Roads & Maritime

Gocup Road upgrade – Halfway Hill and Doctors Hill

Review of environmental factors

May 2017

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Roads and Maritime Services

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Approval and authorisation

Title	Gocup Road upgrade – Halfway Hill and Doctors Hill review of environmental factors
Accepted on behalf of NSW Roads and Maritime Services by:	Anthony Perera Project Manager Regional Project Office Infrastructure Development Division
Signed:	
Dated:	8 May 2017

Executive summary

Overview

Roads and Maritime Services (referred to as 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 needs. 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). Some sections of Gocup Road have been completed or are under construction.

The 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 proposal

Roads and Maritime proposes to upgrade the Halfway Hill/Doctors Hill section of Gocup Road (section 4). Key features of the proposal are shown in Figure 1.2 (Halfway Hill) and Figure 1.3 (Doctors Hill) and 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 alignment changes of up to 115 metres at Halfway Hill and 120 metres at Doctors Hill
- providing two overtaking lanes - a 1.5 kilometre northbound lane at Halfway Hill and a 1.2 kilometre southbound lane at Doctors Hill
- providing four temporary sediment basins at Halfway Hill and four at Doctors Hill
- installing safety barriers
- two permanent bus stops at Halfway Hill
- possible landscaping treatments to aid vegetation connectivity, which will form part of the biodiversity offset strategy
- ancillary facilities including a compound site and stockpile sites along Halfway Hill and Doctors Hill.

Need for the proposal

Gocup Road is used by heavy vehicles associated with the local timber and milling industry. The road does not meet current road design standards. It is generally narrow, with tight corners and steep vertical sections. There are no overtaking lanes, and overtaking opportunities are limited. Travel lanes are below standard widths and there are numerous hazards in the clear zones. The road surface is deteriorating and is not suitable for existing and future volumes of heavy vehicles.

Gocup Road does not meet road safety standards. Heavy vehicles are forced to travel at slow speeds in areas of steep vertical and tight bends. Limited overtaking opportunities cause traffic delays. On several occasions, heavy vehicles have stalled at Doctors Hill, sometimes resulting in loss of vehicle control.

Gocup Road does not provide access for high productivity vehicles, which are required for the future operations of the local timber and milling industry.

Proposal objectives and development criteria

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.

Development criteria used to assess the proposal and other road upgrade options included:
- freight efficiency
- road safety
- affected land area and native vegetation removal (including associated impacts to listed biodiversity and woodland habitats)
- operational noise impacts
- heritage impacts
- land impact
- socio-economic/property impacts.

Options considered

Development of the proposal has included assessing eight route options for Halfway Hill and seven route options for Doctors Hill. The 'do nothing' option was also considered. These options were assessed against the development criteria using an equal weighting scoring approach. Option 1A achieved the highest overall score for Halfway Hill and option E1 achieved the highest overall score for Doctors Hill.

For Halfway Hill, option 1A is preferred because:
- it provides highly improved road safety
- it provides the greatest improvement in freight efficiency of all the options
- it has a favourable earthworks balance and associated cost of transporting material
- it has lower land disturbance impacts than many of the other options
- impacts on flora and fauna listed under the EPBC Act and TSC Act are unlikely to be significant.

For Doctors Hill, option E1 is preferred because:
- it provides highly improved road safety
- it provides highly improved freight efficiency
- it has a favourable earthworks balance and associated cost of transporting material
- it has lower land disturbance impacts than three of the other options
- impacts on flora and fauna listed under the EPBC Act and TSC Act are unlikely to be significant.

Statutory and planning framework

The NSW *State Environmental Planning Policy (Infrastructure) 2007* permits development on any land for the purpose of a road or road infrastructure facilities to be carried out by or on behalf of a public authority without consent.

As the proposal is for the purpose of a road and is to be carried out by Roads and Maritime, it can be assessed under Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Development consent is not required. This review of environmental factors (REF) has been prepared to assess the proposal.

The description of the proposal and associated environmental impacts has been carried out in the context of clause 228 of the NSW *Environmental Planning and Assessment Regulation 2000*, the *Threatened Species Conservation Act 1995* (TSC Act) and the *Fisheries Management Act 1994*. In doing so, the REF helps to fulfil the requirements of Section 111 of the EP&A Act; that Roads

and Maritime examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the activity.

The REF assesses the impacts of the proposal on matters of national environmental significance listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Community and stakeholder consultation

Roads and Maritime has consulted with potentially affected property owners, stakeholders and government agencies when selecting the preferred options and developing the proposal designs. Government agencies and stakeholders consulted have included:

- Office of Environment and Heritage (OEH)
- Environment Protection Authority (EPA)
- Cootamundra-Gundagai Council
- Snowy Valleys Council
- Department of Primary Industries (DPI) – Fishing and Aquaculture
- Telstra
- Essential Energy
- The local Aboriginal community.

The purpose of consultation has been to:

- inform the community of the proposal
- advise government agencies and stakeholders of the proposal and its possible impacts.

If the proposal is determined to proceed, Roads and Maritime would continue to consult with community stakeholders and utility providers.

Environmental impacts

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.

The proposal would result in:

- native vegetation removal, including the threatened ecological community Box-Gum Woodland, and habitat for fauna listed under the TSC Act and EPBC Act
- minor traffic delays and changed road conditions during construction
- potential noise, air quality and visual impacts to residences during construction
- private property and Crown land acquisition
- impacts to some non-Aboriginal heritage value sites, including the former road alignment of Gocup Road and abandoned stock yards near Doctors Hill.

These adverse environmental effects would be minimised by implementing safeguards and management measures outlined in this REF.

Justification and conclusion

The proposal is required to improve road safety and increase traffic and freight efficiency on Gocup Road by meeting current road design standards and supporting high productivity vehicle access.

This REF has examined and taken into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the activity. The REF found that the proposal would not result in significant environmental impacts or be of such a nature or extent as to be regarded as unacceptable. The safeguards and management measures detailed in this REF would avoid or minimise the expected impacts. Overall, the REF finds that any negative impacts are outweighed by the proposal's longer term positive impacts.

Contents

Appendices

1 Introduction

1.1 Overview of Gocup Road upgrade program of works

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). Some sections of Gocup Road have been completed or are under construction.

Gocup Road is used by heavy vehicles primarily associated with the local timber and milling industry. The road does not meet current road design standards. It is generally narrow, with tight corners and steep vertical alignment sections. There are no overtaking lanes, and overtaking opportunities are limited. Travel lanes are below standard widths and there are numerous hazards in the clear zones. The road surface is deteriorating and is not suitable for existing and future large volumes of heavy vehicles.

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.

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 vehicles 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.

The 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 works program has been underway since 2012. To date, three projects have been completed, with three more currently in delivery phase. The remaining major works include the proposed upgrades of the Halfway Hill, Doctors Hill and Cookoomooroo sections. Minor works including shoulder widening and barrier installation to the south of Doctors Hill are also in the development phase (section 1 minor works) (Figure 1.1).

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	Delivery phase
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

Project name	Section	Length	Status
Quidong 90	Section 3.2	1.1 km	Completed
Quidong Corner	Section 3.3	0.7 km	Delivery phase
Stuckeys Creek	Section 3.4	1.8 km	Delivery phase
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

1.2 Proposal identification

This review of environmental factors (REF) assesses the proposed upgrade of the Halfway Hill/Doctors Hill section of Gocup Road (section 4) ('the proposal') (see location in Figure 1.1).

The proposal is located about eight kilometres south of Gundagai in Roads and Maritime's South West Region. The majority of the proposal site is located in the Cootamundra-Gundagai Regional Council local government area (LGA), with a small portion (at the southern end at Halfway Hill) located within the Snowy Valleys LGA (see Figure 1.2).

Key features of the proposal are shown in Figure 1.2 (Halfway Hill) and Figure 1.3 (Doctors Hill) and include:

- widening 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 alignment changes of up to 115 metres at Halfway Hill and 120 metres at Doctors Hill
- providing two overtaking lanes - a 1.5 kilometre northbound lane at Halfway Hill and a 1.2 kilometre southbound lane at Doctors Hill
- providing four temporary sediment basins at Halfway Hill and a further four at Doctors Hill
- installing safety barriers
- two permanent bus stops at Halfway Hill
- possible landscaping treatments to aid vegetation connectivity, which will form part of the biodiversity offset strategy
- ancillary facilities including a compound site and stockpile sites along Halfway Hill and Doctors Hill.

Utility relocation, including Telstra underground utilities and overhead powerline poles, have been assessed in a separate Minor Works review of environmental factors (MWREF) titled 'Gocup Road utilities relocation MWREF, February 2017'.

Construction activities are expected to start in 2017/2018, with utility relocation works starting in 2016/2017. The expected construction duration is about 18 months. Work would generally be staged as follows:

- work to build new sections of realigned road
- connecting the new realigned road to the existing road
- shoulder widening and road reconstruction for all other sections of work along the current road alignment.

Chapter 3 describes the proposal in more detail.

The proposal site passes through land primarily used for agriculture (grazing). A number of rural residences are located at the locality of Minjary at the southern end of the proposal site (Halfway Hill) and at various locations along the proposal site.

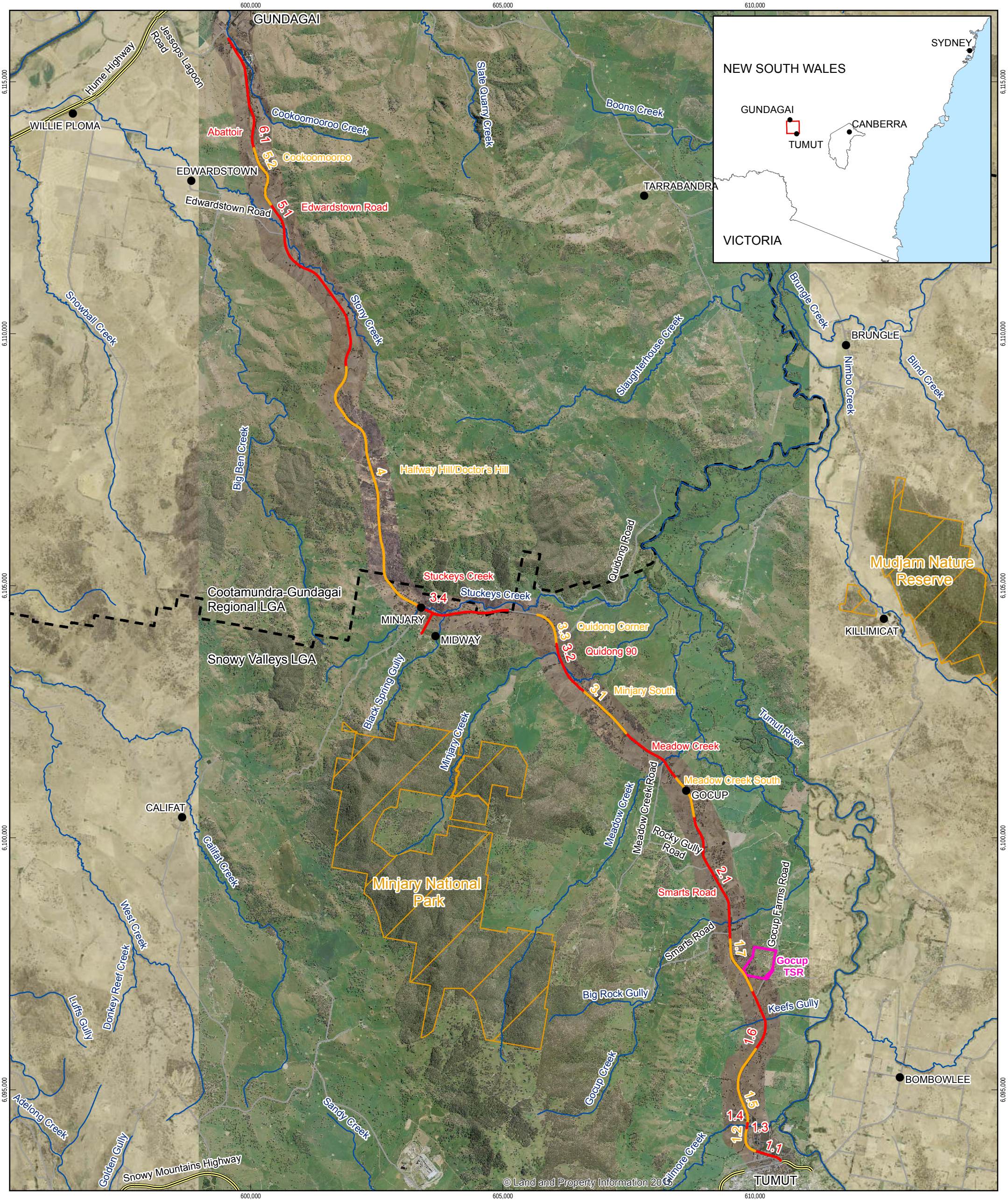
Native woodland is present in the Gocup Road reserve and on private land next to the proposal site. Much of the woodland in the area comprises the threatened ecological community White Box Yellow Box Blakely's Red Gum Woodland (Box-Gum Woodland). Native woodland along Gocup Road is known to provide habitat for a number of threatened woodland birds and microchiropteran bats.

Stuckeys Creek runs from west to east to the south of the proposal site (Halfway Hill), about 10 metres outside the construction footprint.

A more detailed location description is provided in chapter 6.

For the purposes of this REF, the following definitions are used:

- the ‘proposal site’ – refers to the area required for the construction of the proposal, including construction activities and construction vehicle access. It includes the construction footprint, site compound, stockpile sites, temporary sediment basins and any areas that would be disturbed
- the ‘investigation area’ – the area likely to be affected by the proposal, either directly or indirectly. The ‘investigation area’ is defined by the extent of the potential impacts of the proposal relating to each specific discipline
- the ‘locality’ – the area within a 10 kilometre radius of the proposal site.



LEGEND

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

Paper Size A3

0 0.5 1 2

Kilometres

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

N

Roads and Maritime Services
Gocup Road upgrade REFs

Program of works overview and location of the proposal

Job Number	23-15894
Revision	0
Date	08 May 2017

Figure 1.1

G:\23\15894\GIS\Maps\Deliverables\Section4\Gocup4_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, local government areas and NPWS reserves - 2012; aerial photograph - 2015. Created by:rtrobinson

602,000
603,000
6,107,000
6,106,000
6,105,000

Proposed site compound
Proposed bus stop
Proposed stockpile site
Proposed bus stop
Northbound overtaking lane
Proposed Telstra utilities relocation
Proposed stockpile site
Proposed 66kV powerline relocation
Proposed stockpile site
Curve realignment
Proposed sediment basins
Proposed stockpile site
Proposed stockpile site
Proposed stockpile site
Proposed sediment basin
Gocup Road
Cootamundra-Gundagai Regional LGA
Snowy Valleys LGA
Ellis Street
Stuckeys Creek
MINJARY

Doctors Hill
Halfway Hill
Gocup Road

LEGEND

- Locality
- Proposed bus stop
- Proposed 66kV powerline relocation (assessed separately)
- Proposed Telstra utilities relocation (assessed separately)
- Road design
- Northbound overtaking lane
- Proposed sediment basin
- Proposed drainage
- Existing road
- Creek
- Drainage line
- Proposed site compound
- Proposed stockpile site
- Local government area

Paper Size A3
0 100 200 400
Metres

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

N

Roads and Maritime Services
Gocup Road upgrade REFs

Job Number	23-15894
Revision	0
Date	04 May 2017

Halfway Hill proposal

Figure 1.2

G:\23\15894\GIS\Maps\Deliverables\Section4\Gocup4_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; NSW Government (LPI): Creeks, localities, drainage lines, local government areas and roads - 2012. Created by:rtrobinson

601,500
602,000
602,500
6,109,000
6,108,500
6,108,000
6,107,500

Doctors Hill
Halfway Hill
Gocup Road

Proposed stockpile site
Proposed sediment basin
Stony Creek
Proposed stockpile site
Curve realignment
Northern road reserve
Proposed sediment basin
Drainage line
Southbound overtaking lane
Proposed stockpile site incl rock crusher, asphalt batch plant and pugmill
Proposed Telstra utilities relocation
Proposed sediment basin
Gocup Road
Curve realignment
Proposed stockpile site
Proposed stockpile site
Proposed sediment basin
Proposed 10kV powerline relocation
Proposed stockpile site
Proposed site compound

LEGEND

- Proposed 11kV powerline relocation (assessed separately)
- Proposed Telstra utilities relocation (assessed separately)
- Road design
- Southbound overtaking lane
- Proposed sediment basin
- Proposed drainage
- Existing road
- Creek
- Drainage line
- Proposed site compound
- Proposed stockpile site
- Northern road reserve

Paper Size A3
0 50 100 200
Metres

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

N

Roads and Maritime Services
Gocup Road upgrade REFs

Job Number 23-15894
Revision 0
Date 04 May 2017

Doctors Hill proposal

Figure 1.3

G:\23\15894\GIS\Maps\Deliverables\Section4\Gocup4_Fig1-3.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

1.3 Purpose of this report

This review of environmental factors (REF) has been prepared by GHD on behalf of Roads and Maritime. For the purposes of these works, Roads and Maritime is the proponent and the determining authority under Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The purpose of the REF is to describe the proposal, to document the proposal's likely impacts on the environment and to detail protective measures to be implemented.

The description of the proposed work and associated environmental impacts have been carried out in the context of clause 228 of the *Environmental Planning and Assessment Regulation 2000*, the factors in 'Is an EIS Required? Best Practice Guidelines for Part 5 of the *Environmental Planning and Assessment Act 1979*' (Is an EIS required? guidelines) (DUAP, 1995/1996), the *Threatened Species Conservation Act 1995* (TSC Act), the *Fisheries Management Act 1994* (FM Act), and the Australian Government's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

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

- section 111 of the EP&A Act that Roads and Maritime examine and take into account to the fullest extent possible, all matters affecting or likely to affect the environment by reason of the activity
- the strategic assessment approval granted by the Australian Government under the EPBC Act in September 2015, with respect to the impacts of Roads and Maritime's road activities on nationally listed threatened species, populations, ecological communities and migratory species.

The findings of the REF would be considered when assessing:

- whether the proposal is likely to have a significant impact on the environment and therefore the necessity for an environmental impact statement to be prepared and approval to be sought from the Minister for Planning under Part 5.1 of the EP&A Act
- the significance of any impact on threatened species as defined by the TSC Act and/or FM Act, in section 5A of the EP&A Act and therefore the requirement for a Species Impact Statement
- the significance of any impact on nationally listed biodiversity matters under the EPBC Act, including whether there is a real possibility that the activity may threaten long-term survival of these matters, and whether offsets are required and able to be secured
- the potential for the proposal to significantly impact any other matters of national environmental significance or Commonwealth land and the need, subject to the EPBC Act strategic assessment approval, to make a referral to the Australian Government Department of the Environment and Energy for a decision by the Commonwealth Minister for the Environment on whether assessment and approval is required under the EPBC Act.

2 Need and options considered

2.1 Strategic need for the proposal

2.1.1 Existing road constraints

Gocup Road is used by heavy vehicles primarily associated with the local timber and milling industry. The road does not meet current road design standards. It is generally narrow, with tight corners and steep vertical alignment sections. There are no overtaking lanes, and overtaking opportunities are limited. Travel lanes are below standard widths and there are numerous hazards in the clear zones. The road surface is deteriorating and is not suitable for existing and future large volumes of heavy vehicles.

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. Limited overtaking opportunities cause traffic delays. On several occasions, heavy vehicles have stalled at Doctors Hill, sometimes resulting in loss of vehicle control.

The condition of Gocup Road also means that the timber industry cannot use high productivity vehicles to transport freight from plantations across NSW to mills in the South West Slopes, and from these mills to markets across Australia and the ports of Sydney and Melbourne.

2.1.2 Crash history

Twenty-one crashes occurred on Gocup Road between Minjary Creek and the Hume Highway at Gundagai in the period 2010 to 2015 (see Table 2.1). None of these were fatal. Three involved serious injuries.

Crashes near the proposal site included one minor injury crash, one uncategorised injury crash and four non-casualty crashes.

Table 2.1: Crash statistics for Gocup Road between Minjary Creek and Gundagai (2010 – 2015)

Severity of crash	Number of crashes
Fatal	0
Serious injury	3
Moderate injury	1
Minor injury/other	1
Uncategorised injury	4
Non-casualty (tow away)	12

The proposal would improve road safety by realigning three curves, widening the road, reducing steep inclines and providing two overtaking lanes.

2.1.3 Relevant strategies and plans

NSW 2021: A Plan to Make NSW No 1

'NSW 2021: A Plan to Make NSW No 1' (Department of Premier and Cabinet 2011) is a 10-year plan that provides goals and targets to rebuild the economy, provide quality services, renovate infrastructure, restore government accountability, and strengthen the local environment and

communities. It is the NSW Government's strategic business plan, setting priorities for action and guiding resource allocation.

'NSW 2021: A Plan to Make NSW No 1' lists a number of goals relevant to the proposal, identified in Table 2.2.

Table 2.2: Relevant goals of NSW 2021: A Plan to Make NSW No 1

Goal	How the proposal would assist in meeting the goal
Reduce travel time	The proposal would significantly reduce travel time by reducing steep inclines and providing overtaking lanes. Overtaking lanes would allow passing of heavy vehicles.
Improve road safety	The proposal would improve safety by widening the road and improving road alignment to meet current road design standards. Road safety would also be improved by providing overtaking lanes.
Drive economic growth in regional NSW	Existing road constraints impact on the region's productivity and economy. The proposal would provide an upgraded road allowing an easier route for high productivity vehicles. The proposal would therefore improve the strategic freight transport route between Tumut and Gundagai, contributing to economic growth in the region.
Protect our natural environment	The proposal would remove native vegetation for road widening and realignment (see section 6.1). Safeguards detailed in this REF would be carried out to minimise impacts on the natural environment.

Given the likely contribution of the proposal to the goals identified in Table 2.2, the proposal is considered to be consistent with 'NSW 2021: A Plan to Make NSW No 1'.

NSW State Infrastructure Strategy 2012-2032

The 'State Infrastructure Strategy 2012-2032' (Infrastructure NSW 2012) includes details of priority infrastructure to be developed in NSW over the next 20 years and recommends how this will be achieved.

The proposal would help achieve these actions by upgrading the existing Gocup Road to allow for more efficient high productivity vehicle use. The proposal would enhance freight movement productivity to and from the South West Slopes, supporting timber product export from the region.

The proposal supports the following objectives for regional NSW in the strategy:

- improve employment access and connect people and communities
- improve local transport networks
- provide efficient market access, particularly mining and agriculture products to domestic and international markets.

Roads and Maritime 2020 Strategy

The 'Roads and Maritime 2020 Strategy' (Roads and Maritime 2015) outlines the organisation's five strategic priorities:

- making safety paramount

- delivering Roads and Maritime's infrastructure program
- meeting customer and community needs
- being an organisation that delivers
- enhancing economic and social outcomes.

The proposal would improve road safety by upgrading Gocup Road to meet current road design standards. The proposal would meet customer and community needs by making Gocup Road suitable for current and future projected heavy and light vehicle volumes. The proposal would enhance economic and social outcomes by improving heavy vehicle access along Gocup Road for the local timber and milling industry and by making the road safer for all users.

Although there would be environmental impacts associated with the proposal, these have been minimised as far as possible and would be managed through safeguards described in this REF. The community and stakeholders have been consulted during the development of the proposal. Consultation would continue into construction should the proposal proceed.

NSW Long Term Transport Master Plan

The 'NSW Long Term Transport Master Plan' sets the framework for the NSW Government to deliver an integrated, modern transport system that puts the customer first.

Upgrades to Gocup Road are a medium to long-term action in the 'NSW Long Term Transport Master Plan'. The proposal would contribute to achieving this goal.

The proposal supports the following objectives in the 'NSW Long Term Transport Master Plan':
- improve quality of service
- improve liveability
- support economic growth and productivity
- support regional development
- improve safety and security
- improve sustainability.

Murray-Murrumbidgee Regional Transport Plan

The 'Murray-Murrumbidgee Regional Transport Plan' supports the 'NSW Long Term Transport Master Plan' and outlines specific actions to address transport issues in the Murray-Murrumbidgee region. It includes matters identified during consultation with the community in 2012.

Upgrades to Gocup Road are a medium to long-term action in the 'Murray-Murrumbidgee Regional Transport Plan'. The proposal would contribute to achieving this goal.

NSW Freight and Ports Strategy 2013

The 'NSW Freight and Ports Strategy' (Transport for NSW 2013) sets out a range of strategic action programs to improve the efficiency, capacity and sustainability of the NSW freight network. Implementation includes assessment of the road network.

The Gocup Road upgrade is identified in the strategy as being required to enhance freight movement productivity to and from the South West Slopes, supporting export of timber products from the region, and to drive safety improvements and maintenance outcomes. It is also noted that the Gocup Road upgrade would improve its connectivity with the national road network by supporting the use of efficient heavy vehicles.

The proposal would support the following actions in the strategy:
- 1D-3: improve access for high productivity vehicles on state and local roads
- 2B: develop and maintain freight capacity on the road network
- 2G: develop and maintain projects to support network capacity

- 3B-2&3: mitigate noise and emissions from freight operations
- 3C-2: improve heavy vehicle safety.

National Land Freight Network Strategy

The overarching purpose of the 'National Land Freight Network Strategy' (Commonwealth of Australia 2012) is to drive development of efficient, sustainable freight logistics that balance the needs of a growing Australian community and economy, with the quality of life aspirations of the Australian people. The objectives under consideration aim to:

- improve freight movement efficiency across infrastructure networks
- minimise impacts associated with such freight movements
- influence policy making in freight-related areas.

The proposal would improve the freight link between Tumut and Gundagai. This would benefit the local timber and milling industry and promote the state and regional economies.

Tumut to Hume Highway Corridor Strategy

The Tumut to Hume Highway Corridor Strategy (Transport for NSW 2016) sets out the NSW Government's 20 year plan to manage and guide the development of Gocup Road and the Snowy Mountains Highway from Tumut to the Hume Highway.

The objectives of the strategy include improving access for high productivity vehicles and improving traffic efficiency, road safety and asset condition. Both Gocup Road and Snowy Mountains Highway connect rural communities, provide timber haulage routes from forests to timber mills and connected industries, and support agricultural distribution. The strategy also aims to maintain the corridor's current high environmental conservation value and minimise impacts on the natural, built and community environments along the corridor.

Investment priorities for the Tumut to Hume Highway corridor include:

- road widening, road strengthening, straightening curves, providing overtaking lanes and safety improvement strategies
- addressing current and emerging crash cluster locations on both the Snowy Mountains Highway and Gocup Road
- investigating opportunities for future road realignment, overtaking opportunities and heavy vehicle rest areas
- improving active transport infrastructure for local communities.

The proposal would contribute to meeting the objectives and priorities of the Tumut to Hume Highway Corridor Strategy by upgrading the Halfway Hill and Doctors Hill sections of Gocup Road. The proposal would have impacts on biodiversity, as detailed in section 6.1. These have been minimised as far as possible and would be managed through the safeguards described in this REF.

2.2 Existing infrastructure

2.2.1 Roads

Local road network

Gocup Road is about 31 kilometres in length and runs north from the Snowy Mountains Highway at Tumut to the Hume Highway at Gundagai. It is a two lane, two-way sealed road with a speed limit of 100 kilometres per hour. The existing road is typically nine metres wide, with two 3.5 metre travel lanes and two one metre unsealed shoulders. The road condition is considered average (Transport for NSW 2016). The Doctors Hill and Halfway Hill sections of Gocup Road have steep vertical inclines and tight bends, which force heavy vehicles to travel at slow speeds. There are limited overtaking opportunities, causing traffic delays.

There are no major intersections in the proposal site along Gocup Road. One small intersection with Ellis Street at Halfway Hill would be upgraded. A number of property entrances would also be upgraded.

Gocup Road has been identified as a strategic freight route in NSW. Heavy vehicles use Gocup Road to travel between commercial and industrial areas around Tumut and the Hume Highway at Gundagai. It is an important local timber and milling industry route. Higher mass limit (HML) B-double vehicles (B-double vehicles with additional mass entitlements) up to 4.6 metres high are permitted to travel along all of Gocup Road. Forestry product value-adding industry groups are interested in gaining access to the road network with 'high productivity vehicles' (truck and trailer combinations that carry higher volumes of freight more efficiently) to enable more efficient transport of timber products.

Gocup Road is an important route for residents and property owners between Tumut and Gundagai, and for people commuting between the towns for work.

Traffic volumes

Existing daily traffic volumes for Gocup Road are provided in Table 2.3.

Table 2.3: Existing daily traffic volumes for Gocup Road

Road	Existing daily traffic volume (2012-13)	Existing daily heavy vehicle volume (2012-13)	Percentage of heavy vehicles
Gocup Road 2 km north of Snowy Mountains Highway	1672	293	18%
Gocup Road 4.7 km south of Hume Highway	1300	255	20%

Heavy vehicles comprise up to 25 per cent of vehicles on weekdays and up to 10 per cent of vehicles on weekends. Fifty to 75 per cent of heavy vehicles are articulated or combination vehicles. Daytime traffic is expected to have a peak flow of between 100 to 150 vehicles per hour.

Two traffic surveys were carried out as part of the noise assessment for the proposal. Traffic counts ran for one week in 2016 and are similar to the 2012-2013 traffic counts. Recorded daily traffic volumes were 1513-1516 vehicles per day. A slight increase in the percentage of heavy vehicles was recorded in 2016, with 340-360 heavy vehicles per day (22 to 24 per cent of all vehicles). A growth rate in traffic volumes of about five per cent per year is expected into the future.

2.2.2 Property access

Private access roads to local properties are mainly located in the central and southern parts of the proposal site. About 20 unsealed access roads connect to Gocup Road throughout the proposal site.

2.3 Proposal objectives and development criteria

2.3.1 Proposal objectives

The proposal is part of the broader program of works to upgrade sections of Gocup Road. The work is required to meet modern freight demands and address vehicle safety requirements.

The strategic objectives of the Gocup Road program of works 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.

2.3.2 Development criteria

Development criteria used to assess the proposal and other road upgrade options included:

- freight efficiency
- road safety
- affected land area and native vegetation removal (including associated impacts to biodiversity listed under the EPBC Act and TSC Act and woodland habitats)
- operational noise impacts
- heritage impacts
- land impact
- socio-economic/property impacts.

The methodology used to assess the proposal and other road upgrade options against these criteria is discussed in more detail in section 2.4.1 below.

2.4 Alternatives and options considered

2.4.1 Methodology for selection of preferred option

A number of design options were identified and assessed against the proposal objectives and development criteria. These included nine options for Halfway Hill and eight options for Doctors Hill (see section 2.4.2).

Each option was assessed against the development criteria listed in section □ using an equal weighting scoring approach. Scores were assigned from a scale of 1 to 10 based on the scoring criteria listed in Table 2.4.

Table 2.4: Option scoring criteria

Score	Design (freight efficiency, road safety)	Land/vegetation impacts	Environmental (noise, heritage)	Earthworks balance/cost	Property acquisition
10	Significantly improved	No impacts	No impacts	Up to 30,000 m^3 surplus or 20,000 m^3 shortfall	0-2 ha
8	Highly improved	Minor impacts, <15 ha	Minor impacts	Up to 50,000 m^3 surplus or 30,000 m^3 shortfall	2-10 ha
6	Adequately improved	More impacts, 15-30 ha	More impacts	Up to 70,000 m^3 surplus or 35,000 m^3 shortfall	10-20 ha
4	Partly improved	Medium impacts, 30-50 ha	Medium impacts	> 70,000 m^3 surplus or >40,000 m^3 shortfall	20-40 ha

Score	Design (freight efficiency, road safety)	Land/vegetation impacts	Environmental (noise, heritage)	Earthworks balance/cost	Property acquisition
2	Minor improvements	High impacts, >50 ha	High impacts	Large difference in cut and fill	>40 ha
1	Is not improved	N/A	Large impacts	Highest difference in cut and fill	N/A

Scores for each option were added to give total scores, which were used to identify the preferred option.

2.4.2 Identified options

Route options for the proposal are described below in Table 2.5 and shown in Figure 2.1 and Figure 2.2.

Table 2.5: Description of route options

Option	Description
Halfway Hill	
Option 0	Do nothing – no work beyond the current maintenance regime.
Option 1	Realign southern curve to the west of current road alignment and realign remaining curves. Widen road and reduce road slope. Provide 110 km/h horizontal design speed and 100 km/h vertical design speed.
Option 1A	Centreline shift southern curve to the west of current road alignment and realign remaining curves. Widen road and reduce road slope. Provide 110 km/h horizontal design speed and 90 km/h vertical design speed.
Option 2	Centreline shift southern curve to the east of current road alignment. Widen road and reduce road slope (minor). Provide 110 km/h horizontal design speed and 80 km/h vertical design speed.
Option 3	Minor centreline shift of southern curve to the west of current road alignment and realign remaining road. Reduce road slope (minor). Provide 110km/h horizontal design speed and 80 km/h vertical design speed.
Option 4	Centreline shift southern curve to the west of current road alignment and realign remaining road. Reduce road slope and provide 110 km/h horizontal design speed and 100 km/h vertical design speed.
Option 5	Widen existing road. Provide 100 km/h horizontal design speed and 70 km/h vertical design speed.
Option 6	Minor realignment of curves to the east of current road alignment and road widening at connection points with existing road. Minor centreline shift between connection points with existing road. Provide 110 km/h horizontal design speed and 90 km/h vertical design speed.

