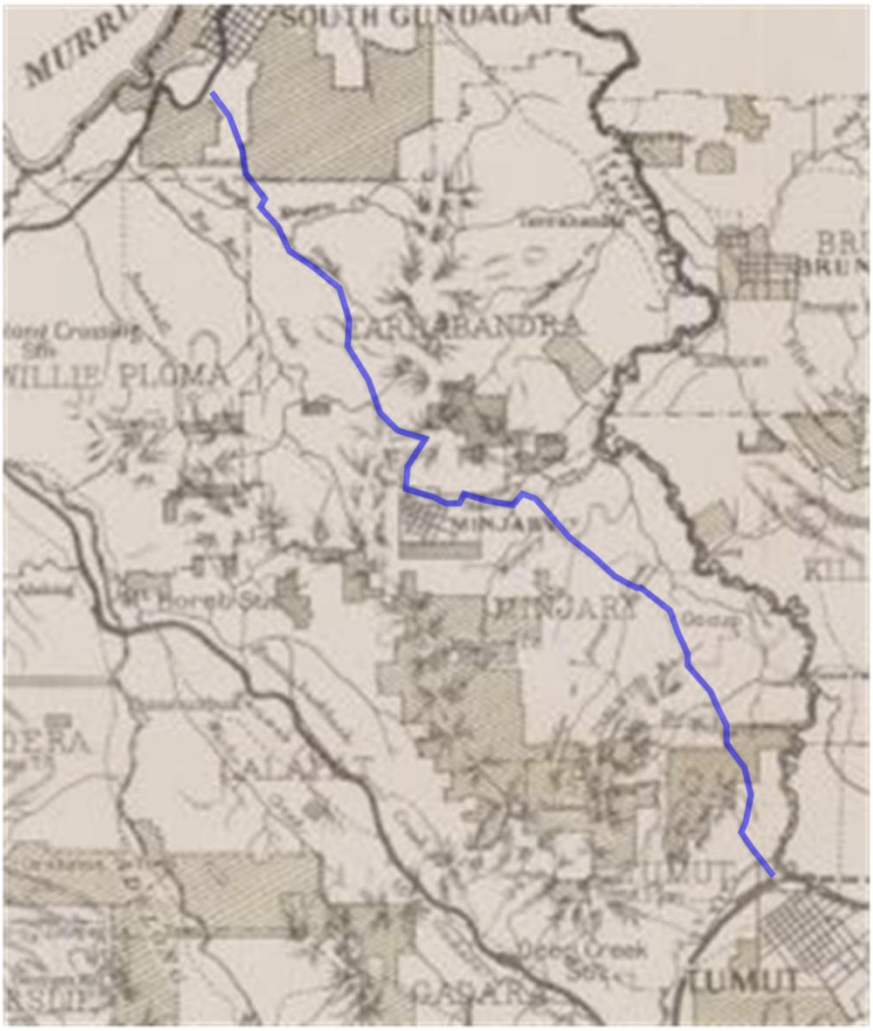


Figure 2.7: A general map of the area developed in 1903 to illustrate the potential capital of the country at Tumut shows the alignment of Gocup Road (shown in blue) – a well-developed road running north/south from Tumut to Gundagai.
Source: 1903 General plan of country surrounding suggested Federal Capital site in the locality of Tumut NSW

With the development of the regional railway, Gocup Road was used far less as a haulage road than during the gold mining period, when Tumut sent produce to Albury and other centres (NSW Agricultural Gazette, 1893). The use of Gocup Road would have declined further when the direct rail link from Gundagai to Tumut was opened in 1903 and the road networks generally suffered from a lack of maintenance. It is also highly likely that Gocup Road would in parts be impassable during heavy wet weather, as there was a need to drain a major swamp on George Godfreys' property (which surrounded the road) in the years between 1863 and 1893. It was the advent of the motor car in the early 20th Century that renewed interest in the condition of the roads.

It is evident that road works took place on the Gocup Road in the late 19th century and early 20th century. Martin Brennan of *Eurobin* tendered to carry out maintenance on Gocup Road. After winning the tender, Mr Brennan purchased surplus government tools to carry out the work, many of which were thought to be of convict origin (R Brennan, peers. comm.). Mr

McEvoy from Gocup was the successful tenderer for these road works, once in 1897 and again in 1900 (Sydney Morning Herald, 1897, 1900), while Mr. Maidment was successful in tendering for work on the Gocup Road in 1899 (Sydney Morning Herald, 1899).

Gocup Road crosses a number of small streams including Gilmore Creek, which has played an important part in the establishment of the town of Tumut. As wheat was a major crop in the area it is no surprise that the first flourmill in the town was built on Gilmore Creek in Tumut in 1846, by Francis Foord and Mr. Moore. While the first butter factory in the region was built on the creek in 1900 and opened on May 16th (French, 1965).

2.8 20TH CENTURY USE

In an article for the *Brisbane Courier*, in 1928 the road to Gundagai through Gocup and Minjary is described from a motorcar as, '…undulating pastoral country… [along] the broad green flats of the Murrumbidgee, extending for miles, and maintaining hundreds of cattle, sheep, and horses that belong to the farmhouses snuggling among enormous old trees'. This article demonstrates that the road was passable to motor traffic in the earlier part of the 20th century.

Logging in the areas surrounding Gocup Road means that it is still a natural thoroughfare in modern times. The use of the road by heavy traffic has appeared to cause some concern. It was reported in a submission to Infrastructure Australia (Miller, 2008) that the present Gocup Road was built to 1960's road design standards with horizontal and vertical alignment designed to minimize earthworks construction. The report also states that aside from recent rehabilitation where the road has been widened, the road generally has a 6.8m wide sealed section with a 1m unsealed shoulder on both sides. The submission also comments that without overtaking lanes, the winding roads combined with the increase in heavy traffic presents an increased safety hazard for light vehicles.

In the 1960s and 1970s with an increase in road transport for goods and for tourism, the road alignments were unable to cope with increasing power and speed as they meandered over hills and valleys following the many bends and curves of the original tracks carved out by the early explorers and settlers (Butcher, 2002. P81).

The level of funding and maintenance of the Gocup Road in the late 20th century has also impacted on the state of the road. In a local history of the region, Headly (1987: 13) comments that the control and financing of various roads in the region has varied considerably. He comments that the State Government was to provide funds for Council to maintain and reconstruct a number of roads including the Gundagai/Tumut (Gocup) Road or MR 279.

In recognition of the important role Gocup Road plays in providing a vital transport link between Sydney and Melbourne, in addition to local access, it was declared a State road in July 2010.

2.9 THE SETTLEMENTS OF GOCUP AND MINJARY

2.9.1 Gocup

The settlement at Gocup grew from the original pastoral run set up by John Archer Broughton, who arrived in the area in 1836 (French, 1965). Broughton was the son of William Broughton who arrived in the colony in the First Fleet in 1788, under Governor Phillip. Mr. Broughton first settled at Mundongo and later took up land at Gocup. In 1837 his brother Robert Kennedy Broughton took up land at Gadara. The State Runs List of 1848 for the MURRUMBIDGEE PASTORAL DISTRICT NO. 7 in 1847 includes Run No. 6 under the name of J. A. Broughton "Mundongudgee" Tumut with a holding of 55,680 acres.

Gocup was a small settlement located on the road between Tumut and Gundagai. It is sometimes misrepresented as *Cockup* or *Cocup* in historical documents and newspaper archives. The Gocup Post Office was opened on 21 October 1885 (Australian Town and Country Journal, 1885) and was closed in 1959.

There were some problems at Gocup with the implementation of the Robertson Land Acts of 1861. Mr Burns presented a petition from Edward Cuzzen, stating that in August 1865, he had conditionally purchased with the approval of the Surveyor General, 120 acres of land at Gocup, near Tumut, which he fenced and otherwise improved and lived at, in accordance with the Crown Lands Alienation Act, and that he was in quiet possession thereof until February, 1867, when the Department of Lands cancelled his selection, on the ground that it was part of a forfeited selection of J. A. Broughton. It was suggested that this had been reselected and claimed by W Smithwick. The petition was received but was found to be informal (Sydney Morning Herald, 1867). It is likely that the forfeited land came about due to this advertisement by J. A Broughton in 1852 in the *Sydney Morning Herald* of 13th November 1852, 'All Parties having any claim against Messrs. J. A. and R. K. Broughton, are requested to forward the same addressed to them, Gocup, Tumut River.' It is quite possible that Edward Cuzzen purchased the land from another person who had answered an advertisement in 1860, 'For Sale Tumut River. The Gocup Run, together with 1,000 cattle, more or less, and 30 head of horses' (Sydney Morning Herald, 1860).

In 1893 George Godfrey with land from Gocup received an Order of Merit in the Mixed Farms over 200 acres and up to 1280 acres category in the National Prize Competition (NSW Agricultural Gazette, 1893). His land was listed has comprising 60 acres of reclaimed marsh, which was used solely for cultivation, 30 acres of gentle hill slopes, suitable for ploughing, with a thin but fair basaltic topsoil, and 210 acres of steep mountain, which is useful for pasture only. The main road from Tumut to Gundagai passed through George Godfrey's

property, 13 miles from Gundagai and 8 miles from Tumut. In 1863 Mr. Godfrey paid £230 for 160 acres of land that formed the basis of his farm, while in 1893 the farm showed an annual profit of £270 and the ability to support 10 adults (NSW Agricultural Gazette, 1893). Major improvements on his property included the draining of marshland and use of the drained water to propagate maize crops. Other owners of land listed under the name of Gocup (including some subdivisions) include: Mr Clee (Sydney Morning Herald, 1944) and Mr Hay (The Capricornian, 1908).

2.9.2 Minjary

A settler named William Warby is noted as having followed Hume and Hovell's tracks to the junction of the Murrumbidgee and Tumut Rivers. Here he took up a pastoral lease of 19,200 acres, with a rent of thirty-three pounds per annum. William Warby called the property 'Minghee' later called 'Mingay' (Bell, 1979).

Another notable early settler in the area was an old soldier named James Ball, who had fought under Wellington at Waterloo, and arrived in the colony in 1826. James Ball died on 22nd August 1876, at Minjary, at the age of 91 (Illustrated Sydney News, 1876).

Minjary has a history of timber gathering for fencing materials, steam production and domestic firewood. The land surrounding Minjary, and to a much lesser degree within Minjary proper, has been cleared for grazing and pasture improvement. A number of old fences within the park provide evidence of former grazing activities (National Parks and Wildlife Service, 2004: 8).

Timber was removed extensively from the Minjary area in the late 1800s and early 1900s to fuel steam boilers associated with gold mining activities in the Adelong area. Bullocks were the most common draught animals, but some teamsters used horses when conditions were boggy (National Parks and Wildlife Service, 2004: 9). Minjary National Park was created in January 2001; it covers an area of 1,462 hectares (NSW Office of Environment and Heritage, 2013).

Votes and Proceedings of the Legislative Assembly of NSW, 1885 provides a list of landholders in NSW according to district with acreage and other matters pertaining to the land (see **Table 2.1**).

Table 2.1 – Gocup and Minjary Landholders, 1885.

Land Holder	Acreage
Gocup	
G. Dunn	194
J. Mc McCormick	225
H. Hogan	230
W. Egan	300
M. Murphy	80
M. Mullay	100
W. Meyers	87
B. Cushen	100
J.N. Jennerratt	75
J. Radcliff	320
J. Gordan	2850
Minjary	
J.H. Reardon	6
J. J Maidmont	40
A. Bollard	80
G. Webb	100
E. Cushen	80
W. Kite	40
G. Godfrey	300
E. Brennan	1059
J. Brennan	2075

In April 1864, the Sydney Morning Herald published a return of towns and villages proclaimed under the 4th section of the Crown Lands Alienation Act of 1861. Minjary village was listed as 126 acres on Stuckey's Creek, also 225 acres set aside for suburbs (SMH, *Abstract of Sales*, 9 April, 1864). **Figure 2.8** shows the Parish Map of the village of Minjary with a water reserve along the northern boundary and an easement for power lines. The line of Gocup Road is shown in red as the northern boundary of the village.

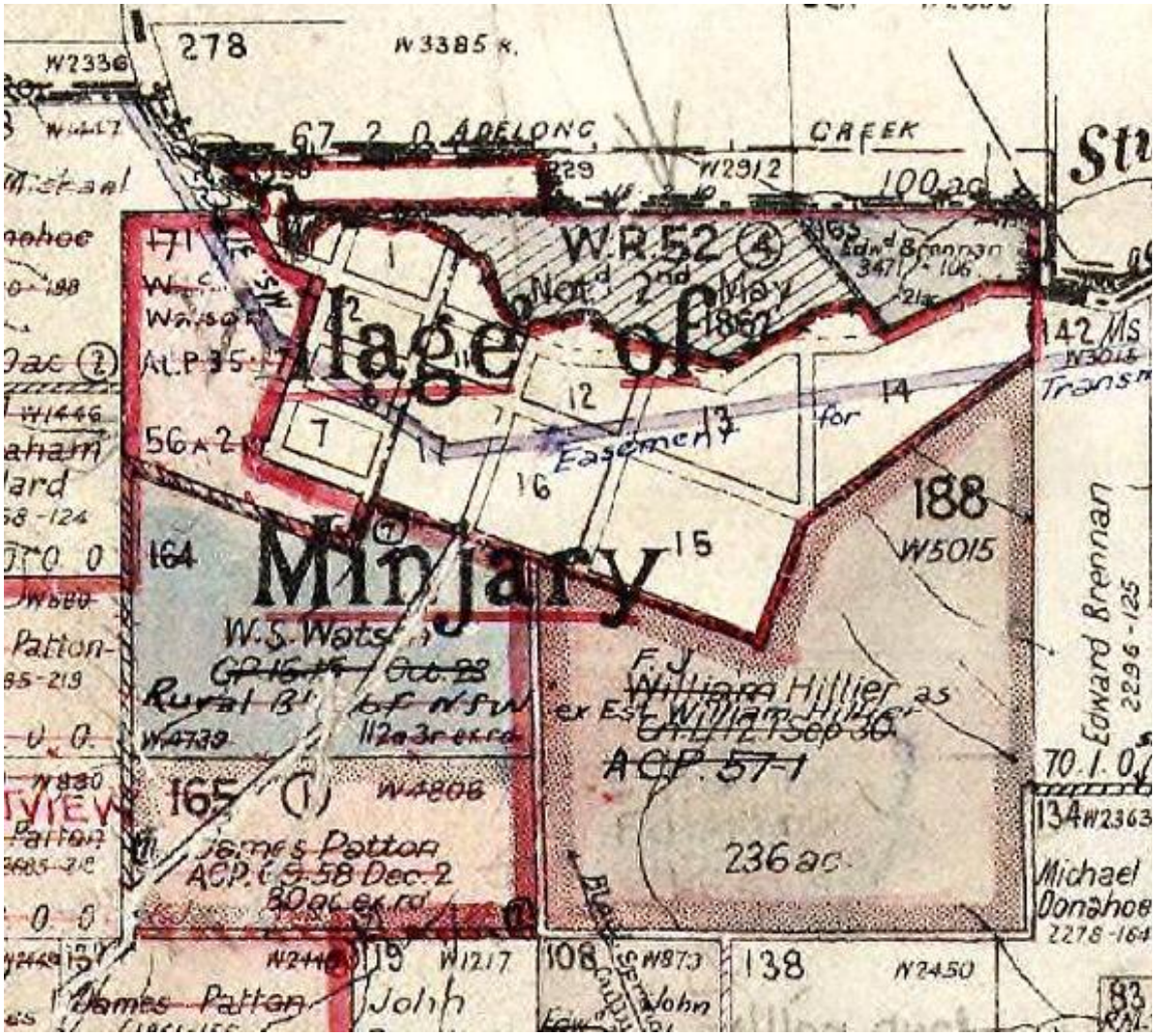


Figure 2.8: Village of Minjary 1894.
Source: LPI Parish Map Series, Parish Tumut, 1984.

The Parish Map of 1926 shows that road works have altered the alignment of Gocup Road to avoid a number of bends and creek crossings (refer **Figure 2.9**). **Figure 2.10** provides a present day context of the Minjary Village in relation to some sites identified during the survey.

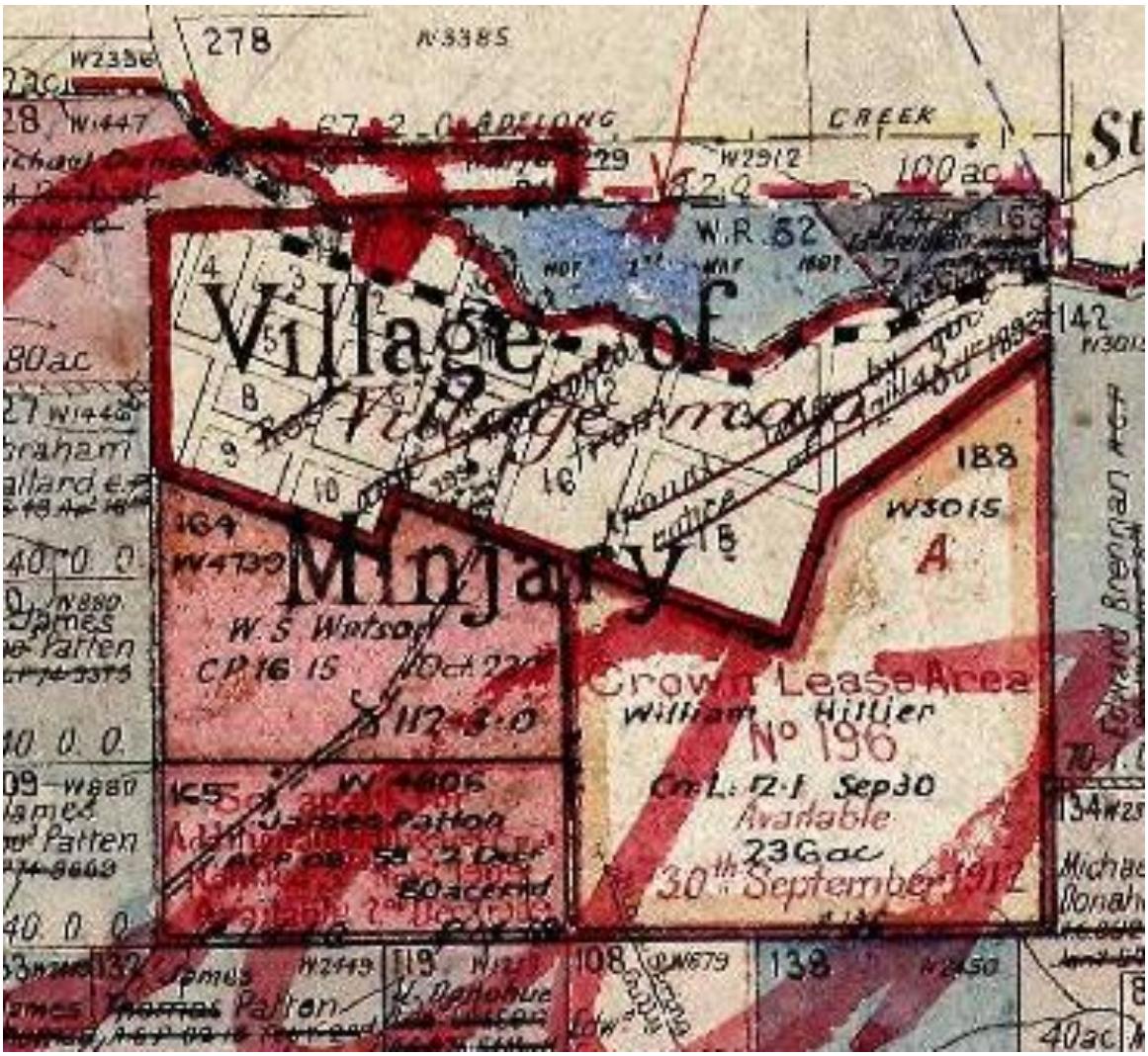


Figure 2.9: Village of Minjary 1926.

Source: LPI Parish Map Series, Parish Minjary, 1926.

Figure 2.10: Present day context of the Minjary Village in relation to sites identified during this survey

3.0 HERITAGE SIGNIFICANCE ASSESSMENT

3.1 INTRODUCTION

The assessment of the heritage values of an item or site depend upon the assessment of its significance together with the potential it may possess to expand the existing level of knowledge. An appreciation of these factors assists in the estimation of the impact that any disturbance, damage or destruction may have on such heritage values.

Fundamental to any consideration of the heritage values of a site is an appreciation of the impact of the NSW Heritage Act, 1977 (the Act) which defines heritage items to be:

> *Those buildings, works, relics or places of historic, scientific, cultural, social, archaeological, architectural, natural or aesthetic significance for the state of New South Wales*.

Heritage items can be broadly interpreted as features, items, landforms and the like that possess characteristics that are presently of value and likely to be valued by future generations, making it worthy of special effort to conserve. These valued characteristics can originate from past associations and/or present circumstances, and do not necessarily have to be old.

