



# **Goonoo Goonoo Road duplication - Tamworth (New England Highway)**

Review of Environmental Factors

Transport for NSW | November 2021



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Prepared by CCHD and Transport for NSW

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# Document controls

## Approval and authorisation

Title	Goonoo Goonoo Road duplication - Tamworth (New England Highway) review of environmental factors
Accepted on behalf of Transport for NSW by:	Gavin Rayward Regional Infrastructure Development North
Signed:	
Dated:	9 November 2021

# Executive summary

## The proposal

Transport for NSW proposes to duplicate Goonoo Goonoo Road (New England Highway) in Tamworth providing two lanes in each direction (the proposal). The proposal is needed to address existing congestion, provide for future traffic growth, and improve road safety. Key features of the proposal would include:

- Changes to the Calala Lane intersection, including:
  - Replacing the existing roundabout with traffic lights
  - Providing one dedicated right turn lane and one shared right / left turn lane from Calala Lane
  - Providing for protected pedestrian movements with pedestrian signal phasing on all intersection legs at Calala Lane
  - Providing separate left and right turn lanes for traffic turning into Calala Lane
- Road widening and pavement reconstruction to provide two lanes each way with a central median between just north of Calala Lane and Jack Smyth Drive
- Changes to the Craigends Lane intersection including:
  - Construction of a roundabout to replace the existing T-intersection
  - Provision for a fourth leg on the roundabout that allows for access to future development on the eastern side of Goonoo Goonoo Road
- Changes to The Ringers Road, including:
  - Left turn out only on The Ringers Road (except for emergency vehicles)
  - Providing a right turn lane for traffic turning into The Ringers Road, with the left turn lane for northbound traffic turning into The Ringers Road retained
- Changes to the Greg Norman Drive intersection, including:
  - Installing 'seagull' intersection to provide a two stage movement across Goonoo Goonoo Road
  - Retaining separate right and left turn lanes out of Greg Norman Drive
- Completion of the shared path along the western side of Goonoo Goonoo Road between Wilburtree Street and Greg Norman Drive
- Formalisation of existing and provision of new parking spaces for heavy vehicles
- Provision of a footpath on the eastern side of Goonoo Goonoo Road between Calala Lane and Barnes Gully
- Street lighting between Calala Lane and Jack Smyth Drive
- Drainage improvements including providing kerb and channel between Calala Lane and Greg Norman Drive, and culvert extension at Barnes Gully
- New line marking and signage.

Construction is expected to commence in 2023 and would take around 12 months to complete, however this is dependent on funding.

## Need for the proposal

The proposal is needed to improve safety, increase road capacity, improve traffic flow and deliver better and more reliable journeys. The proposal is consistent with a range of strategic planning and policy documents including NSW Future Transport Strategy 2056 (Transport for NSW, 2018).

## Proposal objectives

The objectives of the proposal include:

- Increase network capacity to acceptable levels to accommodate forecast traffic growth
- Improve road safety by reducing serious crashes to a comparable rate to similar roads
- Maintain a 'Place' function along the Goonoo Goonoo Road movement corridor.

## Options considered

A range of options were considered including a bypass, public transport provision, traffic calming measures and land use planning changes. A 'do nothing' option was also considered.

The preferred option is the provision of two lanes in each direction and a central median on Goonoo Goonoo Road between just north of Calala Lane and Jack Smyth Drive.

The preferred option was selected because it best responds to the proposal objectives and can be constructed and operated with manageable environmental impacts. The preferred option is largely confined to the existing public road reserve and therefore minimises impacts on adjacent land uses.

## Statutory and planning framework

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

A referral to Australian Government Department of Agriculture, Water and the Environment under the EPBC Act is not required.

## Community and stakeholder consultation

Community consultation on the concept design for the proposal was open for feedback from Monday, 8 March to Wednesday, 31 March 2021. An online survey and face-to-face meetings with businesses and property owners also occurred during this period. A total of 275 submissions were received.

The feedback received in formal submissions raised a number of issues including comments on the various intersection treatments, the need to upgrade the Goonoo Goonoo Road/Scott Road/Vera Street roundabout, provisions for parking, pedestrians, cyclists and heavy vehicles. The feedback has been considered in further developing the proposal and during the environmental assessment.

Consultation has also occurred with Tamworth Regional Council via project steering committee meetings, with the State Emergency Service, businesses and property owners. Representatives of Tamworth Local Aboriginal Land Council have participated in archaeological investigations for the proposal.

The REF will be publicly displayed for comment from mid-November to mid-December 2021. Following the public display of the REF, all comments received would be recorded and addressed in a Submissions Report detailing how each issue raised would be considered in finalising the proposal design. The Submissions Report would be made available to the public on the project webpage on the Transport for NSW website.

## Environmental impacts

Detailed technical investigations have been carried out to identify, assess, manage and minimise the proposal's potential impacts. The following outlines the proposal's main impacts on the environment and surrounding community. The safeguards and mitigation measures identified in this REF would help minimise the expected adverse impact.

## **Traffic and transport**

During construction there is the potential for some delays to traffic on both Goonoo Goonoo Road and the local road network due to lane closures, changes to on-road parking and reduced speed limits. Short term delays and minor diversions could also be experienced by bus users, pedestrians and cyclists.

Once completed, the proposal would improve safety and traffic efficiency while also providing improved facilities for pedestrians and cyclists. There would be some access changes due to the central median as well as the left-turn only movement (except for emergency vehicles) out of The Ringers Road. Formalisation of truck parking is also proposed.

## **Noise and vibration**

During construction, the types of works required and proximity to receivers means the proposal would result in high noise levels, including during the evening and night periods. Management of these impacts would need to include a range of measures including consultation with affected people, careful selection of machinery, modified work practices and respite periods.

Construction plant would also be selected to ensure compliance with target levels for continuous and impulsive vibration. Where necessary, compliance would be confirmed through vibration monitoring.

During operation, exceedances of road traffic noise criteria are predicted, however this is due to forecast traffic growth rather than to the proposal. The noise modelling undertaken indicates that the noise to receivers due to the proposal would not be of a sufficient amount to qualify for consideration of feasible and reasonable noise mitigation measures.

## **Landscape and visual**

The temporary impacts on visual amenity during construction activities would be confined to the road corridor and immediately adjacent areas. Following the completion of construction, the impacts associated with construction equipment and facilities would be removed and disturbed areas restored.

The proposal would have some landscape character impacts but would also formalise the streetscape in line with other sections of Goonoo Goonoo Road further north. This is expected to reinforce the urban quality as part of the entry experience into Tamworth and reduce the more informal and rural character now present along this section of road.

Most assessed viewpoints along the corridor would experience low, low to moderate or moderate impacts. Two viewpoints (view south from Barnes Gully and view south-east from opposite Craigends Lane) would experience a high visual impact due to the removal of mature trees combined with a high sensitivity.

The formalisation of truck parking is also noted as visually detracting from the setting.

An Urban Design Plan, including landscape treatments, will be developed to address the landscape character and visual impacts of the proposal.

## **Aboriginal cultural heritage**

The proposal would result in a 'partial loss' of value to one Aboriginal site and a 'total loss' of value to another. These Aboriginal sites are of significance to the Aboriginal community and considered to have low scientific research potential.

An Aboriginal Heritage Impact Permit under the *National Parks and Wildlife Act 1979* will be required in relation to these impacts.

## **Biodiversity**

The proposal would impact up to about 5.5 hectares of native (i.e. grasses, herbs and forbs) and exotic vegetation which would require disturbance/removal to permit the proposal, including about six native trees. Most of this area comprises the proposed compound locations and would only be temporarily affected, with

rehabilitation of the sites to occur post-construction. The six native trees impacted would be affected by permanent works, with all reasonably practicable measures taken to avoid impact on mature trees by temporary (construction) works. No threatened ecological communities would be affected.

The proposal is not expected to affect threatened flora or fauna. While one hollow bearing tree would be removed, the loss of this tree would not limit the extent of foraging or breeding habitat sites available within the surrounding area for hollow-dependent fauna.

### ***Hydrology, flooding and groundwater***

The proposal would result in a moderate increase in impermeable surfaces (and therefore some additional runoff) due to the construction of widened and additional road surfaces. Provision of kerb and gutter may also increase the velocity of flows to Barnes Gully. The drainage design (longitudinal and cross drainage) would be developed to adequately accommodate increased flows and any changes in flow characteristics.

The provision of kerb and channel drainage is expected to address current flows to the frontage of residential properties on the eastern side of Goonoo Goonoo Road, north of Barnes Gully, during larger wet weather events, reducing the impact of surface runoff on these properties. Further assessment will be carried out during detailed design to identify any increases in flood extents or depths which are expected to only potentially occur in the vicinity of Barnes Gully. The detailed design will respond to any identified flooding impacts.

The proposal is not expected to result in any appreciable changes to existing groundwater levels (through groundwater drawdown or changes to groundwater recharge).

### ***Socio-economic***

The proposal would potentially have some negative socio-economic impacts including:

- Property acquisition (although acquisition would be minimal and would not affect any dwellings)
- Impacts on the amenity of properties (residences and businesses) during construction
- Impacts on access, connectivity and on-street parking during construction.
- Changes to access arrangements to some properties, through the introduction of the central median, creating left-in, left-out access only for some adjacent properties

The environmental management measures in this REF have been proposed to address these impacts.

While the proposal would result in some negative socio-economic impacts as identified above, it would also provide socio-economic benefits including improved safety, traffic efficiency and pedestrian/cycling infrastructure.

## **Justification and conclusion**

The proposal has been developed to improve safety, increase road capacity, improve traffic flow and deliver better and more reliable journeys on Goonoo Goonoo Road.

The proposal is being assessed 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.

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 visual, heritage, noise, traffic and socio-economic impacts. Safeguards and management measures as detailed in this REF would ameliorate or minimise these expected impacts. On balance the proposal is considered justified.

## Display of the review of environmental factors

This REF is on display for comment between 15 November 2021 and 12 December 2021. You can access the documents in the following ways:

### **Internet**

The documents are available as pdf files on the Transport for NSW website at [nswroads.work/ggroad](https://nswroads.work/ggroad)

### **Copies by request**

Printed and electronic copies are available by contacting 1800 653 092, noting that there may be a charge for hard copies, CD or USB.

### **Displays**

Tamworth Regional Council  
Ray Walsh House  
437 Peel Street  
Tamworth

Tamworth Library  
466 Peel Street  
Tamworth

## How can I make a submission?

To make a submission about this proposal, please send your written comments to:

Goonoo Goonoo Road Project Team  
Transport for NSW  
PO 576 Grafton  
NSW 2460

[region.north@transport.nsw.gov.au](mailto:region.north@transport.nsw.gov.au)

Submissions must be received by Sunday 12 December 2021. Submissions will be managed in accordance with the Transport for NSW Privacy Statement which can be found here <https://transportnsw.info/about-us/privacy#> or by contacting 1800 653 092 (business hours) for a copy.

## What happens next?

Transport for NSW will collate and consider the submissions received during public display of the REF.

After this consideration, Transport for NSW will determine whether or not the proposal should proceed as proposed and will inform the community and stakeholders of this decision.

If the proposal is determined to proceed, Transport for NSW will continue to consult with the community and stakeholders prior to and during construction.

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# 1. Introduction

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## 1.1 Proposal identification

Transport for NSW proposes to duplicate Goonoo Goonoo Road (New England Highway) in Tamworth providing two lanes in each direction (the proposal). The proposal is needed to address existing congestion, provide for future traffic growth, and improve road safety. Key features of the proposal would include:

- Changes to the Calala Lane intersection, including:
  - Replacing the existing roundabout with traffic lights
  - Providing one dedicated right turn lane and one shared right / left turn lane from Calala Lane
  - Providing for protected pedestrian movements with pedestrian signal phasing on all intersection legs at Calala Lane
  - Providing separate left and right turn lanes for traffic turning into Calala Lane
- Road widening and pavement reconstruction to provide two lanes each way with a central median between just north of Calala Lane and Jack Smyth Drive
- Changes to the Craigends Lane intersection including:
  - Construction of a roundabout to replace the existing T-intersection
  - Provision for a fourth leg on the roundabout that allows for access to future development on the eastern side of Goonoo Goonoo Road
- Changes to The Ringers Road, including:
  - Left turn out only on The Ringers Road (except for emergency vehicles)
  - Providing a right turn lane for traffic turning into The Ringers Road, with the left turn lane for northbound traffic turning into The Ringers Road retained
- Changes to the Greg Norman Drive intersection, including:
  - Installing 'seagull' intersection to provide a two stage movement across Goonoo Goonoo Road
  - Retaining separate right and left turn lanes out of Greg Norman Drive
- Completion of the shared path along the western side of Goonoo Goonoo Road between Wilburree Street and Greg Norman Drive
- Formalisation of existing and provision of new parking spaces for heavy vehicles
- Provision of a footpath on the eastern side of Goonoo Goonoo Road between Calala Lane and Barnes Gully
- Street lighting between Calala Lane and Jack Smyth Drive
- Drainage improvements including providing kerb and channel between Calala Lane and Greg Norman Drive, and culvert extension at Barnes Gully
- New line marking and signage.

Additional features of the proposal include:

- Utility adjustments
- Minor property adjustments such as reforming of driveway accesses and relocation of property fences
- Temporary ancillary facilities including a site compound / stockpiles / storage areas on the eastern side of Goonoo Goonoo Road near Craigends Lane and near Jack Smyth Drive
- Rehabilitation of disturbed areas following construction.

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.

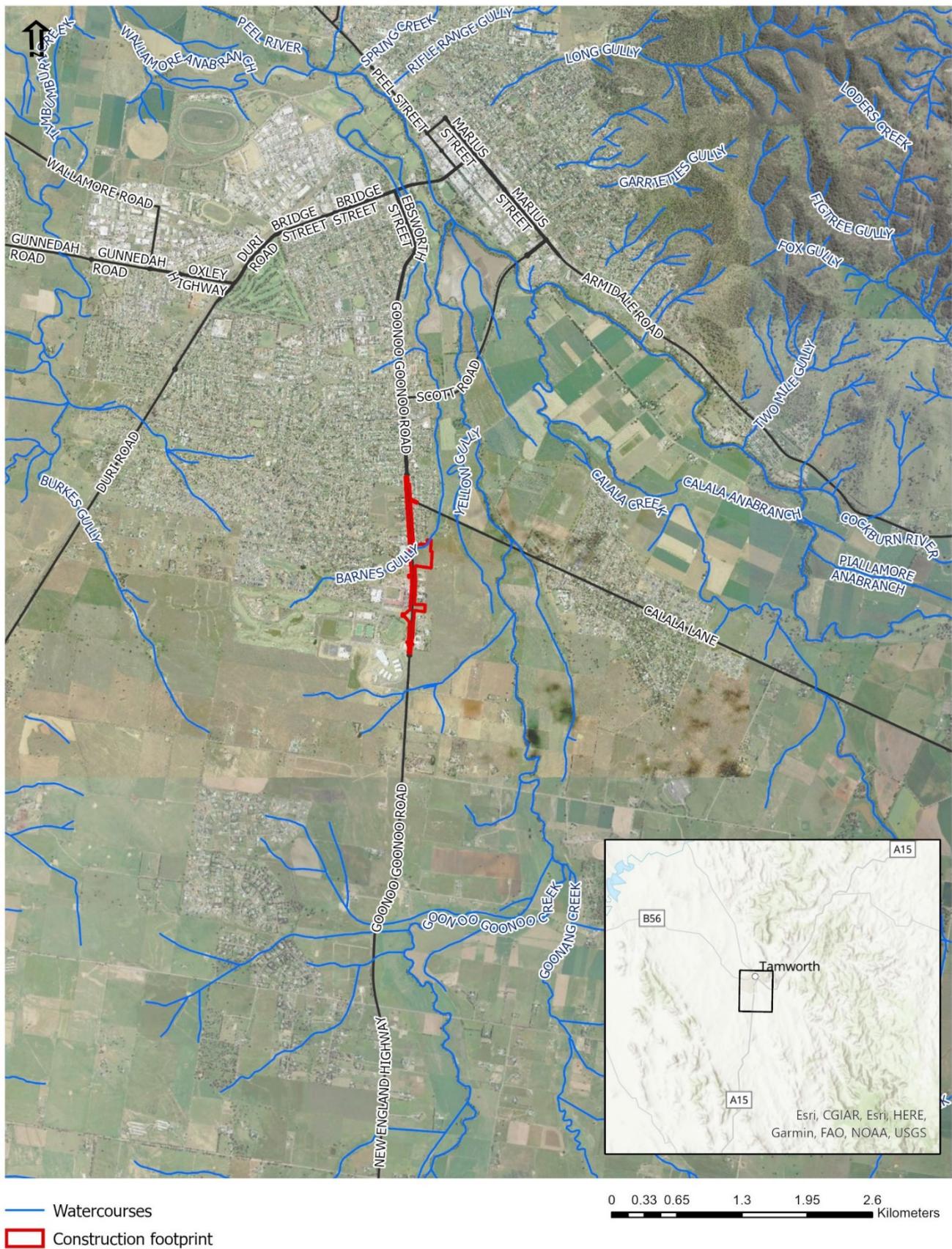
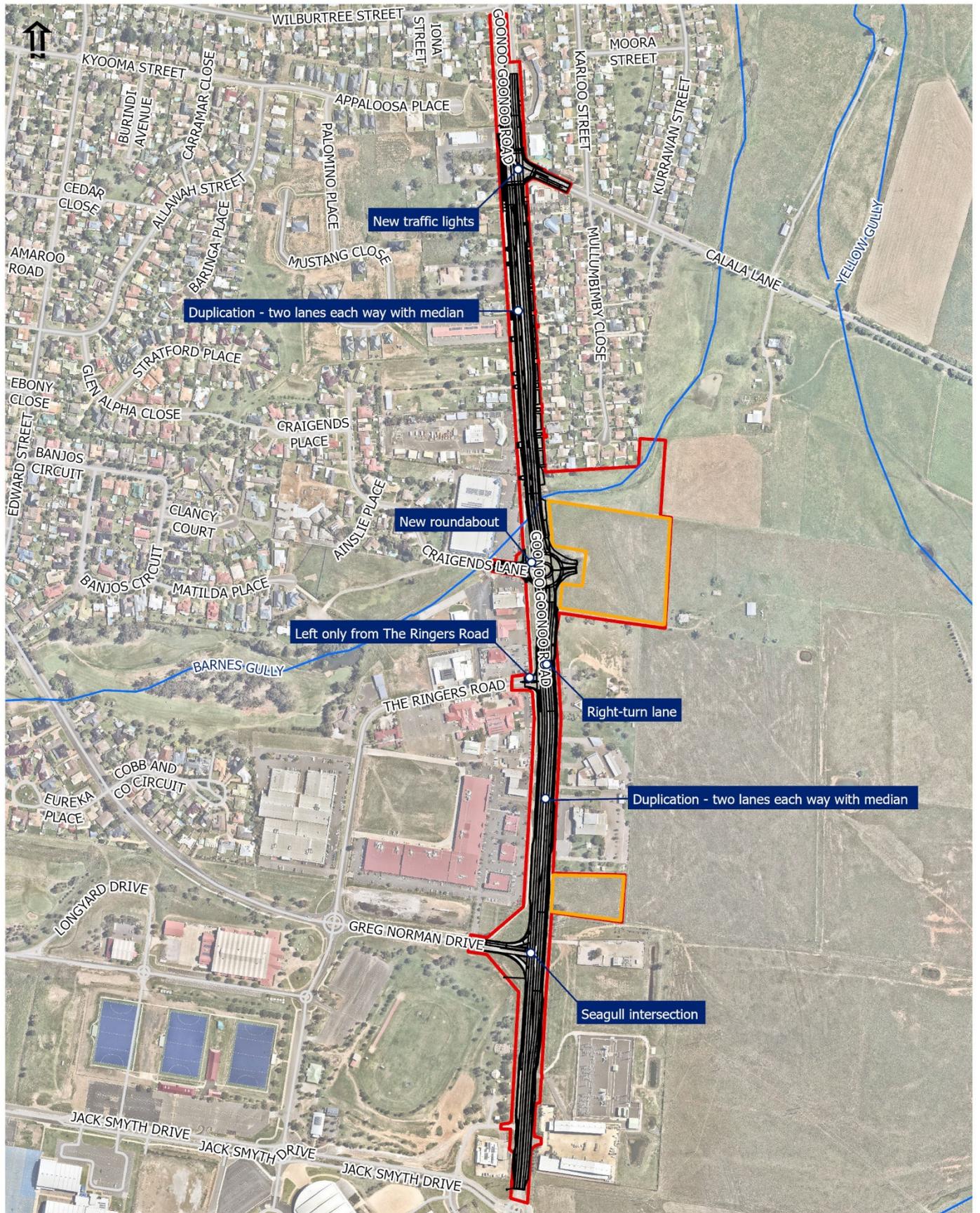


Figure 1-1: Location of the proposal



- Construction footprint
- Compound / Stockpile / Storage
- Watercourses

Figure 1-2: The proposal

The proposal is in the Tamworth Regional local government area, spans the suburbs of South Tamworth and Hillvue and forms part of the nationally significant A15 route between Branxton and the Queensland border. Goonoo Goonoo Road is the main route into Tamworth from the south and provides access to local businesses and regional facilities including the Northern Inland Centre of Sporting Excellence and the Australian Equine and Livestock Events Centre, both of which host a variety of socially and economically important events and provide venues for the annual Tamworth Country Music Festival.

Goonoo Goonoo Road between Calala Lane and Jack Smyth Drive is a two lane undivided road with unsealed shoulders and a speed limit of 60 kilometres per hour. Barnes Gully crosses beneath the road via a multi cell culvert just north of Craighends Lane. There are roundabouts at the Calala Lane and Jack Smyth Drive intersections, with T-intersections at Craighends Lane, The Ringers Road and Greg Norman Drive.

## 1.2 Purpose of the report

This review of environmental factors (REF) has been prepared by CCHD on behalf of Transport for NSW Regional Infrastructure Development North, Infrastructure & Place. 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 strategic assessment approval granted by the Federal Government under the EPBC Act in September 2015, with respect to the impacts of Transport for NSW's road activities on nationally listed threatened species, ecological communities and migratory species.

The findings of the REF would be considered when assessing:

- Whether the proposal is likely to have a significant impact on the environment and therefore the necessity for an environmental impact statement to be prepared and approval to be sought from the Minister for Planning 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 Agriculture, Water and the Environment 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

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### 2.1 Strategic need for the proposal

#### 2.1.1 Strategic plans and policy

##### *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.

The Strategy requires balancing movement and place in transport project planning, development and design. A desired outcome for the future of city living, urban street design and transport is the creation of 'successful places' through integrated land-use transport planning. Essentially, road and mass transport networks not only support the movement of people, goods and services, but also have various place functions that support a range of socio-economic activities. The Movement and Place framework (discussed below) underpins the Strategy and provides a tool for working towards achieving this vision.

By increased road capacity constructed to current design standards, the proposal would directly support the following regional transport customer outcomes:

- Customer Outcome 3 – The appropriate movement and place balance is established enabling people and goods to move efficiently through the network whilst ensuring local access and vibrant places – The proposal would address this outcome by improving local access in Tamworth through increasing capacity on Goonoo Goonoo Road and installing pedestrian and active transport infrastructure.
- Customer Outcome 4 – Supporting centres with appropriate transport services and infrastructure – The proposal would support the growth of Tamworth as a regional city.
- Customer Outcome 5 – Changes in land use, population and demand, including seasonal changes, are served by the transport system – The proposal would support the further development of adjacent areas which have been identified for business development, mixed use and tourist activities. It would also support increases in travel demand associated with special events.
- Customer Outcome 6 – Economic development is enabled by regional transport services and infrastructure – Improved travel times and travel time reliability would support economic development in Tamworth.
- Customer Outcome 7 – A safe transport system for every customer with the aim for zero deaths or serious injuries on the network by 2056 – The proposal would address issues at existing intersections and target the safety performance for the intersections along the length of road between Greg Norman and Calala Lane.
- Customer Outcome 10 – Customers enjoy improved connectivity, integrated services and better use of capacity – The increased capacity provided by the proposal would improve the connection between the urban area of Tamworth into the commercial business area and the Australian Equine and Livestock Events Centre and Regional Sports Precinct at Greg Norman Drive.

##### *Movement and Place framework*

Future Transport Strategy 2056 introduces the movement and place framework which aims to allocate road space in a way that improves the liveability of places. The framework has been subsequently refined in the Practitioner's Guide to Movement and Place (Department of Planning, Industry and Environment, 2020).

The framework identifies the need to prioritise different customer groups, depending on which street environment they are travelling. These environments are described below and their place in the framework is illustrated in Figure 2-1.