Option	Description
Option 7	Minor centreline shift of southern curve to the west of current road alignment and realigning of remaining curves. Reduce road slope (minor) and realign northern half of road to east of current road alignment. Widen road at connection points with existing road. Provide 110 km/h horizontal design speed and 90 km/h vertical design speed.
Doctors Hill	
Option 0	Do nothing – no work beyond the current maintenance regime.
Option A	Centreline shift three curves to the inside of the existing curves. Widen road and reduce road slope (minor). Provide 100 km/h horizontal design speed and 100 km/h vertical design speed.
Option B	Centreline shift one curve to the inside of the existing curve. Widen road and substantially reduce road slope. Provide 100 km/h horizontal design speed and 90 km/h vertical design speed.
Option C	Centreline shift alignment to the west of existing road alignment. Substantial improvement to all curves. Widen road and substantially reduce road slope. Provide 110 km/h horizontal design speed and 100 km/h vertical design speed.
Option C1	Centreline shift alignment to the west of existing road alignment and improve all curves. Widen road and reduce road slope. Provide 110 km/h horizontal design speed and 100 km/h vertical design speed.
Option D	Widen road and provide a short passing lane. Provide a 90 km/h horizontal design speed and 80 km/h vertical design speed.
Option E	Centreline shift northern and southern curves to the inside of the existing curves. Widen road and substantially reduce road slope. Provide 110 km/h horizontal design speed and 90 km/h vertical design speed.
Option E1	Centreline shift southern and middle curves to the inside of the existing curves. Widen road and substantially reduce road slope. Provide 110 km/h horizontal design speed and 90 km/h vertical design speed.

602,000
603,000
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6,105,000
Gocup Road
Doctors Hill
Halfway Hill
Gocup Road
Ellis Street
Minjary Street
MINJARY

LEGEND

- Locality
- Existing road
- Halfway Hill route option
- Options 1 and 1A (preferred)
- Option 2
- Option 3
- Option 4
- Option 5
- Option 6
- Option 7

Paper Size A3
0 100 200 400
Metres

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

N

Roads and Maritime Services
Gocup Road upgrade REFs

Job Number 23-15894
Revision 0
Date 09 Feb 2017

Halfway Hill route options

Figure 2.1

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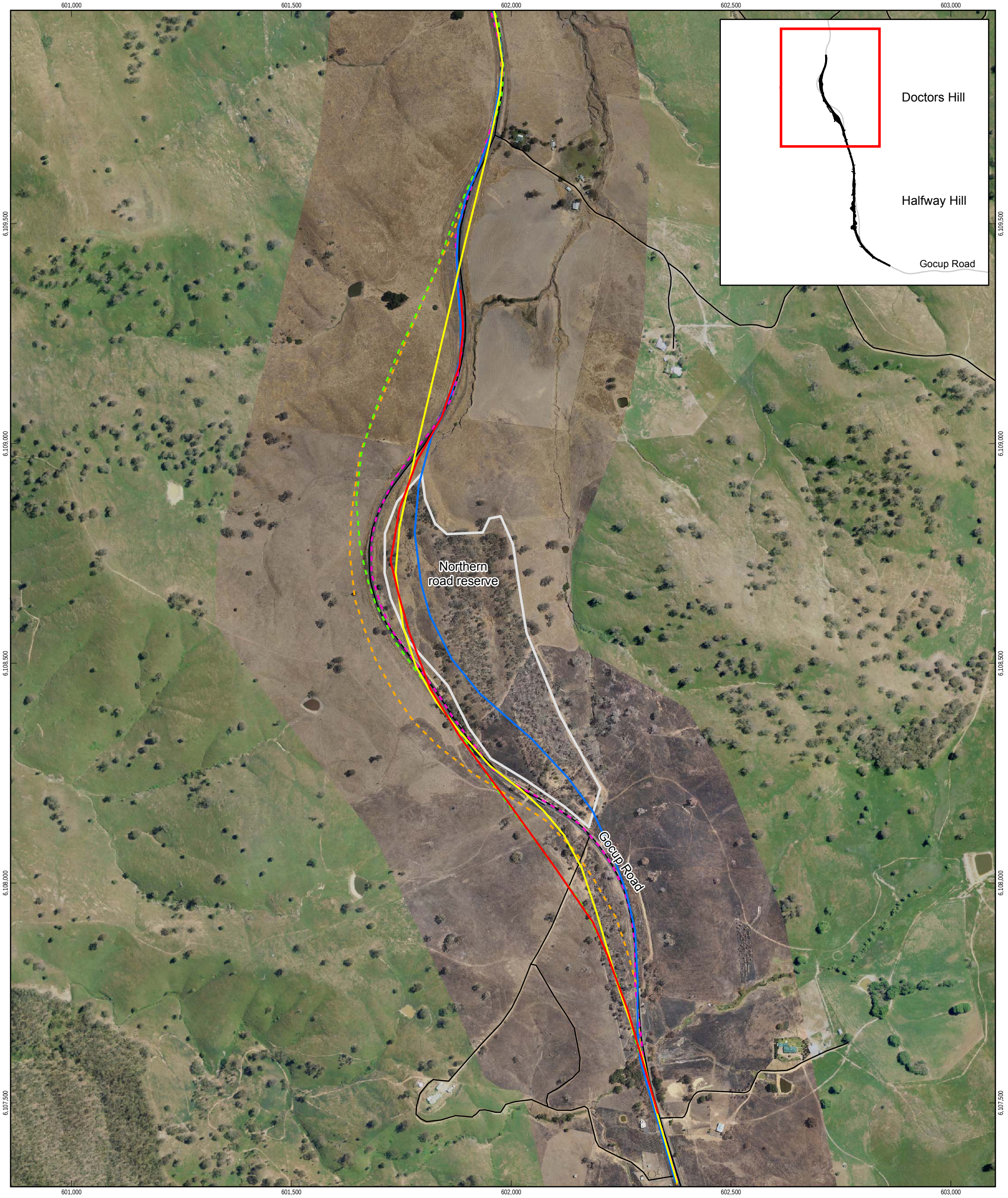
Suite 3, Level 1, 161-169 Baylis Street Wagga Wagga NSW 2650 Australia **T** 61 2 6923 7400 **F** 61 2 6971 9565 **E** wgamail@ghd.com **W** www.ghd.com

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



LEGEND

- Existing road
- Northern road reserve

Doctors Hill route option

- Option A
- Option B
- Options C and C1
- Option D
- Option E
- Option E1 (preferred option)

Paper Size A3

0 100 200 400

Metres

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

N

Roads and Maritime Services
Gocup Road upgrade REFs

Job Number	23-15894
Revision	0
Date	08 May 2017

Doctors Hill route options

Figure 2.2

G:\23\15894\GIS\Maps\Deliverables\Section4\Gocup4_Fig2-2.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, drainage lines and roads - 2012. Created by:rtrobinson

2.4.3 Analysis of options

The ‘do nothing’ options for Halfway Hill and Doctors Hill were discounted as these options would not meet the project objectives. Also, they did not address the safety and freight efficiency constraints of Gocup Road.

Scores against the development criteria for each route option are detailed in Table 2.6.

For Halfway Hill, the options were assessed as follows:

- options 1, 2, 3, 4 and 7 were discounted primarily due to large cut/fill imbalances and high associated costs to transport material to or from the proposal site. Some of these options also had high land disturbance impacts
- option 5 was discounted due to providing no freight efficiency improvement and only ‘partial’ improvement in road safety
- option 6 was discounted due to providing slightly lower improvements in freight efficiency and road safety than option 1A. This option also had a greater land disturbance impact than option 1A
- option 1A achieved the highest overall score.

For Doctors Hill, the options were assessed as follows:

- option A was discounted due to providing only ‘minor’ freight efficiency improvement and only ‘partial’ improvement in road safety. It also had a high land disturbance impact
- option D was discounted due to providing only ‘minor’ freight efficiency improvement and no improvement in road safety
- option E was discounted due to having a large cut/fill imbalance and high associated cost to transport material
- option B was discounted due to providing only ‘adequate’ freight efficiency and road safety improvements. It also had a higher cut/fill imbalance compared to option E1
- despite providing favourable freight efficiency and road safety outcomes, options C and C1 were discounted due to high land disturbance and property acquisition impacts
- option E1 achieved the highest overall score.

Table 2.6: Comparison of scores against development criteria for each route option

Route option	Freight efficiency	Road safety	Land/vegetation impacts	Operational noise impacts	Heritage impacts	Property acquisition	Earthworks balance/cost	Total score (%)
Halfway Hill								
Option 1	6	9	4	5	10	6	4	73%
Option 1A	6	9	7	5	10	6	8	85%
Option 2	3	7	3	5	6	6	2	53%
Option 3	2	7	10	5	10	6	2	70%
Option 4	7	9	4	5	10	6	4	75%
Option 5	1	5	9	5	10	6	10	77%
Option 6	5	8	5	5	10	6	10	82%
Option 7	7	7	3	5	10	6	2	67%
Doctors Hill								
Option A	2	5	4	8	10	8	8	75%
Option B	6	6	4	8	10	8	6	80%
Option C/C1	10	8	2	8	10	4	10	87%
Option D	2	1	8	8	10	10	8	78%
Option E	8	8	5	8	10	6	2	78%
Option E1	8	8	5	8	10	8	8	92%

Note: See Table 2.4 in section 2.4.1 for description of option scoring criteria.

2.5 Preferred option

The preferred options are option 1A (Halfway Hill) and option E1 (Doctors Hill). These options are considered to best achieve the proposal objectives.

Option 1A is preferred for the following reasons:

- it provides highly improved road safety
- it provides the greatest improvement in freight efficiency of all the options
- it has a favourable earthworks balance and associated cost of transporting material
- it has lower land disturbance impacts than many of the other options
- impacts on flora and fauna listed under the EPBC Act and TSC Act are unlikely to be significant.

Option E1 is preferred for the following reasons:

- it provides highly improved road safety
- it provides highly improved freight efficiency
- it has a favourable earthworks balance and associated cost of transporting material
- it has lower land disturbance impacts than three of the other options
- impacts on flora and fauna listed under the EPBC Act and TSC Act are unlikely to be significant.

Options 1A and E1 achieve adequate outcomes in relation to ecologically sustainable development as:

- measures to prevent environmental degradation would not be postponed due to a lack of full scientific certainty about threats of serious or irreversible environmental damage
- the present generation would ensure the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations. The proposed Gocup Road upgrade would provide a safer road environment and would achieve greater freight efficiency into the future. The preferred options achieve highly favourable outcomes in relation to these factors compared to the other options and have lower environmental impacts than many of the other options
- conservation of biological diversity and ecological integrity is a fundamental consideration. The ecological impacts of the preferred options are unlikely to be significant (see section 6.1)
- environmental factors have been included in the valuation of assets and services. The development criteria for selection of the preferred options included environmental considerations, as described in this REF. The preferred options have lower environmental impacts than many of the other options
- the preferred options are considered to be ecologically sustainable.

Further assessment against ecologically sustainable development principles is provided in section 8.2.2.

2.6 Design refinements

Following selection of the preferred options and preparation of concept designs, batter slope designs were steepened from 2 horizontal: 1 vertical to 1.5 horizontal: 1 vertical in the largest sections of cut due to the presence of hard rock. After further investigation and geotechnical considerations, some batter cut slopes were flattened to 1.7 horizontal: 1 vertical.

3 Description of the proposal

3.1 The proposal

Roads and Maritime proposes to upgrade the Halfway Hill/Doctors Hill section of Gocup Road (section 4).

Key features of the proposal are shown in Figure 1.2 (Halfway Hill) and Figure 1.3 (Doctors Hill) and include:

- widening 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 alignment changes of up to 115 metres at Halfway Hill and 120 metres at Doctors Hill
- providing two overtaking lanes - a 1.5 kilometre northbound lane at Halfway Hill and a 1.2 kilometre southbound lane at Doctors Hill
- providing four temporary sediment basins at Halfway Hill and four at Doctors Hill
- installing safety barriers
- two permanent bus stops at Halfway Hill
- possible landscaping treatments to aid vegetation connectivity, which will form part of the biodiversity offset strategy
- ancillary facilities including a compound site and stockpile sites along Halfway Hill and Doctors Hill.

Utility relocation, including Telstra underground utilities and overhead powerline poles, have been assessed in a separate MWREF.

The proposed site compound and stockpile sites are described in section 3.4.

The proposal would have an expected duration of about 18 months.

Gocup Road will remain operational during the construction period.

3.2 Design

3.2.1 Design criteria

Specific design criteria have been developed for the proposal. Key criteria include:

- posted speed of 100 km/h (110 km/h horizontal design speed and 90 km/h vertical design speed)
- travel lanes of 3.5 metres width (including overtaking lanes)
- two 1.35 metre sealed shoulders
- two 0.5 metre unsealed verges
- embankment batter slopes would be 4 horizontal: 1 vertical for batters with a height/depth of two metres or less and generally 2 horizontal: 1 vertical for batters with a height/depth of greater than two metres. Cutting batter slopes would be 1.5 to 2 horizontal: 1 vertical, with benching provided for cuttings where the depth of cuts exceeds seven to nine metres
- asphalt road surface:
  - heavy duty dense graded asphalt in wearing course
  - heavy duty dense asphalt in intermediate courses
- road surface grades of less than 10 per cent
- designed to accommodate high productivity vehicles.

3.2.2 Engineering constraints

Engineering constraints identified for the proposal include:

- hard rock sections of the proposal site, which may require blasting

- steep terrain in some parts of the proposal site.

3.2.3 Major design features

Road upgrade

The proposed Gocup Road upgrade is shown in Figure 1.2 (Halfway Hill) and Figure 1.3 (Doctors Hill).

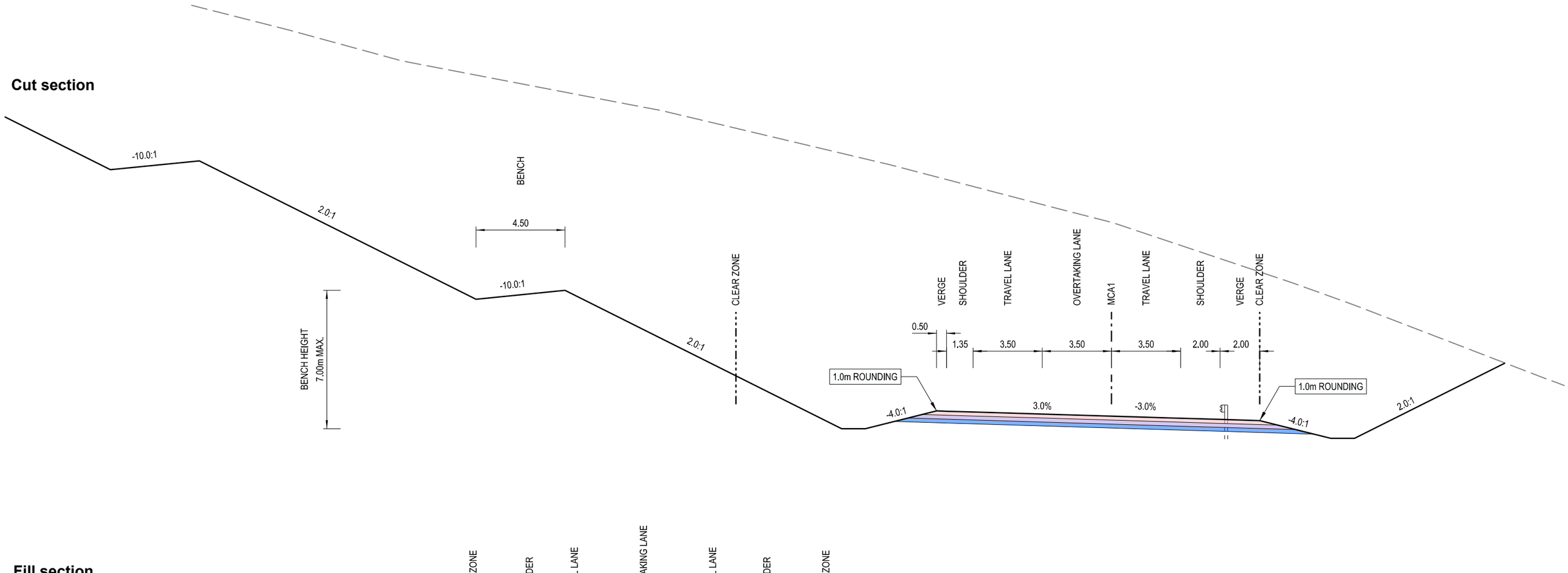
In the Halfway Hill section, the proposal involves a centreline shift of the southern curve to the west of the current road alignment and realigning the remaining curves. The proposal also involves road widening and reducing road slope.

In the Doctors Hill section, the proposal involves a centreline shift of two curves (southern and middle) to the inside of the existing curves, substantial improvement to the slope of the road and road widening.

Cut and fill

Proposed earthworks would create cut (excavation) and fill sections (see Figure 3.1) in the land surface with a width of up to 150 metres. Cut sections would have a maximum depth of 19.2 metres and fill sections would have a maximum height of 13.5 metres. Embankment batter slopes would be 4 horizontal: 1 vertical for batters with a height/depth of two metres or less and generally 2 horizontal: 1 vertical for batters with a height/depth of greater than two metres. Cutting batter slopes 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 250 metres. Cut and fill embankments would have benches to restrict the maximum slope length to seven metres.

Cut section



Fill section

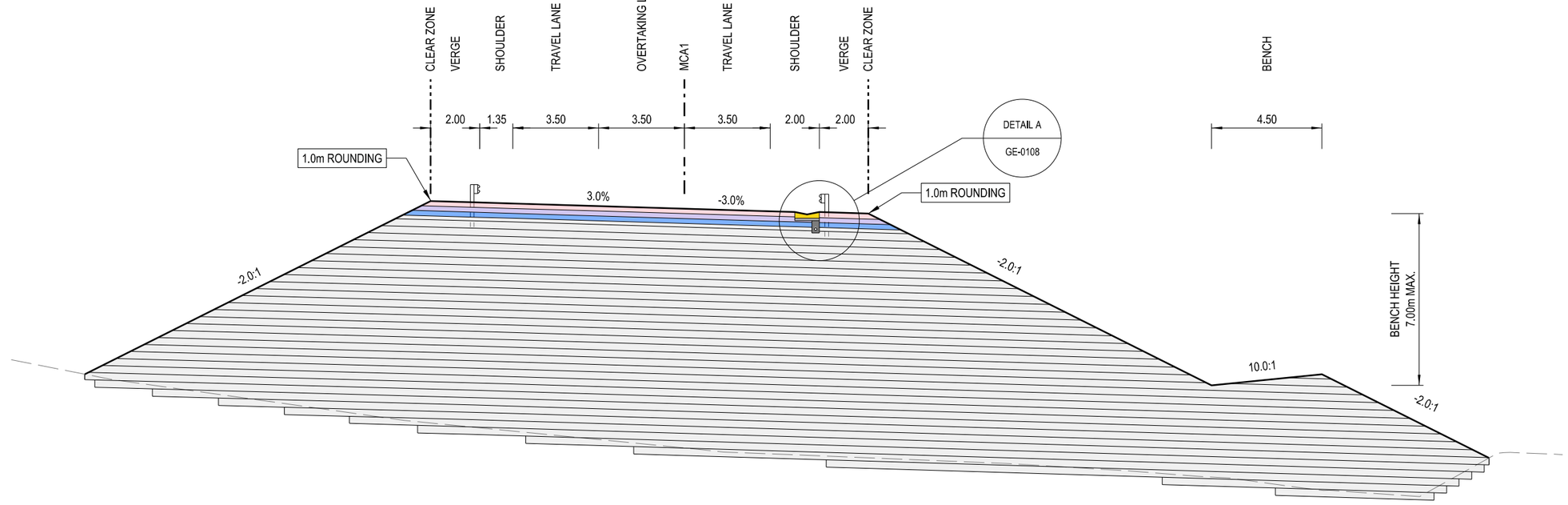


Figure 3.1: Example cross sections of proposal in cut and fill sections

3.3 Construction activities

3.3.1 Work methodology

Staging of work

Work would occur in three stages:

- stage 1 includes bulk earthworks, drainage and road construction for all sections of new realigned road. The expected duration for this stage of work is about 12 months
- stage 2 involves connecting the new realigned road to the existing road at the northern end of Doctors Hill and the southern end of Halfway Hill. This stage is expected to take two months
- stage 3 work includes shoulder widening and road reconstruction for all other sections of work along the current road alignment. Stage 3 work is expected to take about three 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:

- removing trees and vegetation clearing (57.3 hectares of native and introduced 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 17 new culverts at Halfway Hill and nine new culverts at Doctors Hill
  - extending, realigning or replacing seven culverts at Halfway Hill and four culverts at Doctors Hill. 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 transported to the proposed Cookoomooroo upgrade section for use in road construction

  - unsuitable materials that cannot be re-used would be transported to licensed disposal facilities
- reinstating property accesses
- removing asphalt from decommissioned sections of road, including:
  - 2815 square metres at Halfway Hill
  - 3040 square metres at Doctors Hill
- 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.

3.3.2 Construction hours and duration

Construction is expected to start in 2017/2018, with utility relocation works starting in 2016/2017. The expected construction duration is about 18 months.

It is anticipated most of the work for the proposal would be completed in line with OEH's recommended standard hours for construction work (DECC 2009):

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

It is not anticipated that night work would be required. Any out of hours work would be subject to approval by Roads and Maritime and would be in line with the Roads and Maritime 'Environmental Noise Management Manual 2001: Practice Note vii – Road works Outside of Normal Working Hours' (RTA 2001). This would include notifying nearby residents before out of hours work.

3.3.3 Plant and equipment

Plant and equipment required for the proposal would be determined by the contractor(s) during the construction planning phase. Plant and equipment likely to be used for the proposal may include:

General

- excavators
- bulldozers
- graders
- water carts
- semi-trailers and large delivery trucks
- air compressors
- light vehicles
- water pumps
- trencher
- mulchers
- hand tools
- welding equipment
- haulage trucks
- backhoe
- front-end loader
- tree clearing and mulching equipment
- bobcats
- generators
- chainsaws

Road embankment and drainage work

- scrapers
- graders
- vibrating and static rollers
- rock crusher
- excavators
- backhoes
- trenching machines
- rock breakers
- articulated trucks
- screens

Road surface construction

- milling machine
- compactor
- vibrating sheepsfoot roller
- vibrating smooth roller
- multi-wheel rubber tyred roller
- concrete agitator trucks
- concrete pumps
- pugmill
- concrete vibrators
- bitumen spraying and asphalt paver
- bitumen trucks
- kerb extruding machine
- profiler
- linemarking plant
- mobile asphalt batching plant

Traffic management

- safety barriers
- variable message boards

3.3.4 Earthworks

Road construction and utility relocation earthworks would occur over an area of up to 25 hectares. The extents of cut and fill earthworks are shown in Figure 3.2 and Figure 3.3.

Estimated volumes of material excavation (cut) are:

- Halfway Hill: 155,000 cubic metres (including 13,000 cubic metres of topsoil)
- Doctors Hill: 190,000 cubic metres (including 9000 cubic metres of topsoil).

Subject to the suitability of the material for use as fill, 320,000 cubic metres of this material would be used for road construction.

The remaining volume of material (27,000 cubic metres) would be transported to the proposed Cookoomooroo upgrade section for use in road construction.

All excavated topsoil would be stockpiled and re-used in landscaping following road construction.

602,000
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6,106,000
6,105,000
Doctors Hill
Halfway Hill
Gocup Road
Gocup Road
Ellis Street
Stuckeys Creek
MINJARY

LEGEND

- Locality
- Road design
- Existing road
- Creek
- Drainage line

Earthworks
- Cut
- Fill

Paper Size A3
0 100 200 400
Metres

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

N

Roads and Maritime Services
Gocup Road upgrade REFs

Halfway Hill cut and fill earthworks

Job Number	23-15894
Revision	0
Date	17 Feb 2017

Figure 3.2

G:\23\15894\GIS\Maps\Deliverables\Section4\Gocup4_Fig3-2.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

601,500 602,000 602,500

6,109,000

Doctors Hill

Halfway Hill

Gocup Road

Stony Creek

Northern road reserve

Drainage line

Gocup Road

6,108,500

6,108,000

6,107,500

601,500 602,000 602,500

LEGEND

- Road design
- Existing road
- Creek
- Drainage line
- Northern road reserve
- Earthworks
  - Cut
  - Fill

Paper Size A3

0 50 100 200

Metres

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

N

Roads and Maritime Services
Gocup Road upgrade REFs

Doctors Hill cut and fill earthworks

Job Number 23-15894
Revision 0
Date 04 May 2017

Figure 3.3

G:\23\15894\GIS\Maps\Deliverables\Section4\Gocup4_Fig3-3.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

3.3.5 Source and quantity of materials

Earthworks

Fill, sub-base and base materials and aggregates for bitumen sealing and culvert concrete works would consist of:

- soil
- gravel
- crushed and screened rock.

The approximate quantities of materials required for the proposal are estimated to be:

- base – 11,000 cubic metres
- sub-base – 15,000 cubic metres
- asphalt – 13,920 tonnes.

These volumes are indicative only and may change as a result of the detailed design. Materials would be sourced from a local supplier where feasible.

Water

Water would be required during construction for:

- suppressing dust
- adding moisture to earthworks and pavement materials to optimise compaction
- miscellaneous concrete works
- machinery wash-down.

The volume of water required would depend upon construction timing and weather conditions. Water for construction would be sourced firstly from sediment basins and then potentially from the Tumut or Murrumbidgee Rivers. Extraction of water from the Tumut and Murrumbidgee Rivers would require a water supply work approval under the NSW *Water Management Act 2000*.

3.3.6 Traffic management and access

Construction access management

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 and at Cookoomooroo (section 5.2) (see Figure 1.1).

Vehicle movements

During construction, the proposal would generate heavy vehicle movements through transporting materials, structures, machinery, fuel and general provisions.

Heavy vehicle movements may vary depending on construction methodology and weather conditions. It is estimated that 150 to 200 heavy vehicles would access the site per day (300 to 400 movements per day) over the construction period.

Light vehicles would be required to transport staff to and from the proposal site and in various other roles on site. Light vehicles would generally be parked at the main site compound.

It is estimated that in the order of 50 light vehicles would access the site per day for transporting staff (100 movements per day). These movements would typically be expected to occur during early morning and late afternoon periods.

The proposed increase in vehicle movements on Gocup Road during construction represents an increase of up to 36 per cent of the existing traffic volumes.

Traffic management

A Traffic Management Plan would be prepared in line with the 'Traffic Control at Work Sites Manual' (RTA 2010) and Roads and Maritime 'Specification G10 – Control of Traffic before start of construction'. The traffic management plan would provide details of traffic management to be implemented during construction, and to manage traffic flow and driving conditions during construction. All traffic management would be in line with current Roads and Maritime standards.

For short periods of time during construction of the proposal, traffic would be restricted to one lane on Gocup Road. Construction of the proposal would occur at the same time as other road upgrade projects, including Stuckeys Creek/Quidong Corner (section 3.3/3.4). The locations of these sections are shown in Figure 1.1. Construction of the Gocup Road program of works would be managed so that the maximum delay time for motorists on the entire length of Gocup Road would be 20 minutes.

Temporary closure of both traffic lanes would be required for stringing the 11kV powerline across Gocup Road. This would take no longer than five to 10 minutes and would be managed using stop/go controls.

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.

It is not anticipated that any temporary detours would be implemented during construction. No major disruptions to traffic are expected. Access to properties along Gocup Road would be maintained throughout construction.

3.4 Ancillary facilities

3.4.1 Site compounds

A site compound would be established at the site of a disused vineyard at the northern end of the Halfway Hill section (southern end of the Doctors Hill section) (see Figure 1.2 and Figure 1.3).

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.

3.4.2 Stockpile sites

Stockpile sites would primarily be used for storing construction materials. One stockpile site would also be used for plant operation (see section 3.4.4).

Six stockpile sites are proposed at Halfway Hill and six stockpile sites are proposed at Doctors Hill (see Figure 1.2 and Figure 1.3). Other smaller stockpile sites may also be located within the proposal site as required.

The stockpile sites would be subject to the criteria set out in Roads and Maritime's 'Stockpile Site Management Guideline' (RTA 2011a) and 'QA Specification R44 – Earthworks'. Stockpile sites would be managed in line with the following guidelines where practicable:

- located in areas not prone to flash flooding and more than 40 metres from a watercourse
- located more than 100 metres from occupied residences and other land uses that may be sensitive to noise
- located in previously disturbed areas that do not require the clearing of native woodland vegetation
- located in areas of low ecological and heritage conservation significance
- located in plain view of the public to deter theft and illegal dumping
- located outside the drip line of trees
- located on level ground.

3.4.3 Sediment basins and drainage

Proposed temporary sediment basins are shown in Figure 1.2 and Figure 1.3. Four sediment basins are proposed to be constructed at Halfway Hill and four sediment basins are proposed at Doctors Hill. Additional sediment basins may be constructed within the proposal site if required.

The sediment basins would capture runoff from disturbed areas. Captured runoff would be used to settle suspended silt, minimising discharge of silt to adjacent drainage lines. Sediment basins would also reduce flow velocities and potential scouring.

The sediment basins have been designed based on the volumes calculated for sediment control using the 'Blue Book - Soils and Construction - Managing Urban Stormwater' Volume 1 (Landcom 2004) and Volume 2D (DECC 2008). The sediment basins would also capture fuel or chemical spills that could potentially occur during construction. The sediment basins would capture runoff from 50 to 60 per cent of the proposal site, including all large cut sections.

Permanent and temporary drainage would:

- drain clean water around, away from, or through the proposal site
- drain most dirty water generated on-site to sediment basins.

Clean water diversion channels would be sized to convey a two year average recurrence interval storm event, where permitted by topography and clearing limits.

Runoff control from road embankments to sediment basins would be managed using:

- shaping of fill
- diversion drains and banks
- stormwater pits
- earth bunds along fill batters discharging to batter drains.

Culverts would have inlet and outlet protection to minimise scouring.

3.4.4 Other ancillary facilities

The following plant may be operated at a stockpile site about 1.2 kilometres south of the northern end of the Doctors Hill section (see Figure 1.3):

- rock crusher (used to crush rock excavated from the proposal site for re-use in road construction)
- mobile asphalt batch plant (used to prepare asphalt)
- pugmill (used for mixing road materials).

3.5 Public utility adjustment

Public utility adjustments are proposed to allow for the proposed Gocup Road upgrade at Halfway Hill and Doctors Hill. These utility adjustments are described below and shown in

Figure 1.2 and Figure 1.3. The proposed utility adjustments have been assessed in a separate MWREF, but have also been assessed together with the proposed road upgrade in this REF.

Roads and Maritime proposes to relocate the following utilities:

- 3.9 kilometres of Telstra optic fibre cable
- 4.2 kilometres of Telstra copper line
- Essential Energy overhead powerlines including:
  - 764 metres of 66kV powerline at Halfway Hill
  - 388 metres of 11kV powerline at Doctors Hill.

The Telstra optic fibre cable and copper line utilities would be installed together in one trench. The proposal allows for a 20-metre wide construction corridor for the relocation of these utilities in cleared areas and 10 metres in woodland areas.

3.6 Property acquisition

Land acquisition locations for the proposal are shown in Figure 3.4 and Figure 3.5. Details of land acquisition are provided in Table 3.1. These areas are indicative only and may change once boundaries are finalised during detailed design.

Table 3.1: Proposed property acquisition

Area ID	Current owner/ land use	Acquisition area (ha)	Lot and DP	Land use zone (LEP)	Total area of property (ha)
Halfway Hill					
HH1	Private property Agriculture	0.119	Lot 77 DP757251	RU1	23.5
HH2	Private property Residential/agriculture	0.12	Lot 146 DP757251	RU1	18.6
HH3	Private property Residential/agriculture	0.141	Lots 1 & 2 DP1032364	RU1	8.2
HH4	Private property Agriculture	0.137	Lot 1 DP849950	RU1	9.12
HH5	Private property Residential/agriculture	0.566	Lot 2 DP849950	RU1	11.86
HH6	Private property Agriculture	8.153	Lots 12, 226 & 227 DP757251	RU1	81.45
HH7	Private property Residential/agriculture	2.995	Lot 128 DP757241 Lot 201 DP757251	RU1	484.03
HH8	Private property Agriculture	0.637	Lot 125 DP757241	RU1	924.95
HH9	Private property Residential	0.02	Lot 1 Sec 2 DP758677	RU1	0.2
HH10	Private property Residential	0.019	Lot 2 Sec 2 DP758677	RU1	0.2
HH11	Private property Residential	0.019	Lot 3 Sec 2 DP758677	RU1	0.2

Area ID	Current owner/ land use	Acquisition area (ha)	Lot and DP	Land use zone (LEP)	Total area of property (ha)
HH12	Crown land Agriculture	0.36	Lot 7002 DP1126961 Lot 7003 DP1126191	RU1	1.09
Total area		*13.286*			
Doctors Hill					
DH1	Private property Agriculture	1.16	Lots 147 & 148 DP757251	RU1	772.26
DH2	Private property Agriculture	5.9	Lot 4 DP739566	RU1	586.02
DH3	Private property Disused vineyard	0.081	Lot 238 DP848039	RU1	0.81
Total area		*7.141*			

Some of these acquisition areas would be temporarily leased to allow access to the proposal site during the acquisition process. No full acquisitions of property are required for the proposal.

