Mitchell Highway (HW7) Guyong overtaking lane and safety upgrade

Review of Environmental Factors

Transport for NSW | May 2020

NSW GOVERNMENT

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Prepared by Hills Environmental and Transport for NSW

Document controls

Approval and authorisation

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Executive summary

The proposal

Transport for NSW (TfNSW) proposes to make safety improvements to the Mitchell Highway (HW7) from about 500 metres east of the Byng Road intersection to about 240 metres west of the entrance to the East Guyong Quarry (operated by Hanson Australia) (the proposal). The proposal is needed to reduce the risk of crashes on this section of the Mitchell Highway.

Key features of the proposal would include:

- Installation of a flexible safety barrier in the median and on the roadside on both sides (2.5 kilometres of road treated)
- Installation of profile audio tactile line marking on the edge and centrelines
- Widening of the road formation to achieve desired cross section (including provision for a westbound overtaking lane)
- Adjustments to stormwater drainage including culvert extensions to accommodate widening and locate headwalls outside the clear zone
- Adjustments to line marking
- Removal of roadside vegetation to reinstate the safe operation of the road over the cooler months, including the removal of introduced pine trees to mitigate the risk of black ice
- Property acquisition and boundary adjustments

Construction is expected to commence in May 2020 and would take around five months to complete.

Need for the proposal

The proposal is needed to improve road safety on this section of the Mitchell Highway. Within the limit of works for the Guyong safety improvement project, between 1 July 2012 and 30 October 2018, driver fatigue contributed to 40 per cent of crashes. Of the five reported crashes, one was a fatal, two were serious injuries and two were moderate injuries.

The proposal is being delivered under the Saving Lives on Country Roads Program and is also consistent with relevant strategic planning and policy documents including:

- NSW Future Transport Strategy 2056 (Transport for NSW, 2018)
- Regional NSW Services and Infrastructure Plan (Transport for NSW, 2018)
- Road Safety Plan 2021 (Transport for NSW, 2018).

Proposal objectives

The objectives of the proposal are:

1. Reduce the occurrence and severity of head on and run off road crashes
2. Achieve a cross section consistent with other improvements on the Mitchell Highway between Bathurst and Orange
3. Meet the Safety Performance Indicator (SPI) of 10.45 or greater for the proposal (with SPI being the number of serious injuries and deaths saved per $100 million spent in the program).
4. Minimise environmental and community impacts

Options considered

The following options were considered:

- Option 1 – 'do nothing' option. This option would involve leaving the subject section of the Mitchell Highway in its existing condition and not proceeding with safety improvements
- Option 2 – Widening existing road surface, providing an overtaking lane, installing safety barriers in the median and on outside of curves and installing audio tactile pavement marking.

Option 2 was selected as the preferred option because it would best address proposal objectives 1 and 3 through key features including:

- Improved safety with the widening of sealed shoulder areas and pavement repair where necessary
- The separation of travel lanes in opposite directions through installation of median safety barriers
- Improved safety on the outside of four curves with the installation of additional safety barriers
- Reducing the potential for fatigue related crashes through the provision of audio tactile pavement marking

While option 2 would result in some impacts on the environment and community (proposal objective 4), the impacts would be addressed through the implementation of mitigation measures identified in this report.

Statutory and planning framework

The proposed safety improvements to the Mitchell Highway are permissible without consent pursuant to Clause 94 of the State Environmental Planning Policy (Infrastructure) 2007. The proposal can therefore be assessed under Division 5.1 of the *Environmental Planning and Assessment Act 1979* by Transport for NSW as both the proponent and the determining authority.

This Review of Environmental Factors (REF) fulfils the requirements of Section 5.5 of the *Environmental Planning and Assessment Act 1979* and has been prepared in accordance with Clause 228 of the Environmental Planning and Assessment Regulation 2000 and Matters of National Environmental Significance under the *Environment Protection and Biodiversity Conservation Act 1999*.

Community and stakeholder consultation

Transport for NSW has consulted potentially affected residents. During consultation there were 16 consultation events (i.e. where a respondent has made a comment, asked a question or requested further information). The main issues raised and where they are addressed in this REF are set out below:

- Property access (refer to Section 6.7)
- Notifications (Chapter 5)
- Truck movements and haulage routes (refer to Section 6.6)
- Property impacts (refer to Section 6.7)
- Approvals (refer to Chapter 4)
- Construction noise (refer to Section 6.3).

If the proposal is approved, ongoing consultation activities would occur with the affected community including nearby landholders, businesses and road users, during construction.

Environmental impacts

The main environmental impacts of the proposal are:

Biodiversity

Based on a worst-case estimate, about 0.02 hectares of scattered native, and 13.9 hectares of exotic, vegetation will require disturbance/removal; this includes several native/exotic trees, two of which are hollow-bearing. The native vegetation that would be affected does not constitute a threatened ecological community.

The proposal is not likely to significantly impact threatened species or ecological communities or their habitats, within the meaning of the *Biodiversity Conservation Act 2016* or *Fisheries Management Act 1994* and therefore a Species Impact Statement or Biodiversity Development Assessment Report is not required.

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

Flora and fauna would be managed under the Construction Environmental Management Plan (CEMP) as part of the Project Specific Plan to guide the management of potential biodiversity impacts during construction.

Noise and vibration

The construction noise calculations show that the nearest residences could be affected by moderately intrusive noise during site establishment and corridor clearing (and some highly intrusive noise if evening/night works are needed). As works would be moving along the corridor, it is expected that intrusive construction noise would only affect individual receivers for short periods. Works would only occur primarily during standard construction hours, with some out-of-hours day works and potentially some evening/night works if required by a road occupancy licence.

The main potential source of construction vibration would be vibratory rollers. Construction plant would be selected to ensure minimum safe working distances set by the Roads and Maritime Construction Noise and Vibration Guideline (Roads and Maritime Services, 2016) are complied with, both in relation to cosmetic damage and human response to vibration.

The proposal would not result in additional vehicles travelling along the Mitchell Highway or travelling closer to properties located directly next to the highway. Given the nature of the proposed changes to the horizonal alignment and the distance to receivers it is not expected that road traffic noise levels would increase by more than 2 dBA and therefore consideration of mitigation is not required.

There is the potential for changes to maximum noise associated with vehicles crossing audio tactile line marking. However, the safety benefits of installing audio tactile line marking at this location are considered to outweigh any adverse noise impacts.

Construction noise and vibration would be managed under the CEMP as part of the Project Specific Plan to guide the management of potential noise and vibration impacts during construction.

Landscape character and visual

Impacts of the proposal on the long-term landscape character of the identified zones would result from alterations to the existing roadway and associated infrastructure. Impacts would include a widened roadway, extended areas of cut and fill adjoining the road and minor vegetation clearing. The magnitude of the proposal in relation to the landscape areas that it would traverse would be negligible. This is due to the presence of an existing roadway and because the elements of the proposal would be consistent with the existing visual nature of the highway corridor.

Traffic and transport

The proposal would result in traffic impacts during construction, including:

- Traffic delays as a result of temporary road closures
- Increased travel time as a result of reduced speed limits
- Increased travel distance and time as a result of detours during full road closures
- Temporary modifications to private property access

These impacts would be managed by site specific traffic management measures included in the CEMP.

The installation of flexible safety barrier in the median would mean that one property on the northern side of the highway would have left-in left-out access only. This would mean some additional travel time / distance for residents of and visitors to these properties.

Socio-economic and land use

Partial land acquisition is required along the Mitchell Highway (refer to Section 3.6). The acquisition process for all required land would be carried out in accordance with statutory requirements and Transport for NSW policy.

There would be some likely temporary socio-economic impact and benefit to the local community from building the proposal such as:

- Worker travel impact: motorists and other road users may experience minor travel delays. However, the scale of the changes is unlikely to affect people's travel or commuting habits
- Income and employment benefit: there may be some opportunity for localised employment while the proposal is being built as described below.

Once built the proposal would provide a safer roadway that would potentially reduce the number and severity of road crashes along the Mitchell Highway.

Justification and conclusion

The proposal is required to improve safety for road users on the subject section of the Mitchell Highway at Guyong. This section of the highway has a history of crashes including fatal crashes.

A number of potential environmental impacts from the proposal have been avoided or reduced during the concept design development and options assessment. The proposal as described in the REF best meets the project objectives but would still result in some impacts in terms of biodiversity, noise, visual amenity and traffic. Safeguards and management measures as detailed in this REF would ameliorate or minimise these expected impacts. The proposal would also substantially improve road safety. On balance the proposal is considered justified and the following conclusions are made.

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Appendices

1. Introduction

1.1 Proposal identification

Transport for NSW (TfNSW) proposes to make safety improvements to the Mitchell Highway (HW7) from about 500 metres east of the Byng Road intersection to about 240 metres west of the entrance to the East Guyong Quarry (operated by Hanson Australia) (the proposal). The proposal is needed to reduce the risk of crashes on this section of the Mitchell Highway.

Key features of the proposal would include:

- Installation of a flexible safety barrier in the median and on the roadside on both sides (2.5 kilometres of road treated)
- Installation of profile audio tactile line marking on the edge and centrelines
- Widening of the road formation to achieve desired cross section (including provision for a westbound overtaking lane)
- Adjustments to stormwater drainage including culvert extensions to accommodate widening and locate headwalls outside the clear zone
- Adjustments to line marking
- Removal of roadside vegetation to reinstate the safe operation of the road over the cooler months, including the removal of introduced pine trees to mitigate the risk of black ice
- Property acquisition and boundary adjustments.

The proposal site is located within a rural context about 20 kilometres to the south-east of Orange, in the NSW Central West. It is within the suburb of Guyong and the Cabonne local government area. A prominent local feature is the Vittoria State Forest located to the east of the proposal site.

The location of the proposal is shown in Figure 1-1 and an overview of the proposal is provided in Figure 1-2. Chapter 3 describes the proposal in more detail.

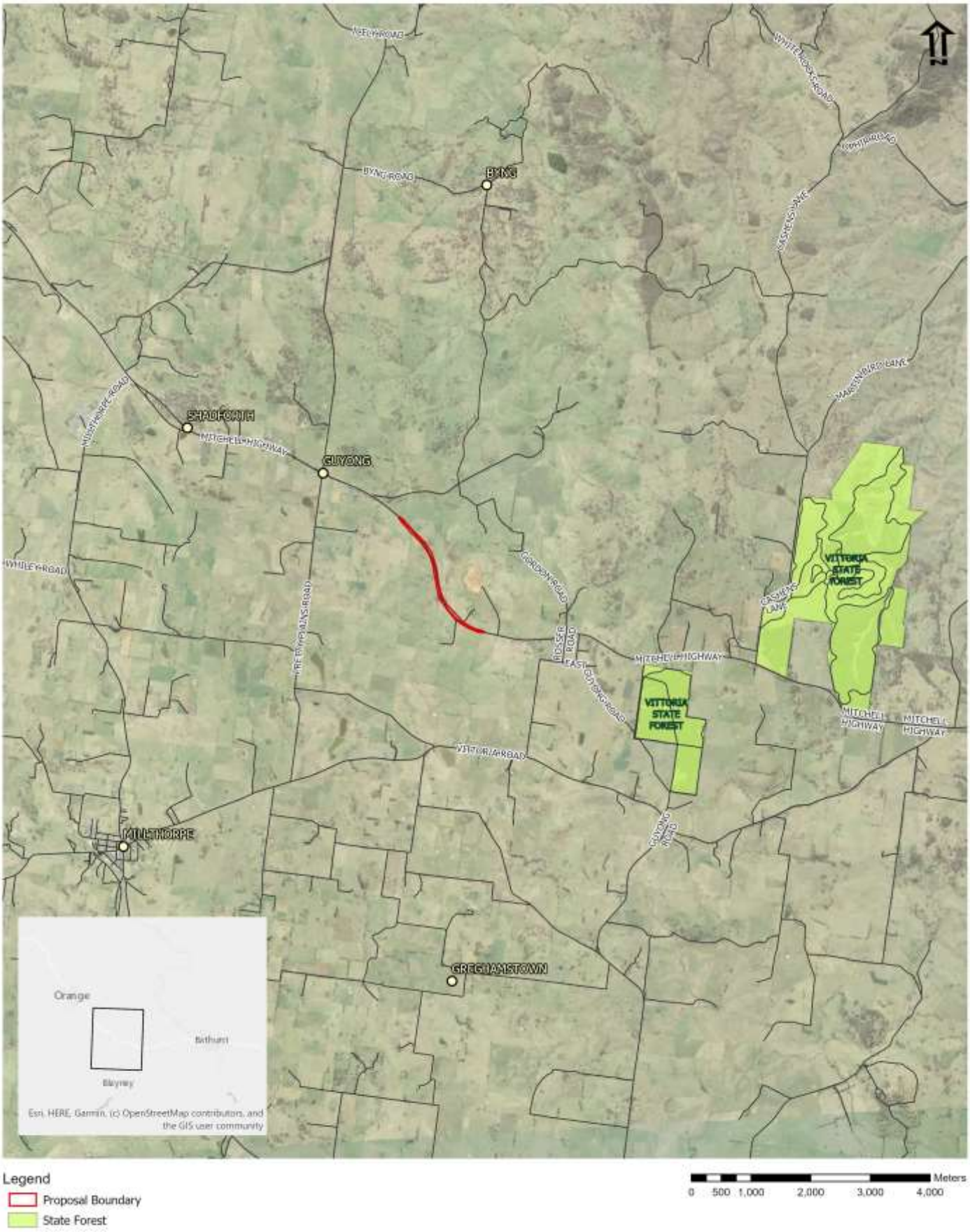

Figure 1-1: Location of the proposal

Figure 1-2: The proposal

1.2 Purpose of the report

This review of environmental factors (REF) has been prepared by Hills Environmental on behalf of Transport for NSW. For the purposes of these works, Transport for NSW is the proponent and the determining authority under Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

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

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

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

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

The findings of the 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 and Public Spaces under Division 5.2 of the EP&A Act
- The significance of any impact on threatened species as defined by the BC Act and/or FM Act, in section 1.7 of the EP&A Act and therefore the requirement for a Species Impact Statement or a Biodiversity Development Assessment Report
- The significance of any impact on nationally listed biodiversity matters under the EPBC Act, including whether there is a real possibility that the activity may threaten long-term survival of these matters, and whether offsets are required and able to be secured
- The potential for the 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

The Mitchell Highway is part of the National Highway A32 corridor and its primary route is via Bathurst, Orange, Dubbo, Nyngan and Bourke to South Western Queensland. The Mitchell Highway also forms part of the shortest route between Sydney and Darwin, making it an important road link for the transport of passengers and freight for regional NSW and Queensland.

The strategic need for the proposal is centred on the need to improve road safety on this important route. In the period between 1 July 2012 and 30 October 2018 there were a total of five recorded crashes within the limit of works for the Guyong safety improvements project. Of the five crashes, one was a fatal, two were serious injuries and two were moderate injuries. Crash types included one head on crash, one accessing road and three runoff road on curve hit object crashes. Fatigue was identified as a contributing factor to 40 per cent of all crashes.

2.1.1 NSW Future Transport Strategy 2056

The NSW Future Transport Strategy 2056 (Transport for NSW, 2018) outlines a clear framework to address transport challenges in NSW over the next 40 years and is an update of the NSW Long Term Transport Master Plan released in 2012. It integrates planning for roads, freight and all other modes of transport and sets out initiatives, solutions and actions to meet NSW transport challenges.

By providing safety improvements on the Mitchell Highway, the proposal would directly support the following regional NSW transport customer outcomes:

- Supporting centres with appropriate transport services and infrastructure.
- Economic development is enabled by regional transport services and infrastructure.
- A safe transport system for every customer with the aim for zero deaths or serious injuries on the network by 2056.

2.1.2 Regional NSW Services and Infrastructure Plan

The Regional NSW Services and Infrastructure Plan (Transport for NSW, 2018) is the NSW Government's blueprint for transport in regional NSW from now until 2056. It sets out the Government's thinking on the big trends, issues, services and infrastructure needs which are now, or will soon shape transport in regional NSW.

The plan recognises that a key to the future success of the Central West and Orana region is supporting efficient transport connections to, from and within the region. The plan specifically identifies Mitchell Highway improvements (lane and seal widening with clear zone works and safety measures) as an initiative for investigation in the 10-20 year period. The proposal is consistent with this commitment.

2.1.3 Road Safety Plan 2021

The Road Safety Plan 2021 (Transport for NSW, 2018) outlines how the NSW Government will work towards the State Priority Target of reducing fatalities by 30 per cent by 2021 (compared to average annual fatalities over 2008–2010). It also aligns the Towards Zero vision with Future Transport 2056, which aims to have a NSW transport network with zero trauma by 2056.

The proposal is consistent with the directions set out in Road Safety Plan 2021 because it includes measures targeted specifically at improving road safety (for example, safety barriers and audio tactile line marking).

2.1.4 Saving Lives on Country Roads Program

The Saving Lives on Country Roads Program aims to reduce the number of people killed and seriously injured on our roads.

In the 2018/19 Budget, the NSW Government announced a record $1.9 billion in dedicated road safety initiatives over five years, which included $640 million to save lives on country roads through targeted safety infrastructure upgrades. The proposal is being delivered under the Saving Lives on Country Roads Program.

2.2 Existing infrastructure

The existing highway within the proposal site is a two-lane undivided road. There are no intersections, but there are several property accesses within the proposal site. The posted speed limit is 100 kilometres per hour.

The road generally follows the natural terrain with some areas of shallow cut to achieve a suitable vertical alignment.

Cross drainage is via several existing pipe culverts. Existing utilities include communications and aboveground low-voltage power.

2.3 Proposal objectives and development criteria

2.3.1 Proposal objectives

The objectives of the proposal are:

1. Reduce the occurrence and severity of head on and run off road crashes
2. Achieve a cross section consistent with other improvements on the Mitchell Highway between Bathurst and Orange
3. Meet the Safety Performance Indicator (SPI) of 10.45 or greater for the proposal (with SPI being the number of serious injuries and deaths saved per $100 million spent in the program).
4. Minimise environmental and community impacts.

2.3.2 Development criteria

The development criteria for the proposal include:

- Designing the proposal in a manner that is informed by environmental investigations to minimise any adverse impact while maximising environmental benefits
- Satisfying the technical and procedural requirements of TfNSW and other stakeholders with respect to the design of the proposal
- Optimising the design to ensure that the proposal can be practically and efficiently constructed and maintained while meeting all other proposal objectives

- Designing all connections, modifications and improvements necessary to link the proposed work to the existing road system
- Planning temporary arrangements that minimise disruption to local and through traffic and that maintain access to adjacent properties during construction
- Developing, implementing and maintaining effective management systems for quality, work health and safety, environmental, proposal reporting, risk management, value management and value engineering, constructability assessment, safety audits and community participation.

2.3.3 Urban design objectives

Urban design objectives for the proposal include:

- Maximise tree retention where possible
- Provide an attractive rural landscape road.

2.4 Alternatives and options considered

Several alternatives and options were identified and considered in developing the proposal and selecting the preferred option. They are summarised in this section.

2.4.1 Methodology for selection of preferred option

The option selection methodology involved assessing each option against the proposal objectives, the adopted development criteria, as well as cost and constructability considerations. In this context, the process of option selection had two broad stages:

- Consideration of where the proposal in any configuration could be justified. This is an evaluation of the 'do nothing' option
- An evaluation of options by reference to their respective impacts and benefits, and whether they meet the proposal objectives and funding allocations.

2.4.2 Identified options

It was identified early in the proposal development process that alternative route options (that is routes other than the existing highway alignment) would not be needed to meet to the proposal objectives and would introduce substantial additional costs. Alternative route options were therefore not developed for evaluation.

The following options were considered:

- Option 1 – 'do nothing' option. This option would involve leaving the subject section of the Mitchell Highway in its existing condition and not proceeding with safety improvements
- Option 2 – Widening existing road surface, providing an overtaking lane, installing safety barriers in the median and on outside of curves and installing audio tactile pavement marking.

2.4.3 Analysis of options

Option 1 – 'Do nothing'

The 'do nothing' option was not considered appropriate as it does not meet the identified need and does not address proposal objectives 1 to 3. While this option would not have the environmental impacts associated with construction work and would not require property acquisition (proposal objective 4), it would also not deliver improved safety for motorists using this key transport link (proposal objectives 1 and 3).