- Civic spaces (was “places for people”) are streets at the heart of our communities and have a significant meaning, activity function, or built environment. They are often in major centres, our tourist and leisure destinations, and our community hubs. These streets are often pedestrian priority, shared spaces.
- Local streets are the majority of streets within transport networks and often have important local place qualities. Activity levels are less intense, however, these streets can have significant meaning for local people.
- Main streets (was “vibrant streets”) have both significant movement functions and place qualities. Balancing the functions of these streets is a common challenge.
- Main roads (were “movement corridors”, and “motorways”) are routes central to the efficient movement of people and freight. They include motorways, primary freight corridors, major public transport routes, the principal bicycle network, and key urban pedestrian corridors. Place activity levels are less intense, however, these roads and routes can have significant meaning to local people.

The proposal would support for efficient and safer access along the Goonoo Goonoo Road, which serves a main street function.



Figure 2-1: Movement and place framework

**Regional 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 and outlines the vision and customer outcomes that the government will use to go about its detailed transport planning in each region and also support its future decision making.

The identified vision for regional NSW is a safe, efficient and reliable network of transport services and infrastructure that recognises and reinforces the vital role of regional cities as hubs for services, employment and social interaction for their surrounding communities.

The regional customer outcomes outlined in the Regional NSW Services and Infrastructure Plan are the same as those identified in NSW Future Transport Strategy 2056, and as noted above, the proposal directly supports several of these customer outcomes.

### ***Tourism and Transport Plan***

The total number of visitors to regional NSW grew by 23 per cent from December 2010 to December 2017 or three per cent each year in compound annual growth terms. The Tourism and Transport Plan (Transport for NSW, 2018) (a companion document to Future Transport Strategy 2056) recognises the connection between transport and tourism and identifies the potential to support and enhance existing tourism as well as create new economic development opportunities.

The plan includes the following four customer outcomes:

- Customer Outcome 1: Enhancing the Visitor Experience
- Customer Outcome 2: Greater access to more of NSW
- Customer Outcome 3: Making transport the attraction
- Customer Outcome 4: A seamless experience.

By improving transport infrastructure on one of the main routes into Tamworth, the proposal aligns with Customer Outcome 2. There may also be opportunities to contribute to Customer Outcomes 1 and 3 as the project development process moves forward.

### ***New England North West Regional Plan 2036***

The New England North West Regional Plan (Department of Planning and Environment, 2017) provides an overarching framework to guide subsequent and more detailed land use plans, development proposals and infrastructure funding decisions for the region.

The proposal supports the following directions from the plan:

- Direction 7: Build strong economic centres – the proposal would improve conditions (in terms of access) for the surrounding commercial business area and sporting centre
- Direction 14: Enhance transport and infrastructure networks – the proposal would be an improvement to the New England highway, which is a significant inland corridor that provides inland access across the Queensland border and into Sydney
- Direction 18: Provide great places to live –The proposal would further support Tamworth’s Northern Inland Centre of Sporting Excellence by providing a better connection between the precinct and the centre of Tamworth.

### ***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 would provide a better standard of road with improved safety through the separation of carriageways and the implementation of contemporary design standards. More specifically, the proposal would address:

- Safety concerns for pedestrians and vulnerable road users through improvements to intersections
- Higher risk conflict points common to three way and four way intersections.

## ***NSW Freight and Ports Strategy***

The NSW Freight and Ports Strategy (NSW Government, 2013) targets specific challenges associated with the forecast doubling of the NSW freight task by 2031. It recognises that providing a network that minimises congestion will support economic growth and productivity and encourage regional development. In this context the strategy identifies the need to develop and maintain capacity for freight on the road network.

Objectives of the NSW Freight and Ports Strategy relevant to the proposal include:

- Delivery of a freight network that efficiently supports the projected growth of the NSW economy
- Balancing freight needs with those of the broader community and the environment.

Actions of the strategy and task actions relevant to the proposal include:

- Action 2B – Develop and maintain capacity for freight on the road network
- Task 2B-2 Prioritise road infrastructure investments
- Action 3B – Manage congestion, noise and emission impacts of freight transport
- Task 3B-1 Recognise costs of congestion.

The proposal is considered consistent with the objectives, actions and tasks referenced above. It would help address growth in freight demand and would enhance safety for all road users.

## ***NSW Freight and Ports Plan 2018-2023***

The NSW Freight and Ports Plan (NSW Government, 2018) is aligned with NSW Future Transport Strategy 2056 and has the aim of providing a network to move goods in an efficient, safe and environmentally sustainable manner, providing successful outcomes for communities and industry. One of the objectives of the plan is to ensure safe, efficient and sustainable freight access to places. The proposal is consistent with this objective because it would assist safe and efficient freight movements.

Another objective of the plan is to increase access for freight across the road and rail network. The proposal would contribute to a transport network where goods move efficiently to their market by providing additional capacity on the New England addressing a key pinch point within the network.

## ***National Land Transport Network***

The New England Highway is a component of the National Land Transport Network. The National Land Transport Network is a defined network of important road and rail infrastructure links, and their intermodal connections. These road and rail transportation links are of national importance and enable international, inter-state and interregional trade and commerce. The National Land Transport Network is determined by the federal Minister under the *National Land Transport Act 2014*.

The New England Highway forms part of the inland Sydney-Brisbane Corridor of the NLTN and, together with the Pacific Highway, forms a major link between the Sydney / Newcastle urban area and South East Queensland, allowing for the transport of goods to domestic and international markets via the ports of Newcastle, Sydney and Brisbane.

The proposal would improve the efficiency of freight movement on the National Land Transport Network.

## ***NSW Heavy Vehicle Access Policy Framework***

The NSW Heavy Vehicle Access Policy Framework (Transport for NSW, 2018) updates the policy on access to the road network for modern high productivity vehicles and sets out the vision for heavy vehicle access in NSW to achieve the NSW Government's objectives of ongoing productivity improvements for movement of freight, in the context of a growing road freight task.

The proposal would improve the efficiency of freight movement on the New England Highway and contribute towards incrementally achieving unrestricted access for PBS 2B vehicles (up to 30 metres long and not exceeding 68.5 tonnes). The removal of congestion on Goonoo Goonoo Road would also have cumulative freight efficiency and access benefits with other New England Highway projects.

### ***Tamworth Regional Blueprint 100***

The Tamworth Regional Blueprint 100 (Tamworth Regional Council, 2020) is an overarching strategy that provides a roadmap to take the Tamworth Region towards its vision of a prosperous economy and high living standards with a population of 100,000 people.

Priorities and actions from Blueprint 100 directly relevant to the proposal are:

- Priority 3.4 Substantially increase Tamworth's meat and food processing capacity
- Action 3.4.4 Prioritise road infrastructure that caters for large transport vehicles. Work with Transport for NSW to understand existing heavy vehicle movements through and within the city and identify appropriate options to balance heavy vehicle access through and within the city
- Priority 5.2 More efficient road network
- Action 5.2.1 Continue to support and implement the Namoi Region Road Network Strategy, including the network and intersection improvements.

### ***Namoi Region Road Network Strategy***

Namoi Road Network Strategy (Namoi Unlimited, 2018) aims to identify needs or missing links within the road network in the Namoi Region. The strategy specifically identifies congestion on the New England Highway to Calala Lane as an important issue, particularly during events. The solution is identified as an increase in capacity from two to four lanes.

#### **2.1.2 Need for the proposal**

The proposal is needed to improve safety, increase road capacity, improve traffic flow and deliver better and more reliable journeys. The proposal is consistent with a range of strategic planning and policy documents including NSW Future Transport Strategy 2056 (Transport for NSW, 2018).

Without the proposal the following is likely:

- Congestion on this section of Goonoo Goonoo Road will disadvantage investment in the Northern Inland Centre of Sporting Excellence
- Congestion on this section of Goonoo Goonoo Road will result in further downstream congestion impacts within Tamworth
- Local access to Goonoo Goonoo Road will be limited due to congestion and this will impact surrounding commercial businesses and facilities (particularly during regular special events held at the sporting centre and Tamworth Country Music Festival) and Australian Equine and Livestock Events Centre events
- Future development opportunities on the eastern side of Goonoo Goonoo Road could potentially be constrained due to a lack of capacity
- Reduced opportunities to turn on to Goonoo Goonoo Road from side roads due to congestion will likely increase driver frustration for drivers using the intersections between Greg Norman Drive and Calala Lane and potentially increase casualty crashes at intersections.

The section of Goonoo Goonoo Road between Greg Norman Drive and Calala Lane is reaching capacity, with traffic modelling showing that the level of service<sup>1</sup> will reach an unacceptable level E in the next 10 years. The current average travel speed for the section is about 50 kilometres per hour in both the AM and PM peaks and by 2034 the average peak speed is expected to drop to about 38 kilometres per hour.

Transport for NSW crash data for the five year period between 1 October 2015 and 30 September 2020 shows there were five crashes on the section of Goonoo Goonoo Road between Calala Lane and just before Jack Smyth Drive. The crashes included two serious injuries, one moderate injury and two minor injuries. The fatal and serious injury crash rate for this section of Goonoo Goonoo Road is about three times worse than the NSW average for similar roads.

## 2.2 Limitations of existing infrastructure

Limitations of existing infrastructure at the proposal location include:

- One lane in each direction which limits capacity and contributes to congestion
- No central median (less safe than a divided road)
- Calala Lane roundabout is operating at capacity with delays exceeding acceptable levels
- No traffic signals or roundabouts at The Ringers Road and Greg Norman Drive which can make it difficult for vehicles to turn on to Goonoo Goonoo Road, especially during peak periods
- Missing links in the shared path on the western side of Goonoo Goonoo Road between Calala Lane and Wilbertree Street, and at the Barnes Gully culvert.

## 2.3 Proposal objectives and development criteria

### 2.3.1 Proposal objectives

The objectives of the proposal include:

- Increase network capacity to acceptable levels to accommodate forecast traffic growth
- Improve road safety by reducing serious crashes to a comparable rate to similar roads
- Maintain a 'Place' function along the Goonoo Goonoo Road movement corridor.

### 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 Transport for NSW 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

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<sup>1</sup> Level of service is a qualitative measure for ranking operating conditions or service quality, based on service measures such as speed, travel time, delay, density, freedom to manoeuvre, interruptions, comfort and convenience. Level of service A represents the best operating condition and service quality from the users' perspective (i.e. free-flow) while level of services F represents the worst.

- Planning temporary arrangements that minimise disruption to local and through traffic
- 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:

- Keep road footprint to a practical minimum
- Provide an attractive and clear gateway to Tamworth
- Ensure clear and open sightlines and minimise visual clutter
- Use materials and plantings that are consistent with the surrounding urban and landscape context.

## **2.4 Alternatives and options considered**

### **2.4.1 Methodology for selection of preferred option**

The options evaluation process involved an initial review broader strategic options (including road based options, other transport modes and non-infrastructure options) to determine which approaches could adequately respond to the identified need.

This was followed by an evaluation of a 'do nothing' option and the proposed duplication against the proposal objectives and environmental considerations.

Intersection treatments forming part of the proposal were developed following Transport for NSW and Tamworth Regional Council investigations and traffic modelling, and were confirmed at a Transport for NSW workshop in October 2019.

### **2.4.2 Identified options**

The following options were initially evaluated:

- Option 1 – Change the land use planning environment (limiting future development)
- Option 2 – Construct heavy or light rail
- Option 3 – Install transit lane
- Option 4 – Provide free bus service
- Option 5 – Provide cycleway
- Option 6 – Slow traffic with 40 kilometre per hour zone
- Option 7 – Install traffic calming measures
- Option 8 – Construct a bypass
- Option 9 – Increase road capacity on the current alignment.

After the initial evaluation a do nothing option (leaving the road in its current configuration and carrying out routine maintenance only) and provision two lanes each way with a central median between just north of Calala Lane and Jack Smyth Drive (based on Option 9 above) were evaluated. The initial evaluation noted that intersection upgrades (without duplication) would not achieve the same safety benefits and that duplication is consistent with the corridor treatment to the north of Calala Lane.

### 2.4.3 Analysis of options

The evaluation of the initial nine options is provided in Table 2-1.

Table 2-1: Initial options evaluation

Option	Description	Evaluation
1	Change the land use planning environment (limiting future development)	<ul style="list-style-type: none"> <li>• Serious impact to the local economy</li> <li>• Existing traffic levels would stay the same</li> <li>• Existing crash rates would stay same</li> <li>• Unlikely to be supported by key stakeholders</li> </ul>
2	Construct heavy or light rail	<ul style="list-style-type: none"> <li>• Mode shifting to rail would decrease passenger traffic and improve road safety</li> <li>• No integration with a broader public transport network</li> <li>• insufficient urban densities to support patronage for these modes</li> <li>• Substantial cost</li> </ul>
3	Install transit lane	<ul style="list-style-type: none"> <li>• Would reduce the number of vehicles during peak periods</li> <li>• Typically, only used on multi lane roads, where at least one lane can be retained for non-transit lane traffic</li> <li>• No readily alternate non-transit lane traffic</li> </ul>
4	Provide free bus service	<ul style="list-style-type: none"> <li>• Would decrease vehicle traffic by positively encouraging mode shift</li> <li>• Would not reduce through traffic, heavy vehicles or the majority of tourist traffic</li> <li>• Would require secondary infrastructure such as car parks and strategically placed starting and end points</li> <li>• Could help lower the crash rate.</li> <li>• More suitable as a complementary measure to a road upgrade.</li> </ul>
5	Provide cycleway	<ul style="list-style-type: none"> <li>• Mode shift to bicycles would reduce the number of cars</li> <li>• Environmental and health benefits associated with active transport</li> <li>• Would not reduce through traffic, heavy vehicles or the majority of tourist traffic</li> <li>• More suitable as a complementary measure to a road upgrade</li> </ul>
6	Slow traffic with 40 kilometre per hour zone	<ul style="list-style-type: none"> <li>• Not suitable for a primary movement corridor</li> </ul>
7	Install traffic calming measures	<ul style="list-style-type: none"> <li>• Not suitable for a primary movement corridor</li> </ul>
8	Construct a bypass	<ul style="list-style-type: none"> <li>• Would only address through traffic</li> <li>• Potential business impacts associated with loss of passing trade</li> <li>• Substantial cost</li> <li>• Property and environmental impacts associated with a new road alignment</li> </ul>

Option	Description	Evaluation
9	Increase road capacity on the current alignment	<ul style="list-style-type: none"> <li>• Directly addresses the proposal objectives</li> <li>• Manageable environmental and social impacts</li> <li>• Moderate costs</li> </ul>

On the basis of the above evaluation, Option 9 was carried forward and refined to include specific treatments at each of the intersections. This option was then evaluated with the 'do nothing' option against the proposal objectives and an environment criterion. This evaluation is summarised in Table 2-2.

Consideration was given to retaining the existing roundabout at Calala Lane (instead of providing traffic signals), however early assessment showed that the Calala Lane roundabout would fail to meet traffic demand by 2030. Traffic signals at this intersection were therefore included in the road duplication option.

Table 2-2: Evaluation against proposal objectives and environmental considerations

Criteria	Do nothing option	Road duplication
Increase network capacity to acceptable levels to accommodate forecast traffic growth	<ul style="list-style-type: none"> <li>• Unacceptable level of service D at the Calala lane intersection in 2030 AM peak</li> <li>• 95th percentile queue for the Calala Lane roundabout extending 641 metres along Calala Lane in the AM peak.</li> <li>• Lengthy delays for turning movements from Craighends Lane, The Ringers Road and Greg Norman Drive</li> <li>• Longer network travel time in 2030 and beyond in both the AM and PM peak periods</li> </ul>	<ul style="list-style-type: none"> <li>• Level of service C or better at the Calala Lane intersection in AM peak in 2030</li> <li>• Acceptable performance for all movements at Craighends Lane, The Ringers Road and Greg Norman Drive</li> <li>• Reduced network travel time in 2030 and beyond in both the AM and PM peak periods</li> </ul>
Improve road safety by reducing serious crashes to a comparable rate to similar roads	<ul style="list-style-type: none"> <li>• Does not address the current frequency and severity of crashes</li> </ul>	<ul style="list-style-type: none"> <li>• Separation of carriageways is expected to reduce the frequency and severity of crashes</li> </ul>
Maintain a 'Place' function along the Goonoo Goonoo Road movement corridor	<ul style="list-style-type: none"> <li>• No change from existing situation</li> </ul>	<ul style="list-style-type: none"> <li>• Opportunity to enhance the gateway function of this section of road through landscape plantings and the provision of a planted central median</li> </ul>
Environmental impacts	<ul style="list-style-type: none"> <li>• No change from existing situation</li> </ul>	<ul style="list-style-type: none"> <li>• Some environmental impacts (primarily noise and visual) which can be adequately managed</li> <li>• Improvements for pedestrians and cyclists which would encourage active transport use</li> </ul>

## 2.5 Preferred option

The preferred option is the provision of two lanes in each direction and a central median on Goonoo Goonoo Road between just north of Calala Lane and Jack Smyth Drive. The preferred option includes:

- Provision of traffic lights at Calala Lane

- Provision of seagull type intersections at The Ringers Road and Greg Norman Drive
- Provision of a new roundabout at Craigends Lane.

The preferred option was selected because it best responds to the proposal objectives and can be constructed and operated with manageable environmental impacts. The preferred option is largely confined to the existing public road reserve and therefore minimises impacts on adjacent land uses.

The principles of ecologically sustainable development encourage the integration of present and future economic, social development and 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 and the alignment of the preferred option with those objectives.

The preferred option is the basis for the proposal, which is described in detail in Chapter 3.

## 3. Description of the proposal

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### 3.1 The proposal

Transport for NSW proposes to duplicate Goonoo Goonoo Road (New England Highway) in Tamworth providing two lanes in each direction (the proposal). The proposal is shown in Figure 1-2 and in Figure 3-1 to Figure 3-5.

Key features of the proposal would include:

- Changes to the Calala Lane intersection, including:
  - Replacing the existing roundabout with traffic lights
  - Providing one dedicated right turn lane and one shared right / left turn lane from Calala Lane
  - Providing pedestrian signal phasing on all intersection legs at Calala Lane
  - Providing separate left and right turn lanes for traffic turning into Calala Lane
- Road widening and pavement reconstruction to provide two lanes each way with a central median between just north of Calala Lane and Jack Smyth Drive
- Changes to the Craigends Lane intersection including:
  - Construction of a roundabout to replace the existing T-intersection
  - A fourth leg on the roundabout that allows for access to future development on the eastern side of Goonoo Goonoo Road
- Changes to The Rangers Road, including:
  - Left turn out only on The Rangers Road (except for emergency vehicles)
  - Providing a right turn lane for traffic turning into The Rangers Road, with the left turn lane for northbound traffic turning into The Rangers Road retained
- Changes to the Greg Norman Drive intersection, including:
  - Installing 'seagull' intersection to provide a two stage movement across Goonoo Goonoo Road
  - Retaining separate right and left turn lanes out of Greg Norman Drive
- Completion of the shared path along the western side of Goonoo Goonoo Road between Wilburtree Street and Greg Norman Drive
- Formalisation of existing and provision of new parking spaces for heavy vehicles
- A footpath on the eastern side of Goonoo Goonoo Road between Calala Lane and Barnes Gully
- Street lighting between the Calala Lane and Jack Smyth Drive
- Drainage improvements including providing kerb and channel between Calala Lane and Greg Norman Drive, and culvert extension at Barnes Gully
- New line marking and signage.

Additional features of the proposal include:

- Utility adjustments
- Minor property adjustments such as reforming of driveway accesses and relocation of property fences
- Temporary ancillary facilities including a site compound / stockpiles / storage areas on the eastern side of Goonoo Goonoo Road near Craigends Lane and near Jack Smyth Drive
- Rehabilitation of disturbed areas following construction.

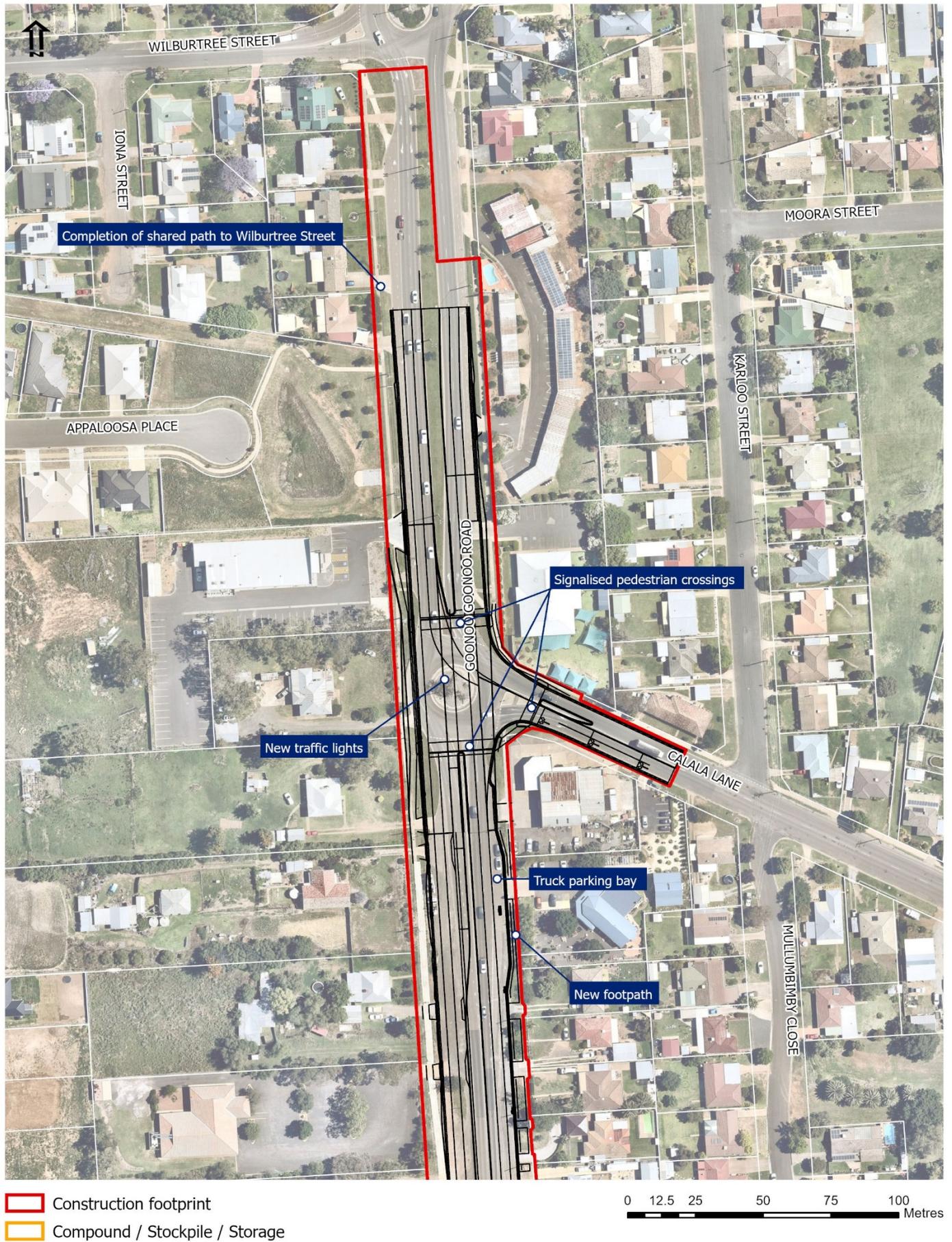
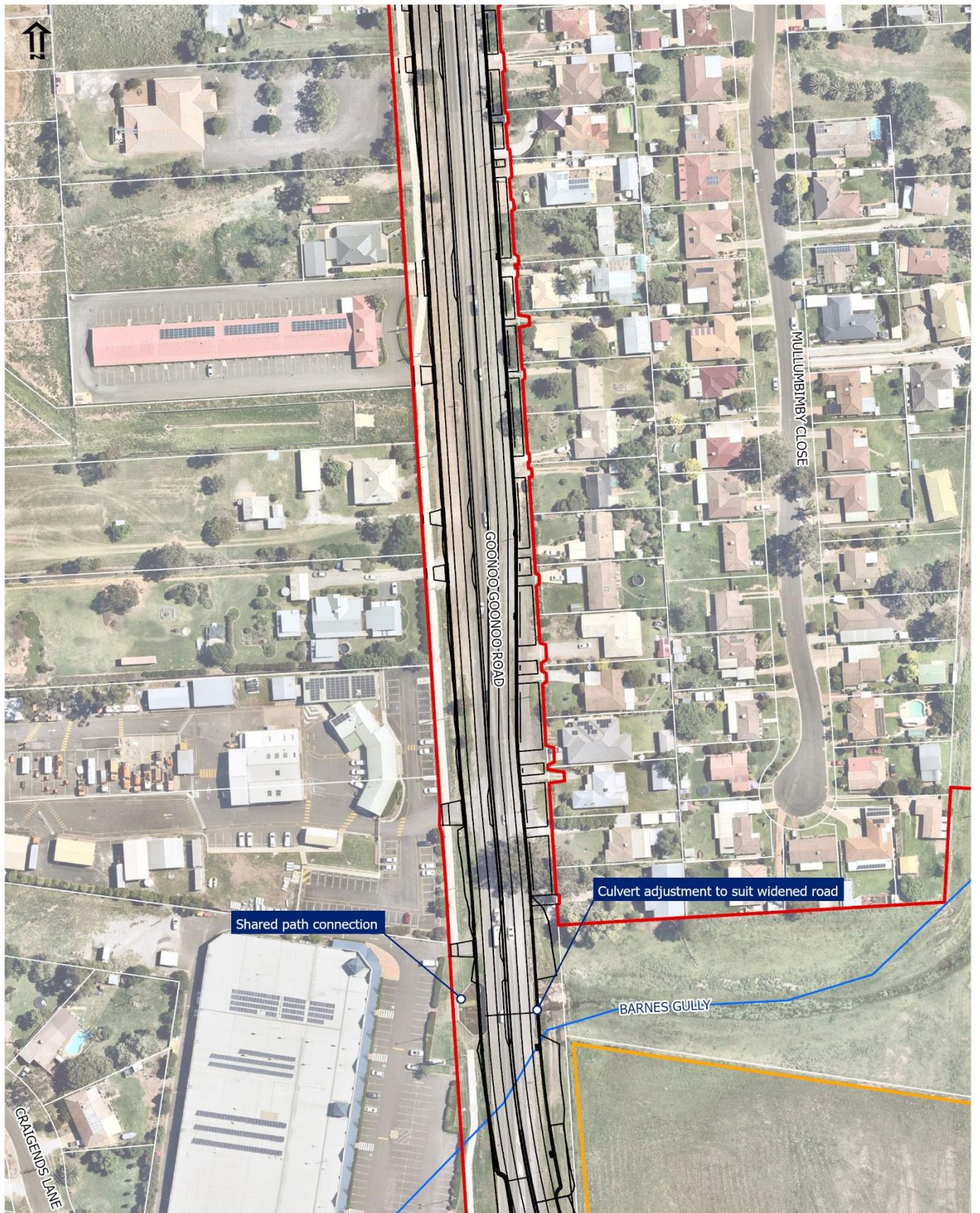