In relation to acquisition of Crown land, an assessment of the proposal against the objects and principles of the *Crown Lands Act 1989* is provided in Table 4.1 in section 4.2.7.

In addition to permanent acquisition, land may be temporarily leased during construction for small temporary stockpile sites and other construction requirements. These requirements have not yet been determined.

All property valuations, lease fees and acquisition payments would be carried out in line with the Roads and Maritime 'Land Acquisition Information Guide' (RTA 2011c) and the *Land Acquisition (Just Terms Compensation) Act 1991*. Property acquisition plans would be prepared for each of the properties where acquisition or leasing is required, as part of the detailed design.

602,000
603,000
6,107,000
6,106,000
6,105,000

Lot 4 DP 739566
Lot 3 DP 1106966
Lot 77 DP 757251
Lot 238 DP 848039
Lot 5 DP 1106966
HH1
Lot 146 DP 757251
Lot 11 DP 114731
HH2
Lot 4 DP 1106966
Lot 206 DP 757251
Lot 228 DP 757251
Lot 2 DP 1032364
HH3
Lot 4 DP 849950
Lot 1 DP 1032364
HH4
Lot 1 DP 849950
Lot 60 DP 757251
Lot 3 DP 849950
Lot 95 DP 757251
Lot 2 DP 849950
Lot 194 DP 757251
HH5
Lot 266 DP 757251
Lot 258 DP 757251
Lot 1 DP 1097872
Lot 12 DP 757251
Lot 1 DP 335482
Lot 275 DP 757251
Lot 12 DP 757251
Lot 1 DP 1100284
Lot 227 DP 757251
Lot 276 DP 757251
Lot 2 DP 1100284
Lot 227 DP 757251
HH6
Lot 226 DP 757251
Lot 226 DP 757251
Lot 277 DP 757251
Lot 201 DP 757251
Lot 281 DP 757251
Lot 201 DP 757251
Lot 235 DP 757251
HH7
Lot 278 DP 757251
Lot 280 DP 757251
Lot 225 DP 757251
Lot 236 DP 757251
Lot 128 DP 757241
Lot 159 DP 757241
Lot 7002 DP 1126961
HH8
HH12
Lot 165 DP 757241
Lot 189 DP 48708
Lot 229 DP 757251
Lot 7003 DP 1126191
Lot 190 DP 48708
Lot 125 DP 757241
Lot 8 DP 758677
HH9
Lot 6 DP 758677
Lot 164 DP 757241
HH10
HH11
Lot 1 DP 114730
Lot 2 DP 823349
Lot 237 DP 757251
Lot 6 DP 758677
Stuckeys Creek
Lot 127 DP 757241
Lot 20 DP 863742
Lot 172 DP 757241
Lot 1 DP 114730
Lot 21 DP 863742
Lot 1 DP 758677
Lot 1 DP 758677

Doctors Hill
Halfway Hill
Gocup Road

LEGEND

Road design

Lot boundary

Refer Table 3.1 of REF for information associated with area IDs

Paper Size A3

0 100 200 400

Metres

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

N

Roads and Maritime Services
Gocup Road upgrade REFs

Halfway Hill property acquisition locations

Job Number	23-15894
Revision	0
Date	14 Feb 2017

Figure 3.4

G:\23\15894\GIS\Maps\Deliverables\Section4\Gocup4_Fig3-4.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): Lot boundaries - 2012. Created by:rtrobinson

601,500 602,000 602,500

6,109,000

6,108,500

6,108,000

6,107,500

Lot 9 DP 252340

Lot 1 DP 739566

Lot 50 DP 1033830

DH1

Lot 147 DP 757251

Lot 148 DP 757251

Northern road reserve

Lot 193 DP 757251

Doctors Hill

Halfway Hill

Gocup Road

Lot 4 DP 739566

Lot 1 DP 1106966

Lot 10 DP 252340

Gocup Road

Lot 5 DP 1106966

DH2

Lot 2 DP 1106966

Lot 2 DP 1106966

Lot 207 DP 757251

Lot 3 DP 1106966

Lot 77 DP 757251

DH3

Lot 5 DP 1106966

Lot 238 DP 848039

Lot 146 DP 757251

601,500 602,000 602,500

LEGEND

Road design

Lot boundary

Northern road reserve

Refer Table 3.1 of REF for information associated with area IDs

Paper Size A3

0 50 100 200

Metres

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

N

Roads and Maritime Services
Gocup Road upgrade REFs

Doctors Hill property acquisition locations

Job Number 23-15894
Revision 0
Date 04 May 2017

Figure 3.5

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): Llot boundaries - 2012. Created by:rtrobinson

4 Statutory and planning framework

4.1 Environmental Planning and Assessment Act 1979

4.1.1 State Environmental Planning Policies

State Environmental Planning Policy (Infrastructure) 2007

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

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

As the proposal is for a new road and road infrastructure facilities and is to be carried out by Roads and Maritime, it can be assessed under Part 5 of the EP&A Act. Development consent from council is not required.

The proposal is not located on land reserved under the *National Parks and Wildlife Act 1974* and does not affect land or development regulated by *State Environmental Planning Policy No. 14 - Coastal Wetlands*, *State Environmental Planning Policy No. 26 - Littoral Rainforests*, *State Environmental Planning Policy (State and Regional Development) 2011* or *State Environmental Planning Policy (Major Development) 2005*.

Part 2 of the ISEPP contains provisions for public authorities to consult with local councils and other public authorities before the start of certain types of development. Consultation, including consultation as required by ISEPP, is discussed in chapter 5 of this REF.

State Environmental Planning Policy No 44 – Koala Habitat

State Environmental Planning Policy No. 44 – Koala Habitat Protection (SEPP 44) aims to encourage the proper conservation and management of areas of natural vegetation that provide habitat for Koalas (*Phascolarctos cinereus*). SEPP 44 also aims to ensure a permanent free-living population of Koalas over their present range, and reverse the current trend of Koala population decline by:

- requiring the preparation of plans of management before development consent can be granted in relation to areas of core Koala habitat
- encouraging the identification of core Koala habitat areas
- encouraging the inclusion of core Koala habitat areas in environment protection zones.

While SEPP 44 does not apply under Part 5 of the EP&A Act, this REF considers the intent of the SEPP.

SEPP 44 applies to each LGA listed in Schedule 1, which includes the Tumut LGA. The Tumut LGA has amalgamated with the Tumbarumba LGA to form the Snowy Valleys LGA. A small portion of the proposal site occurs within the Snowy Valleys LGA. Schedule 2 of SEPP 44 lists preferred feed tree species of the Koala.

White Box (*Eucalyptus albens*) trees occur in the biodiversity investigation area (described in section 6.1) and are a preferred feed tree species. Therefore, potential Koala habitat is present. However, field survey results and habitat assessment for the Koala indicate that the investigation area does not contain habitat for this species (see biodiversity assessment in Appendix B).

The investigation area is therefore unlikely to contain core Koala habitat, defined by SEPP 44 as '*an area of land with a resident population of koalas, evidenced by attributes such as breeding*

females (that is, females with young) and recent sightings of and historical records of a population.'

4.1.2 Local Environmental Plans

Local government areas

The majority of the proposal site is located within the Cootamundra-Gundagai Regional Council LGA (see Figure 1.2), 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.

A small portion of the proposal site (Halfway Hill) is located within the Snowy Valleys LGA (see Figure 1.2), which was created with the amalgamation of the Tumut and Tumbarumba Shire Councils. Currently, the *Tumut Local Environmental Plan 2012* is still relevant to the proposal. Under the *Tumut Local Environmental Plan 2012*, the proposal site is located in the RU1 – Primary Production and SP2 – Infrastructure land use zones with Gocup Road a 'Classified Road'.

The provisions of the *Gundagai Local Environmental Plan 2011 and Tumut Local Environmental Plan 2012* do not apply to the proposal due to the application of the ISEPP. Nevertheless, consideration is given below to the provisions of these LEPs.

RU1 – Primary Production

The objectives of the RU1 Primary Production zone in the *Gundagai Local Environmental* Plan *2011* and the *Tumut Local Environmental Plan 2012* (combined) are:

- to encourage sustainable primary industry production by maintaining and enhancing the natural resource base
- to encourage diversity in primary industry enterprises and systems appropriate for the area
- to minimise the fragmentation and alienation of resource lands
- to minimise conflict between land uses within this zone and land uses within adjoining zones
- to encourage the efficient use and conservation of water resources
- to protect significant scenic landscapes
- to encourage development that does not adversely impact nearby agricultural activities
- to protect, enhance and conserve the natural environment, including native vegetation, wetlands and wildlife habitat
- to ensure development prevents or mitigates land degradation
- to protect significant scenic landscapes.

The proposal would permanently remove 20.4 hectares of agricultural land from production. Agricultural land is well represented in the investigation area and locality, and the proposed removal does not represent a large proportion of agricultural land. The proposal would not cause significant fragmentation of any rural properties. The proposal would therefore have only minor impacts on agricultural land. The proposal would benefit primary industry in the region by providing a safer road environment with a higher level of service.

SP2 – Infrastructure land use

The objectives of the SP2 – Infrastructure land use zone in the *Tumut Local Environmental Plan 2012* are:

- to provide for infrastructure and related uses
- to prevent development that is not compatible with or may detract from the provision of infrastructure.

Gocup Road occurs within this zone. Any impacts to Gocup Road users during construction, including traffic delays, would be minor.

The proposal involves upgrading Gocup Road to provide a safer road environment and a higher level of service for motorists and heavy vehicles. The proposal is therefore compatible with the objectives of this land use zone.

4.2 Other relevant NSW legislation

4.2.1 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 in deciding whether there is likely to be a significant impact on threatened biota or their habitats. For any of these that 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.

The potential for impacts on ecology have been considered in section 6.1. The biodiversity assessment (Appendix B) concludes that the proposal would be unlikely to have a significant impact on any threatened species, populations, ecological communities or their habitats listed under the TSC Act. Therefore, a species impact statement is not required.

4.2.2 Noxious Weeds Act 1993

The objectives of the *Noxious Weeds Act 1993* include:

- identify noxious weeds in respect of which particular control measures need to be taken
- specify those control measures
- specify the duties of public and private landholders as to the control of those noxious weeds
- provide a framework for the State-wide control of those noxious weeds by the Minister and local control authorities.

Under this Act, noxious weeds have been identified for local government areas and assigned control categories (such as W1, W2, W3 and W4). Part 3 of the Act provides that occupiers of land (including owners of land) have responsibility for controlling noxious weeds on the land they occupy.

The potential impacts of the proposal relating to noxious weeds, and site specific safeguards, are included in section 6.1.

4.2.3 National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* (NPW Act) provides the basis for legal protection and management of Aboriginal sites within NSW, and for the management of National Parks estate.

An Aboriginal Heritage Impact Permit (AHIP) was granted for a number of upgrade sections along Gocup Road by OEH on 24 November 2015. An AHIP variation application for the proposal was submitted to OEH in 2016.

4.2.4 Heritage Act 1977

The *Heritage Act 1977* (Heritage Act) is concerned with all aspects of heritage conservation ranging from basic protection against indiscriminate damage and demolition of buildings and sites, through to restoration and enhancement.

Heritage places and items of particular importance to the people of NSW are listed on the State Heritage Register. Only those heritage items that are of State significance are listed on the State Heritage Register. Approval under Section 60 of the Heritage Act may be required for impacts to a listed heritage item.

The Heritage Act also protects 'relics', which can include archaeological material, features and deposits. Section 4(1) of the Heritage Act defines a *'relic'* as follows:
relic means any deposit, artefact, object or material evidence that:
(a) relates to the settlement of the area that comprises New South Wales, not being Aboriginal settlement, and
(b) is of State or local heritage significance.

Under Section 139 of the Heritage Act, NSW Heritage Council approval is required before the disturbance or excavation of land if a project will, or is likely to result in, disturbance to a relic.

4.2.5 Protection of the Environment Operations Act 1997

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

The POEO Act defines land-based extractive activity as an activity that involves the extraction, processing or storage of more than 30,000 tonnes per year of extractive materials. The proposal would likely involve extraction of more than 600,000 tonnes of material.

The POEO Act declares material crushing to be a scheduled activity if it has a capacity to process more than 150 tonnes of materials per day or 30,000 tonnes of materials per year. The proposal has the potential to exceed either of these limits.

An environment protection licence (EPL) from the Environment Protection Authority (EPA) is therefore required. Roads and Maritime would apply to the EPA for an environment protection licence.

4.2.6 Water Management Act 2000

The *Water Management Act 2000* controls the carrying out of activities in or near water sources in NSW, the extraction and use of water and the construction of works such as dams and weirs. 'Water sources' are defined as a river, lake, estuary, place where water occurs naturally on or below the surface of the ground or NSW coastal waters.

The proposal is exempt from the requirement to obtain a 'controlled activity' approval under section 38 of the *Water Management (General) Regulation 2011* for work on waterfront land.

Under clause 61 of the *Water Management Act 2000*, a person may apply to the Minister for Water for an access licence (section 56) if the application is for a specific purpose access licence and a management plan provides that an application for the licence may be made. Under clause 18 of the *Water Management (General) Regulation 2011*, Roads and Maritime is exempt from obtaining an access licence for road construction and maintenance operations, including dust suppression.

Under section 91B of the *Water Management Act 2000*, a water supply work approval authorises its holder to construct and use a specified water supply work at a specified location (eg for pumping water from a river). If extraction of water from the Tumut River and/or Murrumbidgee River is required for the proposal, a water supply work approval would be required.

Water sharing plans created under the *Water Management Act 2000* establish rules for sharing water between the environmental needs of a river or aquifer and water users, and also between different types of water use, such as town supply, rural domestic supply, stock watering, industry and irrigation.

The proposal occurs within the area administered by the *Water Sharing Plan for the Murrumbidgee Regulated River*. Water extraction approvals may be granted in the water sources covered by the Plan.

4.2.7 Crown Lands Act 1989

Acquisition of Crown land would be undertaken in line with section 34 (1) of the *Crown Lands Act 1989*. The area of land to be acquired would be 0.36 hectares.

Clause 10 of the *Crown Lands Act 1989* lists the objects of the Act, while clause 11 details the principles of Crown land management. The proposal is assessed against these objects and principles in Table 4.1.

Table 4.1: Assessment of the proposal against the objects and principles of the *Crown Lands Act 1989*

Object/principle	Response
Clause 10 objects	
To ensure that Crown land is managed for the benefit of the people of NSW and in particular to provide for:	
(a) a proper assessment of Crown land	The assessment of the environmental impacts of the proposal in this REF has included impacts on Crown land. This has included biodiversity values (see section 6.1) and the land use and social values of Crown land for the local community (see section 6.7). The proposal is unlikely to have any substantial impacts on Crown land.
(b) the management of Crown land having regard to the principles of Crown land management contained in this Act	See Clause 11 principles below.
(c) the proper development and conservation of Crown land having regard to those principles	See Clause 11 principles below.
(d) the regulation of the conditions under which Crown land is permitted to be occupied, used, sold, leased, licensed or otherwise dealt with	Not applicable to this REF.
(e) the reservation or dedication of Crown land for public purposes and the management and use of the reserved or dedicated land	Not applicable to this REF.
(f) the collection, recording and dissemination of information in relation to Crown land	Not applicable to this REF.

Object/principle	Response
Clause 11 principles of Crown land management	
(a) that environmental protection principles be observed in relation to the management and administration of Crown land	The assessment of the environmental impacts of the proposal in this REF has included impacts on Crown land. This has included biodiversity values (see section 6.1) and the land use and social values of Crown land for the local community (see section 6.7). The proposal is unlikely to have any substantial impacts on Crown land.
(b) that the natural resources of Crown land (including water, soil, flora, fauna and scenic quality) be conserved wherever possible	The potential impacts of the proposal on soil and water (section 6.2), flora and fauna (section 6.1) and scenic quality (section 6.5) have been assessed by this REF. Safeguards and management measures are detailed in these sections to avoid or minimise the impacts of the proposal.
(c) that public use and enjoyment of appropriate Crown land be encouraged	Not applicable – the Crown land acquired is not available for public use.
(d) that, where appropriate, multiple use of Crown land be encouraged	The impacts of the proposal on all existing uses of Crown land have been assessed in this REF (see section 6.7). The proposal would remove a small area (0.36 hectares) of Crown land currently being used for agricultural production. The proposed acquisition of land is minor and would not have a substantial effect on the agricultural use of the land.
(e) that, where appropriate, Crown land should be used and managed in such a way that both the land and its resources are sustained in perpetuity	This REF has provided safeguards to minimise the potential long term impacts of the proposal on Crown land and its resources as described in the sections of this table above.
(f) that Crown land be occupied, used, sold, leased, licensed or otherwise dealt with in the best interests of the State consistent with the above principles	The proposal would be constructed for the benefit of the people of NSW, with benefits for the timber and milling industry and local community, as detailed in section 6.8. This REF assesses that the acquisition of a small area (0.36 hectares) of Crown land is in the best interests of the State and is consistent with the above principles.

4.3 Commonwealth legislation

4.3.1 Environment Protection and Biodiversity Conservation Act 1999

Under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) a referral is required to the Australian Government for proposed actions that have the potential to significantly impact on matters of national environmental significance or the environment of Commonwealth land. These are considered in Appendix A and chapter 6 of the REF.

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

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

4.4 Confirmation of statutory position

The proposal is categorised as development for the purpose of a road and is being carried out by or on behalf of a public authority. Under clause 94 of the ISEPP the proposal is permissible without consent. The proposal is not State significant infrastructure or State significant development. The proposal can be assessed under Part 5 of the EP&A Act.

Roads and Maritime is the determining authority for the proposal. This REF fulfils Roads and Maritime's obligation under clause 111 of the EP&A Act to examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the activity.

5 Consultation

5.1 Consultation for the Tumut to Hume Highway Corridor Strategy

Transport for NSW and Roads and Maritime developed the Tumut to Hume Highway Corridor Strategy (Transport for NSW 2016). This strategy addressed the constraints associated with the Snowy Mountains Highway and Gocup Road between Tumut and the Hume Highway.

Consultation with the community and stakeholders during the strategy's development is directly relevant to the proposal.

During development of the Tumut to Hume Highway Draft Corridor Strategy, local councils and other government agencies were consulted. Feedback was included in the strategy.

The Tumut to Hume Highway Draft Corridor Strategy was released for community comment between Monday 1 February and Friday 26 February 2016. The draft report was published on the Transport for NSW and Roads and Maritime websites.

Relevant stakeholders were contacted in writing and invited to provide comment on the strategy. Community stakeholders contacted included:

- local government members of parliament
- local shire councils
- government agencies
- Aboriginal land councils
- local interest groups
- Chamber of Commerce
- local industry
- transport operators including freight, bus and taxi
- visitor information centres
- schools
- emergency services.

Community members and stakeholders were encouraged to send submissions via the Roads and Maritime website, email, mail or phone.

Issues identified during the strategy's development, including community and stakeholder consultation, are broadly summarised in Table 5.1.

Table 5.1: Summary of issues identified during development of Tumut to Hume Highway Corridor Strategy

Issues identified	Response / where addressed in REF
The need for the Gocup Road upgrade to: • meet current road design standards • provide a safer road environment • improve traffic and freight efficiency • provide for high productivity vehicles • provide overtaking opportunities • improve the condition of the road surface.	• The need for the proposal is identified in chapter 2 • A description of the proposal, including the design, is provided in chapter 2.5.
• The need to inform road users about delays from road upgrade works.	• Measures to inform road users about delays from road works would be implemented as described in section 6.3.

5.2 Consultation strategy

Roads and Maritime has consulted with potentially affected property owners, stakeholders and government agencies during the selection of the preferred options and development of the proposal designs. The purpose of consultation has been to:

- inform the community of the proposal
- advise government agencies and stakeholders of the proposal and its possible impacts.

If the proposal is determined to proceed, Roads and Maritime would continue to consult with community stakeholders and utility providers.

5.3 Community involvement

5.3.1 Project website

Information regarding the full Gocup Road works program has been placed on the Roads and Maritime project website since the program began in 2012. Since 2015, the project website has included specific reference to the proposed upgrade of the Halfway Hill/Doctors Hill section of Gocup Road. The project website provides the project manager's contact details so the community can comment on the proposal or request further information.

5.3.2 Property owner consultation

Roads and Maritime has consulted individually with property owners near the proposal site, including owners of properties where acquisition is required. This consultation has included:

- notifying property owners of the proposed Gocup Road upgrade of at Halfway Hill and Doctors Hill
- informing property owners of the potential acquisition of land from various properties and new property boundaries, and establishing agreements
- meeting with some property owners to discuss potential short-term leases for temporary stockpile sites
- identifying infrastructure impacts and requirements for infrastructure to be relocated.

Roads and Maritime would continue to consult with the owners of properties near the proposal site during the final stages of detailed design and throughout construction.

5.3.3 Summary of issues raised

Issues raised by the community during consultation for the Tumut to Hume Highway Corridor Strategy and during property owner consultation are summarised in Table 5.2.

Table 5.2: Summary of issues raised by the community

Group	Issue raised	Response / where addressed in REF
Residents and property owners	• Impacts to private infrastructure and relocation requirements.	• Impacts to various items of private infrastructure and relocation measures are described in section 6.7.

5.4 Aboriginal community involvement

Site investigation and consultation with the Aboriginal community was completed in line with the Roads and Maritime 'Procedure for Cultural Heritage Consultation and Investigation' (PACHCI) and in consultation with the Roads and Maritime Aboriginal Cultural Heritage Officer as summarised in Table 5.3.

Table 5.3: Summary of Roads and Maritime Procedure for Aboriginal Cultural Heritage Consultation and Investigation

Stage	Description
Stage 1	Initial Roads and Maritime assessment – a focus group meeting was held on 21 November 2014 in Tumut, which was attended by registered Aboriginal parties.
Stage 2	Site survey and further assessment - a site assessment was carried out by Kelleher Nightingale Consulting (2012) in consultation with Aboriginal stakeholders under Stage 2 of the PACHCI. Further site assessments were carried out by Waters Consultancy (2015a) and Kelleher Nightingale (on 21 August 2015). The latter site survey team comprised the Roads and Maritime Aboriginal Cultural Heritage Officer, representatives from Kelleher Nightingale Consulting and members of the Brungle/Tumut Local Aboriginal Land Council. Additional assessment of concept design changes to sections of the program of works was completed by Waters Consultancy (2015b).
Stage 3	Formal consultation and preparation of an Aboriginal Cultural Assessment was carried out by Waters Consultancy (2015a) to inform the Cultural Heritage Assessment Report (CHAR) prepared by Kelleher Nightingale Consulting (2015) for the entire Gocup Road works program. Roads and Maritime consulted with the Aboriginal community as follows: • advertised the proposed program of works • contacted potential Aboriginal stakeholders identified from government agency notification responses • invited Aboriginal people with relevant knowledge of the Aboriginal objects and places in the area to register an interest in the program of works • conducted investigations which have included consultation with 62 Aboriginal community groups and individuals, including the Brungle Tumut Local Aboriginal Land Council. The cultural assessment identified eight Aboriginal archaeological sites that would be impacted by the Gocup Road upgrade works program. None of these sites are located in the Halfway Hill/Doctors Hill investigation area. Following this, Waters Consultancy (2015b) completed a supplementary Aboriginal cultural assessment to assess changes to the concept designs for the Cookoomoroo, Doctors Hill, Halfway Hill and Gilmore Creek Bridge sections of Gocup Road. An Aboriginal archaeological due diligence assessment was completed by Kelleher Nightingale Consulting (2016) for the proposed extension of the AHIP boundary for additional areas outside the approved AHIP area on Halfway Hill and Doctors Hill.
Stage 4	Implement environmental impact assessment recommendations – standard recommendations would be implemented in relation to unexpected archaeological finds.

A more detailed description of the Aboriginal community consultation process is provided in the Aboriginal heritage assessment provided in Appendix D.

5.5 ISEPP consultation

Clauses 13 to 16 of the ISEPP require that public authorities consult with councils and other public authorities for certain activities when proposing to carry out development without consent. Table 5.4 assesses the relevance of these clauses to the proposal.

Table 5.4: Assessment of clauses 13, 14, 15 and 16 of the ISEPP

Clause	Is consultation required?
Clause 13	
1(a) Substantial impact on stormwater management services provided by a council.	Stormwater management services provided by a council are not present in the investigation area. Formal consultation with a council is not required for this item.
1(b) Likely to generate traffic to an extent that would strain the capacity of the road system in a local government area.	The proposed increase in vehicle movements on Gocup Road during construction represents an increase of up to 36 per cent of the existing traffic volumes. This is unlikely to strain the capacity of the road system. Formal consultation with a council is not required for this item.
1(c) Involves connection to, and a substantial impact on the capacity of, any part of a sewerage system owned by a council.	A sewage system owned by a council is not present in the investigation area. Formal consultation with a council is not required for this item.
1(d) Involves connection to, and use of a substantial volume of water from, any part of a water supply system owned by a council.	A water supply system owned by a council is not present in the investigation area. Formal consultation with a council is not required for this item.
1(e) Involves the installation of a temporary structure on, or the enclosing of, a public place that is under a council's management or control that is likely to cause a disruption to pedestrian or vehicular traffic that is not minor or inconsequential.	The proposal would not involve the construction of a temporary structure on, or the enclosing of, a public place that would cause a disruption to pedestrian or vehicular traffic. Formal consultation with a council is not required for this item.

Clause	Is consultation required?
1(f) Involves excavation that is not minor or inconsequential of the surface of, or a footpath adjacent to, a road for which a council is the roads authority under the *Roads Act 1993* (if the public authority that is carrying out the development, or on whose behalf it is being carried out, is not responsible for the maintenance of the road or footpath).	The proposal would not involve excavation that is not minor or inconsequential, of the surface of a council road. Formal consultation with a council is not required for this item.
Clause 14	
Is likely to have an impact that is not minor or inconsequential on a local heritage item (other than a local heritage item that is also a State heritage item) or a heritage conservation area.	The proposal is unlikely to affect any local heritage items. Formal consultation with a council is not required for this item.
Clause 15	
Development that is to be carried out on flood liable land that may be carried out without consent and that would change flood patterns other than to a minor extent.	The proposal may be located on flood liable land in the vicinity of Stuckeys Creek at the southern end of the proposal site. The proposal would not change flood patterns other than to a minor extent Formal consultation with a council is not required for this item.
Clause 16	
Clause 16 of the ISEPP states that a consent authority must not carry out any of the following development without giving written notice to the specified authority and taken their responses into consideration:	
(a) development adjacent to land reserved under the *National Parks and Wildlife Act 1974*—the Office of Environment and Heritage,	The proposal is not located adjacent to land reserved under the *National Parks and Wildlife Act 1974*.
(b) development adjacent to a marine park declared under the *Marine Parks Act 1997*—the Marine Parks Authority,	The proposal is not located adjacent to a marine park.
(c) development adjacent to an aquatic reserve declared under the *Fisheries Management Act 1994*—Department of Primary Industries—Fishing and Aquaculture,	The proposal is not located adjacent to an aquatic reserve.

Clause	Is consultation required?
(d) development in the foreshore area within the meaning of the Sydney Harbour Foreshore Authority Act 1998—the Sydney Harbour Foreshore Authority,	The proposal is not located in the foreshore area.
(e) development comprising a fixed or floating structure in or over navigable waters—Roads and Maritime,	The proposal does not include development comprising a fixed or floating structure in or over navigable waters.
(f) development for the purposes of an educational establishment, health services facility, correctional centre or group home, or for residential purposes, in an area that is bush fire prone land (as defined by the Act)—the NSW Rural Fire Service.	The proposal is not for the purposes of an educational establishment, health services facility, correctional centre or group home, or for residential purposes.

Formal ISEPP consultation with a council is not required. Nevertheless, Roads and Maritime has consulted extensively with Cootamundra-Gundagai Council and Snowy Valleys Council in relation to the proposal and entire program of works, and would continue to do so during the detailed design and construction of the proposal.

5.6 Government agency and stakeholder involvement

Various government agencies and stakeholders have been consulted about the proposal, listed in Table 5.5.

Table 5.5: Government agencies and stakeholders consulted about the proposal

Agency	Methods of consultation
Office of Environment and Heritage (OEH)	• Letters re Aboriginal heritage • Liaison on additional knowledge holders for PACHCI process • Submission of (Aboriginal Heritage Impact Permit (AHIP) application • Submission of AHIP variations • Letter sent to Biodiversity Conservation Officer (Sep 2016) • Meeting between Project Manager and OEH to discuss AHIP Variation Application (Oct 2016).
Environment Protection Authority (EPA)	• Discussion with EPA in early 2016 regarding Gocup Road upgrade and process for Environment Protection Licence (EPL) • Letter sent to EPA, Sep 2016 outlining proposals • Meeting with EPA in Oct 2016, to discuss EPL application and Gocup Road upgrade.
Cootamundra-Gundagai Council	• Bi-monthly steering committee meetings • Letter Sep 2016.

Agency	Methods of consultation
Snowy Valleys Council	• Bi-monthly steering committee meetings • Letter Sep 2016.
Department of Primary Industries – Fishing and Aquaculture	• Letter Sep 2016.
Telstra	• Telstra engaged in Sep 2016 to design optic fibre relocations.
Essential Energy	• Essential Energy engaged in Sep 2016 to design powerline relocations.

Issues that have been raised as a result of consultation with these agencies and stakeholders are summarised below in Table 5.6. The responses are included in full in Appendix F.

Table 5.6: Issues raised through government agency and stakeholder consultation

Agency	Issue raised	Response / where addressed in REF
EPA	• The goals of the proposal should include the following: – no pollution of waters (including surface and groundwater) – polluted water, including polluted stormwater, is captured on the site and collected, treated and beneficially re-used, where this is safe and practicable to do so • The REF should document the measures that will achieve the above goals • The REF should clearly detail site drainage and any natural or artificial waters within or near the development.	• Sections 3.4.3 and 6.2
	• The proposal's goals should include mitigation of dust impacts such that potential impacts on sensitive receivers are minimised in line with the EPA particulate matter and deposited dust criteria • Details should be provided on the proposed measures to manage dust 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.	• Section 6.5

Agency	Issue raised	Response / where addressed in REF
	• The goals of the proposal should include design, construction, operation and maintenance of the proposed works in line with relevant noise policies, guidelines and criteria to minimise potential noise impacts • Noise impacts need to be assessed and comply with the requirements of the 'Interim Construction Noise Guideline' • All residential and noise sensitive receivers likely to be impacted 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.	• Section 6.4
	• The goals of the project should include the following in relation to waste and chemicals: – it is in line 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 should be mitigated – the beneficial re-use of all wastes generated at the site are maximised where it is safe and practical to do so – no waste disposal occurs on site • 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 line with the EPA guideline 'Waste Classifications Guidelines, Part 1: Classifying waste', November 2014.	• Section 6.11
	• A goal of the proposal should ensure that environmental risks from hazardous chemicals and chemical waste are minimised • 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 or stored on site.	• Section 6.2

Agency	Issue raised	Response / where addressed in REF
OEH	• OEH recommends the determining authority consider whether a flora and fauna assessment (assessment of significance) is required for the development as habitat values may be present for threatened species • To address the impacts on threatened species, the REF should demonstrate how the principle of avoid, minimise and offset has been applied • The REF should 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 impacts to flora and fauna may be assessed using either the BioBanking Assessment Methodology or a detailed biodiversity assessment.	• Section 6.1
	• OEH has already provided advice about the REF requirements for these sections of upgrade for Aboriginal cultural heritage. Aboriginal Heritage Impact Permit #C0001499 has been issued for a number of sections of Gocup Road • An addendum to the original archaeological and cultural value reports must be provided for each section. These reports must follow the Code of Practice requirements • An update on consultation with registered Aboriginal parties must be provided • This information must be provided with an AHIP variation application.	• The requested information and AHIP variation application have been provided.
Snowy Valleys Council	• Snowy Valleys Council has been involved in significant consultation with Roads and Maritime over the past four years to facilitate the construction of the overall Gocup Road upgrade project, which Council recognises will have far reaching benefits to the area, the region and the state • It is expected the REF and EPL will provide sufficient direction to ensure the protection of the local environment is achieved • On these grounds, Snowy Valleys Council offers no objection to the proposed works.	• Noted

5.7 Ongoing or future consultation

Ongoing consultation would be carried out in line with the Roads and Maritime 'Community Engagement Policy Statement 2012' and the Roads and Maritime 'Community Engagement and Communication Manual 2012'.