3.2 ASSESSMENT OF HERITAGE SIGNIFICANCE

An assessment of significance is undertaken to explain why a particular site or item is important, and to enable appropriate best practice heritage management to be determined. Considerations relevant to a heritage significance assessment include whether a site, or the fabric contained within a site, contributes knowledge or has the potential to do so.

An assessment of significance is influenced by the environmental and historical context of the site at the time of the assessment. In this light, significance can be seen as a variable quality. It follows that the evaluation of heritage significance is not a static value, but rather is evolutionary as a function of changing community perspectives and cultural values.

3.2.1 Assessment Criteria

The NSW heritage assessment criterion encompasses the four values in the Australia ICOMOS[1] Burra Charter and these four broad values are used to assess the heritage

[1] **ICOMOS – International Council on Monuments and Sites**

significance of an item. It is important for items to be assessed against these values to ensure consistency across the State. While all four values should be referred to during an assessment, in most cases items will be significant under only one or two values. The four values are:

- historic significance;
- aesthetic significance;
- scientific significance; and
- social significance.

In order to apply a standardised approach to the assessment of these four values relative to items and individual elements within or contributing to items, the NSW Heritage Office (2001:9) has defined a series of seven criteria that will be used by the Heritage Council of NSW as an assessment format within NSW. To be assessed as having heritage significance, an item must meet at least one of the criteria detailed below.

Historic significance is identified by:

Criterion (a) the importance of an item in the course or pattern of the cultural or natural history of NSW or a local area.

Criterion (b) the existence of a strong or special association between an item and the life or works of a person or group of persons important in NSW or a local area.

Aesthetic significance is identified by:

Criterion (c) the importance of an item in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW or a local area.

Social significance is identified by:

Criterion (d) the existence of a strong or special association between an item and the social, cultural or spiritual essence of a particular community or cultural group within NSW or a local area.

Scientific significance is identified by:

Criterion (e) the potential of an item to provide information that will contribute to an understanding of the cultural or natural history of NSW or a local area.

3.2.2 Degree of significance

In addition to the above criteria, in order to describe the degree of significance, an item may be assessed as being either 'Rare' or 'Representative' within its community/cultural/geographical level as distinguished by criterion (f) for rarity or (g) for representativeness.

Thus, degree of significance is identified by either:

Rarity

Criterion (f) the quality of an item to possess uncommon, rare or endangered aspects of the cultural or natural history of NSW or a local area; or

Representativeness

Criterion (g) the demonstration by an item of the principal characteristics of a class of cultural or natural place or cultural or natural environment within NSW or a local area.

3.2.3 Level of Significance

Another aspect of assessment of significance is the level of significance of an item. Level is assessable in two classifications pursuant to NSW Heritage Office (2001) depending upon the breadth of its identifiable cultural, community, historical or geographical context.

Local level identifies the item as being significant within an identifiable local and/or regional cultural and/or community group and/or historical/geographical heritage context;

State level identifies the item as being significant within an identifiable State-wide cultural and/or community group and/or historical/geographical heritage context;

but on a broader front, recognition of an item at the:

National level identifies the item as being significant within an identifiable national cultural and/or community group and/or historical/geographical heritage context;

International level identifies the item as having implications of significance for an identifiable cultural and/or community group both nationally and abroad and/or a world-wide historical/geographical heritage context.

3.2.4 Condition and Integrity

An assessment of condition and integrity of resources contributes to the overall assessment of significance. *Condition* considers the physical state of the fabric of the resource and its potential for survival. *Integrity* observes the degree to which the residual material evidence is an appropriate representation of the resource in its original form. *Potential Impact* assesses the nature and extent to which the resource will be modified as the result of the projected development.

Condition:

The condition of heritage resources and/or individual elements that have been identified above is assessed on a five-stage scale, that is to say:

[i.] *intact*, where the material evidence allows a complete recording of the resource without archaeological hypothesis;

[ii.] *substantially intact*, where the material evidence is incomplete but the recording of material evidence will be sufficient to allow an accurate archaeological reconstruction, with hypotheses based on the archaeological record only;

[iii.] *standing ruin*, where the material evidence is incomplete and the recording of material evidence will be sufficient to define the footprint of the resource and some of its elevations and features but will be insufficient to allow an accurate archaeological reconstruction of the resource without hypotheses based on the archaeological record and on a range of outside sources

[iv.] *ruin*, where the material evidence is incomplete and the recording of material evidence may be sufficient to define part, or the whole, of the footprint of the resource but will be insufficient to allow an archaeological reconstruction of the resource/its features, perhaps spatially and certainly vertically, without hypotheses based on the archaeological record and on a range of outside sources, and in circumstances where the validation of the reconstruction cannot be assured.

[v.] *archaeological site*, implying a mostly sub-surface residue, where the material evidence suggest the former presence of an archaeological resource that cannot be defined without sub-surface investigation.

Integrity:

In order to support an assessment of significance, an item's key attributes must retain a discernible degree of integrity. That is, a relic must retain material associated with the historical development that has remained largely unchanged and/or undisturbed over time. The integrity of archaeological resources and/or individual elements that have been

identified during this study have been assessed on a five-stage scale from intact through to none as defined below.

[i.] *Intact*, where the resource has remained virtually unchanged its form and/or design and/or function can be totally discerned from the material evidence;

[ii.] *Minor Modification*, where the resource has been modified or deteriorated cosmetically and/or in a manner that does not inhibit the discernment of its form and/or design and/or function by archaeological interpretation of the material evidence;

[iii.] *Material Modification*, where the resource has been modified so that its form and/or design and/or function cannot be discerned only by archaeological interpretation and without reference to external sources;

[iv.] *Major Modification*, where the resource has been so modified that attempted discernment of its form and/or design and/or function cannot be achieved by archaeological interpretation of the material evidence and requires a heavy reliance on external sources and in circumstances where discernment one or more elements may be equivocal;

[v.] *None*, where the integrity of the resource has been completely destroyed and the evidence for its form and/or design and/or function is totally external.

It should be noted that where the resource is wholly archaeological, that is entirely sub-surface, integrity cannot reasonably be assessed prior to excavation.

3.3 ASSESSMENT OF HERITAGE IMPACT

Generally, a statement of heritage impact (SOHI) is prepared to assist in the review and approval process when there is a perception that a proposed project could impact upon the heritage values of an item or site. The purpose of a SOHI is to explain how the heritage value of an item might be affected by the proposal. Impact may be positive when an item is to be conserved or enhanced, or impact may be detrimental if the site is to be disturbed or destroyed.

A preliminary assessment of heritage impact seeks to identify whether the disturbance or destruction of an item or site could reasonably be expected to result in a negative impact to assessed heritage values. It then identifies any requirement for additional information in order to inform a more detailed SOHI to further address the guidelines of the NSW Heritage Manual in reference to specific project plans.

The accepted guidelines specify that the following statements are addressed in a SOHI in response to a proposed project:

- *The following aspects of the proposal respect or enhance the heritage significance of the study area for the following reasons.*

- *The following aspects of the proposal could detrimentally impact on heritage significance. The reasons are explained as well as the measures to be taken to minimise impacts.*

- *The following sympathetic solutions have been considered and discounted for the following reasons.*

4.0 SURVEY RESULTS

This section provides the results of site survey carried out between 2 April 2013 and 6 April 2013. A total of 22 items were identified that constituted a site or item with a degree of heritage value (see **Table 4.1**). Figures showing the distribution of these items along Gocup Road is shown at the end of **Section 4.0** (**Figures 4.69** and **4.70**). This survey was conducted with a combination of vehicular survey and pedestrian survey in addition to community consultation and visits to specific sites. All site photographs by Sue Singleton unless specified otherwise.

The majority of the survey was contained within the existing road corridor between roadside and private property fence lines. Survey also included four sections of Gocup Road (totalling 10.1km) extending 50m to either side of Gocup Road which included the existing road corridor and sections of adjacent farm land. A summary of site data is presented in **Table 4.1,** and **Section 4.1.1** to **Section 4.1.20** provides detailed site information.

Table 4.1 - Historic sites identified along Gocup Road (Zone 55, Datum WGS84)

Site / Item	Easting	Northing	Within 50 metre survey zone
1. Gundagai South Cemetery	599576	6115729	×
2. Small stone culvert	600245	6113275	×
3. Large stone culvert	600395	6113171	×
4. Old roadside advertising signs	601835	6109437	×
5. Abandoned yards/section old road	601825	6108942	×
6. Minjary School	602978	6104850	×
7. Minjary School (relocated)	602897	6104805	×
8. Minjary Pub	603014	6104835	×
9. Stone culvert	605959	6104266	✓
10. Timber culvert	606326	6103201	✓
11. Survey Tree	606380	6103098	✓
12. Chimney (former cottage)	606378	6103035	✓
13. Market Garden/Cottage	606511	6102959	✓
14. Tennis court (former)	607487	6101967	✓
15. Telephone Exchange (former location)	608127	6101561	×
16. Post Office (former)	608303	6101727	×
17. Gocup Schoolhouse (former)	608313	6101246	✓
18. Section old road and quarry	608877	6100090	×
19. Remnant stone culvert and old road	609007	6099939	✓
20. Timber crossing/culvert	608917	6099708	×
21. Smarts Road Pub	609467	6098268	✓
22. Tumut Butter Factory & residence	610491	6093576	×

Where accessible, a brief historical overview of each item or site has been provided. Where required to close information gaps or to add clarity to the understanding of an item or site, additional historical context research has been carried out. Based on an understanding of the historical context of the site in the overall historical context contained in **Section 2**, a preliminary assessment of heritage significance has been applied using the heritage assessment guidelines set out in **Section 3**. An assessment of heritage impact is then provided based on any disturbance that might be anticipated at the site. Based on the preliminary assessment of significance and the preliminary SOHI, management recommendations are formulated for application in a more detailed planning process and/or a Review of Environmental Factors to be carried out by RMS.

4.1.1 Gundagai South Cemetery

Grid reference

(Zone 55, Datum WGS84)

Easting	Northing
599576	6115729

Site Description

The Gundagai South Cemetery is located on Gocup Road (also referred to as the Tumut Road), and sits on the outskirts of modern day South Gundagai as shown in **Figure 4.1**. The northern approach along Gocup Road was lined with Poplar Trees as can be seen in **Figure 4.2**. Access could be gained through entry gates on the eastern and northern boundaries. Burials were dispersed across the grounds within fixed denominational areas.

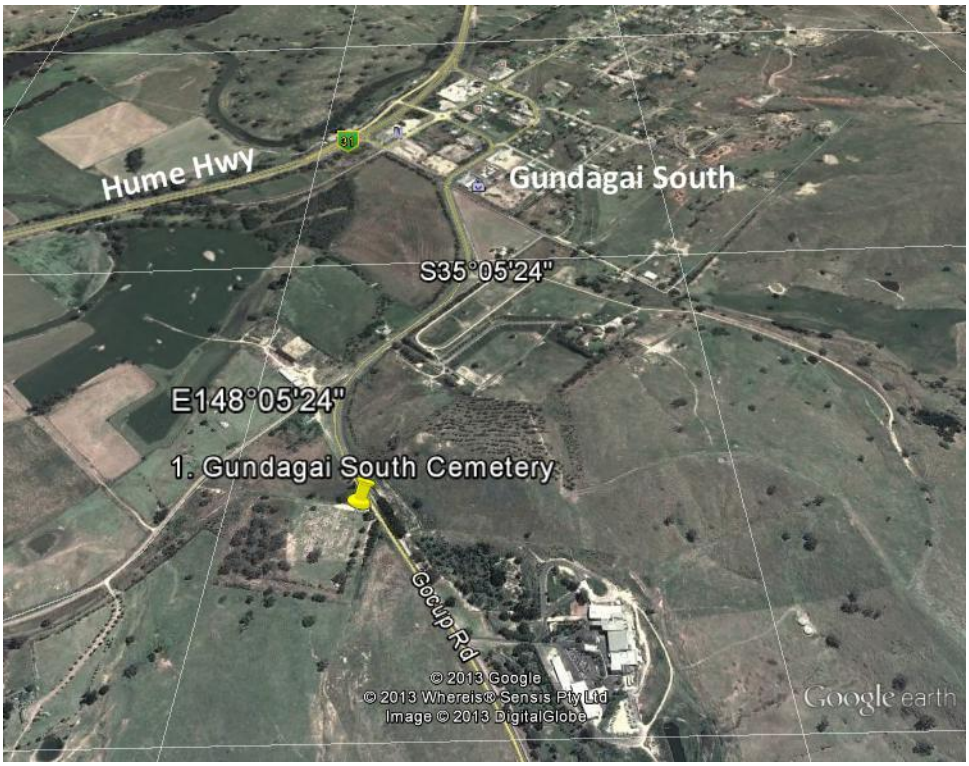


Figure 4.1: Location of Gundagai South Cemetery showing Gocup Road and intersection with Eagle Street.
***Source: Google Earth, 2013*.**

Figure 4.2: View of Gundagai South Cemetery, looking south-west across Gocup Road.

Historical overview

The Gundagai South Cemetery was established as early as 1846, which is the date on the headstone of Edmund Crisp, the oldest known burial at the site. By 1850, there were about five known burials in the grounds. The Gundagai North Cemetery was established a little later with the oldest known burial dated 1858. Historical sources claim that the Gundagai South Cemetery was used during the era of the early township of Gundagai which was located on the river flats to the north of the Murrumbidgee River. After a series of earlier floods that impacted the Gundagai settlement, the devastating flood of 1852 which claimed at least 78 lives, saw the abandonment of the low lying settlement areas to higher ground (The Heraldry and Genealogy Society of Canberra Inc., 1998).

There is no church or rectory associated with the Gundagai South Cemetery with the various religious denominations managing the grounds collaboratively until the 1960s when management responsibility was transferred to the Gundagai Shire Council. It is believed that official burial records that pre-date 1960 no longer exist.

Preliminary heritage assessment

The Gundagai South Cemetery does not appear on the State Heritage Inventory or on the Gundagai LEP 2011. However, it is in the interests of the wider community that cemeteries are conserved as an invaluable historical and family history resource. The Guidelines for Cemetery Conservation published by The National Trust of Australia (NSW) provides a succinct overview of the community value of cemeteries:

> *As an expression of people's culture and identity, cemeteries comprise a fascinating resource which allow the community to delve back into their past. The monuments and graves represent the last public memorials of many people, both famous and unknown, who were intimately involved with the growth of the local area in which they are buried. In this way the headstones themselves, through the names, occupations, dates and epitaphs, provide a largely unique social, literary and economic record of the district. The monuments also demonstrate the art of the stonemason whose skill and craftsmanship is not likely to be repeated.*
>
> *But it is not just the headstones which are important in cemetery landscapes. Many rural cemeteries contain important botanical species which are endangered. Cemeteries have long been recognised as repositories for heritage roses and it is being increasingly recognised that they also harbour and protect native*

vegetation. Along with the vegetation, cemeteries are also a haven for wildlife generally.

In reference to the National Trust Guidelines cemeteries attain historical values for the record it contains of Australian society; social values for the commemorative function that cemeteries serve; religious values of the beliefs, customs and rituals that change over time; genealogical information; artistic, creative and technical elements; landscape setting; botanical elements of cemetery plantings and ecological issues of native flora and fauna.

The most significant element of heritage significance for a cemetery is human remains. The human remains within a cemetery attract archaeological and scientific potential, consider issues of religious belief and their meaning to descendants, and general community respect for our ancestors. These issues remain relevant for unmarked graves and for burial areas cleared of previous monuments, as well as marked grave sites.

Based on an understanding that cemeteries provide an important historical resource for all communities of New South Wales, and by their nature constitute an item of heritage value to the local community, the Gundagai South Cemetery must be considered a locally significant heritage item for its historical, social, aesthetic and scientific values.

Preliminary SOHI

While there are no headstones in the north-west corner of the grounds, which is within 20 metres of the Gocup Road alignment, the potential for unmarked burials in this area cannot be entirely discounted, particularly in the absence of burial records. Any disturbance for road works within the existing cemetery grounds would be considered an unacceptable negative impact to the site.

Preliminary management recommendations

It is rare and undesirable that any disturbance or destruction occur within cemetery grounds, regardless of whether or not there is surface evidence of burials present. Any work or disturbance of a gazetted cemetery requires the permission of the controlling authority, in this case the Gundagai Shire Council.

It is recommended that during any planning for an upgrade of Gocup Road in the vicinity of the Gundagai South Cemetery that any intrusion into to the cemetery grounds is avoided. Further, in the carrying out of any road works in close proximity to the Gundagai South Cemetery, that appropriate workplace procedures are applied to avoid any inadvertent intrusion and/or damage to the cemetery grounds.

4.1.2 Item 2 and Item 3 - Stone Culverts

Grid reference – Item 2 small stone culvert

(Zone 55, Datum WGS84)

Easting	Northing
600245	6113275

Grid reference – Item 3 large stone culvert

(Zone 55, Datum WGS84)

Easting	Northing
600395	6113171

Site description

Items 2 and 3 (small stone culvert and large stone culvert) are associated by their close proximity and by the style and nature of their construction. These items are located along a section of abandoned road alignment (see **Figure 4.3** and **Figure 4.4**). Item 2 consisted of a small bridge/culvert constructed in mortared stone rubble with concrete pipe-ware (see **Figure 4.5**). Item 3 was a large double span of mortared rubble stone supported roadway constructed across a natural drainage line with concrete pipe ware installed for drainage (see **Figure 4.6**).

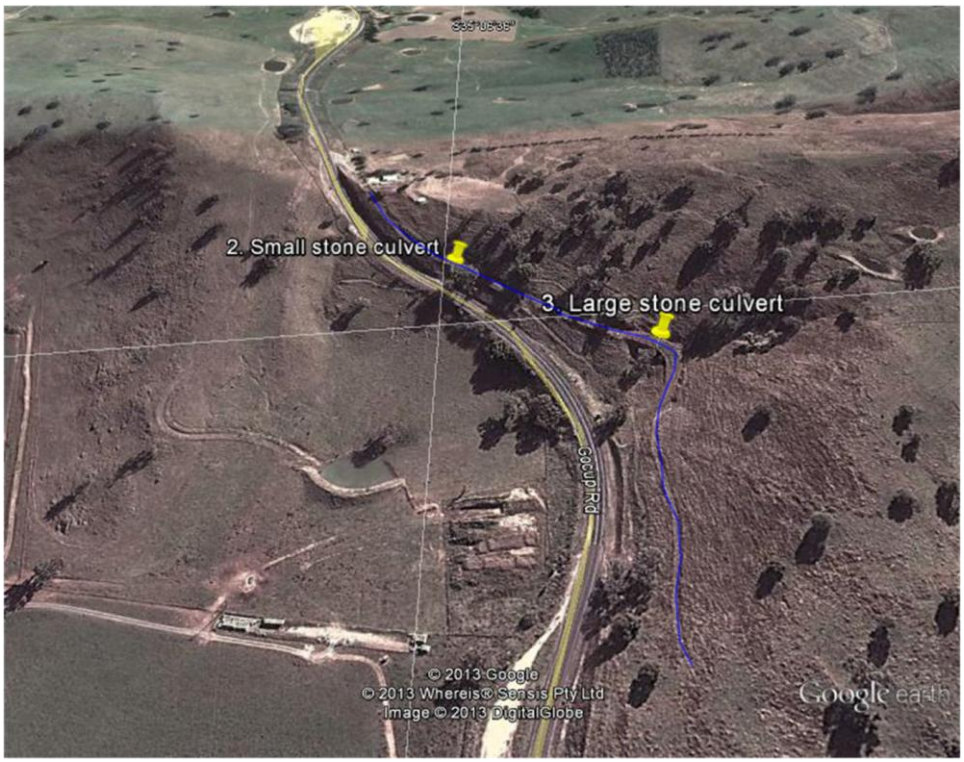


Figure 4.3: Location of stone culverts located in a section of abandoned road alignment. The abandoned road alignment is shown in blue.

Figure 4.4: Context view of Items 2 and 3 with location indicated by blue arrows and the present alignment of Gocup Road approaching a steep decline.

Figure 4.5: Detailed view of Item 2 small stone culvert formation (at right) taken from current road level and showing built-up road surface abandoned alignment.

Figure 4.6: Detailed view of Item 3 large stone supported road formation showing concrete pipes and surface level of abandoned section of road spanning the drainage line.

The re-aligned Gocup Road is now a recognised black spot due to the sweeping curve and steep decline (see **Figure 4.7**).

Figure 4.7: Context view of the re-aligned section of Gocup Road where the abandoned road alignment is located to the left (east) of the modern road.

Historical overview

Based on an understanding of the historical context of regional road evolution, it is likely that these culverts are remnants of road upgrades in the 1920s in order to make the road more serviceable to motor vehicles. The need to keep a relatively even road grade, wherever possible, is evident in the way in which the road spans the drainage lines. Given the landform in the immediate area, there were few options for the road alignment to follow that did not involve long, steep grades. The use of rubble stone indicates the use of locally available materials as was typical of road construction in the early 20th Century.