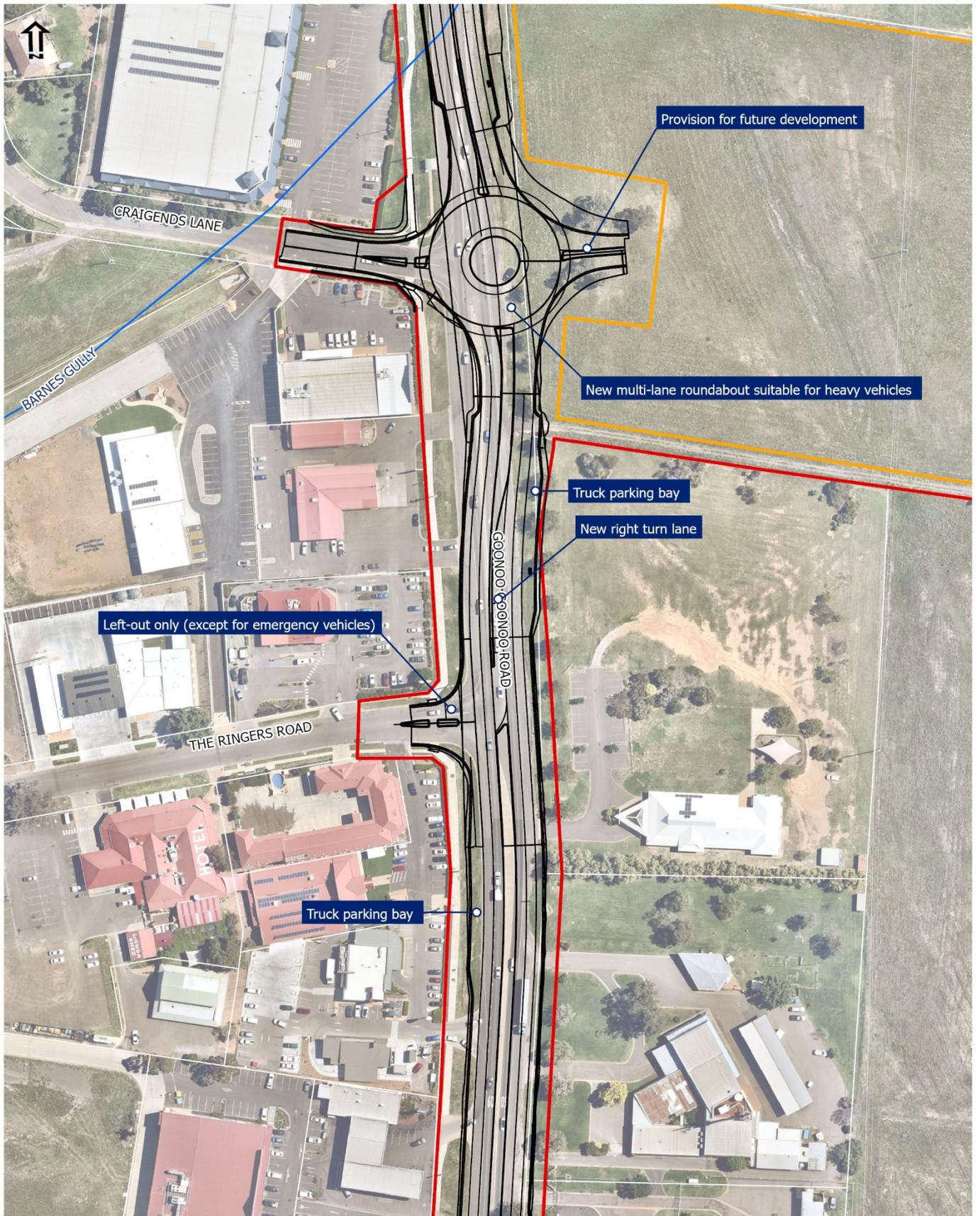
Figure 3-1: Key features of the proposal – map 1



- Construction footprint
- Compound / Stockpile / Storage
- Watercourses

0 12.5 25 50 75 100 Metres

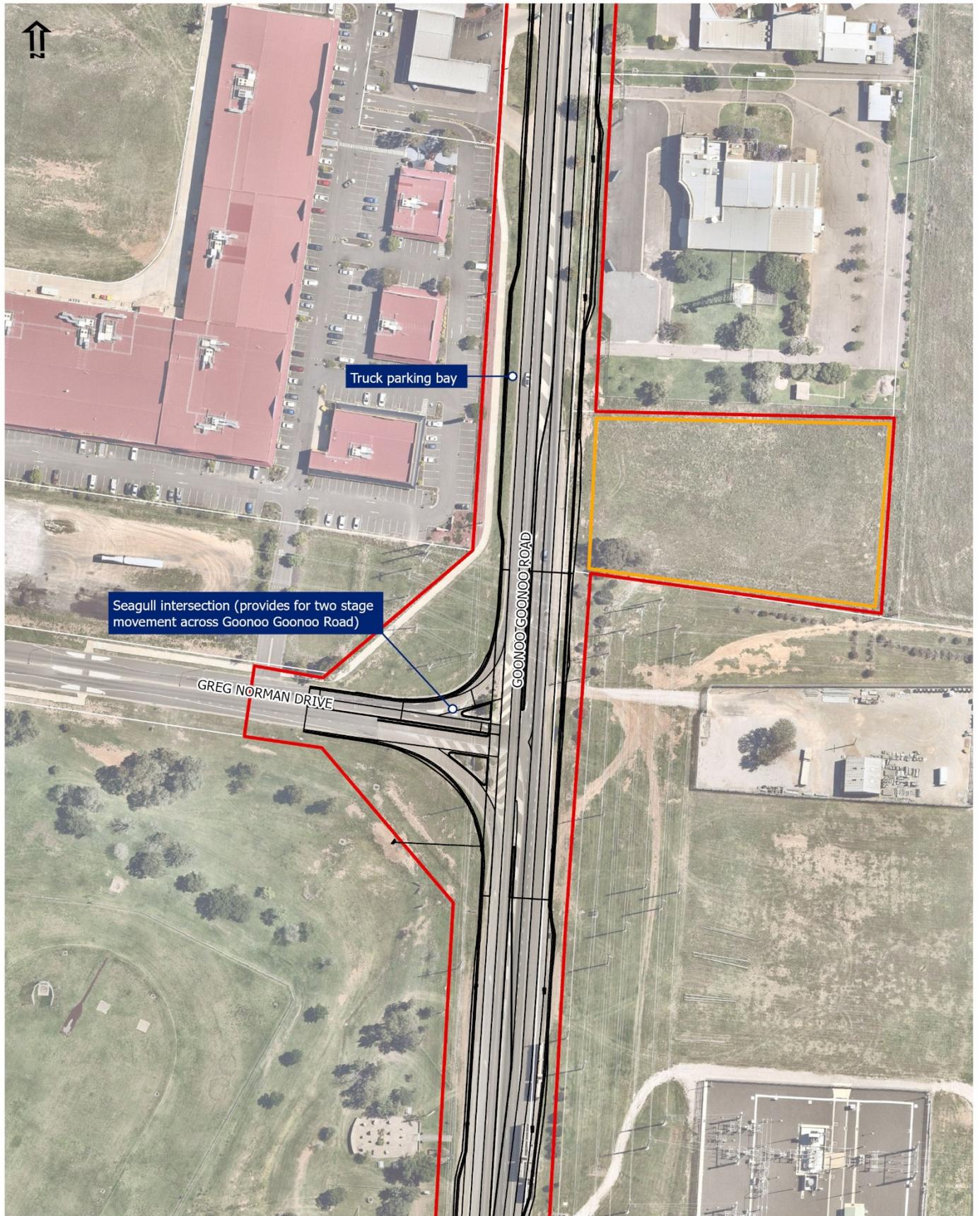
Figure 3-2: Key features of the proposal – map 2



- ▭ Construction footprint
- ▭ Compound / Stockpile / Storage
- Watercourses

0 12.5 25 50 75 100 Metres

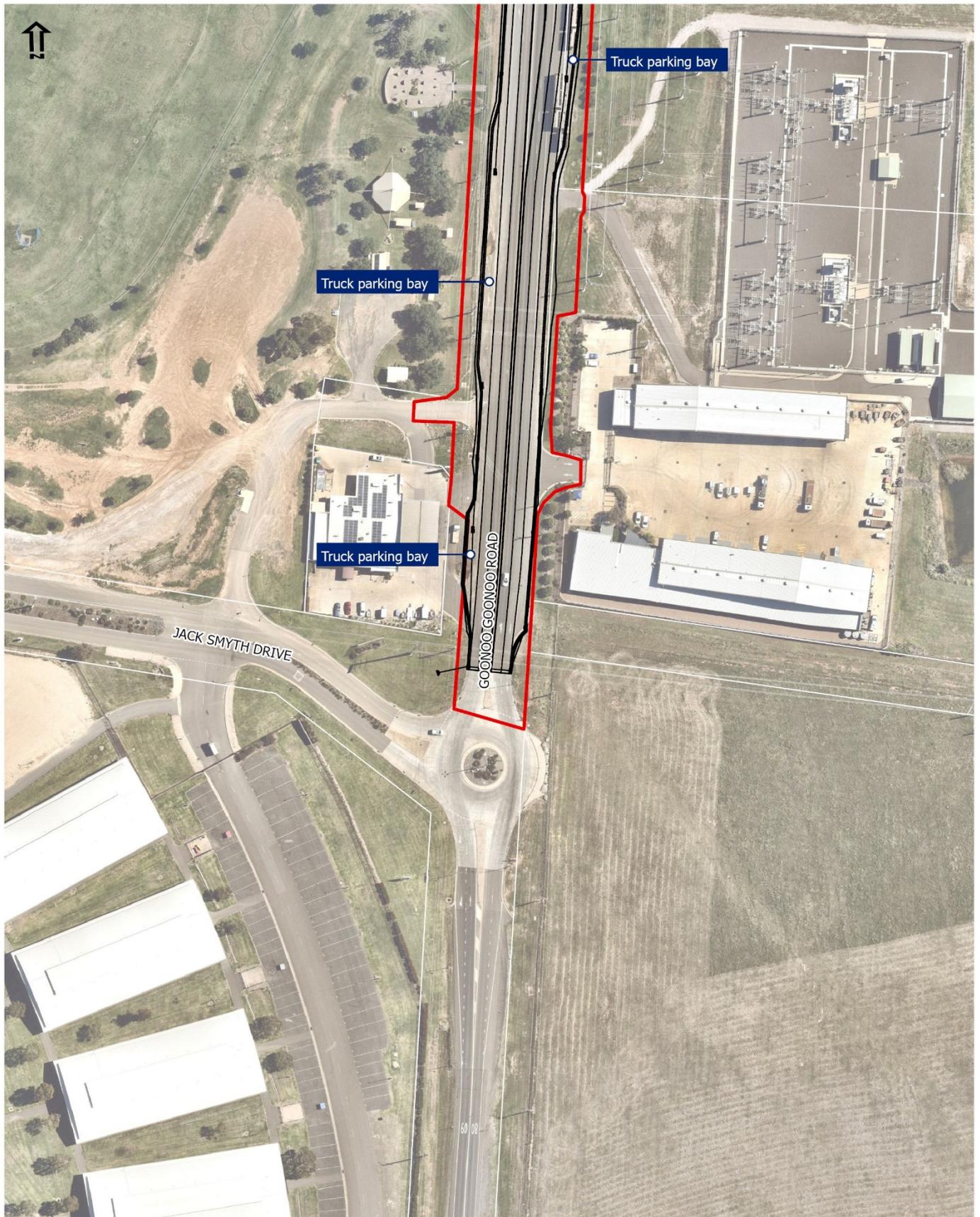
Figure 3-3: Key features of the proposal – map 3



- Construction footprint
- Compound / Stockpile / Storage

0 12.5 25 50 75 100 Metres

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



- Construction footprint
- Compound / Stockpile / Storage

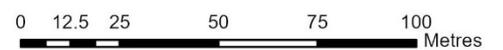


Figure 3-5: Key features of the proposal – map 5

## 3.2 Design

### 3.2.1 Design criteria

Design guides and policies used during the development of the proposal included:

- Austroads Guide to Road Design Part 1: Introduction to Road Design (Austroads, 2015)
- Austroads Guide to Road Design Part 2: Design Considerations (Austroads, 2019)
- Austroads Guide to Road Design Part 3: Geometric Design (Austroads, 2020)
- Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections (Austroads, 2017)
- Transport for NSW supplements to the Austroads Guide to Road Design (Roads and Maritime Services, 2015)
- Austroads Guide to Traffic Management Part 10: Traffic Control and Communication Devices (Austroads, 2016).

Design criteria adopted for the proposal are identified in Table 3-1 while typical cross sections are shown in Figure 3-6 and Figure 3-7.

Table 3-1: Design criteria

Design aspect	Criterion
Posted speed limit	<ul style="list-style-type: none"> <li>• 60 kilometres per hour</li> </ul>
Design speed	<ul style="list-style-type: none"> <li>• 70 kilometres per hour</li> </ul>
Traffic lanes	<ul style="list-style-type: none"> <li>• Four by 3.5 metres wide</li> </ul>
Shoulders	<ul style="list-style-type: none"> <li>• Two by 2.5 metres wide</li> </ul>
Median	<ul style="list-style-type: none"> <li>• Variable but typically 5.0 metres wide</li> </ul>
Shared path	<ul style="list-style-type: none"> <li>• 2.5 metres wide</li> </ul>

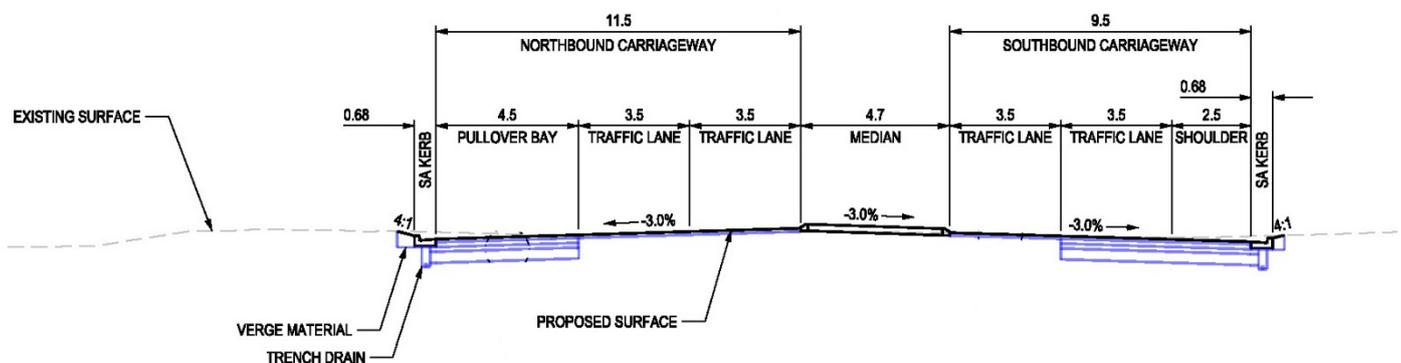


Figure 3-6: Typical cross section (wide median north of Greg Norman Drive)

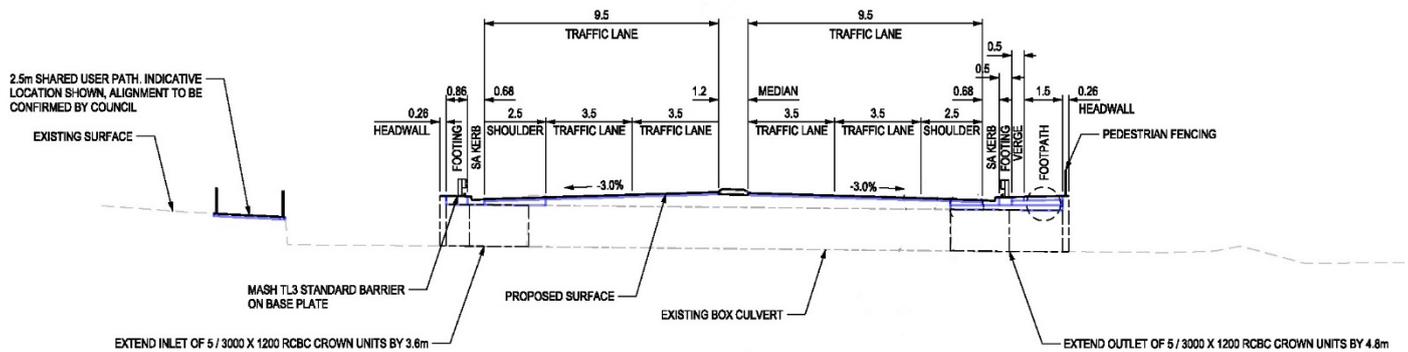


Figure 3-7: Typical cross section (Barnes Gully)

### 3.2.2 Engineering constraints

The proposal has several engineering related constraints as detailed below:

- Need to minimise acquisitions of private land and to use the existing road boundaries of Goonoo Goonoo Road as much as possible
- Requirement to manage additional runoff from increase in impermeable surfaces
- Existing Barnes Gully culvert in the central part of the construction footprint
- Requirement to maintain through traffic and turning movements during construction
- Requirement to maintain access to adjacent properties during construction
- Managing operational changes to traffic movements such as 'U' turns and right turn restrictions.

### 3.2.3 Major design features

#### Intersections

The proposal includes four intersection upgrades. The more substantial changes are proposed at the Calala Lane and Craighends Lane intersections and these are described further below.

#### Goonoo Goonoo Road / Calala Lane

At the Goonoo Goonoo Road / Calala Lane intersection, the existing multi-lane roundabout would be removed and traffic lights would be installed. The proposed intersection configuration is shown in Figure 3-8 and includes:

- Installation of traffic lights posts, in pavement magnetic loops and signal box
- Providing two lanes for right and left turns from Calala Lane
- Signalised pedestrian crossings at the intersection
- Providing left and right turn lanes for traffic turning into Calala Lane
- Shared path connection along the western side of Goonoo Goonoo Road
- Footpath connections on the eastern side Goonoo Goonoo Road.

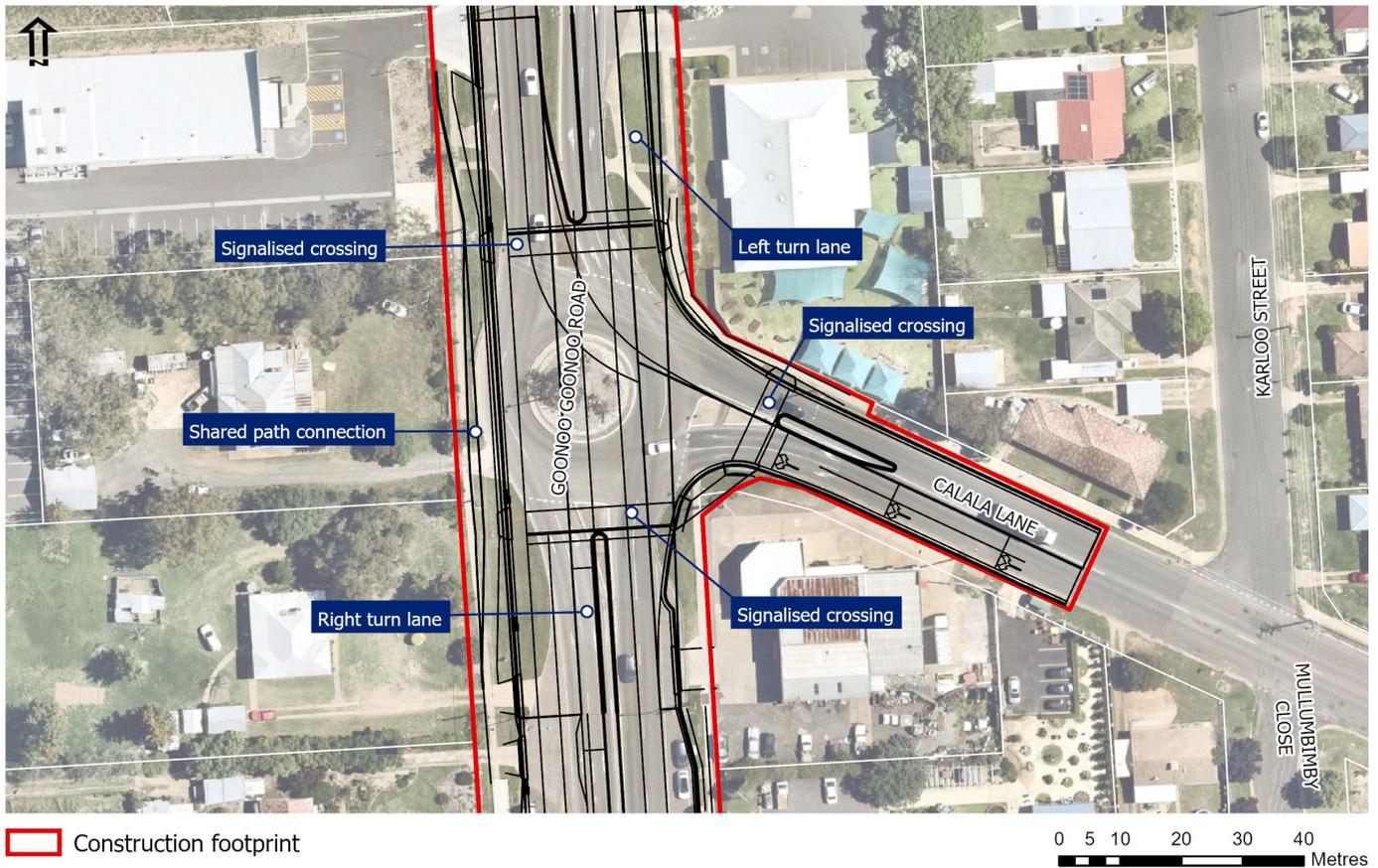


Figure 3-8: Proposed traffic lights at Goonoo Goonoo Road / Calala Lane intersection

### Goonoo Goonoo Road / Craigends Lane

At the Goonoo Goonoo Road / Craigends Lane intersection, the existing T-intersection would be removed, and a multi-lane roundabout would be constructed. The proposed intersection configuration is shown in Figure 3-9 and includes:

- Realignment of Goonoo Goonoo Road to avoid property acquisition on the western side and to achieve the required design standards for the roundabout
- Removal of trees on the eastern side of Goonoo Goonoo Road to accommodate the new alignment
- Construction of multi-lane roundabout with central island
- Providing a stub for connection to future development on the eastern side of Goonoo Goonoo Road
- Providing a pedestrian refuge and footpath connections on Craigends Lane.