The following ongoing consultation would be carried out by Roads and Maritime:

- consult with community stakeholders and property owners in the investigation area to acquire land and to assist in managing impacts during construction
- ongoing meetings with community stakeholders and utility providers as required
- ongoing updates throughout the planning phase and construction period to the immediately affected community
- affected landowners would be notified at least five days before construction activities that would directly impact on properties during construction
- the Roads and Maritime website would include updates, contact details for further information or complaints, and notices of upcoming work
- a contact number would be provided for the community to register any comments or complaints during construction of the proposal
- information would be published in local newspapers, including notices of traffic control.

6 Environmental assessment

This section of the REF provides a detailed description of the potential environmental impacts associated with the construction and operation of the proposal. All aspects of the environment potentially impacted upon by the proposal are considered. This includes consideration of:

- potential impacts on matters of national environmental significance under the EPBC Act
- the factors specified in the guidelines Is an EIS required? (DUAP 1995/1996) as required under clause 228(1) of the *Environmental Planning and Assessment Regulation 2000* and the 'Roads and Related Facilities EIS Guideline' (DUAP 1996). The factors specified in clause 228(2) of the *Environmental Planning and Assessment Regulation 2000* are also considered in Appendix A.

6.1 Biodiversity

A specialist biodiversity assessment of the proposal was prepared (GHD 2017a) and is provided in Appendix B. The outcomes of the assessment are summarised in this section.

6.1.1 Methodology

The investigation area for the biodiversity assessment is defined as the area within 500 metres of the proposal site.

The assessment involved the following methods:

- background ecology information was reviewed. This information included:
  - OEH (2016a) Wildlife Database Atlas – licensed data. 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 2016a) (searched 18 July 2016)
  - NSW Department of Primary Industries – noxious weed declarations – Gundagai and Tumut local government area control areas (DPI 2016b) (searched 18 July 2016)
- previous reports prepared for Roads and Maritime 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)
- flora and fauna surveys were conducted by two ecologists at various times between 8 October 2014 and 7 April 2016 (see Figure 6.1). Surveys included:
  - flora plot and transect surveys
  - hollow-bearing tree surveys
  - fauna habitat assessment

  - diurnal bird surveys
  - bridge/roost watches
  - Anabat echolocation surveys
  - harp trapping for microchiropteran bats
  - spotlighting for nocturnal fauna
  - reptile and amphibian searches
  - opportunistic fauna observations
- targeted surveys for threatened terrestrial fauna and flora species with the potential to occur in the investigation area:
  - Yass Daisy (*Ammobium craspedioides*)
  - Crimson Spider Orchid (*Caladenia concolor*)
  - Pine Donkey Orchid (*Diuris tricolor*)
  - Tarengo Leek Orchid (*Prasophyllum petilum*)
  - Small Purple-pea (*Swainsona recta*)
  - Silky Swainson-pea (*Swainsona sericea*)
  - Austral Toadflax (*Thesium australe*)
  - Golden Sun Moth (*Synemon plana*)
  - Striped Legless Lizard (*Delma impar*)
  - Box-Gum Woodland (White Box Yellow Box Blakely's Red Gum Woodland)
- an assessment of the likelihood of occurrence was completed for threatened species, populations and ecological communities, and migratory species, with the potential to occur in the investigation area. The possibility of an impact on each species, population or ecological community was also assessed
- potential impacts on species listed under the TSC Act were assessed in line with the Assessment of Significance included in section 5A of the EP&A Act, with reference to DECC (2007) (see biodiversity assessment in Appendix B)
- potential impacts on species listed under the EPBC Act were assessed in line with the EPBC Act Policy Statement 'Matters of National Environmental Significance: Significant impact guidelines 1.1' (DotE 2013) (see biodiversity assessment in Appendix B)
- safeguards and management measures for the proposal were developed based on site conditions and the potential impacts of the proposal.

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P18
Northern road reserve
P14
Drainage line
P7
P5
P17
P6
P8
P16
P15
P9
P10
Site compound
Stony Creek
Big Ben Creek
Slaughterhouse Creek
Gocup Road
Minjary Street
Ellis Street
Stuckeys Creek

LEGEND

- Striped Legless Lizard survey (tiles)
- Flora survey
- Bird survey and nocturnal fauna survey
- Road
- Creek
- Drainage line
- Northern road reserve
- Site compound
- Stockpile site
- Proposal site
- Study area

Paper Size A3

0 200 400 800

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 04 May 2017

Biodiversity survey locations

Figure 6.1

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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

6.1.2 Existing environment

Flora

Plant community types

The following plant community types (PCTs) are present in the investigation area:

- White Box and Blakely's Red Gum (*Eucalyptus blakelyi*) (see Figure 6.2) form an ecotone in the investigation 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)
- 'Long-leaved Box – Red Box – Red Stringybark mixed open forest on hills and hillslopes in the NSW South Western Slopes Bioregion' (PCT ID 287).

All PCTs contain patches of vegetation that are in moderate/good condition and low condition, as defined under the BioBanking Assessment Methodology (OEH 2014).

Stuckeys Creek and Black Spring Gully, just south of the proposal site, 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.

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 investigation area (PCT ID 266 and PCT ID 277 – see section above) meets the classification criteria for the ecological community 'White Box Yellow Box Blakely's Red Gum Woodland' (listed as endangered under the TSC Act). Those patches that also contain a predominantly native understorey (assessed using perennial species only) and other distinguishing characteristics also meet 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). Both these listed communities are hereon referred to as Box-Gum Woodland. The extent of Box-Gum Woodland in the investigation area is shown in Figure 6.5. A large area of Box-Gum Woodland is located in the northern section of road reserve at Doctors Hill.

Many areas of Box-Gum Woodland in the investigation area have a ground layer dominated by introduced flora species. The highest diversity of native species occurs on the tops of cuttings in the road reserve and in the larger patches of woodland, which are not as heavily invaded by introduced perennial flora species. The woodland and grassland in the road reserve in the north of the investigation area are the only areas that classify as EPBC Act Box-Gum Woodland (see Figure 6.5 and Figure 6.2).

Figure 6.2: White Box/Blakely's Red Gum woodland in northern section of road reserve

Figure 6.3: Red Box / Long-leaved Box woodland

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Vegetation type and condition

- 287 Long-leaved Box - Red Box - Red Stringybark mixed open forest on hills and hillslopes M/G
- 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

P18
Northern road reserve
P14
Drainage line
P7
P17
P5
Gocup Road
P6
P8
P16
P15
P9
P10
Ellis Street
Minjary Street
Stuckeys Creek
Big Ben Creek
Stony Creek
Slaughterhouse Creek

LEGEND

- Flora survey
- Hollow-bearing tree
- Remove
- Retain
- Road
- Creek
- Drainage line
- Proposal site
- Northern road reserve
- Study area

Paper Size A3

0 200 400 800

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

Plant community types and hollow-bearing trees

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Date 04 May 2017

Figure 6.4

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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

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Threatened ecological community
- Box-Gum Woodland (TSC / EPBC Act)
- Box-Gum Woodland (TSC Act)

Stony Creek
Big Ben Creek
Slaughterhouse Creek
Northern road reserve
Drainage line
P18
P14
P7
P5
P17
Gocup Road
P6
P8
P16
P15
P9
P10
Big Ben Creek
Ellis Street
Minjary Street
Stuckeys Creek

LEGEND
- Flora survey
- Road
- Creek
- Drainage line
- Proposal site
- Northern road reserve
- Study area

Paper Size A3
0 200 400 800
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
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Threatened ecological communities

Figure 6.5

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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

Areas of non-native vegetation are located throughout the proposal site. These occur mostly as introduced grassland dominated by pasture species such as Wild Oats, Phalaris (*Phalaris aquatica*), Fescue (*Vulpia* sp.) and Great Brome (*Bromus diandrus*). Introduced tree species that occur in the investigation area include planted English Elms (*Ulmus procera*) and blossom trees (*Prunus* sp.).

Flora survey results and noxious weeds

Field surveys identified 120 flora species, of which 59 species are native and 61 species are introduced.

Two flora species listed as noxious for the Cootamundra-Gundagai Local Control Authority (LCA) area and one flora species listed as noxious for the Snowy Valleys LCA area (DPI 2016b) were recorded during flora surveys:

- Blackberry (*Rubus* sp.)
- St John's Wort (*Echium plantagineum*)
- Paterson's Curse (*Hypericum perforatum*).

Paterson's Curse is only listed as noxious for the Snowy Valleys LCA area and was the only noxious weed species recorded in the Snowy Valleys LCA section of the investigation area.

Noxious weed classes are prescribed by DPI. All noxious weed species observed are classified as class four weeds. This means the growth of plant must be managed in a manner that reduces its numbers, spread and incidence, and continuously inhibits its reproduction.

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

Although not a noxious weed, African Lovegrass (*Eragrostis curvula*) is present along the existing Gocup Road in the north of the investigation area next to the road reserve woodland in the north of the study area. This is a perennial grass species of concern identified in the listing of the key threatening process 'Invasion of native plant communities by exotic perennial grasses'.

Fauna

Fauna habitats

Woodland

Woodland habitat for fauna in the study includes patches of Box-Gum Woodland and Red Box woodland.

Mature eucalypt trees exist throughout the investigation 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 investigation area would be used for nesting and foraging by a range of woodland birds, arboreal mammals and microchiropteran bats.

Hollow-bearing trees in the investigation area are likely to provide roosting and nesting habitat for microchiropteran bats, such as the threatened Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*), arboreal mammals including the Squirrel Glider (*Petaurus norfolcensis)* and Common Brushtail Possum *(Trichosurus vulpecula),* and a range of woodland birds. Owls such as the threatened Barking Owl (*Ninox connivens*), Barn Owl (*Tyto alba*) and Southern Boobook (*Ninox novaeseelandiae*) 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

Native grassy areas in the investigation area are located west of the existing Gocup Road. They provide foraging habitat for common mammals such as the Eastern Grey Kangaroo (*Macropus giganteus*). Grassy areas also provide foraging and nesting habitat for woodland birds, including threatened species such as the Diamond Firetail (*Stagonopleura guttata*).

Aquatic habitat

No permanent watercourses occur in the investigation area. Stuckeys Creek is an ephemeral creek that intersects Gocup Road just south of the proposal site. 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.

The creek, drainage lines, and farm dams in the investigation area provide potential habitat for frogs such as the Eastern Sign-bearing Froglet (*Crinia parinsignifera*) and Peron's Tree Frog (*Litoria peronii*). Aquatic habitat also provides foraging and breeding habitat for wetland birds, such as ducks and herons.

Northern road reserve drainage line

The drainage line in the north of the investigation area (see Figure 6.5) contains vegetation and rocky areas that provide habitat for fauna, including reptiles. During rain periods, rocky areas are also likely to accumulate pools of water that provide a drinking resource for fauna.

Fauna survey results

As part of biodiversity assessments for other proposals along Gocup Road, fauna surveys were completed at a number of locations outside the investigation area for Halfway Hill/Doctors Hill. These results are also 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 investigation area.

Field surveys for the current survey period along all sections of Gocup Road identified 78 fauna species, of which 75 are native and three are introduced (see biodiversity assessment in Appendix B).

Fifty-three bird species were identified during field surveys, one of which, the Common Starling (*Sturnus vulgaris*), is introduced. 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*).

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, 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. Anabat survey results are included in the biodiversity assessment in Appendix B.

Wildlife connectivity corridors

The nearest remnant native vegetation is in the northern road reserve east of Gocup Road in the north of the investigation area, which is directly connected to the proposal site. The patch and adjoining vegetation is over 10 hectares in size. There are similar remnant patches in private property that are also connected to the proposal site both east and west of the investigation area.

Vegetation in the investigation area is sparsely connected to Minjary National Park, which is located about 2.4 kilometres south of the investigation area. The park has an area of 1462 hectares and contains remnant Box-Gum Woodland.

Woodland in the investigation area is highly fragmented. Habitat connectivity in the investigation area has been largely reduced due to past clearing for agriculture. The existing connectivity of vegetation across Gocup Road in the vicinity of section 4 is limited due to the lack of vegetation corridors immediately adjacent to either side of the road. However, areas of native vegetation are present east and west of the southern and northern ends of the proposal site. It is likely that some fauna would cross the cleared land between these vegetation areas.

Threatened and migratory biota

Literature reviews, database searches and field surveys identified 16 bird species, five mammal species (including four bat species) and one endangered ecological community listed under the TSC Act and EPBC Act, which are known or likely to occur in the investigation area. These species are listed in Table 6.1.

Table 6.1: Listed species and communities known or likely to occur in the investigation area

Species / population / ecological community	Status		Likelihood of occurrence
	NSW	Comm	
Ecological communities			
Box-Gum Woodland	E	CE	Recorded
Birds			
Barking Owl *Ninox connivens*	V	-	High
Black-chinned Honeyeater (eastern subspecies) *Melithreptus gularis gularis*	V	-	Recorded
Black Falcon *Falco subniger*	V	-	Moderate
Brown Treecreeper (eastern subspecies) *Climacteris picumnus victoriae*	V	-	Recorded

Species / population / ecological community	Status		Likelihood of occurrence
	NSW	Comm	
Diamond Firetail *Stagonopleura guttata*	V	-	Recorded
Flame Robin *Petroica phoenicea*	V	-	Recorded
Gang-gang Cockatoo *Callocephalon fimbriatum*	V	-	Recorded
Hooded Robin *Melanodryas cucullata cucullata*	V	-	High
Little Eagle *Hieraaetus morphnoides*	V	-	Recorded
Little Lorikeet *Glossopsitta pusilla*	V	-	Recorded
Scarlet Robin *Petroica boodang*	V	-	High
Speckled Warbler *Chthonicola sagittata*	V	-	High
Superb Parrot *Polytelis swainsonii*	V	V	High
Swift Parrot *Lathamus discolor*	E	E	High
Turquoise Parrot *Neophema pulchella*	V	-	High
Varied Sittella *Daphoenositta chrysoptera*	V	-	Recorded
Mammals			
Squirrel Glider *Petaurus norfolcensis*	V	-	Moderate
Bats			
Eastern Bentwing-bat *Miniopterus schreibersii oceanensis*	V	-	Recorded
Eastern False Pipistrelle *Falsistrellus tasmaniensis*	V	-	High
South-eastern Long-eared Bat *Nyctophilus corbeni*	V	V	Moderate
Yellow-bellied Sheathtail-bat *Saccolaimus flaviventris*	V	-	Recorded

V – vulnerable, E – endangered, CE – critically endangered, Mi – migratory
**Note – records of threatened birds and bats are from other sections of Gocup Road – refer to biodiversity assessment in Appendix B*

EP&A Act assessments of significance were completed for species listed under the TSC Act that are known or likely to occur in the investigation area and that are likely to be affected by the proposal. Significance assessments were also completed for species listed under the EPBC Act that are known or likely to occur in the investigation area and are likely to be affected by the proposal (see biodiversity assessment in Appendix B). The results of these are described in section 6.1.3.

6.1.3 Potential impacts

Construction

Removal of native vegetation

The proposal would remove about 57.3 hectares of vegetation, of which 37.6 hectares is native woodland and grassland (Table 6.2). Of this, 29.5 hectares is classified as Box-Gum Woodland and derived grassland listed under the TSC Act (of which 0.9 hectares is also EPBC Act-listed Box-Gum Woodland) (Table 6.3), and 8.1 hectares is Red Box woodland and derived grassland, which is not a listed ecological community.

Table 6.2: Impacts on vegetation

Plant community type (PCT)	Status	Removal area (ha)
PCTID 266/277 – White Box / Blakely's Red Gum woodland	Endangered – TSC Act Critically endangered – EPBC Act	
Woodland		9.7
Derived grassland		19.8
PCTID 287 - Red Box / Long-leaved Box woodland	Not threatened	
Woodland		2.3
Derived grassland		5.8

The proposed removal of Box-Gum Woodland for section 4 (Halfway Hill and Doctors Hill) is shown in Table 6.3.

Of the 29.5 hectares of Box-Gum Woodland proposed to be removed, 5.7 hectares is moderate/good condition woodland, 19.8 hectares is derived grassland and 4.0 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 81 per cent of all Box-Gum Woodland removal. Three per cent of the Box-Gum Woodland proposed to be removed meets the classification criteria of the EPBC Act form of the ecological community.

The proposal would remove 10.4 per cent of Box-Gum Woodland of moderate/good condition in the investigation area (not including derived grassland).

The removal of Box-Gum Woodland for the entire Gocup Road works program has been assessed in relation to the amount of Box-Gum Woodland in the investigation area (see section 6.12).

Table 6.3: Assessment of Box-Gum Woodland removal from the investigation area

	Box Gum Woodland (meeting TSC Act criteria only) (ha)			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	4.0 (13%)	**4.8 (16%)**	19.8 (67%)	**0.9 (3%)**	**5.7 (19%)**
Box-Gum Woodland in investigation area	Not assessed	**7.6**	Not assessed	**47.4**	**55**
Percentage removed		**63%**		**2%**	**10%**

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

Removal of threatened fauna species habitat

Woodland and derived grassland habitat removal

The woodland proposed to be removed comprises mature and juvenile trees and is known or likely to provide habitat for a range of woodland birds, reptiles and mammals. The removal of woodland is likely to reduce habitat used by fauna for foraging, breeding, shelter and movement.

Removing derived grassland may affect species dependent on groundcover vegetation for foraging such as the Diamond Firetail and Flame Robin.

Loss of hollow-bearing trees

Surveys identified that 23 hollow-bearing trees would likely be removed by the proposal (Figure 6.4). The characteristics of the hollow-bearing trees to be removed are listed in the biodiversity assessment in Appendix B, including tree diameter at breast height (dbh) and number and diameter of hollows. The 23 hollow-bearing trees likely to be removed contain about 60 hollows; including five trees with trunk hollows greater than 30 centimetres.

The proposed removal of hollow-bearing trees is likely to affect threatened hollow-dependent fauna species such as the Brown Treecreeper.

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 fauna habitat resources within the investigation area. There are, however, a large number of hollow-bearing trees in the investigation 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.

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 site.

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.

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 any disturbance. Clearing of hollow-bearing trees carries the risk of injury to hollow dependent fauna that may be using hollows at the time of clearing.

Potential impacts to fauna would be avoided through the implementation of pre-clearing safeguards outlined in section 6.1.4.

There may also be an increase in injury and mortality of wildlife during operation as a result of the widened road, particularly in sections where overtaking lanes are proposed. This is unlikely to substantially increase injury and mortality due to the minor increase in width as a result of the additional lane (3.5 metres).

Disturbance of fauna

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

With the implementation of safeguards in section 6.1.4 including culvert inspections and bat exclusion measures, if required, the proposal would be unlikely to substantially affect fauna in the investigation area.

Groundwater dependent ecosystems

The proposal is located in the catchment of the groundwater dependent ecosystem identified in section 6.1.2. Cut sections for the proposal would have a maximum depth of 19.2 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.

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 investigation area.

Wildlife connectivity and habitat fragmentation

The woodland in the investigation area is highly fragmented. The existing vegetation connectivity across Gocup Road in the vicinity of section 4 is limited due to a lack of adjacent vegetation corridors on either side of the road.

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

Proposed earthworks would create cut and fill sections in the land surface with a width of up to 150 metres. This has the potential to deter ground-dwelling species from moving through the investigation area between areas of native vegetation on either side of the southern half of Gocup Road. Cut sections would have a maximum depth of 19.2 metres and fill sections would have a maximum height of 13.5 metres. Embankment batter slopes would be 4 horizontal: 1 vertical for batters with a height/depth of two metres or less and generally 2 horizontal: 1 vertical for batters with a height/depth of greater than two metres. Cutting batter slopes 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 250 metres and would not prevent fauna from moving through the investigation 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 habitat fragmentation.

The proposal would remove a thin corridor of woodland vegetation next to Gocup Road in the centre of the investigation area. This corridor comprises relatively young regrowth vegetation with a degraded understorey. The corridor does not connect to any larger remnants of woodland. Some arboreal species such as the Squirrel Glider are unlikely to occupy this area due to the lack of connectivity and the young age of the trees. The proposed removal of this vegetation is unlikely to cause a substantial increase in lack of connectivity for fauna species.

The proposal would also remove some 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 investigation 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 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. Roads and Maritime would also investigate revegetation work at other locations along the road corridor and potentially private property as part of the Biodiversity Offset package for the proposal.

Invasion and spread of weeds

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

Three noxious weed species were identified during the surveys. The proposal has the potential to cause further spread of noxious weeds such as St John's Wort, Blackberry and Paterson's Curse throughout the proposal site and investigation area. The spread of weeds is of particular concern in areas with higher proportions of native species such as near the northern road reserve in the north of the investigation area.

Invasion of native plant communities by exotic perennial grasses, such as African Lovegrass (*Eragrostis curvula*), which occurs in the north of the investigation area near the northern road reserve, is a key threatening process.

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 6.1.4.

Sedimentation

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

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 gill surfaces with sediment leading to asphyxiation
- swallowing large amounts of sediment leading to illness
- inhibiting 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 interstitial spaces inhabited by fish.

An erosion and sediment control plan would be prepared as part of the construction environmental management plan (CEMP) to manage potential erosion and sedimentation issues during construction. Potential impacts from sedimentation would be managed by implementing safeguards identified in section 6.1.4.

Contamination

The proposal has the potential to impact native flora and fauna through fuel and chemical spills. 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 6.1.4.

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 workers' 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 6.1.4.

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 6.1.4

Operation

Fauna collisions

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 an increase in traffic speed. 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.

Avoid, minimise, mitigate and offset impacts

The "avoid, minimise, mitigate and offset" hierarchy has been followed in relation to impacts on threatened species, ecological communities and migratory species listed under the TSC Act and the EPBC Act.

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.

Design of the proposal has avoided encroachment on the drainage line at the northern end of the proposal site in the northern road reserve. The proposal would maintain vegetation and rocky habitats in this drainage line.

Safeguards to mitigate impacts on biodiversity are listed in section 6.1.4. The residual impacts of the proposal would be offset as detailed in section 6.1.5.

Conclusion on significance of impacts

The assessment of likelihood of occurrence found that the proposal may potentially impact on 16 bird species, five mammal species (including four bat species) and one ecological community listed under the TSC Act. Assessments of significance under Section 5A of the EP&A Act were completed for these (see biodiversity assessment in Appendix B).

The assessment of likelihood of occurrence found that the proposal may potentially impact upon two bird species, one bat species and one ecological community listed as threatened under the EPBC Act. Significance assessments (with reference to the EPBC Act Policy Statement 'Matters of National Environmental Significance: Significant impact guidelines 1.1') were completed for these (see biodiversity assessment in Appendix B).

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

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

The proposal is not likely to significantly impact threatened species, populations or ecological communities or their habitats, within the meaning of the *Threatened Species Conservation Act 1995* or *Fisheries Management Act 1994* and therefore a species impact statement is not required.

The proposal is not likely to significantly impact threatened species, populations, ecological communities or migratory species, within the meaning of the *Environment Protection and Biodiversity Conservation Act 1999.*

6.1.4 Safeguards and management measures

Impact	Safeguards and management measures	Responsibility	Timing
Biodiversity – 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 construction environmental management plan (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.	Project manager	After award pre-construction

Impact	Safeguards and management measures	Responsibility	Timing
Biodiversity – 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 • 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) and revegetation areas • Where practicable, hollow-bearing tree removal will occur outside the main fauna breeding season (August to January) to avoid potential fauna breeding disturbance • The pre-clearing process detailed in RTA (2011) – 'Biodiversity Guidelines Guide 1: Pre-clearing process', will be implemented before start of work • 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, trees in the vicinity of stockpile sites and the drainage line in the northern road reserve in the north of the investigation area • Large and hollow-bearing trees to be retained will be defined by survey before clearing and protected by a physical barrier or fence • The limits of the proposal will be defined by survey before clearing and grubbing.	Project manager and contractor	After award pre-construction
Biodiversity – loss of native vegetation and fauna habitat	• 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 • Where possible, make design changes to avoid or minimise impacts to better quality patches of Box-Gum Woodland • Where possible, minimise removal of mature trees, including hollow-bearing trees, while still meeting operational objectives for road safety and design • Where possible, avoid disturbing native vegetation when building temporary access tracks to stockpile sites or establishing temporary facilities	Project manager and contractor	Pre-construction

Impact	Safeguards and management measures	Responsibility	Timing
	• A hollow replacement strategy will be investigated to compensate for removal of hollow-bearing trees for the full works program • Hollows will be placed in areas where few current suitable den/nest trees exist but where other habitat components (connectivity and foraging) are of good quality.		
Biodiversity – impacts to microbats using culverts	• Culverts will be inspected for roosting bats before culvert extension works are carried out. Inspections will be carried out in line with 'Biodiversity Guidelines Guide 1: Pre-clearing process' and 'Biodiversity Guidelines Guide 9: Fauna handling' (RTA 2011) • If bats are found to inhabit the culverts, an ecologist will relocate the bats and implement exclusion measures before culvert works start.	Project manager	After award pre-construction and construction
Biodiversity – 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'.	Project manager and contractor	After award pre-construction
Biodiversity – loss of native vegetation and fauna habitat	• Felled hollow-bearing trees will be left on site for at least 24 hours after felling to allow any resident fauna to relocate • 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 • All construction vehicles and equipment will follow the traffic management plan, including the vehicle movement plan.	Project manager and contractor	Construction

Impact	Safeguards and management measures	Responsibility	Timing
Biodiversity – 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) • 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.	Project manager and contractor	Construction
Biodiversity – loss of mature trees, including hollow-bearing trees	• Pruning or lopping of limbs will be conducted in preference to tree removal wherever possible.	Project manager and contractor	Construction
Biodiversity – 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' • 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'.	Project manager and contractor	Construction
Biodiversity – 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 manager immediately and commissioning an assessment of the likely impacts of the proposal on the threatened species.	Project manager and contractor	Construction

Impact	Safeguards and management measures	Responsibility	Timing
Biodiversity – impacts to aquatic habitat	• If necessary, aquatic habitat at Stuckeys Creek will be protected in line with RTA (2011) – 'Biodiversity Guidelines Guide 10: Aquatic habitats and riparian zones' and Section 3.3.2 'Standard precautions and mitigation measures' of the 'Policy and guidelines for fish habitat conservation and management Update 2013' (Department of Primary Industries – Fishing and Aquaculture NSW 2013).	Project manager and contractor	Construction
Biodiversity – impacts to groundwater dependent ecosystems	• Interruptions to water flows associated with groundwater dependent ecosystems will be minimised through detailed design.	Project manager	Pre-construction
Biodiversity – changes to hydrology	• Changes to existing surface water flows will be minimised through detailed design.	Project manager	Pre-construction
Biodiversity – spread of weeds	• Declared noxious weeds will be managed in line with the requirements of the NSW *Noxious Weeds Act 1993* • Weed infested topsoil will be disposed of or treated and will not be stockpiled near any areas of native vegetation.	Project manager and contractor	After award pre-construction
Biodiversity – 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'.	Project manager and contractor	Construction
Biodiversity – fragmentation of habitat corridors	• To minimise impacts on vegetation connectivity, sections of decommissioned road will be revegetated to improve connectivity of roadside vegetation • Roads and Maritime will investigate revegetation work at other locations along the road corridor and potentially private property as part of the Biodiversity Offset package for the proposal.	Project manager	Post-construction

Impact	Safeguards and management measures	Responsibility	Timing
Biodiversity – loss of native vegetation and fauna habitat	• 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 • 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'.	Project manager	Post-construction

6.1.5 Biodiversity offsets

To determine if the proposal requires biodiversity offsets, the Roads and Maritime (2016d) 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.

A preliminary draft of the Major Projects linear infrastructure module of the BioBanking Credit Calculator was completed on 5 April 2017 for the Halfway Hill/Doctors Hill section only. About 1381 ecosystem credits would be required to offset the impacts of the proposal. A full biobanking assessment would be required to accurately quantify the potential number of ecosystem credits required for the proposal.

Roads and Maritime would implement a biodiversity offset strategy in line with the Roads and Maritime policy document 'Guideline for Biodiversity Offsets'.

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

Offsets would be sought for the total area of Box-Gum Woodland impacted by the full Gocup Road works program. 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
- replacing habitat features eg tree hollows or placement of hollow logs in adjacent vegetation

- preparing a management plan for each offset site to demonstrate how management actions would be implemented.

6.2 Soils, water quality, hydrology and groundwater

The investigation area for assessment of soils, water quality, hydrology and groundwater is defined as the area within 500 metres of the proposal site.

6.2.1 Existing environment

Topography

The terrain of the investigation area is hilly to undulating. The investigation area is located in the Minjary Hills and Ranges Mitchell Landscape, which has a general elevation of 300 to 930 metres above sea level, with local relief 400 metres (Mitchell 2002).

Geology

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 (Mitchell 2002).

Hydrology

The drainage of the investigation area is shown in Figure 1.2 and Figure 1.3. Stuckeys Creek, an ephemeral watercourse, exists in the investigation area. This is a third order stream that crosses Gocup Road adjacent to the southern extent of the proposal site. An unnamed first order ephemeral watercourse that forms a deep gully is located in the northern road reserve along the east of the proposal site in the north of the investigation area. Black Spring Gully is located to the east of the southern end of the proposal site and Stony Creek is located to the east of the northern end of the proposal site.

Runoff from the southern third of the investigation area drains to Stuckeys Creek, which drains to the Tumut River about five kilometres east of the proposal site. About half of the investigation area drains to Big Ben Creek about 1.5 kilometres west of the proposal site. A small part of the investigation area in the north drains to Stony Creek, which runs about 600 metres east of the northern end of the proposal site. These creeks drain to the Murrumbidgee River about nine kilometres north-west of the proposal site.

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 (Mitchell 2002).

Contamination

A search of the EPA 'Contaminated Land: Record of Notices' (EPA 2017a) and 'List of NSW contaminated sites notified to EPA' (EPA 2017b) did not find any sites issued with regulatory notices, or any sites notified to the EPA, located in or near the investigation area.

Water quality

The water quality of creeks and drainage lines in the investigation area is affected by agricultural runoff. Agricultural runoff may contain farm chemicals and fertilisers that degrade water quality. Agricultural runoff may also contain manure from stock, which can increase:

- biochemical oxygen demand
- Levels of nutrients such as nitrogen
- Levels of bacteria such as faecal coliforms.

Groundwater

A geotechnical investigation found that depth to groundwater in the vicinity of the proposed cut sections is greater than 19.2 metres. Groundwater bores registered with the Office of Water in the investigation area record depth to groundwater at 3.0 metres, 6.4 metres and 30 metres below ground level.

Generally, the level of the water table in the investigation area is likely to fluctuate with a range of factors including proximity to creeks and drainage lines, soil type, location of aquifers, elevation, season and rainfall.

6.2.2 Potential impacts

Construction

Soil erosion

There are no major geotechnical or soil constraints to the construction and long term maintenance of the proposal.

Vegetation removal

The proposal would remove about 57.3 hectares of vegetation. Vegetation removal would expose soils to weathering processes, increasing the risk of erosion and sedimentation.

Earthworks

The proposal would involve cut and fill earthworks over an area of about 25 hectares. Estimated volumes of material excavation (cut) are:

- Halfway Hill: 155,000 cubic metres (including 13,000 cubic metres of topsoil)
- Doctors Hill: 190,000 cubic metres (including 9000 cubic metres of topsoil).

Subject to the material's suitability for use as fill, 320,000 cubic metres of this material would be used for road construction.

Large cut excavations have the potential to destabilise landforms, particularly on cutting faces. Loose fill may erode during rainfall events. Erosion of earthworks could cause sedimentation of creeks and drainage lines. Sedimentation may also influence nearby vegetation and habitat by smothering groundcover vegetation and changing soil surface characteristics.

Construction of new road

During construction of new roads there would be a risk of soil compaction from the movement and operation of large machinery such as excavators, rollers and trucks. Heavy machinery can disturb the soil surface, increasing the potential for erosion.

Vehicle movements, including machinery and support vehicles

Machinery and support vehicles used for construction would be driven off road and would have the potential to transport excess material onto sealed roads near the construction site.

Stockpiling

Material would be stockpiled at various stages during construction. Inadequately stabilised stockpile material could erode in high rainfall or windy conditions.

Soil contamination

Fuel and chemical spills

There is potential for fuel or chemical spills during construction, which may result in localised contamination of soils. Spills could occur during refuelling or through leaking of hydraulic and lubricating oil from plant and equipment. The potential for contamination from fuel and chemical

spills is considered to be low provided the safeguards and management measures outlined in section 6.2.3 are implemented.

Exposure of contaminated soil

No known contaminated sites are located in or near the investigation area. Given the agricultural land use of the investigation area, it is unlikely that any soil contamination would be exposed during construction.

Water quality

The introduction of pollutants from construction into the surrounding environment, if uncontrolled, could potentially have the following impacts on the water quality of creeks and drainage lines:

- increased sediment load and organic matter causing adverse impacts to water quality, such as increased turbidity. Provided safeguards and management measures are implemented, this is unlikely
- gross pollutants (large waste items such as rubbish and construction materials) entering creeks and drainage lines, particularly during high rainfall events
- reduced water quality in creeks and drainage lines due to an influx of contaminants such as fuel or chemicals from accidental spills.

Water quality impacts could also occur through uncontrolled release of rinse water from plant washing and concrete slurries.

The potential for construction water quality impacts to Stuckeys Creek and drainage lines is considered to be moderate, given their close proximity to the proposal site.