Preliminary heritage assessment

These two features are considered locally significant for the historical, aesthetic and scientific potential they contain in being able to contribute information on early 20th Century road construction and drainage methods. Based on a number of other examples in the region, these items would be considered representative in nature.

Preliminary SOHI

Given proximity of Item 2 (small stone culvert) to the current road alignment (within 5 metres) on a sweeping bend it is reasonable to consider that the structure and the surrounding road structure may be at risk of impact in any upgrade plans that increase the cutting in this location. While this would be considered a negative impact to the heritage

values of the item, adequate mitigation measures may be applied in any detailed project planning. Item 3 is well beyond the survey limit at approximately 80 metres to the east of the present road alignment and appears at no risk of heritage impact.

Preliminary management recommendations

In the event that disturbance or destruction of Item 2 is unavoidable, best practice heritage guidelines should be applied to include the formulation of appropriate management strategies which should include archival recording prior to the commencement of any road works in the vicinity.

4.1.3 Item 4 - Old advertising signs

Grid reference

(Zone 55, Datum WGS84)

Easting	Northing
601835	6109437

Site description

This item consisted of two old roadside advertising signs, one advertising the date of the next Tumut Turf Club Meeting and the other promoting the Elms Motor Inn, Tumut. While well weathered, the signs are still legible. More a point of interest rather than a heritage site as such, the signs provided a reminder of the location of the former road alignment at this location, and are reminiscent of roadside advertising of the 1960s/1970s. It is likely that the road upgrade of the 1980s saw the road re-aligned at this location and that the signs have been abandoned to remain as a marker of the old road alignment.

Remnants of the old road surface are visible on the ground surface and the abandoned section can still be seen on aerial mapping as shown in **Figure 4.8**. **Figure 4.9** provides a context view of the road signs and **Figure 4.10** gives a detailed view of the two remnant signs.

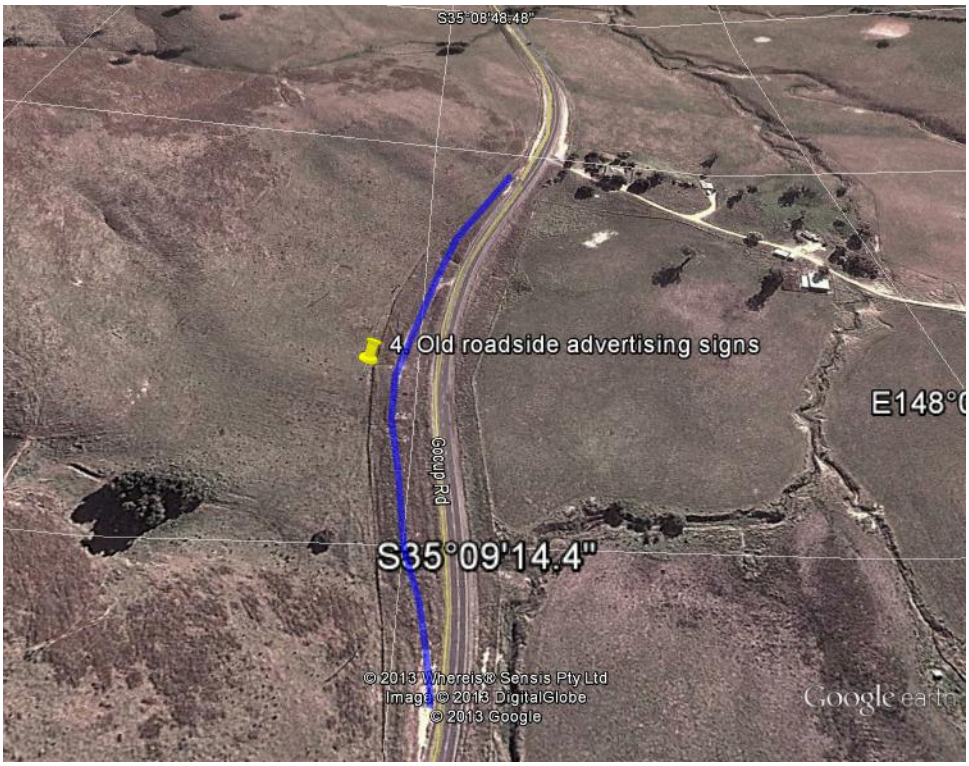


Figure 4.8: Location of Item 4 – Old roadside advertising signs showing the abandoned road alignment highlighted in blue alongside the current Gocup Road. ***Source: Google Earth, 2103.***

Figure 4.9: Context view along the abandoned section of road alignment, looking south, showing old road signs.

Figure 4.10: Detailed view of old road advertising signs for the Elms Motor Inn and the Tumut Turf Club.

Historical overview

Tumut Turf Club is one of the oldest Race Clubs in NSW having commenced racing in the 1850's. The original grandstands are still in use today and are heritage listed items in the Tumut LEP 2012.

The Elms Motor Inn is still operating. Located in Fitzroy Street, Tumut, it is now owned by the Golden Chain Motor Inn group.

Preliminary heritage assessment

These items could be considered locally significant for their historical and social values in advertising two establishments of Tumut. The signs now constitute a landmark for regular road users and are representative of their era.

Preliminary SOHI

The removal of the signs at this location would result in a minor heritage impact in the removal of a long standing landmark item. However, the need to balance road safety and serviceability would be reasonably offset through sensitive management of the signs after removal.

Preliminary management recommendations

In the event that the signs need to be removed, an attempt to locate a suitable repository should be made. This might include approaching the original owners or the local historical museum.

4.1.4 Item 5 - Abandoned stock yards and section of old road

Grid reference

(Zone 55, Datum WGS84)

Easting	Northing
601825	6108942

Site description

This site was highly visible on an open slope to the east of Gocup Road (refer to **Figure 4.11**). The remains of the stock yards consist of a number of upright posts showing modern construction techniques although likely dated to the early part of the 20th Century. The height of the remnant posts indicate the yards were constructed for sheep management (see **Figure 4.12**). The remnants of a loading ramp structure were also observed. The old stock yards are a well known landmark to the locals (R Brennan, pers. comm.). The yards were ideally located on a section of old road alignment which is still visible within line of trees adjacent to the former yards (refer to **Figure 4.13**). The line of old road was traced to the location where a former crossing would have been located across a deep drainage line at the base of the gully. A modern concrete culvert now existed where any former historical crossing would have occurred.

The abandoned line of road travelled upslope to the south of the yards and involved a relatively steep incline to the crest of the hill where it continued in a southerly direction. It is likely this line of road was selected in order to avoid a low lying swampy area in the gully that was likely impassable during wet weather. The long abandoned nature of the road surface with trees and pasture now almost obscuring its presence, likely places its abandonment in the 1920s.

Figure 4.11: Location of abandoned cattle yards #5 in relation to the abandoned alignment of Gocup Road (shown in blue). ***Source: Google Earth, 2103.***

Figure 4.12: View of abandoned stock yards looking east across Gocup Road. The abandoned road alignment is located to the right of view.

Figure 4.13: View of abandoned road alignment adjacent to the stock yards (which are just out of view to the left). The old road runs between the lines of trees at centre with a drain visible a little to the right.

Historical overview

The stockyards would be associated with the use of the land for stock management and based on their style of construction, likely date to the early to mid 20th Century. The section of abandoned road alignment may represent the original line of road circa 1860 as there appears to be little observable road surface formation other than a dish drain

Preliminary heritage assessment

The abandoned stock yards carry little heritage significance in themselves as they have little potential to contribute additional information to that already known about the history of early 20th Century stock management in the region. However, they have some aesthetic significance in their function as a well known landmark to the local road users.

According to Kass, 2006, cut-off sections of road, bypassed culverts and cuttings as well as extant road construction techniques, some surviving on bypassed lengths of road or sometimes encapsulated beneath current road surfaces all have the ability to demonstrate former road construction techniques. This concept is reasonably applicable to this abandoned section of road.

Thus, it could be considered that this section of abandoned road alignment attains historical and scientific heritage value in its potential to contribute to an understanding of road construction techniques used on the early alignment of Gocup Road.

Preliminary SOHI

Any disturbance or destruction of the stock yards would be considered a minor heritage impact in the loss of a long standing landmark item. However, the need to balance road safety and serviceability would be reasonably offset the loss of this item.

The disturbance or destruction of the abandoned line of road would be considered a negative heritage impact that would require appropriate heritage management.

Preliminary management recommendations

In the first instance, planning for any road works should avoid any disturbance or destruction of the abandoned section of road. In the event that disturbance is unavoidable, appropriate heritage management strategies should be formulated through an additional SOHI, in order that the potential for the retrieval of information on former road construction techniques, possibly circa 1860, is not lost.

4.1.5 Item 6 - Minjary School and Item 8 - Australian Arms pub

Grid reference Item 6 – Minjary Public School

(Zone 55, Datum WGS84)

Easting	Northing
602978	6104850

Grid Reference Item 8 –Australian Arms Pub

Zone 55, Datum WGS84)

Easting	Northing
603014	6104835

Site description

These sites were identified during consultation with Mr Rob Brennan of *Eurobin* and are reported together given their close proximity and historical association. The sites were located on the northern alignment of Gocup Road on the outskirts of the village of Minjary as shown in **Figure 4.14**.

The location of the Australian Arms Pub (possibly also known as the Minjary Hotel) was known to Mr Rob Brennan. The site is now occupied by a modern residence. The original school house was reportedly located adjacent to the hotel in what is now a relatively clear grassed area to the north-west of the residence (see **Figure 4.15**).

There was no surface evidence of the former hotel structure which was reportedly destroyed in a fire in 1905. Mr Brennan also revealed that the site has been a haunt for amateur bottle collectors over the years.

Historical overview

Portion No 3097 reserved from sale lands were advertised in the *Wagga Wagga Advertiser* on 1 September 1883 for Minjary Public School. Therefore, the earliest date for the establishment the Minjary School is known. Local knowledge claims that the original school site was adjacent to the Minjary Hotel. Community concern about the location was raised and the school was moved to a site directly across the Gocup Road. It is claimed that the original building was relocated and stood at this site until the school closed around the 1940s (R Brennan, pers. comm.). The school building has since been moved to another property (R Brennan, pers. comm.).

A search of available archives did not reveal any historical information on the Australian Arms Pub but did reference a Mr Ellis's (sic) Minjary Hotel in the *Empire* Newspaper on 15 June 1863. Mr Rob Brennan advised that Mr Martin Brennan was the first proprietor of the Australian Arms Pub in 1878. However, this anomaly may be the result of a change in ownership, and a change in business name at that time.

Mr Brennan recalled local knowledge that The Australian Arms Pub was destroyed in a devastating bushfire in 1905. Newspaper reports in the Sydney Morning Herald in January 1905 confirm a series of devastating fires that swept through Gocup. Among those to lose property in the fire was Mr Edward Brennan of *Eurobin*. As an aside, Mr Rob Brennan recounted that his ancestor Mr Martin Brennan won a tender to maintain the Gocup Road. In order to carry out the work he purchased surplus government tools, some of which were associated with the convict era. The Brennan family was in possession of the tools until very recently when they were sold to a collector (R Brennan, pers. comm.).

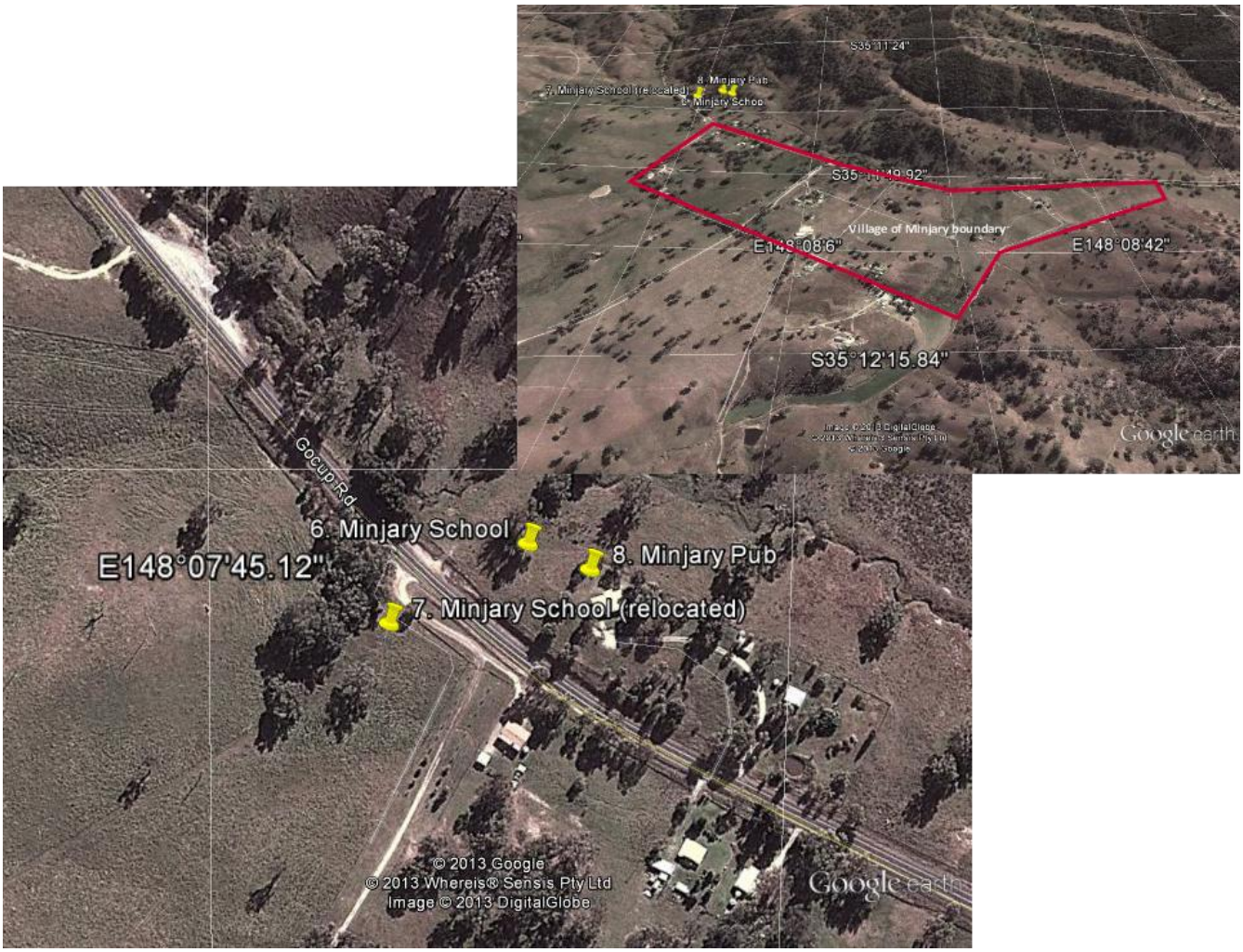


Figure 4.14: Location of three related sites at Minjary. Inset shows the boundary of the Minjary Village. The original location of Minjary Public School #6 which was located adjacent to the Australian Arms Inn #*8. The re-located Minjary Public School is shown at #7. Inset shows the boundary of the village of Minjary. *Source: Google Earth, 2103*.

Figure 4.15: View looking east across Gocup Road towards the former site of the Australian Arms Pub which stood approximately where the residence now stands. The original location of the Minjary Public School can be seen beyond the double property gates at left of view. The cutting in road is likely the result of 1960s/1980s upgrade works.

Preliminary heritage assessment

The site of the former hotel must be considered a wholly archaeological site as no surface evidence appears to have survived. The site of the former hotel is likely to attain a local level of significance for its historical, social and scientific values and would likely be considered representative in nature.

In the absence of any physical evidence of the former school, the site attains a level of historical and social significance at best for its association with the original location of the Minjary Public School circa 1883-1904.

Preliminary SOHI

Disturbance of this site would result in a negative heritage impact in the loss of an archaeological resource. However, appropriate archaeological management would mitigate any loss of heritage values through the opportunity to gain an understanding of the former occupation and use of the site that is not available elsewhere.

It would be unlikely that disturbance of the site of the former Minjary Public School would result in any negative heritage impact.

Preliminary management recommendations

In the first instance, it is recommended that these sites are avoided in the planning of any road upgrade works. In the event that road works would intrude into the former hotel site such that disturbance was unavoidable, additional archaeological assessment would be required. It is highly likely that the relic's provisions of the NSW Heritage Act would be triggered in the event that structural relics or artefacts were exposed, and that the need for a statutory excavation permit would arise.

4.1.6 Item 7 - Relocated Minjary School

Grid reference

(Zone 55, Datum WGS84)

Easting	Northing
602897	6104805

Site description

This site was identified by Mr Rob Brennan of *Eurobin* who can recall the school house at this site. Please refer to **Figure 4.14** for a site map which shows this site in relation to the former location of the school. **Figure 4.16** provides a context view of the site of the re-located Minjary Public School. There appeared to be no surface evidence that indicated the former presence of a building and this is likely because the school sat on stump foundations.

Historical overview

It is believed that the Minjary Public School building was relocated from the northern side of Gocup Road sometime in the very early 1900s. Had the school building remained in its original location, it would likely have been lost in the fire of 1905 which destroyed the Minjary Hotel/Australian Arms structure.

Preliminary heritage assessment

This site attracts little heritage significance and could be considered to attain historical and social significance at best for its association with the Minjary Public School circa 1900-1940.

Figure 4.16: The site of the relocated Gocup Public School, directly across the Gocup Road from its former location adjacent to the Australian Arms Inn.

Preliminary SOHI

Based on the present understanding of the site, any disturbance resulting from road works at this site would result in no discernible heritage impact.

Preliminary management recommendations

Due diligence management to stop work and inform the relevant authorities in the event that archaeological relics are exposed during any disturbance.

4.1.7 Item 9 - Stone and earthenware pipe culvert on old section of road

Grid reference

(Zone 55, Datum WGS84)

Easting	Northing
605959	6104266

Site description

This site was located on a section of abandoned road alignment on the boundary fence line of the adjoining property (see **Figure 4.17** and **Figure 4.18**). The site occurs within the 50 metre survey zone. Obscured by overgrowth, the site was known to Mr Rob Brennan. It consisted of a mortared rubble stone culvert supporting the road surface over three earthenware pipes (see **Figure 4.19**). The drainage line was still functional, dispersing run-off directed from a modern concrete culvert above. The construction of the culvert was consistent with that observed at Items 2 an4.18d 3 (see **Section 4.1.2**)

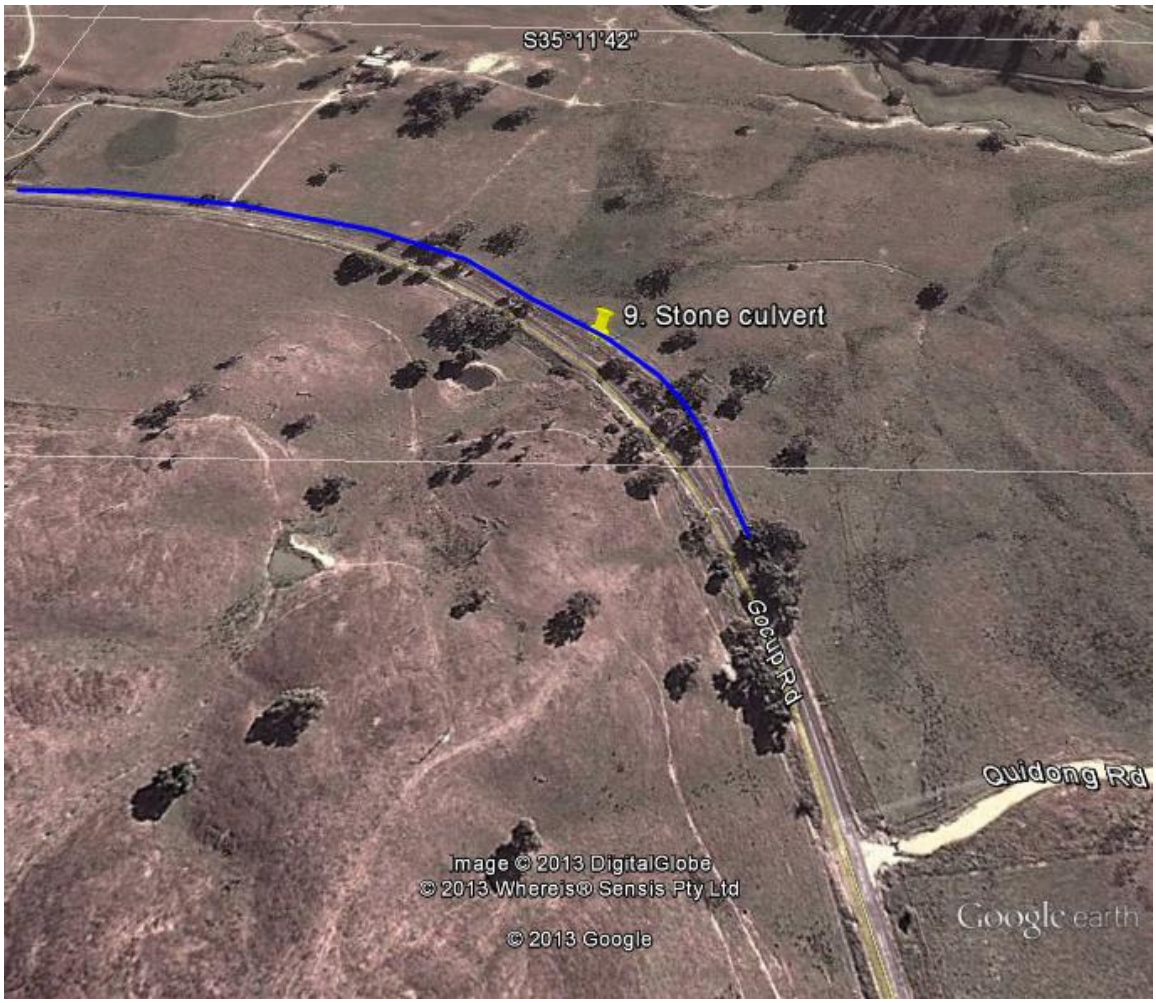


Figure 4.17: Location of stone culvert showing line of old road adjacent to the current alignment of Gocup Road. *Source: Google Earth, 2103*.