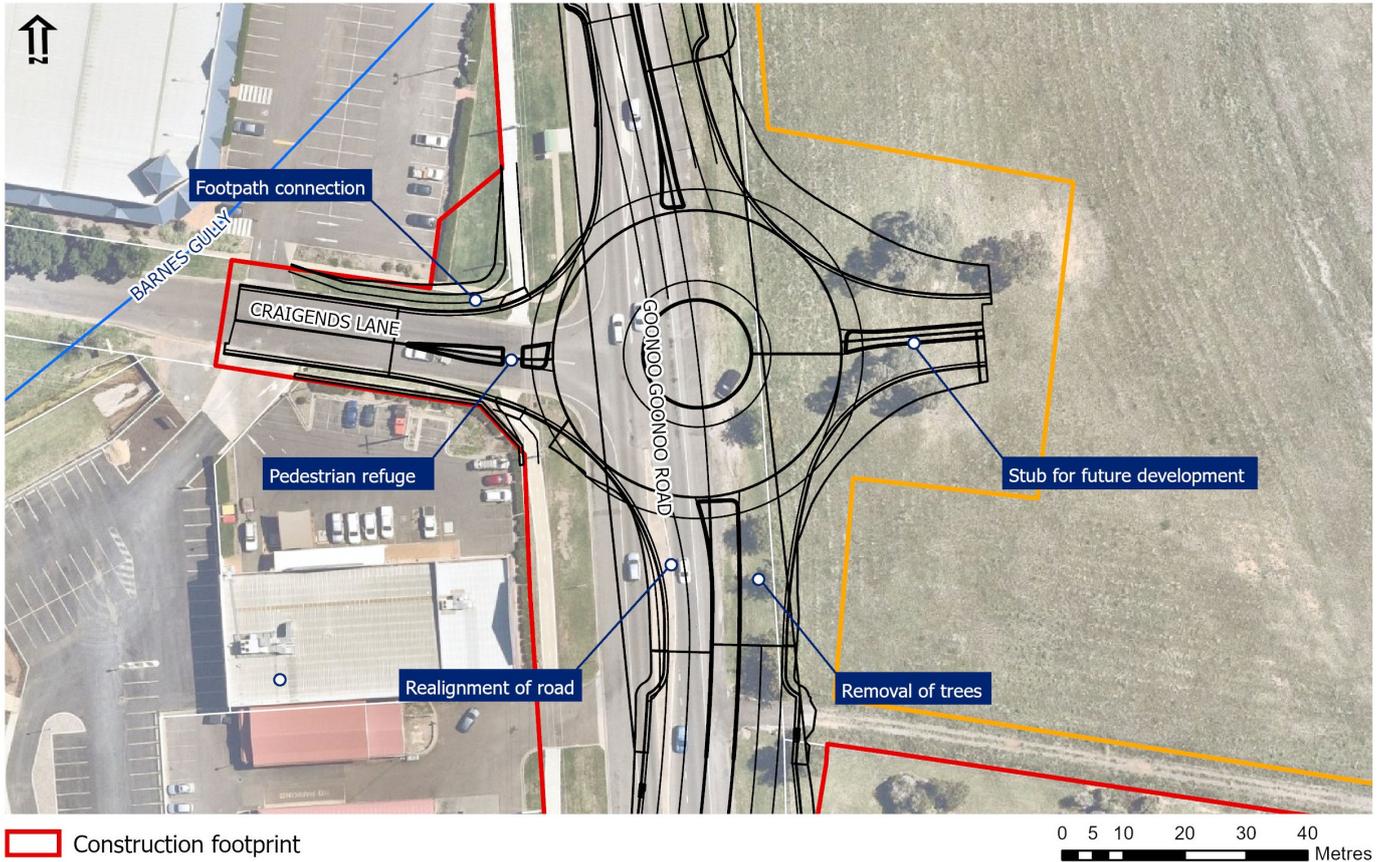


Figure 3-9: Proposed roundabout at Goonoo Goonoo Road / Craigends Lane intersection

### 3.3 Construction activities

#### 3.3.1 Work methodology

The general sequence of construction activities is identified in Table 3-2 below. The sequence is indicative and may need to be modified following the appointment of a construction contractor.

Table 3-2: Typical construction activities and sequence

Activity	Work description
Activity 1 – Site establishment and environmental protection	<ul style="list-style-type: none"> <li>• Setup environmental, safety and traffic management controls</li> <li>• Site demarcation, exclusion fencing and barrier establishment, identification and protection of sensitive areas (e.g. trees to be retained)</li> <li>• Establish site compounds (refer to Section 3.4), designated storage areas, stockpile areas and stabilised access to work zones across the construction footprint</li> <li>• Pre-clearance surveys and obtaining any permits or licences</li> <li>• Tree removal</li> <li>• Install temporary reduced speed limits (where required)</li> <li>• Install temporary site drainage controls (where required)</li> <li>• Cover existing signage and provide diversionary signage for all road users, cyclists and pedestrians and introduce temporary footpath closures/restrictions, where needed.</li> </ul>

Activity	Work description
Activity 2 – Utilities, earthworks and drainage	<p>Utilities</p> <ul style="list-style-type: none"> <li>• Protect existing utilities where specified</li> <li>• Adjust and relocate existing utilities where specified</li> <li>• Install and test new utilities</li> </ul> <p>General utility work would vary depending on whether the utility is being relocated, removed or installed, and could include a combination of:</p> <ul style="list-style-type: none"> <li>• Trench excavation</li> <li>• Bedding material installation</li> <li>• Pipeline and conduit installation</li> <li>• Cable pulling to install new power and communications cables</li> <li>• Pit and cutover excavation</li> <li>• Valve, switch and other infrastructure installation to allow the transfer of utilities to the new alignment</li> <li>• Utility and service testing and commissioning</li> <li>• Concrete pouring to create protective slabs</li> <li>• Backfill and compaction</li> <li>• Ground surface restoration.</li> </ul>
	<p>Earthworks</p> <ul style="list-style-type: none"> <li>• Sequentially strip and excavate top soil and sub soil</li> <li>• Grade and compact areas (where required at this stage).</li> </ul>
	<p>Drainage lines and drainage work:</p> <ul style="list-style-type: none"> <li>• Extend existing Barnes Gully culvert</li> <li>• Install new cross and longitudinal drains</li> </ul> <p>Other drainage work would vary depending on whether the drainage is to be relocated, removed or installed. Typically, it would involve:</p> <ul style="list-style-type: none"> <li>• Set out the changes including the location, lengths, levels and outlets/inlets for pipes, culverts, pits, junction boxes and structures</li> <li>• Install temporary diversions and erosion and sediment control measures</li> <li>• Excavate overburden on existing structures and protect, cap, seal and remove any existing infrastructure</li> <li>• Trench excavation for the new structures and inclusion of measures to protect any retained drainage structures</li> <li>• Install foundation and bedding material</li> <li>• Install and connect infrastructure</li> <li>• Undertake integrity and flow testing</li> <li>• Backfill and compaction with excavated materials or import new clean fill</li> <li>• Ground surface restoration.</li> </ul>
Activity 3 – Road and intersection removal, and/or building and repair	<ul style="list-style-type: none"> <li>• Implement diversions and traffic management controls (where needed)</li> <li>• Remove materials to support the new kerb/median alignment and depth (boxing out)</li> <li>• Milling the asphalt</li> <li>• Prepare and level the subgrade</li> <li>• Lay and compact new pavement layers</li> <li>• Install new stormwater drainage pits, pipes and connections</li> <li>• Install new kerbs and stormwater inlets.</li> </ul>

Activity	Work description
Activity 5 – Supporting infrastructure	<ul style="list-style-type: none"> <li>• Install power supply, cables and conduits</li> <li>• Install traffic signs and signals</li> <li>• Install lighting (including conduits and cables – to be coordinated with other utility conduit adjustments).</li> </ul>
Activity 6 – Amenity planting, landscaping and urban design work	<ul style="list-style-type: none"> <li>• Carry out final grading, levelling and compaction</li> <li>• Landscape along the verges and in median</li> <li>• Prepare final treatments and finishes.</li> </ul>
Activity 7 – Finalisation work	<ul style="list-style-type: none"> <li>• Implement final kerb adjustments and side-road lines (where required)</li> <li>• Tie-ins to the existing roads</li> <li>• Paint permanent line markings.</li> </ul>
Activity 8 – Demobilisation	<ul style="list-style-type: none"> <li>• Demobilise the site compounds</li> <li>• Remove temporary traffic management controls to allow traffic to use all lanes and intersections</li> <li>• Remove temporary footpath restrictions and/or closures</li> <li>• Remove environmental, safety and traffic controls.</li> </ul>

### 3.3.2 Construction workforce

Construction of the proposal is expected to require up to 80 workers during peak construction times. Workers would be distributed between the worksite and the site compounds depending on the activities occurring and the time of day.

### 3.3.3 Construction hours and duration

Subject to approval, construction is anticipated to commence in 2023 and take about 12 months to complete, weather permitting.

- Monday-Friday: 7:00am to 6.00pm
- Saturday: 8.00am to 5.00pm (note extended hours on Saturday)
- Sunday and Public Holidays: no work

However, work may be undertaken outside of the extended hours on weekends or nights to minimise traffic impacts on the community. For work required outside standard hours, feasible and reasonable work practices to minimise noise nuisance (nominally set at 5 dB(A) above background noise levels) would be planned and implemented through a construction noise management plan. This would include notifying potentially affected residents and businesses. For further details refer to section 6.2.5 of this REF.

### 3.3.4 Plant and equipment

The plant and equipment needed to build the proposal would vary depending on the construction activities. Table 3-3 indicates the plant and equipment that would be likely used to build the proposal, however this would be finalised by the contractor.

Table 3-3: Indicative plant and equipment

Activity	Plant / equipment
Site establishment	<ul style="list-style-type: none"> <li>• Trucks and light vehicles</li> <li>• Compressor</li> <li>• Welding equipment</li> <li>• Backhoe</li> <li>• Scissor lift</li> <li>• Hand tools</li> </ul>
Tree removal	<ul style="list-style-type: none"> <li>• Chainsaw</li> <li>• Mulcher</li> </ul>
Drainage and utilities	<ul style="list-style-type: none"> <li>• Franna crane</li> <li>• Concrete truck</li> <li>• Trucks</li> <li>• Excavator</li> <li>• Backhoe</li> </ul>
Earthworks	<ul style="list-style-type: none"> <li>• Bulldozer</li> <li>• Grader</li> <li>• Water cart</li> <li>• Dump trucks</li> <li>• Loaders</li> </ul>
Paving / asphaltting	<ul style="list-style-type: none"> <li>• Milling machine</li> <li>• Tracks</li> <li>• Grader</li> <li>• Rollers</li> <li>• Asphalt truck and sprayer</li> <li>• Asphalt paver</li> </ul>
Finalisation work	<ul style="list-style-type: none"> <li>• Line marking equipment</li> <li>• Trucks</li> <li>• Scissor lift</li> <li>• Mobile crane</li> <li>• Hand tools</li> </ul>

### 3.3.5 Earthworks

Excavations would be required to widen the road, install drainage and to relocate utilities. The ability to reuse the material would depend on its physical and chemical properties. Uncontaminated material that is not suitable for use as structural fill could be used to line the utility trenches or in areas of landscaping. Material unsuitable for construction use would need to be transported offsite by a licensed contractor for disposal at a licensed waste management facility following testing and classification where required.

### 3.3.6 Source and quantity of materials

The proposal would require moderate quantities of concrete and select materials. The quantities of material required would not result in a regional or local supply shortage, and none are likely to be in short supply in the foreseeable future. Materials would be sourced from local commercial suppliers where available.

Non-renewable resources such as petroleum fuels would not be used in large quantities.

### 3.3.7 Traffic management and access

Traffic management considerations will be considered throughout the design phase to identify the impact of the construction on the travelling public. Identification of the construction impacts will form the basis of the required conditions that will be included in the construction contract documents. These conditions will be addressed in the contractor's traffic management plan.

The proposal is expected to generate up to 60 heavy and 40 light construction vehicle movements per day at the peak of construction activity, mainly associated with:

- Movement of construction workers
- Delivery of construction materials
- Spoil and waste removal
- Delivery and removal of construction equipment and machinery.

Access to the proposal footprint would generally occur directly from Goonoo Goonoo Road.

All existing traffic movements would generally be maintained during construction; however, some temporary lane closures would be required on Goonoo Goonoo Road and adjacent the local road network. These would occur in accordance with a Traffic Management Plan (TMP) and, where necessary, a Road Occupancy Licence (ROL).

Access to properties between Craighends Lane and Calala Lane is generally available for right turns into and out of these properties. These properties would become left in and left out only as part of the upgrade (similar to properties immediately north and south along Goonoo Goonoo Road). This change in access arrangements would enhance the safety and efficiency of the corridors operation. It is likely that during construction, these changed access arrangements would be implemented to enable the widening of Goonoo Goonoo Road to four lanes.

Standard traffic management measures would be used to minimise the short-term traffic impacts during construction. These measures would be identified in the TMP for the proposal and would be developed in accordance with the Traffic Control at Works Sites Technical Manual (Transport for NSW, 2020) and Transport for NSW Specification G10 – Control of Traffic.

During all stages of construction, access to businesses and other private property would be maintained. Pedestrian and cyclist routes would be managed daily to suit construction activities.

## 3.4 Ancillary facilities

Two possible construction compounds have been identified next to Goonoo Goonoo Road (refer to Figure 3-10 and Figure 3-11). The compound site near Craighends Lane could have an area of about 25,000 square metres while the compound site near Greg Norman Drive having an area of about 6,250 square metres. The subject areas could be used, subject to agreement with the landowners, for the following during construction:

- Site office
- Worker parking and amenities

- Equipment and materials storage
- Refuelling
- Vehicle washdown
- Temporary stockpiling.

The compounds would be accessed directly from Goonoo Goonoo Road.



Figure 3-10: Proposed compound near Craigends Lane



Figure 3-11: Proposed compound near Greg Norman Drive

### 3.5 Public utility adjustment

The proposal would require certain aboveground and underground utilities and services to be adjusted, relocated, protected or installed along the alignment. These would include:

- New street lighting
- Overhead electricity along the western side of Goonoo Goonoo Road, but which also traverses the alignment at multiple locations.
- Underground electricity which also traverses the alignment at multiple locations
- Sewer mains on the western side of Goonoo Goonoo Road, but which also traverses the alignment at multiple locations
- Optic fibre and telephone lines on the western side of Goonoo Goonoo Road
- Water mains on both sides of Goonoo Goonoo Road.

Utilities adjustment and protection requirements would be confirmed during detailed design with Tamworth Regional Council and other asset owners.

### 3.6 Property acquisition

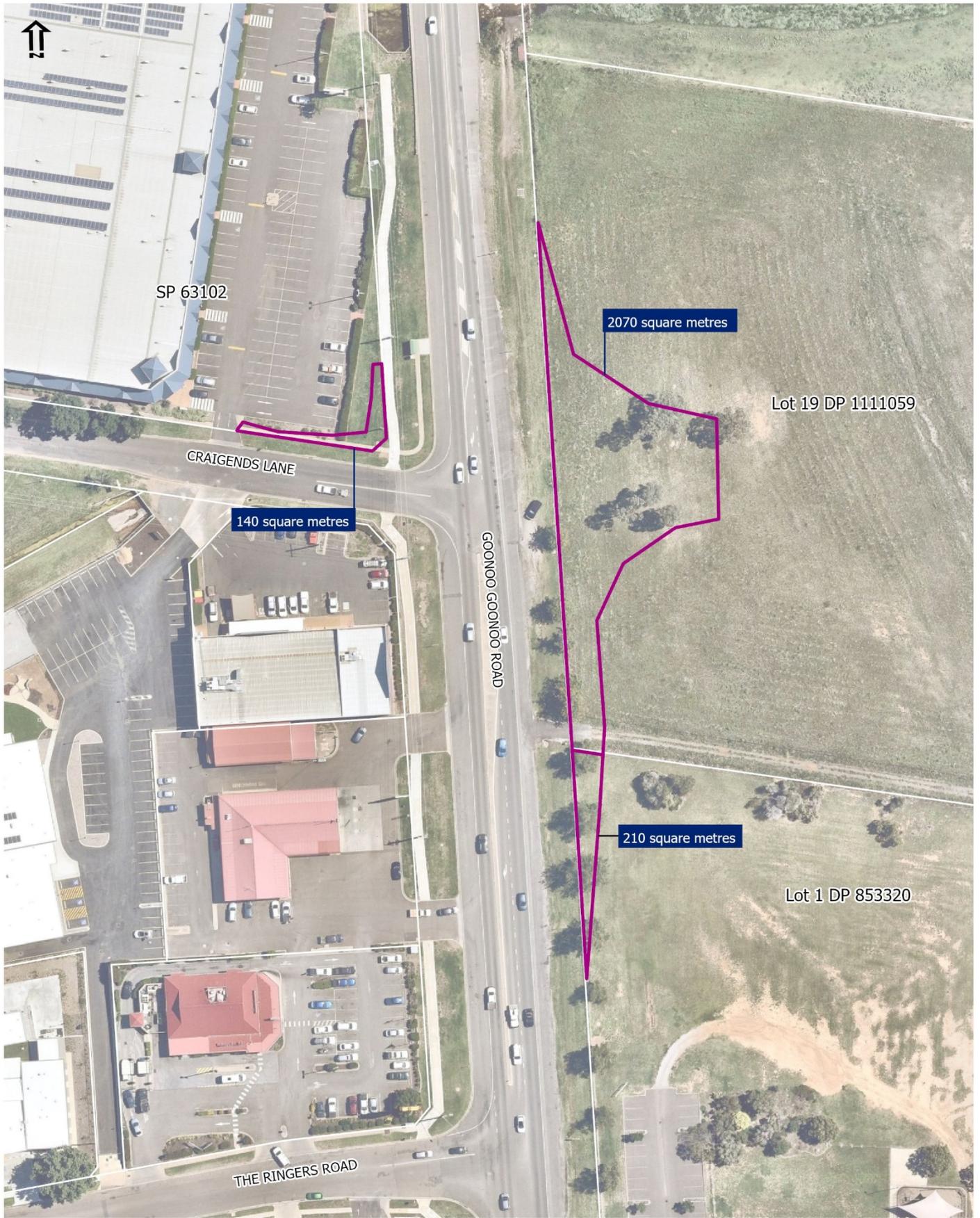
Some property acquisition is required for the proposal as detailed in Table 3-4 and as shown on Figure 3-19 to Figure 3-21. Property acquisition would be in accordance with the requirements of the *Land Acquisition (Just Terms Compensation) Act 1991*.

Table 3-4: Proposed property acquisition

Area ID	Description	Total area	Acquisition type	Current owner	Lot and DP	Land use zone (LEP)
1	Urban land	10m <sup>2</sup>	Partial	Private	Lot 42 DP 1042398	R1 General Residential
2	Rural land	2070m <sup>2</sup>	Partial	Private	Lot 19 DP 1111059	B5 Business Development
3	Rural land	210m <sup>2</sup>	Partial	Private	Lot 1 DP 853320	B5 Business Development
4	Urban land	140m <sup>2</sup>	Partial	Private	SP 63102	B4 Mixed Use



Figure 3-12: Proposed property acquisition Lot 42 DP 1042398



— Proposed property acquisition



Figure 3-13: Proposed property acquisition Lot 19 DP 1111059, Lot 1 DP DP853320 and SP 63102

## 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 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.

#### 4.1.2 Local Environmental Plans

The proposal is within the Tamworth local government area. Land use and development within the Tamworth local government area is primarily regulated by the Tamworth Regional Local Environmental Plan 2010 (Tamworth Regional LEP).

Table 4-1 identifies the objectives for each of the affected zones under the Tamworth Regional LEP.

Table 4-1: Consistency with zone objectives – Tamworth Regional LEP

Zone	Objective	Comment
R1 General Residential	<ul style="list-style-type: none"><li>To provide for the housing needs of the community.</li><li>To provide for a variety of housing types and densities.</li><li>To enable other land uses that provide facilities or services to meet the day to day needs of residents.</li></ul>	This is the current zoning of Goonoo Goonoo Road generally north of Barnes Gully. The proposal supports access to this residential zoned land.
B4 Mixed Use	<ul style="list-style-type: none"><li>To provide a mixture of compatible land uses.</li><li>To integrate suitable business, office, residential, retail and other development in accessible locations so as to maximise</li></ul>	This is the current zoning west of Goonoo Goonoo Road near Craigends Lane and The Ringers Road. The proposal supports access to this mixed use zoned land.

Zone	Objective	Comment
	public transport patronage and encourage walking and cycling.	
B5 Business Development	<ul style="list-style-type: none"> <li>To enable a mix of business and warehouse uses, and specialised retail premises that require a large floor area, in locations that are close to, and that support the viability of, centres.</li> </ul>	This is the current zoning of Goonoo Goonoo Road near Craigends Lane and The Ringers Road. The proposal supports access to this future development on this business development zoned land. The proposed intersection design at Craigends Lane includes a stub for future access to the land to the east.
SP2 Infrastructure	<ul style="list-style-type: none"> <li>To provide for infrastructure and related uses.</li> <li>To prevent development that is not compatible with or that may detract from the provision of infrastructure.</li> </ul>	The proposal relates to the provision of infrastructure and is therefore consistent with the first SP2 zone objective.
SP3 Tourist	<ul style="list-style-type: none"> <li>To provide for a variety of tourist-oriented development and related uses.</li> <li>To facilitate development that recognises the unique characteristics of the nationally and regionally significant tourist precincts that are the Australian Equine Livestock and Events Centre (AELEC) and the Tamworth Regional Racing Precincts.</li> </ul>	This is the current zoning of Goonoo Goonoo Road near Greg Norman Drive and Jack Smyth Drive. The proposal supports access to and accommodates travel demand associated with this tourist zoned land.

Development for the purposes of roads is permitted either without or with development consent in the above zones. As noted above, the ISEPP operates to remove any consent requirements.

## 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* (POEO Act) 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.

Clause 35 of Schedule 1 of the POEO Act applies to road construction, meaning the construction, widening or rerouting of roads. Development activities require an environment protection licence under the POEO Act if those activities meet the following assessment criteria:

*Clause 35(3)(a) the extraction or processing (over the life of the construction) of more than (i) 50,000 tonnes of materials in the case of premises in the regulated area or in the local government areas of Bega Valley, Eurobodalla, Goulburn Mulwaree, Queanbeyan-Palerang Regional or Snowy Monaro Regional.*

*Clause 35(3)(b) the existence of 4 or more traffic lanes (other than bicycle lanes or lanes used for entry or exit) for a continuous length of at least:*

(iii) 5 kilometres — where the road is not in a metropolitan area and is classified, or proposed to be classified, as a main road, freeway or tollway under the Roads Act 1993.

The proposal is not expected to trigger the need for an environment protection licence under Schedule 1.

Section 148 of the POEO Act 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**

The Heritage Act 1977 provides for the conservation of buildings, work, relics and places that are of historic, scientific, cultural, social, archaeological, architectural, natural or aesthetic significance to the State. Matters protected under the Act include items subject to an Interim Heritage Order and items listed on the State Heritage Register, the heritage schedules of local council LEPs, and the heritage and conservation registers established under section 170 of the *Heritage Act 1977* by NSW Government agencies (Section 170 Heritage and Conservation Registers). The Act also provides for the protection of archaeological 'relics', being any deposit, object or material evidence that relates to the non-Aboriginal settlement of NSW and is of State or local heritage significance.

There are no items within or immediately adjacent to the investigation area that are subject to an Interim Heritage Order or a listing on the State Heritage Register.

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. Section 139(4) of the Heritage Act 1977 makes provision for the issuing of an exception in certain prescribed circumstances. The requirement or otherwise for a permit should be determined during detailed environmental assessment.

#### **4.2.3 National Parks and Wildlife Act 1979**

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 (AHIP) 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 would be affected by the proposal and Transport for NSW would therefore apply for an AHIP. Refer to Section 6.4 for further details.

#### **4.2.4 Water Management Act 2000**

The proposal construction footprint is covered by the Water Sharing Plan for the Peel Valley Regulated, Unregulated, Alluvium and Fractured Rock Water Sources 2010. It is subject to the provisions of the 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

Activity	Plant / equipment
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	Potentially required for dewatering of construction 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.

#### 4.2.5 Fisheries Management Act 1994

The *Fisheries Management Act 1994* aims to conserve, develop and share the fishery resources of the State for the benefit of present and future generations.

Section 199 of the Fisheries Management Act 1994 provides that:

(1) A public authority (other than a local government authority) must, before it carries out or authorises the carrying out of dredging or reclamation work:

(a) give the Minister written notice of the proposed work, and

(b) consider any matters concerning the proposed work that are raised by the Minister within 21 days after the giving of the notice (or such other period as is agreed between the Minister and the public authority).

Notice under Section 199 is typically only required in relation to mapped Key Fish Habitat. There is no Key Fish Habitat within the construction footprint, however Goonoo Goonoo Creek (about 700 metres east) is Key Fish Habitat.

#### 4.2.6 Biodiversity Conservation Act 2016

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

Part 7 of the BC Act requires that the significance of the impact on threatened species, populations and endangered ecological communities listed under the BC Act 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 (BDAR) must be prepared.

An assessment of the potential impact on biodiversity is provided in Section 6.5.

#### **4.2.7 Biosecurity Act 2015**

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 within the proposal footprint, none are listed in Schedule 3 of the Biosecurity Regulation 2017.