Hydrology

Construction of the proposal is likely to affect surface runoff characteristics near the proposal site through cut and fill earthworks and roadside drainage construction. 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 substantial long-term changes in surface hydrology.

The proposal may involve extraction of water from the Tumut and/or Murrumbidgee Rivers. The volume of water extracted would be unlikely to substantially affect flows in these rivers. Extraction of water would be managed to minimise impacts to the environment of these rivers.

Groundwater

Excavations for the proposal would have a maximum depth of 19.2 metres. Geotechnical investigations for the proposal have indicated that groundwater would not be intercepted at this depth. Depth to groundwater may be less in areas of the proposal site located away from hills. Cut in these areas would be minimal and would also be unlikely to intercept groundwater.

Operation

Topography and soils

Impacts to landscape, geology, and soils may occur through the operation of the proposal, due to:

- an increase in the amount and velocity of water runoff due to the sealed road surface and road embankments
- alterations to the topographic environment through road work and landscaping.

These changes could result in erosion and scouring in the investigation area. Maintenance activities during operation that could disturb soils and landforms include cleaning of culverts and table drains. Potential impacts during maintenance would be minimised by following the relevant

Roads and Maritime specifications. Impacts would also be minimal due to the infrequent nature of the activities. Revegetation and installing water control structures would reduce water velocity and the potential for erosion during operation.

Water quality

Stormwater runoff from the road may impact on the water quality of creeks, drainage lines and dams. Operation of roads leads to the build-up of contaminants on road surfaces and roadside corridors. During rain events these contaminants can be transported by run-off into surrounding waterbodies and lands. These potential impacts are unlikely to have any greater risk than that which is already present.

Maintenance during operation may result in a spill of chemicals or fuels near a creek or drainage line, however the risk of this occurring is low.

6.2.3 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing
Soils and water quality – soil erosion, sedimentation and water quality	• A soil and water management plan (SWMP) will be prepared as part of the CEMP in line with Roads and Maritime specification G38 – 'Soil and Water Management' • The soil and water management plan will also address the following: – The Blue Book - 'Soils and Construction – Managing Urban Stormwater Volume 1' (Landcom 2004) and Volume 2 (DECC 2008a) – Technical Guideline: 'Temporary Stormwater Drainage for Road Construction' (Roads and Maritime 2011b) – Guideline for Batter Surface Stabilisation Using Vegetation (RMS 2015) • A site specific Erosion and Sediment Control Plan (ESCP) will be prepared and implemented as part of the Soil and Water Management Plan. The ESCP will include arrangements for wet weather events, including monitoring of potential high risk events (such as storms) and follow-up measures to be applied in the event of wet weather. The ESCP will also include: – A maintenance schedule for ongoing maintenance of temporary erosion and sediment controls – A sediment basin management plan to guide appropriate management of runoff during construction and operation – A site specific emergency spill plan, which will include spill management	Project manager and contractor	Pre-construction

Impact	Environmental safeguards	Responsibility	Timing
	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).		
Soils and water quality – soil erosion and water quality	• A Roads and Maritime approved soil conservationist will be engaged to provide advice through all stages of the project to assess and advise on erosion and sediment control, including progressive preparation of the ESCP. The soil conservationist must regularly (at least once a month and before and after rain events) review and inspect works throughout the construction phase and provide written recommendations on the ESCP drawings and the effectiveness of controls in place. A copy of the report is to be provided to the Principal • Controls will be implemented before topsoil removal and start of earthworks within the catchment area of each structure. This includes construction of sediment basins and other water quality structures.	Project manager and contractor	Pre-construction and construction
Soils and water quality – soil contamination	• The CEMP will include a contaminated land management plan, which must comply with the *Contaminated Land Management Act 1997*, '*Guideline for the Management of Contamination'* (Roads and Maritime 2013), 'Environmental Incident Classification and Reporting Procedure' (Roads and Maritime 2014) and EPA guidelines on contaminated land management • The contaminated land management plan will include: – unexpected contamination finds – any land contamination caused during construction – measures to ensure the safety of site personnel and local communities during construction.	Project manager and contractor	Construction

Impact	Environmental safeguards	Responsibility	Timing
Soils and water quality – soil erosion and sedimentation	• Sediment and erosion controls (including sediment basins), clean water diversions and culverts will be constructed and be on line before earthworks start • Sediment basins will be regularly serviced and maintained to comply with water quality and capacity requirements • Vegetation clearing and stabilisation/revegetation activities will be carried out progressively to limit the time disturbed areas are exposed to erosion processes • Site stabilisation of disturbed areas will be carried out progressively as stages are completed • Topsoil and mulch will each be stockpiled separately for possible re-use in rehabilitation works. Mulch may also be used for erosion and sediment controls • High risk soil erosion activities such as earthworks will not be carried out immediately before or during high rainfall or wind events • Any material transported onto pavement surfaces will be swept and removed at the end of each working day • Erosion and sediment control measures will be maintained until the works are complete and areas are stabilised • Sediment netting will be installed downstream of any works in drainage lines.	Project manager and contractor	Construction
Soils and water quality – water contamination	• All fuels, chemicals, and liquids will be stored at least 50 metres away from any drainage lines and waterways and will be stored in an impervious bunded area within the compound site • Refuelling of plant and planned maintenance of machinery and plant will be carried out 50 metres away from waterways and drainage lines • Vehicles and plant will be properly maintained and regularly inspected for fluid leaks • Control of dirty water will be managed on site to avoid release into drainage lines and/or waterways • Potable water will be used for wash down • Containment material will be used to capture/filter water used in vehicle wash-	Project manager and contractor	Construction

Impact	Environmental safeguards	Responsibility	Timing
	downs • Vehicle and plant wash downs and/or concrete truck washouts will be carried out within a designated bunded area with an impervious surface or will be carried out off site • Visual monitoring of local water quality (ie turbidity, hydrocarbon spills/slicks) at Stuckeys Creek and drainage lines will be carried out on a regular basis to identify any potential spills or deficient erosion and sediment controls. Inspection records will be kept • Emergency spill kits will be kept on site at all times • All staff will be inducted about incident and emergency procedures and made aware of the locations of emergency spill kits • Should a spill occur during construction, the emergency response plan will be implemented, and the Roads and Maritime senior regional environmental officer contacted. The EPA will also be notified as per Part 5.7 of the POEO Act.		
Soils and water quality – soil contamination	• If contaminated areas are encountered during construction, appropriate control measures will be implemented to manage immediate contamination risks. All other works that may impact on the contaminated area will stop until the nature and extent of the contamination has been confirmed and any necessary site-specific controls or further actions identified in consultation with the Roads and Maritime environment officer and/or EPA.	Project manager and contractor	Construction
Soils and water quality – soil erosion and sedimentation	• Carry out surveillance to monitor the effectiveness of soil stabilisation and erosion management measures • Additional erosion management measures may be implemented if measures implemented during construction are not performing to requirements.	Roads and Maritime and construction contractor (defects liability period about two years)	Operation

6.3 Traffic and transport

6.3.1 Existing environment

The investigation area for the traffic and transport assessment is defined as the Halfway Hill/Doctors Hill section of Gocup Road and connected property access roads.

Existing roads

Gocup Road is about 31 kilometres in length and runs north from the Snowy Mountains Highway at Tumut to the Hume Highway at Gundagai. It is a two lane, two-way sealed road with a speed limit of 100 kilometres per hour. The road typically has lane widths of 3-3.5 metres and 0.5 metre sealed shoulders. The road condition is considered average (Transport for NSW 2016). Sections of the road at Halfway Hill and Doctors Hill are steep, causing heavy vehicles to travel slowly.

Gocup Road has no major intersections in the proposal site. An intersection with Ellis Street at Minjary is located at the southern end of the proposal site (Halfway Hill).

Gocup Road has been identified as a strategic freight route in NSW. Heavy vehicles use Gocup Road to travel between commercial and industrial areas around Tumut and the Hume Highway at Gundagai. This is an important route for the local timber and milling industry. Higher mass limit B-double vehicles up to 4.6 metres high are permitted to travel along the entire length of Gocup Road. Forestry product value-adding industry groups are interested in gaining access to the road network with 'high productivity vehicles' to enable more efficient transport.

Gocup Road is also an important route for residents and property owners between Tumut and Gundagai, and for people commuting between the towns for work.

Traffic volumes

Existing and projected future daily traffic volumes for roads in the investigation area are described in section 2.2.1.

Crash history

The crash history of Gocup Road between Minjary Creek and the Hume Highway at Gundagai is described in section 2.1.2.

Property access

Private access roads to local properties are mainly located in the central and southern parts of the proposal site. About 20 unsealed access roads connect to Gocup Road throughout the proposal site.

6.3.2 Potential impacts

Construction

Changed traffic conditions

Much of the proposal site is located on, or next to, the existing Gocup Road. Construction impacts to traffic would occur during construction in these areas. Where construction activities would be carried out away from the existing Gocup Road, impacts to traffic would be minimal.

Changed traffic conditions on Gocup Road near construction activities could potentially lead to reduced safety for motorists.

Lane closures for short periods would cause minor traffic delays. No temporary detours would be required for the proposal.

Increased traffic on Gocup Road

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.

During construction, the proposal would generate heavy vehicle movements through transporting materials, structures, machinery, fuel and general provisions.

Light vehicles would be required to transport staff to and from the site and in various other roles on site.

As described in section 3.3.6, the following vehicle movements are expected during construction:

- 150 to 200 heavy vehicles would access the site per day (300 to 400 movements per day)
- About 50 light vehicles would access the site per day for transporting staff (100 movements per day).

The proposed increase in vehicle movements on Gocup Road during construction represents an increase of up to 36 per cent of the existing traffic volumes. Construction vehicle impacts on the local road network are generally expected to be low.

Changes to property access

Changes to property access would be required during construction. Some property access roads may be re-located, depending on land acquisition and final design. Access to properties would be maintained throughout construction.

Operation

The main benefits of the proposal during operation include the following:

- improved road safety by upgrading the road geometry and alignment of Gocup Road. The proposal would remove existing steep inclines and sharp corners and provide a continuous 100 kilometre per hour travel speed
- improved road freight efficiency by upgrading the alignment of Gocup Road, providing a more efficient route for heavy vehicles
- improved travel times on Gocup Road by removing the constraints posed by the existing road alignment and road surface condition.

6.3.3 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing
Traffic and transport – construction impacts to traffic	A Traffic Management Plan (TMP) will be prepared and implemented as part of the CEMP. The TMP will be prepared in line with the Roads and Maritime 'Traffic Control at Work Sites Manual' (RTA, 2010) and 'QA Specification G10 Control of Traffic'. The TMP will include: • confirmation of haulage routes • measures to maintain access to local roads and properties • site specific traffic control measures (including signage) to manage and regulate traffic movement • requirements and methods to consult and inform the local community of local road network impacts in line with the Roads and Maritime 'Community Engagement and Communication Manual' (Roads and Maritime 2012) • access to construction sites including entry and exit locations and measures to prevent construction vehicles queuing on public roads • a response plan for any construction traffic incident • monitoring, review and amendment mechanisms.	Contractor and Project Manager	Detailed design/pre-construction
Traffic - construction impacts to traffic	• Property access will be maintained at all times unless otherwise agreed with affected property owners. Where changes to access arrangements are necessary, Roads and Maritime will advise owners and tenants and consult with them on alternate access arrangements • Work to tie in the new road to existing roads will occur during off-peak periods where possible to minimise impacts on traffic flow • Construction traffic will enter/exit the construction zone only in areas designated for this purpose in the Traffic Management Plan • The community will be kept informed about upcoming road construction activities, including through advertisements in the local media and by prominently placed advisory notices.	Project manager and contractor	Construction

6.4 Noise and vibration

A specialist noise and vibration assessment of the proposal was prepared (GHD 2017b) and is provided in Appendix C. The outcomes of the assessment are summarised in this section.

6.4.1 Methodology

Overview

The investigation area for the noise and vibration assessment includes all sensitive receivers within the distance that could potentially be affected by the proposal. The area encompasses 25 sensitive receivers near the proposal site (see Figure 6.6).

To assess potential noise and vibration impacts arising from construction and operation of the proposal, an assessment has been carried out considering the following:

- 'NSW Road Noise Policy' (RNP) (DECCW 2011)
- 'Noise Criteria Guideline' (NCG) (Roads and Maritime 2014b)
- 'Noise Mitigation Guideline' (NMG) (Roads and Maritime, 2014c)
- 'Noise Model Validation Guideline' (NVG) (Roads and Maritime 2016c) (currently in draft form)
- 'Preparing an Operational Traffic and Construction Noise and Vibration Assessment Report' (Roads and Maritime 2016a)
- 'Interim Construction Noise Guideline' (ICNG) (DECC 2009)
- 'Construction Noise and Vibration Guideline' (CNVG) (Roads and Maritime 2016b)
- 'Assessing Vibration: A Technical Guideline' (DEC 2006).

Noise monitoring

Noise monitoring (attended and unattended) was carried out from 11 August to 22 August 2016, at two locations near the proposal site (shown in Figure 6.6). Noise monitoring was carried out to determine background noise levels for the construction noise assessment and existing road traffic noise levels for the operational noise assessment noise modelling verification process. All noise monitoring activities were carried out and processed in line with the 'Industrial Noise Policy' (EPA 2000) long-term monitoring method. A more detailed description of the noise monitoring method is provided in the noise and vibration assessment in Appendix C.

Traffic counts were conducted in conjunction with long-term noise monitoring for the operational noise assessment noise modelling verification process.

Construction noise and vibration assessment

Overview

The methodology for the construction noise and vibration assessment included:

- establishing the construction investigation area in line with the CNVG
- calculating the rating background levels (RBL) for the proposal from the noise monitoring data obtained from the noise monitoring locations. The RBLs were used to establish the construction noise management levels in line with the ICNG
- sourcing a list of likely construction activities. Typical sound power levels for each activity were sourced from the CNVG
- predicting and assessing potential noise impacts on the surrounding sensitive receivers against the construction noise management levels and sleep disturbance criteria for each construction activity
- assessing noise impacts associated with construction traffic impacts
- carrying out a construction vibration assessment and identifying potentially impacted sensitive receivers for vibratory plant and equipment
- assessing vibratory impacts due to blasting and the impacts on nearby sensitive receivers

- considering construction noise and vibration mitigation measures with reference to the CNVG.

Construction noise source emissions

Noise levels for construction scenarios (see Table 6.4) 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 6.4: 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	121	Standard
S03	Drainage works	Backhoe, excavator, concrete pump and 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
S08	Site clean-up and rehabilitation	Trucks, scissor lifts, franna crane	115	Standard

The construction noise scenarios were categorised into the overall construction stages in Table 6.5 and were used to assess noise impacts during construction on sensitive receivers.

Table 6.5: Categorised construction scenarios

Construction stage category	Included construction scenarios
Stage 1 – offline works	S01, S02, S03, S04, S05, S06
Stage 2 / 3 – tie in works, resurfacing works	S06, S08
Compound operation	S07

Construction vibration levels

Safe working buffer distances to comply with the human comfort, cosmetic damage and heritage structural damage criteria were sourced from the CNVG and are presented in Table 6.6.

Table 6.6: Vibration safe working buffer distances

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)

Operational noise assessment

The methodology for the operational road traffic noise assessment included the following:

- establishing the noise investigation area in line with the NCG
- assessing road classification changes were assessed for existing side roads
- analysing the effects on noise levels due to road surface changes
- using these models to assess the potential noise impact against the noise criteria and assess any road traffic noise increase at sensitive receivers.

6.4.2 Existing environment

Noise environment and sensitive receivers

The existing noise environment in both project areas 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.

A number of rural residences are located at the locality of Minjary at the southern end of the proposal site and at various locations along the proposal site. The area contains 25 sensitive receivers near the proposal site (see Figure 6.6).

Summary of noise monitoring results

Attended noise monitoring results

Details of the attended noise monitoring results is provided in Table 6.7.

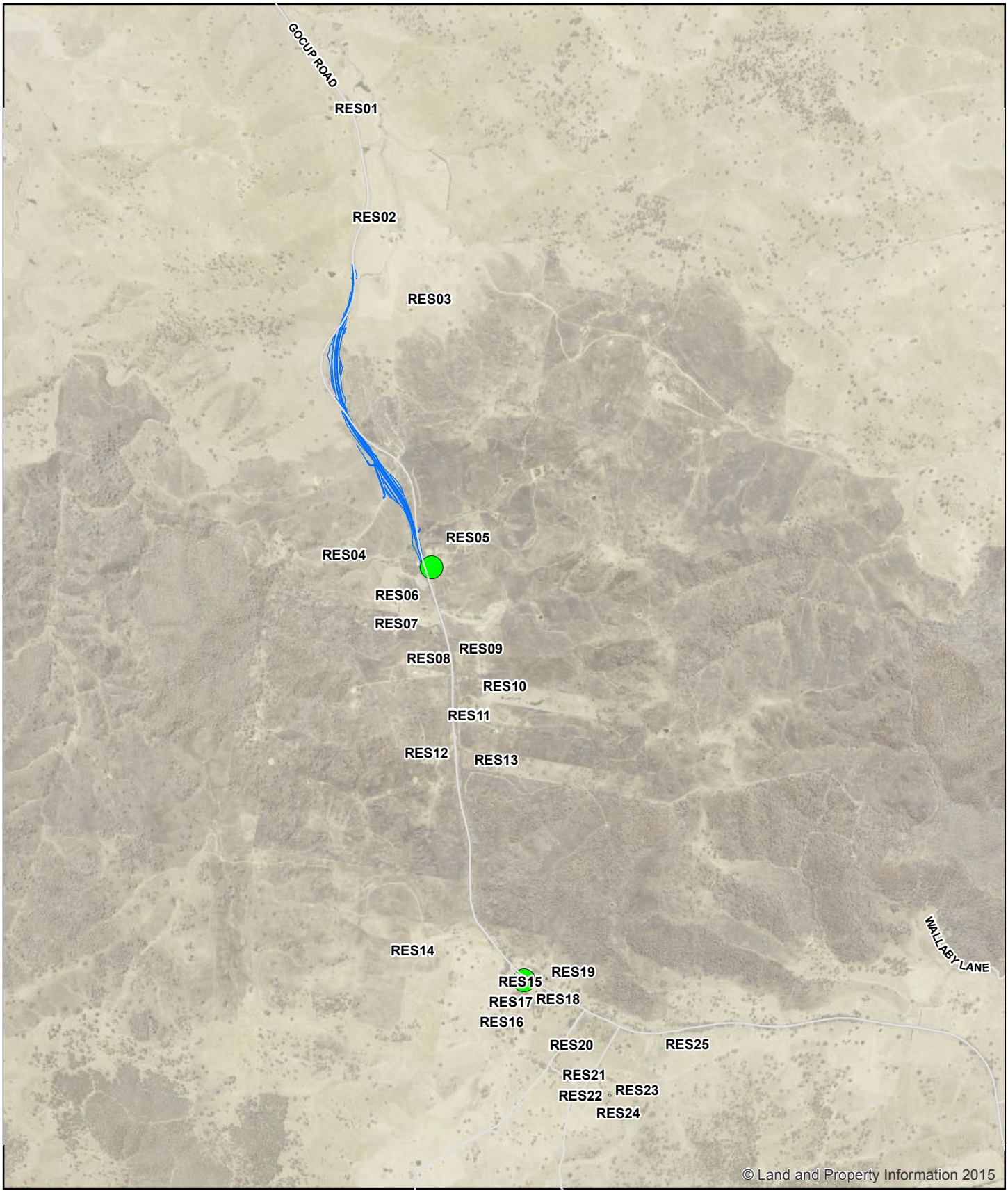
Table 6.7: Attended noise monitoring results

Location	Start	End	L_{Aeq}	L_{A90}	L_{Amin}	L_{Amax}
Location 1 (Halfway Hill)						
13 Minjary Street	11:34	11:49	63.3	36.8	29.9	88.5
13 Minjary Street	11:50	12:05	60.9	33.4	29.0	82.6

Location	Start	End	L_{Aeq}	L_{A90}	L_{Amin}	L_{Amax}
Location 2 (Doctors Hill)						
2001 Gocup Road	13:32	14:47	57.8	28.8	25.3	75.2
2001 Gocup Road	13:47	14:02	59.2	31.7	27.6	81.6

Unattended noise monitoring results

A summary of the noise logger data results, including rating background levels (RBL) and road traffic noise descriptors, is provided in Table 6.8. Data has been provided for the full noise monitoring period.



LEGEND

Noise monitoring location

Compound site

Proposal site

Paper Size A4

0 120 240 480 720 960

Metres

Map Projection: Transverse Mercator

Horizontal Datum: GDA 1994

Grid: GDA 1994 MGA Zone 55

N

Roads and Maritime Services

Doctors Hill and Halfway Hill

Noise sensitive receivers and monitoring locations

Job Number 23-15894

Revision A

Date 03 May 2017

Figure 6.6

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

C:\Users\afoddy\Desktop\Outputs\Doctors_Halfway.mxd

Data source: Data Custodian, Data Set Name/Title, Version/Date. Created by:afoddy

Table 6.8: Summary of noise monitoring results, dBA

Date	Background noise descriptors			Road traffic noise descriptors		
	$L_{A90(Day)}$	$L_{A90(Evening)}$	$L_{A90(Night)}$	$L_{Aeq(15hr)}$	$L_{Aeq(9hr)}$	$L_{A10(18hr)}$
	7am to 6pm, Monday to Saturday; 8am to 6pm Sundays & public holidays	6pm to 10pm, Monday to Sunday & public holidays	10pm to 7am, Monday to Saturday; 10pm to 8am Sunday & public holidays	7am to 10pm weekdays	10pm to 7am weekdays	6am to 12am weekdays
Location 1 – 13 Minjary Street, Halfway Hill						
Summary (overall)	30.7	33.6	29.4	59.2	56.7	57.4
Summary (weekday)	-	-	-	59.8	57.3	58.0
Location 2 – 2001 Gocup Road, Doctors Hill						
Summary (overall)	29.8	32.4	30.4	58.0	55.7	59.3
Summary (weekday)	-	-	-	57.9	56.1	59.3

Traffic survey results

Two traffic surveys were carried out as part of the noise assessment for the proposal. Traffic counts ran for one week in 2016 and are similar to the 2012-2013 traffic counts. Recorded daily traffic volumes were 1513-1516 vehicles per day. A slight increase in the percentage of heavy vehicles was recorded in 2016, with 340-360 heavy vehicles per day (22 to 24 per cent of all vehicles).

6.4.3 Criteria

Construction noise management levels

Construction noise management levels for the proposal are based on the ICNG and the CNVG. Construction work would occur during standard construction hours stated in the ICNG. Plant and equipment that generate tonal or impulsive noise emissions and blasting activities would be carried out during construction hours stated in the CNVG (see noise and vibration assessment in Appendix C).

The ICNG outlines a method to determine construction noise management levels for residential premises. Guidance to determine the residential noise management levels during and outside standard construction hours are provided in Table 6.9. The highly noise affected level (75 dB (A)) represents the level above which strong community reaction to noise is likely.

Table 6.9 details the ICNG construction noise management levels at sensitive receivers. The noise management levels for the proposal during and outside standard construction hours at sensitive receivers located inside the investigation area are summarised in Table 6.10.

Table 6.9: Noise management levels at residences

Time of day	Management level $L_{Aeq(15min)}$
Recommended standard hours: Monday to Friday 7am to 6pm Saturday 8am to 1pm No work on Sundays or public holidays	Noise affected Rating background level plus 10 dBA
	Highly noise affected 75 dBA
Outside recommended standard hours	Noise affected Rating background level plus 5 dBA

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 CNVG recommends a 65 dBA LAmax external noise level for sleep disturbance. This level has been adopted for this assessment.

Table 6.10: Proposal specific construction noise management levels, dBA

Receivers	Construction noise management level, $L_{Aeq\ (15min)}$					Sleep disturbance noise level L_{Amax}
	During standard hours		Outside standard hours			
	Noise affected	Highly noise affected	Day	Evening	Night	Night
Residence	40[1]	75	35[1]	35[1]	35[1]	65 dBA (External)

Note 1: Noise management levels are based on a RBL of 30 dBA as the measured background levels were below 30 dBA

Construction vibration criteria

Human comfort

Human comfort vibration criteria have been set with consideration to 'Assessing Vibration: A Technical Guideline' (DEC 2006). British Standard BS 6472 – 1992, 'Guide to Evaluation of Human Exposure to Vibration in Buildings (1 Hz to 80 Hz)' is recognised by the guideline as the preferred standard for assessing the 'human comfort criteria'.

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 6.11 for sensitive receivers.

While the assessment of response to vibration in BS 6472-1:1992 is based on vibration dose value (refer to Table 6.11) 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 building damage. 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 6.12.

Table 6.11: Human comfort intermittent vibration limits (BS 6427-1992)

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 6.12: 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.

Structural damage

Currently, there is no Australian Standard that sets criteria for the assessment of building damage caused by vibration. Guidance of limiting vibration values is attained from reference to German Standard DIN 4150-3: '1999 Structural Vibration – Part 3: Effects of vibration on structure'.

Table 6.13 presents guideline values for the maximum absolute value of the velocity "at the foundation of various types of building. Experience has shown that if these values are complied with, damage that reduces the serviceability of the building will not occur. If damage nevertheless occurs, it is to be assumed that other causes are responsible."

Measured values exceeding those listed in Table 6.13 "does not necessarily lead to damage; should they be significantly exceeded, however, further investigations are necessary."

Table 6.13: Guideline values for short term vibration on structures

Line	Type of structure	Guideline values for velocity (mm/s)		
		1 Hz to 10 Hz	10 Hz to 50 Hz	50 Hz to 100 Hz[1]
1	Buildings used for commercial purposes, industrial buildings, and buildings of similar design.	20	20 to 40	40 to 50
2	Dwellings and buildings of similar design and/or occupancy	5	5 to 15	15 to 20
3	Structures that, because of their particular sensitivity to vibration, cannot be classified under lines 1 and 2 and are of great intrinsic value (eg listed buildings under preservation order)	3	3 to 8	8 to 10

Note 1: At frequencies above 100 Hz the values given in this column may be used as minimum values.

Operational road traffic noise criteria

Noise criteria are assigned to sensitive receivers using the Roads and Maritime 'Noise Criteria Guideline'. The 'Noise Criteria Guideline' provides guidance on how to apply the 'NSW Road Noise Policy'.

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.

When the project specific criteria have been exceeded, a receiver may qualify for consideration of noise mitigation.

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
- event duration
- level above background or ambient noise levels.

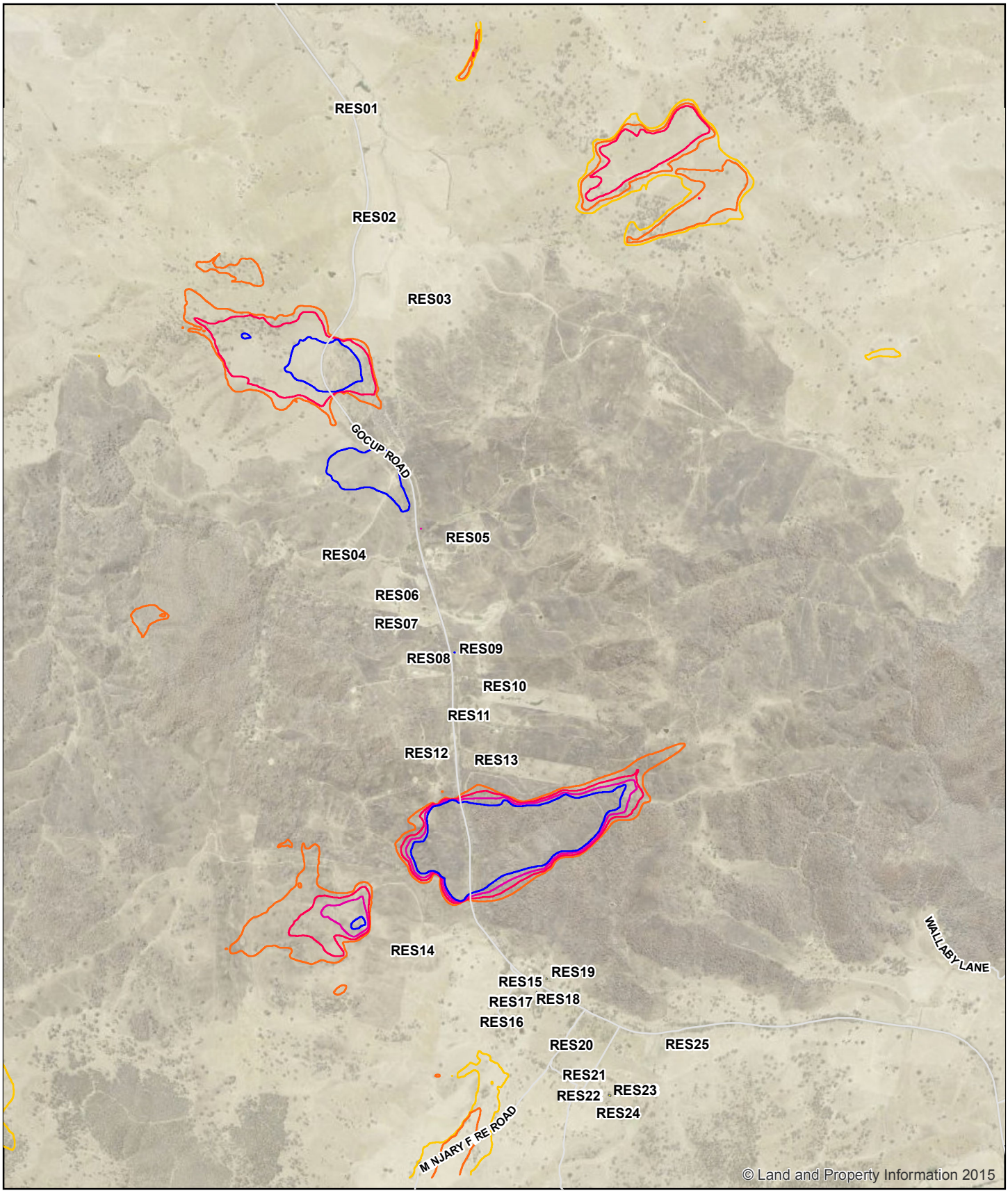
For continuous rather than intermittent traffic flow, the ENMM recommends L_{Amax} noise pass-by events should not exceed $L_{Aeq\ (1hr)}$ noise levels by more than 15 dBA. The ENMM advises that maximum noise levels can be used as a tool to prioritise and rank mitigation strategies, but should not be applied as a decisive criterion in itself.

Proposal specific operational noise criteria

The proposal has been classed within the 'new' and 'redeveloped' road categories. Sections of Gocup Road that have been substantially realigned are classified as 'new' while 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 six transition zones, one located at each end of the proposal and four located at the ends of sections that have been substantially realigned. The noise criteria for residences located within the transition zones would have specific noise criteria between the new and redeveloped NCG noise criteria.

Proposal specific operational noise criteria at all identified receivers are summarised in the noise and vibration assessment in Appendix C and shown in Figure 6.7 and Figure 6.8.