Figure 4.18: Context view of stone culvert looking north, with blue arrow indicating its position. The red overlay indicates the line of the old road surface.

Figure 4.19: Detailed view of stone and earthenware pipe culvert.

Historical overview

This site likely represents an early phase of road upgrade to improve the road conditions in a low lying area and across a drainage line. The earthenware pipe is indicative of

construction around the 1920s/1930s which corresponds to the introduction of the motor vehicle. The original crossing was likely a basic stone crossing in the bed of the drainage line and likely impassable during wet weather.

The road surface has been formed across this section and is still discernible as can be seen in **Figure 4.18**.

Preliminary heritage assessment

This structure is a remnant of an earlier phase of road construction and appears with a level of retained integrity. For these reasons, the structure would attain a level of local significance, representative in nature, for its historical and scientific values to contribute information on early culvert construction techniques as part of the road improvement works.

Preliminary SOHI

Disturbance or destruction of this item would result in a negative heritage impact in the loss of a heritage resource which provides a good example of its type and provenance.

Preliminary management recommendations

In the first instance, if possible this site should be avoided in the planning of any road upgrade works. As this item would be defined as a 'work' it is not subject statutory approvals for disturbance or destruction. However, best practice heritage management should be applied in the formulation of appropriate management strategies should the disturbance or destruction of the site be unavoidable.

4.1.8 Item 10 -Timber bridge/culvert on old section of road

Grid reference

(Zone 55, Datum WGS84)

Easting	Northing
606326	6103201

Site description

This site consisted of a simple bed log and log girder bridge covered with stone rubble with a packed earth surface. This item was located within a section of abandoned road alignment

directly adjacent to the present day Gocup Road alignment (see **Figure 4.20**). The site was identified during consultation with Mr Rob Brennan and was well hidden within overgrown roadside vegetation, and this is probably responsible for its good condition. The timber wing walls of the culvert were still discernible although in a state of decay (see **Figure 4.21**). A single upright of the former safety rail was still in place on the western alignment of the bridge (see **Figure 4.22**).

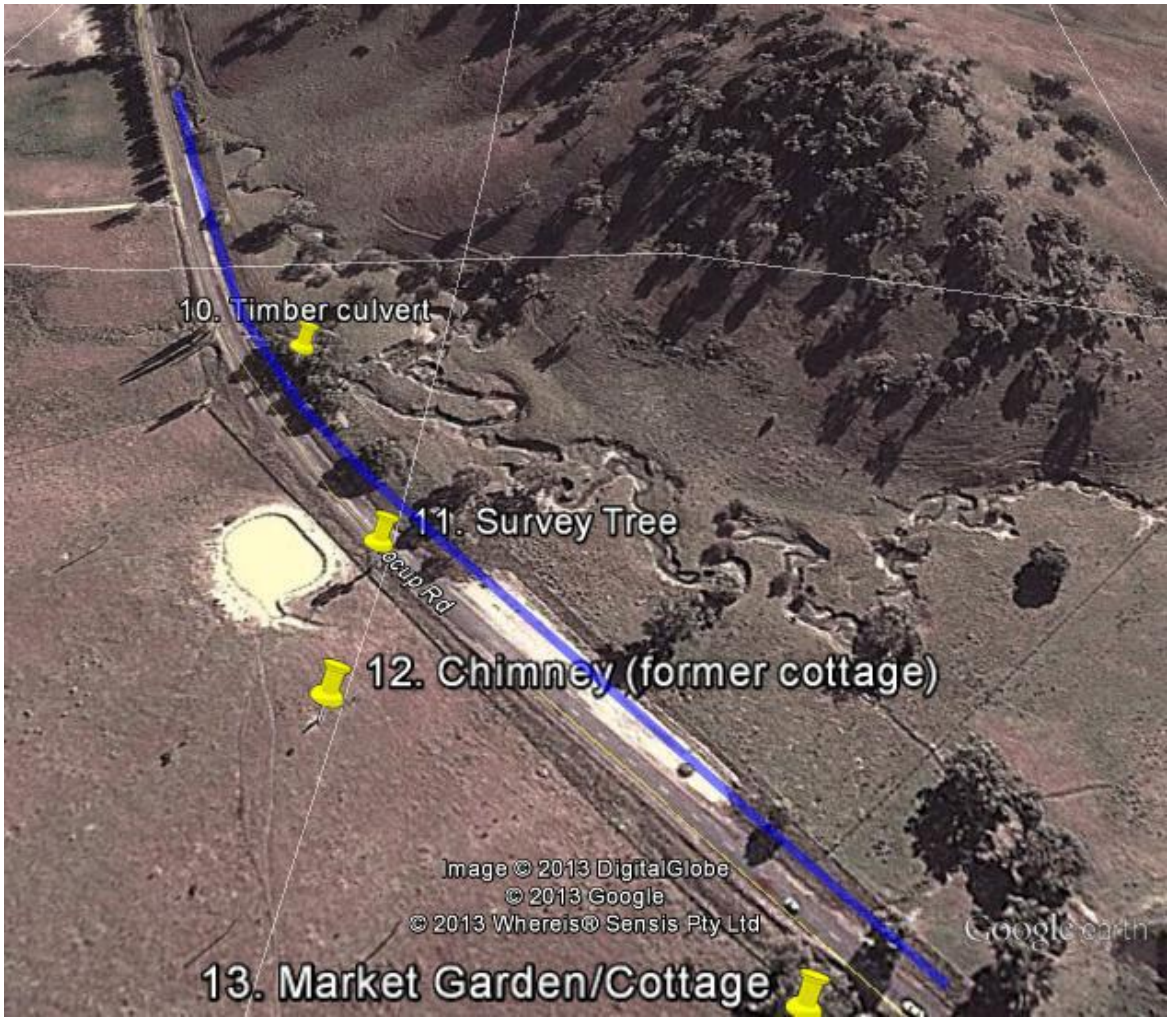


Figure 4.20: Location of the remnant timber culvert on abandoned section of road. The old road alignment is shown in blue and runs adjacent to present day Gocup Road. *Source: Google Earth, 2103*.

Figure 4.21: Timber crossing/culvert, looking south-west, showing the north-eastern alignment of the former road. Note the substantial bed logs, timber girders and timber wing walls. Note also the depth of coverage of stone and clay to form the road surface.

Figure 4.22: View of the south-western alignment almost obscured by grass cover. The timber culvert is still functioning as a drainage line. A single upright timber of the safety rail remains.

Historical overview

The style of construction and use of round timbers in this culvert provide an indicator of construction in the late 19th Century rather than 20th Century upgrade works. At the time of re-alignment of this section of road in the 1960s, it was likely more efficient to alter the line of road than to upgrade the existing timber crossing. Mr Rob Brennan can recall the bridge still in use when the safety rail timbers were painted white.

Preliminary heritage assessment

According to Kass, (2006) bypassed culverts have the ability to demonstrate former road construction techniques. This item provides an excellent example of its type and as a result attracts historical and scientific heritage significance at a local level for its potential to contribute meaningful information on road and bridge construction technology of the 19th Century. This style of culvert could be considered a rare example of its kind within the locality. The structure itself has weathered only minor modification and retains good integrity.

Preliminary SOHI

Disturbance or demolition of this item will result in a negative impact in the loss of a valuable, and possibly rare, local heritage resource.

Preliminary management recommendations

In the first instance, it is recommended that any disturbance or encroachments at this site are avoided if possible. However, as the site is located within the 50 metre survey zone, any proposed disturbance should be offset with a due diligence approach to heritage management.

As this item is defined as a work and not a relic, there is no requirement for statutory approvals and the relics provisions of the Heritage Act would not generally apply. However, if during the course of any disturbance artefacts that fall within the definition of relic are exposed, work would need to cease and appropriate measures taken to follow best practice heritage management guidelines.

Based on the significance of the item and the potential for the recovery of historical and technical information, a specific SOHI should form part of any future planning process with regard to road upgrade works that impact this location.

4.1.9 Item 11 - Survey tree, SSM 5356

Grid reference

(Zone 55, Datum WGS84)

Easting	Northing
606380	6103098

Site description

This item is located within the road reserve on the boundary line of the adjoining property as shown in **Figure 4.23** and **Figure 4.24**. This item consisted of a tree blazed with a permanent survey mark typical of 1960 surveying methods (see **Figure 4.25**).

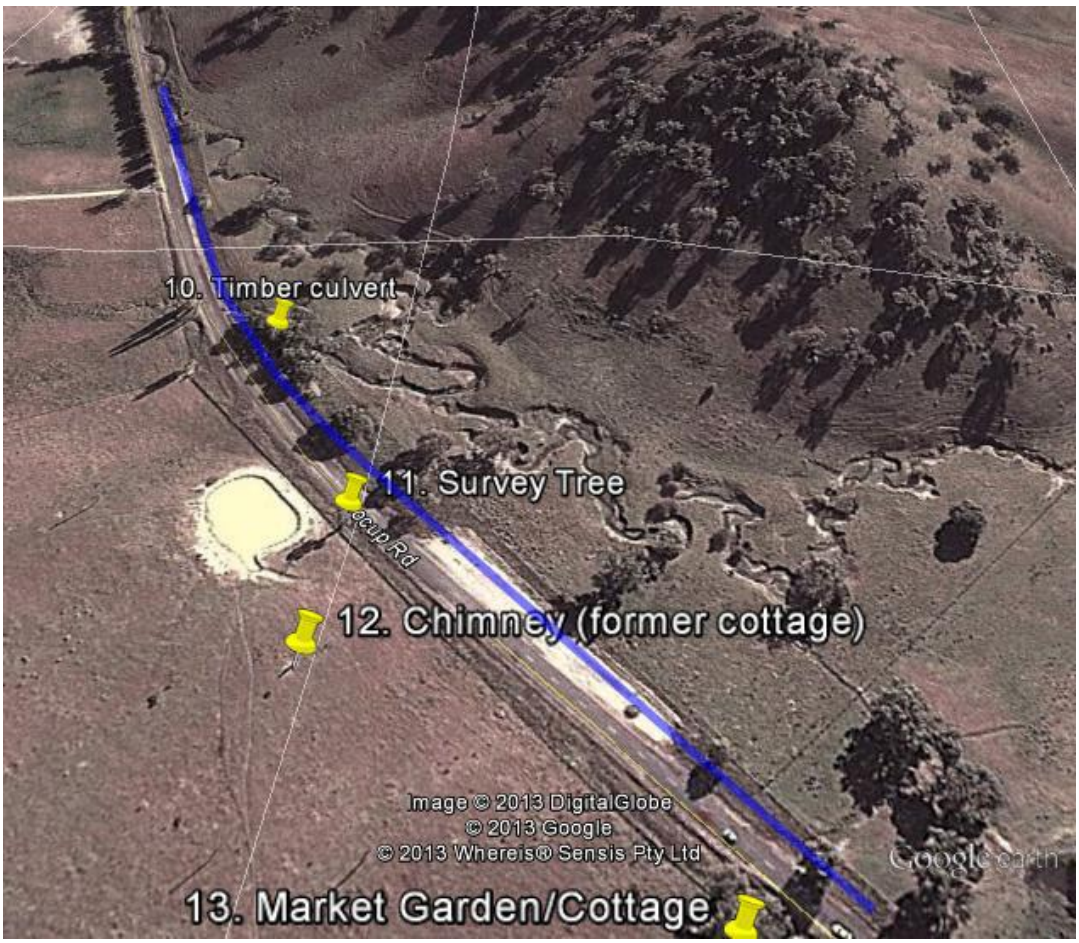


Figure 4.23: Location of the survey tree #11, in relation to the timber culvert #10 and the chimney #12 showing current alignment of Gocup Road and abandoned alignment (shown in blue). ***Source: Google Earth, 2103.***

Figure 4.24: Context view of survey tree (centre left), looking north along Gocup Road along boundary fence.

Figure 4.25: Detailed views of tree containing State Survey Mark 5356. A large burl exists just above the mark (see left) and the mark shows the PM for 'permanent mark' and the government arrow above.

Historical overview

While there is no date on the locality sketch (refer to **Figure 4.26**), consultation with Peter Baxter of Baxter Geo Consulting, anticipated that it was carried out in the 1960s as the measurements are in feet with annotations in kilometres. The mark was most probably put in to bring level control to the area for construction of the re-aligned section of Gocup Road.

The present method of "blazing" lines was first formally regulated in the 1853 instructions for marking Crown Land by Government Surveyors. Prior to 1850, rock marks were occasionally used but no standard had been adopted. In 1852 an act was passed directing that the official mark for surveys conducted for the government was the broad arrow (Marshall, 2002).

The tree is a standard marker (put in to monument the Survey mark) that was standard practice when putting in these types of marks at that time (P Baxter, pers. comm.). It is rare to create such marks in trees today.

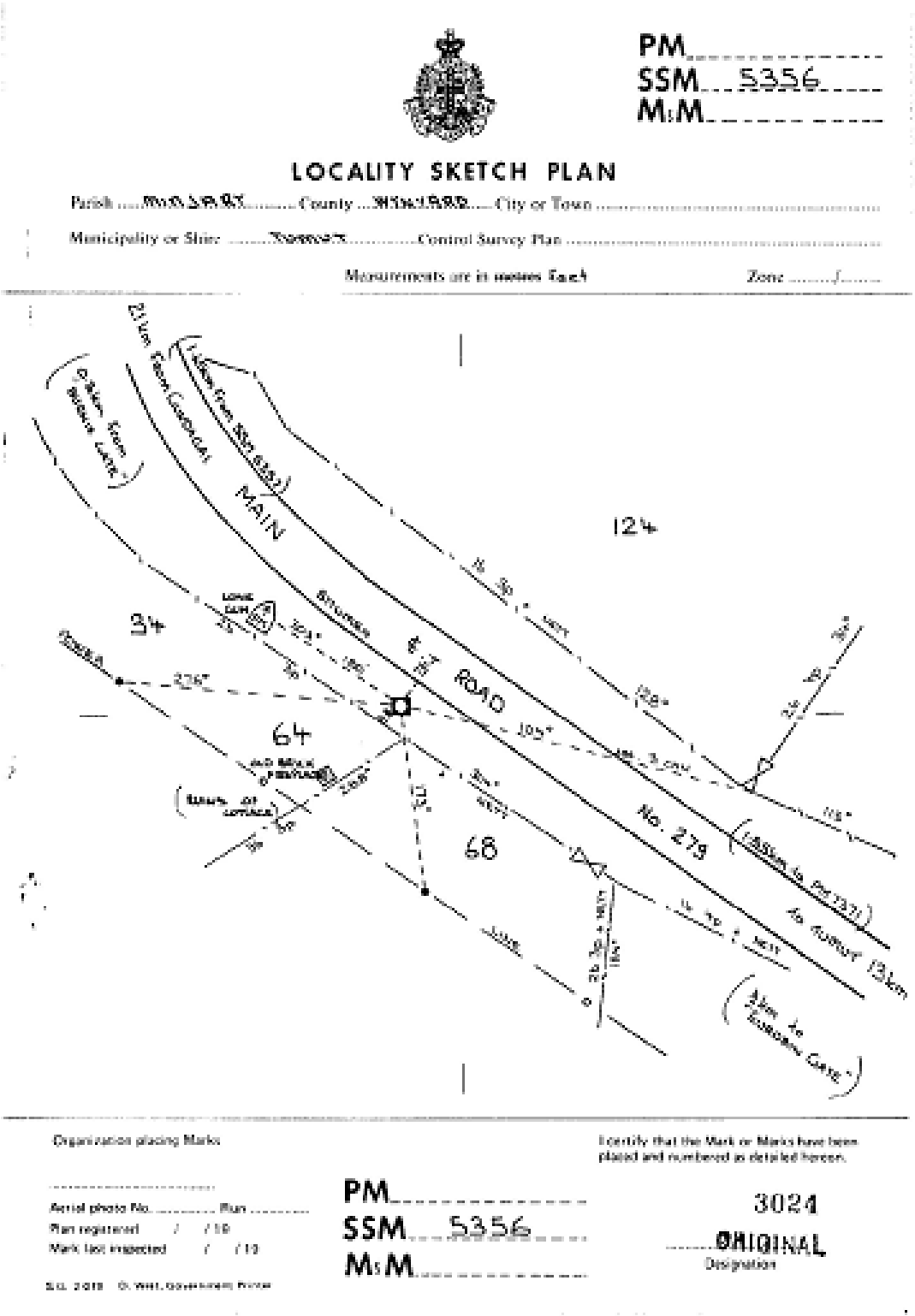


Figure 4.26: Locality Sketch Plan of State Survey Mark 5356 dated to the 1960s. This plan includes location of the chimney of the former cottage in the adjacent property.
Source: LPI Online: www.lpi.nsw.gov.au/surveying/scims_online

Preliminary heritage assessment

This item is considered of local heritage value at best. It is a remnant of the road upgrade works of the 1960s and for this reason would attain historical and to a degree social value for its landmark qualities to the local residents. Survey marks are now rarely left in trees (due to the often ephemeral life of trees) and for this reason, it is considered to be of some historical and aesthetic heritage value.

Preliminary SOHI

The destruction of the survey tree would result in a negative impact to historical and aesthetic values that attach the site. However, the need to balance a safe and serviceable road would accommodate the loss the site with appropriate heritage management.

Preliminary management recommendations

As this site falls within the 50m survey zone, RMS should note that the removal of a permanent survey mark must be notified under Clause 88 of the Surveying Regulation 2006, under the Surveying Act 2002 as follows:

Applications to remove survey marks under section 24 of the Act

(1) An application for an authorisation referred to in section 24 (1) of the Act must be made to the Surveyor-General at least 14 days before ***the date*** on which the applicant intends to remove, damage, destroy, obliterate or deface the survey mark in respect of which the authorisation is sought.

(2) This clause applies only to permanent survey marks and reference marks.

In the event that the demolition of the site is unavoidable, appropriate management strategies should be formulated in order to archivally record the site prior to removal and with consideration in the recovery of the survey should a suitable repository be available.

4.1.10 Item 12 – chimney – former Cottage site

Grid reference

(Zone 55, Datum WGS84)

Easting	Northing
606378	6103035

Site description

This site comprised a brick chimney located on private property that marked the site of a former cottage. It was located approximately 50 metres from the Gocup Road alignment (see **Figure 4.27**). A scatter of demolition rubble and landform evidence indicative of buried building materials was observed at the base of the chimney. At the outset the chimney looked to be in very good condition for its anticipated time of construction in the late 1800s/early 1900s. **Figure 4.28** and **Figure 4.29** provide alternative views of the chimney.