Option 2 – Road widening, installing safety barriers and audio tactile pavement marking

This option would address the need to improve the safety for road users (proposal objectives 1 and 3) and would support the provision of a consistent road cross section between Bathurst and Orange (proposal objective 2). This option would allow the improvement of safety for road users though the installation of safety barriers and widening of the road shoulders at locations with a crash history (proposal objectives 1 and 3). This option would also provide an additional safe overtaking opportunity for westbound traffic. There would be some potential environmental impacts during construction and some property acquisition, however these have been minimised by limiting the proposal footprint where possible (proposal objective 4).

2.5 Preferred option

The preferred option is option 2. This option would best address proposal objectives 1 and 3 through key features including:

- Improved safety with the widening of sealed shoulder areas and pavement repair where necessary
- The separation of travel lanes in opposite directions through installation of median safety barriers
- An additional safe overtaking opportunity for westbound traffic
- Improved safety on the outside of curves with the installation of additional safety barriers
- Reduced the potential for fatigue related crashes through the provision of audio tactile pavement marking

While option 2 would result in some impacts on the environment and community (proposal objective 4), the impacts would be addressed through the implementation of mitigation measures identified in this report.

The principles of ecologically sustainable development encourage integration of economic, social development and the environmental considerations into the decision-making process for all developments. The development of the proposal is consistent with these principles as demonstrated by the proposal objectives (which include environmental and social considerations) and the alignment of the preferred option with those objectives. The principles of ecologically sustainable development are also specifically supported by the proposal through:

- Improving safety for the benefit of present and future generations
- Adopting a simple cost-effective design that makes use of an existing road corridor and minimises footprint related environmental impacts
- Being easy to build, which would reduce the construction program and footprint and therefore minimise the social impact on the people that live in the area.

On balance, the benefits to the broader community of road users from the improved safety conditions derived from proceeding with the proposal outweigh the potential short-term impacts.

3. Description of the proposal

3.1 The proposal

Transport for NSW proposes to make safety improvements to the Mitchell Highway (HW7) from about 500 metres east of the Byng Road intersection to about 240 metres west of the entrance to the East Guyong Quarry (operated by Hanson Australia) (the proposal). The proposal is shown in Figure 1-2 in Chapter 1 (introduction) and in Figure 3-1 to Figure 3-4 below.

Key features of the proposal would include:

- Installation of a flexible safety barrier in the median and on the roadside on both sides (2.5 kilometres of road treated)
- Installation of profile audio tactile line marking on the edge and centrelines
- Widening of the road formation to achieve desired cross section (including provision for a westbound overtaking lane)
- Adjustments to stormwater drainage including culvert extensions (at seven locations) to accommodate widening and locate headwalls outside the clear zone
- Adjustments to line marking
- Removal of roadside vegetation to reinstate the safe operation of the road over the cooler months, including the removal of introduced pine trees to mitigate the risk of black ice
- Property acquisition and boundary adjustments.

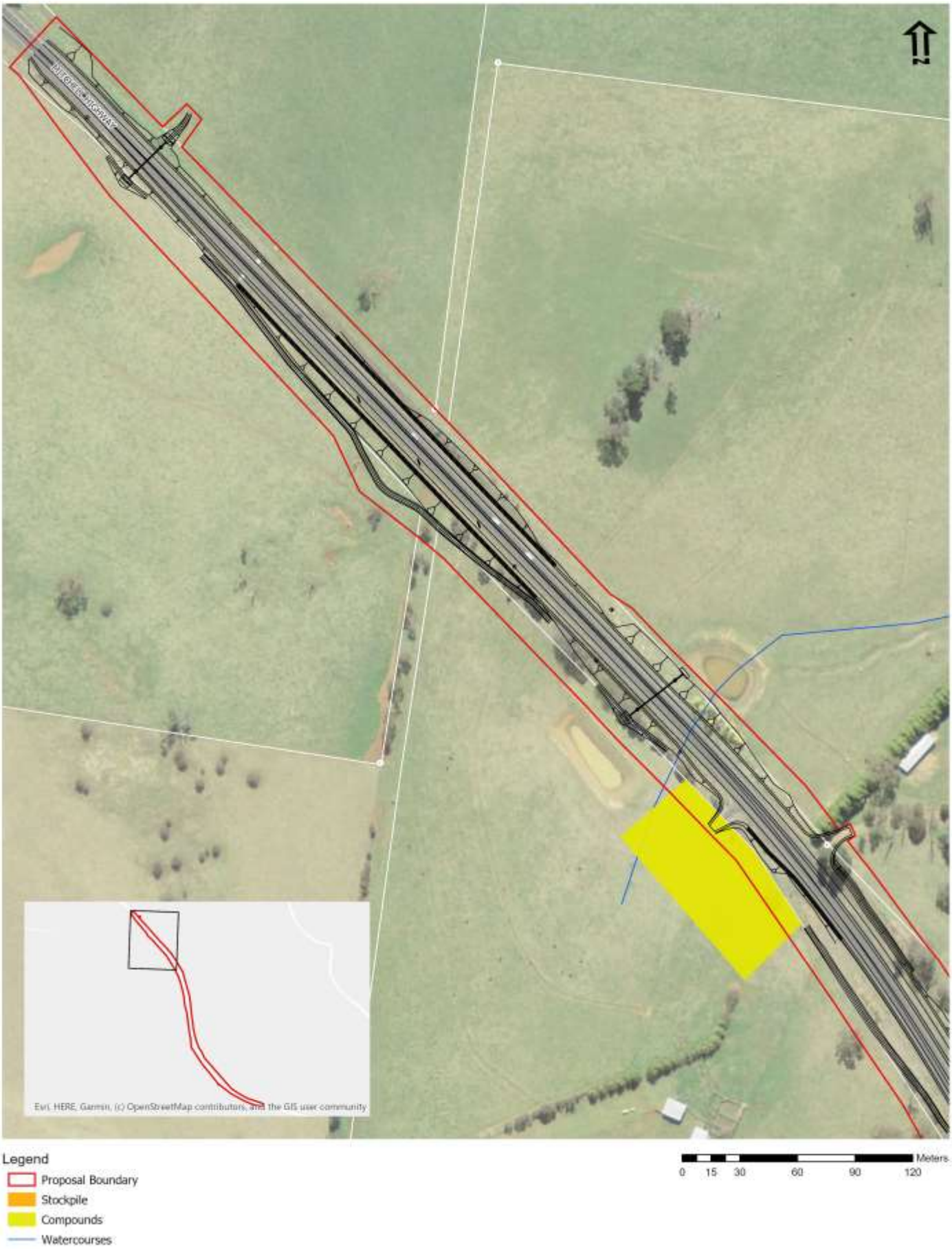

Figure 3-1: Key features of the proposal – map 1

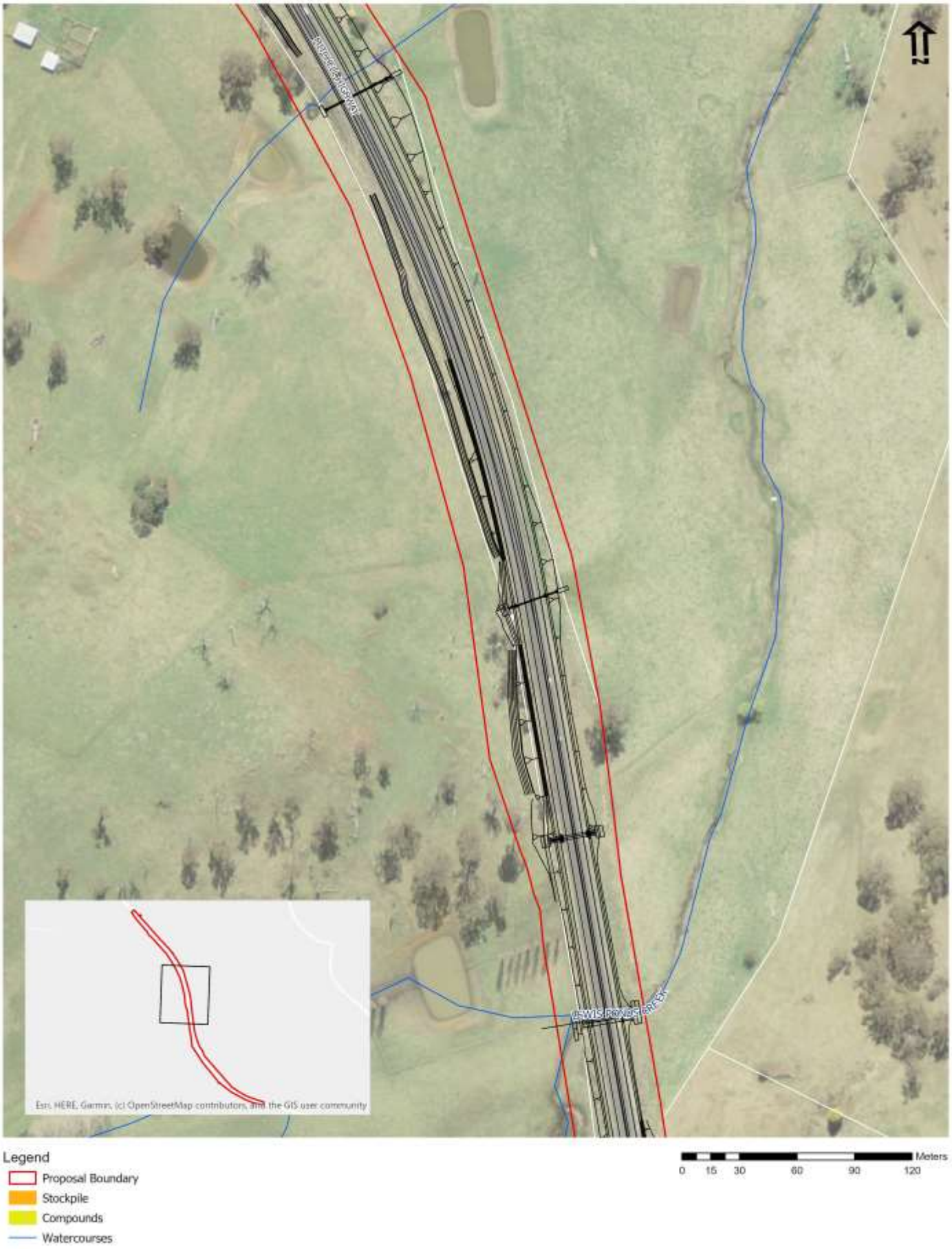

Figure 3-2: Key features of the proposal – map 2

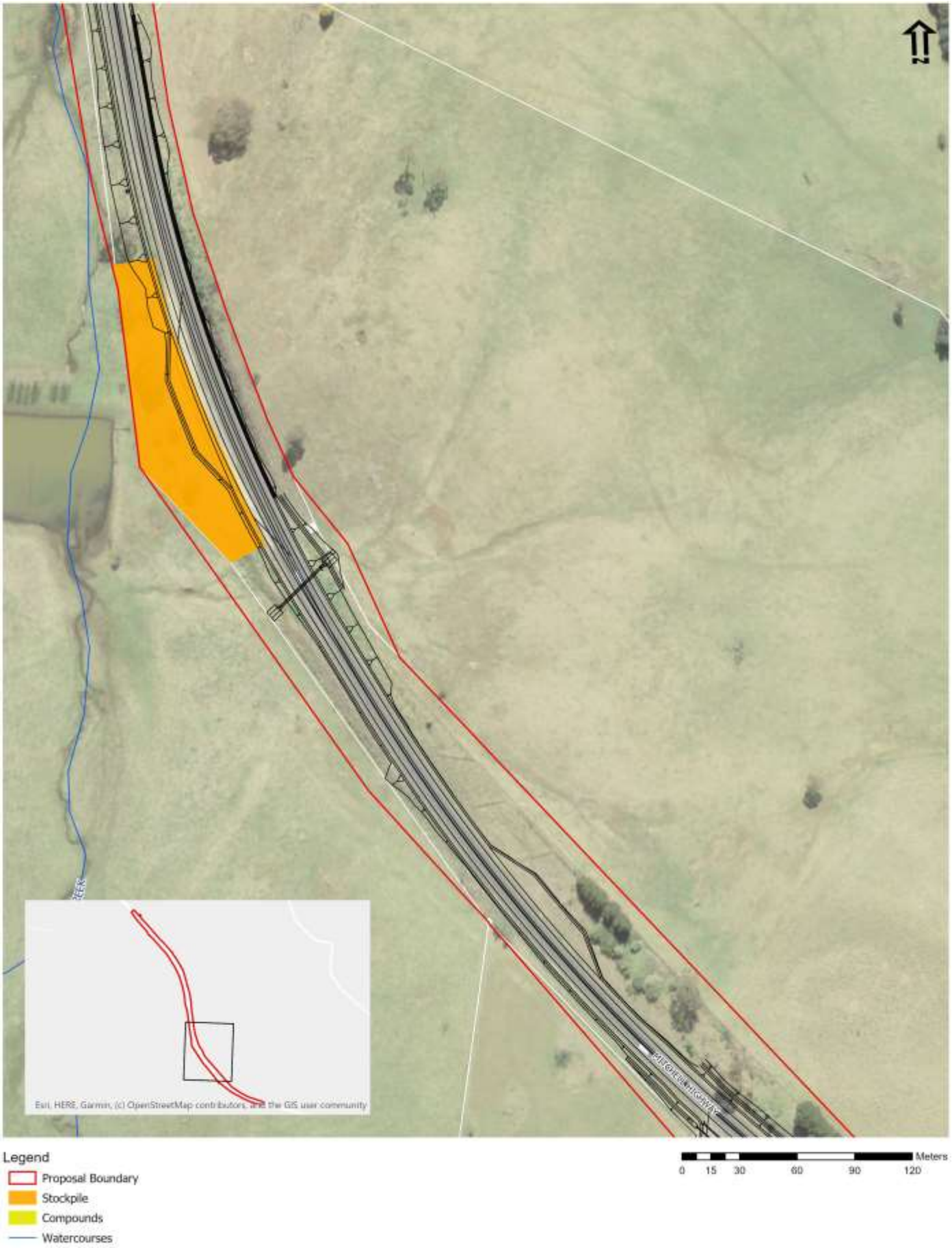

Figure 3-3: Key features of the proposal – map 3

Figure 3-4: Key features of the proposal – map 4

3.2 Design

The following guidelines and standards have been used to inform and develop the concept design:

- Guide to Road Design set (Austroads, 2019) (in conjunction with Transport for NSW Austroads Guide Supplements)
- Guide to Road Safety set (Austroads, 2019)
- Beyond the Pavement - Urban Design Policy Procedures and Design Principles (Roads and Maritime Services, 2014).

3.2.1 Design criteria

The above guidelines and standards describe the criteria that should be adopted for specific road types (i.e. rural roads, sub-arterials, arterial etc.) and conditions (i.e. rural, semi-urban). The criteria have been developed to ensure all roads are designed to be safe, effective, well-planned and easily maintained.

Table 3-1 shows design criteria that have been adopted for the proposal. Figure 3-5 to Figure 3-7 show typical cross sections for the proposal.

Table 3-1: Design criteria

Aspect	Design criteria
Design speed	• 110 kilometres per hour
Posted speed	• 100 kilometres per hour
Centre median	• 1.4 metres wide median treatment with flexible centre median safety barrier, widening to 4.4 metre median where the median safety barrier is broken to allow property access.
Lane width	• 3.5 metres
Shoulders	• 2.0-metre-wide shoulders when adjacent to overtaking lanes • 4.0-metre-wide shoulder at property accesses • 3.0-metre-wide shoulders elsewhere
Grades	• Generally, as per existing
Turning paths	• Design vehicle is a 26-metre B-double.
Batter slopes	• Generally, 2H:1V. In areas which have no shoulder barriers, the batter slope to be flattened to 6H:1V where possible.