LEGEND

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
Doctors Hill and Halfway Hill

Job Number 23-15894
Revision A
Date 03 May 2017

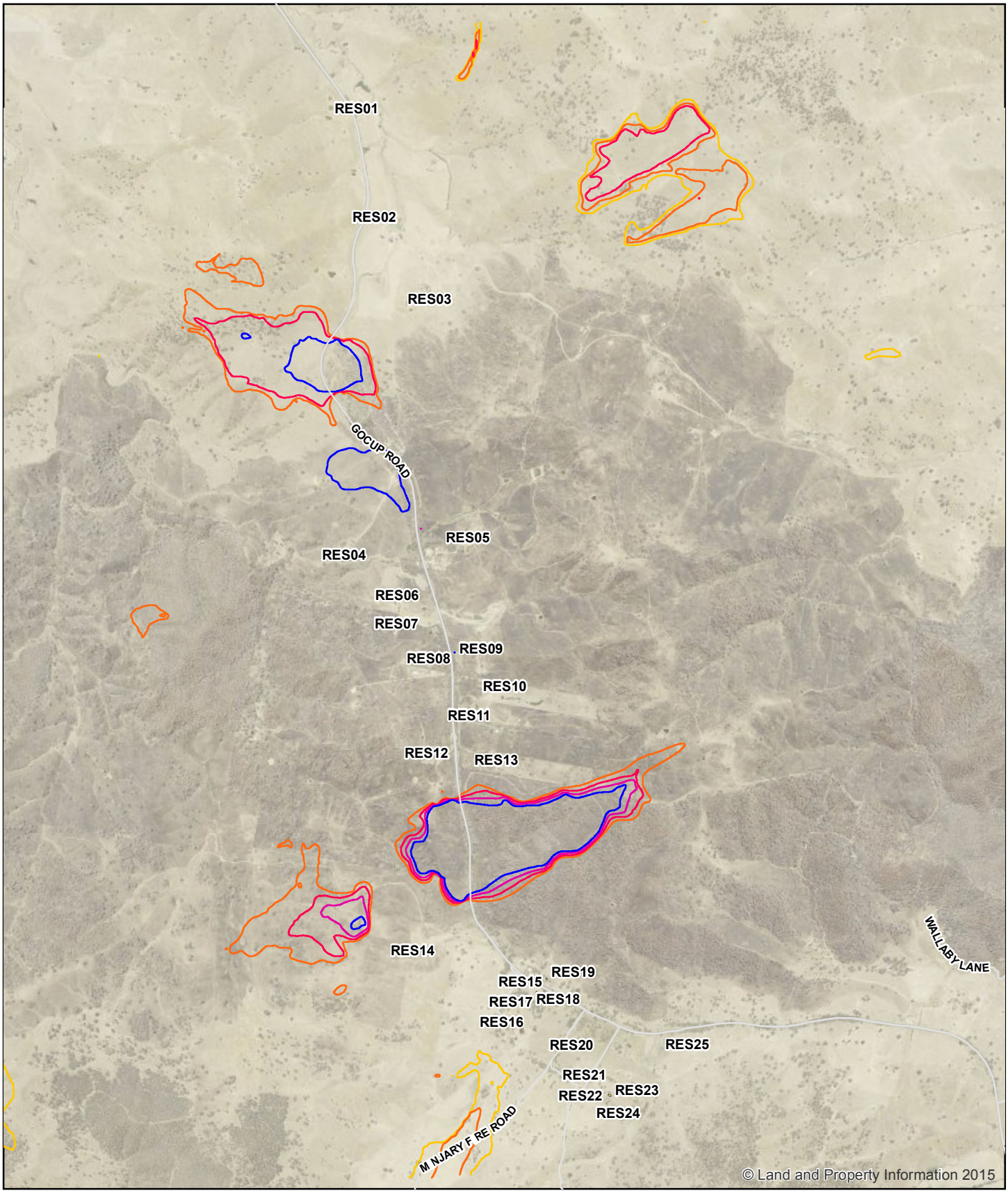
Operational noise criteria, day

Figure 6.7

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

C:\Users\afoddy\Desktop\Outputs\Doctors_Halfway.mxd

Data source: Data Custodian, Data Set Name/Title, Version/Date. Created by:afoddy



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

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Roads and Maritime Services
Doctors Hill and Halfway Hill

Job Number 23-15894
Revision A
Date 03 May 2017

Operational noise criteria, night

Figure 6.8

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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Data source: Data Custodian, Data Set Name/Title, Version/Date. Created by:afoddy

6.4.4 Potential impacts

Construction

Noise impacts during standard construction hours

Overview

Predicted noise levels from the construction scenarios outlined in Table 6.4 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 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. The predicted noise levels for each construction stage category outlined in Table 6.5 is provided below. Noise impacts have only been assessed during standard construction hours as works are not anticipated to occur outside these hours.

Stage 1 – offline works

Noise management levels during stage one works are expected to be exceeded at all sensitive receivers located within 1100 metres of the proposal site. Noise levels are predicted to exceed the noise management level of 40 dBA by up to 44 dBA at receivers located near the proposal site.

The highly noise affected level of 75 dBA is predicted to be exceeded at residences located within 60 metres of the proposal site.

Stage 2/3 – tie in works, resurfacing works

Noise management levels during stage two and three are expected to be exceeded at all residences located within 600 metres of the construction investigation area. Noise levels are predicted to exceed the noise management level of 40 dBA by up to 37 dBA at the receivers located near the proposal site.

The highly noise affected level of 75 dBA is predicted to be exceeded at residences located within 30 metres of the proposal site.

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.

Compound operation

Noise management levels during compound operation are expected to be exceeded at seven residences by up to 20 dBA.

The highly noise affected level of 75 dBA is not predicted to be exceeded during compound operation.

Summary of impacts

Noise impacts are expected during all construction stages due to the proximity of the proposal site to nearby sensitive receivers. The highest number of exceedances occurs during vegetation clear-zone works, bulk earthworks, pavement/asphalting works and site clean-up and rehabilitation.

Construction noise mitigation measures are recommended to reduce noise levels. These are identified in section 6.4.5.

The number of predicted exceedances for each construction scenario is provided in Table 6.14.

Table 6.14: 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)	7	25	0	6	23	24	7	21
Standard construction hours (exceeds highly noise affected-residential receivers)	0	4	0	0	0	1	0	0

Sleep disturbance impacts

No sleep disturbance impacts at sensitive receivers are predicted. Works are expected to occur during standard construction hours.

Vibration

High vibration generating activities such as vibratory rolling, pavement breaking and pavement milling have the potential to cause cosmetic damage to standard dwellings. Safe working distances for the proposal are based on a vibratory roller greater than 18 tonnes. Standard dwellings have been identified within 100 metres and 25 metres of the proposal site. The number of dwellings within each buffer distance is listed in Table 6.15.

Table 6.15: Number of dwellings within safe working distances

Type	Number of receivers
Standard dwellings identified within 100 m of construction corridor (human comfort)	5 (residential)
Standard dwellings identified within 25 m of construction corridor (cosmetic damage)	1 (residential)

The receiver located within 25 metres of the vibration safe buffer distance for cosmetic damage is identified in Table 6.16.

Table 6.16: Dwellings within safe working distances for cosmetic damage

Receiver ID	Address	Building type	Distance from proposal, m
RES15	1603 Gocup Road	Residential	15

Construction blasting impacts

There is potential for blasting to be carried out at a few locations within the investigation area. Potential blasting locations are shown in Figure 6.9.

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 line with AS2187.2 Explosives – storage and use, which provides site exponents for ‘average’ meteorological attenuation and ground conditions.

Ground vibration and airblast overpressure levels at various distances from the blasting site have been calculated and are shown in Figure 6.10 and Figure 6.11 for various charge masses. The relevant noise and vibration criteria have also been plotted on the graphs.

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, in particular receivers RES10 to RES13 (see Figure 6.9). Mitigation measures have been recommended in section 6.4.5 to minimise these impacts.

Operation

Assessment of noise impacts against NCG controlling criterion

No residential receivers in the investigation area qualify for noise mitigation.

Noise impact assessment results have been modelled in line with the RNP, NCG and NMG and are as follows:

- the NCG controlling criterion is predicted to be exceeded at two sensitive receivers during the day-time period
- the NCG controlling criterion is predicted to be exceeded at four 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 road does not create a large increase in existing noise levels for any sensitive receiver located within the noise and vibration investigation 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 receivers exceeding the criteria is provided in Table 6.17.

Table 6.17: Properties where the NCG controlling criterion is exceeded

Controlling criterion exceeded day		Controlling criterion exceeded night	
RES01	2262 Gocup Road	RES01	2262 Gocup Road
RES15	1603 Gocup Road	RES15	1603 Gocup Road
-	-	RES17	1583 Gocup Road
-	-	RES18	1575 Gocup Road

The NMG is used to assess whether a receiver that exceeds the controlling criterion qualifies for additional mitigation. No receivers that exceed the controlling criterion qualify for additional mitigation as:

- the increases 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.

601,000 602,000 603,000 604,000

6,109,000 6,108,000 6,107,000 6,106,000 6,105,000

RES03
RES04
RES05
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RES16
RES17
RES18
RES19

Doctors Hill
Halfway Hill
Gocup Road

Big Bar Creek
Gocup Road
Ellis Street
Minjary Street
MINJARY
Stuckeys Creek
Gocup Road

LEGEND

- Locality
- Road design
- Existing road
- Creek
- Potential blasting location

Paper Size A3

0 100 200 400

Metres

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

N

Roads and Maritime Services
Gocup Road upgrade REFs

Potential construction blasting locations

Job Number	23-15894
Revision	0
Date	04 May 2017

Figure 6.9

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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

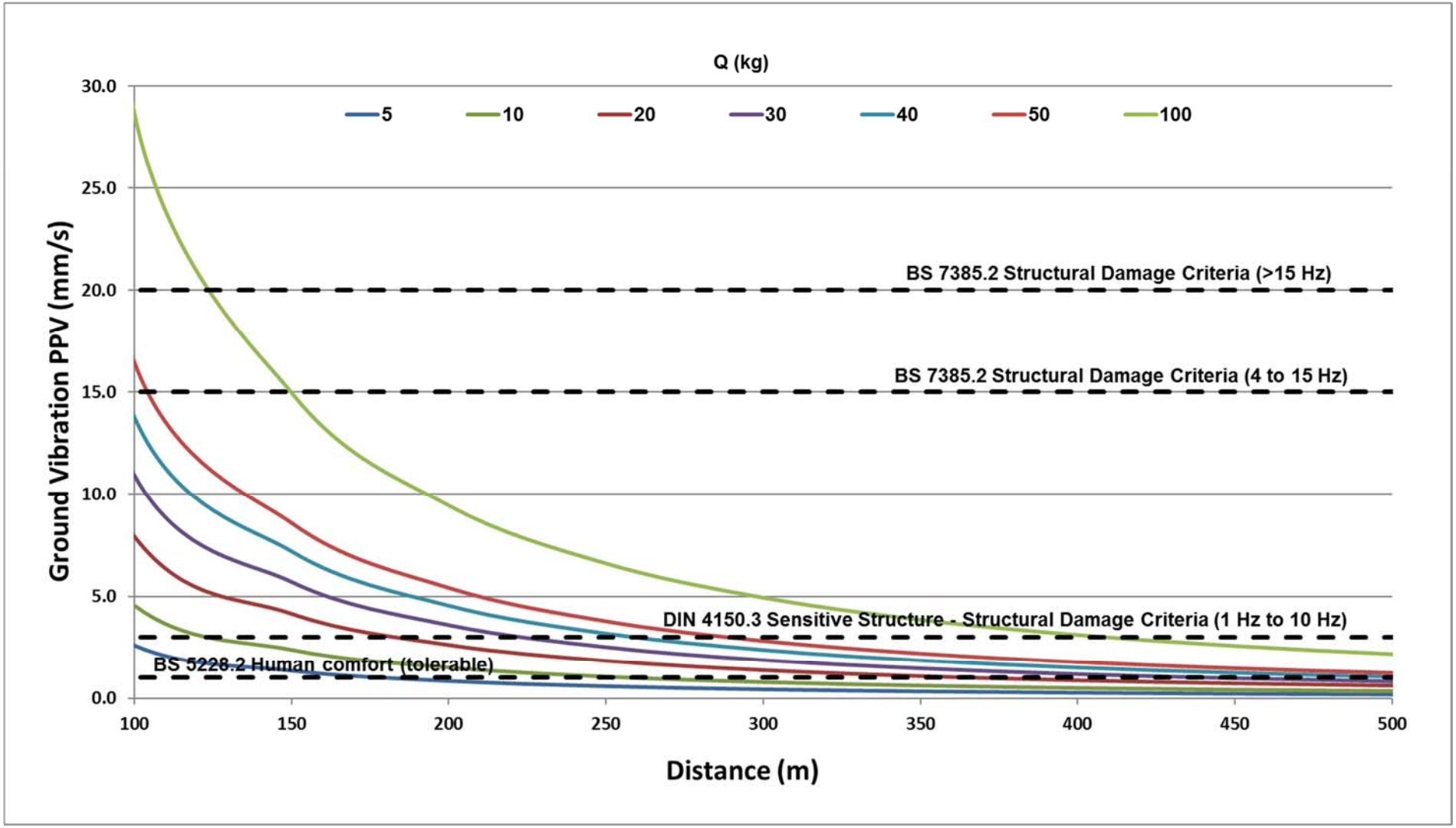


Figure 6.10: Ground vibration overpressure levels for various charge masses with distance

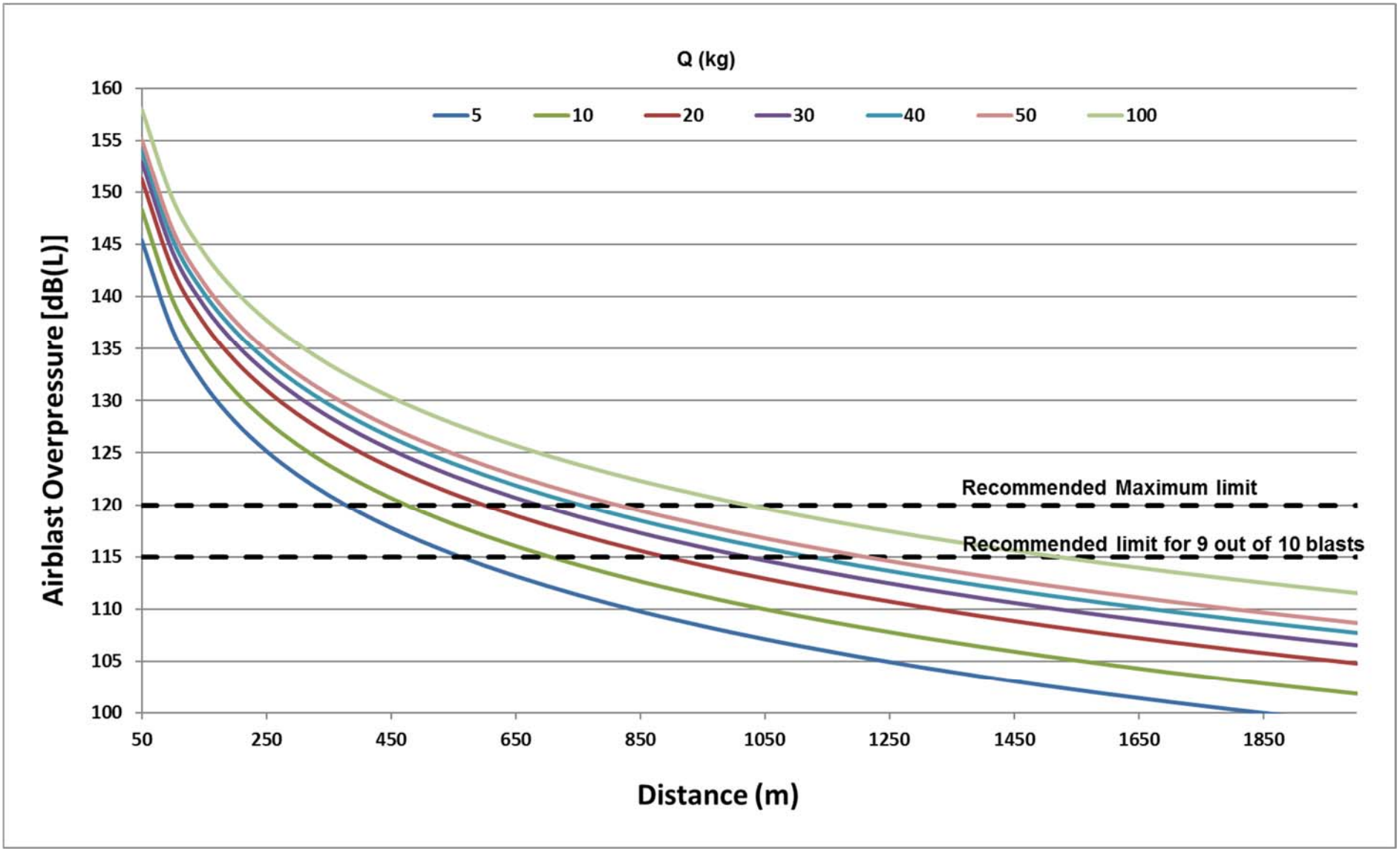


Figure 6.11: Airblast overpressure levels for various charge masses with distance

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 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 6.18.

Table 6.18: 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 13 Minjary Street	26-66	45-63	34	27	78
Location 2 2001 Gocup Road	28-61	48-79	27	22	74

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:

- an improved road surface which is likely to reduce road irregularities and associated maximum noise level events
- the new vertical road alignment which would require less acceleration and deceleration, reducing maximum noise events.

No treatments are required to manage sleep disturbance impacts.

6.4.5 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing
Noise and vibration – construction noise and vibration impacts	• A noise and vibration management plan (NVMP) will be prepared and implemented as part of the CEMP. The NVMP will generally follow the approach in the Roads and Maritime Construction Noise and Vibration Guideline (CNVG).	Contractor	Detailed design/pre-construction
Noise and vibration – construction noise and vibration impacts	• 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:	Contractor	Detailed design/pre-construction

Impact	Environmental safeguards	Responsibility	Timing
	– periodic notification (letterbox drop or equivalent) – website – project info-line – construction response line – email distribution list – community based forums (if required by approval conditions).		
Noise and vibration – construction noise and vibration impacts	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 work hours • 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.	Contractor	Pre-construction
Noise and vibration – construction impacts	• The CEMP must be regularly updated to account for changes in noise and vibration management issues and strategies • Carry out building dilapidation surveys on all buildings located within a 15 metre buffer zone for standard structures before start of activities with the potential to cause property damage • A non-vibratory roller must be used when compacting within 15 metres of a residential receiver • Where feasible and reasonable, construction will be carried out during standard daytime working hours. Work generating high noise and/or vibration levels should be scheduled during less sensitive time periods • The use of mulchers, jack 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 • Use quieter and less vibration emitting construction methods where reasonable and feasible	Contractor	Construction

Impact	Environmental safeguards	Responsibility	Timing
	• Ensure plant including the silencer is well maintained • 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 • Simultaneous operation of noisy plant within discernible range of a sensitive receiver is to be avoided • The offset distance between noisy plant and adjacent sensitive receivers is to be maximised • Plant used intermittently to be throttled down or shut down • Noise-emitting plant to be directed away from sensitive receivers • Only have necessary equipment on site • 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 • Where additional activities or plant may only result in a marginal noise increase and speed up works, consider limiting impact duration by concentrating noisy activities at one location and move to another as quickly as possible • The use of ambient sensitive alarms that adjust output relative to the ambient noise level will be considered • Loading and unloading of materials/deliveries is to occur as far as possible from sensitive receivers • Select site access points and roads as far as possible away from sensitive receivers • Dedicated loading/unloading areas to be shielded if close to sensitive receivers • Avoid or minimise out of hours movements where possible • 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		

Impact	Environmental safeguards	Responsibility	Timing
	conditions • A detailed blast management plan will be prepared by the construction contractor before carrying out any blasting.		
Noise and vibration – Complaints	• 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	Contractor	Construction

6.5 Air quality

6.5.1 Existing environment

The investigation area for the air quality assessment is defined as the area within 500 metres of the proposal site. The area contains 25 sensitive receivers in the vicinity of the proposal site.

The proposal is located in a rural area between Gundagai and Tumut dominated by agricultural land use (see Figure 1.2 and Figure 1.3).

Sources of air pollution in the investigation area are likely to include:
- dust from vehicles travelling on unsealed roads
- emissions from vehicles on Gocup Road
- dust from agricultural activities
- Smoke from paddock stubble burn-off in agricultural areas during autumn.

A search of the National Pollutant Inventory (DotEE 2016c) on 15 September 2016 did not identify any air pollutant substances for the 2014 to 2015 reporting period near the investigation area.

6.5.2 Potential impacts

Construction

During construction the following activities would potentially result in air quality impacts:
- vegetation clearing
- stripping and stockpiling topsoil
- windblown dust from exposed surfaces eg stockpiles, roads etc
- earthworks
- road construction
- transport and handling of soils and materials
- vehicular dust from traffic movements on unpaved roads
- use of construction vehicles, generating exhaust fumes.

Potential air quality impacts during construction would predominantly be from dust generation. Dust generation could result in health and amenity impacts to nearby receivers.

The quantity of dust dispersed would depend on the dust generation rate and the drift of dust particles which is influenced by atmospheric stability as well as wind speed and direction. Larger particles generally settle closer to the source while finer particles disperse over greater distances.

Dust settlement may impact properties near the proposal site. Air quality impacts as a result of dust generation are considered to be minor, as they would be limited to the construction phase and would be minimised by implementing the safeguards and management measures outlined in section 6.5.3.

Machinery and other construction vehicles would emit exhaust fumes. Gaseous emissions are associated with diesel fuel and petrol combustion from vehicle movements and operation of on-site plant and construction machinery. These sources would generate emissions of carbon monoxide, carbon dioxide, oxides of nitrogen, sulphur dioxide and trace amounts of non-combustible hydrocarbons.

The emissions rate and potential impact would depend on the number and power output of the engines, the quality of fuel used, the condition of the engines and the intensity (engine speed) of use. A number of plant items would be in use at any given time. The volume of gaseous emissions would be influenced by the number and type of items that are running at full power or idling.

The impact of these emissions would be temporary in nature (limited to the duration of construction and staging of construction) and are considered to be minor. Implementation of the safeguards and management measures outlined in section 6.5.3 would minimise these impacts.

Odours may be generated during the application of asphalt and line marking. However, the construction period would be temporary and there would be no long-term odour impacts for nearby receivers.

With the implementation of safeguards and management measures in section 6.5.3, it is expected the potential air quality impacts during construction would be low and short-term.

Operation

Changes in air quality as a result of the proposal would be considered low. The proposal would move the new road alignment slightly closer to two residences, but this is unlikely to cause a substantial change in air quality at these receivers. Emissions from heavy vehicles may decrease as a result of the proposal, as the new vertical road alignment would require less acceleration and deceleration. The proposal is therefore unlikely to cause any substantial adverse air quality impacts at the residence.

6.5.3 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing
Air quality – construction air quality impacts	An Air Quality Management Plan (AQMP) will be prepared and implemented as part of the CEMP. The AQMP will include, but not be limited to: • potential sources of air pollution • air quality management objectives consistent with any relevant published EPA and/or OEH guidelines • mitigation and suppression measures to be implemented • methods to manage work during strong winds or other adverse weather conditions • a progressive rehabilitation strategy for exposed surfaces	Contractor	Detailed design/pre-construction

Impact	Environmental safeguards	Responsibility	Timing
	• monitoring and reporting procedures • a management procedure to deal with air quality complaints.		
Air quality – dust management	• Exposed surfaces will be watered regularly to minimise dust emissions as necessary • Vegetation clearing will be minimised where possible • Disturbed surfaces will be stabilised as soon as practicable • Stockpiles or areas that may generate dust will be managed to suppress dust emissions in line with the Roads and Maritime 'Stockpile Site Management Guideline' (RTA 2011a) • All trucks will be covered when transporting dust generating material to and from the site • Dust and/or particulate matter (PM_{10}) will be monitored if considered necessary to identify the potential for nuisance dust impacts.	Project manager and contractor	Construction
Air quality – other air emissions	• Plant and machinery will be turned off when not in use as much as possible and will be fitted with emission control devices complying with Australian Design Standards where practicable • Construction plant, vehicles and equipment will be maintained in good working condition to limit impacts on air quality • No burning of any materials will occur.	Project manager and contractor	Construction

6.6 Landscape character and visual impacts

6.6.1 Existing environment

The investigation area for the landscape character and visual assessment is defined as the area within which the proposal may affect visual characteristics for key receivers.

The landscape character of the investigation area is generally defined by rural properties used for agriculture (primarily grazing) and areas of scattered woodland. The terrain of the investigation area is hilly to undulating. Native vegetation is densest on the surrounding hills.

Key receivers in the investigation area include rural residences at Minjary at the southern end of the proposal site (Halfway Hill), and at various locations along the length of the proposal site. Key receivers also include local road users. The investigation area contains 25 key receivers in the vicinity of the proposal site, as well as additional receivers with views of the proposal site further away.

6.6.2 Potential impacts

Construction

Visual impacts during construction would generally be associated with:

- road embankment construction
- plant and equipment along the alignment
- vegetation removal
- establishing the site compound and stockpile sites.

These have the potential to temporarily affect views for residents with a line of sight to the proposal site, and local road users. Construction-related visual impacts would be temporary and progressive site stabilisation would reduce the magnitude of changes in the short to medium term.

Operation

The proposal would create large road embankments in areas of cut and fill earthworks (see Figure 3.1, Figure 3.2 and Figure 3.3 in section 3.3.4). Cut and fill sections have a width of up to 150 metres. Cut sections would have a maximum depth of 19.2 metres and fill sections would have a maximum height of 13.5 metres.

The proposed cut and fill embankments would not introduce a new landscape feature, as road embankments already exist along Gocup Road. 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. The major section of cut at Halfway Hill would be shifted to the west, bringing it to within about 115 metres of a residence at that location. Due to the sufficient distance of the residence from the cut, and the existing presence of a cut section at that location, the proposal is unlikely to cause a substantial visual impact to the residence. For other sections of major cut and fill, residences are located at sufficient distances from the proposal site to avoid substantial visual impacts (greater than 350 metres).

6.6.3 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing
Landscape and visual – visual impacts of the proposal	• The proposal footprint will be limited as much as possible to minimise earthworks and maintain existing vegetation wherever possible.	Project manager	Detailed design
Landscape and visual – visual impacts of construction works	• The work site will be left in a tidy manner at the end of each work day.	Project manager and contractor	Construction
Landscape and visual – views of cut and fill batters	• Batters will be rehabilitated progressively.	Contractor	Construction

6.7 Property and land use

The investigation area for the land use and property assessment includes the proposed road reserve and the surrounding area in which land uses could be affected by the proposal.

6.7.1 Existing environment

The surrounding landscape is primarily dominated by agricultural land use, such as grazing. About 25 residences are located near the proposal site. These are mainly located in the central and southern parts of the investigation area.

The road reserve woodland at Doctors Hill is primarily being used for native woodland conservation. A small area of the reserve is being used as a council stockpile site.

6.7.2 Potential impacts

Construction

Land acquisition

Locations of land acquisition for the proposal are shown in Figure 3.4 and Figure 3.5. Details of land acquisition are provided in Table 3.1 in section 3.6. These areas are indicative only and may change once boundaries are finalised during detailed design. No full property acquisitions are required for the proposal.

A small area (0.36 hectares) of Crown land would be acquired near Minjary at the southern end of the proposal site. The land is currently being used for grazing by a neighbouring landholder. The proposed acquisition of land is minor and would not have a substantial effect on the agricultural use of the land. An assessment of the proposal against the objects and principles of the *Crown Lands Act 1989* is provided in Table 4.1 in section 4.2.7.

Proposed land acquisition has generally been minimised where possible. Land acquisition would not result in any unreasonable land use impacts. The future land uses of these properties and adjoining properties would remain consistent with existing land uses. The direct area of loss would be relatively small.

All property valuations, lease fees and acquisition payments would be carried out in line with the Roads and Maritime 'Land Acquisition Information Guide' (RTA 2011c) and the *Land Acquisition (Just Terms Compensation) Act 1991*. Property acquisition plans would be prepared for each of the properties where acquisition or leasing is required, as part of the detailed design.

In addition to permanent acquisition, land may be temporarily leased during construction for small temporary stockpile sites and other construction requirements. These requirements have not yet been determined.

Utilities

Utilities are located within the proposal site as described in section 3.5. Service relocation and protection activities would be required for public utilities, including Telstra optic fibre cable and copper line, and 11kv and 66kV powerlines. There would be three short outages during the relocation of the powerline and two short outages for the relocation of the Telstra utilities.

Service disruption impacts are considered to be temporary, and would be managed to minimise customer disruption. This would include providing notification before disruptions occur. The relocation of utilities has been assessed in a separate MWREF.

Private infrastructure

The proposal would require relocation or replacement of a number of infrastructure items on private properties including:

- fences and gates
- silage pits
- a farm dam
- water systems
- stockyards
- horse shelter
- bore solar electric pump
- mailbox

- tree plantings
- signage
- solar light

Amenity and access

Potential short term amenity and access impacts may occur during construction. These may include increased noise and vibration, increased truck movements on Gocup Road associated with materials delivery, dust and temporary visual impacts associated with construction activities.

Operation

In the longer term, the proposal would be unlikely to cause any significant negative impacts to land use.

Access along Gocup Road would be enhanced by providing a safer road with improved reliability for daily road users. Road safety would be enhanced by implementing current road design standards, improving horizontal and vertical alignments, providing overtaking lanes and wider sealed shoulders, and reducing roadside hazards.

The proposal would benefit local residents and the towns of Gundagai and Tumut by supporting regional growth, improving connectivity and providing more efficient movement between the towns. Local industry would benefit from increased freight efficiency along Gocup Road.

6.7.3 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing
Land use and property – land use impacts	• A construction program will be developed to maintain access and amenity for all land uses adjacent to the proposal site as far as is practicable • All property acquisition will be carried out in line with the Roads and Maritime 'Land Acquisition Information Guide' (RTA 2011c) and the *Land Acquisition (Just Terms Compensation) Act 1991* • Relocation or replacement of private infrastructure costs required for the proposal will be funded by Roads and Maritime • Affected landowners and tenants will be consulted on an ongoing basis about acquisition status and timing.	Project manager and contractor	Pre-construction and construction
Land use and property – impacts to utilities	• Roads and Maritime will consult with relevant service providers during detailed design and construction to minimise the potential for service interruptions.	Project manager and contractor	Pre-construction and construction

6.8 Socio-economic

The investigation area for the socio-economic assessment is defined as the region between, and surrounding, the towns of Tumut and Gundagai.

6.8.1 Existing environment

Gocup Road connects the regional centres of Tumut and Gundagai. Demographic data for these towns is provided below.

Gundagai

The 2011 Census (ABS 2016a) provides the following core demographic data about Gundagai:

- at the time of the 2011 Census there were 3664 people living in Gundagai
- 60.9 per cent of the people living in Gundagai over the age of 15 and who identified as being in the labour force were employed full time
- 35 per cent were working on a part time basis
- the median weekly household income was $761 per week
- the average household size was 2.5 people
- the main method of travel to work was by car, with 1062 people driving or travelling as a passenger in a vehicle
- the total number of registered motor vehicles was 3080
- the largest age demographic was 0 to 14 years (21.3 per cent of the population).

The top employment industries for Gundagai (ABS 2016a) are provided in Table 6.19.

Table 6.19: Top employment industries for Gundagai in 2011

Industry	Percentage of people employed
Managers	22.7
Labourers	20.6
Technicians and trade workers	12.6
Professionals	10.2
Clerical and administrative	9.1
Community and personal service workers	8.7
Machinery operators and drivers	8.1
Sales workers	5.9

Tumut

The 2011 Census (ABS 2016b) provides the following core demographic data about Tumut:

- at the time of the 2011 Census there were 4785 people living in Tumut
- 60.4 per cent of the people living in Tumut over the age of 15 and who identified as being in the labour force were employed full time
- the median weekly household income was $811 per week
- the average household size was 2.4 people
- the main method of travel to work was by car, with 1440 people driving or travelling as a passenger in a vehicle
- the total number of registered motor vehicles was 4126.

The top employment industries for Tumut (ABS 2016b) are provided in Table 6.20.

Table 6.20: Top employment industries for Tumut in 2011

Industry	Percentage of people employed
Managers	21
Labourers	18
Technicians and trade workers	14
Professionals	11.4
Machinery operators and drivers	10.7
Clerical and administrative	9.4
Community and personal service workers	7.9
Sales workers	5.6

Gocup Road

Gocup Road is an important regional road connecting Tumut to Gundagai. Heavy vehicles use Gocup Road to travel between commercial and industrial areas around Tumut and the Hume Highway at Gundagai. This is an important route for the local timber and milling industry. Higher mass limit B-double vehicles up to 4.6 metres high are permitted to travel along the entire length of Gocup Road. Forestry product value-adding industry groups are interested in gaining access to the road network with 'high productivity vehicles' to enable more efficient transport.

Gocup Road is also an important route for residents and property owners between Tumut and Gundagai, and for people commuting between the towns for work.

6.8.2 Potential impacts

Construction

Land acquisition

Minor social impacts associated with the proposal would arise in association with land acquisition. The proposal would require only very limited acquisition of private property and no residential dwellings would be directly impacted.

Land acquisition impacts are described in more detail in section 6.7.

Road users

There may be some minor access changes during the construction period which could potentially inconvenience motorists. These changes would likely be for short periods and would have only limited impacts. These impacts are assessed in section 6.3.

Amenity and access

Potential short term amenity and access impacts may occur during construction as summarised in section 6.7.1.

Benefits

The local area would experience a short-term increase in employment opportunities and procurement of local goods and services.

Operation

Benefits

The proposal would improve road safety by upgrading the road to current road design standards.

In the longer term, the proposal to upgrade Gocup Road would support sustainable growth and development of regional centres. The proposal upgrades existing infrastructure to improve safety and transit times to residential and commercial growth areas within Gundagai and Tumut.

6.8.3 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing
Socio-economic – construction impacts on the community	• Potentially affected property owners and residents will be contacted before the start of work in line with the Roads and Maritime 'Community Engagement and Communication Manual' (Roads and Maritime 2012). Residents will be notified via door knocks, newsletters or letter box drops providing information on the proposed work, working hours and a contact name and number should any complaints wish to be registered • A complaints management procedure and register will be included in the CEMP.	Project manager and contractor	Pre-construction
Socio-economic – construction impacts on the community	• Local residents and road users will be kept regularly informed of construction activities during the construction process.	Project manager and contractor	Construction

6.9 Aboriginal heritage

The following Aboriginal archaeological and cultural heritage investigations have been carried out for the entire length of Gocup Road:

- Aboriginal Archaeological Survey Report Stage 2 PACHCI (Kelleher Nightingale Consulting 2012).
- Aboriginal Cultural Assessment (Waters Consultancy 2015a)
- Aboriginal Cultural Heritage Assessment Report (CHAR) (Kelleher Nightingale Consulting 2015)
- Aboriginal Cultural Assessment – Supplementary Report on Cookoomoroo, Doctors Hill, Halfway Hill and Gilmore Creek Bridge potential additional works (Waters Consultancy 2015b).