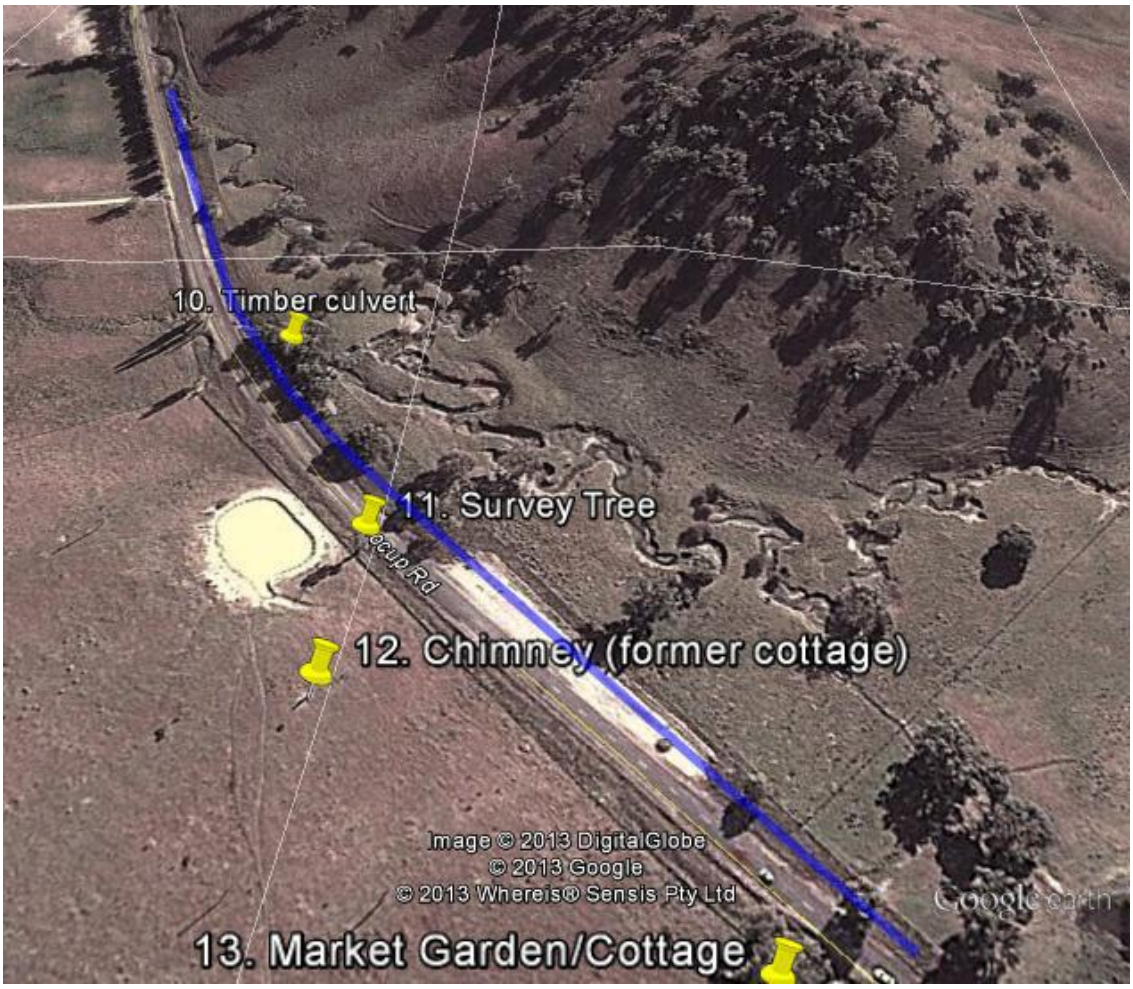


Figure 4.27: Location of brick chimney in relation to the survey tree #11 and Gocup Road.
Source: Google Earth, 2103.

Figure 4.28: Context view of chimney looking west across Gocup Road. Item 11- SSM 5356 is visible at far right.

Figure 4.29: Alternative view of brick chimney from property boundary fence, looking south.

Historical overview

This lone chimney represents a former cottage site thought to date to around 1870 (R Brennan, pers. comm.). A Mr McDonoghue is known to have lived there and made a living from rabbiting in the early 1900s.

The chimney had become a well known landmark to local residents and regular travellers. When the structure collapsed a few years ago, the land owners re-erected it as a community service and in respect for the social and historical values it held for well over 100 years (R Brennan, pers. comm.).

It is likely the cottage was small, perhaps a two or four room dwelling with a single fireplace, typical of worker's cottages around the turn of the 20th Century.

Preliminary heritage assessment

The site attains local historical and social heritage values for the present day community. The structure is intact although modified through re-construction and as such could be considered to attain a low level of integrity.

Preliminary SOHI

The loss of a well known landmark to the local area would constitute a negative heritage impact. Landholder consultation should be carried out with a view to preserving the site to avoid such impact.

Preliminary management recommendations

This site is located within the 50 metre survey zone but is located at a distance of 50 metres from the road boundary. In the first instance, disturbance should be avoided if at all possible. Planning of upgrade works should aim to preserve this site for future generations. Any road upgrade works should avoid encroaching upon the site of the former cottage which is indicated on the ground surface by a scatter of demolition rubble.

A specific SOHI should be carried out for any proposed disturbance at this site and appropriate heritage mitigation measures will need to be formulated. While the chimney structure would be defined as a building, there is no requirement for development consent to demolish. However, any disturbance of the ground surface surrounding the chimney would require a statutory excavation permit to manage the anticipated archaeological relics of former occupation and use that would exist at the site.

4.1.11 Item 13 - Former market garden and cottage

Grid reference

(Zone 55, Datum WGS84)

Easting	Northing
606511	6102959

Site description

This site was identified a short distance from sites #11 and #12during consultation with Mr Rob Brennan of Eurobin (see **Figure 4.30** and **Figure 4.31**). There was no surface evidence of to indicate the location of the market garden other than a patch of richly green pasture observed just within the property boundary fence (see **Figure 4.32**). The site was located within the 50 metre survey zone.

Figure 4.30: Location of former market garden and cottage in relation to the brick chimney #12 and SSM 5356 #11 showing close proximity to Gocup Road.

Source: Google Earth, 2103.

Figure 4.31: Context view of site of former market garden, looking north-west across Gocup Road. The chimney is just visible in that background at right of view.

Figure 4.32: Detailed view of former market garden, looking south-west, indicated by dark green colour of pasture beyond trees.

Historical overview

Historical background for this site has relied upon the local knowledge of Mr Rob Brennan who informs a Mr George Hillier carried on a market garden at this location. A fibro cottage associated with the garden was apparently demolished around 1962 when road the road was realigned (R Brennan, pers. comm.). The Australian Town and Country Journal mentions a Mr George Hillier, farmer of Gocup in June 1897.

Preliminary heritage assessment

This site could be considered marginally locally significant for its historical association with late 19th Century and early 20th Century rural enterprise. However, in the absence of any surface remains, the site must be considered wholly archaeological. Any relics of former occupation would attain a local level of historical significance

Preliminary SOHI

Previous disturbance at this site for road upgrade works in the 1960s has likely destroyed and/or obscured any occupation evidence. It is unlikely that any further disturbance for road works at the site would result any additional negative impact at this location.

Preliminary management recommendations

Due diligence heritage practice should be applied during any disturbance at this site such the exposure of any relics is not reasonably expected. In the event of the exposure of unexpected relics, work should cease and appropriate management measures taken.

4.1.12 Item 14 - Former tennis court

Grid reference

(Zone 55, Datum WGS84)

Easting	Northing
607487	6101967

Site description

This site was observed during vehicular survey and confirmed during consultation with Mr Rob Brennan of *Eurobin.* The site was located only a few metres from the current alignment of Gocup Road and fell within the 50 metre study zone (see **Figure 4.33** and **Figure 4.34**). The site consisted of the remaining landform item that comprised the former surface of the

tennis court (see **Figure 36**). There was no remaining evidence of any of the former structures or court fencing. Exotic tree plantings mark the location of a former player's shed at the southern end of the court (see **Figure 35**).

Mr Brennan can recall a memory of the court during his lifetime and confirms that there was a player's shelter shed at the southern end of the court and an umpire's chair. The court has been abandoned for many years now but the level surface of the court is still easily discernible.

Figure 4.33: Location of the former tennis court showing its proximity to Gocup Road.
Source: Google Earth, 2103.

Figure 4.34: View of location of former tennis court, looking west across Gocup Road.

Figure 4.35: View of location of former player's shed and exotic tree plantings for shade at the player's shed.

Figure 4.36: View of raised, level surface for the tennis court, looking south.

Historical overview

The modern game of tennis had is origins in England but the game itself can be traced back to the times of the Ancient Greeks and Ancient Romans. From its ancient origins, the sport of tennis was associated with the elite. In English society tennis became a symbol of the civilised and the rich, and exclusive lawn tennis clubs were established across England in the 1870s. Tennis courts formed a part of the large and wealthy estates
Like many aspects of early Australian life, the sport of tennis was imported from England around the 1880s. In England, tennis courts consisted of a lawn surface. However, in Australia the environment did not always favour a lawn court and other materials such as clay and bitumen were popular as a surface. Another material that proved suitable for a tennis court surface in the more remote regions of New South Wales and Queensland was crushed termite nests.

In its initial years, Australian tennis matches, practice sessions and social games occurred at the private grounds of the wealthy in both the city and country areas, on club lawns or on the larger outback stations.

Women had few opportunities to compete in sport in Australia until the 1880s. One of the reasons women were encouraged to play gentle sports such as croquet, tennis and golf during the late 1800s was because it was seen as beneficial to their health. These sports were also seen as passive, non-aggressive and non-threatening to the period's concepts of masculinity and femininity.

In regional and isolated districts tennis clubs helped to create community connections that might not exist otherwise. By 1910 mixed gendered and single women's tennis tournaments were being played regularly between districts and on the larger bush stations.

Lawn tennis matches between Gadara and Gocup were advertised in the Adelong and Tumut Express as early as November 1900. In 1908 the Adelong and Tumut Express reported on a ladies tennis match between Tumut and Gocup, where Tumut were the victors. Newspaper reports between 1900 and 1912 indicate that there were tennis clubs at Gadara, Adelong, Upper Gilmore, Lower Gilmore and Gocup with regular competition between the clubs. Historical photographs show that tennis was also popular in Gundagai at this time (see **Figures 4.37** and **Figure 4.38**)

On Friday 19 March 1926 *The Albury Banner and Wodonga Express* reported that the annual meeting of, the Gocup Tennis Club was held at Mrs. N. Murphy's residence, when it was decided to replace the court fencing with the posts to be supplied by Mr Brennan.

The limited historical research carried out as part of this preliminary study indicated that the site of the tennis court represented an important aspect of the social development and function of the Gocup community dating from the late 19th Century and that this continued well into the 20th Century.

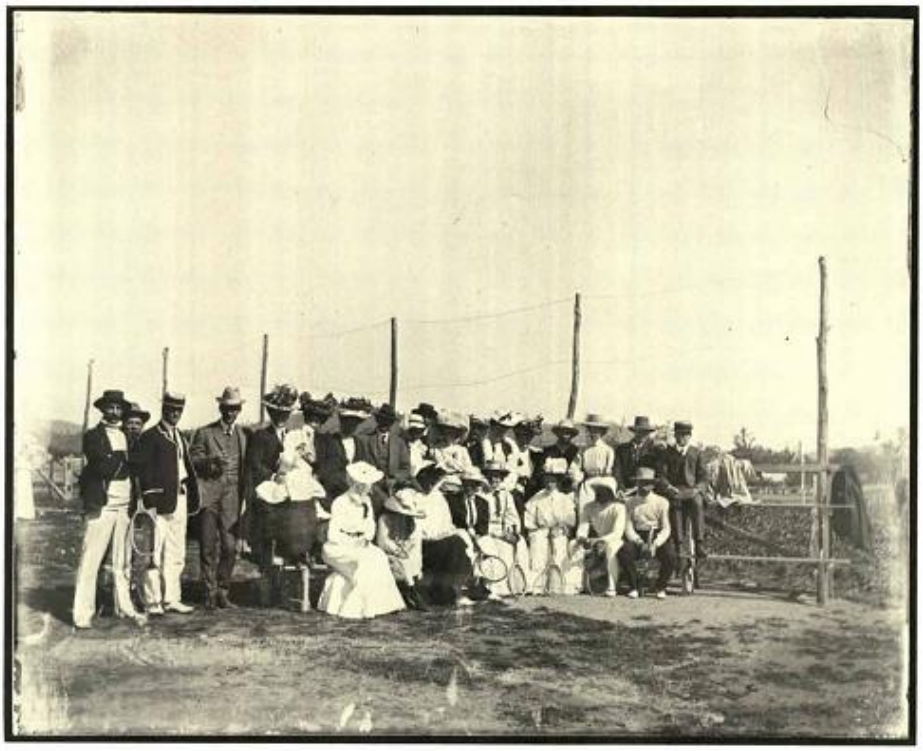


Figure 4.37: **A group of tennis players and spectators pose for a photograph in Gundagai. The exact location is not known but based on the style of dress, the photograph must date to around the turn of** *20th* **Century.** ***Source: Quartermaine, 1976*****.**

Figure 4.38: An alternative view of a tennis player and spectators taken at Gundagai at around the turn of the 20th Century. Note the use of sapling trees for the court fencing. ***Source: Quartermaine, 1976*****.**

Preliminary heritage assessment

While it might be easy to dismiss a site such as this in other geographical settings, and to underestimate the time of development and use this site would be considered locally significant for its ability to demonstrate the historical and social development of the Gocup and Minjary communities in the late 19th and early 20th Centuries, and the community relationships that were fostered from a competitive sport. The site retains a level of reasonable integrity although considered modified by abandonment and decline.

Preliminary SOHI

Any proposed disturbance at this site would be considered a negative impact upon the historical and social heritage values of the Gocup and Minjary communities.

Preliminary management recommendations

In the event of unavoidable disturbance or destruction of this site for road upgrade works, landholder consultation should be carried out for additional historical information, and appropriate heritage mitigation measures and management should be formulated as part of a more detailed SOHI.

4.1.13 Item 15 - Former telephone exchange

Grid reference

(Zone 55, Datum WGS84)

Easting	Northing
608127	6101561

Site description

This site was identified during consultation with Mr Rob Brennan of *Eurobin* and is located on the western side of Gocup Road at Meadow Creek (see **Figure 4.39**). This section of Gocup Road has been recently upgraded as shown in **Figure 4.40**. The site is now occupied by a modern residence with a carport and sheds in the anticipated location of the former telephone exchange (see **Figure 4.41**).

Figure 4.39: Location of former telephone exchange in relation to the former Gocup Post Office and showing Gocup Road during the RMS Meadow Creek road upgrade works. ***Source: Google Earth, 2103.***

Figure 4.40: View of recent upgrade works adjacent to the former telephone exchange, which is just out of view to the left.

Figure 4.41: View of the anticipated located of the former telephone exchange, approximated by the garden shed to the left of the carport.

Historical Overview

The first telephones were introduced into Australia in the 1880s and by the 1920s, most rural areas had access to the telephone.

The erection of the telephone wires from Tumut to Gocup was under way in August 1907 with the service expected to commence within weeks ***(***Adelong and Tumut Express, 30 August, 1907). The Deputy Postmaster General proposed a telephone exchange for Tumut in 1908 with a deputation to interview residents in order to get sufficient numbers of subscribers to form the exchange (Adelong and Tumut Express, 31 January 1908). In 1910, the Brungle Progress Association was still agitating for the extension of the telephone from Gundagai to Tumut via Brungle and it appears that this was achieved by 1914 (Albury Banner and Wodonga Express, 20 November 1914).

The first exchanges were manually operated switchboards. These were generally small wall-mounted units operated by a local who also operated the general store and post office. Smaller automatic exchanges housed in purpose built sheds (refer **Figure 4.41a**) came into use in the 1920s in rural areas.

Figure 4.41a: An example of a rural automatic telephone exchange circa 1920, housed in a corrugated iron shed.

Preliminary heritage assessment

The site of the former telephone exchange would be considered marginally significant for its historical association with the expansion of telecommunications in the early 20th Century in the Gocup and wider Tumut locality. However, the potential for this site to contribute meaningful information to that already known on this subject is limited at best.

Preliminary SOHI

Given the location of this site within private property, there is no anticipated potential for heritage impact from any proposed road upgrade works at this site.

Preliminary management recommendations

None required.

4.1.14 Item 16 - Former post office

Grid reference

(Zone 55, Datum WGS84)

Easting	Northing
608303	6101727

Site description

In the absence of any specific direction from historical resources, this site was identified with the assistance of Mr Rob Brennan of Eurobin. The former post office was set well back from Gocup Road and almost obscured by vegetation (**see Figure 4.42 and Figure 4.43**)

Figure 4.42: Location of the former Gocup Post Office in relation to the former telephone exchange. ***Source: Google Earth, 2103.***

Figure 4.43: View of the former Post Office, now a private residence, looking north-east and directly into the sun. The chimney of the building can be seen and centre left and the site is littered with car bodies.

Historical overview

There is some speculation that the Quidong Road was the original alignment of the Gocup Road (R Brennan, pers. comm.) which would explain the location of the Post Office at such a set back from the current alignment of the Gocup Road. The Gocup Post Office was opened on 21 October 1885 (Australian Town and Country Journal, 1885) and was closed in 1959.

Preliminary heritage assessment

The site of the Gocup Post Office is of historical and social significance for its association with advancement of communication throughout the region.

Preliminary SOHI

Given the location of this site within private property, there is no anticipated potential for heritage impact from any proposed road upgrade works at this site.

Preliminary management recommendations

None required unless disturbance unavoidable

4.1.15 Item 17 - Former Gocup public School

Grid reference

(Zone 55, Datum WGS84)

Easting	Northing
608313	6101246

Site description

The Gocup Schoolhouse is located on the western alignment of Gocup Road and now forms part of a private property (see **Figure 4.44**). The site is located within the 50 metre survey zone although at a distance of 46 metres from the existing road alignment. The school building is in typical government style of single roomed school house of the early 20th Century with a lean to addition at the rear. It appears that modifications have been made to convert the school to a dwelling.

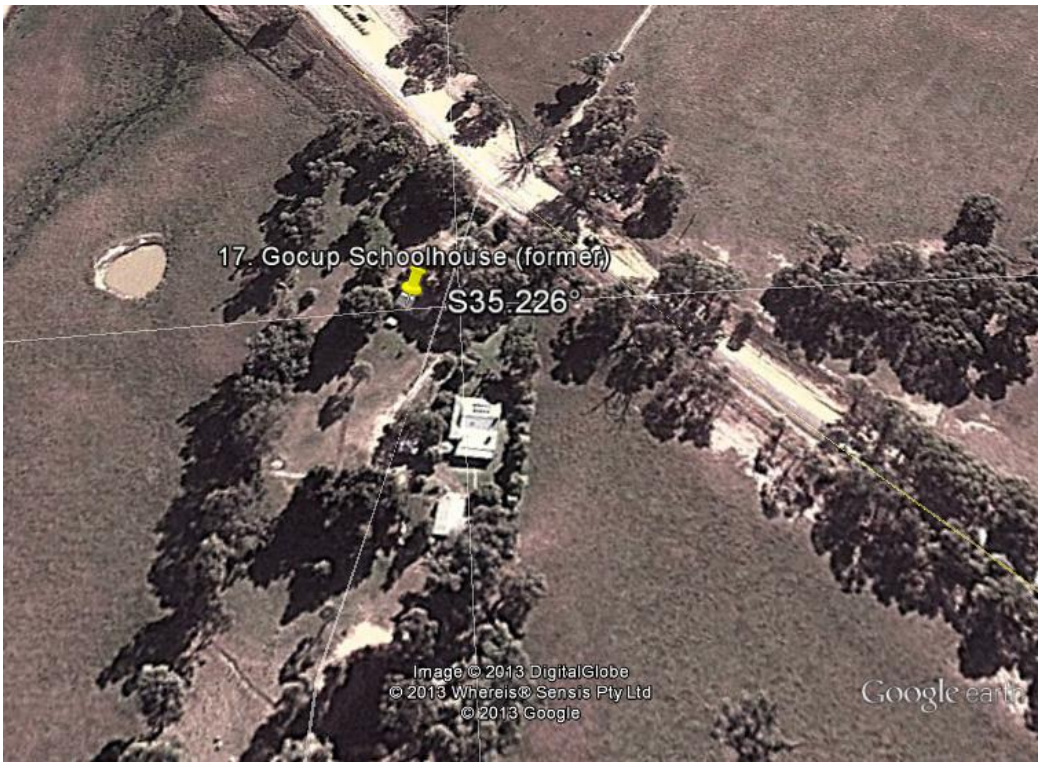


Figure 4.44: Location of Gocup Public School (former) showing the adjoining modern residence.*Source: Google Earth, 2103.*

Figure 4.45: Context view of the school house building, looking south-west from Gocup Road.

Figure 4.46: Detailed view of school house building, looking north-west, now being utilised as part of a private residence.

Historical overview

Gocup Public School was first established in 1873 and closed in 1939. Student numbers must have declined between 1939 and 1944 (during the Second World War) because the school opened again as a Provisional School in August 1944. A Provisional School was classified by the government a small school with between 15 and 25 children. Parents generally provided the building and furniture, while the Council of Education or later the Department of Education paid the teacher and supplied books and equipment. In 1949 the provisional school was reclassified as a public school and finally closed in 1970 (http://www.governmentschools.det.nsw.edu.au). The Parish Map of 1925 shows the school was allocated a small parcel of reserved land (see **Figure 4.47**).