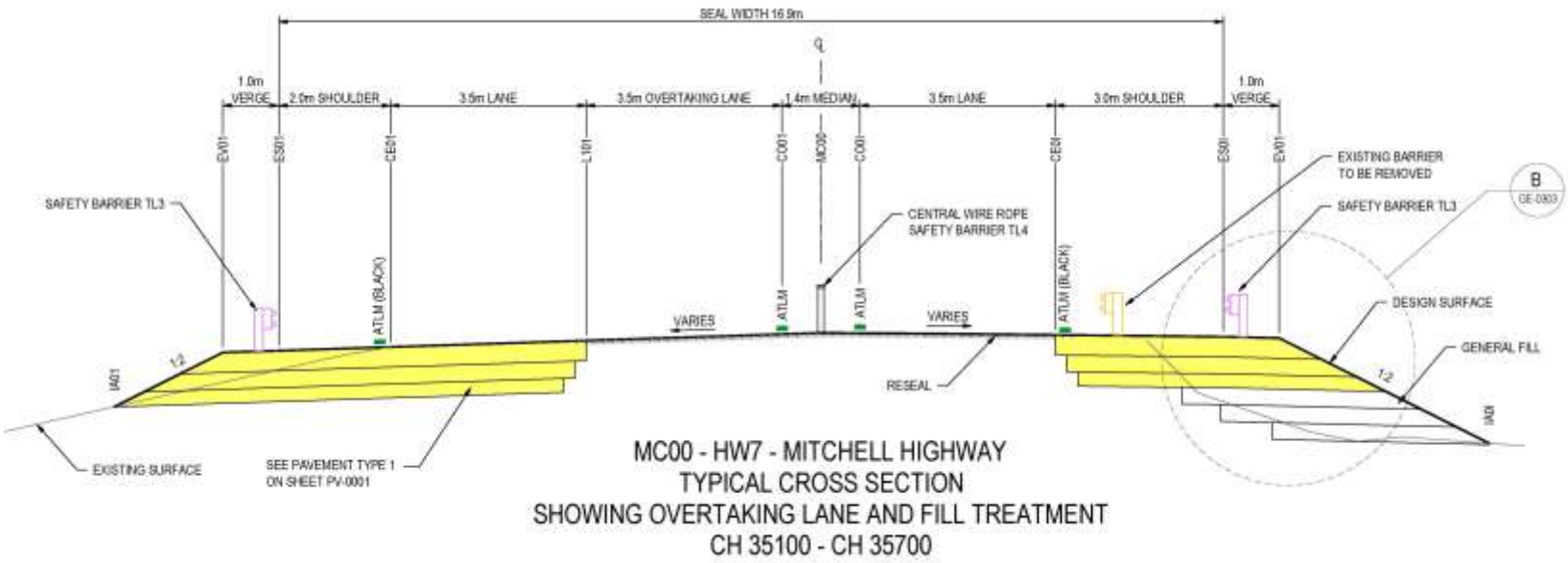

Figure 3-5: Typical cross section – overtaking lane and fill treatment

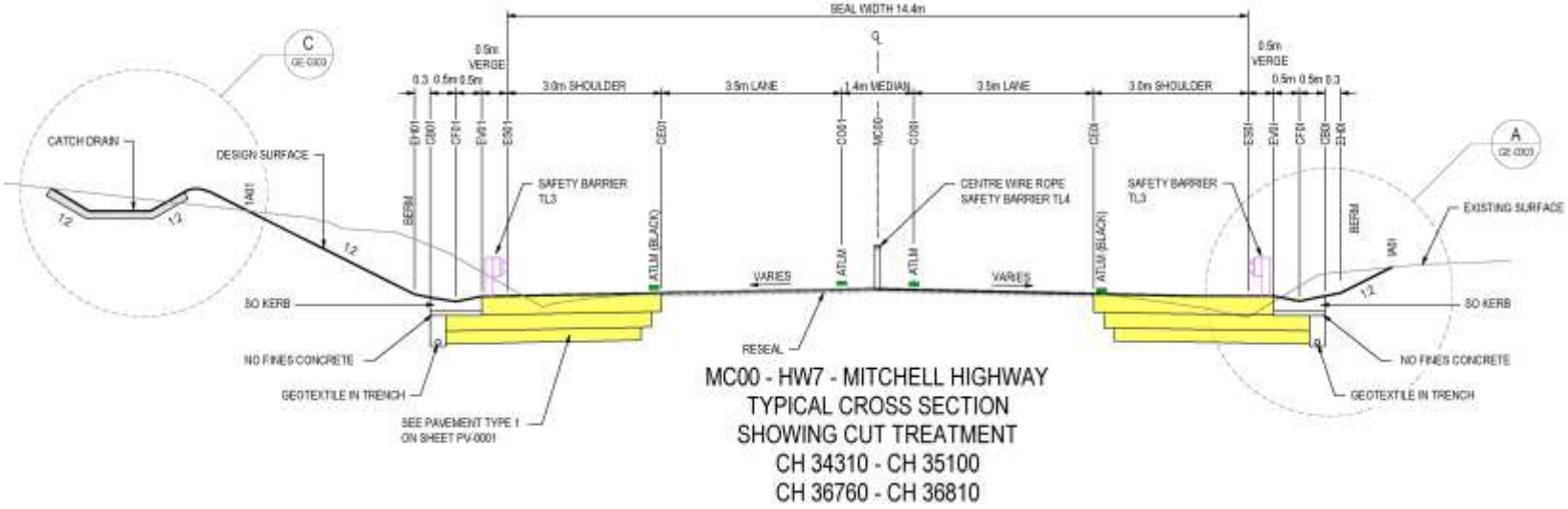

Figure 3-6: Typical cross section – cut treatment

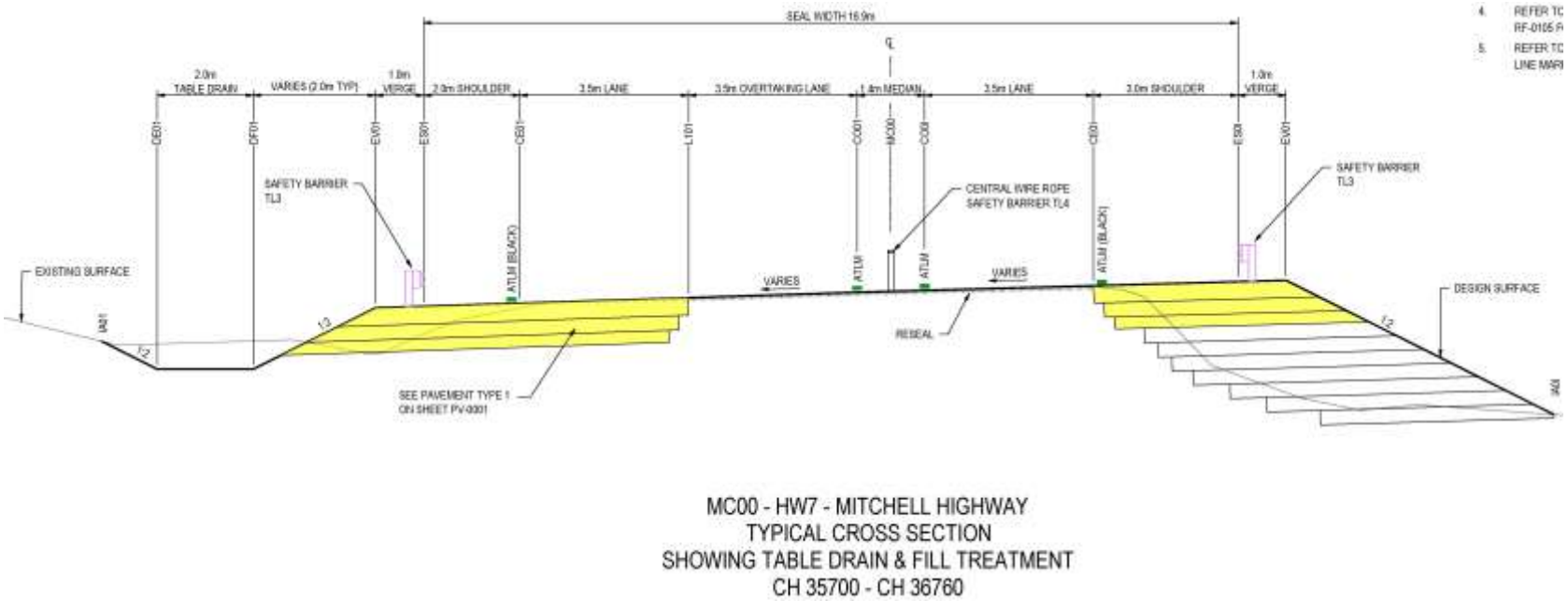

Figure 3-7: Typical cross section – table drain and fill treatment

3.2.2 Engineering constraints

Several engineering issues and constraints for the design and construction of the proposal have been identified. Table 3-2 identifies the main issues and constraints for the proposal. These issues and constraints have informed the development of the design for the proposal. Further discussion of these issues and constraints are provided in Chapter 6 (Environmental assessment) where there is an expected environmental impact to the study area as a result of the proposal.

Table 3-2: Engineering constraints

Constraint	Comment
Utilities in the area	• Utilities affected by the road widening would need to be relocated while others would need to be protected in place
Properties	• Some property acquisition is required for the proposal; however, acquisition does need to be minimised.
Traffic and access	• Requirement to maintain through traffic and turning movements during construction

3.3 Construction activities

3.3.1 Work methodology

The proposal has been designed to allow the Mitchell Highway to remain operational during construction. The proposal would generally involve the following sequence of work activities:

- Site establishment and environmental protection
- Utility adjustment/installation, earthworks and drainage work
- Road removal, building and/or repair of the road and installing new road infrastructure
- Amenity, landscaping and urban design work
- Finalisation work
- Site demobilisation.

Table 3-3 describes the likely work activities that would be undertaken to build the proposal. It is likely that the following activities would take place across all work stages in all sections of the proposal footprint

Table 3-3: Likely sequence of work activities for the proposal

Stage	Activities
Site establishment and environmental protection	• Setup environmental, safety and traffic management controls (refer to Chapter 7) • Pre-clearance surveys and obtaining any permits or licences • Establish site compounds (refer to section 3.5), designated storage areas, stockpile areas and stabilised access to work zones across the proposal footprint • Site demarcation, exclusion fencing and barrier establishment,

Stage	Activities
	identification and protection of any sensitive areas (such as trees identified for retention) • Land clearance (vegetation removal, clearing and grubbing) and any property adjustments • Install temporary site drainage controls (as required).
Utility adjustment/installation	• Protect existing utilities • Adjust and relocate existing utilities • Install and test new utilities • General utility work would vary depending on whether the utility is to be protected, adjusted or installed, and whether it is underground or above ground. Work would include a combination of: – Trench and/or under-boring excavation – Bedding material installation – Pipeline and conduit installation – Cable pulling to install new power and communications cables – Pit and cutover excavation – Valve, switch and other infrastructure installation to allow the transfer of utilities to the new alignment – Service testing and commissioning – Backfill and compaction – Ground surface restoration.
Earthworks	• Sequentially strip and excavate topsoil and sub soil • Grade and compact areas (where required).
Drainage works	• Drainage lines and general drainage work. Drainage work would vary depending on whether the drainage is to be relocated, removed or installed. Typically, it may involve: – Temporary diversions and erosion and sediment control measures – Excavating overburden on existing structures and protect, cap, seal and remove any existing infrastructure – Trench excavation for the new structures and inclusion of measures to protect any retained drainage structures – Installing foundation and bedding material – Installing and connecting infrastructure – Integrity and flow testing – Backfill and compaction with excavated materials or import new clean fill – Ground surface restoration work
Road removal, building and/or repair of the road and installing new road infrastructure	• Implement diversions and traffic management controls (as needed) • Remove materials to support the new work and depth (referred to as boxing out)

Stage	Activities
	• Milling the road surface • Prepare and level the subgrade • Lay and compact new road surface layers • Install new road infrastructure.
Amenity, landscaping and urban design work	• Carry out final grading, levelling and compaction • Landscape and final treatments and finishes.
Finalisation work	• Paint permanent line markings etc.
Site demobilisation	• Demobilise the site compounds • Remove temporary traffic management controls • Remove environmental, safety and traffic controls (refer to Chapter 7)

3.3.2 Construction hours and duration

Transport for NSW plans to carry out the proposal over a period of about five months (weather permitting) with construction expected to commence in mid-2020.

Construction would primarily occur during the following standard work times:

- 7am to 6pm Monday to Friday
- 8am to 1pm Saturday.

However, to minimise the overall duration of works (and the duration of impacts on nearby residences), works are proposed to occur every second weekend. This would include the following additional daytime out-of-hours works:

- On every second Saturday from 7am to 8am
- On every second Saturday 1pm to 5pm
- On every second Sunday 7am to 5pm

Additionally, to minimise impacts on the road network, all work would also need to be in accordance with road occupancy licence (ROL) requirements and this may require some evening and/or night work.

For scheduled out-of-hours work, potentially impacted sensitive receivers would be consulted and kept informed of construction progress to minimise any impacts. In addition, management and mitigation measures detailed within the CEMP would be implemented as required to further mitigate any construction impacts. This includes the development of an out-of-hours work protocol which would govern the management of work outside standard work hours.

Out-of-hours work would be carried out in accordance with the Noise Criteria Guideline (Roads and Maritime Services, 2015) and Construction Noise and Vibration Guideline (Roads and Maritime Services, 2016). Prior advice would be given to the community regarding work hours, and any planned construction work that is proposed to be carried out outside standard work hours.

3.3.3 Plant and equipment

The proposal would require the use of a range of plant and equipment including:

- Trucks
- Water carts
- Cranes
- Vibratory compactors
- Elevated work platform
- Rollers (vibratory, rubber tyred)
- Backhoes
- Concrete truck
- Trenchers
- Light vehicles and four-wheel drive
- Excavators
- Bitumen sprayers
- Graders
- Asphalt pavers and profilers
- Handheld tools
- Generators.

3.3.4 Earthworks

The proposal would require earthworks including the following activities:

- Excavation of unsuitable material from the road formation
- Modification to existing cut and fill batters
- Demolition of areas of existing formation for pavement repairs
- Excavation and placement of materials for areas of new pavement
- Excavation for drainage works.

The following preliminary quantities have been identified:

- Removal and stockpiling of non-contaminated topsoil – about 2,760 cubic metres
- General earthworks cut/fill – about 21,008 cubic metres
- Unsuitable material – about 1,051 cubic metres
- Selected Material zone (imported) – about 7,254 cubic metres

Earthwork materials and estimated quantities would be further refined prior to the start of construction. Any unsuitable or surplus material would be managed in accordance with resource management hierarchy principles. This includes, in order of preference:

- Reuse as engineered fill onsite
- Transfer:
  - To another TfNSW project for use as engineering fill
  - For storage at a TfNSW stockpile site to allow for its future reuse
  - To another construction site for use as engineering fill
  - To a licenced waste recovery site

- For disposal at a licenced facility.

Any material containing or likely to contain naturally occurring asbestos must be managed in accordance with the Naturally Occurring Asbestos Management Plan. Containment of naturally occurring asbestos material typically occurs within the proposal area or is disposed of at a licensed waste facility.

3.3.5 Source and quantity of materials

Natural resources would include aggregate and sand for use in concrete. Asphalt would be required for the proposal. Manufactured items, including steel and, pre cast components would also be required.

Materials would be sourced from appropriately licensed facilities. Wherever possible, materials would be sourced from commercial suppliers in nearby areas or other viable sources such as other nearby infrastructure planning proposals. No materials currently proposed to be used for the proposal are considered to be in short supply.

Materials required for the proposal would include but not be limited to:

- Select fill, sand, road-base and sub-base
- Aggregates
- Cement and concrete
- Bitumen
- Steel
- Timber for formwork and temporary structures
- Road furniture including safety barriers, cables, posts, and signage
- Geotextile fabrics
- Rock filled wire mattresses
- Water
- Precast drainage structures
- Diesel
- Temporary fencing.

Water would be required for activities such as the compaction of earthwork and pavement layers and dust suppression. The amount of water that would be required during construction is unknown at this stage. The amount would depend on material sources and methodologies applied by the contractor. Water would be sourced from the following:

- Orange / Bathurst standpipes
- Summer Hill Creek (to the west near Orange)
- Shadforth Quarry on the Millthorpe Road (periodic use only).

Noting that the proposal site is within an area classified as in drought, construction water will be managed within the sustainable limits of the area and catchment. It may be necessary to reduce or limit water extraction and some construction activities if water supply is heavily constrained. The Transport for NSW Regional Environmental Manager will be asked for direction prior to the extraction of any water for the proposal.

3.3.6 Traffic management and access

Vehicle movements

Road traffic would be impacted throughout the construction period. Construction traffic movements would occur on the surrounding road network with around 50 heavy vehicle and 50 light vehicle movements per day during peak construction times. Access to the site would be restricted to left-in-left-out only where practical and feasible to do so.

Heavy vehicles would be used to deliver construction material to the proposal footprint and transfer construction materials to nominated stockpile sites. These would be managed in accordance with the management measures outlined in the Traffic Management Plan for the proposal.

Traffic management, control and signage

Where possible, construction would be programmed to minimise the impact on traffic using the local and regional road network.

Standard traffic management measures would be used to minimise the traffic impact expected during construction. These measures would be identified in a Traffic Management Plan for the proposal and would be developed in accordance with Traffic Control at Work Sites (Roads and Maritime Services, 2018)

The Traffic Management Plan would provide details of traffic management to be implemented during construction. Impact to the public (including traffic and cyclists) during construction would be managed through the TMP and detailed traffic control plans. During all stages of construction, access to businesses and to work areas would be maintained.

Road and lane closures

Traffic delays that may occur as a result of the proposal being built would be managed through the provisions the Traffic Management Plan. Traffic management would be designed to ensure the flow of traffic throughout the periods of lane closures while the proposal being built.

The impact of construction worker vehicle parking would be managed through measures identified in the Traffic Management Plan.

3.4 Ancillary facilities

Compound sites close to the proposal footprint would be required to for site offices, worker amenities and to store equipment, machinery and vehicles to build the proposal. Stockpile sites would be required for the temporary storage of bulk materials. The specific requirements for each site would depend on the construction staging. Provisionally, there are two locations that would be used as site compounds and one location that would be used as a stockpile site during construction. The locations of these ancillary facilities are shown on Figure 3-1, Figure 3-3 and Figure 3-4.

The location of all ancillary facilities has been selected to meet the following criteria, where possible:

- Away from areas of ecological and heritage conservation value
- Outside of flood prone land
- Setback from perennial watercourses
- On previously disturbed areas that do not require the clearing of native vegetation
- More than 100 metres from residential properties
- Outside the drip line of trees and on relatively level ground.

Compounds and stockpile sites would be accessed directly from the Mitchell Highway.

3.5 Public utility adjustment

Adjustment or protection of utilities and services (low voltage power and communications) at various locations along the alignment.

Additional surveys would be carried out prior to the start of work to determine any additional utility impact. Consultation with public utility providers for the proposal is ongoing.

3.6 Property acquisition

About 14,300 square-metres (about 1.4 hectares) of land would need to be acquired from private land owners to build the proposal. TfNSW would also need to temporarily lease or negotiate access for additional land during construction. While the final land purchase requirements would be confirmed during the detailed design, all land acquisition would be carried out in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991* and supporting policy.

Table 3-4 and Figure 3-8 describes and show the proposed acquisition of land required for the proposal.

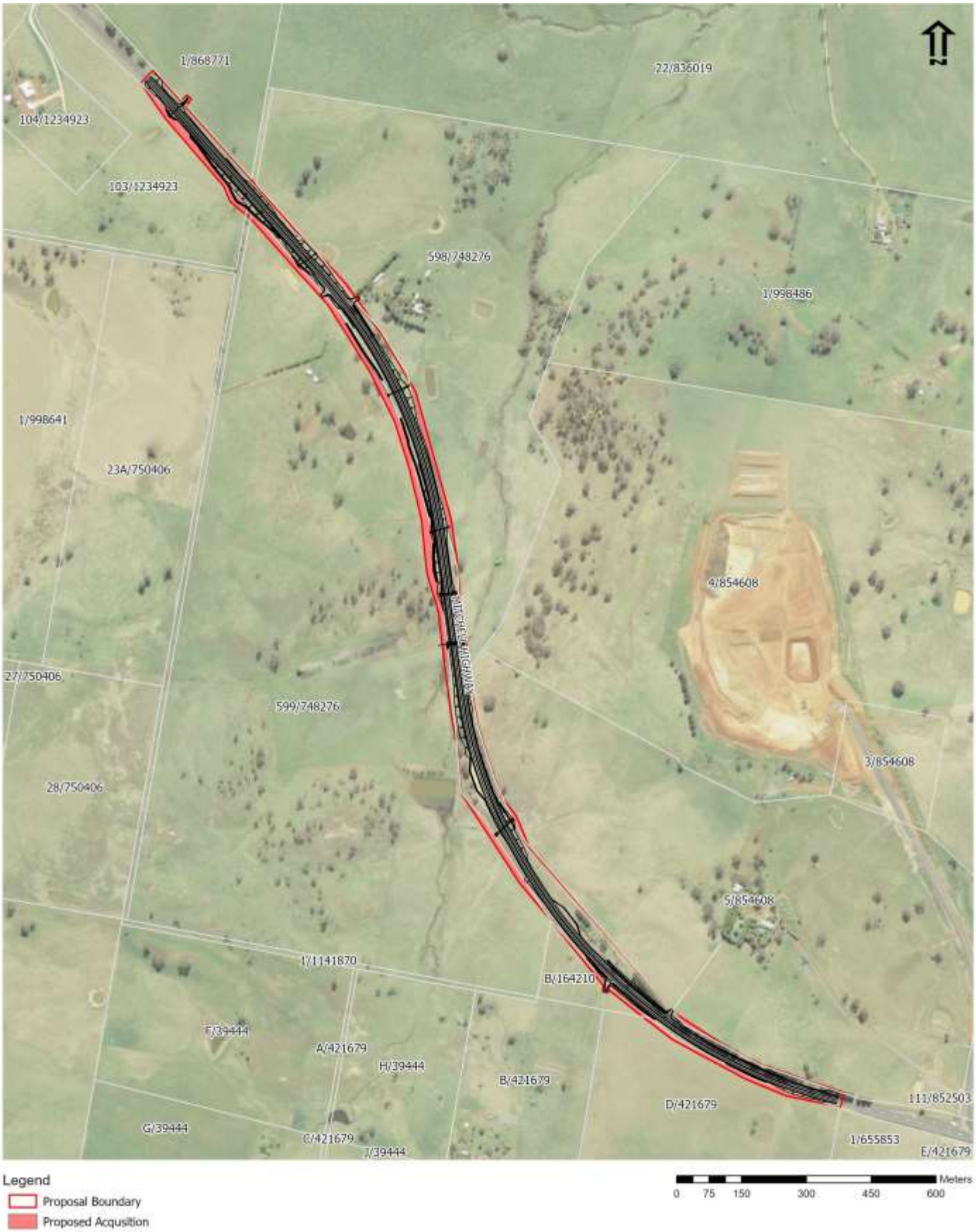

Figure 3-8: Proposed property acquisition

Table 3-4: Proposed property acquisition

Area ID	Description	Total area (m^2)	Acquisition type	Current owner	Lot and DP	Land use zone (LEP)
1	3485 Mitchell Highway, Guyong	2,890	Partial	Private property	Lot D DP421679	RU1 Primary Production
2	3485 Mitchell Highway, Guyong	1,462	Partial	Private property	Lot B DP164210	RU1 Primary Production
3	3629 Mitchell Highway, Guyong	1,395	Partial	Private property	Lot 599 DP748726	RU1 Primary Production
4	3713 Mitchell Highway, Guyong	3,677	Partial	Private property	Lot 103 DP1234923	RU1 Primary Production
5	3626 Mitchell Highway, Guyong	3,676	Partial	Private property	Lot 598 DP748726	RU1 Primary Production
6	3472 Mitchell Highway, Guyong	1,204	Partial	Private property	Lot 5 DP854608	RU1 Primary Production

4. Statutory and planning framework

4.1 Environmental Planning and Assessment Act 1979

4.1.1 State Environmental Planning Policies

State Environmental Planning Policy (Infrastructure) 2007

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

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

As the proposal is for a road and road infrastructure facilities and is to be carried out by Transport for NSW, it can be assessed under Division 5.1 of the *Environmental Planning and Assessment Act 1979*. Development consent from council is not required.

The proposal is not located on land reserved under the *National Parks and Wildlife Act 1974* and does not require development consent or approval under State Environmental Planning Policy (Coastal Management) 2018, State Environmental Planning Policy (State and Regional Development) 2011 or State Environmental Planning Policy (State Significant Precincts) 2005.

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

State Environmental Planning Policy –(Koala Habitat Protection) 2019

State Environmental Planning Policy (Koala Habitat Protection) 2019 aims to encourage the conservation and management of areas of natural vegetation that provide habitat for Koala's to ensure a permanent free-living population over their present range and reverse the current trend of Koala population decline. The SEPP applies to a range of local government areas including Cabonne.

Part 2 of the SEPP regulates impact on Koala habitats. While it strictly only applies to proposals being assessed under Part 4 of the EP&A Act, as a matter of practice Transport for NSW considers the SEPP as part of the Division 5.1 assessment process.

The potential impact on Koala habitat and habitat connectivity is an important issue for the proposal and is discussed in section 6.1.

4.1.2 Local Environmental Plans

Cabonne Local Environmental Plan 2012

Land use and development within this part of the Cabonne local government area is primarily regulated by the Cabonne Local Environmental Plan 2012 (Cabonne LEP).