The potential impacts and relevant safeguards are discussed further in Section 6.5. Appropriate biosecurity controls would be put in place for the proposed works to minimise the risk of weed transfer.

### **4.3 Commonwealth legislation**

#### **4.3.1 Environment Protection and Biodiversity Conservation Act 1999**

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

A referral is not required for proposed road activities that may affect nationally listed threatened species, 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 Agriculture, Water and the Environment under the EPBC Act.

#### **4.3.2 Native Title Act 1993**

The *Native Title Act 1993* recognises and protects native title. The Act covers actions affecting native title and the processes for determining whether native title exists and compensation for actions affecting native title. It establishes the Native Title Registrar, the National Native Title Tribunal, the Register of Native Title Claims and the Register of Indigenous Land Use Agreements, and the National Native Title Register. Under the Act a future act includes proposed public infrastructure on land or waters that affects native title rights or interest.

A search of the Native Title Tribunal Native Title Vision website was undertaken, with one Native Title claimants identified as follows:

- NC2011/006 – Gomeroi People (entered on Register 20/1/2012).

Transport for NSW would provide a notice of the proposal to NTSCORP under section 24KA of the Act and would invite comment on the proposal.

#### **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.

Transport for NSW is the determining authority for the proposal. This REF fulfils Transport for NSW'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.

A referral to Australian Government Department of Agriculture, Water and the Environment under the EPBC Act is not required.

## 5. Consultation

### 5.1 Consultation strategy

The consultation strategy for the proposal has included the following objectives:

- Inform the community and stakeholders of the proposal and possible impacts
- Seek feedback on the proposal and issues of concern for consideration in developing the detailed design and method of construction
- Identify interested and concerned community members to continue engagement with during the proposal's development and construction.

The REF will be displayed on the Transport for NSW website and at selected locations in Tamworth. A community update will be letterbox dropped to residents and businesses in the vicinity of the proposal, and additional stakeholders will receive the community update with a covering email/letter.

### 5.2 Community involvement

Community consultation on the concept design for the proposal was open for feedback from Monday, 8 March to Wednesday, 31 March 2021. A total of 275 submissions were received.

The feedback received raised a number of issues including comments on the various intersection treatments, the need to upgrade the Goonoo Goonoo Road/Scott Road/Vera Street roundabout, provisions for parking, pedestrians, cyclists and heavy vehicles. A summary of the main issues raised and the response to those issues is shown in Table 5-1, while a consultation Report is included in Appendix C.

Table 5-1: Summary of issues raised by the community

Issue raised	Response / where addressed in REF
Need to upgrade Goonoo Goonoo Road / Scott Road / Vera St roundabout	The need for the current proposal is explained in Chapter 2. The Scotts Road / Vera Street intersection is still identified as a priority location for Tamworth and Transport will continue to investigate opportunities to upgrade this location.
Treatment of the Calala Lane roundabout. Some support to retain as a roundabout and some support to upgrade to traffic lights.	Traffic lights best meet needs at this intersection when considering anticipated population and traffic growth during the next 20 years. Traffic lights also provide better safety for cyclists and enable safe crossing points for pedestrians.
Concerns with the roundabout at Craigends Lane and no right turn out of The Ringers Road.	A roundabout at Craigends Lane achieves the best balance between impacts on existing developed land and achieving intersection efficiency requirements. The Craigends Lane location is also best suited for U-turn manoeuvres due to the need to access businesses and for southbound travel. Motorists wanting to travel south from The Ringers Road can first travel north to the Craigends Lane roundabout and conduct a U-turn, which is safer than trying to turn right across four lanes of traffic from The Ringers Road Emergency vehicles will be able to turn right out of The Ringers Road.

Issue raised	Response / where addressed in REF
Removing vegetation from roundabouts and ensuring adequate lighting at intersections	The design will include street lighting, signage and the appropriate landscaping to comply with all safety requirements.
Provisions for cars and heavy vehicles so people can access businesses along Goonoo Goonoo Road	The design incorporates parking bays for use by heavy vehicles. Parking is discussed further in Section 6.1.
Ensuring adequate provisions for pedestrians	<p>The 2.5 metre wide shared path on the western side of Goonoo Goonoo Road will extend from Wilburtree Street to Greg Norman Drive.</p> <p>The proposal also includes a 1.5 metre wide footpath on the eastern side of Goonoo Goonoo Road from Calala Lane extending 400 metres to the south.</p> <p>Pedestrian crossings would also be provided at the Calala Lane traffic lights.</p>
Provision of on-road cycling facilities to ensure safety for cyclists	The proposal includes 2.5 metre sealed shoulders. On-road cyclists choosing not to travel in the traffic lanes can travel in the shoulders. There is also a shared path on the western side of Goonoo Goonoo Road.

### 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 5-2. An Aboriginal Cultural Heritage Assessment Report (Stage 3 in Table 5-2) has been prepared for the proposal and is included in Appendix D.

Table 5-2: Summary of Transport for NSW Procedure for Aboriginal Cultural Heritage Consultation and Investigation

Stage	Description
Stage 1	Initial Transport for NSW assessment
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

During the preparation of the Aboriginal Cultural Heritage Assessment Report consultation has occurred with the Aboriginal community. A public notice was issued in the Northern Daily Leader on 6 January 2021 seeking registration of interest from Aboriginal persons, and this resulted in a list of five Registered Aboriginal Parties (RAPs).

A site inspection and consultation meeting on 10 February 2021 was attended by a Tamworth Local Aboriginal Land Council (LALC) representative during which the excavation methodology (relating the previously recorded Aboriginal sites) was discussed and agreed. Excavations were carried out with Tamworth LALC sites officers on 10 and 11 March 2021.

Consultation identified that two Aboriginal sites affected by the proposal are of social and/or cultural significance to the local Aboriginal community. The sites demonstrate that the occupation of the Peel Valley

by Aboriginal people extended beyond the main rivers and waterways into the upper catchments and open hills.

## 5.4 ISEPP consultation

Tamworth Regional Council and the State Emergency Service have been consulted about the proposal as per the requirements of clauses 13 (council infrastructure and services) and 15AA (development with impacts on flood liable land) of the ISEPP.

Issues that have been raised as a result of this consultation are outlined below in Table 5-3.

Table 5-3: Issues raised through ISEPP consultation

Agency	Issue raised	Response / where addressed in REF
Tamworth Regional Council	<ul style="list-style-type: none"> <li>Strong support for the proposal</li> <li>Query whether the proposed “left out only” at The Ringers Road has been modelled to understand the impact to traffic on both local roads and at the Greg Norman Drive intersection with Goonoo Goonoo Road.</li> <li>Query regarding proposed changes to on road parking</li> <li>Request for opportunity to comment on proposed stormwater design</li> <li>Request for involvement in the detail design</li> </ul>	<ul style="list-style-type: none"> <li>Support noted</li> <li>Traffic modelling outcomes are reported in Section 6.1.</li> <li>Proposed changes to on road parking are discussed in Section 6.1</li> <li>Transport for NSW seek Tamworth Regional Council input to the stormwater design</li> <li>Transport for NSW seek Tamworth Regional Council input to the detailed design</li> </ul>
State Emergency Service	<ul style="list-style-type: none"> <li>Proposal appears to pose minimal risk to NSW State Emergency Services response operations</li> </ul>	<ul style="list-style-type: none"> <li>Noted</li> </ul>

## 5.5 Government agency and stakeholder involvement

Issues raised by Tamworth Regional Council in response to ISEPP consultation are addressed above in Section 5.4. Tamworth Regional Council initially prepared the strategic design for the proposal and has been consulted extensively during the subsequent proposal development. This has included participation in regular project control meetings.

## 5.6 Ongoing or future consultation

This REF will be placed on public exhibition for stakeholder and community comment. All comments received will be considered when finalising the proposal design. The community would be kept informed of any further changes to the proposal resulting from this and any future consultation process.

Following the public display of the REF, all comments received would be recorded and addressed in a Submissions Report detailing how each issue raised would be considered in finalising the proposal design. The Submissions Report would be made available to the public on the project webpage on the Transport for NSW website. A community update will be distributed to advise the availability of the submissions report.

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

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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 identified potential impacts.

### 6.1 Traffic and transport

#### 6.1.1 Methodology

The approach to the assessment of traffic and transport impact involved the following:

- Review of the proposal design and identification of relevant aspects of the existing environment including the road network, active transport, buses and parking
- Qualitative assessment of potential impacts during both construction and operation
- Traffic modelling to identify the operational performance of the proposal
- Identification of safeguards and mitigation measures to address potential impacts.

#### 6.1.2 Existing environment

##### **Road network**

The key characteristics of roads affected by the proposal are:

- Goonoo Goonoo Road (HW9 New England Highway) – Generally two-lane undivided road south of Calala Lane with a posted speed limit of 60 kilometres per hour. Goonoo Goonoo Road forms part of the nationally significant A15 route between Branxton and the Queensland border, but also provides access to key facilities within Tamworth including sporting and entertainment venues.
- Calala Lane – Unclassified two lane undivided sub arterial road which provides access to the suburb of Calala. Calala Lane has a posted speed limit of 60 kilometres per hour near the Goonoo Goonoo Road intersection and an 80 kilometre per hour speed limit west of the Calala urban area. The Calala Lane intersection with Goonoo Goonoo Road is a three legged multi-lane roundabout.
- Craigends Lane – Two lane undivided local road. The Craigends Lane intersection with Goonoo Goonoo Road is a T-intersection configuration, with a turning lane for southbound traffic on Goonoo Goonoo Road turning right to Craigends Lane.
- The Ringers Road - Two lane undivided local road. The Ringers Road intersection with Goonoo Goonoo Road is a T-intersection configuration, with a turning lane for southbound traffic on Goonoo Goonoo Road turning right to The Ringers Road.

- Greg Norman Drive – Two lane partly divided local road that provides access to the southern parts of the suburb of Hillvue. The Greg Norman Drive intersection with Goonoo Goonoo Road is configured with dedicated turning lanes into and from the local road.
- Jack Smyth Drive – Two lane divided local road that provides access to various sporting facilities and the Australian Equine and Livestock Events Centre. The Jack Smyth Drive intersection with Goonoo Goonoo Road is a multi-lane roundabout.

### **Traffic volumes**

Current and projected traffic volumes are provided in Table 6-1. About 94 percent of vehicles use Goonoo Goonoo Road between 7am and 10pm.

Table 6-1: Current and projected traffic volumes for Goonoo Goonoo Road

<b>Location</b>	<b>Year</b>	<b>Vehicles per day</b>	<b>% Heavy vehicles</b>
North of Greg Norman Drive	2020	11,364	12%
South of Greg Norman Drive	2020	10,447	12%
North of Greg Norman Drive	2030	20,023	12%
South of Greg Norman Drive	2030	19,619	12%

### **Walking and cycling**

Existing facilities for walking and cycling include:

- Footpaths and on-road bicycle lanes on both sides of Goonoo Goonoo Road, north of Calala Lane
- Footpath on eastern side of Goonoo Goonoo Road, extending 50 metres to the south of Calala Lane
- Shared path on the western side of Goonoo Goonoo Road south of Calala Lane to Barnes Gully, and then from the southern side of Barnes Gully to Greg Norman Drive
- Pedestrian refuge on the Calala Lane leg of the Goonoo Goonoo Road / Calala Lane roundabout.

### **Public transport**

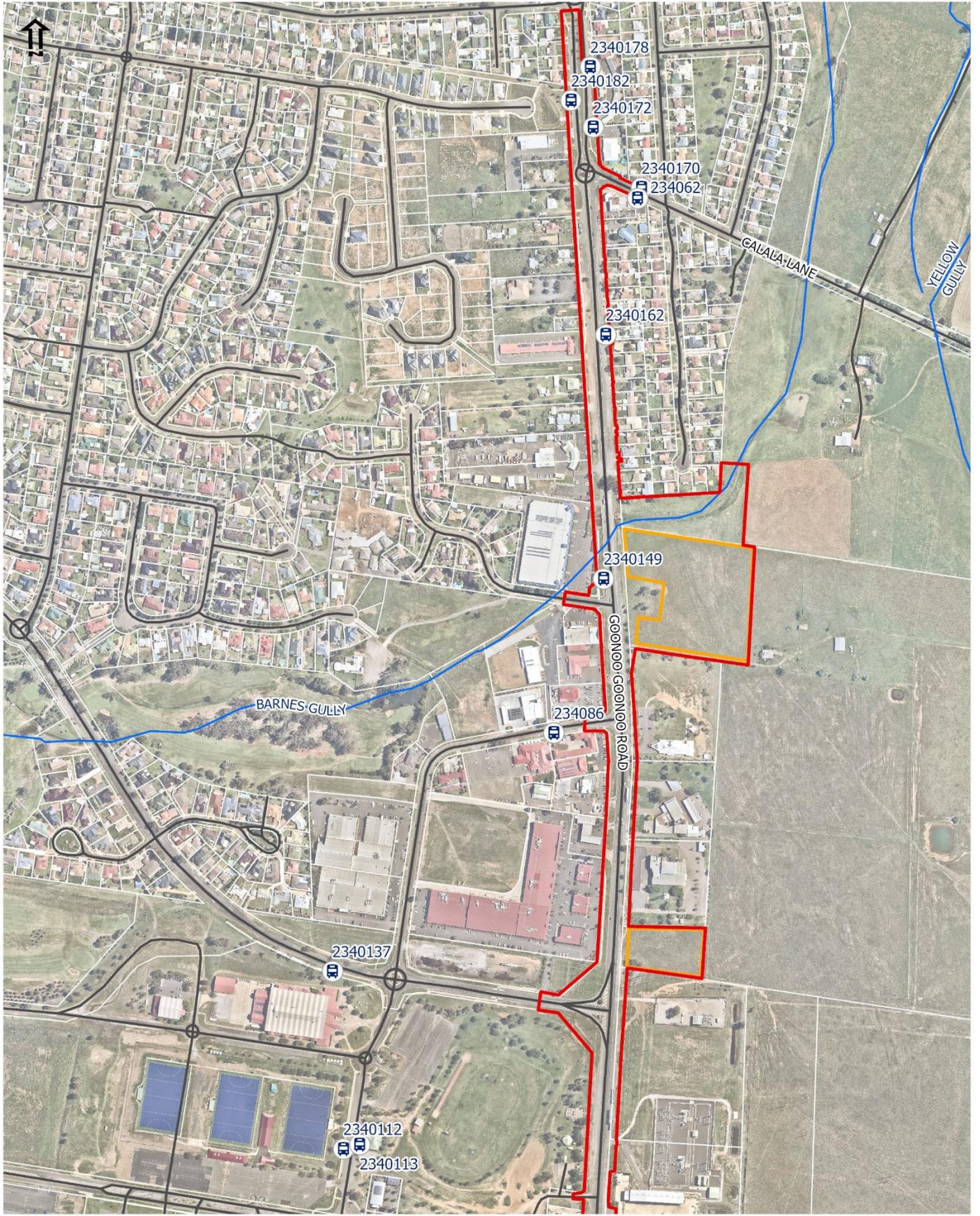
The following Tamworth Buslines operated bus routes traverse the proposal footprint:

- Route 435 – Tamworth to Tamworth Sports Dome via South Tamworth (loop service) – daytime services Monday to Saturday
- Route 436 – Tamworth to Calala via Goonoo Goonoo Road & Tamworth Shoppingworld (loop service) – daytime services Monday to Saturday

The following bus stops are within or immediately adjacent to the proposal footprint (refer also to Figure 6-1):

- Stop 2340178 – Goonoo Goonoo Road after Kurrawan Street – not marked on street
- Stop 2340176 – Goonoo Goonoo Road before Wilburtree Street – not marked on street
- Stop 2340172 – Goonoo Goonoo Road before Calala Lane – not marked on street
- Stop 2340170 – Calala Lane at Karloo Street – not marked on street
- Stop 234062 – Calala Lane before Goonoo Goonoo Road – not marked on street
- Stop 2340162 – 380 Goonoo Goonoo Road – not marked on street
- Stop 2340149 – Goonoo Goonoo Road at Craigends Lane – bus shelter with advertising panel
- Stop 234086 – Longyard Hotel, The Ringers Road – concrete pad with plinth signage

- Stop 2340137 – TRECC, Greg Norman Drive – post mounted sign and bus zone
- Stops 2340113 and 2340112 – AELEC/TRECC, Ringers Road – not marked on street.



- Construction footprint
- Compound / Stockpile / Storage
- Bus stops
- Watercourses

0 50 100 200 300 400 Metres

Figure 6-1: Bus stops within or near the proposal footprint

## **Parking**

Current parking provision includes unrestricted parking on verge on both sides of Goonoo Goonoo Road, except for the western side of the road between The Ringers Road and Greg Norman Drive, where no stopping restrictions generally apply. A no stopping restriction also applies to vehicles over 45 tonne on the western side of Goonoo Goonoo Road between Craigends Lane and The Ringers Road.

Limited site observations suggest parking supply is adequate for current levels of demand, likely due to the provision of off-street parking at key sites. Higher levels of parking demand for heavy vehicles have been noted between Craigends Lane and Greg Norman Drive and outside the Tamworth Truck Drivers Memorial (on the western side of Goonoo Goonoo Road just north of Jack Smyth Drive).

### **6.1.3 Potential impacts**

#### **Construction**

##### **Construction vehicles and lane closures**

There is the potential for some delays to traffic on Goonoo Goonoo Road and the connecting local road network due to short-term lane closures and reduced speed limits. Any lane closures would occur outside AM and PM peak periods to minimise delays to traffic.

As noted in Section 3.3.7 the proposal is expected to generate up to 60 heavy and 40 light construction vehicle movements per day at the peak of construction activity, which is a small proportion of total daily traffic. Most of these movements would occur outside morning and evening peak periods on the road network. Impacts on network performance due to construction traffic would therefore be minor.

Access to properties between Craigends Lane and Calala Lane is generally available for right turns into and out of these properties. These properties would become left in and left out only as part of the upgrade (similar to properties immediately north and south along Goonoo Goonoo Road). This change in access would occur during construction to enable the widening of Goonoo Goonoo Road to four lanes and installation of a central median.

##### **Pedestrians and cyclists**

Pedestrians and cyclist access through the proposal site would be maintained during construction. Pedestrians and cyclists may experience short delays resulting from minor diversions or directives from traffic controllers.

##### **Buses**

Buses are likely to be affected similarly to general traffic and it is expected that construction would have a minor impact on the overall operation of bus services and the customers using them. Minor and temporary relocation of bus stops may be required, however any additional walking distance to access bus stops would be negligible.

##### **Emergency vehicles**

South Tamworth Fire Station is located on The Ringers Road and it is expected other emergency vehicles would also periodically use the subject section of Goonoo Goonoo Road. Impacts on emergency service vehicles are expected to be minor provided ongoing consultation occurs, and a traffic management plan is implemented. Traffic management arrangements during construction would be designed to ensure larger NSW Fire and Rescue vehicles can negotiate the worksite during construction.

##### **Parking**

There would be some temporary loss of parking to allow for construction, however this would be short-term. Adequately alternative parking supply is available in the immediate locality.

## Operation

### Traffic

At a network level, the proposal results in an increased number of movements as a result of the changes to the network configuration. In 2020 this results in a slightly lower level of travel distance (VKT) but a longer travel time (VHT). By 2030 modelling shows in improved travel time in the AM peak and PM peak periods for the project case, indicating that congestion is reduced. In 2040 there are further travel time improvements when compared to the no project case.. Table 6-2 provides the network modelling results.

Table 6-2: Network performance

Year	Project / No project	AM peak		PM Peak	
		VKT	VHT	VKT	VHT
2020	No Proposal	4,677.9	86.6	4,989.0	91.2
	Proposal	4,646.2	96.8	4,952.5	106.0
2030	No Proposal	7032.6	250.2	7,387.2	276.1
	Proposal	6,976.0	151.7	7,366.6	172.5
2040	No Proposal	7,732.0	342.9	7,878.8	388.7
	Proposal	7,952.1	190.4	8,303.8	195.2

Table 6-3 provides a summary of the modelling results for the Goonoo Goonoo Road / Calala Lane intersection. The results indicate that by 2030, the anticipated traffic volumes will exceed the capacity of the existing roundabout in the AM peak period with the 95<sup>th</sup> percentile queue extending along Calala Lane in the AM peak period.

Table 6-3: Goonoo Goonoo Road / Calala Lane intersection modelling results

Year	Project / No project	AM peak		PM Peak	
		LOS	Avg Delay	LOS	Avg Delay
2020	No Proposal	B	11s	A	8s
	Proposal	C	25s	C	29s
2030	No Proposal	D	54s	B	11s
	Proposal	C	31s	D	44s
2040	No proposal	E	63s	B	16s
	Proposal	D	46s	C	33s

Table 6-4 provides a summary of the modelling results for the Goonoo Goonoo Road / Craigends Lane intersection. The results indicate that by upgrading the intersection to a four-way dual lane roundabout arrangement, a minimum intersection level of service 'A' can be achieved (in 2030 AM PM peaks and in the 2040 AM peak) with the inclusion of U-turn movements from The Ringers Road. By 2030 without the proposal, the would be upgraded to a single lane roundabout with a new approach on the east. Modelling indicates that without the proposal, the western approach from Craigends Lane will fail with LOS F and average delay of three minutes.

Table 6-4: Goonoo Goonoo Road / Craigends Lane intersection modelling results

Year	Project / No project	AM peak		PM Peak	
		LOS	Avg Delay	LOS	Avg Delay
2020	No proposal	-	1s	-	1s
	Project	A	5s	A	5s
2030	No proposal	A	8s	C	26s
	Project	A	6s	A	7s
2040	No proposal	F	70s	F	208s
	Project	A	8s	C	22s

Table 6-5 provides a summary of the modelling results for the Goonoo Goonoo Road / The Ringers Road intersection. The results indicate that with the change to left turns only from The Ringers Road, the intersection would operate acceptably. Without the proposal, the right turn movement from The Ringers Road would experience lengthy delays by 2030. It is expected that implementing the left-out only movement would result in 60 percent of vehicles performing a U-turn at Craigends Lane and the remaining 40 percent along Jack Smyth Drive. The U-turn Movements would have a minimal impact on the operational efficiency of the Craigends Lane Intersection.

Table 6-5: Goonoo Goonoo Road / The Ringers Road intersection modelling results

Year	Project / No project	AM peak		PM Peak	
		LOS	Avg Delay	LOS	Avg Delay
2020	No proposal	-	4s	-	4s
	Project	-	3s	-	2s
2030	No proposal	-	64s	-	138s
	Project	-	2s	-	3s
2040	No proposal	-	118s	-	79s
	Project	-	3s	-	2s

Table 6-6 provides a summary of the modelling results for the Goonoo Goonoo Road / Greg Norman Drive intersection. The results indicate that that the proposed intersection configuration will operate acceptably in to 2040. While not shown in the overall intersection results presented in Table 6-6, by 2040 the right turn movement from Greg Norman Drive is expected to fail with a lengthy delay time and LOS F. With the proposed median storage lane, right turn-out movements in 2040 are expected to have a LOS C and a delay time of 21 seconds.

Table 6-6: Goonoo Goonoo Road/ Greg Norman Drive intersection modelling results

Year	Project / No project	AM peak		PM Peak	
		LOS	Avg Delay	LOS	Avg Delay
2020	No proposal	-	2s	-	2s
	Project	-	2s	-	3s
2030	No proposal	-	79s	-	56s

Year	Project / No project	AM peak	PM Peak
2040	Project	-	4s
	No proposal	-	84s
	Project	-	6

### Access

Properties between Craighends Lane and Calala Lane would become left in and left out only, similar to properties immediately north and south along Goonoo Goonoo Road. While this change would mean some additional travel for certain journeys, it is necessary to ensure the route can continue to operate in a safe and efficient manner with increasing traffic volumes.

### Pedestrian and cyclists

The proposal would provide improved facilities for pedestrians and cyclists that would enhance safety, accessibility and amenity, including:

- Extension of the existing shared path on the western side of Goonoo Goonoo Road to Wilburtree Street
- Signalised pedestrian crossings on all intersection legs at Calala Lane
- A footpath on the eastern side of Goonoo Goonoo Road between Calala Lane and Barnes Gully
- A 2.5 metre wide sealed shoulder available for use by cyclists.

While not part of the proposal, Tamworth Regional Council will concurrently address the gap in the shared path on the western side of Goonoo Goonoo Road at Barnes Gully.

### Buses

The duplication of Goonoo Goonoo Road and the resulting improved traffic efficiency would benefit bus operations similar to general traffic. No permanent changes to bus routes or bus stops are required due to the proposal.

### Emergency vehicles

The improved standard of road with two lanes in each direction and sealed shoulders is expected to make access easier for emergency vehicles. All intersection treatments would be designed to adequately accommodate larger emergency vehicles.

The restriction on right-turns from The Ringers Road to Goonoo Goonoo Road would not apply to emergency vehicles (noting the South Tamworth Fire Station is located at 16 The Ringers Road, Hillvue).