The Kelleher Nightingale Consulting (2015) and Waters Consultancy 2015b reports are provided in Appendix D. The findings relevant to the proposal are summarised below.

6.9.1 Methodology

Aboriginal heritage assessments were completed for the entire Gocup Road works program. Site investigation and consultation with the Aboriginal community was completed in line with the Roads and Maritime 'Procedure for Cultural Heritage Consultation and Investigation' (PACHCI) and in consultation with the Roads and Maritime Aboriginal Cultural Heritage Officer. A methodology overview for the Aboriginal heritage assessments is summarised in Table 5.3 in section 5.4.

The investigation area for the Aboriginal heritage assessment is defined by the impact corridor mapped in the Aboriginal heritage assessments provided in Appendix D.

6.9.2 History

The investigation area is situated in Wiradjuri country, a region with boundaries defined by traditional language-speaking areas (MacDonald 1998). The Wiradjuri language group is the largest group in NSW, encompassing the Macquarie, Lachlan and Murrumbidgee Rivers (NPWS 2003).

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). Terrestrial mammals, reptiles and birds, including wombats, kangaroos, goannas and bush turkeys, were also recorded as being hunted in the region (Sams 1982).

Seasonal movement of Aboriginal groups along the Tumut River valley in relation to Bogong Moth (*Agrotis infusa*) hunts in the nearby 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.

6.9.3 Existing environment

Overview of the program of works investigation area

Gocup Road crosses a cultural landscape of interlinked elements that connect a range of ceremonial areas and significant ancestral beings lying within the landscape. Identified Aboriginal cultural sites around the village of Minjary (about one kilometre east of the southern end of the proposal site) are part of a wider network of cultural elements that connect two key cultural areas: Mudjarn and Minjary.

The identified pathways near Stony Creek and Gilmore Creek are part of a network of pathways that facilitated the movement of people into the Bogong Peaks, where a wide variety of inter-group social, economic and ceremonial activities occurred as part of the Bogong Moth gatherings.

Artefact scatters and isolated artefacts have generally been found next 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.

Archaeological surveys of the investigation area were carried out as part of the Stage 2 PACHCI and identified eight artefact scatters, two isolated artefacts and one potential archaeological deposit within the proposed upgrade program of works corridor. The majority of identified sites were close to Stuckeys Creek in areas of remnant Box Gum woodland. The majority of stone tools identified during the survey were created from quartz which was locally available.

Six areas of Aboriginal cultural significance were identified within and around the program of works investigation area. The six Aboriginal cultural areas (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 wetland that constituted a resource gathering area.

Aboriginal heritage sites in the proposal investigation area

Areas of Aboriginal cultural significance

Two areas of Aboriginal cultural significance, sites C and F, are located in the investigation area and are described below.

Site C: Brungle to Adelong Pathway Cultural Site

Cultural site C is a seasonal pathway that links the mountain ranges of the Brungle area to those in the Adelong area. The site also connects the Mudjarn ceremonial area to the east with the Minjary ceremonial area to the south west. The site contains a number of archaeological sites.

The site extends from Brungle and Mudjarn across the Tumut River valley. The site follows the Stuckeys Creek flats from the Tumut River along the southern boundary of Eurobin Ridge to the confluence of Black Spring Gully at Minjary. The site then travels Black Spring Creek towards Minjary Mountain and Adelong. The investigation area encompasses a portion of the site along Gocup Road, about 300 metres north of the Quidong Road intersection and 200 metres east of the Gilmore Street intersection.

The site was assessed as being of high cultural significance. It crosses Gocup Road to the east of the southern end of the proposal site and is shown in Figure 4 of Kelleher Nightingale (2015) in Appendix D.

Site F: Stony Creek Pathway Cultural Site

Cultural Site F is a pathway associated with specific resource use that runs along Stony Creek, linking the country near Doctors Hill to the Murrumbidgee River near Gundagai. The site is associated with the use of grass trees (*Xanthorrhoea* sp.), primarily for the production of spears, and the seasonal movement of Aboriginal people to the Bogon Peaks (Waters Consultancy 2015a). 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 2015a).

The site extends along Stony Creek from the confluence with Big Ben Creek into the hills north of Doctors Hill and continues along Slaughterhouse Creek towards the Tumut River. The investigation area encompasses a portion of the site where Gocup Road runs parallel to Stony Creek near the Edwardstown Road intersection.

The site was assessed as being of moderate cultural significance. It is located about one kilometre from the northern end of the proposal site at Doctors Hill and is shown in Figure 4 of Kelleher Nightingale (2015) in Appendix D.

Archaeological sites

Cultural site C contains a number of archaeological sites described in Kelleher Nightingale (2015) and shown in Figure 7 (see Appendix D).

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 overlooking Stuckeys Creek. The site had been extensively disturbed by the previous construction of Gocup Road. The site has 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 site's intactness, representativeness and research potential, Gocup Road 08 is determined to have low archaeological significance.

Gocup Road 07 (AHIMS # 56-3-0099)

Site Gocup Road 07 is an isolated flake that was identified on the western edge of the valley flat next to Stuckeys Creek, about 50 metres east of the southern end of the proposal site. The site demonstrated moderate scientific value and it was assessed likely that further investigation would contribute to understanding of Aboriginal landscape use in the region. Based on the site's intactness, representativeness and research potential, Gocup Road 07 was determined to have moderate archaeological significance.

This site has now been impacted by upgrade work for the Stuckeys Creek section of Gocup Road (road section 3.4). Information recovery through salvage excavation of the site was carried out to offset the loss of the site. The purpose of the salvage was to increase understanding, strengthen interpretation and improve recognition of Aboriginal culture and heritage within an area where little previous documented information exists.

Additional sites to the east have also been impacted by upgrade work for the Stuckeys Creek section of Gocup Road.

Halfway Hill site

An area of cultural value is located on the eastern side of the existing road alignment at Halfway Hill, about 150 metres east of the proposal site. This area of cultural value is shown in Figure 3 in Waters (2015b) (Appendix D).

Doctors Hill site

An area of cultural value is located east of the existing Gocup Road about 500 metres from the proposal site. This area of cultural value is shown in Figure 5 in Waters (2015b) (Appendix D). This area of cultural value is associated with the Site 'F' Stony Creek Pathway Cultural Site described above and identified in Figure 4 of Kelleher Nightingale (2015) (Appendix D).

6.9.4 Potential impacts

The proposal would avoid impacts to the site 'Gocup Road 08 (AHIMS # 56-3-0100)'. It is located on the existing road table drain. The site would be protected during construction.

An AHIP was granted for a number of upgrade sections along Gocup Road by OEH on 24 November 2015. An AHIP variation application for the proposal was submitted to OEH in 2016.

6.9.5 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing
Aboriginal heritage – impacts on known sites of Aboriginal heritage significance	• Site 'Gocup Road 08 (AHIMS # 56-3-0100)' will be fenced before construction to prevent impacts to the site.	Project manager and contractor	Pre-construction

Impact	Environmental safeguards	Responsibility	Timing
Aboriginal heritage – impacts on known sites of Aboriginal heritage significance	• All workers will be inducted before work starts about the nature of the Aboriginal heritage resource in the investigation area (including protected sites along Gocup Road in the Stuckeys Creek section (3.4) and the penalties for breaches of the *National Parks and Wildlife Act 1974*.	Project manager and contractor	Construction
Aboriginal heritage – impacts on potential unknown sites of Aboriginal heritage significance	• The 'Standard Management Procedure - Unexpected Heritage Items' (Roads and Maritime 2015) will be followed in the event that an unknown or potential Aboriginal object/s, including skeletal remains, is found during construction. This applies where Roads and Maritime does not have approval to disturb the object/s or where a specific safeguard for managing the disturbance (apart from the Procedure) is not in place • Work will only re-start once the requirements of that Procedure have been satisfied.	Project manager and contractor	Construction

6.10 Non-Aboriginal heritage

A non-Aboriginal heritage assessment has been carried out for the entire length of Gocup Road (OnSite Cultural Heritage Management 2013) and is provided in Appendix E. A heritage assessment and statement of heritage impact was prepared by Biosis (2017) for impacts to a former Gocup Road alignment and abandoned stockyards, and is provided in Appendix E.

6.10.1 Methodology

Non-Aboriginal heritage for entire Gocup Road upgrade

The methodology for the non-Aboriginal heritage assessment of the entire Gocup Road program of works (OnSite Cultural Heritage Management 2013) included:

- historical research of the investigation area
- an on-site 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 an investigation area plan showing the high, moderate and low zones of archaeological potential
- a statement of heritage impact, where applicable, for individual sites
- recommendations to avoid, minimise or mitigate against any impact
- the identification of any legislative requirements under the NSW *Heritage Act 1977*.

Non-Aboriginal heritage for Doctors Hill upgrade

The methodology for the heritage assessment and statement of heritage impact (Biosis 2017) included:

- investigating documents, including primary archival sources such as historic maps, plans and photographs, and newspapers
- secondary sources, including published and unpublished works, which were used to provide the report's historical context
- a site inspection involving survey of the investigation area on foot to understand the heritage character of existing heritage items and to determine the nature and extent of archaeological resources.

The investigation area for this assessment is defined as the section of the proposal site encompassing the former Gocup Road alignment and the abandoned stockyards. These are both located near the northern end of the proposal site at Doctors Hill (see Figure 6.12).

6.10.2 History

The local region was first explored by Hume and Hovell in 1824, who passed through the region now known as Tumut on their expedition from Lake George to Port Phillip (Clouston 1924). When travelling through Gundagai, they recorded seeing trees already marked by steel tomahawks. Tumut is recorded as the Aboriginal name for the area, or alternatively Doomut, meaning camping ground (French 1965).

The local area's history is closely linked with pastoralism, with this being the dominant local industry throughout the 19th and 20th centuries, and gold mining to an extent, which came to its peak in the latter half of the 19th century.

The area that now forms the town of Gocup was first inhabited sometime in the late 1830s or early 1840s, by John Archer Broughton, the son of William Broughton, who came to Australia on the First Fleet.

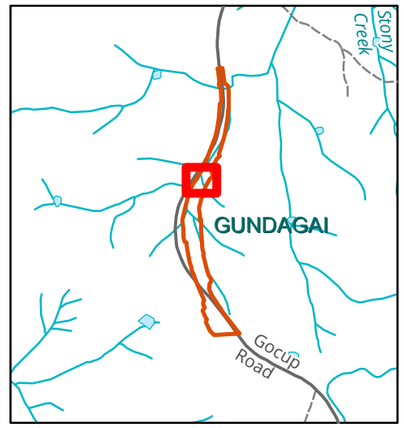
The original Gocup Road was, in its earliest form, a rough track used by settlers and travellers. It crossed hilly terrain between Gundagai and Tumut and was first known as the Gundagai or Tumut Road. When Cobb and Co expanded their services into New South Wales in 1861, they used the road between Tumut and Gundagai (Butcher 2002) for mail delivery and passenger fares.

The earliest reference to the road being named as 'Gocup Road' is from 1866, in a newspaper which described a man being robbed on Gocup Road (*Tumut and Adelong Times* 1866).

A number of small towns developed along the road, including Gocup and Minjary. Historical developments along the road included hotels, schools and a post office to support the surrounding properties.

By the end of the 19th century, Gocup Road had become a much more formalised track and was listed as the main road between Gundagai and Tumut on Parish Maps for the area. With the opening of the rail link between Tumut and Gundagai in 1903, the road became less used, at least with regard to the hauling of produce and heavy goods, and was not as well maintained. It was speculated, at least in parts, that it was impassable in heavy wet weather (OnSite Cultural Heritage Management 2013).

The current roadway was built to the standards of 1960s road design, with its alignment designed to minimise earthworks in construction. As a result of this it follows in many areas the original tracks from the 1860s and earlier (Miller 2008).



Legend

Study area

Heritage Items

Abandoned stockyards

Former alignment of Gocup Road

Figure 6.12: Non-Aboriginal heritage sites in investigation area for Doctors Hill upgrade

0 3 6 9 12 15

Metres

Scale: 1:350 @ A3

Coordinate System: GDA 1994 MGA Zone 55

N

Matter: 22735
Date: 09 September 2016,
Checked by: JAC, Drawn by: LH, Last edited by: lharley
Location:\\10.3.0.4\Matters\22700s\22735\Mapping\22735_F3_HeritageItems

6.10.3 Existing environment

The investigation area consists of a portion of private land and a road reserve along Gocup Road (see Figure 6.12). It is located across a small area of cleared paddocks and open woodland at the base of Doctors Hill, along the eastern side of Gocup Road. The investigation area appears to primarily have been used for grazing, but also as a road or track at some point in the past.

The former Gocup Road alignment enters the investigation area from the south, and continues north to merge with the current road alignment (see Figure 6.12). To the south of the proposal site there are a number of excavated trenches that form the spoon drain on the western side of the alignment. Further to the south of the proposal site, there is also evidence of the hillside having been excavated to level the road base (see Figure 6.14). The former Gocup Road alignment is assessed as having moderate archaeological potential. Based on the historical context and documentary evidence, it is probable that archaeological significant remains could be present in the investigation area. The former road alignment is considered to be historically significant at a local level. The alignment dates to sometime between the 1860s and the 1890s, and is likely based on one of the early tracks used by locals travelling between Gundagai and Tumut. It was abandoned sometime after 1932, and is an example of informal roadmaking in NSW.

Within the investigation area are abandoned stockyards which were part of a large pastoral run owned by the Lindleys in the 1920s (see Figure 6.15). The stockyards are no longer in use and have been assessed as being in poor condition. All that remains of them is a number of posts in the formation of stockyards. The abandoned stockyards are assessed as having low archaeological potential. Based on the historical context and documentary evidence, it is unlikely that archaeological significant remains would occur in the investigation area. The stockyards date to the 1920s or later, and are only noted as a minor landmark for local road users. They do not fulfil any of the criteria required to be considered significant in NSW or the local area.

Figure 6.13: Former road alignment in proposal site, view south (1 metre scale)

Figure 6.14: Former Gocup Road alignment south of proposal site, view east (1 metre scale)

Figure 6.15: Abandoned stockyards, view south-east (1 metre scale)

6.10.4 Potential impacts

Construction

Construction impacts to the sites investigated would result from earthworks and the construction of a new road. The road's proposed design is necessary to meet current road design standards and, as such, it cannot be altered to avoid impact to the former Gocup Road alignment.

The proposal would only affect a small proportion of the former Gocup Road alignment.. As such, the proposal's impact to the historical significance of the former road alignment is considered minor. The remainder of the former alignment is under a low level of development pressure as it is located in the northern road reserve at Doctors Hill being managed for conservation. No further impacts are foreseen at this time. Any future development in the area may pose a greater risk through cumulative impacts to the alignment over time. As the proposal would have only a minor impact, it is considered to be acceptable.

Operation

The proposed development would have a limited impact on the views and vistas surrounding the former Gocup Road alignment, as it would affect only a small portion of the alignment. The majority of the surviving alignment is naturally buffered from the proposal by Doctors Hill.

6.10.5 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing
Non-Aboriginal heritage – impacts to the former Gocup Road alignment	• Exclusion zone fencing will be erected to protect sections of the former Gocup Road alignment located outside the proposal site.	Project manager and contractor	Pre-construction
Non-Aboriginal heritage – inadvertent impacts on heritage items	• As part of the site induction, all workers will be advised of their obligations in relation to heritage before working on the site and the guidelines to follow if unanticipated heritage items or deposits are located during construction.	Project manager and contractor	Construction
Non-Aboriginal heritage – unanticipated archaeological finds	• In the event of an unexpected find of an archaeological deposit (or suspected item), work will stop in the affected area and Roads and Maritime's Environment Officer will be contacted for advice on how to proceed. The 'Unexpected Heritage Items Procedure' (Roads and Maritime 2015) will be followed if a potential artefact is uncovered • Work will only re-start once the requirements of that Procedure have been satisfied.	Project manager and contractor	Construction

6.11 Other impacts

6.11.1 Existing environment and potential impacts

Environmental factor	Existing environment	Potential impacts
Waste management	N/A	The proposal has the potential to generate waste from the following sources, some of which would be recycled or re-used: • green waste from vegetation clearing (native and introduced vegetation). Noxious weed material would be separated from native green waste • excess spoil from material excavation– this would be transported to Cookoomooroo for use in that section of the Gocup Road works program • roadside materials (fencing, guide posts etc) • general waste from staff (lunch packaging, portable toilets etc) • chemicals and oils • waste water from wash-down and bunded areas • redundant erosion and sediment controls • paper and office waste from site and management facilities.
Hazards and risk	The existing hazards and risks in the investigation area are generally associated with operation of the existing road network.	• The proposal could potentially generate a bushfire through the operation of machinery and equipment in areas of long flammable grass • The proposal has the potential to intercept utilities during earthworks. This risk would be managed by further investigation during detailed design, including 'Dial Before You Dig' • Spills or leakage of contaminants such as fuels, chemicals and hazardous substances entering surface and groundwater or contaminating soils • Flooding of the proposal site during extreme rain events • Changed traffic conditions leading to incidents

Environmental factor	Existing environment	Potential impacts
		• Vehicle crashes are an inherent aspect of the operation of any road. These vehicle hazards and risks would be minimised primarily by constructing the proposal to meet current network safety and design standards, which would improve road safety.
Climate change impacts on the proposal	The Gundagai/Tumut area receives an average annual rainfall of 303.5 millimetres. Rainfall is spread throughout the year but tends to reach a maximum in November with an average of 67.8 millimetres (BOM 2016). Average monthly minimum temperature varies from 2.5 degrees celsius in July to 16.7 degrees celsius in February. The average monthly maximum temperature varies from 12.9 degrees celsius in July to 32.7 degrees celsius in January (BOM 2016).	**Potential climate change impacts on the proposal** *Construction* • Increases in temperatures may reduce work capacity and increase the risk of heat stress for site workers • Impacts to various construction activities from climate change, such as increased temperatures interfering with the laying of asphalt or concreting • An increase in extreme weather events, such as intense rainfall interfering with construction timeframes or dry, hot weather conducive to generation of dust • Increased summer and autumn rainfall may result in increased flooding and erosion risks at the site, and associated erosion and sediment loss *Operation* • Increases in temperature may affect pavement integrity and other aspects of the proposal in the long term • Increased potential for localised flooding • Drainage and stormwater impacts • Aquaplaning (cars sliding in pooled water on the road) • Changes to flora and fauna species and distribution, including pest and weed species • Erosion impacts, resulting in sediment loss from the site • Watercourse impacts, including changes to channel structure and other characteristics resulting from changed hydrological conditions

Environmental factor	Existing environment	Potential impacts
		Potential impacts of the proposal on climate change *Construction* • Carbon dioxide and nitrous oxide would be generated from liquid fuel use in plant and vehicles (diesel, petrol) during construction, and disposal and transport of materials • Atmospheric carbon dioxide may increase as a result of vegetation clearing (minor reduced uptake of carbon dioxide from the atmosphere, as well as decomposition of cleared vegetation) • Use of materials such as concrete that have high embodied energy content • Methane would be released from landfilling any carbon based waste, and from possible fugitive emissions from natural gas use • Various greenhouse gas emissions would be associated with the extraction and production of materials used in the road construction • On-site electricity usage. *Operation* • the proposal would upgrade Gocup Road to provide a road with improved horizontal and vertical alignment meeting current road design standards. This is likely to reduce the need for acceleration and deceleration and associated fuel consumption, thereby reducing operational greenhouse gas emissions • Provision for high productivity vehicles would also increase freight efficiency, reducing fuel consumption per quantity of product transported.

6.11.2 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing
Hazards and risk	• Emergency response plans will be incorporated into the CEMP • An incident response plan will be developed and implemented as required as part of the CEMP to manage any identified risks on site • A design safety audit will be carried out before construction • 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. Consultation with the local Rural Fire Service will be carried out during preparation of the plan.	Project manager and contractor	Pre-construction
Hazards and risk	• All workplace health and safety requirements will be fulfilled during construction • Public access to the work site will be prohibited and access barriers will be erected • Relevant standards and utility provider procedures will be implemented for utility adjustments.	Project manager and contractor	Construction
Waste	• A Waste Management Plan (WMP) will be prepared and implemented as part of the CEMP. The WMP will include but not be limited to: – measures to avoid and minimise waste associated with the project – classification of wastes and management options (re-use, recycle, stockpile, disposal) – statutory approvals required for managing both on and off-site waste, or application of any relevant resource recovery exemptions – procedures for storage, transport and disposal – monitoring, record keeping and reporting • The WMP will be prepared taking into account the *Environmental Procedure - Management of Wastes on Roads and Maritime Services Land* (Roads and Maritime 2014) and relevant Roads and Maritime Waste Fact Sheets.	Contractor	Detailed design / pre-construction

Impact	Environmental safeguards	Responsibility	Timing
Waste management – general impacts	• Resource management hierarchy principles will be followed: – avoid unnecessary resource consumption as a priority – recover resources as far as is practicable (including re-use of materials, reprocessing, and recycling and energy recovery). This may include reuse of asphalt removed from decommissioned sections of road – disposal is carried out as a last resort (in line with the Waste Avoidance and Resource Recovery Act 2001) • Site inductions will be carried out (and recorded) by a site supervisor for all staff, to provide a thorough knowledge of all key environmental/safety issues, including waste disposal protocols • All wastes will be managed and disposed of in line with the Waste Classification Guidelines (EPA 2014) and the POEO Act • Stockpiles will be managed to avoid causing pollution or contamination in line with the 'Stockpile Site Management Guideline' (RTA 2011a) • Garbage receptacles will be provided and recycling of materials encouraged. Rubbish will be transported to an appropriate waste disposal facility • All working areas will be maintained, kept free of rubbish and cleaned up at the end of each working day.	Project manager and contractor	Construction
Climate change – impacts of climate change on the proposal	• Detailed design will take into consideration the potential effect of climate change on the proposal, including flooding and drainage requirements, in line with the Roads and Maritime climate change plan • Opportunities for reducing greenhouse gas emissions during construction and operation of the proposal will be considered during the detailed design phase.	Project manager and contractor	Detailed design
Climate change – impacts of the proposal on climate change	• Material and waste transport will be scheduled to achieve full loads and to minimise required number of vehicle trips • Materials will be transported from local suppliers, and surplus materials and wastes will be transported to local sites and facilities, wherever possible • Appropriately sized construction equipment, plant and vehicles will be used • Regular equipment servicing will be carried out to maintain optimal performance and to minimise down time (which can improve overall efficiency) • The layout of access, machinery and facilities will be designed to minimise	Project manager and contractor	Construction

Impact	Environmental safeguards	Responsibility	Timing
	movement and vegetation clearing • The use of alternative fuels and power sources for construction plant and equipment will be investigated and implemented, where appropriate • Energy efficiency and related carbon emissions will be considered in the selection of vehicles, plant and equipment.		

6.12 Cumulative impacts

6.12.1 Investigation area

The cumulative impact assessment has considered the entire area within 500 metres of the full Gocup Road works program, which is shown in Figure 1.1.

6.12.2 Gocup Road upgrade program of works

The full Gocup Road works program is described in section 1.1.

Biodiversity

The cumulative biodiversity 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 2017c). A summary of this assessment is provided below.

Removal of Box-Gum Woodland

Total Box-Gum Woodland removal for all road upgrade sections is shown in Table 6.21 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 6.21: 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
Meadow Creek	Meadow Creek	Completed/area of vegetation removal known	GHD (2011)		0.09		0.5	0.59

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)	
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
Doctors 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 investigation area for the full works program contains about 212 hectares of moderate/good condition Box-Gum Woodland (not including derived grassland). The works program would therefore remove six per cent of this moderate/good condition Box-Gum Woodland in the investigation area (see Table 6.22).

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

Table 6.22: Assessment of Box-Gum Woodland removal from the investigation 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 investigation 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 investigation area, which are connected to woodland in the investigation 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 Road works program (NPWS 2004). The works program would therefore remove only a minor fraction of the adjacent connected Box-Gum Woodland in the locality. It is therefore unlikely that the works program would have a significant cumulative impact.

Compensatory measures would be implemented to offset the cumulative residual impacts of the Gocup Road upgrade (see section 6.1.5).

Removal of woodland habitat for threatened fauna

The works program 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 investigation area for the works program 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 investigation 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 investigation area, indicating that the trees to be removed do not form a large proportion of the hollow-bearing trees in the investigation area.

Woodland in the investigation area is connected to larger areas of woodland in the locality, including 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.

6.12.3 Other potential impacts

Environmental factor	Construction	Operation
Traffic	The proposal would occur at the same time as upgrades of other Gocup Road sections, including Stuckeys Creek/Quidong Corner (section 3.3/3.4), creating cumulative traffic delays along Gocup Road. The locations of these sections are shown in Figure 1.1.	
Landscape and visual		The proposal and other upgrade sections of Gocup Road would result in cumulative changes to the visual characteristics along Gocup Road through the construction of large embankments in areas of cut and fill earthworks. The proposed cut and fill embankments would not introduce new features 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 and other upgrade sections would be in keeping with the current road environment.

Environmental factor	Construction	Operation
Property and land use	The proposal and other upgrades of sections of Gocup Road would have a cumulative impact in relation to private property acquisition. The areas proposed to be acquired are relatively small and are unlikely to substantially affect land use in the region.	
Socio-economic	The proposal and other upgrades of sections of Gocup Road would have a positive cumulative impact, benefitting the community and regional economy by improving traffic and freight efficiency between Gundagai and Tumut and by improving safety for all road users.	

6.12.4 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing
Cumulative traffic impacts	• The Traffic Management Plan will consider other developments that may be under construction to minimise traffic conflict and congestion that may occur due to the cumulative increase in construction vehicle traffic • Construction of the Gocup Road works program will be managed so that the maximum delay time for motorists on the entire length of Gocup Road would be 20 minutes.	Project managers	Construction

7 Environmental management

7.1 Environmental management plans

A number of safeguards and management measures have been identified in the REF to minimise adverse environmental impacts, including social impacts, which could potentially arise as a result of the proposal. Should the proposal proceed, these safeguards and management measures would be incorporated into the detailed design and applied during the construction and operation of the proposal.

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

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

7.2 Summary of safeguards and management measures

Environmental safeguards and management measures outlined in this REF will be incorporated into the detailed design phase of the proposal and during construction and operation of the proposal, should it proceed. These safeguards and management measures will minimise any potential adverse impacts arising from the proposed works on the surrounding environment. The safeguards and management measures are summarised in Table 7.1.

Table 7.1: Summary of safeguards and management measures

No.	Impact	Environmental safeguards	Responsibility	Timing
GEN1	General - minimise environmental impacts during construction	A CEMP will be prepared and submitted for review and endorsement of the Roads and Maritime Environment Officer prior to start of the activity. As a minimum, the CEMP will address the following: • any requirements associated with statutory approvals • details of how the project will implement the identified safeguards outlined in the REF • issue-specific environmental management plans • roles and responsibilities • communication requirements • induction and training requirements • procedures for monitoring and evaluating environmental performance, and for corrective action • reporting requirements and record-keeping • procedures for emergency and incident management • procedures for audit and review. The endorsed CEMP will be implemented during the activity.	Project manager and contractor	Pre-construction / detailed design
GEN2	General - notification	All businesses, residential properties and other key stakeholders (eg schools, local councils) affected by the activity will be notified at least five days before start of the activity.	Project manager and contractor	Pre-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
GEN3	General – environmental awareness	All personnel working on site will receive training to ensure awareness of environment protection requirements to be implemented during the project. This will include up-front site induction and regular "toolbox" style briefings. Site-specific training will be provided to personnel engaged in activities or areas of higher risk. These include: • areas of Aboriginal heritage sensitivity • threatened species habitat • adjoining residential areas requiring particular noise management measures • areas containing features of potential non-Aboriginal heritage significance.	Project manager and contractor	Pre-construction / detailed design
GEN4	General – stockpile sites	Stockpile sites will be managed in line with the following guidelines where practicable: • located in areas not prone to flash flooding and more than 40 metres from a watercourse • located more than 100 metres from occupied residences and other land uses that may be sensitive to noise • located in previously disturbed areas that do not require the clearing of native woodland vegetation • located in areas of low ecological and heritage conservation significance • located in plain view of the public to deter theft and illegal dumping • located outside the drip line of trees located on level ground.		
B1	Biodiversity – 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 construction environmental management plan (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.	Project manager	After award pre-construction
B2	Biodiversity – loss of native vegetation and	• Plans will be prepared for the proposal site and adjoining area showing native	Project manager and contractor	After award pre-