The proposal site is zoned as follows under the Cabonne LEP:

- SP2 Infrastructure (covers the existing Mitchell Highway corridor)

- RU1 Primary Production (covers land adjacent to the Mitchell Highway)

Development for the purpose of roads is permitted with development consent in all the affected zones under the Cabonne LEP. As noted in Section 4.1.1, the ISEPP operates to remove consent requirements and/or prohibitions that would otherwise apply.

The consistency of the proposal with the objectives of the affected zones is considered in Table 4-1.

Table 4-1: Consistency of the proposal with zone objectives

Zone	Objective	Comment
RU 1 Primary Production	To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.	The proposal would require acquisition of relatively small amounts of land within this zone. The overall objective of sustainable primary industry production would not be affected.
	To encourage diversity in primary industry enterprises and systems appropriate for the area.	The proposal would require acquisition of relatively small amounts of land within this zone. The proposal would not compromise opportunities to develop diversity in primary industry enterprises and systems.
	To minimise the fragmentation and alienation of resource lands.	The proposal would require acquisition of relatively small amounts of land within this zone immediately adjacent to the existing Mitchell Highway corridor. There would be no further fragmentation of resource lands.
	To minimise conflict between land uses within this zone and land uses within adjoining zones.	The proposal would not alter the relationship between different uses in the RU1 zone or between the RUI zone and the Mitchell Highway corridor.
	To enable function centres, restaurants or cafes and appropriate forms of tourist and visitor accommodation to be developed in conjunction with agricultural uses	The proposal would require acquisition of relatively small amounts of land within this zone. The proposal would not compromise opportunities for restaurants or cafes and appropriate forms of tourist and visitor accommodation within the RU1 zone.
SP2 Infrastructure	To provide for infrastructure and related uses.	The proposal would improve safety on an existing highway and is therefore consistent with this objective.
	To prevent development that is not compatible with or that may detract from the provision of infrastructure.	The proposal supports existing road transport infrastructure.

4.2 Other relevant NSW legislation

4.2.1 Protection of the Environment Operations Act 1997

Part 3.2 of the *Protection of the Environment Operations Act 1997* requires an environmental protection licence for scheduled development work and the carrying out of scheduled activities (as set out in Schedule 1 of the POEO Act), which includes road construction. The proposal does not trigger these requirements.

Section 148 of the *Protection of the Environment Operations Act 1997* requires immediate notification of pollution incidents causing or threatening material harm to the environment to each relevant authority. An Incident Management Plan would be included in the environmental management documentation for the proposal, to be prepared during the detailed design phase.

4.2.2 Heritage Act 1977

An excavation permit is required to disturb or excavate any land knowing or having reasonable cause to suspect that the disturbance or excavation will or is likely to result in a relic being discovered, exposed, moved, damaged or destroyed. A permit is also required to disturb or excavate any land on which the person has discovered or exposed a relic. Relics are not expected to be affected by the proposal (refer to Section 6.8) and an unexpected find procedure would be documented in the Construction Environmental Management Plan (written at detailed design phase) and implemented during construction.

4.2.3 National Parks and Wildlife Act 1974

The harming or desecrating of Aboriginal objects or places is an offence under Section 86 of the *National Parks and Wildlife Act 1979*. Under Section 90, an Aboriginal heritage impact permit may be issued in relation to a specified Aboriginal object, Aboriginal place, land, activity or person or specified types or classes of Aboriginal objects, Aboriginal places, land, activities or persons. Aboriginal objects and/or places are not expected to be affected by the proposal (refer to Section 6.7) and an unexpected find procedure would be documented in the Construction Environmental Management Plan and implemented during construction.

4.2.4 Biodiversity Conservation Act 2016

The *Biodiversity Conservation Act 2016* seeks to conserve biological diversity and promote ecologically sustainable development; to prevent extinction and promote recovery of threatened species, populations and ecological communities; and to protect areas of outstanding biodiversity value.

The *Biodiversity Conservation Act 2016* provides a listing of threatened species, populations and ecological communities, areas of outstanding biodiversity value, and key threatening processes.

Part 7 of the *Biodiversity Conservation Act 2016* requires that the significance of the impact on threatened species, populations and endangered ecological communities listed under the *Biodiversity Conservation Act 2016* or *Fisheries Management Act 1994*, are assessed using a five-part test. Where a significant impact is likely to occur, a Species Impact Statement or Biodiversity Development Assessment Report must be prepared in accordance with the Office of Environment and Heritage requirements.

An assessment of the potential impact on biodiversity is provided in Section 6.1.

4.2.5 Water Management Act 2000

Potentially relevant *Water Management Act 2000* approval requirements are reviewed in Table 4-2.

Table 4-2: Water Management Act 2000 approvals

Provision	Application
Water access licences (s.56 & s.60A)	Exemption for roads authorities in relation to water required for road construction and road maintenance under clause 21 and Schedule 4 of the Water Management (General) Regulation 2018.
Water use approval (s.89 & s.91A)	Exemption for roads authorities in relation to water required for road construction and road maintenance under clause 34 and Schedule 5 of the Water Management (General) Regulation 2018.
Water supply work approval	Water supply work approval potentially required for any water extraction or dewatering of excavations.
Controlled activity approval Required for carrying out controlled activities including works on waterfront land (s.91 and s.91E)	Exemption in clause 41 of the Water Management (General) Regulation 2018.

4.3 Commonwealth legislation

4.3.1 Environment Protection and Biodiversity Conservation Act 1999

4.3.2 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, 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 A.

Findings – matters of national environmental significance

The assessment of the proposal's impact on matters of national environmental significance and the environment of Commonwealth land found that there is unlikely to be a significant impact on relevant

matters of national environmental significance or on Commonwealth land. Accordingly, the proposal has not been referred to the Australian Government Department of the Agriculture, Water and the Environment under the EPBC Act.

Findings – nationally listed biodiversity matters (where the strategic assessment applies)

The assessment of the proposal's impact on nationally listed threatened species, endangered ecological communities and migratory species found that there is unlikely to be a significant impact on relevant matters of national environmental significance. Chapter 6 of the REF describes the safeguards and management measures to be applied.

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 ISEPP, the proposal is permissible without consent. The proposal is not State Significant Infrastructure or State Significant Development. The proposal can be assessed under Division 5.1 of the EP&A Act.

TfNSW is the determining authority for the proposal. This REF fulfilsTfNSW's obligation under Section 5.5 of the EP&A Act including 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 strategy

The consultation strategy for the proposal involves several engagement tools which have and will continue to be used to consult with the community and identified stakeholders. These include:

- Project notifications and project updates for nearby residents
- Door-knocking nearby residents and businesses
- Meetings and briefings for stakeholders, businesses and residents (as required)
- Letters, emails, social media posts and targeted correspondence
- Updates on the Roads and Maritime website: www.rms.nsw.gov.au/projects

5.2 Community involvement

Taking into account the scale of the proposal and the location of potentially affected stakeholders, targeted consultation rather than broader community involvement was identified as appropriate. In late 2019 Transport for NSW carried out consultation with the following groups:

- Landowners – directly affected (i.e. by property acquisition)
- Landowners – indirectly affected (e.g. by construction related delays or amenity impacts)
- Business owner / operator
- Residents.

During consultation there were 16 consultation events (i.e. where a respondent has made a comment, asked a question or requested further information). The main issues raised and where they are addressed in this REF are set out below:

- Property access (refer to Section 6.7)
- Notifications (this chapter)
- Truck movements and haulage routes (refer to Section 6.6)
- Property impacts (refer to Section 6.7)
- Approvals (refer to Chapter 4)
- Construction noise (refer to Section 6.3)

5.3 Aboriginal community involvement

The proposal has been considered against the requirements of the Procedure for Aboriginal Cultural Heritage Consultation and Investigation (PACHCI) (Roads and Maritime Services, 2011). This procedure is generally consistent with the Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 (Department of Environment, Climate Change and Water, 2010). An outline of the procedure is presented in Table 5-1.

Table 5-1: Summary of Procedure for Aboriginal Cultural Heritage Consultation and Investigation

Stage	Description
Stage 1	Initial Roads and Maritime assessment

Stage	Description
Stage 2	Site survey and further assessment
Stage 3	Formal consultation and preparation of a cultural heritage assessment report
Stage 4	Implement environmental impact assessment recommendations

TfNSW has determined that it is not necessary to proceed beyond Stage 1 of the PACHCI. Refer to the Aboriginal cultural heritage advice included in Appendix C.

5.4 ISEPP consultation

There are no specific ISEPP consultation requirements relevant to the proposal. Appendix B contains an ISEPP consultation checklist that documents how ISEPP consultation requirements have been considered.

5.5 Government agency and stakeholder involvement

Specific consultation with government agencies has not occurred during the preparation of the concept design and environmental assessment. Consultation with identified agencies and stakeholders would occur as needed during the detailed design and delivery of the proposal.

Consultation with following utility providers has occurred as part of and has informed the design development process:

- Essential Energy – correspondence regarding street lighting design
- Cabonne Shire Council – site meeting and correspondence regarding water and sewer relocations, including as well as minimum cover requirements
- NBN Co
- Telstra.

5.6 Ongoing or future consultation

If the proposal is approved, ongoing consultation activities would occur with the affected community including nearby landholders, businesses and road users during construction. Ongoing communications and notifications may include:

- Community/construction updates
- Media announcements
- NSW LiveTraffic updates and social media updates
- Stakeholder meetings as required
- Web page updates
- Work notification letters (as required).

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.

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

6.1 Biodiversity

This section summarises the assessed impact on biodiversity values that are likely to occur when building and operating the proposal. A biodiversity assessment was undertaken by Lesryk Environmental to support the REF, and is included as Appendix D.

6.1.1 Methodology

Desktop assessment

Prior to carrying out any fieldwork, previous studies conducted in the region and relevant databases were consulted to identify the diversity of ecological communities, flora and fauna species known for, or potentially occurring in, the study region. The results informed the identification of appropriate field surveys. The following databases and information sources were consulted:

- Federal Department of Environment an Energy Protected Matters Search Tool – accessed on 15 October 2019 using a 10-kilometre buffer.
- Department of Primary Industries WeedWise database – accessed October 2019 (Central Tablelands)
- Bionet Atlas of NSW Wildlife – accessed October 2019 with a 10-kilometre buffer
- Department of Planning, Industry and Environment threatened species website – accessed 16 October 2019
- Areas of Outstanding Biodiversity Value register (formerly Critical Habitat Register – accessed October 2019
- Bionet Vegetation Classification Database – accessed 14 November 2019
- Bionet Threatened Biodiversity Profile Data Collection – accessed 19 November 2019
- Department of Planning, Industry and Environment Biodiversity Values Map and Threshold Tool – accessed October 2019

Field survey

Field investigations were carried out on 29 October 2019, and on 26 November 2019. The purpose of the field survey was to identify those vegetation communities, fauna habitats, plants and animals present within, and in close proximity to, the proposed road work area that are of State and/or national conservation

significance as listed under the Schedules to the *Environment Protection and Biodiversity Conservation Act 1999*, *Biodiversity Conservation Act 2016* and/or *Fisheries Management Act 1994*.

The survey methods employed during the field investigation are summarised below with additional detail included in Appendix D:

- Identification of those plants present, including any areas affected by direct and indirect impacts
- Identification of the structure of those vegetation communities and fauna habitats present at the site
- Direct observation of those fauna species present within, next to, or in close proximity to the subject site
- Diurnal call identifications of fauna species, with all calls being identified in the field
- Identification of any indirect evidence such as tracks, scats, scratchings and diggings that would suggest the presence of a particular fauna species
- Search of the culverts beneath the subject section of the Mitchell Highway to determine if the culverts present support suitable habitat for cave-occupying microchiropterans (such as small crevices) and if there was any evidence of bat guano or staining
- Leaf litter and ground debris searches for sheltering reptiles and amphibians.

6.1.2 Existing environment

Plant community types

Plant community types within and adjacent to the proposal site are identified in Table 6-1 and shown by Figure 6-1.

Table 6-1: Plant community types within and adjacent to the proposal site

Plant community type	Condition class	Threatened ecological community	Area (ha) within the proposal site
Non-native	Poor	No	13.8
1101 - Ribbon Gum - Snow Gum grassy open forest on flats and undulating hills of the eastern tableland; South Eastern Highlands Bioregion	Good	No	0.02

The non-native vegetation type is dominated by exotic species with no native canopy or shrub layer and only very minor native ground cover components. Several weed trees and shrubs frequently observed include Hawthorn (*Crataegus monogyna*), Tree Lucerne (*Chamaecytisus palmensis*) and Radiata Pine (*Pinus radiata*). The exotic ground layer species Cocksfoot Grass (*Dactylis glomerata*), Phalaris (*Phalaris aquatica*) and Meadow Fescue (*Festuca pratensis*) were strongly dominant in most areas. Other exotics frequently observed were Hemslock (*Conium maculatum*), Spear Thistle (*Cirsium vulgare*) and Prairie Grass (*Bromus catharticus*).

Plan Community Type 1101 includes remnant native canopy trees recorded along the route within the road verge (as well as in adjoining paddocks) were Ribbon Gum (*Eucalyptus viminalis*) and Apple Box (*E. bridgesiana*). Red Box (*Eucalyptus polyanthemos*) was observed within paddocks, with foliage overhanging the road verge in limited areas. The only native midstorey species recorded was Silver Wattle (*Acacia dealbata*) with several regenerating stands recorded. Native groundlayer species included the grasses *Poa sieberiana*, Hairy Panic (*Panicum effusum*), Kangaroo Grass (*Themeda triandra*), *Rytidosperma tenuius*, and the forbs Native Geranium (*Geranium solanderi*), Yellow Buttons (*Chrysocephalum apiculatum*), Bidgee-widgee (*Acaena novae-zelandiae*) and Native Blue bell (*Wahlenbergia communis*).

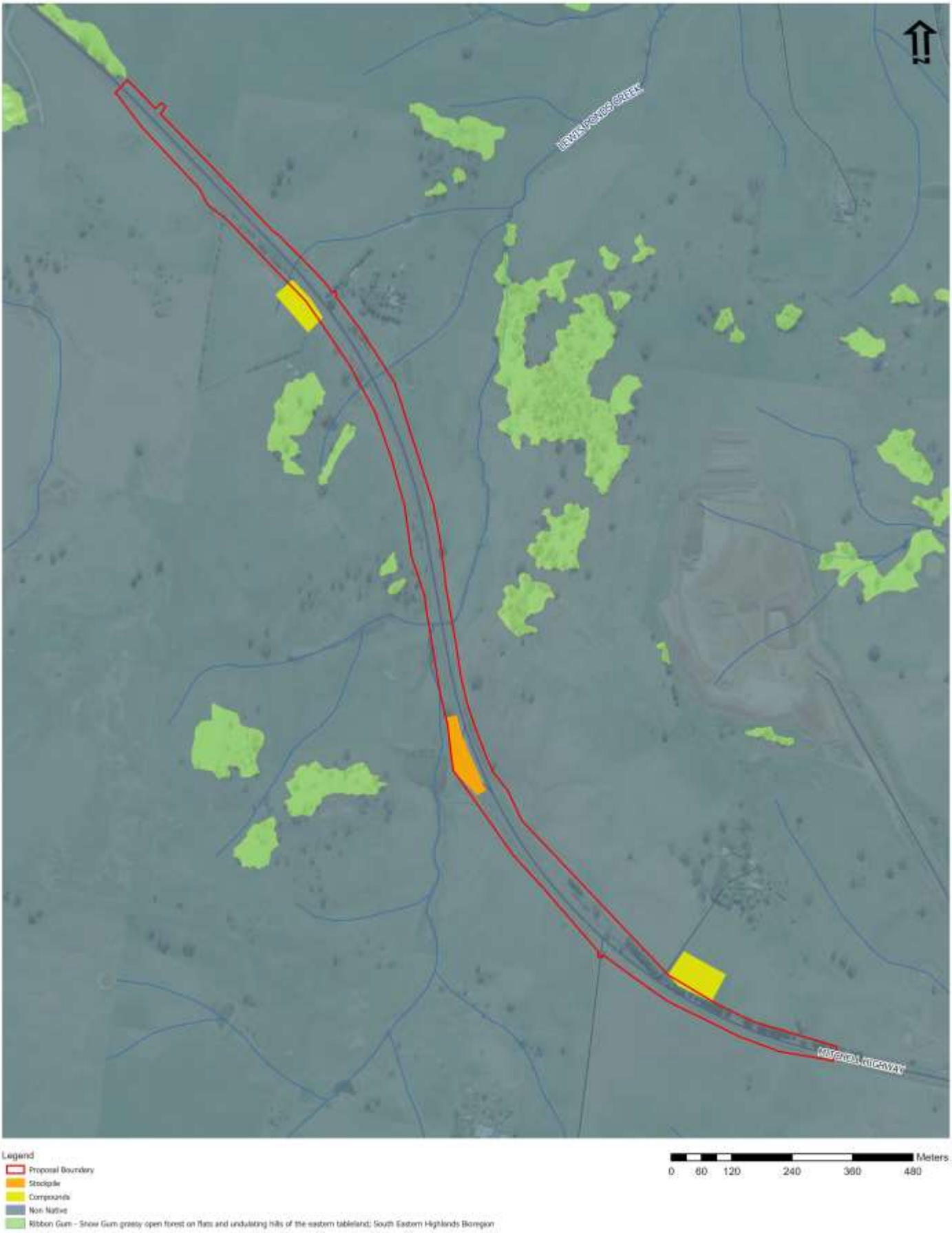

Figure 6-1: Plant community types within and adjacent to the proposal site

Threatened ecological communities

None of the PCT's identified within the proposal area meet the definition of a threatened ecological community listed, or currently being considered for listing, under the *Environment Protection and Biodiversity Conservation Act 1999* and/or *Biodiversity Conservation Act 2016*.

Groundwater dependent ecosystems

With reference to the Bureau of Meteorology Groundwater Dependant Ecosystems Atlas, one aquatic groundwater dependant ecosystem is mapped as being Lewis Ponds Creek, north and south of the Mitchell Highway (Bureau of Meteorology, 2019).

Flora

By the completion of the field survey a number of native and exotic plants had been recorded – refer to the Biodiversity Assessment in Appendix D.

Of those plants recorded, none are:

- Listed, or currently being considered for listing by the Environment Protection and Biodiversity Conservation Act 1999 or Biodiversity Conservation Act 2016.
- Identified on the list of Rare or Threatened Australian Plants.

Fauna

By the completion of the field investigation one mammal, 15 native birds and two reptiles had been recorded within or near the proposal site.

None of the native animals recorded are listed, or currently being considered for listing, as threatened under the *Environment Protection and Biodiversity Conservation Act 1999*. One recorded species, the Little Eagle (*Hieraaetus morphnoides*) is listed as Vulnerable under the *Biodiversity Conservation Act 2016.* During the site investigation, no characteristic raptor nests were observed, and the Little Eagle is therefore not considered to be nesting within, or close to, the section of highway investigated. The individual is likely to have been detected during one of its foraging periods.

No fish, as per the definition provided under the FM Act, were present within or close to the section of highway inspected. As no fish were present, and no aquatic habitats recorded, particularly those important to species listed under the FM Act, further consideration of this piece of legislation is not required.

Areas of Outstanding Biodiversity Value

None of the Areas of Outstanding Biodiversity Value listed under Part 3 of the Biodiversity Conservation Regulation 2017 occur within, or in the vicinity of, the proposal site. Similarly, reference to the Critical Habitat register (Department of Environment and Energy) indicated no such area occurs in or near to the proposal site.

Wildlife connectivity corridors

The section of Mitchell Highway investigated is not part of a significant vegetation corridor; the proposal site being located within a primarily agricultural landscape. To the north and south, scattered trees provide a highly fragmented link to isolated stands of woodland and, beyond these, to those conservation areas within the region.

The current width of the highway is likely to be having an adverse impact on the north-south movement patterns of those ground traversing species recorded or expected to occur. When combined with the urban

infrastructure of the existing Mitchell Highway road corridor, it is considered that there are limited opportunities for the dispersal and movement needs of ground dwelling, arboreal and gliding mammals.

6.1.3 Potential impacts

Construction

Removal of native vegetation

Based on a worst-case estimate, about 0.02 hectares of scattered native, and 13.8 hectares of exotic, vegetation will require disturbance/removal; this includes several native/exotic trees, two of which are hollow-bearing.

Post-work, the site surveyed is expected to stabilise/naturally regenerate. Considering the site exhibits good regeneration potential, in the long-term, the road verges should reflect their current condition.