### Parking

The proposal would not substantially alter the overall availability of on-street parking along Goonoo Goonoo Road. Recognising existing demand, the proposal includes specific provision for heavy vehicle parking (via 4.5 metre wide pull over bays) at up to eight locations<sup>2</sup> along the subject section of Goonoo Goonoo Road.

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<sup>2</sup> Final number of bays and location will be confirmed during detailed design.

## 6.1.4 Safeguards and management measures

Table 6-7: Safeguards and management measures – traffic and transport

Impact	Environmental safeguards	Responsibility	Timing	Reference
Traffic and transport	<p>A Traffic Management Plan (TMP) will be prepared and implemented as part of the CEMP. The TMP will be prepared in accordance with the Traffic Control at Work Sites Manual (Roads and Maritime, 2018) and QA Specification G10 Control of Traffic (Roads and Maritime, 2008). The TMP will include:</p> <ul style="list-style-type: none"> <li>• Confirmation of haulage routes</li> <li>• Measures to maintain access to local roads and properties</li> <li>• Site-specific traffic control measures (including signage) to manage and regulate traffic movement</li> <li>• Measures to ensure emergency services vehicles can negotiate the project area during construction</li> <li>• Measures to maintain pedestrian and cyclist access</li> <li>• Requirements and methods to consult and inform the local community of impacts on the local road network</li> <li>• Access to construction sites including entry and exit locations and measures to prevent construction vehicles queuing on public roads</li> <li>• A response plan for any construction traffic incident</li> <li>• 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.</li> </ul>	Contractor	Pre-construction	Section 4.8 of QA G36 Environment Protection

## 6.2 Noise and vibration

A noise and vibration assessment for the proposal was carried out by Muller Acoustic Consulting. The main findings of that assessment are summarised below while the full report is included in Appendix E.

### 6.2.1 Methodology

The noise and vibration impact assessment methodology involved:

- Identifying and classifying sensitive receivers. Receivers were classified using a combination of recent aerial and ground photography, web-based information sources and cadastral data and site inspection
- Carrying out background noise monitoring to identify existing noise levels. Background noise was measured at locations on Goonoo Goonoo Road (representative of immediately adjacent receivers) and on Mullumbimby Close (representative of ambient noise sources in the wider area) using calibrated, industry standard, Type 1 noise loggers
- Validation of noise models using noise logger
- Establishing proposal specific construction noise management levels in accordance with the Interim Construction Noise Guideline (Department of Environment and Climate Change, 2009)
- Modelling of construction noise using construction sound power levels as per the Construction Noise and Vibration Guideline (Roads and Maritime Services, 2016) and construction scenarios which assume worst-case scenarios for construction activities, such as sources operating concurrently, minimum offset distances between source and receiver and no mitigation measures
- Modelling of operational road traffic noise using the Calculation of Road Traffic Noise (CoRTN) method, which is widely accepted in Australia
- Assessment of construction and operational noise predictions against applicable criteria
- Identification of feasible and reasonable environmental management measures.

### 6.2.2 Existing environment

The noise environment surrounding the proposal footprint is typical of a rural environment on a suburban fringe, with dominant sources including road traffic noise from the New England Highway, general urban hum and environmental noise from birds and insects.

A review of aerial photography identifies more than 700 receivers within approximately 600 metres of the proposal footprint. Residential receivers are generally located adjacent to the northern half of the proposal footprint with the nearest receivers located immediately adjacent to Goonoo Goonoo Road at an offset distance of less than 20 metres. At the southern end of the site, receivers are generally classified as commercial receivers or areas of active recreation. Other receivers include churches and hotel accommodation.

Measured background noise levels are provided in Table 6-8.

Table 6-8: Existing background noise levels (RBL, dBA)

Location	Day (7am-6pm)	Evening (6pm-10pm)	Night (10pm-7am)
L1	51	43	31
L2	40	43	35

### 6.2.3 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 evening and 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 6-9. Relevant noise management levels for non-residential receivers are also provided.

Table 6-9: Noise management levels

Receiver	Assessment period	RBL (db LA <sub>90</sub> )	NML (db LA <sub>eq</sub> )
Residences	Standard hours	40	50
Residences	Out-of-hours Period 1 <sup>1</sup>	40	45
Residences	Out-of-hours Period 2 <sup>2</sup>	31	36
Commercial	When in use	N/A	70
Places of worship	When in use	N/A	55 <sup>3</sup>
Accommodation services	Day / Evening	N/A	70
Accommodation services	Night	N/A	40
Child care centres	Day	N/A	35 (internal sleep area) 55 (external play area)
Passive recreation	When in use	N/A	60
Active recreation	When in use	N/A	65

<sup>1</sup> Out-of-hours Period 1: Monday to Friday 6pm to 10pm, Saturday 7am to 8am and 1pm to 10pm, Sunday / Public Holiday 8am to 6pm

<sup>2</sup> Out-of-hours period 2: Monday to Friday 10pm to 7am, Saturday 10pm to 8am, Sunday / Public Holiday 6pm to 7pm

<sup>3</sup> Assumed equivalent external noise level with windows open.

### 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 Construction Noise and Vibration Guideline (Roads and Maritime Services, 2016). Safe working distances to achieve the DIN 4150.3 criteria for heritage structures are about double the safe working distance for cosmetic damage.

Table 6-10: Minimum working distances for relevant vibration intensive plant

Plant item	Rating / description	Cosmetic damage (BS7385)	Heritage item (DIN 4150)	Human response
Vibratory Roller	< 50 kN (Typically 1-2 tonnes)	5m	10m	15m to 20m
	< 100 kN (Typically 2-4 tonnes)	6m	12m	20m
	< 200 kN (Typically 4-6 tonnes)	12m	24m	40m
	< 300 kN (Typically 7-13 tonnes)	15m	30m	100m
Small Hydraulic Hammer	(300 kg - 5 to 12t excavator)	2m	4m	7m

Plant item	Rating / description	Cosmetic damage (BS7385)	Heritage item (DIN 4150)	Human response
Jackhammer	Hand held	1m nominal	2m	2m

### Sleep disturbance

The maximum noise level assessment (sleep disturbance) criterion of 65dB  $L_{Amax}$  is referred to in Section 3.1.5 of the Environmental Impact Assessment Procedure: Preparing an Operational Traffic and Construction Noise and Vibration Assessment Report (Roads and Maritime Services, 2016) and Appendix E of the Construction Noise and Vibration Guideline (Roads and Maritime Services, 2016). The maximum noise level assessment criterion relates to both operational phase and construction phase sleep disturbance impacts.

### Audio-tactile pedestrian push button devices

In relation to the operation of the audio-tactile pedestrian push button devices, the Management framework on audio tactile push buttons (Roads and Traffic Authority, 2005) indicates that noise management strategies need to be investigated where the  $LA_{max}$  walk phase audio signal noise level exceeds the  $LA_{90}$  background noise level by greater than 15dBA during any noise assessment period. The resulting noise goals are provided in Table 6-11.

Table 6-11: Noise goals for audio-tactile pedestrian push button devices

Receiver type	Period	RBL, dB $LA_{90}$	Goal $LA_{max}$
Residential	Day	51	66
	Evening	43	58
	Night	31	46

### Operational road traffic noise criteria

The proposal is considered a road redevelopment under the Road Noise Policy (Department of Environment, Climate Change and Water, 2011). The applicable road traffic noise assessment criteria for residential land uses for the proposal are presented in Table 6-12.

Table 6-12: Road traffic noise assessment criteria for residential receivers

Road	Type of proposal	Land use	Day (7am-10pm)	Night (10pm - 7am)
Freeway/arterial / sub-arterial road*	Existing residences affected by noise from new freeway / arteria / sub arterial road corridors	Residential	60 dB(A) $LA_{eq}(15hr)$	55 dB(A) $LA_{eq}(9hr)$

The Road Noise Policy also states that where existing road traffic noise criteria are already exceeded, any additional increase in total traffic noise level should be limited to 2 dB, which is generally accepted as the threshold at which a change in noise level can be perceived.

In addition to meeting the above assessment criteria, any substantial increase in total traffic noise at receivers must be considered. Receivers experiencing increases in total traffic noise levels above those presented in Table 6-13 are considered for mitigation.

Table 6-13: Relative increase criteria for residential land uses

Road	Type of proposal	Day (7am-10pm)	Night (10pm - 7am)
Freeway / arterial / sub-arterial road*	New road corridor / redevelopment of existing road/land use development with the potential to generate additional traffic on existing road.	Existing traffic LA <sub>eq</sub> (15hr) +12 dB (external)	Existing traffic LA <sub>eq</sub> (15hr) +12 dB (external)

The road traffic noise levels are considered to be ‘acute’ where predicted noise levels at the receiver is greater than or equal to 65 dB LA<sub>eq</sub>(15hr) (day) or 60 dB LA<sub>eq</sub>(9hr) (night). Residential receivers exposed to ‘acute’ noise levels as part of a road proposal are considered for mitigation regardless of the increase associated with the proposal.

When the total noise level in the build year is 5 dB(A) or more above the traffic noise criterion it is considered to have exceeded the cumulative limit. Receivers where the exceedance occurs qualify for consideration of noise mitigation. The cumulative limit does not apply if the contribution from the road project is less than 2.0 dB(A) in the build year. Instead, consideration should then be given to whether the noise levels are ‘acute’ at the receiver.

Road traffic noise criteria for non-residential uses are provided in Table 6-14.

Table 6-14: Road traffic noise assessment criteria – non-residential land uses

Receiver type	Application	Day (7am to 10pm)	NML (10pm to 7am)
School classrooms	Internal	40dB, LA <sub>eq</sub> (1hr)	-
Hospital wards	Internal	35dB, LA <sub>eq</sub> (1hr)	35dB, LA <sub>eq</sub> (1hr)
Places of worship	Internal	40dB, LA <sub>eq</sub> (1hr)	40dB, LA <sub>eq</sub> (1hr)
Active recreation	External	60dB, LA <sub>eq</sub> (15hr)	-
Passive recreation	External	55dB, LA <sub>eq</sub> (15hr)	-
Child care	Sleeping Rooms (Internal)	35dB, LA <sub>eq</sub> (1hr)	-
	Indoor Play Areas (Internal)	40dB, LA <sub>eq</sub> (1hr)	-
	Outdoor Play Areas (External)	55dB, LA <sub>eq</sub> (15hr)	-

## 6.2.4 Potential impacts

### Construction

#### Construction noise levels at most affected receivers

The results of the construction noise assessment for the most affected residential receivers are provided in Table 6-15. The results of the assessment show that LA<sub>eq</sub>(15min) noise levels would be above the relevant NMLs for residential receivers during all activities except establishment of the compound/ancillary sites, with LA<sub>eq</sub>(15min) noise levels of up to 70 dB at the most affected residential receiver (345 Goonoo Goonoo Road) during demolition of existing pavement and earthworks.

The construction noise levels are predicted to exceed the NMLs for all for non-residential receivers during all construction activities except compound/ancillary site establishment. Only accommodation services during the standard construction hours are predicted to meet the NMLs during all construction activities.

Table 6-15: Construction noise assessment results – most affected receivers

Receiver type	Period	NML (dB LA <sub>eq</sub> )	SC1	SC2	SC3	SC4	SC5	SC6	SC7
Residential	Day	50	49	65	70	65	67	67	55
	Evening	45	49	65	70	65	67	67	55
	Night	36	49	65	70	65	67	67	55
Accommodation	Day	70	47	67	70	65	67	67	56
	Evening	70	47	67	70	65	67	67	56
	Night	60	47	67	70	65	67	67	56
Place of worship	All	65	46	62	67	61	63	64	53
Child care	Sleep area	55	<30	67	71	65	68	68	56
	Play area	65	<30	67	71	65	68	68	56
Active recreation	When in use	65	43	61	66	61	63	62	52
Commercial	When in use	70	51	67	71	66	68	68	58

Note: NML exceedances shown in **bold**

SC1 – Site establishment

SC2 – Utility adjustments

SC3 – Pavement demolition and earthworks

SC4 – Drainage works

SC5 – Rehabilitation of existing pavement

SC6 – New pavement works

SC7 – Road furniture installation and line marking

#### Construction noise levels – establishment of compound site

Table 6-16 shows L<sub>Aeq(15min)</sub> noise emissions are predicted to be above the standard hours NML for nearby residential receivers during establishment of the compound site. The highest predicted noise levels of up to 49 dB(A) are expected at 400 Goonoo Goonoo Road.

Table 6-16: Affected distances – Compound establishment

Receiver type	Period	NML (dB LA <sub>eq</sub> )	Affected distance	Number of receivers
Residential	Day	50	0	0
Residential	Evening	45	Approx. 150 metres	16
Residential	Night	36	Approx. 350 metres	60
Residential	Highly affected	75	0	0

#### Construction noise levels – utility adjustments

Table 6-17 shows L<sub>Aeq(15min)</sub> noise emissions are predicted to be above the standard hours NML for nearby residential receivers during utility adjustments. The highest predicted noise levels of 65dB(A) are at 315 and 345 Goonoo Goonoo Road.

Table 6-17: Affected distances – Utility adjustments

Receiver type	Period	NML (dB LA <sub>eq</sub> )	Affected distance	Number of receivers
Residential	Day	50	Approx. 150 metres	Approx. 50
Residential	Evening	45	Approx. 240 metres	Approx. 110
Residential	Night	36	Approx. 790 metres	Approx. 650

Receiver type	Period	NML (dB LA <sub>eq</sub> )	Affected distance	Number of receivers
Residential	Highly affected	75	<10 metres	0

During utility adjustment works, noise levels are predicted to exceed the NMLs for accommodation services during the night at three locations (2 The Ringers Road, Hillvue, 333 Goonoo Goonoo Road, Hillvue, and 361 Goonoo Goonoo Road, Hillvue). The NMLs are also expected to be exceeded at the Goodstart Early Learning Centre (child care centre) at 358 Goonoo Goonoo Road, Hillvue for outdoor play areas and sleeping areas.

#### Construction noise levels – pavement demolition and earthworks

Table 6-18 shows L<sub>Aeq(15min)</sub> noise emissions are predicted to be above the standard hours NML for nearby residential receivers during pavement demolition and earthworks. The highest predicted noise levels of 70dBA are at 315 and 345 Goonoo Goonoo Road.

Table 6-18: Affected distances – Utility adjustments

Receiver type	Period	NML (dB LA <sub>eq</sub> )	Affected distance	Number of receivers
Residential	Day	50	Approx. 170 metres	Approx. 85
Residential	Evening	45	Approx. 430 metres	Approx. 170
Residential	Night	36	Approx. 1,050 metres	Approx. 900
Residential	Highly affected	75	Approx. 15 metres	0

During demolition of the existing pavement and earthworks, noise levels are predicted to exceed the NMLs at the following non-residential receiver locations:

- Accommodation services at four locations (2 The Ringers Road, Hillvue, 333 Goonoo Goonoo Road, Hillvue, 356 Goonoo Goonoo Road, Hillvue, and 361 Goonoo Goonoo Road, Hillvue) during the night
- Goodstart Early Learning Centre (child care centre) at 358 Goonoo Goonoo Road, Hillvue, for outdoor play areas and sleeping areas
- Commercial receivers at 360 – 362 Goonoo Goonoo Road, Hillvue and 502 Goonoo Goonoo Road, Hillvue
- Active recreation area identified as rest area adjacent to Goonoo Goonoo Road, between Jack Smyth Drive and Greg Normal Drive
- Tamworth Southside Uniting Church at 440 Goonoo Goonoo Road, Hillvue.

#### Construction noise levels – drainage works

Table 6-19 shows L<sub>Aeq(15min)</sub> noise emissions are predicted to be above the standard hours NML for nearby residential receivers during drainage works. The highest predicted noise levels of 65dBA are at 345 Goonoo Goonoo Road.

Table 6-19: Affected distances – Drainage works

Receiver type	Period	NML (dB LA <sub>eq</sub> )	Affected distance	Number of receivers
Residential	Day	50	Approx. 130 metres	50
Residential	Evening	45	Approx. 170 metres	85
Residential	Night	36	Approx. 570 metres	315
Residential	Highly affected	75	<10 metres	0

During drainage works, noise levels are predicted to exceed the NMLs for accommodation services during the night at three locations (2 The Ringers Road, Hillvue, 333 Goonoo Goonoo Road, Hillvue, and 361 Goonoo Goonoo Road, Hillvue). The NMLs are also expected to be exceeded at the Goodstart Early Learning Centre (child care centre) at 358 Goonoo Goonoo Road, Hillvue for outdoor play areas and sleeping areas.

#### Construction noise levels – pavement rehabilitation

Table 6-20 shows  $L_{Aeq(15min)}$  noise emissions are predicted to be above the standard hours NML for nearby residential receivers during pavement rehabilitation. The highest predicted noise levels of 67dBA are at 345 Goonoo Goonoo Road.

Table 6-20: Affected distances – Pavement rehabilitation

Receiver type	Period	NML (dB LA <sub>eq</sub> )	Affected distance	Number of receivers
Residential	Day	50	Approx. 155 metres	60
Residential	Evening	45	Approx. 230 metres	110
Residential	Night	36	Approx. 810 metres	400
Residential	Highly affected	75	<15 metres	0

During pavement rehabilitation works, noise levels are predicted to exceed the NMLs for accommodation services during the night at three locations (2 The Ringers Road, Hillvue, 333 Goonoo Goonoo Road, Hillvue, 356 Goonoo Goonoo, Road Hillvue, and 361 Goonoo Goonoo Road, Hillvue). The NMLs are also expected to be exceeded at the Goodstart Early Learning Centre (child care centre) at 358 Goonoo Goonoo Road, Hillvue for outdoor play areas and sleeping areas.

#### Construction noise levels – paving and asphaltting

Table 6-21 shows  $L_{Aeq(15min)}$  noise emissions are predicted to be above the standard hours NML for nearby residential receivers during paving and asphaltting. The highest predicted noise levels of 67dBA are at 345 Goonoo Goonoo Road.

Table 6-21: Affected distances – Paving and asphaltting

Receiver type	Period	NML (dB LA <sub>eq</sub> )	Affected distance	Number of receivers
Residential	Day	50	Approx. 155 metres	60
Residential	Evening	45	Approx. 250 metres	105
Residential	Night	36	Approx. 770 metres	420
Residential	Highly affected	75	<15 metres	0

During paving and asphaltting works, noise levels are predicted to exceed the NMLs for accommodation services during the night at three locations (2 The Ringers Road, Hillvue, 333 Goonoo Goonoo Road, Hillvue, 356 Goonoo Goonoo, Road Hillvue, and 361 Goonoo Goonoo Road, Hillvue). The NMLs are also expected to be exceeded at the Goodstart Early Learning Centre (child care centre) at 358 Goonoo Goonoo Road, Hillvue for outdoor play areas and sleeping areas.

#### Construction noise levels – road furniture installation and line marking

Table 6-22 shows  $L_{Aeq(15min)}$  noise emissions are predicted to be above the standard hours NML for nearby residential receivers during road furniture installation and line marking. The highest predicted noise levels of 55dBA are at 345 Goonoo Goonoo Road.

Table 6-22: Affected distances – Road furniture installation and line marking

Receiver type	Period	NML (dB LA <sub>eq</sub> )	Affected distance	Number of receivers
Residential	Day	50	Approx. 40 metres	20
Residential	Evening	45	Approx. 80 metres	Approx. 40
Residential	Night	36	Approx. 300 metres	Approx. 120
Residential	Highly affected	75	N/A	0

During road furniture installation and line marking, noise levels are predicted to exceed the NMLs at the Goodstart Early Learning Centre (child care centre) at 358 Goonoo Goonoo Road, Hillvue for sleeping areas only.

#### Construction noise levels – sleep disturbance

Out of hours construction activities occurring during the night-time have the potential to generate noise emissions that may cause sleep disturbance at receivers near the proposal footprint. Modelling identified that noise emissions have the potential to be above the maximum noise trigger level at residential receivers and accommodation services located within about 200 metres of the proposal site (about 110 receivers in total).

#### Construction traffic noise

The assessment of construction road traffic noise levels assumed construction would generate approximately 60 heavy vehicle movements and 40 light construction vehicle movements per day at the peak of construction activity (25 light vehicles and 37 heavy vehicles during standard construction hours, and 15 light vehicles and 23 heavy vehicles during out of hours work periods). On this basis, modelling indicates that construction generated road traffic noise would be about 0.1 dB for the day period and about 0.9 dB LA<sub>eq(9hr)</sub> for the night period. This is negligible when compared against the noise generated by the existing traffic volumes on Goonoo Goonoo Road.

#### Construction vibration

The main potential source of construction vibration would be vibratory rollers and hydraulic hammers. The use of hydraulic hammers would potentially occur during demolition of the existing pavement, while rolling would likely take place along the alignment prior to road resurfacing. Peak levels of vibration from rolling typically occurs as the roller stops to change direction and a resonance is created as the roller (and vibrator) is stationary.

Construction plant would be selected to ensure minimum safe working distances set by the Construction Noise and Vibration Guideline (Roads and Maritime Services, 2016) (refer to Section 6.2.3) are complied with where possible, for cosmetic damage and human response to vibration. If safe working distances cannot be complied with, additional measures including vibration monitoring would be implemented.

#### Operation

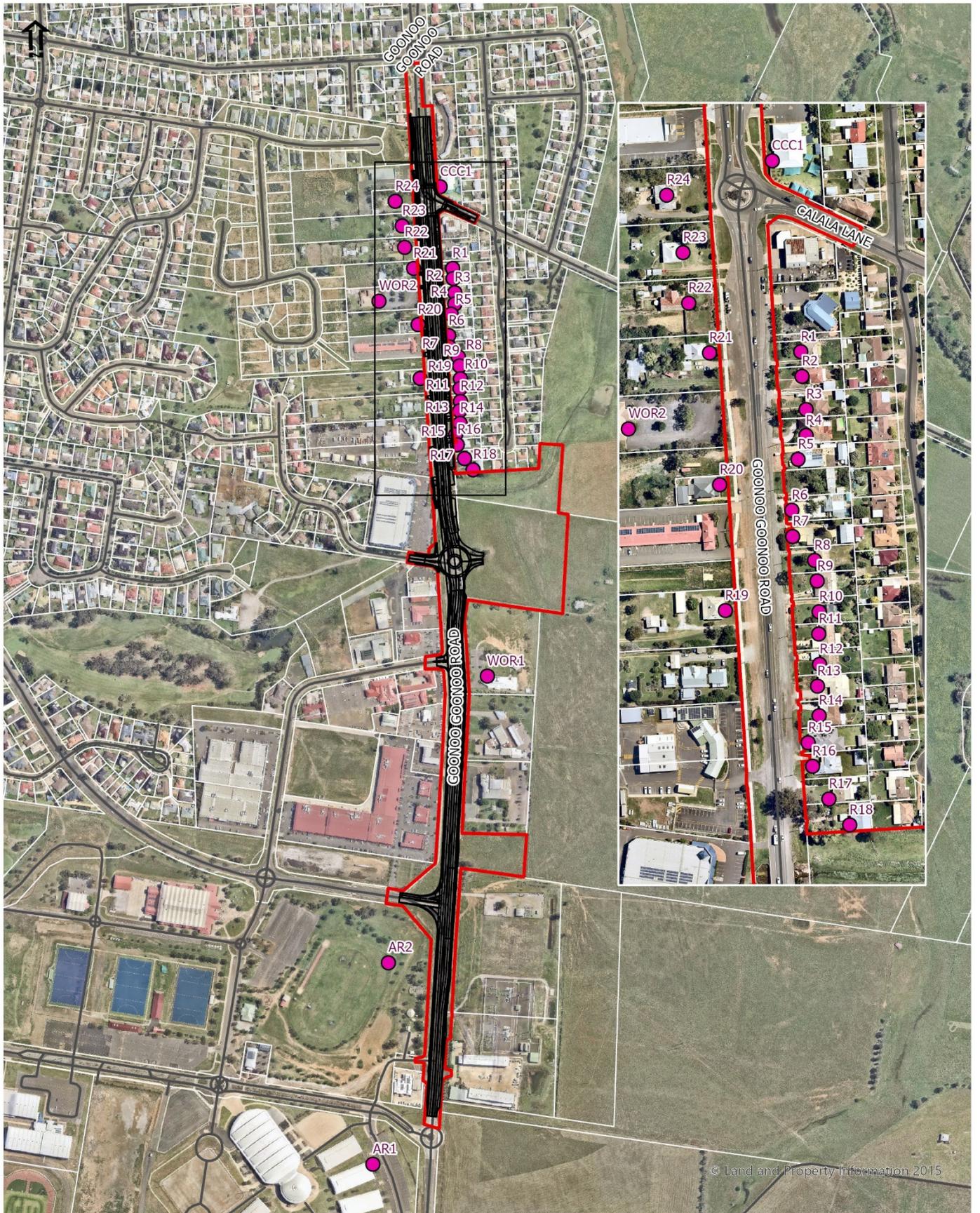
Road traffic noise predictions are provided in Table 6-23 while the sensitive receiver locations are shown in Figure 6-2. The results show that by 2034, road traffic noise levels are anticipated to exceed the relevant criteria for residential receivers R6 and R7, R13 to R16, and R19. Criteria are also predicted to be exceeded for indoor sleeping areas and external play areas at the Goodstart Early Learning Centre (child care centre) at 358 Goonoo Goonoo Road, Hillvue. The predicted noise levels at all other assessed receivers were observed to remain below the relevant criteria.