No.	Impact	Environmental safeguards	Responsibility	Timing
	fauna habitat	vegetation, flora and fauna habitat, threatened species and endangered ecological communities • 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) and revegetation areas • Where practicable, hollow-bearing tree removal will occur outside the main fauna breeding season (August to January) to avoid potential fauna breeding disturbance • The pre-clearing process detailed in RTA (2011) – 'Biodiversity Guidelines Guide 1: Pre-clearing process', will be implemented before start of work • 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, trees in the vicinity of stockpile sites and the drainage line in the northern road reserve in the north of the investigation area • Large and hollow-bearing trees to be retained will be defined by survey before clearing and protected by a physical barrier or fence The limits of the proposal will be defined by survey before clearing and grubbing.		construction
B3	Biodiversity – loss of native vegetation and fauna habitat	• 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 • Where possible, make design changes to avoid or minimise impacts to better quality patches of Box-Gum Woodland • Where possible, minimise removal of mature trees, including hollow-bearing trees, while still meeting operational objectives for road safety and design • Where possible, avoid disturbing native vegetation when building temporary access tracks to stockpile sites or establishing temporary facilities • A hollow replacement strategy will be investigated to compensate for removal of hollow-bearing trees for the full works program Hollows will be placed in areas where few current suitable den/nest trees exist but	Project manager and contractor	Pre-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
		where other habitat components (connectivity and foraging) are of good quality.		
B4	Biodiversity – impacts to microbats using culverts	• Culverts will be inspected for roosting bats before culvert extension works are carried out. Inspections will be carried out in line with 'Biodiversity Guidelines Guide 1: Pre-clearing process' and 'Biodiversity Guidelines Guide 9: Fauna handling' (RTA 2011) • If bats are found to inhabit the culverts, an ecologist will relocate the bats and implement exclusion measures before culvert works start.	Project manager	After award pre-construction and construction
B5	Biodiversity – 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'.	Project manager and contractor	After award pre-construction
B6	Biodiversity – loss of native vegetation and fauna habitat	• Felled hollow-bearing trees will be left on site for at least 24 hours after felling to allow any resident fauna to relocate • 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 • All construction vehicles and equipment will follow the traffic management plan, including the vehicle movement plan.	Project manager and contractor	Construction
B7	Biodiversity – 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) • 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.	Project manager and contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
B8	Biodiversity – loss of mature trees, including hollow-bearing trees	• Pruning or lopping of limbs will be conducted in preference to tree removal wherever possible.	Project manager and contractor	Construction
B9	Biodiversity – 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' • 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'.	Project manager and contractor	Construction
B10	Biodiversity – 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 manager immediately and commissioning an assessment of the likely impacts of the proposal on the threatened species.	Project manager and contractor	Construction
B11	Biodiversity – impacts to aquatic habitat	• If necessary, aquatic habitat at Stuckeys Creek will be protected in line with RTA (2011) – 'Biodiversity Guidelines Guide 10: Aquatic habitats and riparian zones' and Section 3.3.2 'Standard precautions and mitigation measures' of the 'Policy and guidelines for fish habitat conservation and management Update 2013' (Department of Primary Industries – Fishing and Aquaculture NSW 2013).	Project manager and contractor	Construction
B12	Biodiversity – impacts to groundwater dependent ecosystems	• Interruptions to water flows associated with groundwater dependent ecosystems will be minimised through detailed design.	Project manager	Pre-construction
B13	Biodiversity – changes to hydrology	• Changes to existing surface water flows will be minimised through detailed design.	Project manager	Pre-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
B14	Biodiversity – spread of weeds	• Declared noxious weeds will be managed in line with the requirements of the NSW *Noxious Weeds Act 1993* • Weed infested topsoil will be disposed of or treated and will not be stockpiled near any areas of native vegetation.	Project manager and contractor	After award pre-construction
B15	Biodiversity – 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'.	Project manager and contractor	Construction
B16	Biodiversity – fragmentation of habitat corridors	• To minimise impacts on vegetation connectivity, sections of decommissioned road will be revegetated to improve connectivity of roadside vegetation • Roads and Maritime will investigate revegetation work at other locations along the road corridor and potentially private property as part of the Biodiversity Offset package for the proposal.	Project manager	Post-construction
B17	Biodiversity – loss of native vegetation and fauna habitat	• 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 • 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'.	Project manager	Post-construction
SW1	Soils and water quality – soil erosion, sedimentation and water quality	• A soil and water management plan (SWMP) will be prepared as part of the CEMP in line with Roads and Maritime specification G38 – 'Soil and Water Management' • The soil and water management plan will also address the following: – The Blue Book - 'Soils and Construction – Managing Urban Stormwater Volume 1' (Landcom 2004) and Volume 2 (DECC 2008a)	Project manager and contractor	Pre-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
		– Technical Guideline: 'Temporary Stormwater Drainage for Road Construction' (Roads and Maritime 2011b) – Guideline for Batter Surface Stabilisation Using Vegetation (RMS 2015) • A site specific Erosion and Sediment Control Plan (ESCP) will be prepared and implemented as part of the Soil and Water Management Plan. The ESCP will include arrangements for wet weather events, including monitoring of potential high risk events (such as storms) and follow-up measures to be applied in the event of wet weather. The ESCP will also include: – A maintenance schedule for ongoing maintenance of temporary erosion and sediment controls – A sediment basin management plan to guide appropriate management of runoff during construction and operation • 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).		
SW2		• A Roads and Maritime approved soil conservationist will be engaged to provide advice through all stages of the project to assess and advise on erosion and sediment control, including progressive preparation of the ESCP. The soil conservationist must regularly (at least once a month and before and after rain events) review and inspect works throughout the construction phase and provide written recommendations on the ESCP drawings and the effectiveness of controls in place. A copy of the report is to be provided to the Principal • Controls will be implemented before topsoil removal and start of earthworks within the catchment area of each structure. This includes construction of sediment basins and other water quality structures.	Project manager and contractor	Pre-construction and construction
SW3	Soils and water quality – soil contamination	• The CEMP will include a contaminated land management plan, which must comply with the *Contaminated Land Management Act 1997*, '*Guideline for the Management of Contamination'* (Roads and Maritime 2013), 'Environmental	Project manager and contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
		Incident Classification and Reporting Procedure' (Roads and Maritime 2014) and EPA guidelines on contaminated land management • The contaminated land management plan will include: – unexpected contamination finds – any land contamination caused during construction • measures to ensure the safety of site personnel and local communities during construction.		
SW4	Soils and water quality – soil erosion and sedimentation	• Sediment and erosion controls (including sediment basins), clean water diversions and culverts will be constructed and be on line before earthworks start • Sediment basins will be regularly serviced and maintained to comply with water quality and capacity requirements • Vegetation clearing and stabilisation/revegetation activities will be carried out progressively to limit the time disturbed areas are exposed to erosion processes • Site stabilisation of disturbed areas will be carried out progressively as stages are completed • Topsoil and mulch will each be stockpiled separately for possible re-use in rehabilitation works. Mulch may also be used for erosion and sediment controls • High risk soil erosion activities such as earthworks will not be carried out immediately before or during high rainfall or wind events • Any material transported onto pavement surfaces will be swept and removed at the end of each working day • Erosion and sediment control measures will be maintained until the works are complete and areas are stabilised • Sediment netting will be installed downstream of any works in drainage lines.	Project manager and contractor	Construction
SW5	Soils and water quality – water contamination	• All fuels, chemicals, and liquids will be stored at least 50 metres away from any drainage lines and waterways and will be stored in an impervious bunded area within the compound site • Refuelling of plant and planned maintenance of machinery and plant will be carried out 50 metres away from waterways and drainage lines • Vehicles and plant will be properly maintained and regularly inspected for fluid	Project manager and contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
		leaks • Control of dirty water will be managed on site to avoid release into drainage lines and/or waterways • Potable water will be used for wash down • Containment material will be used to capture/filter water used in vehicle wash-downs • Vehicle and plant wash downs and/or concrete truck washouts will be carried out within a designated bunded area with an impervious surface or will be carried out off site • Visual monitoring of local water quality (ie turbidity, hydrocarbon spills/slicks) at Stuckeys Creek and drainage lines will be carried out on a regular basis to identify any potential spills or deficient erosion and sediment controls. Inspection records will be kept • Emergency spill kits will be kept on site at all times • All staff will be inducted about incident and emergency procedures and made aware of the locations of emergency spill kits • Should a spill occur during construction, the emergency response plan will be implemented, and the Roads and Maritime senior regional environmental officer contacted. The EPA will also be notified as per Part 5.7 of the POEO Act.		
SW6	Soils and water quality – soil contamination	• If contaminated areas are encountered during construction, appropriate control measures will be implemented to manage immediate contamination risks. All other works that may impact on the contaminated area will stop until the nature and extent of the contamination has been confirmed and any necessary site-specific controls or further actions identified in consultation with the Roads and Maritime environment officer and/or EPA.	Project manager and contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
SW7	Soils and water quality – soil erosion and sedimentation	• Carry out surveillance to monitor the effectiveness of soil stabilisation and erosion management measures • Additional erosion management measures may be implemented if measures implemented during construction are not performing to requirements.	Roads and Maritime and construction contractor (defects liability period about two years)	Operation
T1	Traffic and transport – construction impacts to traffic	A Traffic Management Plan (TMP) will be prepared and implemented as part of the CEMP. The TMP will be prepared in line with the Roads and Maritime 'Traffic Control at Work Sites Manual' (RTA, 2010) and 'QA Specification G10 Control of Traffic'. The TMP will include: • confirmation of haulage routes • measures to maintain access to local roads and properties • site specific traffic control measures (including signage) to manage and regulate traffic movement • requirements and methods to consult and inform the local community of local road network impacts in line with the Roads and Maritime 'Community Engagement and Communication Manual' (Roads and Maritime 2012) • access to construction sites including entry and exit locations and measures to prevent construction vehicles queuing on public roads • a response plan for any construction traffic incident • monitoring, review and amendment mechanisms.	Contractor and Project Manager	Detailed design/pre-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
T2	Traffic - construction impacts to traffic	• Property access will be maintained at all times unless otherwise agreed with affected property owners. Where changes to access arrangements are necessary, Roads and Maritime will advise owners and tenants and consult with them on alternate access arrangements • Work to tie in the new road to existing roads will occur during off-peak periods where possible to minimise impacts on traffic flow • Construction traffic will enter/exit the construction zone only in areas designated for this purpose in the Traffic Management Plan The community will be kept informed about upcoming road construction activities, including through advertisements in the local media and by prominently placed advisory notices.	Project manager and contractor	Construction
NV1	Noise and vibration – construction noise and vibration impacts	• A noise and vibration management plan (NVMP) will be prepared and implemented as part of the CEMP. The NVMP will generally follow the approach in the Roads and Maritime Construction Noise and Vibration Guideline (CNVG).	Contractor	Detailed design/pre-construction
NV2	Noise and vibration – construction noise and vibration impacts	• 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).	Contractor	Detailed design/pre-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
NV3	Noise and vibration – construction noise and vibration impacts	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 work hours • 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.	Contractor	Pre-construction
NV4	Noise and vibration – construction impacts	• The CEMP must be regularly updated to account for changes in noise and vibration management issues and strategies • Carry out building dilapidation surveys on all buildings located within a 15 metre buffer zone for standard structures before start of activities with the potential to cause property damage • A non-vibratory roller must be used when compacting within 15 metres of a residential receiver • Where feasible and reasonable, construction will be carried out during standard daytime working hours. Work generating high noise and/or vibration levels should be scheduled during less sensitive time periods • The use of mulchers, jack 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 • Use quieter and less vibration emitting construction methods where reasonable and feasible • Ensure plant including the silencer is well maintained • 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	Contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
		CNVG • Simultaneous operation of noisy plant within discernible range of a sensitive receiver is to be avoided • The offset distance between noisy plant and adjacent sensitive receivers is to be maximised • Plant used intermittently to be throttled down or shut down • Noise-emitting plant to be directed away from sensitive receivers • Only have necessary equipment on site • 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 • Where additional activities or plant may only result in a marginal noise increase and speed up works, consider limiting impact duration by concentrating noisy activities at one location and move to another as quickly as possible • The use of ambient sensitive alarms that adjust output relative to the ambient noise level will be considered • Loading and unloading of materials/deliveries is to occur as far as possible from sensitive receivers • Select site access points and roads as far as possible away from sensitive receivers • Dedicated loading/unloading areas to be shielded if close to sensitive receivers • Avoid or minimise out of hours movements where possible • 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.		

No.	Impact	Environmental safeguards	Responsibility	Timing
NV5	Noise and vibration – Complaints	• 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	Contractor	Construction
AQ1	Air quality – construction air quality impacts	An Air Quality Management Plan (AQMP) will be prepared and implemented as part of the CEMP. The AQMP will include, but not be limited to: • potential sources of air pollution • air quality management objectives consistent with any relevant published EPA and/or OEH guidelines • mitigation and suppression measures to be implemented • methods to manage work during strong winds or other adverse weather conditions • a progressive rehabilitation strategy for exposed surfaces • monitoring and reporting procedures • a management procedure to deal with air quality complaints.	Contractor	Detailed design/pre-construction
AQ2	Air quality – dust management	• Exposed surfaces will be watered regularly to minimise dust emissions as necessary • Vegetation clearing will be minimised where possible • Disturbed surfaces will be stabilised as soon as practicable • Stockpiles or areas that may generate dust will be managed to suppress dust emissions in line with the Roads and Maritime 'Stockpile Site Management Guideline' (RTA 2011a) • All trucks will be covered when transporting dust generating material to and from the site Dust and/or particulate matter (PM_{10}) will be monitored if considered necessary to identify the potential for nuisance dust impacts.	Project manager and contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
AQ3	Air quality – other air emissions	• Plant and machinery will be turned off when not in use as much as possible and will be fitted with emission control devices complying with Australian Design Standards where practicable • Construction plant, vehicles and equipment will be maintained in good working condition to limit impacts on air quality • No burning of any materials will occur.	Project manager and contractor	Construction
LV1	Landscape and visual – visual impacts of the proposal	• The proposal footprint will be limited as much as possible to minimise earthworks and maintain existing vegetation wherever possible.	Project manager	Detailed design
LV2	Landscape and visual – visual impacts of construction works	• The work site will be left in a tidy manner at the end of each work day.	Project manager and contractor	Construction
LV3	Landscape and visual – views of cut and fill batters	• Batters will be rehabilitated progressively.	Contractor	Construction
LP1	Land use and property – land use impacts	• A construction program will be developed to maintain access and amenity for all land uses adjacent to the proposal site as far as is practicable • All property acquisition will be carried out in line with the Roads and Maritime 'Land Acquisition Information Guide' (RTA 2011c) and the *Land Acquisition (Just Terms Compensation) Act 1991* • Relocation or replacement of private infrastructure costs required for the proposal will be funded by Roads and Maritime • Affected landowners and tenants will be consulted on an ongoing basis about acquisition status and timing.	Project manager and contractor	Pre-construction and construction
LP2	Land use and property – impacts to utilities	• Roads and Maritime will consult with relevant service providers during detailed design and construction to minimise the potential for service interruptions.	Project manager and contractor	Pre-construction and construction

No.	Impact	Environmental safeguards	Responsibility	Timing
SE1	Socio-economic – construction impacts on the community	• Potentially affected property owners and residents will be contacted before the start of work in line with the Roads and Maritime 'Community Engagement and Communication Manual' (Roads and Maritime 2012). Residents will be notified via door knocks, newsletters or letter box drops providing information on the proposed work, working hours and a contact name and number should any complaints wish to be registered • A complaints management procedure and register will be included in the CEMP.	Project manager and contractor	Pre-construction
SE2	Socio-economic – construction impacts on the community	• Local residents and road users will be kept regularly informed of construction activities during the construction process.	Project manager and contractor	Construction
AH1	Aboriginal heritage – impacts on known sites of Aboriginal heritage significance	• Site 'Gocup Road 08 (AHIMS # 56-3-0100)' will be fenced before construction to prevent impacts to the site.	Project manager and contractor	Pre-construction
AH2	Aboriginal heritage – impacts on known sites of Aboriginal heritage significance	• All workers will be inducted before work starts about the nature of the Aboriginal heritage resource in the investigation area (including protected sites along Gocup Road in the Stuckeys Creek section (3.4) and the penalties for breaches of the *National Parks and Wildlife Act 1974*.	Project manager and contractor	Construction
AH3	Aboriginal heritage – impacts on potential unknown sites of Aboriginal heritage significance	• The 'Standard Management Procedure - Unexpected Heritage Items' (Roads and Maritime 2015) will be followed in the event that an unknown or potential Aboriginal object/s, including skeletal remains, is found during construction. This applies where Roads and Maritime does not have approval to disturb the object/s or where a specific safeguard for managing the disturbance (apart from the Procedure) is not in place • Work will only re-start once the requirements of that Procedure have been satisfied.	Project manager and contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
NAH1	Non-Aboriginal heritage –impacts to the former Gocup Road alignment	• Exclusion zone fencing will be erected to protect sections of the former Gocup Road alignment located outside the proposal site.	Project manager and contractor	Pre-construction
NAH2	Non-Aboriginal heritage – inadvertent impacts on heritage items	• As part of the site induction, all workers will be advised of their obligations in relation to heritage before working on the site and the guidelines to follow if unanticipated heritage items or deposits are located during construction.	Project manager and contractor	Construction
NAH3	Non-Aboriginal heritage – unanticipated archaeological finds	• In the event of an unexpected find of an archaeological deposit (or suspected item), work will stop in the affected area and Roads and Maritime's Environment Officer will be contacted for advice on how to proceed. The 'Unexpected Heritage Items Procedure' (Roads and Maritime 2015) will be followed if a potential artefact is uncovered • Work will only re-start once the requirements of that Procedure have been satisfied.	Project manager and contractor	Construction
HR1	Hazards and risk	• Emergency response plans will be incorporated into the CEMP • An incident response plan will be developed and implemented as required as part of the CEMP to manage any identified risks on site • A design safety audit will be carried out before construction • 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. Consultation with the local Rural Fire Service will be carried out during preparation of the plan.	Project manager and contractor	Pre-construction
HR2	Hazards and risk	• All workplace health and safety requirements will be fulfilled during construction • Public access to the work site will be prohibited and access barriers will be erected • Relevant standards and utility provider procedures will be implemented for utility adjustments.	Project manager and contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
	Waste	• A Waste Management Plan (WMP) will be prepared and implemented as part of the CEMP. The WMP will include but not be limited to: – measures to avoid and minimise waste associated with the project – classification of wastes and management options (re-use, recycle, stockpile, disposal) – statutory approvals required for managing both on and off-site waste, or application of any relevant resource recovery exemptions – procedures for storage, transport and disposal – monitoring, record keeping and reporting • The WMP will be prepared taking into account the *Environmental Procedure - Management of Wastes on Roads and Maritime Services Land* (Roads and Maritime 2014) and relevant Roads and Maritime Waste Fact Sheets.	Contractor	Detailed design / pre-construction
W1	Waste management – general impacts	• Resource management hierarchy principles will be followed: – avoid unnecessary resource consumption as a priority – recover resources as far as is practicable (including re-use of materials, reprocessing, and recycling and energy recovery). This may include reuse of asphalt removed from decommissioned sections of road – disposal is carried out as a last resort (in line with the Waste Avoidance and Resource Recovery Act 2001) • Site inductions will be carried out (and recorded) by a site supervisor for all staff, to provide a thorough knowledge of all key environmental/safety issues, including waste disposal protocols • All wastes will be managed and disposed of in line with the Waste Classification Guidelines (EPA 2014) and the POEO Act • Stockpiles will be managed to avoid causing pollution or contamination in line with the 'Stockpile Site Management Guideline' (RTA 2011a) • Garbage receptacles will be provided and recycling of materials encouraged. Rubbish will be transported to an appropriate waste disposal facility • All working areas will be maintained, kept free of rubbish and cleaned up at the end of each working day.	Project manager and contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
CC1	Climate change – impacts of climate change on the proposal	• Detailed design will take into consideration the potential effect of climate change on the proposal, including flooding and drainage requirements, in line with the Roads and Maritime climate change plan • Opportunities for reducing greenhouse gas emissions during construction and operation of the proposal will be considered during the detailed design phase.	Project manager and contractor	Detailed design
CC2	Climate change – impacts of the proposal on climate change	• Material and waste transport will be scheduled to achieve full loads and to minimise required number of vehicle trips • Materials will be transported from local suppliers, and surplus materials and wastes will be transported to local sites and facilities, wherever possible • Appropriately sized construction equipment, plant and vehicles will be used • Regular equipment servicing will be carried out to maintain optimal performance and to minimise down time (which can improve overall efficiency) • The layout of access, machinery and facilities will be designed to minimise movement and vegetation clearing • The use of alternative fuels and power sources for construction plant and equipment will be investigated and implemented, where appropriate • Energy efficiency and related carbon emissions will be considered in the selection of vehicles, plant and equipment.	Project manager and contractor	Construction
CT1	Cumulative traffic impacts	• The Traffic Management Plan will consider other developments that may be under construction to minimise traffic conflict and congestion that may occur due to the cumulative increase in construction vehicle traffic • Construction of the Gocup Road works program will be managed so that the maximum delay time for motorists on the entire length of Gocup Road would be 20 minutes.	Project managers	Construction

7.3 Licensing and approvals

If a contractor carries out an activity requiring approval from an authority, it is the responsibility of the contractor to obtain the necessary approval. Licences and approvals that may be required for the proposal are summarised in Table 7.2.

Table 7.2: Summary of licensing and approvals required

Instrument	Requirement	Timing
Protection of the Environment Operations Act 1997 (s43)	Environment protection licence (EPL) for scheduled activities (extractive and crushing activities) from the EPA.	Before start of the activity.
National Parks and Wildlife Act 1974 (s90)	Aboriginal heritage impact permit variation for the proposal from the OEH Chief Executive.	Before start of the activity.
Water Management Act 2000 (s91B)	Extraction of water from the Tumut River or Murrumbidgee River would require a water supply work approval from DPI (Water).	Before start of the activity.

8 Conclusion

8.1 Justification

This section provides the justification for the proposal taking into account its biophysical, social and economic impacts, the suitability of the site and whether or not the proposal is in the public interest. The proposal is also considered in the context of the objectives of the *Environmental Planning and Assessment Act 1979* (EP&A Act), including the principles of ecologically sustainable development as defined in Schedule 2 of the *Environmental Planning and Assessment Regulation 2000*.

The proposal is considered to be consistent with a number of strategies or plans, including:

- NSW 2021: A Plan to Make NSW No 1
- NSW State Infrastructure Strategy 2012-2032
- Roads and Maritime 2020 Strategy
- NSW Long Term Transport Master Plan
- Murray-Murrumbidgee Regional Transport Plan
- NSW Freight and Ports Strategy 2013
- National Land Freight Network Strategy
- Tumut to Hume Highway Corridor Strategy.

Gocup Road has been identified as a strategic freight route in NSW. It is an important route for the local timber and milling industry. Gocup Road is also an important route for residents and property owners between Tumut and Gundagai, and for people commuting between the towns for work.

Gocup Road does not meet current road design standards and has a number of constraints for motorists and heavy vehicles. Due to these constraints, Gocup Road does not meet road safety standards and has low freight and travel efficiency.

The proposal would improve road safety and increase traffic and freight efficiency by meeting current road design standards and supporting high productivity vehicle access, with benefits for the regional economy.

There would also be a number of adverse environmental impacts as a result of the proposal. Where possible, impacts would be avoided or minimised through the design process and site-specific safeguards.

On balance, it is considered that the adverse environmental impacts of the project are outweighed by the beneficial effects and that the proposal is therefore justified.

8.2 Objects of the EP&A Act

8.2.1 Summary of the proposal against the objects of the EP&A Act

Table 8.1 provides a summary of the proposal against the objects of the EP&A Act.

Table 8.1: Objects of EP&A Act

Object	Comment
5(a)(i) To encourage the proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment.	The proposal would remove about 37.6 hectares of native vegetation, including 29.5 hectares of Box-Gum Woodland and derived grassland. This also includes 12 hectares of woodland that provides habitat for listed fauna. Impacts on listed biota are unlikely to be significant, as detailed in section 6.1. The proposal would acquire about 20.4 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. Roads and Maritime would aim to use all excavated material as fill for the Gocup Road upgrade works program. The proposal would have amenity impacts (noise, air quality and visual) during construction. These impacts would be minimised with the implementation of safeguards. 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.
5(a)(ii) To encourage the promotion and co-ordination of the orderly economic use and development of land.	Roads and Maritime is carrying out consultation and environmental investigations required to properly plan and develop the proposal without undue impacts on the local economy. The proposal would benefit the regional economy by improving traffic and freight efficiency between Gundagai and Tumut.
5(a)(iii) To encourage the protection, provision and co-ordination of communication and utility services.	Roads and Maritime is consulting with utility providers about the potential protection and relocation of utilities near the proposal site, and would continue to consult with these providers during the detailed design phase and construction.
5(a)(iv) To encourage the provision of land for public purposes.	The proposal involves work for the purpose of a road, which is for a public purpose.
5(a)(v) To encourage the provision and co-ordination of community services and facilities.	The proposal is located in a rural environment. No community services or facilities would be affected by the proposal.

Object	Comment
5(a)(vi) To encourage the protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats.	The proposal would remove about 37.6 hectares of native vegetation, including 29.5 hectares of Box-Gum Woodland and derived grassland. This also includes 12 hectares of woodland that provides habitat for listed fauna. Impacts on listed biota are unlikely to be significant, as detailed in section 6.1.
5(a)(vii) To encourage ecologically sustainable development.	Ecologically sustainable development is considered in sections 8.2.2 below.
5(a)(viii) To encourage the provision and maintenance of affordable housing.	Not relevant to the proposal.
5(b) To promote the sharing of the responsibility for environmental planning between different levels of government in the State.	Not relevant to the proposal.
5(c) To provide increased opportunity for public involvement and participation in environmental planning and assessment.	Roads and Maritime has consulted with the community and stakeholders for the proposal as described in chapter 5. This has included the Aboriginal community. Issues raised during consultation in relation to the proposal have been addressed during the environmental planning and assessment process.

8.2.2 Ecologically sustainable development

Australia's 'National Strategy for Ecologically Sustainable Development 1992' defines ecologically sustainable development as "using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased".

The principles of ecologically sustainable development have been incorporated into the concept design and environmental assessment of the proposal. The integration of these principles is discussed below.

The precautionary principle

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

Evaluation and assessment of alternative options have aimed to reduce the risk of serious and irreversible environmental impacts. Community consultation considered issues raised by the community and a range of specialist studies were carried out for key issues to provide accurate and impartial information to assist in options evaluation.

The detailed assessment of potential environmental impacts in the preparation of the design has sought to minimise impacts on the amenity of the area, while maintaining engineering feasibility and safety for all road users.

This process has enabled the proposal's impacts to be predicted within a reasonable degree of certainty. All predictions, however, contain a degree of variability, which reflects the variable nature of the environment. Where there has been any uncertainty in the prediction of impacts throughout the environmental impact assessment process, a conservative approach was adopted to ensure the worst case scenario was predicted in the assessment of impacts. A number of safeguards have been proposed to minimise potential impacts. These safeguards would be implemented during construction and operation of the proposal. No safeguards have been postponed as a result of lack of scientific certainty.

A CEMP would be prepared before construction starts. This requirement would ensure the proposal achieves a high-level of environmental performance.

Intergenerational equity

The principle states, "the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations".

The proposal would benefit future generations by ensuring the proposal does not give rise to long-term adverse environmental impacts and by ensuring that potential impacts are minimised by implementing appropriate safeguards. This would ensure the principle of intergenerational equity is not compromised.

Should the proposal not proceed, the principle of intergenerational equity may be compromised, as future generations would inherit a road with a lower level of service and of poorer quality. The proposal would benefit future generations by improving traffic and freight efficiency and road safety.

Conservation of biological diversity and ecological integrity

This principle states that the "conservation of biological diversity and ecological integrity should be a fundamental consideration".

An assessment of the existing local environment has been carried out to identify and manage the potential impacts of the proposal on local biodiversity. The proposal would remove about 37.6 hectares of native vegetation, including 29.5 hectares of Box-Gum Woodland and derived grassland. This also includes 12 hectares of woodland that provides habitat for listed fauna. Impacts on listed biota are unlikely to be significant, as detailed in section 6.1. A specialist biodiversity assessment is provided in Appendix B. Detailed design and implementation of safeguards and management measures would aim to minimise biodiversity impacts. On this basis, the conservation of biological diversity and ecological integrity has been a fundamental consideration in the assessment of the proposal.

Improved valuation, pricing and incentive mechanisms

This principle requires that "environmental factors should be included in the valuation of assets and services, such as:

(i) polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,

(ii) the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,

(iii) environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems."

The REF has examined the environmental consequences of the proposal and identified safeguards and management measures for areas that have the potential to experience adverse impacts. Requirements imposed in terms of implementation of these safeguards and management measures would result in an economic cost to Roads and Maritime. The implementation of safeguards and management measures would increase both the capital and operating costs of the proposal. This signifies environmental resources have been given appropriate valuation.

The concept design for the proposal has been developed with an objective of minimising potential impacts on the surrounding environment. This approach would also be applied to the detailed design.

All contractors engaged by Roads and Maritime are to abide by the environmental standards and procedures established by Roads and Maritime, and are to factor environmental management measures (such as waste management) into the cost of their work.

8.3 Conclusion

Roads and Maritime proposes to upgrade the Halfway Hill/Doctors Hill section of Gocup Road.

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.

The proposal is subject to assessment under Part 5 of the EP&A Act. This REF has examined and taken into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the proposed activity. This has included consideration of conservation agreements and plans of management under the *National Parks and Wildlife Act 1974*, joint management and biobanking agreements under the *Threatened Species Conservation Act 1995,* wilderness areas, critical habitat, impacts on threatened species, populations and ecological communities and their habitats and other protected fauna and native plants.

The proposal as described in this review of environmental factors best meets the proposal objectives but would still result in the following impacts:

- native vegetation removal, including the threatened ecological community Box-Gum Woodland, and habitat for listed fauna. The impacts of the proposal on species and ecological communities listed under the TSC Act and EPBC Act
- minor traffic delays and changed road conditions during construction
- potential noise, air quality and visual impacts to residences during construction
- private property and Crown land acquisition
- impacts to sites of some non-Aboriginal heritage value, including the former road alignment of Gocup Road and abandoned stock yards.

These adverse environmental impacts would be minimised through the implementation of safeguards and management measures outlined in this review of environmental factors.
On balance, it is considered that the adverse environmental impacts of the proposal are outweighed by the beneficial effects and that the proposal is therefore justified.

This review of environmental factors concludes that the proposal is unlikely to have a significant impact on any threatened species, populations or ecological communities or their habitats, listed under the *Threatened Species Conservation Act 1995* or *Fisheries Management Act 1994* and therefore a species impact statement is not required.

This review of environmental factors finds that the proposal is unlikely to have a significant environmental impact and therefore an Environmental Impact Statement is not required. Approval

from the Minister for Planning and Infrastructure under Part 5.1 of the *Environmental Planning and Assessment Act 1979* is not required.

The proposal is unlikely to affect Commonwealth land or have a significant impact on any matters of national environmental significance and therefore a referral under the *Environment Protection and Biodiversity Conservation Act 1999* to the Australian Government Department of the Environment and Energy is not required.

9 Certification

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

Reuben Robinson
Senior Environmental Scientist
GHD Pty Ltd
Date: 8 May 2017

I have examined this review of environmental factors and the certification by Reuben Robinson of GHD Pty Ltd and accept the review of environmental factors on behalf of Roads and Maritime Services.

Anthony Perera
Project Manager
Regional Project Office
Roads and Maritime Services
Date: 8 May 2017

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Terms and acronyms used in this REF

Term / Acronym	Description
ABS	Australian Bureau of Statistics
AHIMS	Aboriginal Heritage Information Management System
Biota	The flora and fauna of a region
CEMP	Construction Environmental Management Plan
Chainage	The distance of a point along a control line, measured from a datum point.
Construction environmental management plan	A site or proposal specific plan developed to ensure that appropriate environmental management practices are followed during the construction and/or operation of a proposal.
CSIRO	Commonwealth Scientific and Industrial Research Organisation
Culvert	One or more subsurface adjacent pipes or enclosed channels for conveying surface water or a stream below a road.
Cumulative impact	An impact created by accumulation or successive additions of individual impacts, which may not themselves be substantial.
Cut	The depth from the natural surface of the ground to the construction level.
dB(A)	Frequency weighting filter used to measure 'A-weighted' sound pressure levels, which conforms approximately to the human ear response, as our hearing is less sensitive at very low and very high frequencies
dbh	Diameter at breast height
DECC	Department of Environment and Climate Change, now OEH (see below)
DECCW	NSW Department of Environment, Climate Change and Water, now OEH (see below)
Decibel [dB]	The units that sound is measured in.
'Do nothing' option	This assumes that Gee Gee Bridge is not replaced and assumes existing road conditions and networks remain unchanged.
DotEE	Australian Department of the Environment and Energy
Earthworks	All operations involved in loosening, removing, depositing, shaping and compacting soil or rock
Ecologically sustainable development	Development which uses, conserves and enhances the resources of the community so that ecological processes on which life depends, are maintained and the total quality of life, now and in the future, can be increased.
EIS	Environmental Impact Statement

Term / Acronym	Description
ENMM	Roads and Maritime's Environmental Noise Management Manual 2001, Practice Notes vii – Roadworks Outside of Normal Working Hours (ENMM)
Environment	For the purpose of the REF, environment incorporates physical, biological, heritage, cultural, economic and social aspects.
EP&A Act	Environmental Planning and Assessment Act 1979
EP&A Regulation	Environmental Planning and Assessment Regulation 2000
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
ESD	Ecologically sustainable development. Development which uses, conserves and enhances the resources of the community so that ecological processes on which life depends, are maintained and the total quality of life, now and in the future, can be increased.
Fill	One or more of the following: 1. The depth from the subgrade level to the natural surface. 2. That portion of road where the formation is above the natural surface. 3. The material placed in an embankment.
FM Act	Fisheries Management Act 1994
GHD	GHD Pty Ltd
High productivity vehicles	Truck and trailer combinations that that carry higher volumes of freight more efficiently, resulting in greater environmental and safety performance.
Higher mass limit vehicles	Heavy vehicles with higher mass entitlements, which provide increased road freight productivity. In NSW, vehicle types eligible to operate with higher mass limits include: • B-doubles • Type 1 A double road trains • B-triples • AB-triples • Modular B-triples • Vehicles operating under Performance Based Standards (PBS) schemes, including quad axle combinations.
ISEPP	State Environmental Planning Policy (Infrastructure) 2007
km/h	Kilometres per hour
$L_{Aeq(period)}$	Equivalent sound pressure level: the steady sound level that, over a specified period of time, would produce the same energy equivalence as the fluctuating sound level actually occurring.
$L_{Aeq(15hr)}$	The L_{Aeq} noise level for the period 7 am to 10 pm.
$L_{Aeq(9hr)}$	The L_{Aeq} noise level for the period 10 pm to 7 am.
$L_{Aeq(1hr)}$	The highest hourly L_{Aeq} noise level during the day and night periods.

Term / Acronym	Description
LALC	Local Aboriginal Land Council
L_{Amax}	The maximum sound level recorded during the measurement period.
Land use	The type of development existing or permitted in an area whether it be industrial, commercial, residential, recreational or a combination of some or all of these different uses.
LEP	Local Environmental Plan
LGA	Local government area
Likely	Taken to be a real chance or possibility.
Locality	The area within a 10 kilometre radius of the proposal.
Lot	A part (consisting of one or more pieces) of any land (except a road, a reserve, or common property) shown on a plan, which can be disposed of separately and includes a unit or accessory unit on a registered plan of strata subdivision and a lot or accessory lot on a registered cluster plan.
NPW Act	National Parks and Wildlife Act 1974
NSW	New South Wales
OEH	NSW Office of Environment and Heritage
PACHCI	RTA Procedure for Aboriginal Cultural Heritage Consultation and Investigation
POEO Act	Protection of the Environment Operations Act 1997
Proposal	The proposed upgrade of the Halfway Hill and Doctors Hill sections of Gocup Road.
Proposal site	The area required for the construction of the proposal, including construction activities and construction vehicle access. It includes the construction footprint, site compound, stockpile sites, temporary sediment basins and any areas that would be disturbed.
QA Specifications	Specifications developed by Roads and Maritime for use with roadworks and bridgeworks contracts let by Roads and Maritime Services.
Rating background level	The overall single-figure background noise level measured in each relevant assessment period (during or outside the recommended standard hours).
Receiver	Any person, as well as a residence, business or facility, with the potential to be affected by an environmental impact (eg noise or air quality).
REF	Review of environmental factors
Road reserve	A road reserve is a legally described area within which facilities such as roads, footpaths, and associated features may be constructed for public travel. It is the total area between boundaries shown on a cadastral plan.

Term / Acronym	Description
Roads and Maritime Services	Roads and Maritime Services is the proponent for the Gee Gee Bridge REF. Roads and Maritime Services is the NSW state government department responsible for the environmental assessment on the proposal.
RTA	NSW Roads and Traffic Authority. The RTA now forms part of Roads and Maritime Services.
SEPP	State Environmental Planning Policy
Study area	The area identified for assessing the potential impacts of the proposal relating to a specific discipline. Generally the study area is defined as the area of impact and any additional areas that are likely to be affected by the proposal, either directly or indirectly.
Threatened species	A species specified in Schedule 1 Part 1 (endangered species), Part 4 (presumed extinct) and Schedule 2 (vulnerable species) of the TSC Act, in Schedule 4 (endangered species), 4A (critically endangered species) and Schedule 5 (vulnerable species) or under the EPBC Act.
TSC Act	*Threatened Species Conservation Act 1995*
Unlikely	Taken to be an unlikely or remote possibility of occurring.