Removal of threatened fauna habitat

Three hollow-bearing trees (hollow diameter 100 millimetres) were observed during the investigation (these potentially occupied by threatened microchiropteran); of these, two are located within the proposed construction zone and, as such, may require removal.

Within a 10 kilometre radius of the section of highway investigated, no threatened microchiropterans have been previously recorded (although this could be due to factors such as a lack of habitat or survey effort). Further, during a terrestrial fauna survey carried out at the nearby East Guyong Hard Rock Quarry site, no threatened bats were recorded. Those microchiropterans that were detected were the Gould's Wattled Bat (*Chalinolobus gouldii*), Lesser Long-eared Bat (*Nyctophilus geoffroyi*) and Gould's Long-eared Bat (*N.gouldi*) (Western Research Institute, 2006), all of which are considered to be common to abundant.

While no significant impacts on these threatened bats are expected to arise due to the possible removal of two hollow-bearing trees, to consider the impact of the road work on threatened microchiropterans an assessment drawing on the criteria provided under Part 7, Section 7.3 of the *Biodiversity Conservation Act 1999* was carried out (Appendix D). Impacts were found not to be significant.

Removal of threatened flora

No threatened plants were recorded or considered likely to occur within the area investigated; as such, as no threatened species are considered to be adversely impacted on by the proposal,

Injury and mortality

Injury and mortality of native animals is currently occurring. During the field investigation, several vehicle-struck individuals were observed including the Eastern Grey Kangaroo (*Macropus giganteus*), Eastern Snake-necked Turtle (*Chelodina longicollis*) and an unidentified bird. The upgrading of the section of highway investigated is unlikely to alter the current situation significantly. The impact of the vehicle strikes on the viability of local populations of those species struck is not considered to be significant. The work will not have an impact on the long-term viability of these species or their local populations.

Vegetation clearing to permit the proposal will require the removal of natural ground debris; the work also affecting both groundcover vegetation and possibly clearing two hollow-bearing trees. Therefore, there is the potential that sheltering animals could be injured during the course of this work. Additionally, given the proposal will involve habitat clearing directly next to the existing highway, this may result in an increase in individuals being injured or killed by vehicles in the short term. Safeguards have been proposed top address these potential impacts.

Indirect/operational impact

Wildlife connectivity and habitat fragmentation

There is currently limited connectivity between areas of vegetation to the north and south of the Mitchell Highway within the study area due to the existing infrastructure. The proposal would not further fragment any habitat areas or erect any additional barriers to the movement and dispersal patterns of flying species (i.e. birds, bats), nor any gliding arboreal mammals, that may be currently negotiating the Mitchell Highway at the site investigated. Ground traversing species, including nocturnal mammals, if currently doing so, will be able to negotiate the new width.

Edge effects on adjacent native vegetation and habitat

Weeds are readily spread by existing dispersal factors such as wind, birds, water and the movement of vehicles along the highway. Clearing and opening up of new vegetation edges can facilitate the recruitment of these species and provide opportunity for the establishment of other weed species. These weeds are often able to out-compete native flora and fauna species and reduce the habitat values of these areas. While this is the case, edge effects beyond those that are currently occurring within the 2.5 kilometre section of highway investigated are not expected to be exaggerated due to the proposal.

Weeds are already prevalent at the roadside edge of the Mitchell Highway, the botanical survey confirming that exotic species dominate the area inspected. However, the proposed work is not expected to exacerbate the current situation such that the integrity of the native vegetation communities present is to be compromised.

Invasion and spread of weeds

Under the *Biosecurity Act 2015* 'all plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.'

Of those introduced plant species recorded *Rubus anglocandicans* (Blackberry) (formerly known as *Rubus fruticosus* spp. *aggregate*) is listed:

- Under Schedule 3 of the NSW Biosecurity Regulation 2017
- As a 'priority weed' in the Central Tablelands region (which includes the Cabonne local government area)
- As a Weed of National Significance

Safeguards have been proposed to address the potential spread of weeds.

Invasion and spread of pests

A number of European Rabbits (*Oryctolagus cuniculus*) and Brown Hares (*Lepus capensis*) were observed within the study area. In addition, flocks of the introduced Common Starling (*Sturnus vulgaris*) were common. Further pest species that may be present include the Feral Cat (*Felis catus*), Dog (C*anis lupus familiaris*) and European Red Fox (*Vulpes vulpes*).

Beyond existing levels, the proposal is unlikely to increase the presence of pest species within the study area.

Invasion and spread of pathogens and disease

There is a risk that the proposal could introduce, spread or exacerbate the plant diseases caused by *Phytophthora cinnamomi* and Myrtle Rust (*Puccinia psidii*). These diseases are most likely introduced or spread through the importation or movement of soil, water and landscaping materials, either directly or through incidental attachment to machinery. Safeguards have been proposed to address these potential impacts.

Changes to hydrology

The proposal would not result in any substantial changes to hydrology. While a number of dams occur within adjoining paddocks and several drainage lines traverse beneath the existing highway, none will be directly or indirectly affected by the proposal.

Noise, light and vibration

During construction, activities associated with the proposal would cause additional noise and vibration; however, given the presence and proximity of the existing Mitchell Highway, it is not considered that the proposal would result in changes to existing levels of noise, vibration and light from the existing road network and surrounding environment such that there would be a significant impact to native fauna species.

Conclusion on significance of impacts

The proposal is not likely to significantly impact threatened species or ecological communities or their habitats, within the meaning of the *Biodiversity Conservation Act 2016* or *Fisheries Management Act 1994* and therefore a Species Impact Statement or Biodiversity Development Assessment Report is not required.

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

6.1.4 Safeguards and management measures

Table 6-2: Biodiversity environmental management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Biodiversity	Flora and fauna management will occur in accordance with *Biodiversity Guidelines: Protecting and Managing Biodiversity on RTA Projects* (RTA, 2011) and will be implemented as part of the CEMP. Flora and fauna management will include, but not be limited to: • plans showing areas to be cleared and areas to be protected, including exclusion zones, protected habitat features and revegetation areas • pre-clearing survey requirements • procedures for unexpected threatened species finds and fauna handling • procedures in the event of injury to native fauna • protocols to manage weeds and pathogens.	Contractor	Pre-construction	Section 4.8 of QA *G36 Environment Protection*
Biodiversity	Measures to further avoid and minimise the construction footprint and native vegetation or habitat removal will be investigated during detailed design and implemented where practicable and feasible.	Transport for NSW	Detailed design	Additional measure
Biodiversity	A pre-clearing survey will be conducted and	Contractor	Pre-	Additional

Impact	Environmental safeguards	Responsibility	Timing	Reference
	will: • Confirm clearing boundaries, exclusion zones, protected habitat features and revegetation areas prior to starting work • Identify, in toolbox talks, where biodiversity • controls are located on the site		construction	measure
Spread of weeds	Weed management will occur in accordance with *Biodiversity Guidelines, Guide 6* (Roads and Maritime, 2016) and will include: • The identification of weeds on site (confirmed during pre-clearing survey) • Weed management priorities and objectives Exclusion zones, protected habitat features and revegetation areas prior to starting work within or directly next to the site • The location of weed infested areas • Weed control methods • Measures to prevent the spread of weeds, including machinery hygiene procedures and disposal requirements • A monitoring program to measure the success of weed management • Communication with local Council noxious weed representative.	Contractor	Pre-construction	Additional measure
Spread of diseases affecting plants	Management measures will be implemented to control and/or prevent the introduction and/or spread of disease-causing agents such as bacteria and fungi in accordance with the *Biodiversity Guidelines, Guide 7* (Roads and Maritime, 2016)	Contractor	Pre-construction	Additional measure
Unexpected threatened species finds	If unexpected flora or fauna are discovered on site stop work immediately and implement the Roads and Maritime Unexpected Threatened Species Find Procedure in the *Biodiversity Guidelines, Guide 1* (Roads and Maritime, 2016).	Contractor	Construction	

6.1.5 Biodiversity offsets

With reference to Table 1, within Section 4.2 of the Guideline for Biodiversity Offsets (Roads and Maritime Services, 2016) it is noted that the proposal would not result in impacts to greater than one hectare of a threatened ecological community or habitat for threatened species which cannot withstand a loss. Therefore, offsets for threatened ecological communities or species would not be necessary, and a Biodiversity Offset Strategy would not be required.

6.2 Soils and contamination

6.2.1 Methodology

The assessment of the impact to soils included a review of the following information sources

- Geological mapping.
- NSW Soil and Land Information eSpade data and soil landscapes mapping (via eSpade)
- Naturally occurring asbestos mapping
- Contaminated sites data held by the NSW Environment Protection Authority

6.2.2 Existing environment

Geology and soils

The geology of the proposal site is identified by Department of Primary Industries geological mapping as comprising the following geology:

- Byng Volcanics – Vesicular, flow-banded porphyritic basalt (emplaced as a flow) to basaltic/andesitic/volcaniclastic sandstone – occurring generally to the east of Lewis Ponds Creek
- Oakdale Formation – Mafic volcanic sandstone; basalt, basaltic andesite, latite and intrusions emplaced as a lava; volcaniclastic breccia and conglomerate, siltstone, shale, chert; minor allochthonous limestone and calcareous sediments – occurring generally west of Lewis Ponds Creek.

The proposal site is within the following soil landscapes:

- Spring Hill – Krasnozems are the dominant soils with yellow podzolic soils occurring on the lower slopes with yellow solodic soils in drainage lines. Erodibility of topsoils is generally classed as moderate while subsoils have a low to moderate erodibility.
- Macquarie (adjacent to Lewis Ponds Creek) – Soils include black loam to clay loam, brownish black loam to clay loam, black light clay and alluvial sands. Erodibility of topsoils and subsoils is generally classed as low to moderate.

Land and soil capability

Land and soil capability (LSC) is the inherent physical capacity of the land to sustain a range of land uses and management practices in the long term without degradation to soil, land, air and water resources.

The LSC assessment scheme uses the biophysical features of the land and soil including landform position, slope gradient, drainage, climate, soil type and soil characteristics to derive detailed rating tables for a range of land and soil hazards. These hazards include water erosion, wind erosion, soil structure decline, soil acidification, salinity, waterlogging, shallow soils and mass movement. Each hazard is given a rating between 1 (best, highest capability land) and 8 (worst, lowest capability land). The final LSC class of the land is based on the most limiting hazard. The final LSC class for land within the proposal site is primarily class 3 (high capability) however there is class 2 (Very high capability) land along Lewis Ponds Creek.

These classes are defined below:

- Class 2 – Very high capability land: Land has slight limitations. These can be managed by readily available, easily implemented management practices. Land is capable of most land uses and land management practices, including intensive cropping with cultivation.

- Class 3 – High capability land: Land has moderate limitations and is capable of sustaining high impact land uses, such as cropping with cultivation, using more intensive, readily available and widely accepted management practices. Careful management of limitations is required for cropping and intensive grazing to avoid land and environmental degradation

Contamination

A search of the NSW Environment Protection Authority contaminated land record for the Cabonne local government area was carried out on 19 January 2020. There were no site notices placed on land within one kilometre of the proposal. A search of the NSW EPA contaminated sites list (as at 14 January 2020) also returned no records.

Naturally occurring asbestos

Within the Guyong area, there are areas of naturally occurring asbestos occurring within Byng Volcanics geological unit. Areas within NSW where naturally occurring asbestos has been found, or has the potential to be found within 10 metres of the surface have been mapped by the Department of Planning, Industry and Environment. The part of the proposal site is mapped as having a high probability of naturally occurring asbestos as show by Figure 6-2.

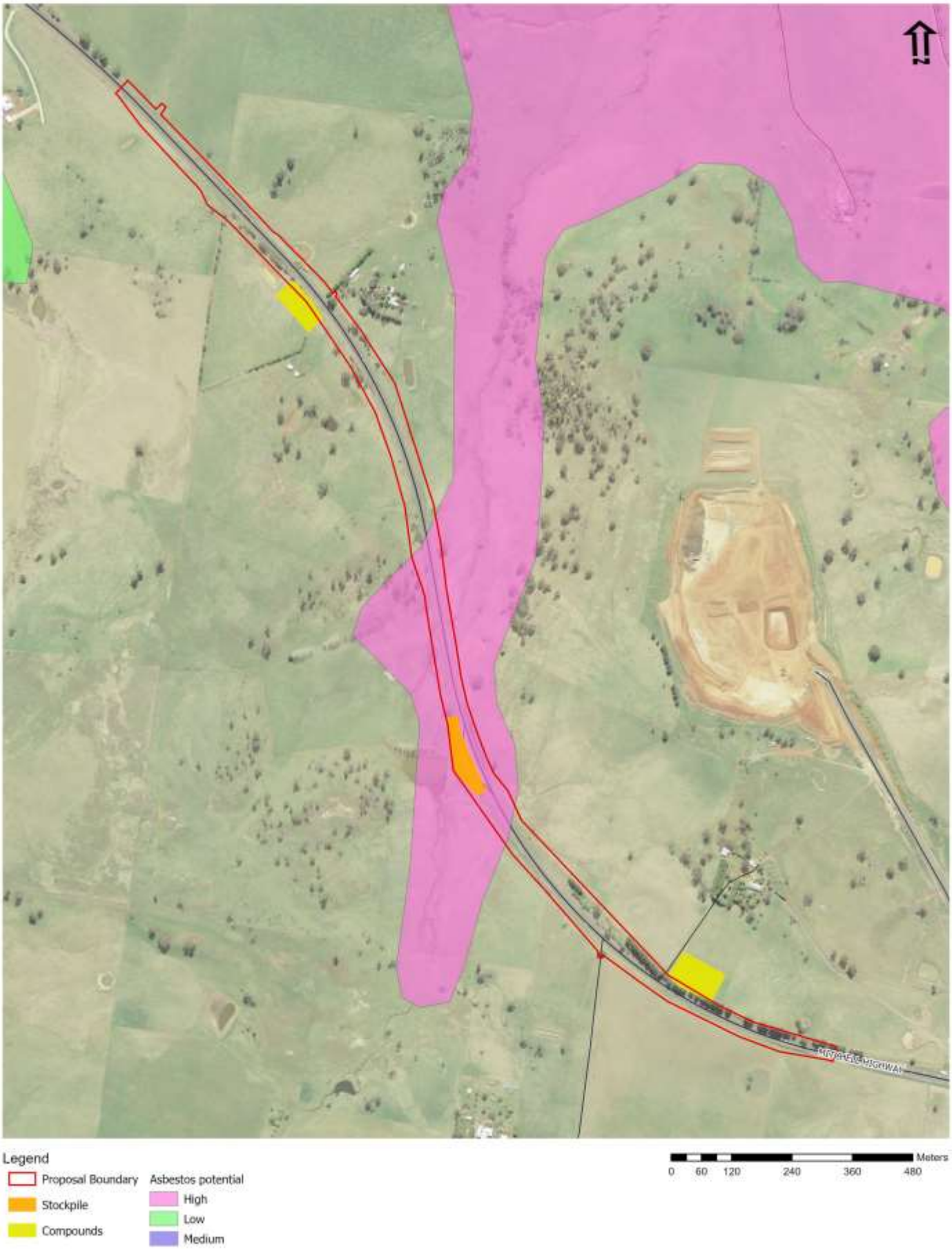

Figure 6-2: Probability of naturally occurring asbestos

6.2.3 Potential impacts

Construction

Soils

The potential work activity impact would be primarily associated with soil loss from erosion of exposed soils and stockpiles, and potential sedimentation of surrounding land and waterways, including the several unnamed minor watercourses which traverse the proposal site. Work activities with the potential to expose soils include:

- Vehicle movements
- Stockpiling
- Excavation
- Importation of fill material (as required)
- Vegetation removal.

These activities would potentially cause:

- Erosion and sedimentation of exposed soils
- Erosion, leaching and dust generation from stockpiled materials
- Loss of soil quality and condition from material stockpiling
- Associated soil quality impact as a result of accidental spills and leaks caused by:
  - Use of fuels and oils outside of bunded and/or contained areas
  - Leaks from poorly maintained vehicles, machinery and equipment
  - Temporary storage and management of spoil and waste.

Unmitigated potential impacts associated with the sedimentation of eroded material include:

- Increased sedimentation and elevated turbidity levels of nearby drainage channels from exposed soil during site disturbance and movement of construction vehicles, particularly following rainfall events
- Increased sedimentation in receiving watercourses, which reduces light penetration, smothers aquatic life, alters fluvial geomorphology and affects the ecosystems of downstream sensitive waterways
- Increased levels of nutrients, metals and other pollutants, transported via sediment receiving watercourses.

Naturally occurring asbestos

Naturally occurring asbestos can become a health risk to works or nearby residents if weather conditions or work that may be undertaken (such as digging, cultivation and excavation) disturbs asbestos and releases fibres that can be inhaled. An Asbestos Management Plan would be developed to address this risk.

Operation

Operation of the proposal would be consistent with the existing use of this section of the Mitchell Highway. The operation and ongoing maintenance of the road would be managed through similar practices that are currently carried out along the highway. There is expected to be no net change or impact from maintaining the road.

The proposal would result in some additional hardstand areas due to the widened carriageway. The increase in hardstand areas may result in the increase of surface water run-off and the risk of soil erosion

along the road. Given that major changes in flow volumes/velocities are not expected, there is unlikely to be a change in the risk of erosion and scour at stormwater discharge points.

6.2.4 Safeguards and management measures

Table 6-3: Soils environmental management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Soils	Soil and water management will be addressed and implemented as part of the CEMP. The CEMP will identify all reasonably foreseeable risks relating to soil erosion and water pollution and describe how these risks will be addressed during construction.	Contractor	Pre-construction	Section 2.1 of QA G38 Soil and Water Management
Soils	A site-specific Erosion and Sediment Control Plan/s will be prepared and implemented as part of the CEMP. The ESCP(s) will address the requirements of RMS specification G38.	Contractor	Pre-construction	Section 2.2 of QA G38 Soil and Water Management
Soils	The Erosion and Sediment Control Plan/s will include arrangements for managing wet weather events, including monitoring of potential high-risk events (such as storms) and specific controls and follow-up measures to be applied in the event of wet weather. The Plan/s will also include measures to minimise the impact of discharging site water to the adjacent watercourses.	Contractor	Pre-construction	Section 2.2 of QA G38 Soil and Water Management
Naturally occurring asbestos	An Asbestos Management Plan will be developed for the proposal. The plan will include but not be limited to: • Testing requirements to confirm the extent and depth of naturally occurring asbestos within the work site • Segregation of the worksite into clean and dirty zones • Personal protective equipment requirements • Decontamination requirements • Disposal requirements and locations • Monitoring requirements	Contractor	Pre-construction	Additional measure
Contaminated land – potential onsite and off-site sources	An unexpected finds procedure will be developed in the proposal CEMP for contamination. The procedure will ensure that if contaminated areas are encountered during construction, appropriate control	Contractor	Detailed design / Pre-construction	Section 4.2 of QA *G36 Environment Protection*

Impact	Environmental safeguards	Responsibility	Timing	Reference
	measures will be implemented to manage the immediate risks of contamination. All other works that may impact on the contaminated area will cease 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 Transport for NSW Regional Environment Manager and/or EPA.			

6.3 Noise and vibration

6.3.1 Methodology

The Construction Noise and Vibration Guideline (Roads and Maritime Services, 2016) and associated estimator tool were used to assess the potential noise impacts as a result of construction of the proposal.

Recognising the traffic volumes on the Mitchell Highway, the 100 kilometre per hour speed limit and the rural context, representative noise environment R2 from the estimator was used with the Distance Based Assessment (Scenario) worksheet. The following construction noise scenarios were considered using the estimator tool.

- Mobilisation and site establishment
- Corridor clearing
- Paving and asphalting
- Road furniture installation.

Consideration was also given to the potential blasting during construction and potential noise impacts during operation following the installation of audio tactile line marking on the edge and centrelines.

6.3.2 Existing environment

Noise sensitive receivers near the proposal site are limited to rural residences. The nearest residence to the proposal site is on the northern side of the Mitchell Highway at a distance of about 85 metres from proposed roadworks and about 140 metres from the nearest compound locations. The location of the nearest noise sensitive receivers is shown in Figure 6-3.

As noted above representative noise environment R2 from the construction noise estimator were adopted. For the daytime period (7am to 6pm) the R2 background noise level is 45 LA_{90} dBA.

Figure 6-3: Nearest noise sensitive receivers

6.3.3 Criteria

Construction noise criteria

Noise management levels (NMLs) for the proposal were established in accordance with the Interim Construction Noise Guideline (Department of Environment and Climate Change, 2009). The guideline prescribes noise management goals for receivers. As a guide, construction noise for residential receivers should not exceed the background noise levels by more than 10 dB(A) during standard hours, and by more than 5 dB(A) out-of-hours (that is, for night-time work). The level of 75 dB(A) is identified as the point above which there may be a strong community reaction to construction noise.