While exceedances are predicted, the difference in road traffic noise levels between the no build and build scenarios would be less than 2 dBA and therefore the change in noise levels due to the proposal would not result in an additional noise impact at any of the assessed receivers.

The Noise Mitigation Guideline (Roads and Maritime Services, 2015) indicates that once noise has been minimised by feasible and reasonable methods during the corridor planning and road design stages, receivers with residual exceedances of the criteria can be assessed to determine if they qualify for noise mitigation. The Noise Mitigation Guideline provides three triggers where a receiver may qualify for consideration of noise mitigation. These are:

- Trigger 1 – The total noise level at the receiver in the build scenario is 5 dB or greater than the criterion, and the total noise level at the receiver in the build scenario minus the contribution from only existing roads in the build scenario at the receiver is greater than 2 dB
- Trigger 2 – The total noise level at the receiver in the build scenario is greater than the criterion, and the total noise level at the receiver in the build scenario minus the total noise level at the receiver in the no-build scenario is greater than 2 dB
- Trigger 3 – The total noise level at the receiver in the build scenario is above the acute noise level and the dominant noise at the receiver is due to the proposal.

Based on the above triggers, no receivers would qualify for consideration of feasible and reasonable noise mitigation measures due to the proposal.



- Construction footprint
- Noise sensitive receivers

0 62.5 125 250 375 500 Metres

Figure 6-2: Sensitive receiver locations

Table 6-23: Predicted road traffic noise levels

Receiver	Opening noise (dBA)				10 years after opening (dBA)				Criteria (dBA)		Criteria exceeded		Opening Change in noise (dBA)		10 years after opening Change in noise (dBA)	
	No build		Build		No build		Build		Day	Night	Day	Night	Opening Day	Design Night	Opening Day	Design Night
	Day	Night	Day	Night	Day	Night	Day	Night								
R1	55.4	45.7	55.5	45.8	57.9	48.1	58	48.2	60	55	No	No	0.1	0.1	0.1	0.1
R2	55.2	45.5	55.2	45.5	57.7	48	57.7	48	60	55	No	No	0	0	0	0
R3	54.9	45.2	55	45.3	57.4	47.7	57.5	47.8	60	55	No	No	0.1	0.1	0.1	0.1
R4	55.3	45.6	55.3	45.6	57.7	48	57.7	48	60	55	No	No	0	0	0	0
R5	56.5	46.8	56.6	46.8	59	49.3	59	49.3	60	55	No	No	0.1	0	0	0
R6	58.9	49.2	59	49.3	61.4	51.6	61.5	51.8	60	55	Yes	No	0.1	0.1	0.1	0.2
R7	59.5	49.8	59.4	49.7	62	52.3	62	52.2	60	55	Yes	No	-0.1	-0.1	0	-0.1
R8	57.1	47.4	57	47.2	59.5	49.8	59.4	49.7	60	55	No	No	-0.1	-0.2	-0.1	-0.1
R9	57.1	47.4	57	47.3	59.5	49.8	59.4	49.7	60	55	No	No	-0.1	-0.1	-0.1	-0.1
R10	57.2	47.5	57.1	47.4	59.6	49.9	59.6	49.9	60	55	No	No	-0.1	-0.1	0	0
R11	57.4	47.7	57.4	47.7	59.9	50.2	59.9	50.2	60	55	No	No	0	0	0	0
R12	57.6	47.9	57.5	47.8	60	50.3	60	50.2	60	55	No	No	-0.1	-0.1	0	-0.1
R13	57.9	48.2	57.8	48.1	60.4	50.7	60.3	50.6	60	55	Yes	No	-0.1	-0.1	-0.1	-0.1
R14	58	48.3	57.8	48.1	60.4	50.7	60.2	50.5	60	55	Yes	No	-0.2	-0.2	-0.2	-0.2
R15	59.4	49.7	59.1	49.4	61.9	52.2	61.6	51.9	60	55	Yes	No	-0.3	-0.3	-0.3	-0.3
R16	59	49.3	58.8	49.1	61.5	51.8	61.3	51.6	60	55	Yes	No	-0.2	-0.2	-0.2	-0.2
R17	56	46.3	56	46.3	58.4	48.7	58.5	48.8	60	55	No	No	0	0	0.1	0.1
R18	57.5	47.8	57.4	47.7	59.9	50.2	59.9	50.2	60	55	No	No	-0.1	-0.1	0	0
R19	58.3	48.6	58.8	49.1	60.7	51	61.2	51.5	60	55	Yes	No	0.5	0.5	0.5	0.5
R20	56.6	46.9	57.5	47.8	59	49.4	59.9	50.2	60	55	No	No	0.9	0.9	0.9	0.8

Receiver	Opening noise (dBA)				10 years after opening (dBA)				Criteria (dBA)		Criteria exceeded		Opening Change in noise (dBA)		10 years after opening Change in noise (dBA)	
	No build		Build		No build		Build		Day	Night	Day	Night	Opening Day	Design Night	Opening Day	Design Night
	Day	Night	Day	Night	Day	Night	Day	Night								
R21	55.8	46.1	56.6	46.9	58.3	48.6	59	49.3	60	55	No	No	0.8	0.8	0.7	0.7
R22	54.6	44.9	55.2	45.5	57	47.3	57.6	47.9	60	55	No	No	0.6	0.6	0.6	0.6
R23	55.3	45.7	55.9	46.2	57.8	48.1	58.3	48.6	60	55	No	No	0.6	0.5	0.5	0.5
R24	55.7	46.1	56.5	46.8	58.1	48.5	58.9	49.2	60	55	No	No	0.8	0.7	0.8	0.7
CCC1	58.1	n/a	59.2	n/a	60.5	n/a	61.6	n/a	55	n/a	Yes	n/a	1.1	n/a	1.1	n/a
WOR1	55.9	46.2	56	46.3	58.4	48.7	58.5	48.8	60	60	No	No	0.1	0.1	0.1	0.1
WOR2	51	41.4	51.4	41.7	53.5	43.8	53.9	44.2	60	60	No	No	0.4	0.3	0.4	0.4
AR1	46.8	n/a	46.7	n/a	49.2	n/a	49.1	n/a	60	n/a	No	n/a	-0.1	n/a	-0.1	n/a
AR2	52.6	n/a	52.5	n/a	55	n/a	54.9	n/a	60	n/a	No	n/a	-0.1	n/a	-0.1	n/a

## Sleep disturbance

Noise logging results show there is existing exposure of residents adjacent to the proposal to maximum noise levels from passing vehicles (with up to 51 maximum noise level events recorded during the night period, with a peak of 10 events between 4am and 5am). The proposal is not expected to result in a change to the number of heavy vehicles using this section of Goonoo Goonoo Road and is not expected to result in a major change to maximum noise level events. The following observations regarding the proposal can be made:

- An additional northbound and southbound lane will result in a lateral shift of traffic towards receivers on either side of the carriageway, which may result in an increase in the number of maximum noise level events
- Improved pavement quality is expected to result in a reduction of maximum noise level events from heavy vehicles traversing rough sections of the carriageway
- With the replacement of the roundabout intersection at Calala Lane with a signalised intersection, the frequency of maximum noise level events from braking or acceleration would likely be reduced as the flow of vehicles through the intersection would be improved, although noise from braking and accelerating to and from the intersection is likely to result in some maximum noise level events
- A roundabout intersection at Craigends Lane is unlikely to contribute to additional maximum noise level events due to a separation distance between the intersection and the nearest residential receivers of greater than 100 metres.

## Signalised Crossing Noise Assessment

The provision of traffic lights with pedestrian crossings at the Goonoo Goonoo Road / Calala Lane intersection would involve the installation of audible locating and crossing signals to assist vision impaired users.

The locating signal is characterised by a short duration tonal pulse with a periodicity of about three seconds. The locating signal operates at a frequency of about 1000Hz with a periodicity of about two seconds. The crossing signal is a rapid tonal pulse which operates at a frequency of about 500Hz.

The loudest producible noise level during the walk phase is 85dBA at a distance of one metre from the push button device (which corresponds to a sound power level of 93dBA). To account for the tonal component at the start of the walk phase, a 5dBA correction is applied to the noise source level in accordance with the Noise Policy for Industry (Environment Protection Authority, 2017). Hence, the maximum sound power level for the walk phase signal is 98dBA.

To achieve a balance between ensuring the safety needs of vision impaired persons and the amenity needs of nearby noise sensitive receivers, the audio-tactile pedestrian push button devices are designed to produce an audio signal with a built-in volume control that is automatically adjusted relative to the ambient noise level. Additionally, the devices are fitted with a three-setting volume switch that can allow a volume adjustment potential of 6dBA, where required.

The predicted noise levels from the walk phase signal at the nearest residential receiver locations are presented in Table 6-24. The assessment has considered the 'high', 'normal' and 'low' volume settings with a 3dBA sound level reduction for each volume adjustment setting.

Table 6-24: Operational noise assessment – signalised crossing alarms

Receiver	Period	Criteria (dB LA <sub>max</sub> )	Predicted noise level (dB LA <sub>eq 15min</sub> )
333-335 Goonoo Goonoo Road	Day	66	High 53, Medium 49, Low 46
	Evening	58	High 52, Medium 49, Low 46
	Night	46	High 52, Medium 49, Low 46
337 Goonoo Goonoo Road	Day	66	36
	Evening	58	36
	Night	46	34

The results of the assessment show that noise from the operation of the audio-tactile pedestrian push button devices would achieve the maximum noise goal of 60dB LA<sub>max</sub>, above which sleep disturbance impacts are possible, on the high, normal, or low volume settings.

Assessment of predicted noise against the established noise goals (refer to Section 6.2.3) shows that the predicted noise levels would remain below the compliance noise goals at the nearest residential receivers for the day and evening periods, however, noise would exceed the noise goals for the night period. Further analysis demonstrates that where the 'low' volume setting is adopted, the noise emissions would achieve the compliance noise goals at 333-335 Goonoo Goonoo Road. However, noise would exceed the compliance noise goal by 1dB LA<sub>max</sub> at 337 Goonoo Goonoo Road. This exceedance can be adequately addressed by activation of the devices automatic gain control, which is a built-in volume control that is automatically adjusted relative to the instantaneous ambient noise level immediately prior to the walk phase signal being activated.

### 6.2.5 Safeguards and management measures

Table 6-25: Safeguards and management measures – noise and vibration

Impact	Environmental safeguards	Responsibility	Timing	Reference
Construction noise and vibration	<p>A Noise and Vibration Management Plan (NVMP) will be prepared and implemented as part of the CEMP.</p> <p>The NVMP 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:</p> <ul style="list-style-type: none"> <li>• Key potential noise and vibration generating activities associated with the activity</li> <li>• Feasible and reasonable mitigation measures to be implemented</li> <li>• A monitoring program to assess performance against relevant noise and vibration criteria</li> <li>• A review process scheduling and assessing out-of-hours activities including consideration of alternatives to out-of-hours work,</li> </ul>	Contractor	Pre-construction	Section 4.6 of QA G36 Environment Protection

Impact	Environmental safeguards	Responsibility	Timing	Reference
	<p>plant selection, work locations and screening to minimise impacts</p> <ul style="list-style-type: none"> <li>• A working schedule which records respite periods for extended out-of-hours works</li> <li>• Arrangements for consultation with affected neighbours and sensitive receivers, including notification and complaint handling procedures</li> <li>• Contingency measures to be implemented in the event of non-compliance with noise and vibration criteria.</li> </ul>			
Construction vibration	<p>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 (including heritage fabric). 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).</p> <p>If recommended minimum working distances cannot be met by selecting smaller plant, vibration monitoring will occur to quantify and help manage vibration. If necessary, trial vibration measurements will be conducted to further assess any possible impacts and buffer distances that may be required.</p>	Contractor	Construction	Additional measure
Construction noise and vibration	<p>All sensitive receivers likely to be affected will be notified at least five working days prior to commencement of any works associated with the activity that may have an adverse noise or vibration impact. The notification will provide details of:</p> <ul style="list-style-type: none"> <li>• The proposal</li> <li>• The construction period and construction hours</li> <li>• Contact information for project management staff</li> <li>• Complaint and incident reporting</li> <li>• How to obtain further information.</li> </ul>	Contractor	Pre-construction	Standard measure

### 6.3 Landscape character and visual impacts

A landscape character and visual impact assessment for the proposal was carried out by Ki Studio. The main findings of that assessment are summarised below while the full report is included in Appendix F.

### 6.3.1 Methodology

The methodology used for the visual impact assessment is consistent with the Environmental Impact Assessment Practice Note: Guidelines for Landscape Character and Visual Impact Assessment (Transport for NSW, 2020).

The guidelines establish an assessment process with reference to the sensitivity of an area and magnitude of the proposal in that area.

		MAGNITUDE			
		HIGH	MODERATE	LOW	NEGLIGIBLE
SENSITIVITY	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 6-3: Landscape character and visual impact assessment matrix

#### ***Landscape character assessment***

The landscape character assessment determines the impact of the proposal on the area’s character and sense of place by:

- Identifying the site’s landscape character zones
- Assessing how sensitive the landscape character zones are to the proposed changes and the capacity to absorb change
- Assessing the magnitude of change
- Providing an overall assessment based on the measures of sensitivity and magnitude, as shown in Figure 6-3.

#### ***Visual impact assessment***

The visual impact assessment determines the impact of the proposal on key existing views by:

- Selecting the key views within the visual catchment
- Assessing how sensitive the views are considering the capacity to absorb change, type and number of viewers and length of exposure to that view
- Identifying changes to each view as a result of the proposal
- Assessing the magnitude of change
- Providing an overall assessment based on the measures of sensitivity and magnitude, as shown in Figure 6-3.

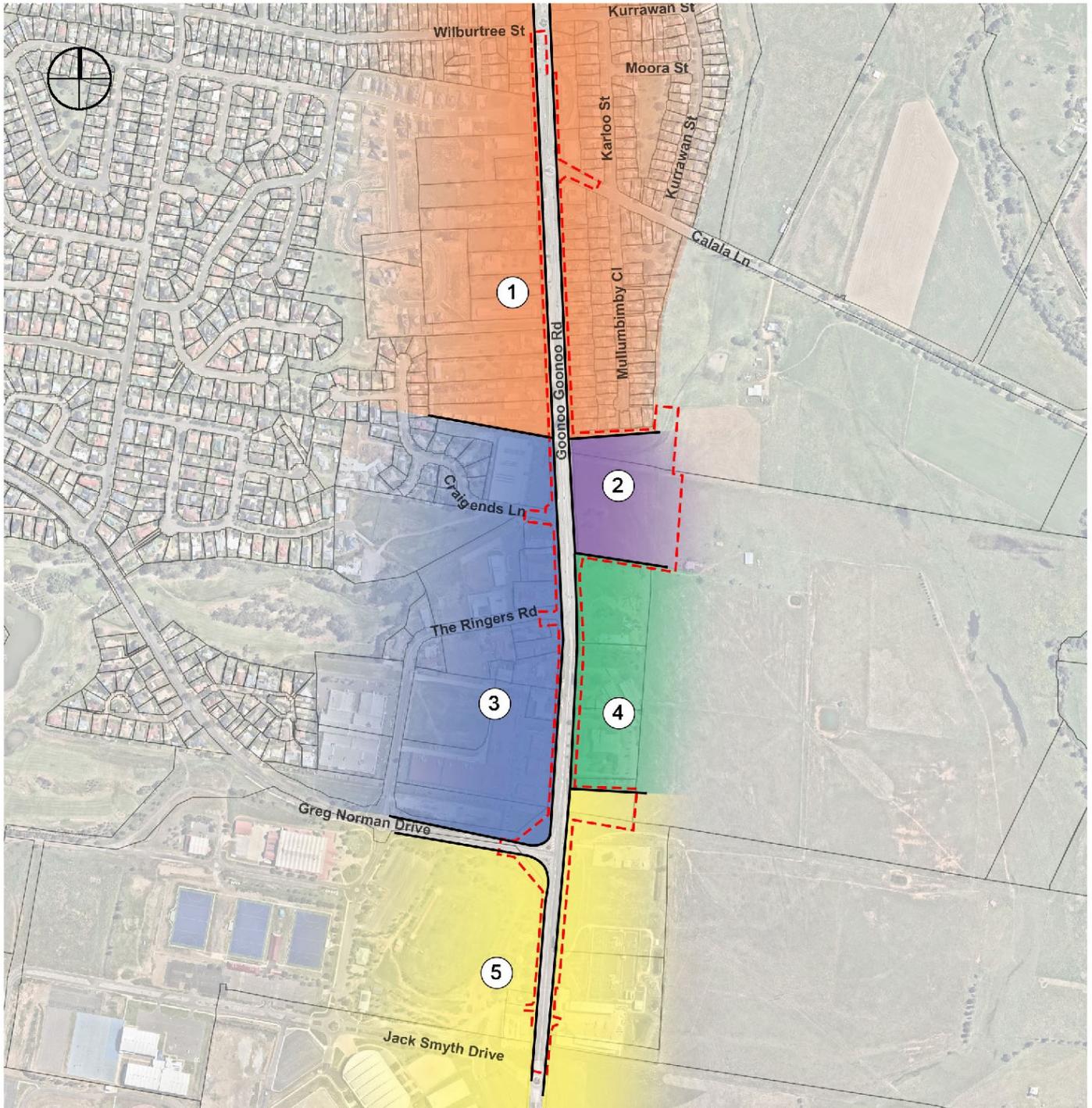
### 6.3.2 Existing environment

#### ***Landscape character zones***

The following eight landscape character zones were identified as relevant to the proposal (refer to Figure 6-4). The sensitivity of each zone is discussed below:

- Landscape Character Zone 1 – Northern end of the study area, flanking both sides of the road. The sensitivity of this area is considered high due to its land use even though it fronts a busy road.

- Landscape Character Zone 2 – Flanking the eastern verge, this zone is situated between Landscape Character Zone 1 and Landscape Character Zone 3, opposite Craighends Lane. The sensitivity of this zone is considered high due to its picturesque and scenic qualities.
- Landscape Character Zone 3 – This zone is situated along the western verge, south of Landscape Character Zone 1. The sensitivity of this area is considered moderate as this zone acts to some degree as a gateway into Tamworth. This is reinforced by the presence of the visitor centre.
- Landscape Character Zone 4 – Situated along the eastern verge, south of Landscape Character Zone 2. A low sensitivity is assessed for this zone due to its commercial nature, having a high absorption capacity, aided by the green buffer zones fronting the road and the limited interface with the streetscape.
- Landscape Character Zone 5 – The southern most zone. The sensitivity of this area is considered moderate. Although there is a high presence of infrastructure elements, the rest area/memorial park is considered to have a moderate sensitivity to change. This zone also marks the entry point into the Tamworth urban area making it a significant milestone in the journey experience.



**LEGEND**

 Proposal area

- |                                    |                                    |
|------------------------------------|------------------------------------|
| ① Goonoo Goonoo Rd Residential     | ④ Goonoo Goonoo Rd Commerical East |
| ② Pastureland                      | ⑤ Open Infrastructure              |
| ③ Goonoo Goonoo Rd Commercial West |                                    |

Figure 6-4: Landscape character zones

### Visibility and viewpoints

There would be limited visibility of the proposal beyond the road corridor due mainly to the built form elements and some screening vegetation. The exception to this are the few more open areas such as within Landscape Character Zones 2 and 5, however, the flat topography also limits the visual exposure of the site. Vistas from higher viewing points such as the Oxley lookout are considered insignificant due to the distance from the site. The visibility of the proposal is illustrated by the visual envelope map in Figure 6-5.



#### LEGEND

Visual envelope

Proposal area

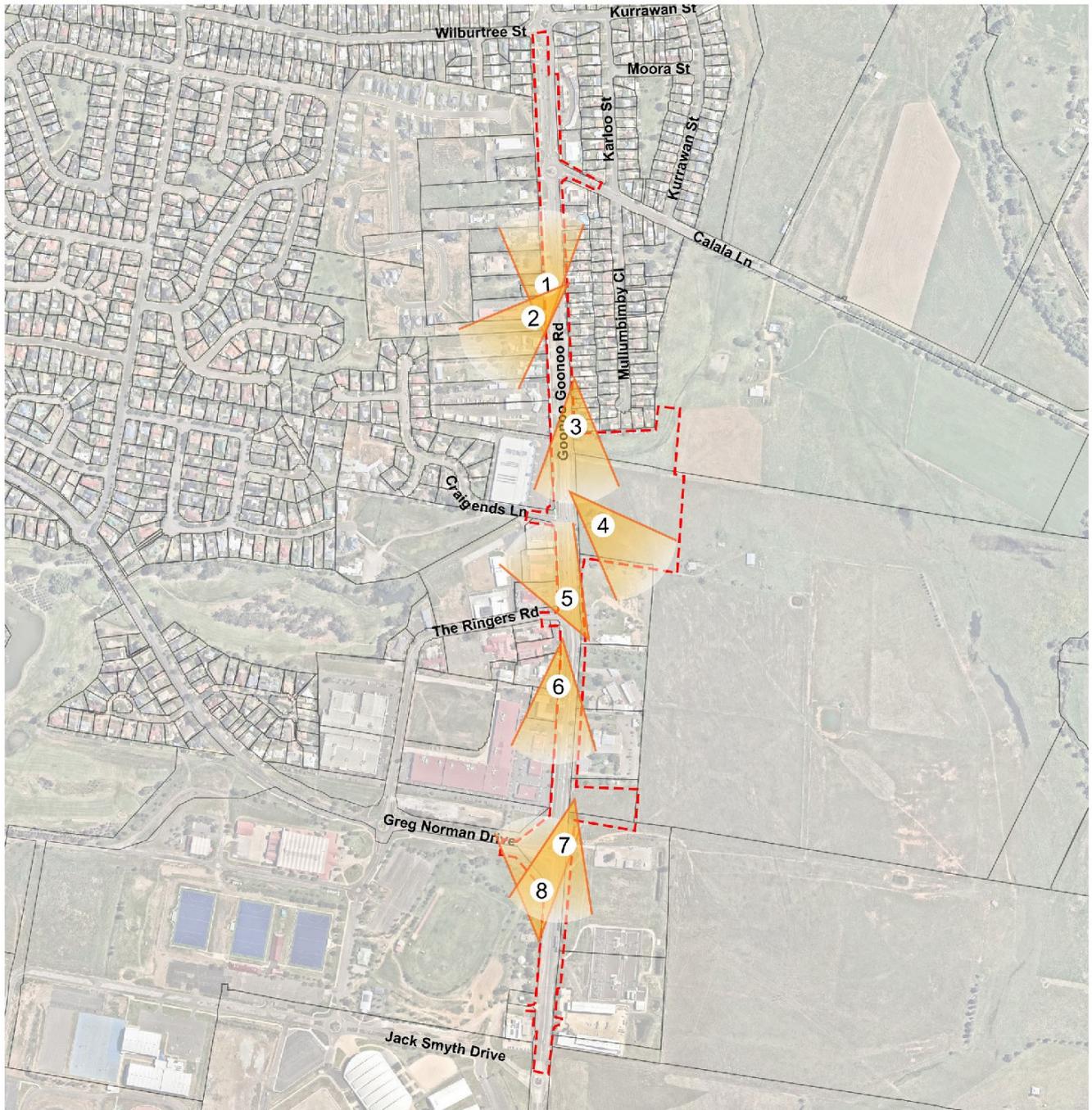
Figure 6-5: Visual envelope

The visual impact assessment has been based on selecting representative viewpoints from the immediately surrounding visually exposed areas. A total of eight viewpoints were selected from various locations as shown in Figure 6-6 and as described in Table 6-26.

Table 6-26: Description of assessed viewpoints

ID	Description	Image	Sensitivity
01	View along shared path, western verge looking north. Shared path along major arterial road set in a predominantly residential area with pockets of commercial properties.		Low; the transient nature of this viewpoint limits the sensitivity of the viewer. Hence, a low rating is considered appropriate.
02	View from residences fronting a major arterial road looking towards the opposite verge. Some landscape within front yards provides limited visual screening.		High; the residential land use contributes to the viewer being more sensitive to change, potentially enjoying prolonged viewing periods from their front yards.
03	Streetscape setting along major arterial road adjacent to residences along the eastern verge.		High; the residential land use contributes to the viewer being more sensitive to change, potentially enjoying prolonged viewing periods from their front yards.
04	Rural setting with panoramic vistas and stands of trees with a textured grass understorey. Provides a distinctive scenic quality compared to the adjacent more urbanised areas.		High; this viewshed is representative of the private property tenure. Although the number of viewers is limited, a high sensitivity rating is considered appropriate due to the scenic qualities and limited visual absorption capacity of the site.