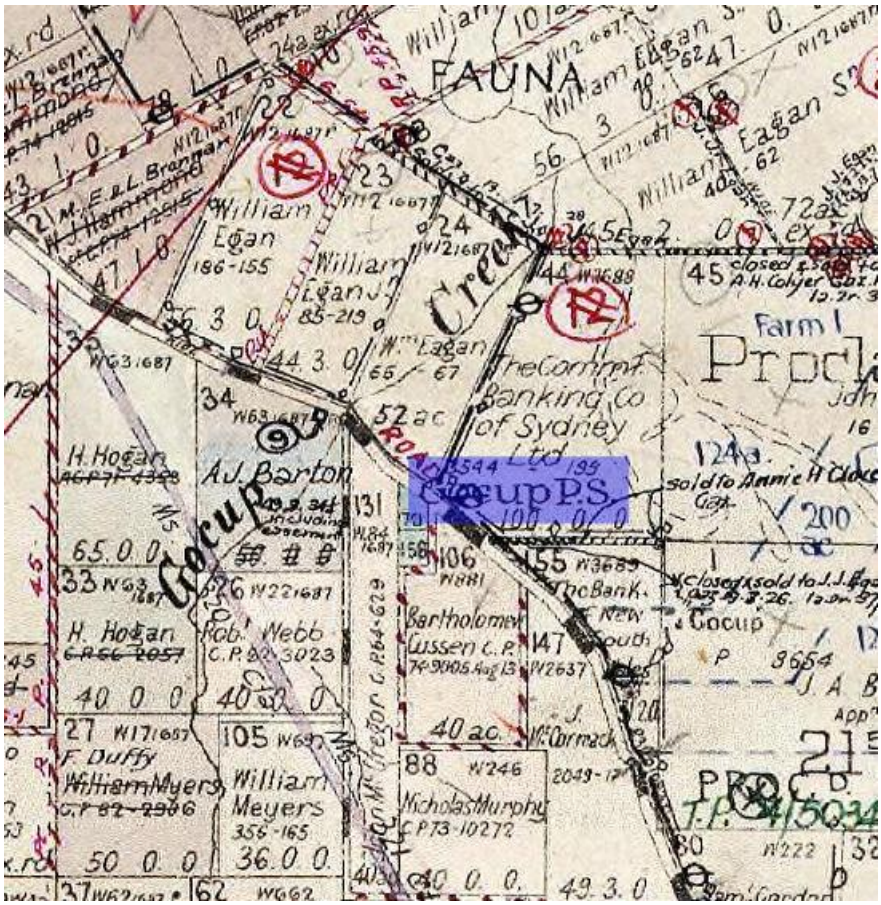


Figure 4.47: Parish Map of Minjary 1925 marking Gocup Public School.

Preliminary heritage assessment

The Gocup School site is considered locally significant for its contribution to the historical and social development of Gocup, and its surrounds, in the provision of public schooling since 1873 until 1970. It continues to be a well known local landmark.

Preliminary SOHI

Any disturbance of the site of the former Gocup School would be considered a negative impact to the heritage values of the site.

Preliminary management recommendations

Apply due diligence management in any future road upgrade planning such there is no intrusion into the curtilage of the former Gocup school site. In the event that disturbance is unavoidable, additional investigation and a site specific SOHI should be carried out in order to formulate appropriate heritage mitigation strategies.

4.1.16 Item 18 - Section of old road and former quarry

Grid reference

(Zone 55, Datum WGS84)

Easting	Northing
608877	6100090

Site description

This site was located along the western alignment of Gocup Road (see **Figure 4.48**) and consisted of a landform indicating the use of the area as a quarry (refer **Figure 4.49**). A section of abandoned road alignment was observed to the north of the quarry within a line of trees (**see Figure 4.50**).

Figure 4.48: Location of section of old road surface and quarry #18 in relation to the abandoned road alignment (shown in blue), the current Gocup Road alignment, and two associated sites #19 and #20. Source: *Google Earth, 2103*.

Figure 4.49: Context view of quarry centre left, looking west from Gocup Road across a compacted area indicative of heavy vehicle traffic, possibly a depot for raw materials.

Figure 4.50: To the north of the quarry, the old road formation can be seen adjacent to the current alignment of the Gocup Road.

Historical overview

Quarries were often commenced as a way to source road building material locally. Given the location of the quarry with easy access to Gocup Road and room for heavy vehicles to move around in road verge, it is likely that the quarry was commenced during the upgrade

works of the 1920s. It is possible that the abandoned line of road is a remnant section of the original 1860s alignment.

Preliminary heritage assessment

The site attains little, if any, heritage significance as there is little potential for the physical site to contribute any meaningful information to the historical record.

Preliminary SOHI

There is no anticipated heritage impact in any disturbance at this site.

Preliminary management recommendations

None required.

4.1.17 Item 19 -Remnant stone culvert and section of old road

Grid reference

(Zone 55, Datum WGS84)

Easting	Northing
609007	6099939

Site description

This site was located in an open gravelled pad alongside the current alignment of Gocup Road (see **Figure 4.51** and **Figure 4.52**). It appeared the area has been used as depot for relatively recent roadworks. The remnants of a stone rubble culvert with earthenware drainage pipe was found in the centre of the pad surrounded by sand bags and pegs for protection (see **Figure 4.53**), obviously recognised for its heritage provenance by road workers. The remnant culvert structure indicated the position of the western road alignment. A search for the eastern road alignment, and the culvert outlet, was unsuccessful as the eastern alignment of the road was obscured beneath imported fill.

The abandoned section of road was easily traced although now covered and partially obscured by regrowth.

Figure 4.51: Location of Item #19 in relation to surrounding sites and showing the abandoned line of Gocup Road in blue in comparison to the current road alignment. *Source: Google Earth, 2103.*

Figure 4.52: Context view of abandoned road alignment, looking south. The old road alignment at this location involved navigating some dangerous bends on a short steep decline.

Figure 4.53: Context view of protected culvert formation with the old road formation just discernible to the left.

Figure 4.54: Detailed view of the remains of a stone rubble culvert and earthenware drainage pipe.

Historical overview

This item is likely a remnant of 1920s road works to improve drainage on what would have been a dangerous stretch of road, and to improve road conditions for the introduction of the motor vehicle.

Preliminary heritage assessment

The culvert is considered to have little heritage value due to its reduced condition and integrity due inadvertent disturbance and partial demolition. There are better examples of its type and prevenance within the study route.

Preliminary SOHI

There is little potential for heritage values to suffer negative impact from the destruction of this item.

Preliminary management recommendations

This item is defined as a work and therefore there is no requirement for statutory permit application for any disturbance or destruction at this site.

4.1.18 Item 20 - Timber bridge/culvert

Grid reference

(Zone 55, Datum WGS84)

Easting	Northing
608917	6099708

Site description

This item was located on section of abandoned roadway as shown in **Figure 4.55** and falls within the 50 metre survey zone. The abandoned road alignment was traced to the extent possible and this revealed the structural remnants of a timber crossing/culvert over Gocup Creek. It is likely this crossing dates to the era of the motor vehicle and forms part of the road improvements made at this time.

A context view of the current line of Gocup Road showing the former approach to the old crossing from the south is provided in **Figure 4.56. Figure 4.57** shows where the new road alignment crossed the old road alignment for the northern approach to the crossing and **Figure 4.58** provides a view of the old road now obscured by dumped material.

Figure 4.55: Location of the timber crossing/culvert #20 on the abandoned road alignment (shown in blue) and in relation to the present alignment of the Gocup Road.
Source: Google Earth, 2103.

Figure 4.56: Context view of the current Gocup Road alignment, looking north, with the timber crossing located in the drainage line at left of view. A section of the old road surface is visible in foreground.

Figure 4.57: View of the approach to the timber crossing. The former road alignment crossed the present Gocup Road at this point and continued along the tree line to the gully below. .

Figure 4.58: Northern approach to the timber crossing with the old road surface obscured under demolition rubble of old road. The old road surface would have provided a solid base for heavy vehicles to dump their loads.

Approximately 10 metres (30 feet) wide (see **Figure 4.59**), this crossing appeared typical of regional creek crossings constructed of locally available materials during the early 20th Century. The crossing consisted of a simple log girder bridge with stone and earth decking (see **Figure 4.60** and **Figure 4.61**).

Figure 4.59: Context view of site of timber crossing in drainage line, looking north. The blue arrows indicate the total width of the crossing timbers.

Figure 4.60: Detailed view of timbers the form the base of the crossing and the roof of the culvert.

Figure 4.61: Detailed view of timbers with stone rubble and earthen surface.

Historical overview

The *Adelong and Tumut Express* published an article in November 1901 that expressed surprise at the poor state of Gocup Road between Gocup Creek and the Gocup Post Office. It claimed that for 20 years there had been available, a grant of fifty pounds per mile each year for road repairs. The article continued to claim that a good stretch of the road had never been formed. It was further described as a principal route with a great deal of traffic, and suggested that Gocup Road required more attention.

Preliminary heritage assessment

This abandoned section of road and creek crossing were considered locally significant for its historical, aesthetic and scientific values and for the potential of the items to demonstrate former road and bridge construction techniques. The crossing retains a good level of condition and integrity and provides a good representative example of its type.

Preliminary SOHI

Any disturbance or destruction of these items would constitute a negative heritage impact and appropriate heritage mitigation and archaeological management would be justified.

Preliminary management recommendations

It is recommended that the site of the timber crossing be avoided in any road upgrade works such that the site may remain undisturbed and preserved into the future. The abandoned road alignment and the timber crossing are both defined as 'works' and therefore the relics provisions of the NSW Heritage Act do not apply to any disturbance of these items. However, the need for due diligence heritage management should be address in a SOHI in the event that

4.1.19 Item 21 - Smarts Road Pub (location)

Grid reference

(Zone 55, Datum WGS84)

Easting	Northing
609467	6098268

Site description

The site was located a short distance to the north of Smarts Road and was known locally as the site of the Smarts Road pub (see **Figure 4.62**). It falls within the 50 metre survey zone at a distance of approximately 22 metres from western alignment of Gocup Road..

Initially the site was identified during vehicular survey and confirmed upon consultation with Mr Rob Brennan of *Eurobin.* The site consisted of an open area, indicating a former building platform, located adjacent to a mature stand of Elm trees. The site was ideally located along a creek line for the supply of water for patrons and horses. There are no surface evidence or landform indicators of a former structure although it is likely that any structure would have been constructed of timber. Given the local knowledge of the site and the exposed location of the site to Gocup Road, it is highly likely that amateur bottle collectors have already disturbed the site in the search for collectibles.

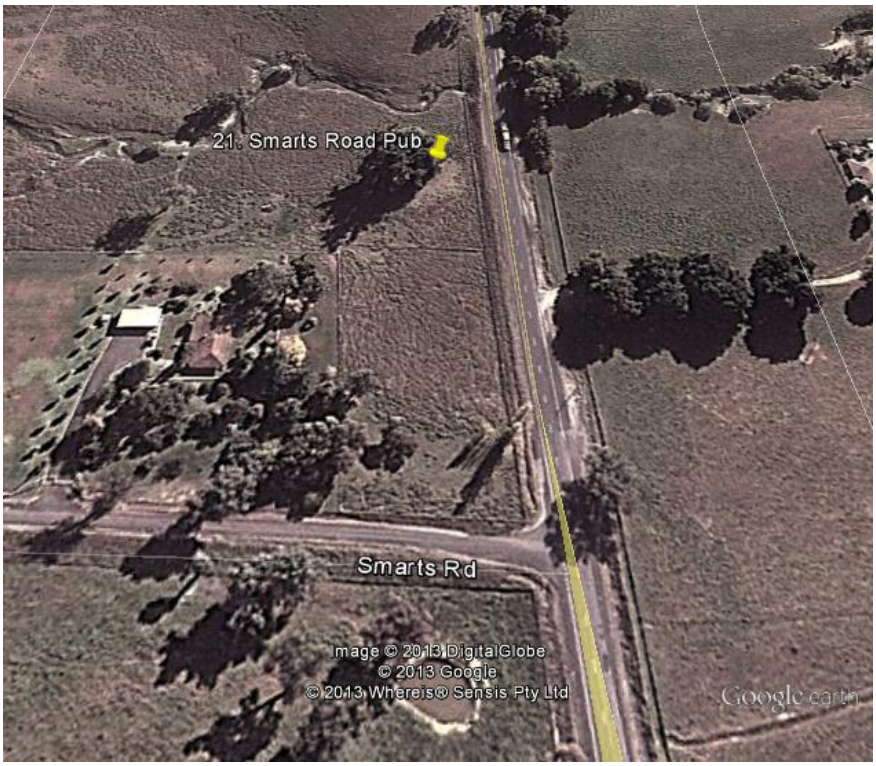


Figure 4.62: Location of the former Smarts Road Pub showing Smarts Road and Gocup Road. ***Source: Google Earth, 2103.***

Figure 4.63: Context view of the site of the former Smarts Road Pub looking west across Gocup Road.

Figure 4.64: Context view of the former Smarts Road Pub Site, looking north-west, showing the stand of mature Elm trees that form a landscape marker, and the rolling hills of the surrounding landform in the background

Historical overview

Upon reporting his death in 1901, Mr William Beck was described as a very long resident of Tumut and the long time proprietor of a hotel at Gocup. Hotels and Inns were usually the first commercial enterprises established along regional roads and were primarily used as stopping places for travellers. It is likely that the Gocup Hotel (or the Smarts Road Pub as it is has become known) is associated with the earliest development of the Tumut/Gundagai Road in the mid 1800s. The time of abandonment is currently unknown although it is possible that any remaining structure perished in the fire of 1905.

Preliminary heritage assessment

This site constituted a wholly archaeological site. Based on an understanding of the historical context, and the potential of the site to constitute one of the earliest hotels to be established on Gocup Road, there is potential for this site to attain historical and scientific significance at the local level. Archaeological investigation may provide meaningful information on the use and occupation of this site that is not available elsewhere and which may contribute valuable historical information on early structures and commercial enterprise along Gocup Road.

Preliminary SOHI

Any proposed disturbance at the site of the former Gocup Hotel (Smarts Road Pub) would be assessed as a negative impact on the anticipated historical, social and scientific heritage values of the site such that appropriate archaeological management is justifiable.

Preliminary management recommendations

Site avoidance in any road upgrade planning is recommended. Any proposed disturbance has the potential to trigger the relic's provisions of the NSW Heritage Act 1977 and may require application for a statutory excavation permit under s140 of the Act.

In the event that disturbance is unavoidable, it is recommended that additional research is carried out to substantiate the potential for archaeological remains to occur at this site and for a site specific SOHI to be carried out in order to formulate appropriate archaeological management strategies. .

4.1.20 Item 22 - Tumut Butter Factory and residence

Grid reference

(Zone 55, Datum WGS84)

Easting	Northing
610491	6093576

Site description

This site comprised the residence associated with the former Tumut Butter Factory and located approximately 40 metres to the west of the intersection of Gocup Road and HW4, the Snowy Mountains Highway (see **Figure 4.65**). This intersection marks the southern extreme of the study route (see **Figure 4.66**). The original alignment of Gocup Road has been abandoned for a new route that runs to the west of the treatment works plant (see **Figure 4.65**).

Figure 4.65: Location of the Tumut Butter Factory on the corner of HW4 and Gocup Road. The original line of Gocup Road is shown in blue with the present Gocup Road shown the west. This realignment occurred in the 1980s.
***Source: Google Earth, 2103*.**

Figure 4.66: The intersection of HW4 and MR279, and the site of the former Tumut Butter Factory.

Historical overview

The Tumut area proved suitable for dairy cattle and a Samuel Gordon of Gocup had established an Ayrshire herd of dairy cattle in the 1880s. Gordon made cheese and butter for the local markets in Tumut, Adelong and Gundagai (Centenary Celebrations, 1986). In the late 1880s, the Mill Dairy (the converted flour mill) was also producing butter for sale in Tumut. In 1900, a Mr W O'Brien erected the first dedicated butter factory on Gilmore Creek at Tumut. The first factory was built in corrugated iron and cost 500 pounds. The equipment, including a refrigerating plant, cost 2000 pounds (Centenary Celebrations, 1986). A community co-operative took over the butter factory operations in 1901 but struggled to keep operations afloat due to a shortage in milk supply during the first year. The "Gadara" brand was eventually registered as the brand name.

The co-operative continued to struggle and in 1903 there were plans to liquidate the business. However, puzzling as it seems, it was decided to construct another butter factory adjoining the railway. The new factory was completed and in operation by November 1904. A Mr Hammond was appointed Manager.

The new factory enjoyed great success and by 1921, the capacity of factory had been exceeded. It was decided a new factory was urgently needed. Land adjoining the existing factory was purchased from the railway for the new factory. The new factory, the present day building, (refer to **Figure 4.67**) was in operation by 1923. It is likely that the Manager's

residence was constructed at the same time as the new factory. The architectural style of the residence is reminiscent of 1920s design (see **Figure 4.68**).

Figure 4.67: The former Tumut Butter Factory, now adaptively re-purposed as a gym.

Figure 4.68: The residence constructed for the manager of the Tumut Butter Factory, looking south. Gocup Road is out of view to the left.

Preliminary heritage assessment

The former Tumut Butter Factory residence is considered of local historical and aesthetic significance for it association with the development of the butter making industry in the Tumut region. Representative in its form, it provides a good example of its type and is set in a relatively original context surrounded by mature garden plantings.

Preliminary SOHI

Any site disturbance or intrusion into the curtilage of the former butter factory residence would be considered a negative heritage impact.

Preliminary management recommendations

In the event that intrusion into the site is unavoidable, a more detailed study and SOHI should be carried out in order to formulate appropriate heritage mitigation strategies.

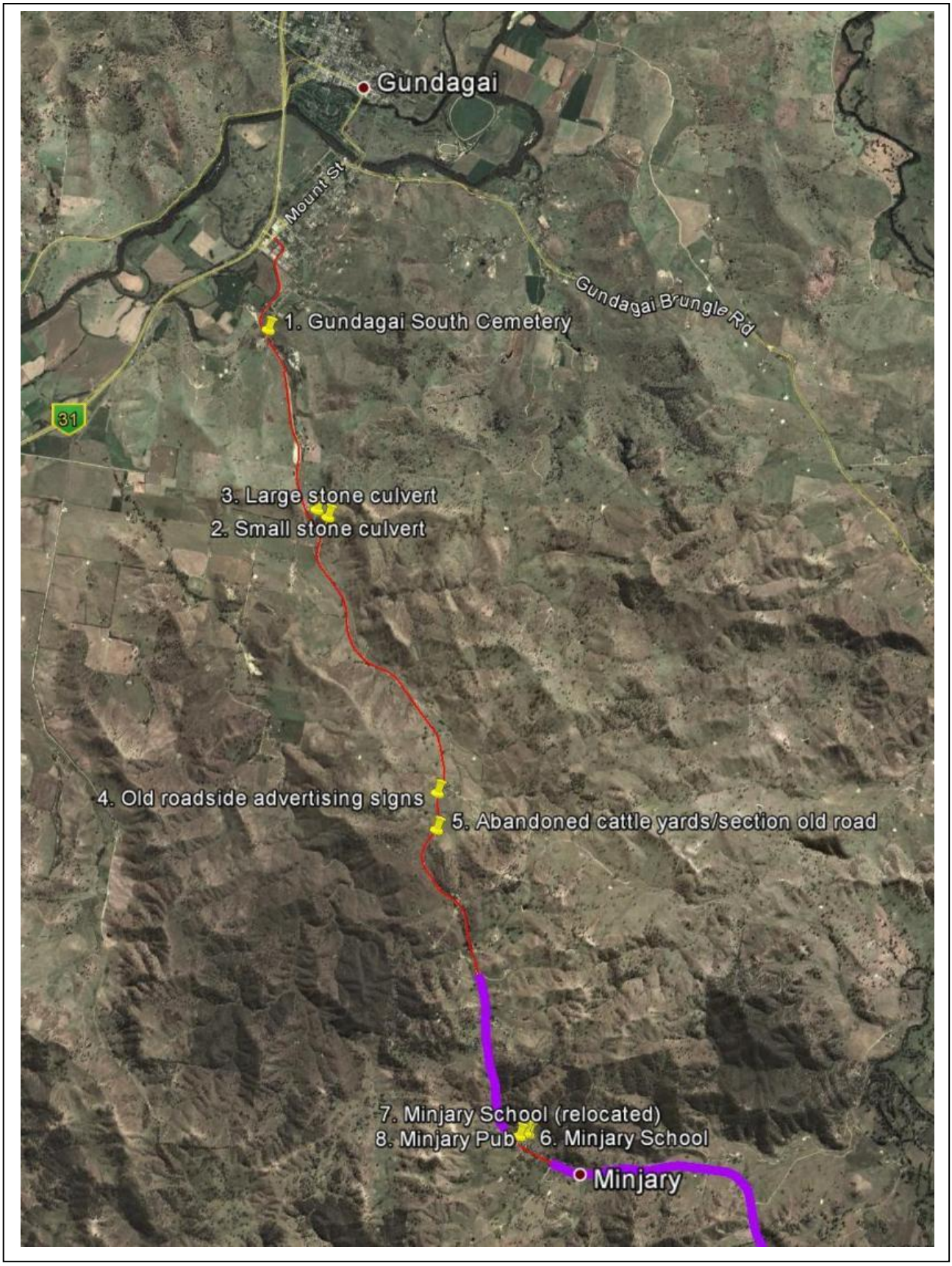


Figure 4.69: Sites located between Gundagai to Minjary (Items 1 to 8). Sections assessed to 50 metres each side of the current alignment are shown in purple.