The project specific NMLs for the sensitive receivers identified for the proposal are provided in Table 6-4.

Table 6-4: Project specific noise management levels

Period		NML (dBA)
Day	Monday to Friday (7am to 6pm), Saturday (8am to 1pm)	55
Evening (out of hours work period 1)	6pm to 10pm	N/A
Night (out of hours work period 2)	10pm to 7am	N/A
Sleep disturbance	NA	N/A

Construction traffic noise criteria

When construction related traffic moves onto the public road network, vehicle movements are regarded as additional road traffic and are assessed under the Road Noise Policy (RNP) (Department of Environment Climate Change and Water, 2011). An initial screening test is applied by evaluating if noise levels would increase by more than 2 dB (an increase in the number vehicles of approximately 60 per cent) due to construction traffic or a temporary detour due to a road closure.

Construction vibration criteria

As a guide, safe working distances for the proposed items of vibration intensive plant are provided in the Roads and Maritime Construction Noise and Vibration Guideline and Table 6-5.

Table 6-5: Recommended safe working distances for vibration intensive plant

Plant item	Rating / description	*Safe working distances (metres)*	
		Cosmetic damage	*Human response*
Vibratory roller	< 50 kN (Typically 1-2t)	5	15 to 20
	< 100 kN (Typically 2-4t)	6	20
	< 200 kN (Typically 4-6t)	12	4
	< 300 kN (Typically 7-13t)	15	100
	> 300 kN (Typically 13-18t)	20	100
	> 300 kN (Typically > 18t)	25	100

Plant item	Rating / description	*Safe working distances (metres)*	
Small hydraulic hammer	300 kg - 5 to 12t excavator	2	7
Medium hydraulic hammer	900 kg - 12 to 18t excavator	7	23
Large hydraulic hammer	1600 kg - 18 to 34t excavator	22	73
Vibratory pile driver	Sheet piles	2 to 20	20
Pile boring	≤ 800 mm	2 (nominal)	4
Jackhammer	Hand held	1 (nominal)	Avoid contact with structure

Blasting

Consistent with recent approvals for NSW infrastructure projects, vibration and overpressure limits for blasting are expected to be:

- Vibration (PPV): 25 millimetres per second
- Overpressure: 125 dBL.

Heritage buildings and structures are not to be assumed to be more sensitive to vibration unless they are found to be structurally unsound. Where heritage buildings and structures are found to be structurally unsound, a more conservative cosmetic damage objective of 2.5 mm/s PPV (from DIN 4150) would be adopted.

If blasting is proposed, blasting limits, including for overpressure and ground vibration, will be confirmed in a project specific Blast Management Plan.

Operational noise

Under the Noise Criteria Guideline (Roads and Maritime Services, 2015), the proposal is classified as minor work. The Noise Criteria Guideline states that the existing road criteria may be applied where minor work increases noise levels by more than 2.0 dB(A) relative to existing noise levels at the worst affected receiver. Where the total noise level for the 'build' year exceeds the criterion, and there is an increase of more than 2.0 dB(A) (i.e. 2.1 dB(A)), relative to the 'no-build' year, then the receiver qualifies for consideration of noise mitigation.

6.3.4 Potential impacts

Construction

Construction noise

The affected distances and distances for moderately intrusive noise and highly intrusive noise are provided for each of the assessment scenarios in the daytime period in Table 6-6. Out-of-hours predictions have been provided for all scenarios; however, it is expected that only paving/asphalting and road furniture installation would potentially occur during the evening and night out-of-hours periods.

Table 6-6: Construction noise predictions (standard hours daytime – 7am to 6pm)

Scenario	Period	Affected distance	Moderately intrusive 20 to 30 dBA above background	Highly intrusive > 30 dBA above background
Mobilisation & site establishment	Day	250 metres	115 metres	35 metres
	Day (OOHW)	360 metres	115 metres	35 metres
	Evening	525 metres	170 metres	65 metres
	Night	755 metres	250 metres	115 metres
Corridor clearing	Day	290 metres	135 metres	45 metres
	Day (OOHW)	420 metres	135 metres	45 metres
	Evening	605 metres	200 metres	85 metres
	Night	875 metres	290 metres	135 metres
Paving and asphalting	Day	155 metres	55 metres	20 metres
	Day (OOHW)	230 metres	55 metres	20 metres
	Evening	335 metres	105 metres	30 metres
	Night	485 metres	155 metres	55 metres
Road furniture installation	Day	125 metres	35 metres	15 metres
	Day (OOHW)	185 metres	35 metres	15 metres
	Evening	265 metres	75 metres	25 metres
	Night	390 metres	125 metres	35 metres

The construction noise calculations show that the nearest residences could be affected by moderately intrusive noise during site establishment and corridor clearing assessment scenarios but would only be affected by highly intrusive noise if these scenarios were to occur during the evening and night periods. The paving / asphalting scenario could result in moderately intrusive noise at the nearest receivers during the evening and night periods while the road furniture installation scenario could affect the nearest receivers with moderately intrusive noise during the night period.

The construction noise estimator identifies that highly noise affected distances would be 35 metres for site establishment, 45 metres for corridor clearing, 20 metres for paving / asphalting and 15 metres for road furniture installation. The nearest receivers are therefore not expected to be highly noise affected during construction.

It should also be noted that as works would be moving along the corridor, it is expected that intrusive construction noise would only affect individual receivers for short periods.

Sleep disturbance

The construction noise estimator identifies that sleep disturbance distances would be 115 metres for site establishment, 230 metres for corridor clearing, 270 metres for paving / asphalting and 85 metres for road furniture installation. The nearest receivers are therefore could therefore be affected by noise causing sleep

disturbance, although it is noted that corridor clearing and site establishment scenarios are not likely to occur during the night period.

Construction traffic noise

The proposal would involve (as a worst-case) up to 40 construction personnel on average per shift using a designated car park at one of the site compounds. Given the relatively high existing traffic volumes and the small contribution from the proposal, it is not expected that the increase in noise as a result of construction related vehicles would be more than 2dB.

Construction vibration

The main potential source of construction vibration would be vibratory rollers. Construction plant would be selected to ensure minimum safe working distances set by the Roads and Maritime Construction Noise and Vibration Guideline (Roads and Maritime Services, 2016) are complied with, both in relation to cosmetic damage and human response to vibration.

Blasting

Blasting can be used as an alternative to rock breaking and may shorten the duration of noisy rock breaking activities. Blasting has the potential to result in brief ground vibration and air overpressure impacts at nearby receivers.

The level of vibration would be controlled by adjusting the amount of explosive that is detonated at any instant having regard to the distance to nearby receivers.

Airblast is the pressure wave produced by the blast and transmitted through the atmosphere and can again be controlled by the blast size and by having regard to receiver distances and weather conditions.

Details of procedures to manage both vibration and airblast impacts would be included in a Blast Management Plan.

Operation

The proposal would not result in additional vehicles travelling along the Mitchell Highway or travelling closer to properties located directly next to the highway. Given the nature of the proposed changes to the horizonal alignment and the distance to receivers it is not expected that road traffic noise levels would increase by more than 2 dBA and therefore consideration of mitigation is not required.

There is the potential for changes to maximum noise associated with vehicles crossing audio tactile line marking. The closest residence to the newly installed audio tactile line marking would be at a distance of about 90 metres.

Given the crash history of this section of the Mitchell Highway, the benefits associated with the installation of audio tactile line marking are considered to outweigh the potential noise impacts. Consistent with Transport for NSW policy, prior to the installation of the audio tactile line marking, potentially affected residences (within 500 metres – refer to Figure 6-4) will be contacted regarding the proposed installation of audio tactile line marking, a signed agreement for installation will be requested from each of the residences and the audio tactile line marking will be discerningly installed based on the Transport for NSW policy and community feedback..

Figure 6-4: Audio tactile line marking – consultation area

6.3.5 Safeguards and management measures

Table 6-7: Noise and vibration environmental management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Noise and vibration	Noise and vibration management measures will be implemented as part of the CEMP.	Contractor	Pre-construction	Section 4.6 of QA *G36 Environment Protection*
Noise and vibration	The noise and vibration management measures in the CEMP will generally follow the approach in the Interim Construction Noise Guideline (ICNG) (DECC, 2009) and the Construction Noise and Vibration Guideline (Roads and Maritime Services, 2016) and identify: • all potential significant noise and vibration generating activities associated with the activity • feasible and reasonable mitigation measures to be implemented • a monitoring program to assess performance against relevant noise and vibration criteria • arrangements for consultation with affected neighbours and sensitive receivers, including notification and complaint handling procedures • contingency measures to be implemented in the event of non-compliance with noise and vibration criteria.	Contractor	Pre-construction	Section 4.6 of QA *G36 Environment Protection*
Construction vibration	Where vibration intensive plant such as vibratory rollers are used, vibration must be managed to minimise disturbance to building occupants and to avoid damage to buildings and other structures. This includes adhering to the recommended minimum working distances for vibration intensive plant identified in Section 7.1 of the Construction Noise and Vibration Guideline (Roads and Maritime Services, 2016). If recommended minimum working distances cannot be met by selecting smaller plant vibration monitoring will occur to quantify and help manage vibration emissions. If necessary, trial vibration measurements will be conducted before activities to further assess any possible impacts and buffer distances that may be required.	Contractor	Construction	Additional measure

Impact	Environmental safeguards	Responsibility	Timing	Reference
Blasting	A Blasting Management Plan will be prepared. As a minimum the plan will include: • applicable blast criteria • review of risks associated with blasting • blast design and execution • mitigation measures • compliance management.	Contractor	Construction	Additional measure

6.4 Landscape character and visual

6.4.1 Methodology

The landscape character and visual impact assessment has been undertaken in accordance with the environmental impact assessment practice note EIA-N04: Guidelines for landscape character and visual impact assessment (Roads and Maritime Services, 2018). The guidelines establish an assessment process by reference to the sensitivity of the area and magnitude of the proposal in that area. Figure 6-5 illustrates this process.

SENSITIVITY \ MAGNITUDE	HIGH	MODERATE	LOW	NEGLIGIBLE
HIGH	HIGH	HIGH - MODERATE	MODERATE	NEGLIGIBLE
MODERATE	HIGH - MODERATE	MODERATE	MODERATE - LOW	NEGLIGIBLE
LOW	MODERATE	MODERATE -LOW	LOW	NEGLIGIBLE
NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE

Figure 6-5: Landscape character / visual impact grading matrix

Landscape character

Landscape character assessment sums up an area's sense of place including all built, natural and cultural aspects, covering towns, countryside and all shades between (Roads and Maritime Services, 2013). The assessment involves identifying landscape character zones and considers the impact of the proposal on those character zones.

Visual impact

Assessing the visual impact of a proposal involves assessment of the visibility of the proposal, the identification of key existing viewpoints and their sensitivity followed by the assessment of their visual impact.

6.4.2 Existing environment

The proposal traverses a largely rural landscape that is typical for the region. The Mitchell Highway road corridor consists of the sealed roadway that sits within a gently undulating landscape, with small cuttings at some locations to maintain a suitable vertical alignment. The rural landscape consists mainly of pasture lands with isolated stands of exotic and native vegetation. At the eastern extent of the proposal site there is

a planted row of conifers which provide screening for the adjacent property on the northern side of the Mitchell Highway. Figure 6-6 and Figure 6-7 illustrate the landscape.

Figure 6-6: View south-east towards Lewis Ponds Creek

Figure 6-7: View north from central part of the proposal site

The proposal was identified as traversing one landscape character zone:

- 01 Rural area directly adjacent to and extending to the north and south of the road corridor – this zone consists of cleared rural land with isolated residential dwellings and scattered remnant trees and exotic trees. This zone affords views of reasonable distance in all directions. The landscape is undulating and consistent with the wider rural landscape of the area. The sensitivity of this zone was assessed as moderate given the distant views of a rural landscape.

6.4.3 Potential impacts

Construction

The proposal would result in visual impacts as a result of construction activities. Visual amenity, or the viewpoints for road users and residential receivers in the vicinity, would be impacted by:

- Compound facilities, plant and equipment, and material storage
- Temporary safety barriers and traffic control equipment including signage
- Temporary stockpiling
- Temporary lighting
- Earthworks including areas of cut and fill.

The impact on landscape character and visual amenity would be confined to the road corridor and immediately adjacent areas. The impacts would be short-term with construction related equipment and facilities removed at the completion of work and disturbed roadside areas restored.

Operation

Impacts of the proposal on the long-term landscape character of the identified zones would result from alterations to the existing roadway and associated infrastructure. Impacts would include a widened roadway, extended areas of cut and fill adjoining the road and minor vegetation clearing. The magnitude of the proposal in relation to the landscape areas that it would traverse would be negligible. This is due to the presence of an existing roadway and because the elements of the proposal would be consistent with the existing visual nature of the highway corridor.

The outcomes of the landscape character assessment for the above zones is shown in Table 6-8. The impacts on both zones in the vicinity of the proposal would negligible. The proposal would encroach on the adjoining landscape only to a minor extent and while there would be some visual changes to embankments and minor clearing, it is not considered that this would be to an extent that would alter the character of the adjoining landscapes.

Table 6-8: Landscape character assessment

Character zone	Sensitivity	Magnitude	Impact
01	Moderate	Low	Moderate-Low

There would be no long-term impacts on the viewpoints of residential receivers in the area or road users given the consistency of the proposal with the existing roadway and associated infrastructure.

It is noted that a number of pine trees on the northern side of the highway will need to be removed to maintain a suitable clear zone and reduce risks associated with shading and black ice formation in the Winter months. It is understood that these trees were planted to provide visual screening between the highway and quarry operations to the north. However, due to the contour of the land to the north of the highway, it is not expected that the quarry would be a prominent visual feature in views for motorists following the removal of these trees.

6.4.4 Safeguards and management measures

Table 6-9: Landscape character and visual impact environmental management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference

Impact	Environmental safeguards	Responsibility	Timing	Reference
Visual impacts during construction	Work sites including all ancillary facilities will be managed to minimise visual impacts including consideration of screening, placement of facilities and storage areas and maintaining sites in a clean state with minimal visual clutter.	TfNSW project manager Contractor	Construction	Additional safeguard
Visual impacts during operation	Following the completion of construction works, plant/equipment will be removed, and disturbed areas will be revegetated, seeded or otherwise restored as appropriate.	TfNSW project manager Contractor	Construction	Additional safeguard

6.5 Aboriginal heritage

6.5.1 Methodology

The approach to the assessment of potential Aboriginal heritage impacts has involved a search (by Transport for NSW) of the Aboriginal Heritage Information Management System (AHIMS) and a consideration of the levels of previous disturbance within the proposal site.

6.5.2 Existing environment

The proposal site is within a rural context, with previous disturbance having occurred for road construction and underground utilities and agriculture.

The Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales (Department of Environment, Climate Change and Water, 2010) identifies rock shelters, sand dunes, natural waterways, waterholes and wetlands as indicators of likely existence of Aboriginal objects. Of these landscape features, natural watercourses (Lewis Ponds Creek) are present within the proposal area.

6.5.3 Potential impacts

The Aboriginal Cultural Heritage Advisor (Western Region) has advised the following in relation to the proposal (refer to Appendix C):

- The proposal is unlikely to harm known Aboriginal objects or places.
- The AHIMS search did not indicate, moderate to high concentrations of Aboriginal objects and places inside the study area.
- The study area does contain landscape features that could indicate the presence of Aboriginal objects, based on the Office of Environment and Heritage's Due diligence Code of Practice for the Protection of Aboriginal objects in NSW and the Roads and Maritime Services' procedure.
- The cultural heritage potential of the study area appears to be reduced due to past disturbance

6.5.4 Safeguards and management measures

Table 6-10: Aboriginal heritage environmental management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Aboriginal heritage	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 Transport for NSW 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-commence once the requirements of that Procedure have been satisfied.	Contractor	Pre-construction	Section 4.9 of QA *G36 Environment Protection*

6.6 Traffic and transport

6.6.1 Methodology

Traffic and transport impacts were assessed by reference to the existing road environment and requirements for lane closures during the works. As the proposal would not change traffic volumes or substantially alter road capacity, traffic modelling was not considered necessary.

6.6.2 Existing environment

The existing road environment is described in Section 2.2.

6.6.3 Potential impacts

Construction

The proposal would result in traffic impacts during construction, including:

- Traffic delays as a result of temporary road closures
- Increased travel time as a result of reduced speed limits
- Increased travel distance and time as a result of detours during full road closures
- Temporary modifications to private property access

The impacts would generally be determined by the staging of the work. Construction staging would be managed to minimise the duration and extent of impacts. Full road closures would not be required for the proposal and Emergency vehicle access would not be impeded.

Access to private property would be maintained throughout construction, however, temporary modifications may be required. Implementation of modifications would be carried out in consultation with affected landholders.

Additional traffic volumes generated by construction traffic is estimated to be up to 100 heavy vehicle movements during the peak construction period on a typical working day. The movement of workers, supervisors and small plant are estimated at 80 movements per day. Given existing traffic volumes it is not expected that construction traffic would result in a noticeable impact or cause a strain on the broader network.

Operation

The operation of the proposal would result in positive impacts for road users. Safety improvements would include provision of wider sealed shoulders, safety barriers and improving the road pavement surfaces in areas requiring repair.

The installation of flexible safety barrier in the median would mean that one property on the northern side of the highway would have left-in left-out access only. For this property the change could mean additional travel time of about one minute for westbound trips (assuming a turnaround movement at the quarry access road, additional travel of about 1.2 kilometres and an average speed of 80 kilometres per hour). Alternatively, this property could use its current direct access to the quarry access road and make a right turn at the highway intersection, where turning lanes are provided.

There would be no other long-term negative impacts on traffic and transport as a result of the proposal.

6.6.4 Safeguards and management measures

Table 6-11: Traffic and transport environmental management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Traffic and transport	A Traffic Management Plan (TMP) will be prepared and implemented as part of the CEMP. The TMP will be prepared in accordance with the Roads and Maritime *Traffic Control at Work Sites Manual* (RTA, 2010) and *QA Specification G10 Control of Traffic* (Roads and Maritime, 2008). 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 • measures to maintain pedestrian and cyclist access • requirements and methods to consult and inform the local community of impacts on the local road network	Contractor	Detailed design / Pre-construction	Section 4.8 of QA *G36 Environment Protection*

Impact	Environmental safeguards	Responsibility	Timing	Reference
	• 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 • consideration of 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 • monitoring, review and amendment mechanisms.			

6.7 Socio-economic and land use

6.7.1 Methodology

The socio-economic assessment was prepared in accordance with the Environmental Impact Assessment Practice Note: Socio-economic assessment: EIA-N05 (Roads and Maritime, 2013). The proposal occurs on an arterial road and is anticipated to have a minimal localised impact to the communities surrounding the Mitchell Highway. A basic level of socio-economic assessment was therefore applied.

The socio-economic assessment:

- Identified the existing socio-economic characteristics of the study area through desktop research, reviewing secondary-source quantitative data, undertaking limited primary research, in particular referring to:
  - Census data (Australian Bureau of Statistics - Census Quick Stats 2016)
  - Publicly available information on local community structure and patterns such as that derived from Cabonne Council's website.
- Reviewed the outcome of other assessments containing relevant socio-economic themes, namely:
  - Traffic and access (refer to section 6.7)
  - Noise and vibration (refer to section 6.3)
  - Landscape character and visual impact (refer to section 6.4).
- Considered a range of land use and property information, including:
  - Existing and future land uses in the area
  - Property acquisition or leasing requirements
  - The temporary and permanent public and private property impact
  - Conflict of consistency with land use zoning provisions in the area
  - Identified the adverse impact that would need safeguarding or management.

6.7.2 Existing environment

Community profile

Key demographic, social and economic information derived from the 2016 Census for Guyong is outlined below in Table 6-12.

Table 6-12: Key social and demographic information

Category	Value
Population	127
Employment	61 people in the labour force. 52.5% employed full time, 36.1% employed part-time and 4.9% unemployed. Beef cattle farming was the main employing industry, employing 33% of the Guyong population.
Travel to work	Car as driver 54.7% Worked at home 37.7%
Education	52% of people attending an educational institution.
Median weekly household income	$1,843
Motor vehicles per dwelling	2.0

Community values

Community values held by local residents and workers are likely to include:

- Employment security for local residents and workers
- Maintained local character, amenity and natural setting
- Road access and connectivity to facilities and services.

Land use changes and development

The land located directly next to the proposal site is zoned as RU2: Primary Production. There are no exhibited planning instruments that would change this zoning.

6.7.3 Potential impacts

Construction

Partial land acquisition is required along the Mitchell Highway (refer to Section 3.6). The acquisition process for all required land would be carried out in accordance with statutory requirements and Transport for NSW policy. As such the economic impact on individual property owners is not expected to be substantial.

There would be some likely temporary socio-economic impact and benefit to the local community from building the proposal such as:

- Worker travel impact: motorists and other road users may experience minor travel delays. However, the scale of the changes is unlikely to affect people's travel or commuting habits
- Income and employment benefit: there may be some opportunity for localised employment while the proposal is being built as described below.

Acquired land would change from a primary production use to an infrastructure use. The extent of the change in the broader context of these two land use types within the Cabonne local government area is considered negligible.

Operation

Once built the proposal would provide a safer roadway that would potentially reduce the number and severity of road crashes along the Mitchell Highway. No longer term negative socio-economic and land use impacts have been identified.

The proposal would have no direct impact on social infrastructure in the local area during operation.

6.7.4 Safeguards and management measures

Table 6-13: Socio-economic environmental management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Socio-economic	A Communication Plan (CP) will be prepared and implemented as part of the CEMP to help provide timely and accurate information to the community during construction. The CP will include (as a minimum): • mechanisms to provide details and timing of proposed activities to affected residents, including changed traffic and access conditions • contact name and number for complaints. The CP will be prepared using the Roads and Maritime Stakeholder engagement toolkit	Contractor	Detailed design / pre-construction	Standard measure
Property acquisition	All property acquisition will be carried out in accordance with the Land Acquisition Information Guide (Roads and Maritime, 2012) and the *Land Acquisition (Just Terms Compensation) Act 1991*.	Transport for NSW	Detailed design / pre-construction	Additional measure
Socio-economic	Road users, including freight companies will be informed of changed conditions, including likely disruptions to access	Transport for NSW Contractor	Pre-construction / construction	Additional measure

Impact	Environmental safeguards	Responsibility	Timing	Reference
	during construction.			
Socio-economic	Consultation will be undertaken with potentially affected residences prior to the commencement of and during work in accordance with the Roads and Maritime's Community Involvement and Communications Resource Manual. Consultation will include but not limited to door knocks, newsletters or letter box drops providing information on the proposed work, working hours and a contact name and number for more information or to register complaints.	Transport for NSW	Detailed design / pre-construction	Additional measure
Access for emergency services	Access for emergency vehicles will be maintained at all times during construction. Any site specific requirements will be determined in consultation with the relevant emergency services agency	Contractor	Construction	Additional measure
Socio-economic	Consultation will be carried out with all affected property owners during detailed design and construction to develop and implement measures to mitigate the impact on land use viability, infrastructure and severance.	Transport for NSW	Detailed design / pre-construction	Additional measure
Utilities	Residents and businesses will be notified before any utility interruption	Contractor	Construction	Additional measure
Utilities	A utility management plan will be prepared to include: • Utility company consultation • Maintenance and emergency access requirements • Construction staging and programming conflicts	Contractor	Pre-construction	Additional measure

6.8 Other impacts

6.8.1 Existing environment and potential impacts

Table 6-14: Review of other potential environmental impacts

Environmental factor	Existing environment	Potential impacts
Non-Aboriginal heritage	A search of the following statutory and non-statutory heritage lists/registers was carried out in January 2020: • NSW heritage database (including State Heritage Register) • Roads and Maritime Heritage and Conservation Register • Australian Heritage Database • Australian Heritage Places Inventory • Cabonne LEP. The searches identified no heritage items near the proposal site, with the nearest item being located at the Mitchell Highway / Bing Road intersection, about 400 metres to the north-west.	No direct or indirect impacts on non-Aboriginal heritage items are expected as a result of the proposal
Air quality	The proposal is in a predominantly rural environment. Contributors to air quality in the broader region include urban centres of Orange and Bathurst, mining and power generation. Ambient air quality would also be influenced by exhaust emissions from vehicles using the highway. Sensitive receivers in the vicinity of the proposal include residential properties.	The proposal would include excavation of the existing road formation and adjoining embankments. Material would be transported between worksites and stockpiled throughout the proposal corridor. These ground disturbing activities would have the potential to generate dust. In addition, vehicular movements on unsealed areas, and vegetation clearing would have the potential to generate dust. Construction vehicles, plant and machinery would generate emissions. Odours may be generated during asphalting works. Impacts on air quality and sensitive receivers as a result of the proposal would be limited to the construction phase. Impacts

Environmental factor	Existing environment	Potential impacts
		would be temporary and minor in nature subject to the implementation of mitigation measures. The proposal would not result in a noticeable increase in traffic volumes of change the traffic mix and there would be no long-term impacts on air quality as a result of the proposal.
Surface water	The Mitchell Highway is in the Macquarie River Catchment. Local watercourses ate unnamed and traverse beneath the highway in culvert structures. Water quality is influenced by the primarily agricultural land use in the catchment. The proposal site is not identified as within a flood planning area by the Cabonne LEP.	Potential impacts on surface water and hydrology during construction of the proposal would include: • Release of sediment to waterways and drainage lines during earthworks • Temporary changes to onsite drainage • Localised inundation of work sites during high rainfall events, particularly during culvert extension work • Pollution as a result of fuel or oil spills. The proposal would involve cut and fill activities on embankments directly adjacent to the roadway as well as excavations in drainage lines for the extension of existing culverts. Given the nature of the adjacent landform and vegetation cover, it is considered that the potential for the release of sediments off site is minimal provided the implementation of appropriate controls The proposal would include the extension of existing culverts in several locations where the road would be widened to allow the existing drainage regime to continue. The design of the proposal would allow for appropriate surface flow from the road formation during operation including re-establishing grassed swales to direct flows to existing drainage lines where necessary.
Climate change	The climate in Guyong is mild, and generally warm and temperate. There are warm summers (with cool mornings) and cool winters with frequent morning frosts and light to moderate, sometimes heavy snowfalls.	The following construction activities would result in the release of greenhouse gas emissions: • Fossil fuel combustion relations to use of plant, equipment and vehicles • Vegetation clearing

Environmental factor	Existing environment	Potential impacts
		• Electricity use • Embedded emissions from manufacture and delivery of materials Given the scope and duration of the proposal, the impact of the emissions would be temporary and minor in nature subject to the implementation of mitigation measures. The proposal would not change traffic volumes and traffic mix during operation and therefore a long-term increase in emissions as a result of the proposal is not expected.
Waste and resource use	Transport for NSW is committed to ensuring the responsible management of unavoidable waste and promotes the reuse of such waste in accordance with the resource management hierarchy principles outlined in the Waste Avoidance and Resource Recovery Act 2001. These resource management hierarchy principles, in order of priority are: • Avoid unnecessary resource consumption as a priority • Avoidance is followed by resource recovery (including reuse of materials, reprocessing, recycling and energy recovery) • Disposal is undertaken as a last resort (in accordance with the Waste Avoidance and Resource Recovery Act 2001). By adopting the above principles, TfNSW aims to efficiently reduce resource use, reduce costs, and reduce environmental harm in accordance with the principles of ecologically sustainable development.	The proposal is not expected to generate large quantities of waste materials. The following waste streams have been identified: • Spoil • Waste concrete / asphalt • Removed signage • Wastewater (excavation dewatering, testing and commissioning of water/sewer mains) • General garbage and refuse.
Hazards and risk management	Existing hazards and risks associated with the operation of the Mitchell Highway in the proposal location include vehicle to vehicle collision and vehicles leaving the roadway. There is a known crash hazard on the subject section of the highway with a recent fatality recorded.	The construction of the proposal would result in changed traffic conditions that may result in hazards for road users. Construction personnel would be working near live traffic resulting on the potential for harm. The hazards associated with the changed traffic conditions would be mitigated through the implementation

Environmental factor	Existing environment	Potential impacts
		of an approved traffic management and associated traffic control plans. There would be no long-term hazards or risks associated with the operation of the proposal with an overall improvement to the safety of road users.

6.8.2 Safeguards and management measures

Table 6-15: Other impacts environmental management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Non-Aboriginal heritage	The *Standard Management Procedure - Unexpected Heritage Items* (Roads and Maritime, 2015) will be followed in the event any unexpected heritage items, archaeological remains or potential relics of Non-Aboriginal origin are encountered. Work will only re-commence once the requirements of that Procedure have been satisfied.	Contractor	Detailed design / pre-construction	Section 4.10 of QA *G36 Environment Protection*
Air quality	Air quality management measures will be prepared and implemented as part of the CEMP. The CEMP will include, but not be limited to the following in relation to air quality: • 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	Section 4.4 of QA *G36 Environment Protection*
Spills	A site-specific emergency spill plan will be developed, and include spill management measures in accordance with the Roads and Maritime Code of Practice for Water Management (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).	Contractor	Detailed design / pre-construction / construction	Section 4.3 of QA G36 Environment Protection
Water quality	Visual monitoring of local surface water will be undertaken on a regular basis to identify increase turbidity, hydrocarbon slicks etc. If pollution noted, the source will be identified, clean-up undertaken and/or controls reviewed.	Contractor	Construction	Additional safeguard
Water quality	Designated, fully contained concrete washout areas would be established	Contractor	Construction	Additional

Impact	Environmental safeguards	Responsibility	Timing	Reference
	away from drainage lines and waterways.			safeguard
Spills	Refuelling areas and chemical stores will be located in impervious bunded areas and at least 50 metres from any drainage lines and waterways to minimise potential of pollution.	Contractor	Construction	Section 4.3 of QA G36 Environment Protection
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	Section 4.2 of QA *G36 Environment Protection*
Hazards and risk management	A Hazard and Risk Management Plan (HRMP) will be prepared and implemented as part of the CEMP. The HRMP will include, but not be limited to: • details of hazards and risks associated with the activity • measures to be implemented during construction to minimise these risks • record keeping arrangements, including information on the materials present on the site, material safety data sheets, and personnel trained and authorised to use such materials • a monitoring program to assess performance in managing the identified risks • contingency measures to be implemented in the event of unexpected	Contractor	Detailed design / pre-construction	Additional measure

Impact	Environmental safeguards	Responsibility	Timing	Reference
	hazards or risks arising, including emergency situations. The HRMP will be prepared in accordance with relevant guidelines and standards, including relevant Safe Work Australia Codes of Practice, and EPA or Office of Environment and Heritage publications.			

6.9 Cumulative impacts

6.9.1 Study area

The cumulative impact assessment as considered the Cabonne local government area and Mitchell Highway corridor.

6.9.2 Broader program of work

The proposal is being delivered under the Saving Lives on Country Roads Program and aims to reduce the number of people killed and seriously injured on our roads. A similar safety upgrade at Glanmire (between Bathurst and Lithgow) is also planned and it is likely works on both projects would occur concurrently. Safety improvements at East Guyong, are also being planned but are expected to occur following the completion of the proposal.

6.9.3 Other projects and developments

A cumulative impact occurs when two or more projects are carried out concurrently and near to one another. The impacts may be caused by both construction and operational activities and can result in a greater impact to the surrounding area than would be expected if each project was carried out in isolation.

A search of the Department of Planning, Industry and Environment's Major Projects Register and the Central Coast Council ePlanning portal was carried out in January 2020 for Cabonne local government area with no proposals identified that are likely substantially interact with the proposal. It is noted that in April 2019, the planning approval for the East Guyong Quarry was modified to increase approved production from 400,000 tonnes per annum to 600,000 tonnes per annum of basalt quarry products.

Other developments likely to occur within the locality would be small-scale projects and would be unlikely to result in a cumulative impact with the proposal.

6.9.4 Potential impacts

The main potential cumulative impact would be associated with construction traffic from the Guyong safety upgrade and the proposed improvements at Glanmire. However, noting the moderate existing traffic volumes, additional traffic from both projects is not expected to adversely affect the operation of the Mitchell Highway or the broader network.

The Biodiversity Assessment (Appendix D) concludes that the proposal would not contribute to a cumulative ecological impact in a local and regional context. It also notes that the proposal would not further contribute to the decline of any threatened species, populations or ecological communities within the locality.

6.9.5 Safeguards and management measures

Table 6-16: Cumulative environmental management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Cumulative	• The Traffic Management Plan will	TfNSW Project	Pre-	Additional

Impact	Environmental safeguards	Responsibility	Timing	Reference
construction impacts	include a requirement to coordinate traffic control measures including night works and full road closures with concurrent Highway Upgrade projects with the potential to impact traffic on the Mitchell Highway to minimise traffic delays where possible.	Manager Contractor	construction / construction	safeguard

7. Environmental management

7.1 Environmental management plans (or system)

A number of safeguards and management measures have been identified in the REF in order 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 prior to construction of the proposal and must be reviewed and certified by the Transport for NSW Environment Officer, Western Region, prior to the commencement of any on-site works. The CEMP will be a working document, subject to ongoing change and updated as necessary to respond to specific requirements. The CEMP would be developed in accordance with the specifications set out in the [adjust as necessary: QA Specification G36 – Environmental Protection (Management System), QA Specification G38 – Soil and Water Management (Soil and Water Plan), QA Specification G40 – Clearing and Grubbing and 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	Reference
GEN1	General - minimise environmental impacts during construction	A CEMP will be prepared and submitted for review and endorsement of the TfNSW Environment Manager prior to commencement 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 undertaking of the activity.	Contractor / TfNSW project manager	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 prior to commencement of the activity.	Contractor / TfNSW project manager	Pre-construction	

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
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 includes • Adjoining heritage items • adjoining residential areas requiring particular noise management measures	Contractor / TfNSW project manager	Pre-construction / detailed design	
BIO1	Biodiversity	Flora and fauna management will occur in accordance with *Biodiversity Guidelines: Protecting and Managing Biodiversity on RTA Projects* (RTA, 2011) and will be implemented as part of the CEMP. Flora and fauna management will include, but not be limited to: • plans showing areas to be cleared and areas to be protected, including exclusion zones, protected habitat features and revegetation areas • pre-clearing survey requirements • procedures for unexpected threatened species finds and fauna handling • procedures in the event of injury to native fauna • protocols to manage weeds and pathogens.	Contractor	Pre-construction	Section 4.8 of QA *G36 Environment Protection*
BIO2	Biodiversity	Measures to further avoid and minimise the construction footprint and native vegetation or habitat removal will be investigated during detailed design and implemented where practicable and feasible.	TfNSW	Detailed design	Additional measure
BIO3	Biodiversity	A pre-clearing survey will be conducted and will: • Confirm clearing boundaries, exclusion zones, protected habitat features and revegetation areas prior to starting work • Identify, in toolbox talks, where biodiversity controls are located on the site	Contractor	Pre-construction	Additional measure
BIO4	Spread of weeds	Weed management will occur in accordance with *Biodiversity Guidelines, Guide 6* (Roads and Maritime, 2016) and will include:	Contractor	Pre-construction	Additional measure

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		• The identification of weeds on site (confirmed during pre-clearing survey) • Weed management priorities and objectives Exclusion zones, protected habitat features and revegetation areas prior to starting work within or directly next to the site • The location of weed infested areas • Weed control methods • Measures to prevent the spread of weeds, • including machinery hygiene procedures and • disposal requirements • A monitoring program to measure the success of weed management Communication with local Council noxious weed representative.			
BIO5	Spread of diseases affecting plants	Management measures will be implemented to control and/or prevent the introduction and/or spread of disease-causing agents such as bacteria and fungi in accordance with the *Biodiversity Guidelines, Guide 7* (Roads and Maritime, 2016)	Contractor	Pre-construction	Additional measure
BIO6	Unexpected threatened species finds	If unexpected flora or fauna are discovered on site stop work immediately and implement the Roads and Maritime Unexpected Threatened Species Find Procedure in the *Biodiversity Guidelines, Guide 1* (Roads and Maritime, 2016).	Contractor	Construction	
SCO1	Soils	Soil and water Management will be addressed and implemented as part of the CEMP. The CEMP will identify all reasonably foreseeable risks relating to soil erosion and water pollution and describe how these risks will be addressed during construction.	Contractor	Pre-construction	Section 2.1 of QA G38 Soil and Water Management
SCO2	Soils	A site-specific Erosion and Sediment Control Plan/s will be prepared and implemented as part of the CEMP. The ESCP will address the requirements of RMS specification G38.	Contractor	Pre-construction	Section 2.2 of QA G38 Soil and Water Management

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
SCO3	Soils	The Erosion and Sediment Control Plan/s will include arrangements for managing wet weather events, including monitoring of potential high-risk events (such as storms) and specific controls and follow-up measures to be applied in the event of wet weather. The Plan/s will also include measures to minimise the impact of discharging site water to the adjacent watercourses.	Contractor	Pre-construction	Section 2.2 of QA G38 Soil and Water Management
SCO4	Naturally occurring asbestos	An Asbestos Management Plan will be developed for the proposal. The plan will include but not be limited to: • Testing requirements to confirm the extent and depth of naturally occurring asbestos within the work site • Segregation of the worksite into clean and dirty zones • Personal protective equipment requirements • Decontamination requirements • Disposal requirements and locations • Monitoring requirements	Contractor	Pre-construction	Additional measure
SCO5	Contaminated land – potential onsite and off-site sources	An unexpected finds procedure will be developed in the proposal CEMP for contamination. The procedure will ensure that if contaminated areas are encountered during construction, appropriate control measures will be implemented to manage the immediate risks of contamination. All other works that may impact on the contaminated area will cease 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 Transport for NSW Regional Environment Manager and/or EPA.	Contractor	Detailed design / Pre-construction	Section 4.2 of QA *G36 Environment Protection*
NV1	Noise and vibration	Noise and vibration management measures will be implemented as part of the CEMP.	Contractor	Pre-construction	Section 4.6 of QA *G36 Environment Protection*
NV2	Noise and	The noise and vibration management measures in the CEMP will generally	Contractor	Pre-	Section 4.6

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
	vibration	follow the approach in the Interim Construction Noise Guideline (ICNG) (DECC, 2009) and the Construction Noise and Vibration Guideline (Roads and Maritime Services, 2016) and identify: • all potential significant noise and vibration generating activities associated with the activity • feasible and reasonable mitigation measures to be implemented • NVa monitoring program to assess performance against relevant noise and vibration criteria • arrangements for consultation with affected neighbours and sensitive receivers, including notification and complaint handling procedures • contingency measures to be implemented in the event of non-compliance with noise and vibration criteria.		construction	of QA *G36 Environment Protection*
NV3	Construction vibration	Where vibration intensive plant such as vibratory rollers are used, vibration must be managed to minimise disturbance to building occupants and to avoid damage to buildings and other structures. This includes adhering to the recommended minimum working distances for vibration intensive plant identified in Section 7.1 of the Construction Noise and Vibration Guideline (Roads and Maritime Services, 2016). If recommended minimum working distances cannot be met by selecting smaller plant vibration monitoring will occur to quantify and help manage vibration emissions. If necessary, trial vibration measurements will be conducted before activities to further assess any possible impacts and buffer distances that may be required.	Contractor	Construction	Additional measure
NV4	Blasting	A Blasting Management Plan will be prepared. As a minimum the plan will include: • applicable blast criteria • review of risks associated with blasting • blast design and execution • mitigation measures	Contractor	Construction	Additional measure

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		• compliance management.			
LVI1	Visual impacts during construction	Work sites including all ancillary facilities will be managed to minimise visual impacts including consideration of screening, placement of facilities and storage areas and maintaining sites in a clean state with minimal visual clutter.	TfNSW project manager Contractor	Construction	Additional safeguard
LVI2	Visual impacts during operation	Following the completion of construction works, plant/equipment will be removed, and disturbed areas will be revegetated, seeded or otherwise restored as appropriate.	TfNSW project manager Contractor	Construction	Additional safeguard
LVI3	Visual impacts during construction	Work sites including all ancillary facilities will be managed to minimise visual impacts including consideration of screening, placement of facilities and storage areas and maintaining sites in a clean state with minimal visual clutter.	TfNSW project manager Contractor	Construction	Additional safeguard
AH1	Aboriginal heritage	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 Transport for NSW 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-commence once the requirements of that Procedure have been satisfied.	Contractor	Pre-construction	Section 4.9 of QA *G36 Environment Protection*
TT1	Traffic and transport	A Traffic Management Plan (TMP) will be prepared and implemented as part of the CEMP. The TMP will be prepared in accordance with the Roads and Maritime *Traffic Control at Work Sites Manual* (RTA, 2010) and *QA Specification G10 Control of Traffic* (Roads and Maritime, 2008). 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 • measures to maintain pedestrian and cyclist access • requirements and methods to consult and inform the local community of	Contractor	Detailed design / Pre-construction	Section 4.8 of QA *G36 Environment Protection*