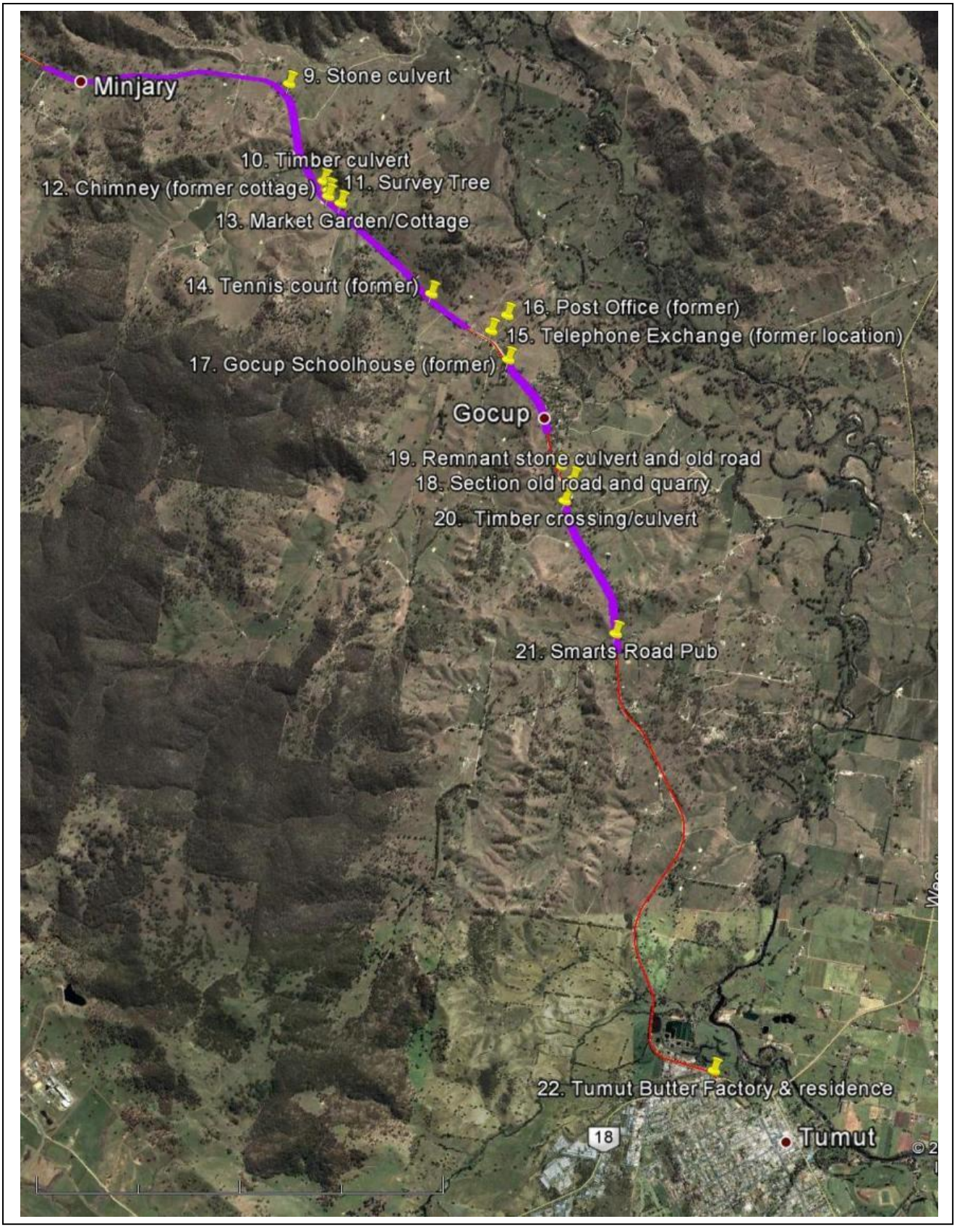


Figure 4.70: Sites located between Minjary and Tumut (Items 9 to 22). Sections assessed to 50 metres each side of the current alignment are shown in purple.

5.0 INVENTORY SEARCHES

Heritage registers and inventories are lists of identified items of heritage significance. These registers are searched for any listed heritage items that occur within or in close proximity to the study route.

Registers and inventories relevant to this study are:

- The Tumut Local Environmental Plans – LEP 2012;
- The Gundagai Local Environmental Plan – LEP 2011;
- The RTA s170 Register;
- State Heritage Register and State Heritage Inventory;
- The Australian Heritage Database;
- The National Trust; and
- Local isolated graves listings.

In overview, there were no listed heritage sites or items identified along Gocup Road. A summary of inventory and register search results is provided in **Table 5.1**. **Section 5.1.1** to **Section 5.1.6** below provides detailed search results.

Table 5.1- Summary of Inventory Search Results

Register/Inventory	Listed Sites
Tumut LEP 2012	No
Gundagai LEP 2011	No
State Heritage Register	No
State Heritage Inventory	No
RTS s170 Register	No
Australian Heritage Database	No
National Trust	No
Isolated graves	No

5.1.1 State Heritage Register and State Heritage Inventory

The State Heritage Register (SHR) is managed by the NSW Heritage Council and comprises a list of heritage items of particular importance to the people of NSW. Items appearing on the SHR are considered significant to the State and are afforded statutory protection.

The State Heritage Inventory (SHI) is a listing of heritage items within NSW and is also managed by the NSW Heritage Council. It comprises a database of heritage items listed by Local Government and State Agencies across NSW as the result of heritage studies. Items listed on the SHI are considered locally significant and subject to protection through local government processes.

A search of the SHR and SHI showed that there were no heritage listed sites that occurred along Gocup Road. In addition, searched results showed that there were no heritage listed sites listed under the localities of Gocup or Minjary. A wider search of the SHR and SHI returned a number of listed heritage sites in the Tumut LGA and Gundagai LGA, most of which were located with the township limits and well beyond the study route.

5.1.2 Local Environmental Plans (Tumut 2012, Gundagai 2011)

Local environmental plans (LEPs) provide a framework for development controls in their local area. Heritage schedules within an LEP provide for the identification and protection of heritage items. Gocup Road transitions across Tumut LGA and Gundagai LGA. Search results of the Tumut LEP 2012 and the Gundagai LEP 2011 are provided below:

5.1.2.1 Tumut LEP 2012

The Tumut 2012 LEP outlines a portion of its aims in regards to heritage as:

> This Plan aims to make local environmental planning provisions for land in Tumut in accordance with the relevant standard environmental planning instrument under section 33A of the Act… to protect, conserve and enhance Tumut's rich indigenous and non-indigenous cultural heritage (Tumut LEP, 2012).

A search of the Tumut 2012 LEP indicates that there are no heritage items located along Gocup Road. There were a number of heritage items listed in the Tumut LEP. However, these sites were all within the township of Tumut.

5.1.2.2 Gundagai LEP 2011

The Gundagai 2011 LEP outlines a portion of its aims in regards to heritage as:

> This Plan aims to make local environmental planning provisions for land in Gundagai in accordance with the relevant standard environmental planning instrument under section 33A of the Act. The particular aims of this Plan are 'to protect, conserve and enhance Gundagai's rich indigenous and non-indigenous cultural heritage (Gundagai LEP, 2012).

A search of the Gundagai 2011 LEP indicated that there were no listed heritage items located along Gocup Road.

5.1.3 RTA S170 register

Government agencies have a responsibility under Section 170 of the NSW Heritage Act 1977 to identify, conserve and manage heritage assets owned, occupied or managed by that agency. It requires agencies to keep a Register of heritage items, commonly, a s170 Register.

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A s170 register consists of a list of heritage assets and an assessment of the significance of each asset. The register identifies buildings and structures, but may also include natural, movable, archaeological, landscape and Aboriginal heritage

A s170 register forms part of the State Heritage Inventory. State significant items identified in a s170 register are considered for individual listing on the State Heritage Register.

A search of the RTA s170 register for the local government areas of Gundagai and Tumut showed one listed item of heritage significance in the Gundagai LGA and no listed items in the Tumut LGA:

- Prince Alfred Bridge over Murrumbidgee River (RTA Bridge No 6637) – located beyond the northern bounds of the study route

5.1.4 The Australian Heritage Database

The Australian Heritage Council is an independent agency within the Department of Sustainability, Environment, Water, Population and Communities. The Council is the principal adviser to the Australian Government on heritage matters. The Council assesses nominations for the National Heritage List, and the Commonwealth Heritage List. The Council is responsible for the Australian Heritage Places Inventory (AHPI) and the Australian Heritage Database (AHD) both of which are non-statutory archives.

A comprehensive search of the Australian Heritage Database showed there were no listed heritage sites located along Gocup Road.

5.1.5 National Trust Register

The National Trust maintains a Register of landscapes, townscapes, buildings, industrial sites, cemeteries and other items or places that the Trust determines have cultural significance and are worthy of conservation. Currently, there are some 12,000 items listed on the Trust's Register (National Trust, 2013).

A search of the National Trust Register indicated that there were no heritage listings under Gocup Road.

5.1.6 Isolated graves

Lists of isolated graves and small cemeteries are often compiled by local history groups and can be a useful reference in the heritage assessment process. The Tumut Family History Group compiled a list of isolated graves and small cemeteries of the Tumut District in 1999. A search of the list found a small private cemetery situated on the property *Wollongawah* located in Gocup Farms Road in the locality of Gocup. The cemetery contains three marked graves and eight unmarked graves. Burials date from 1843 to 1935.

The cemetery is located well outside the study route but given the remote location of the settlements at Gocup and Minjary, the presence of the private cemetery highlights the need for care in any excavation within private properties.

6.0 HERITAGE MANAGEMENT

6.1 OVERVIEW OF STUDY RESULTS

Typical of the establishment and development of regional roads across New South Wales, Gocup Road was in its earliest form a rough track used by travellers and settlers. It crossed hilly terrain between Gundagai and Tumut and was first known as the Gundagai or Tumut Road. Early historical reports dispute the use of the term 'road', claiming it was little more than a bush track and even as late as 1901, local newspaper reports still mention the very poor state of the road given its use as a primary route of travel.

Again typical of regional development, small settlements formed along the road in the mid 1800s. The road became known as the Gocup Road in the late 1800s in response to establishment of the settlement of Gocup. The Minjary settlement was established perhaps a little earlier than Gocup and a formal village was set out although little development took place.

It was a pastoral area supporting both sheep and cattle, and for a time dairy cattle. Historical development along the road included hotels, schools and a post office to support the surrounding properties. Historical reports claim that the road was often impassable during wet weather. Even today the road is subject to flooding. Private contractors tendered to maintain the road in the late 1800s and eventually with the increasing status of the road, this responsibility moved to local authorities, and has now devolved to the State. Road improvements, particularly with the introduction of the motor vehicle, occurred in the 1920s when many of the more reliable creek crossings would have been installed.

The line of the Gocup Road has been altered over the years to improve creek crossings, avoid dangerous corners and to evade steep inclines and declines. It seems that the main road improvement works have occurred in the 1920s, the 1960s and the 1980s.

Statutory heritage registers and inventories show that there are no recognised heritage sites listed along the line of the Gocup Road and in observation, this is likely the result of a lack of a dedicated heritage study and a poor understanding of the local history, rather than an absence of historical items.

This study has revealed twenty-two items of potential heritage significance. These items have been recognised for their ability to contribute meaningful information to the knowledge of the historical development of the Gocup and Minjary areas. Items include works such as culverts, bridges and abandoned road formations along the line of road itself, and include historical development such as schools, hotels and cottages. Some items are wholly archaeological where no surface evidence remains.

In the absence of specific road works plans, each identified item has been assessed in a preliminary fashion and a general assessment of impact provided with guiding recommendations for use in a detailed planning process. Management recommendations include the need to avoid the disturbance of some sites in order to avoid the need for additional detailed study, and the potential for triggering the relic's provisions of the *NSW Heritage Act 1977.* Where alternatives have been considered during the planning process and disturbance is unavoidable, recommendations for additional study and the formulation of detailed heritage/archaeological management strategies have been made.

In summary, Gocup Road has been a vital connection that has bound the communities of Gundagai and Tumut, and the settlements of Gocup and Minjary. This connection is as important today as it was in the 1800s.

Heritage management recommendations have been made based on this understanding of the study route and the concept of upgrade routes proposed by RMS.

6.1 HERITAGE MANAGEMENT OVERVIEW

There are three important principles to consider in regard to the management of heritage within a planning process:

1. The legislative obligations under NSW law to take appropriate action to manage heritage items.

2. Heritage significance is based on established assessment criteria. If the value of a heritage item is not clear, a precautionary approach should be adopted until a definitive assessment can be made.

3. Management of an item should be based on the significance of the item and practical realities for its conservation. Management does not preclude adaptive reuse or the installation of modern facilities. It does not preclude demolition where there is no feasible alternative.

6.2 STATUTORY CONSIDERATIONS

The NSW Heritage Act 1977 (Section 4) defines "environmental heritage" to mean those places, buildings, works, relics, moveable objects, and precincts, of historical, scientific, cultural, social, archaeological, architectural, natural or aesthetic value that are assessed as significant to the State of New South Wales, significant within the local area.

Ideally, significant heritage resources should remain undisturbed to be conserved *in situ* within the framework of the Burra Charter. Such a course is frequently impossible or impractical and questions are posed by the conflicting interests of heritage on the one hand,

and progress and development on the other. Relevant to the parallel issues of site conservation and the need for development, redevelopment and remediation, is NSW heritage legislation and its application within the SEPP (Infrastructure) 2007.

There has been a slight shift in heritage legislation away from the age of the site, and automatic inclusion as a heritage item in this regard, to the assessed significance of a site and the need for justified management to result in the contribution of meaningful information, rather than the duplication of information already known.

6.2.1 Application of statutory considerations and guidelines

The application of statutory considerations to the study site, with reference to the definitions contained in Section 4 of the Heritage Act and with reference to SEPP (Infrastructure) 2007 and the RTA Heritage Guidelines 2004 are discussed below.

1. In reference to the definition of environmental heritage contained in the Heritage Act, a **work** is not further defined by the Act, but dictionary definitions are adopted such that a work is taken to mean *'an engineering structure, such as a building, bridge, dock, etc'*. This definition would extend to cover abandoned road formation and "works" such as bridges and culverts that are associated with road construction.

2. Where a 'work' will be impacted by project works there is no requirement for statutory permit application under the NSW Heritage Act 1977, however the potential for the relics provisions of the Heritage Act to be triggered should be carefully considered.

3. The RTA Guidelines consider the recognition and understanding of the significance of these heritage items is the first step towards their proper care and management.

4. The items identified in this study should be considered as heritage assets and managed according to RTA Heritage Guidelines, particularly in the application of detailed assessment as set out in Section 4.3 of the RTA Heritage Guidelines.

5. Due diligence heritage management and the *NSW Heritage Act 1977* requires that if unexpected **relics** are exposed during any project works, that work is suspended and appropriate RMS heritage personnel consider the need to inform the Heritage Branch of the NSW Office of Environment and Heritage. In this case, additional archaeological assessment and further approvals may be required.

6.3 HERITAGE MANAGEMENT RECOMMENDATIONS

Recommendations for each individual site or item are made in **Section 4.0** and are designed to offset potential heritage issues and to inform the selection of suitable options for road upgrade works. Where justifiable, the need for additional study is specified. Recommendations at this concept stage have been based on the potential for disturbance of sites and items by road upgrade works. Further, recommendations are made with a focus upon the elimination and/or reduction of negative impact upon archaeological and/or heritage values. The objective of management recommendations is to provide a reasonable, balanced and precautionary approach that will appropriately address the potential for the exposure of archaeological resources (relics), and to trigger a due diligence heritage management response, as a consequence of any proposed road upgrade works.

A summary of individual site recommendations is provided in **Table 6.1**

Table 6.1 – Summary of recommendations for identified sites.

Site / Item	Within 50 m zone	Summary of Recommendations
1. Gundagai South Cemetery	No	Avoid any intrusion or disturbance.
2. Small stone culvert	No	Unavoidable disturbance would require management.
3. Large stone culvert	No	Avoid disturbance.
4. Old roadside advertising signs	No	Disturbance acceptable with management.
5. Abandoned cattle yards/section old road	No	Disturbance unlikely, but acceptable with management.
6. Minjary School	No	Disturbance acceptable with due diligence heritage management.
7. Minjary School (relocated)	No	Disturbance acceptable with due diligence heritage management.
8. Minjary Pub	No	Unavoidable disturbance would require archaeological management.
9. Stone culvert	Yes	Unavoidable disturbance would require management.
10. Timber culvert	Yes	Unavoidable disturbance would require management.
11. Survey Tree	Yes	Unavoidable disturbance would require management.
12. Chimney (former cottage)	On western edge of zone	Unavoidable disturbance would require management.
13. Market Garden/Cottage	Yes (western side)	Disturbance acceptable with due diligence heritage management.
14. Tennis court (former)	Yes (western side)	Unavoidable disturbance would require management.
15. Telephone Exchange (former location)	No	Disturbance unlikely, but acceptable with management.
16. Post Office (former)	No	Disturbance unlikely. No management required.
17. Gocup Schoolhouse (former)	On western edge of zone	Avoid any intrusion or disturbance.
18. Section old road and quarry	No	Disturbance acceptable with due diligence heritage management.
19. Remnant stone culvert and old road	Partial (east & west)	Disturbance acceptable with due diligence heritage management.
20. Timber crossing/culvert	On western edge of zone	Unavoidable disturbance would require archaeological management.
21. Smarts Road Pub	Yes	Unavoidable disturbance would require archaeological management.
22. Tumut Butter Factory & residence	No	Avoid any intrusion or disturbance.

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1883 Macdonald. Map of the colony of New South Wales cartographic material.

1898 Parish Map of Tumut.

1894 Parish Map of Minjary.

1903 General plan of country surrounding suggested Federal Capital site in the locality of Tumut NSW No 15 cartographic material shewing approximately city site proposed water supply railways.

1984 Parish Map of Tumut.

Appendix F

Responses to government agency consultation

NSW EPA

Our reference: EF14/24267 DOC16/504438

Mr Daniel Keep
Project Manager – Gocup Road Upgrade
Roads and Maritime Services
PO Box 484
WAGGA WAGGA NSW 2650

Dear Mr Keep

Re Proposed Road Upgrade – Gocup Road – Halfway Hill/Doctors Hill and Cookoomooroo

I refer to the letter dated 27 September 2016 to the Environment Protection Authority (EPA) seeking our comments regarding preparation of Reviews of Environmental Factors (REF) for the proposed upgrading of two sections of Gocup Road.

The EPA has reviewed the details of the project as outlined in your letter and consider the key environmental aspect to be considered in the two REFs is the mitigation of surface water impact arising from stormwater runoff and erosion. Based on the details provided with your letter the specific issues we consider to be critical to an assessment of the proposed road construction activities include the following.

- Water quality impacts particularly erosion and subsequent sedimentation of waterways and the landscape and measures designed to minimise off-site impacts.
- Air quality impacts such as dust and measures proposed to manage dust and mitigate air quality impacts on sensitive receptors.
- Impact of noise on all residential or noise sensitive premises. All feasible and reasonable work practices should be implemented to minimise noise impacts to noise sensitive receivers.

Detailed at Attachment A is the full suite of matters that need to be addressed in the REFs and at Attachment B is a list of EPA guidance documents.

If you have any further enquiries about this matter please contact me by telephoning 02 6022 0600.

Yours sincerely

BRIAN WILD 10 October 2016
Head, Albury Unit
Environment Protection Authority

PO Box 544 Albury NSW 2640
Second Floor, Government Offices
512 Dean Street Albury NSW 2640
Tel: (02) 6022 0600 Fax: (02) 6022 0610
ABN 30 841 387 271
www.environment.nsw.gov.au

ATTACHMENT A

Potential environmental impacts of the project

The following potential environmental impacts of the project need to be assessed, quantified and reported on.

(a) Water
(b) Air
(c) Noise
(d) Waste and chemicals

The Review of Environmental Factors (REF) should address how the required environmental goals will be met for each potential impact, and describe mitigation and management options that will be used to prevent, control, abate or mitigate identified potential environmental impacts associated with the project and to reduce risks to human health and prevent the degradation of the environment. This should include an assessment of the effectiveness and reliability of the measures and any residual impacts after these measures are implemented.

Potential impacts on water quantity and quality

The goals of the project should include the following.

- No pollution of waters (including surface and groundwater); and
- Polluted water, including polluted stormwater, is captured on the site and collected, treated and beneficially reused, where this is safe and practicable to do so.

The REF should document the measures that will achieve the above goals. Stormwater mitigation and control measures should be implemented in accordance *with Managing Urban Stormwater Soils and Construction: Volume 1* and *Volume 2D Main road construction.* The REF should also clearly detail the site drainage and any natural or artificial waters within or adjacent to the development.

Potential impacts on air quality

The goals of the project in relation to air quality should include mitigation of dust impacts such that potential impacts on sensitive receptors are minimised in accordance with Environment Protection Authority (EPA) particulate matter and deposited dust criteria.