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		impacts on the local road network • 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 • consideration of 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 monitoring, review and amendment mechanisms.			
SE1	Socio-economic	A Communication Plan (CP) will be prepared and implemented as part of the CEMP to help provide timely and accurate information to the community during construction. The CP will include (as a minimum): • mechanisms to provide details and timing of proposed activities to affected residents, including changed traffic and access conditions • contact name and number for complaints. • The CP will be prepared using the Roads and Maritime Stakeholder engagement toolkit	Contractor	Detailed design / pre-construction	Standard measure
SE2	Property acquisition	All property acquisition will be carried out in accordance with the Land Acquisition Information Guide (Roads and Maritime, 2012) and the *Land Acquisition (Just Terms Compensation) Act 1991*.	TfNSW	Detailed design / pre-construction	Additional measure
SE3	Socio-economic	Road users, including freight companies will be informed of changed conditions, including likely disruptions to access during construction.	TfNSW Contractor	Pre-construction / construction	Additional measure
SE4	Socio-economic	Consultation will be undertaken with potentially affected residences prior to the commencement of and during work in accordance with the Roads and Maritime's Community Involvement and Communications Resource Manual. Consultation will include but not limited to door knocks, newsletters or letter box drops providing information on the proposed work, working hours and a contact name and number for more information or to register complaints.	TfNSW	Detailed design / pre-construction	Additional measure

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
SE5	Access for emergency services	Access for emergency vehicles will be maintained at all times during construction. Any site specific requirements will be determined in consultation with the relevant emergency services agency	Contractor	Construction	Additional measure
SE6	Socio-economic	Consultation will be carried out with all affected property owners during detailed design and construction to develop and implement measures to mitigate the impact on land use viability, infrastructure and severance.	TfNSW	Detailed design / pre-construction	Additional measure
SE7	Utilities	Residents and businesses will be notified before any utility interruption	Contractor	Construction	Additional measure
SE8	Utilities	A utility management plan will be prepared to include: • Utility company consultation • Maintenance and emergency access requirements • Construction staging and programming conflicts	Contractor	Pre-construction	Additional measure
OTH1	Non-Aboriginal heritage	The *Standard Management Procedure - Unexpected Heritage Items* (Roads and Maritime, 2015) will be followed in the event any unexpected heritage items, archaeological remains or potential relics of Non-Aboriginal origin are encountered. Work will only re-commence once the requirements of that Procedure have been satisfied.	Contractor	Detailed design / pre-construction	Section 4.10 of QA *G36 Environment Protection*
OTH2	Air quality	Air quality management measures will be prepared and implemented as part of the CEMP. The CEMP 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	Section 4.4 of QA *G36 Environment Protection*

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
OTH3	Spills	A site-specific emergency spill plan will be developed, and include spill management measures in accordance with the Roads and Maritime Code of Practice for Water Management (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).	Contractor	Detailed design / pre-construction / construction	Section 4.3 of QA G36 Environment Protection
OTH4	Water quality	Visual monitoring of local surface water will be undertaken on a regular basis to identify increase turbidity, hydrocarbon slicks etc. If pollution noted, the source will be identified, clean-up undertaken and/or controls reviewed.	Contractor	Construction	Additional safeguard
OTH5	Water quality	Designated, fully contained concrete washout areas would be established away from drainage lines and waterways.	Contractor	Construction	Additional safeguard
OTH6	Spills	Refuelling areas and chemical stores will be located in impervious bunded areas and at least 50 metres from any drainage lines and waterways to minimise potential of pollution.	Contractor	Construction	Section 4.3 of QA G36 Environment Protection
OTH7	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	Section 4.2 of QA *G36 Environment Protection*
OTH8	Hazards and risk management	A Hazard and Risk Management Plan (HRMP) will be prepared and implemented as part of the CEMP. The HRMP will include, but not be limited	Contractor	Detailed design / pre-	Additional measure

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		to: • details of hazards and risks associated with the activity • measures to be implemented during construction to minimise these risks • record keeping arrangements, including information on the materials present on the site, material safety data sheets, and personnel trained and authorised to use such materials • a monitoring program to assess performance in managing the identified risks • contingency measures to be implemented in the event of unexpected hazards or risks arising, including emergency situations. The HRMP will be prepared in accordance with relevant guidelines and standards, including relevant Safe Work Australia Codes of Practice, and EPA or Office of Environment and Heritage publications.		construction	
CI1	Cumulative construction impacts	The Traffic Management Plan will include a requirement to coordinate traffic control measures including night works and full road closures with concurrent Highway Upgrade projects with the potential to impact traffic on the Mitchell Highway to minimise traffic delays where possible.	TfNSW Project Manager Contractor	Pre-construction / construction	Additional safeguard

7.3 Licensing and approvals

Table 7-2 provides a summary of the licensing and approval requirements relevant to the proposal.

Table 7-2: Summary of licensing and approvals required

Instrument	Requirement	Timing
Roads Act 1993 (section 138)	Road occupancy licence	Prior to start of activity
Water Management Act 2000 (Section 92)	Water supply work approval (for dewatering of excavations and/or extraction)	Prior to dewatering activity

8. Conclusion

This chapter 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 EP&A Act, including the principles of ecologically sustainable development as defined in Schedule 2 of the Environmental Planning and Assessment Regulation 2000.

8.1 Justification

The proposal is required to improve safety for road users on the subject section of the Mitchell Highway at Guyong. This section of the highway has a history of crashes including fatal crashes. The proposal would widen the shoulders and provide safety barriers.

A 'do nothing' approach was not considered appropriate as it does not address the identified need and does not meet the proposals objectives.

While there would be some temporary environmental impacts as a consequence of the proposal including traffic and transport impacts, construction noise, vegetation removal and potential soil and water impacts, they have been avoided or minimised wherever possible through the site specific safeguards summarised in section 7.

The benefits of the proposal are considered to outweigh the mostly temporary adverse impacts and risks associated with the proposal.

8.2 Objects of the EP&A Act

Table 8-1 reviews the consistency of the proposal with the objects of the EP&A Act.

Table 8-1: Objects of the EP&A Act

Object	Comment
1.3(a) To promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources.	The proposal would improve road user safety while minimising the impact on the natural environment and resources through the implementation of mitigation measures described in Section 7.2. It is therefore consistent with this objective.
1.3(b) To facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment.	The principles of ecological sustainable development are considered in section 8.2.1 to 8.2.4 below.
1.3(c) To promote the orderly and economic use and development of land.	The proposal would continue to support the orderly economic use and development of land by improving safety of road users on a key regional transport link.
1.3(d) To promote the delivery and maintenance of affordable housing.	Not relevant to the project.
1.3(e) To protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities	The proposal would result in minor impacts on the natural environment. Measures have been proposed to minimise the impact (refer Section 7.2).

Object	Comment
and their habitats.	
1.3(f) To promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage).	The proposal would not result in impacts on built and cultural heritage (including Aboriginal cultural heritage).
1.3(g) To promote good design and amenity of the built environment.	The design of the built elements of the proposal would be consistent with the existing character of the roadway infrastructure.
1.3(h) To promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants.	Not relevant to the project.
1.3(i) To promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State.	Not relevant to the project.
1.3(j) To provide increased opportunity for community participation in environmental planning and assessment.	Consultation with directly affected residences has occurred. See Chapter 5.

8.2.1 The precautionary principle

The precautionary principle deals with certainty in decision-making. It provides that where there is a threat of serious or irreversible environmental damage, the absence of full scientific certainty should not be used as a reason to postpone measures to prevent environmental degradation. The threat of serious or irreversible environmental damage is one of the essential preconditions to the engagement of the precautionary principle. In this case there is no threat of serious or irreversible environmental damage.

8.2.2 Intergenerational equity

Social equity is concerned with the distribution of economic, social and environmental costs and benefits. Inter-generational equity introduces a temporal element with a focus on minimising the distribution of costs to future generations.

The impacts of the proposal have been identified as short term and manageable. Road safety improvement benefits would be experienced over a longer period.

8.2.3 Conservation of biological diversity and ecological integrity

The twin principles of biodiversity conservation and ecological integrity have been a consideration during the design and assessment process with a view to identifying, avoiding, minimising and mitigating impacts.

The proposal is not expected to have significant biodiversity impacts. Refer to Section 6.1.

8.2.4 Improved valuation, pricing and incentive mechanisms

The principle of internalising environmental costs into decision making requires consideration of all environmental resources which may be affected by a project, including air, water, land and living things.

While it is often difficult to place a reliable monetary value on the residual, environmental and social effects of the project, the value placed on environmental resources within and around the corridor is evident in the extent of environmental investigations, planning and design of impact mitigation measures to prevent adverse environmental impacts.

8.3 Conclusion

The proposed safety improvements on the Mitchell Highway at Guyong are subject to assessment under Division 5.1 of the EP&A Act. The REF has examined and taken into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the proposed activity.

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

A number of potential environmental impacts from the proposal have been avoided or reduced during the concept design development and options assessment. The proposal as described in the REF best meets the project objectives but would still result in some impacts in terms of biodiversity, noise, visual amenity and traffic. Safeguards and management measures as detailed in this REF would ameliorate or minimise these expected impacts. The proposal would also substantially improve road safety. On balance the proposal is considered justified and the following conclusions are made.

Significance of impact under NSW legislation

The proposal would be unlikely to cause a significant impact on the environment. Therefore, it is not necessary for an environmental impact statement to be prepared and approval to be sought from the Minister for Planning and Public Spaces under Division 5.2 of the EP&A Act. A Biodiversity Development Assessment Report or Species Impact Statement is not required. The proposal is subject to assessment under Division 5.1 of the EP&A Act. Consent from Council is not required.

Significance of impact under Australian legislation

The proposal is not likely to have a significant impact on matters of national environmental significance or the environment of Commonwealth land within the meaning of the *Environment Protection and Biodiversity Conservation Act 1999*. A referral to the Australian 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.

Stuart Hill

Environmental Planner

Hills Environmental

Date: 6 May 2020

I have examined this review of environmental factors and accept it on behalf of Transport for NSW.

Jacob Ward

Project Manager

Transport for NSW

Date: 05/06/2020

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Terms and acronyms used in this REF

Term / Acronym	Description
AHIMS	Aboriginal Heritage Information Management System
CEMP	Construction environmental management plan
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW). Provides the legislative framework for land use planning and development assessment in NSW
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth). Provides for the protection of the environment, especially matters of national environmental significance, and provides a national assessment and approvals process.
EPL	Environment Protection Licence
ESD	Ecologically sustainable development. Development which uses, conserves and enhances the resources of the community so that ecological processes on which life depends, are maintained and the total quality of life, now and in the future, can be increased
FM Act	*Fisheries Management Act 1994* (NSW)
ISEPP	State Environmental Planning Policy (Infrastructure) 2007
LEP	Local Environmental Plan. A type of planning instrument made under Part 3 of the EP&A Act.
NML	Noise management level
RBL	Rating Background Level
SEPP	State Environmental Planning Policy. A type of planning instrument made under Part 3 of the EP&A Act.
QA Specifications	Specifications developed by Roads and Maritime Services for use with road work and bridge work contracts let by Roads and Maritime Services.

Appendix A

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

Clause 228(2) Checklist

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

Factor	Impact
a) Any environmental impact on a community? The proposal would have the potential for short-term traffic and transport and noise impacts on nearby residents and road users during construction. There would be potential for localised dust impacts and potential temporary changes to private property access. Safeguards have been proposed to minimise the extent and duration of these potential impacts.	Minor short-term negative
b) Any transformation of a locality? The proposal would not result in the transformation of a locality as the works would occur in an existing road corridor.	Nil
c) Any environmental impact on the ecosystems of the locality? The proposal would result in the removal of about 0.5 hectares of native vegetation. The vegetation affected is not a threatened ecological community. Assessments of significance determined that the proposal is unlikely to have a significant impact on the biodiversity values of the area.	Minor short-term and long-term negative
d) Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality? The proposal would have minor short-term negative aesthetic impacts. These impacts would be confined to the construction phase. Safeguards have been proposed to address the identified potential impacts. A reduction in recreational, scientific or other environmental quality or value of the locality is not anticipated	Minor short-term negative
e) Any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations? The proposal is not expected to affect Aboriginal cultural heritage. While there are a number of nearby (locally significant) non-Aboriginal heritage items, these would not be directly affected and indirect impacts (visual/setting) have been assessed as minor.	Minor short-term negative
f) Any impact on the habitat of protected fauna (within the meaning of the *National Parks and Wildlife Act 1974)?* The proposal would impact the habitat of protected fauna within the small amount of foraging woodland habitat to be permanently removed. The assessment of significance determined that the removal of this vegetation would not constitute a significant impact for threatened species.	Minor short-term negative
g) Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air? The proposal would not endanger any species of animal, plant or other form of life.	Nil
h) Any long-term effects on the environment? The nature and scale of the proposal are such that substantial long-term effects on the environment are not expected.	Nil

Factor	Impact
i) Any degradation of the quality of the environment? The proposal would have some potential for temporary degradation of the quality of the environment through the generation of dust, potential release of sediment, noise generation, and vegetation clearing. Safeguards have been proposed to address this risk.	Minor short-term negative
j) Any risk to the safety of the environment? During construction, the proposal would involve minimal risk to the safety of the environment due to the limited scope of works and the implementation of appropriate work health and safety measures. Safeguards have been proposed to address risks associated with naturally occurring asbestos.	Minor short-term negative
k) Any reduction in the range of beneficial uses of the environment? The proposal would not reduce the range of beneficial uses of the environment.	Nil
l) Any pollution of the environment? The proposal would not result in pollution of the environment. There would be short-term minor risks to local water quality in the event of a spill of release of sediment off site. Noise would be generated during construction and there would be potential for dust generation. Safeguards have been proposed to address the risk of pollution.	Minor short-term negative
m) Any environmental problems associated with the disposal of waste? Waste generated by the proposal would be contained and removed for disposal at approved facilities or appropriately licenced landfill.	Nil
n) Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply? The proposal would not increase demand for resources which are, or likely to become, in short supply.	Nil
o) Any cumulative environmental effect with other existing or likely future activities? Cumulative impacts are not expected.	Nil
p) Any impact on coastal processes and coastal hazards, including those under projected climate change conditions? The proposal would not impact coastal processes and coastal hazards.	Nil

Matters of National Environmental Significance and Commonwealth land

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

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

Factor	Impact
a) Any impact on a World Heritage property? The proposal would not impact on World Heritage property given lack of proximity.	Nil
b) Any impact on a National Heritage place? The proposal would not impact on World Heritage property given lack of proximity.	Nil
c) Any impact on a wetland of international importance? The proposal is not located near a wetland of international importance. Indirect impacts are not expected.	Nil
d) Any impact on a listed threatened species or communities? The Biodiversity Assessment concluded that there would not be a significant impact on Commonwealth listed species and communities.	Nil
e) Any impacts on listed migratory species? No impacts on migratory species (or their habitats are expected)	Nil
f) Any impact on a Commonwealth marine area? The proposal would not impact on a Commonwealth marine area given lack of proximity.	Nil
g) Does the proposal involve a nuclear action (including uranium mining)? The proposal does not involve a nuclear action.	Nil
h) Additionally, any impact (direct or indirect) on the environment of Commonwealth land? The proposal would not affect Commonwealth land.	Nil

Appendix B

Statutory consultation checklists

Infrastructure SEPP

Certain development types

Development type	Description	Yes / No	If 'yes' consult with	ISEPP clause
Car Park	Does the project include a car park intended for the use by commuters using regular bus services?	No		ISEPP cl. 95A
Bus Depots	Does the project propose a bus depot?	No		ISEPP cl. 95A
Permanent road maintenance depot and associated infrastructure	Does the project propose a permanent road maintenance depot or associated infrastructure such as garages, sheds, tool houses, storage yards, training facilities and workers' amenities?	No		ISEPP cl. 95A

Development within the Coastal Zone

Issue	Description	Yes / No / NA	If 'yes' consult with	ISEPP clause
Development with impacts on certain land within the coastal zone	Is the proposal within a coastal vulnerability area and is inconsistent with a certified coastal management program applying to that land?	No		ISEPP cl. 15A

Note: See interactive map here: ***https://www.planning.nsw.gov.au/policy-and-legislation/coastal-management***. Note the coastal vulnerability area has not yet been mapped.

Note: a certified coastal zone management plan is taken to be a certified coastal management program

Council related infrastructure or services

Issue	Potential impact	Yes / No	If 'yes' consult with	ISEPP clause
Stormwater	Are the works likely to have a *substantial* impact on the stormwater management services which are provided by council?	No		ISEPP cl.13(1)(a)
Traffic	Are the works likely to generate traffic to an extent that will *strain* the capacity of the existing road system in a local government area?	No		ISEPP cl.13(1)(b)
Sewerage system	Will the works involve connection to a council owned sewerage system? If so, will this connection have a *substantial* impact on the capacity of any part of the system?	No		ISEPP cl.13(1)(c)

Issue	Potential impact	Yes / No	If 'yes' consult with	ISEPP clause
Water usage	Will the works involve connection to a council owned water supply system? If so, will this require the use of a *substantial* volume of water?	No		ISEPP cl.13(1)(d)
Temporary structures	Will the works involve the installation of a temporary structure on, or the enclosing of, a public place which is under local council management or control? If so, will this cause more than a *minor* or *inconsequential* disruption to pedestrian or vehicular flow?	No		ISEPP cl.13(1)(e)
Road & footpath excavation	Will the works involve more than *minor* or *inconsequential* excavation of a road or adjacent footpath for which council is the roads authority and responsible for maintenance?	No		ISEPP cl.13(1)(f)

Local heritage items

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

Flood liable land

Issue	Potential impact	Yes / No	If 'yes' consult with	ISEPP clause
Flood liable land	Are the works located on flood liable land? If so, will the works change flood patterns to more than a *minor* extent?	No		ISEPP cl.15
Flood liable land	Are the works located on flood liable land? (to any extent). If so, do the works comprise more than minor alterations or additions to, or the demolition of, a building, emergency works or routine maintenance	No		ISEPP cl.15AA

Note: Flood liable land means land that is susceptible to flooding by the probable maximum flood event, identified in accordance with the principles set out in the manual entitled *Floodplain Development Manual: the management of flood liable* land published by the New South Wales Government.

Public authorities other than councils

Issue	Potential impact	Yes / No	If 'yes' consult with	ISEPP clause
National parks and reserves	Are the works adjacent to a national park or nature reserve, or other area reserved under the *National Parks and Wildlife Act 1974*, or on land acquired under that Act?	No	Office of Environment and Heritage	ISEPP cl.16(2)(a)
National parks and reserves	Are the works on land in Zone E1 National Parks and Nature Reserves or in a land use zone equivalent to that zone?	No	Office of Environment and Heritage	ISEPP cl. 16(2)(b)
Aquatic reserves	Are the works adjacent to an aquatic reserve or a marine park declared under the *Marine Estate Management Act 2014*?	No	Department of Industry	ISEPP cl.16(2)(c)
Sydney Harbour foreshore	Are the works in the Sydney Harbour Foreshore Area as defined by the *Sydney Harbour Foreshore Authority Act 1998?*	No	Sydney Harbour Foreshore Authority	ISEPP cl.16(2)(d)
Bush fire prone land	Are the works for the purpose of residential development, an educational establishment, a health services facility, a correctional centre or group home in bush fire prone land?	No	Rural Fire Service	ISEPP cl.16(2)(f)
Artificial light	Would the works increase the amount of artificial light in the night sky and that is on land within the dark sky region as identified on the dark sky region map? (Note: the dark sky region is within 200 kilometres of the Siding Spring Observatory)	No	Director of the Siding Spring Observatory	ISEPP cl.16(2)(g)
Defence communications buffer land	Are the works on buffer land around the defence communications facility near Morundah? (Note: refer to Defence Communications Facility Buffer Map referred to in clause 5.15 of Lockhardt LEP 2012, Narrandera LEP 2013 and Urana LEP 2011.	No	Secretary of the Commonwealth Department of Defence	ISEPP cl. 16(2)(h)
Mine subsidence land	Are the works on land in a mine subsidence district within the meaning of the *Mine Subsidence Compensation Act 1961?*	No	Mine Subsidence Board	ISEPP cl. 16(2)(i)

Appendix C

Aboriginal cultural heritage advice

Appendix D

Biodiversity Assessment

rms.nsw.gov.au/

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Customer feedback
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May 2020