Potential emissions include but are not necessarily limited to construction, traffic movements, open exposed areas, material processing and handling, use of haul road and importing material from offsite. Details should to be provided on the proposed measures to manage dust from these activities and their performance.

The REF should identify any other existing impacts on air quality within the area and if necessary provide an assessment and commentary on the predicted cumulative impacts that may arise.

Potential impacts of noise

The goals of the project should include design, construction, operation and maintenance of the proposed works in accordance with relevant policies, guidelines and criteria in order to minimise potential impacts from noise.

Noise impacts from the project need to be assessed and comply with the requirements of the *Interim Noise Construction Guideline*. All residential or noise sensitive premises likely to be impacted by the development must be identified and included in the assessment. All feasible and reasonable work practices should be implemented to minimise noise impacts to noise sensitive receivers.

Waste and chemicals

The goals of the project should include the following.

- It is in accordance with the principles of the waste hierarchy and cleaner production;
- Where potential impacts associated with the handling, processing and storage of all materials used at the site are identified, these be mitigated by the development;
- The beneficial reuse of all wastes generated at the premises are maximised where it is safe and practical to do so; and
- No waste disposal occurs on site.

A goal of the project should ensure that environmental risks from hazardous chemicals and chemical waste are minimised. The REF needs to identify the type, quantity and location of all wastes and chemicals that will be generated or stored on site. Wastes must be classified in accordance with the EPA guideline *Waste Classification Guidelines, Part 1: Classifying waste,* November 2014.

Spill management measures, including items such as bunding, and emergency procedures should be clearly outlined for all liquid wastes or other liquid chemicals that may be used and stored on site.

ATTACHMENT B

Guidance Material - Assessing Environmental Impacts

Noise and vibration

- NSW Industrial Noise Policy (DECC, 2000). Available online http://www.epa.nsw.gov.au/resources/noise/ind_noise.pdf
- Appendices - NSW Industrial Noise Policy. Available online http://www.epa.nsw.gov.au/resources/noise/ind_noise_app.pdf
- Interim Noise Construction Guideline (DECCW, 2009). Available online http://www.epa.nsw.gov.au/resources/noise/09265cng.pdf

Stormwater

- Managing Urban Stormwater: Soils and Construction - Volume 1 (Landcom, 2004)
- Managing Urban Stormwater: Soils and Construction - Volume 2D Main road construction

Waste

- Waste Classification Guidelines 2014. Available online http://www.epa.nsw.gov.au/resources/wasteregulation/140796-classify-waste.pdf

NSW GOVERNMENT | Office of Environment & Heritage

Your reference P.0009855.01.100.002.004
Our reference: DOC16/510358
Contact: Andrew Fisher
Ph. 6022 0623

Mr Daniel Keep
Project Manager – Gocup Road Upgrade
Roads and Maritime - Transport
PO Box 484
WAGGA WAGGA NSW 2000

Dear Mr Keep,

RE: Consultation regarding proposed Gocup Road upgrades – Halfway Hill/Doctors Hill and Cookoomooroo

I refer to your letter dated 27 September 2016 to the Office of Environment and Heritage (OEH) seeking our requirements for the development of a Review of Environmental Factors (REF) for the proposed upgrade of two sections of Gocup Road south of Gundagai. This response is in regard to statutory matters relating to application of the *National Parks and Wildlife Act 1974* and the *Threatened Species Conservation Act 1995.*

OEH notes that these proposed works include road realignment and will involve extensive earthworks. Native vegetation will be cleared as part of these proposed road works. We recommend that the REF consider the potential impacts of this clearing on the impacts on both biodiversity, including threatened species, and Aboriginal cultural heritage. Further information on the requirements for the REF is provided in Attachment 1.

Should you wish to discuss these matters further, please contact Andrew Fisher on 6022 0623 or by email at andrew.fisher@environment.nsw.gov.au.

Yours sincerely

P.E ~ 18/10/16

PETER EWIN
Senior Team Leader Planning
South West Region
Regional Operations
Office of Environment and Heritage

Enclosure: ATTACHMENT 1 – Recommended matters for consideration within the REF for Gocup Road upgrade

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www.environment.nsw.gov.au

ATTACHMENT 1 – Recommended matters for consideration within the REF for Gocup Road upgrade

Biodiversity

OEH recommend the determining authority consider whether a flora and fauna assessment (assessment of significance or 7-part test) is required for the development as habitat values may be present for threatened species. The maps provided indicate that the proposed works will require the removal of native vegetation. A number of threatened species have been recorded in the vicinity of the proposed works.

To address the impacts on threatened species, the REF should include demonstration of how the principle of avoid, minimise and offset has been applied and include a timeframe for rehabilitation activities across the entire proposal site. Negative impacts to native vegetation should be avoided where possible using prevention and mitigation measures. Where impacts cannot be avoided, the REF should detail how the residual direct and indirect impacts will be addressed through biodiversity offsetting. BioBanking provides a voluntary mechanism through which this can be achieved. The BioBanking Assessment Methodology (OEH 2014) allows quantification of impacts and assessment of the value of offset areas and associated management regimes for those areas. The BioBanking scheme provides an alternative path for proponents to the current threatened species assessment of significance process.

The impacts to flora and fauna may be assessed using either the BioBanking Assessment Methodology or a detailed biodiversity assessment (including an Assessment of Significance or 7-part test). The requirements for each of these approaches are detailed below.

1 BioBanking

The BioBanking Assessment Methodology can be used either to obtain a BioBanking statement, or to assess impacts of a proposal and to determine required offsets without obtaining a statement. In the latter instances, if the required credits are not available for offsetting, appropriate alternative options may be developed in consultation with OEH officers.

Where a BioBanking Statement is being sought under Part 7A of the *Threatened Species Conservation* Act *1995* (TSC Act), the assessment must be undertaken by an accredited BioBanking assessor (as specified under Section 142B (1) (c) of the TSC Act) and done in accordance with the BioBanking Assessment Methodology (www.environment.nsw.gov.au/resources/biobanking/140661BBAM.pdf). To qualify for a BioBanking Statement a proposal must meet the 'improve or maintain' standard. Further information about BioBanking is available on the OEH website at www.environment.nsw.gov.au/biobanking/.

The EIS should include specific commitments that reflect all requirements of the BioBanking Statement including the number of credits required and any Chief Executive Officer approved variations to impact on Red Flags.

Where the BioBanking Assessment Methodology is being used to assess impacts of a proposal and to determine required offsets, and a BioBanking Statement is not being obtained, the EIS should contain a detailed biodiversity assessment and all components of the assessment must be undertaken in accordance with the BioBanking Assessment Methodology. The EIS should include specific commitments that are informed by the outcomes of the proposed BioBanking assessment offset package, which:

- sets out the ecosystem and species credits required by the BioBanking Assessment Methodology and how these ecosystem and/or species credits will be secured and obtained
- provides appropriate alternative options to offset expected impacts if the ecosystem or species credits cannot be obtained, noting that an appropriate alternative option may be developed in consultation with OEH officers and in accordance with OEH policy
- demonstrates how all options have been explored to avoid red flag areas
- includes all relevant 'BioBanking files (e.g. *.xml output files), data sheets, underlying assumptions (particularly in the selection of vegetation types from the vegetation types database), and documentation (including maps, aerial photographs, GIS shape files, other remote sensing imagery etc.) to ensure that the OEH can conduct an appropriate review of the assessment.

2 Detailed biodiversity assessment

An assessment of significance should be completed for developments that may impact on threatened flora, fauna, endangered ecological communities or endangered populations. An assessment of significance should address all threatened species potentially occurring on site that may be directly or indirectly impacted by the proposal. Guidelines for completing an assessment of significance can be found on the OEH website at www.environment.nsw.gov.au/resources/threatenedspecies/tsaguide07393.pdf.

The OEH threatened species website (www.environment.nsw.gov.au/threatenedspecies/) and Atlas of NSW Wildlife (www.bionet.nsw.gov.au/) can be used to generate a list of threatened species, populations and ecological communities predicted or known to occur in the area. Vegetation map datasets can be accessed through the OEH website at mapdata.environment.nsw.gov.au/. Habitat preferences can then be used to determine the likelihood of these species occurring in the study area. Appropriate measures to avoid, minimise and mitigate any losses to vegetation and threatened species habitat should be set out in the REF. If impacts on biodiversity are likely to be significant, then one option to mitigate these impacts is through the use of a biodiversity offset. If an offset is to be used, then the principles for its implementation are available from the OEH website at www.environment.nsw.gov.au/biodivoffsets/oehoffsetprincip.htm.

Species Impact Statements

If a significant impact on a threatened species is deemed likely following a threatened species 'Assessment of Significance', it may be necessary to prepare a Species Impact Statement (SIS) in accordance with the TSC Act. If a SIS is required, the applicant for the development consent or the proponent of the activity must request the Environmental Assessment Requirements for a Species Impact Statement from the Chief Executive Officer of OEH.

Matters of National Environmental Significance

With regard to the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*, the assessment should identify any relevant Matters of National Environmental Significance and whether the proposal has been referred to the Commonwealth or already determined to be a controlled action.

Aboriginal Cultural Heritage

OEH has already provided advice regarding the REF requirements for these sections of upgrade for Aboriginal cultural heritage. Aboriginal Heritage Impact Permit (AHIP) #C0001499 has been issued for a number of sections of Gocup Road. A condition of this AHIP is that a variation application is required for each additional section.

OEH met with RMS on 10 August 2016 to discuss the assessment requirements for these sections. It was agreed that the following must be provided:

- an addendum to the original archaeological and cultural value reports for each section. These reports must follow the Code of Practice requirements; and
- an update on consultation undertaken with registered Aboriginal parties.

This information must be submitted with an AHIP variation application and a copy of each REF determination.

MC:RD

19th October, 2016

Roads & Maritime Service
Attn Daniel Keep
Po Box 484
WAGGA WAGGA NSW 2650

RE: CONSULTATION OF PROPOSED UPGRADES – GOCUP ROAD PROJECT

Dear Daniel,

Reference is made to your letter dated 27 September 2016, seeking input from Council on the proposed major projects of Halfway Hill, Doctors Hill and Cookoomooroo on Gocup Road.

Snowy Valleys Council has been involved in significant consultation with Roads and Martime Services over the past four years to facilitate the construction of the overall Gocup Road upgrade project, one of which Council recognises will have far reaching benefits to the area, the region as well as the state.

The initiative shown in this project will deliver on this vision through reduction in road gradients, allowing for improved freight movement and heavy vehicle interaction with light vehicles.

Council appreciates the gravity of the project reflected in the significant quantity of earthworks required on all three projects. However, these works will not be without benefit to the region and the state economically and socially.

It is expected the Review of Environmental Factors and Environmental Protection Licence will provide sufficent direction to ensure the protection of the local environment is achieved.

On these grounds, Snowy Valleys Council offers no objection to the proposed works at Halfway Hill, Doctors Hill and Cookoomooroo.

Should you require any further information please contact the Executive Director Engineering Services, Mr. Matthew Christensen on (02) 6941 2555.

Yours Faithfully,

Matthew Christensen
EXECUTIVE DIRECTOR ENGINEERING SERVICES

Tumbarumba Office
Cnr Bridge and Winton Sts, Tumbarumba NSW 2653
PO Box 61, Tumbarumba NSW 2653
Phone: 02 6948 9100 Fax: 02 6948 2865 Freecall: 1800 069 280
Email: tumbaadmin@snowyvalleys.nsw.gov.au

Tumut Office
76 Capper St, Tumut NSW 2720
Phone: 02 6941 2555 Fax: 02 6941 2678
Email: tumutadmin@snowyvalleys.nsw.gov.au

Appendix G

Database searches

Healthy Environme

Home Contaminated land Record of notices

Attention Internet Explorer 10 users

Some functionality on this webpage is currently not compatible with Internet Explorer 10.
We recommend you enable compatibility mode on your browser:

1. Press F12 on your keyboard to display the developer tools
2. On the developer tools menu, select Browser Mode then select Internet Explorer 9

Your original settings will be restored when you close the browser window.
We are working to resolve this issue and apologise for the inconvenience.

Search results

Your search for:LGA: Gundagai Shire Council

Search
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did not find any records in our database.

If a site does not appear on the record it may still be affected by contamination. For example:

- Contamination may be present but the site has not been regulated by the EPA under the Contaminated Land Management Act 1997 or the Environmentally Hazardous Chemicals Act 1985.
- The EPA may be regulating contamination at the site through a licence or notice under the Protection of the Environment Operations Act 1997 (POEO Act).
- Contamination at the site may be being managed under the planning process.

More information about particular sites may be available from:

- The POEO public register
- The appropriate planning authority: for example, on a planning certificate iss local council under section 149 of the Environmental Planning and Assessmer

See What's in the record and What's not in the record.

If you want to know whether a specific site has been the subject of notices issue
under the CLM Act, we suggest that you search by Local Government Area only
review the sites that are listed.
This public record provides information about sites regulated by the EPA under t
Contaminated Land Management Act 1997, including sites currently and previou
under the Environmentally Hazardous Chemicals Act 1985. Your inquiry using th
search criteria has not matched any record of current or former regulation. You
consider searching again using different criteria. The fact that a site does not ap
record does not necessarily mean that it is not affected by contamination. The si
been notified to the EPA but not yet assessed, or contamination may be present
is not yet being regulated by the EPA. Further information about particular sites
available from the appropriate planning authority, for example, on a planning ce
issued by the local council under section 149 of the Environmental Planning and
Act. In addition the EPA may be regulating contamination at the site through a li
the Protection of the Environment Operations Act 1997. You may wish to search
public register

15 F

Australian Government
Department of the Environment and Energy

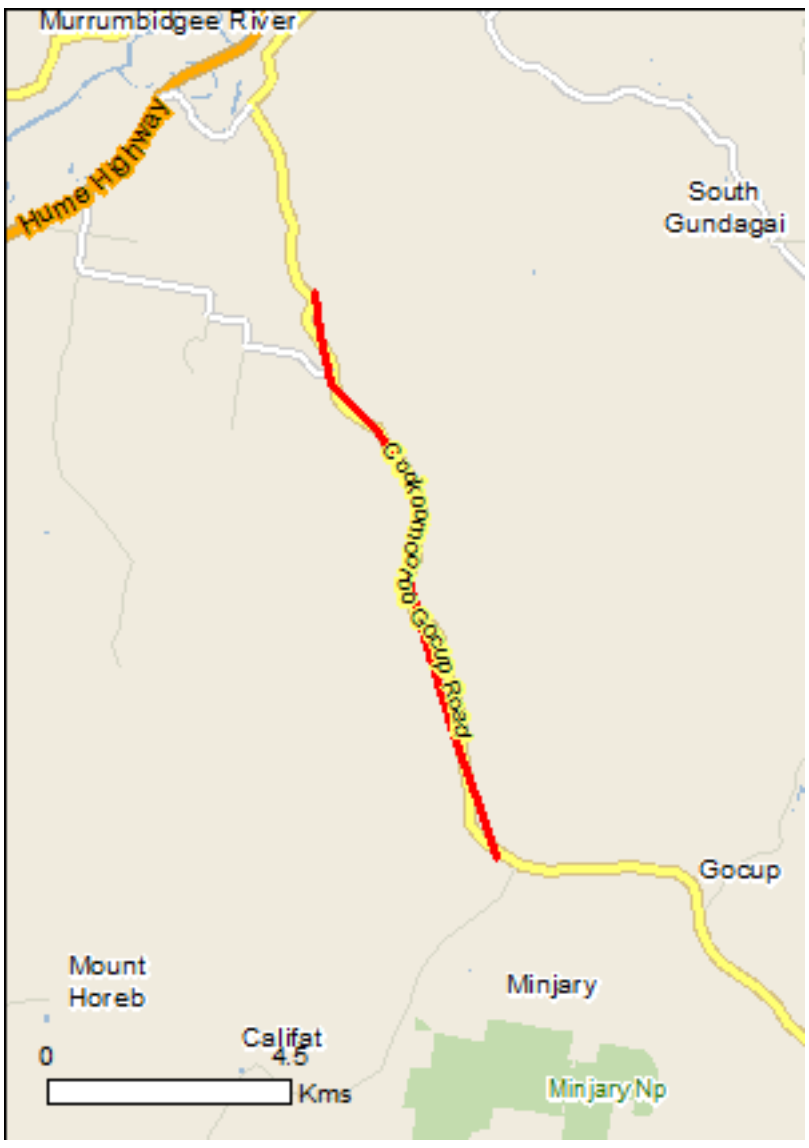
EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 03/02/17 08:58:58



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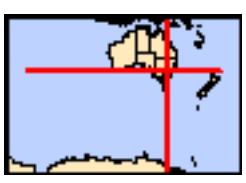

Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	4
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	3
Listed Threatened Species:	25
Listed Migratory Species:	8

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	14
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	1
Regional Forest Agreements:	1
Invasive Species:	31
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar) [Resource Information]

Name	Proximity
Banrock station wetland complex	700 - 800km upstream
Hattah-kulkyne lakes	500 - 600km upstream
Riverland	600 - 700km upstream
The coorong, and lakes alexandrina and albert wetland	700 - 800km upstream

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Endangered	Community likely to occur within area
Natural Temperate Grassland of the South Eastern Highlands	Critically Endangered	Community likely to occur within area
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Anthochaera phrygia		
Regent Honeyeater [82338]	Critically Endangered	Foraging, feeding or related behaviour likely to occur within area
Botaurus poiciloptilus		
Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Grantiella picta		
Painted Honeyeater [470]	Vulnerable	Species or species habitat known to occur within area
Lathamus discolor		
Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Polytelis swainsonii		
Superb Parrot [738]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Rostratula australis		
Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area

Name	Status	Type of Presence
Fish		
Maccullochella macquariensis Trout Cod [26171]	Endangered	Species or species habitat may occur within area
Maccullochella peelii Murray Cod [66633]	Vulnerable	Species or species habitat may occur within area
Macquaria australasica Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area
Frogs		
Litoria booroolongensis Booroolong Frog [1844]	Endangered	Species or species habitat likely to occur within area
Litoria raniformis Growling Grass Frog, Southern Bell Frog, Green and Golden Frog, Warty Swamp Frog [1828]	Vulnerable	Species or species habitat may occur within area
Insects		
Synemon plana Golden Sun Moth [25234]	Critically Endangered	Species or species habitat may occur within area
Mammals		
Dasyurus maculatus maculatus (SE mainland population) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat may occur within area
Nyctophilus corbeni Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat likely to occur within area
Petauroides volans Greater Glider [254]	Vulnerable	Species or species habitat may occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat may occur within area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Plants		
Ammobium craspedioides Yass Daisy [20758]	Vulnerable	Species or species habitat likely to occur within area
Caladenia concolor Crimson Spider-orchid, Maroon Spider-orchid [5505]	Vulnerable	Species or species habitat likely to occur within area
Grevillea wilkinsonii Tumut Grevillea [56396]	Endangered	Species or species habitat known to occur within area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat may occur within area
Reptiles		
Aprasia parapulchella Pink-tailed Worm-lizard, Pink-tailed Legless Lizard [1665]	Vulnerable	Species or species habitat likely to occur within area
Delma impar Striped Legless Lizard [1649]	Vulnerable	Species or species

Name	Status	Type of Presence
		habitat known to occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat likely to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat likely to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat likely to occur within area
Migratory Wetlands Species		
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land - Australian Telecommunications Commission

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat likely to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat likely to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Minjary	NSW

Regional Forest Agreements	[Resource Information]

Note that all areas with completed RFAs have been included.

Name	State
Southern RFA	New South Wales

Invasive Species	[Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence

Name	Status	Type of Presence
Birds		
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur

Name	Status	Type of Presence
		within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Cytisus scoparius Broom, English Broom, Scotch Broom, Common Broom, Scottish Broom, Spanish Broom [5934]		Species or species habitat likely to occur within area
Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat likely to occur within area
Genista linifolia Flax-leaved Broom, Mediterranean Broom, Flax Broom [2800]		Species or species habitat likely to occur within area
Nassella neesiana Chilean Needle grass [67699]		Species or species habitat likely to occur within area
Nassella trichotoma Serrated Tussock, Yass River Tussock, Yass Tussock, Nassella Tussock (NZ) [18884]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Senecio madagascariensis Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
Solanum elaeagnifolium Silver Nightshade, Silver-leaved Nightshade, White Horse Nettle, Silver-leaf Nightshade, Tomato Weed, White Nightshade, Bull-nettle, Prairie-berry, Satansbos, Silver-leaf Bitter-apple, Silverleaf-nettle, Trompillo [12323]		Species or species habitat likely to occur within area
Ulex europaeus Gorse, Furze [7693]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-35.118473 148.101779,-35.124089 148.102466,-35.130828 148.104526,-35.136443 148.111392,-35.145989 148.119632,-35.156094 148.116886,-35.167883 148.121005,-35.17967 148.125125,-35.189771 148.129932,-35.195382 148.131992,-35.195382 148.131992

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-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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