ID	Description	Image	Sensitivity
05	Urban vista from the Uniting Church entrance to one of the commercial properties opposite. Urban setting with a variety of built form elements and limited greenery.		Low; this viewpoint is representative of commercial properties flanking Goonoo Goonoo Road. A low sensitivity is assessed due to the limited visual interface of these properties with the streetscape, the nature of the landuse and the highly modified and somewhat incohesive streetscape character.
06	Streetscape setting along the shared user path on the western verge, in front of the visitor information centre.		Moderate; the transient nature of the view makes it less sensitive, however its location in front of the visitor centre makes it more sensitive due to the high number of potential viewers.
07	Streetscape setting opposite to Greg Norman Drive. Relative open setting with vistas beyond.		Low; the transient nature of the viewer limits the sensitivity.
08	Streetscape view from in front of the Tamworth Truck Drivers Memorial.		Moderate; as this area also acts as a rest point, longer viewing periods are likely. Yet the site is of a transient nature. The memorial setting also contributes to the moderate rating.



**LEGEND**

 Proposal area

 Viewpoints

Figure 6-6: Assessed viewpoints

### 6.3.3 Potential impacts

#### Construction

The proposal would result in a temporary visual impact on the road corridor as a result of construction activities. The viewpoints for road users, residential properties near the site and users of public domain area would be impacted by:

- Compound facilities and stockpile/material storage
- Construction plant and equipment
- Temporary safety barriers and traffic control equipment including signage
- Temporary construction lighting.

Impacts were assessed as varying between moderate-low and high, depending on the viewpoint. The temporary impacts on visual amenity during construction activities would be confined to the road corridor and immediately adjacent areas. Following the completion of construction, the impacts associated with construction equipment and facilities would be removed and disturbed areas restored.

Some of the longer-term operational impacts (such as those associated with tree removal) would occur during the early stages of construction.

#### Operation

##### Landscape character impacts

Overall, the proposal would have a moderate to high landscape character impact. This is driven predominantly by the formalisation of the roadway and truck parking areas and the introduction of a central green median and footpaths, formalising the streetscape in line with the sections of road further to the north, and resulting in a more urban environment.

The proposal would change the character of the roadway from a single carriageway into a dual-carriageway, creating a boulevard type character that celebrates the entry way into Tamworth. It would contribute to a better functioning of the streetscape, enhancing safety and providing continuity with the sections further to the north.

The outcomes of the landscape character impact assessment are summarised in Table 6-27.

Table 6-27: Landscape character impact assessment

Zone	Sensitivity	Magnitude	Impact
1 – Goonoo Goonoo Road Residential	High: sensitive land use with a limited absorption capacity.	High: the magnitude of impact to this zone is considerable. The streetscape would be formalised with the introduction of kerbs and gutters, and the provision of a new central median. This would transform the streetscape and provide an enhanced sense of safety to pedestrians and cyclists.	<b>High.</b> The proposal would transform the road by formalising the streetscape, resulting in a changed character. The introduction of kerbs along the verges would reduce potential dust and safety issues from vehicles parking along the existing verge, enhancing the environment.
2 – Pastureland	Moderate: rural scenic farmland with some capacity to absorb change. This area is partially zoned B5 (Business Development) and is likely	High: the functioning, sense of place and identity of this zone would be affected. The loss of a stand of trees and the interface of the intersection into the property would remove	<b>Moderate to high.</b> The general character and identity of this zone would be impacted, with its rural quality compromised. This impact should be considered in the context of future land use change.

Zone	Sensitivity	Magnitude	Impact
	to change in the mid-to long term.	important buffer zones, impacting the character of the private property. The formalisation of truck parking bays would further contribute to the urbanisation of the area.	The loss of important stands of trees would affect the picturesque character of the property. The entry to the property would be less defined by the loss of boundary vegetation.
3 – Goonoo Goonoo Road Commercial West	Moderate: Incohesive streetscape with dominant built form elements and car parks. Generally this zone has a high absorption capacity however, it acts as a gateway into the town raising its sensitivity to moderate.	High: there would be some loss in streetscape vegetation and the road would be formalised, changing its character. The introduction of a central median, wider road and formal truck parking bays contribute to the higher impact rating.	<b>Moderate to high.</b> The proposed roadworks would create a more formal and urbanised character. The western verge already has a formalised kerb and gutter treatment which would be relocated.
4 – Goonoo Goonoo Road Commercial East	Low: The land use and introverted character of this zone makes it less sensitive to change.	High: the magnitude of change to this zone is high, similar to Landscape Character 3. The identity, functioning and character of this zone would be retained.	<b>Moderate.</b> A more formalised environment would result, moderately changing the sense of place and identity to this zone.
5 – Open Infrastructure	Moderate: Although there is a high presence of infrastructure elements, the rest area/memorial park is considered to have a moderate sensitivity to change.	Moderate: The identity, functioning and character of this zone would be retained.	<b>Moderate.</b> A more formalised environment would result, moderately changing the sense of place and identity to this zone.

## Visual impacts

The assessed level of visual impact for each viewpoint is summarised in Table 6-28.

Table 6-28: Visual impacts

View	Sensitivity	Magnitude	Impact
V01	Low	Moderate	<b>Low to moderate.</b> The relocation of the kerb closer towards the shared path would be detracting, yet the introduction of landscape measures would enhance the visual quality of the streetscape.
V02	High	Moderate	<b>Moderate to high.</b> The introduction of a green median would provide a visual relief of the roadway, new landscape measures would enhance the visual quality of the streetscape.
V03	High	High	<b>High.</b> The streetscape would visually change in character. Landscape design measures would enhance the streetscape and ensure a consistent approach is taken.
V04	High	High	<b>High.</b> The loss of vegetation would detract from the green and rural quality of the setting. The introduction of a new road (stub) into the property would highly impact its scenic quality, but this should be viewed in the context of a different future land use. The arrival sequence into the property would be visually diminished. However, the design intends to introduce a green backdrop through planting along the opposite verge, somewhat mitigating the effect of vegetation removal.
V05	Low	Low	<b>Low.</b> The general setting would not greatly change. The introduction of a green median would provide visual relief. An enhanced streetscape would be provided through landscape design measures along the verges.

View	Sensitivity	Magnitude	Impact
V06	Moderate	High	<b>Moderate to high.</b> The introduction of the truck parking bay would detract from the desired streetscape quality but serves an important function. The introduction of a green median helps to visually articulate the roadway.
V07	Low	Moderate	<b>Moderate.</b> The lack of median and the additional road width contribute to the moderate rating. The overall streetscape quality would not greatly change.
V08	Moderate	Moderate	<b>Moderate.</b> The proposal would positively contribute to the memorial grounds and rest stop by widening the verge at the entrance. The introduction of a truck parking bay in front of the grounds reduces visual amenity but has benefits for visiting truck drivers.

### 6.3.4 Safeguards and management measures

Table 6-29: Safeguards and management measures – landscape and visual

Impact	Environmental safeguards	Responsibility	Timing	Reference
Landscape character and visual impact	<p>An Urban Design Plan (including detailed urban design drawings and landscape plans) will be prepared to support the final detailed project design.</p> <p>The Urban Design Plan will present an integrated urban design for the project, providing further practical detail on the application of design principles and objectives identified in this REF. The Plan will confirm design treatments for:</p> <ul style="list-style-type: none"> <li>• Location and identification of existing vegetation and proposed landscaped areas, including species to be used</li> <li>• Details of the staging of landscape works taking account of related environmental controls such as erosion and sedimentation controls and drainage</li> <li>• Procedures for monitoring and maintaining landscaped or rehabilitated areas.</li> <li>• The Urban Design Plan will be prepared in accordance with relevant guidelines, including:</li> <li>• Beyond the Pavement urban design policy, process and principles (Roads and Maritime, 2020)</li> <li>• Landscape Guideline (Roads and Maritime Services, 2019).</li> </ul>	Transport for NSW	Detailed design	Standard measure
Visual impacts	Where reasonable and feasible trees will be retained in design.	Transport for NSW	Detailed design	Additional measure
Visual impacts	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.	Contractor	Construction	Additional measure

Impact	Environmental safeguards	Responsibility	Timing	Reference
Impacts on street trees	<p>Tree protection zones would be implemented to minimise the impact to street trees (identified for retention).</p> <p>Tree protection structure would be implemented to protect trees if construction is required to occur within the Tree Protection Zones.</p> <p>Any excavation within Tree Protection Zones (of trees identified for retention) or pruning trees (or tree roots) is to occur under the supervision of an AQF5 qualified arborist and in accordance with a pre-agreed methodology.</p> <p>Vehicles, plant or equipment would not be parked or stored within the tree protection zone, if parking or storage is required additional mitigation measures would be implemented to minimise the impact to the vegetation</p>	Contractor	Construction	Additional measure
Impact from lighting	Construction site and compound lighting will be oriented to minimise the risk of light spill impacts on any nearby residences.	Contractor	Construction	Additional measure
Impacts from lighting	The design of new street lighting will consider potential light spill impacts on adjacent properties.	Transport for NSW	Detailed design	Additional measure

## 6.4 Aboriginal cultural heritage

An Aboriginal Cultural Heritage Assessment Report for the proposal was carried out by Everick Heritage. The main findings of that assessment are summarised below while the full report is included in Appendix D.

### 6.4.1 Methodology

The approach to the assessment of Aboriginal cultural heritage impacts has been guided by the following:

- Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW (Department of Environment, Climate Change and Water, 2010)
- Aboriginal Cultural Heritage Consultation Requirements for Proponents (Department of Environment, Climate Change and Water, 2010)
- Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales (Office of Environment and Heritage, 2011)
- Procedure for Aboriginal Cultural Heritage Consultation and Investigation (Roads and Maritime Services, 2011).

The approach has involved:

- Consultation with the Registered Aboriginal Stakeholders for the proposal (refer to Section 5.3)
- Searches of applicable heritage registers including the Aboriginal Heritage Information Management System (AHIMS)
- Review of ethnographic and historic resources relevant to the region

- Review previous archaeological work and the landscape context
- Summarising of the local and regional character of Aboriginal land use and its material traces
- Formulation of a predictive model
- Field investigation including a site inspection and consultation meeting with a representative of the Tamworth LALC on 10 February 2021
- Test pit excavation program on 10 and 11 March 2021 targeting the most likely landforms to contain Aboriginal objects
- Aboriginal community consultation regarding the management of the site
- Reporting on findings and recommended management strategies.

## 6.4.2 Existing environment

### *Archaeology and ethnohistory*

The Gamilaroi (also referred to as Komilaroi) has been recognised by researchers as the primary linguistic group for the greater New England region. Two sub-communities of the Gamilaroi occupied the area now known as Tamworth: the Mooni people and the Goonoo Goonoo people. The Goonoo Goonoo people are said to have occupied the Peel River flatlands, including the lands which comprise the proposal footprint.

The antiquity of occupation of northern New South Wales is still debated, with sites dated between 3,600 Before Present (BP) and 20,000 BP. The oldest dated site in the Tamworth region is 4,950 BP, although earlier occupation is possible, and this may be a reflection on the lack of archaeological investigations in the region.

Early population estimates made by European settlers record that between 4000 and 12,000 Aboriginal peoples inhabited camps located in the Peel River Valley, south of modern-day Tamworth, with groups gathering and moving across the landscape, participating in trading practices with other groups throughout the region. European settlement had a major impact on these traditional practices. The increasing agricultural cultivation by European settlers in the 1830s forced groups to extend their subsistence practices further from the Peel River in pursuit of plant resources and game which had been driven further from the valley as a result of the expanding European settlements.

Further ethnohistory details and a review of previous archaeological studies is provided in the Aboriginal Cultural Heritage Assessment Report included in Appendix D.

### *Known Aboriginal sites*

A search of the Aboriginal Heritage Information Management System on 07 January 2021 returned six known Aboriginal Sites within one kilometre of the proposal footprint (refer to Table 6-30). One site, an isolated artefact (GG01) was identified within the proposal footprint.

Table 6-30: AHIMS Extensive search results

Site ID	Name	Feature
29-2-0243	EQUINE 1P/1	Artefact: 3
29-2-0325	GG05	Artefact: 1
29-2-0326	GG06	Artefact: 1
29-2-0327	GG04	Artefact: 1, Water Hole: 1
29-2-0328	GG03	Artefact: 1

Site ID	Name	Feature
29-2-0329	GG01	Artefact: 1

### **Predictive model**

The proposal footprint is surrounded by known and registered Aboriginal cultural heritage sites, and falls into a significant broader cultural landscape, the Tamworth region. The area is known to have a high degree of disturbance; however, sites have still been found during site inspections as recent as 2014. It is expected that isolated artefacts and artefact scatters are the most likely form of physical Aboriginal cultural heritage to be found in the proposal footprint, with the possibility of previously identified isolated finds revised as artefact scatters. There is also a possibility of finding culturally modified trees within the impacted area.

### **Consultation and survey results**

The main findings of the field inspection and archaeological excavations were:

- One site comprising three silcrete stone artefacts was identified within TP7 (within the proposed compound area) and was subsequently lodged as a registered site on AHIMS as 'Barnes Gully 1' (29-2-0412). The site comprises three small flake pieces which are consistent with the artefacts known to occur in the surrounding soils.
- GG01 site could not be identified during the site inspection, and it is considered that the artefact has moved down the road reserve into Barnes Gully, although it is possible the artefact is retained within the turf layer or has been moved by a mower/ slasher by maintenance crews.
- Absence of artefacts on the ridge crest of Lot 2 DP501210 is likely the result of historic soil disturbance and distance from water. The ridge crest to the east at the confluence of Barnes Gully and Goonoo Goonoo Creek would be the logical location for an Aboriginal campsite.
- Slopes adjacent to Barnes Gully are likely to have been used as a pathway or hunting area, but the proposal footprint does not likely include a large campsite or occupation area.

### **Statement of significance**

The Aboriginal sites within and adjacent to the proposal footprint are of significance to the Aboriginal community and considered to have low scientific research potential. This primarily relates to the association of the sites to each other and to additional sites recorded within the Peel River Valley. The sites provide tangible evidence of the use of the Peel River Valley by ancestors of the Aboriginal community and have the potential to make a positive contribution to the cultural life of the Aboriginal community.

### **6.4.3 Potential impacts**

The proposal would result in a 'partial loss' of value to the Barnes Gully 1 site and a 'total loss' of value to the GG01 site as summarised in Table 6-31. An Aboriginal Heritage Impact Permit under the *National Parks and Wildlife Act 1979* will be required in relation to these impacts.

Table 6-31: Aboriginal cultural heritage impact summary

Site Name	Site ID	Type of harm	Degree of harm	Consequence of harm
GG01	29-2-0329	Direct	Total	Total loss of value
Barnes Gully 1	29-2-0412	Direct	Partial	Partial loss of value

#### 6.4.4 Safeguards and management measures

Table 6-32: Safeguards and management measures – Aboriginal heritage

Impact	Environmental safeguards	Responsibility	Timing	Reference
Aboriginal cultural heritage	An application for an Aboriginal Heritage Impact Permit (AHIP) will be made under section 90A of the National Parks and Wildlife Act 1974 for the land and associated objects within the boundaries of the study area.	Transport for NSW	Detailed design	Additional measure
Aboriginal heritage	An Aboriginal Heritage Management Plan (AHMP) will be prepared in accordance with the <i>Procedure for Aboriginal cultural heritage consultation and investigation</i> (Transport for NSW, 2012) and <i>Standard Management Procedure - Unexpected Heritage Items</i> (Transport for NSW, 2015) and implemented as part of the CEMP. It will provide specific guidance on measures and controls to be implemented for managing impacts on Aboriginal heritage. The AHMP will be prepared in consultation with all relevant Aboriginal groups.	Contractor	Detailed design / pre-construction	Section 4.9 of QA G36 <i>Environment Protection</i>
Aboriginal heritage	<i>The Standard Management Procedure - Unexpected Heritage Items</i> (Transport for NSW, 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	Detailed design / pre-construction	Section 4.9 of QA G36 <i>Environment Protection</i>

## 6.5 Biodiversity

A Biodiversity Assessment for the proposal was carried out by Lesryk Environmental. The main findings of that assessment are summarised below while the full report is included in Appendix G.

### 6.5.1 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:

- Department of Agriculture, Water and Environment Protected Matters Search Tool – accessed on 10 March 2021 using a 10-kilometre buffer
- Department of Primary Industries WeedWise database – accessed March 2021 (North West)
- Bionet Atlas of NSW Wildlife – accessed 10 March 2021 with a 10-kilometre buffer
- Department of Primary Industries Fisheries Spatial Data Portal – accessed March 2021
- Bureau of Meteorology’s Atlas of Groundwater Dependent Ecosystems – accessed March 2021
- Sharing and Enabling Environmental Data (SEED) spatial datasets.

The conservation significance of those ecological communities, plants and animals recorded was made with reference to:

- Rare or Threatened Australian Plants (RoTAP) list
- EPBC Act, BC Act and/or Fisheries Management Act
- Remnant Vegetation of the western Cumberland subregion, 2013 Update
- BioNet Vegetation Classification database.

#### *Field survey*

Field investigations were carried out on 4 and 5 March 2021. The purpose of the field survey was to identify those vegetation communities, fauna habitats, plants and animals present within, and near, the proposal footprint that are of State and/or national conservation significance.

While conducting the habitat assessments, efforts were made to identify features such as known vegetation associations, geological features, feed trees, mature trees with hollows, connectivity of fauna corridors, aquatic environments and other habitat features important to the lifecycle requirements of those threatened plants and animals previously recorded in the study region.

The survey methods employed during the field investigations were:

- Identification of those plants present, including within any areas affected by direct and indirect impact
- Identification of the structure of those vegetation communities and fauna habitats present at, and close to, the site
- Direct observation of those fauna species present within or near to the site
- Diurnal call identifications of those fauna species present, 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

- Leaf litter and ground debris searches for sheltering reptiles and amphibians
- Visual inspection of the Barnes Gully culvert.

As parts of the proposal would be carried out within and/or near a drainage line, an aquatic study was broadly performed in accordance with Aquatic Ecology in Environmental Impact Assessment (Lincoln-Smith, 2003).

The investigation involved traversing those accessible portions of the drainage line present, with notes taken on the; habitats observed within the sections being 'disturbed', the structure of their banks, the riparian communities, their course, and the presence of any snags or other features important to the lifecycle requirements of those aquatic species present or considered likely to occur.

## 6.5.2 Existing environment

### *Plant community types*

The study area and adjacent areas are mapped as non-native by the State Vegetation Type Map: Border Rivers Gwydir / Namoi Region. The nearest mapped native vegetation plant community types (PCT) are:

- PCT84: River Oak – Rough-barked Apple – red gum - box riparian tall woodland (wetland) of the Brigalow Belt South and Nandewar Bioregions. This PCT is mapped as occurring along Goonoo Goonoo Creek about 800 metres to the east of the study area.
- PCT599: Blakely's Red Gum – Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion. The nearest stand of this PCT is mapped as occurring about 1 kilometre to the east on the opposite side of Calala Lane.

No part of Barnes Gully has been mapped as PCT84 River Oak – Rough-barked Apple - red gum - box riparian tall woodland (wetland), and this PCT does not conform to any threatened ecological communities that are known to occur in the Nandewar bioregion.

### *Threatened ecological communities*

Six eucalypt trees (including those in the paddock) and a few ground cover species were identified in the study area during the survey. The groundcover species are Barbed-wire Grass (*Cymbopogon refractus*), Tussock (*Poa labillardieri*), Hedgehog Grass (*Echinopogon* sp.) and Austral Cranesbill (*Geranium solanderi*) which occur scattered through the study area but primarily adjacent to the adjacent paddock. These groundcover species commonly occur in many grassland, woodland and forest communities as well as disturbed areas, and the presence of these and the six eucalypts are not considered to constitute a stand of the White Box - Yellow Box - Blakely's Red Gum Woodland and Derived Native Grassland critically endangered ecological community (BC Act and EPBC Act).

### *Groundwater dependent ecosystems*

The search of the Bureau of Meteorology Atlas of Groundwater Dependent Ecosystems identifies no aquatic, subterranean or terrestrial groundwater dependent ecosystems within or immediately adjacent to the proposal footprint. High potential groundwater dependent ecosystems are located along Goonoo Goonoo Creek about 500 metres to the east.

### *Flora*

Several native and exotic plants were recorded during the field surveys. Refer to the Biodiversity Assessment in Appendix G for a list of species.

Of those plants recorded, none are:

- Listed, or currently being considered for listing by the EPBC Act or BC Act
- Identified on the list of Rare or Threatened Australian Plants.

While the threatened species Hawkweed (*Picris evae*) occurs in the locality, it does so in natural or only slightly modified contexts. Noting the extensive previous disturbance of the proposal footprint (including cropping and grazing), the potential for this species to occur is considered low.

### ***Fauna***

By the completion of the field survey, 20 native birds had been recorded within, or near, the proposal footprint. None of the native species recorded are listed, or currently being considered for listing, under the EPBC Act, BC Act and/or FM Act.

One hollow-bearing tree was recorded within the proposal footprint, however, the overall value of this tree for hollow-dependent threatened species (specifically microbats) is considered to be minimal.

### ***Aquatic habitats***

Upstream of Goonoo Goonoo Road Barnes Gully is within a concrete structure that is present under a commercial development. South-west of Craighends Lane, for a distance of about 380 metres, Barnes Gully is a regularly maintained grass and concrete storm water channel, the (linear) alignment and structure of which has been dramatically altered by urban development. Downstream of Goonoo Goonoo Road the alignment of this drainage line also appears to have been altered, with several linear sections present.

Barnes Gully traverses beneath Goonoo Goonoo Road through a five cell box culvert that is about 20 metres wide. The concrete bed (within the section of waterway investigated) is topped with fine sediment on which a high density of weeds (primarily on the eastern side) has established, with emergent aquatic plants present. Apart from the introduced Mosquito Fish, no fish were observed within the waterway.

### ***Weeds***

Of those introduced plant species recorded, none are listed:

- Under Schedule 3 of the NSW Biosecurity Regulation 2017
- As a 'priority weed' in the North West region
- As a Weed of National Significance.

### ***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 near the proposal footprint. Similarly, reference to the Critical Habitat register (Department of Agriculture, Water and the Environment) indicated no such area occurs in or near to the proposal footprint.

### ***Wildlife connectivity corridors***

The proposal footprint is not part of a significant vegetation corridor. Goonoo Goonoo Creek, more than about 500 metres to the east provides the nearest wildlife corridor. The small stands and/or isolated trees within and adjacent to the proposal footprint provide a highly fragmented link through the nearby urban and agricultural landscape.

### 6.5.3 Potential impacts

#### **Construction**

##### Removal of native vegetation

Based on a worst-case estimate, up to about 5.5 hectares of native (i.e. grasses, herbs and forbs) and exotic vegetation would require disturbance/removal to permit the proposal, including no more than six native trees; one of which was observed to be hollow-bearing, and suitable for habitation by vertebrate fauna. No threatened ecological communities would be affected.

Post-construction, disturbed areas not part of the road or pathways are expected to naturally regenerate or be landscaped.

One hollow-bearing tree (hollow diameter of about 20 millimetres) was recorded about 35 metres east of Goonoo Goonoo Road within an adjacent paddock; which was potentially available to threatened microbats.

##### Removal of threatened fauna habitat

One hollow-bearing tree would be removed to allow the construction of the eastern leg of the Craigends Lane roundabout. Though available for use by hollow-occupying threatened fauna, it is noted that the hollow nesting introduced Common Starling was observed near this feature. Where feral species and unusually abundant native species occur, competition for hollows limits their availability to other species.

The loss of this tree would not limit the extent of foraging or breeding habitat sites available within the surrounding area for hollow-dependent fauna. The overall value of this plant for hollow-dependent fauna is minimal, and its removal is not considered to have a significant adverse effect.

No other habitat for threatened fauna species would be affected.

##### Removal of threatened flora

No threatened plants were recorded or considered likely to occur within the area investigated; as such, the proposal is not expected to have an adverse impact on any threatened plant species.

##### Aquatic impacts

No major areas of aquatic habitat would be removed, modified or disturbed for the proposal. The proposal would not result in any fish species, aquatic-associated animals or their populations becoming extinct in the locality. Post-construction, the resources offered by this habitat type for those species expected, particularly any fish (i.e. eels) that may traverse along Barnes Gully, would remain and be available for their lifecycle requirements.

While habitat of the Murray Cod could occur within 10 kilometres of the proposal footprint, Barnes Gully does not provide suitable habitat for this species.

##### Injury and mortality

The proposal would affect about six trees, groundcover vegetation, shrubs and natural ground debris. Given the proposal would be conducted within a previously disturbed and modified environment, it is not likely that sheltering animals would be injured during works. No bird nests were observed within the study area during the investigation.

#### **Operation**

##### Wildlife connectivity and habitat fragmentation

Given the proposal footprint is partially located within an existing road network and a highly fragmented landscape, connectivity is currently limited.

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 moving through the area. Ground traversing species, including nocturnal mammals, if currently doing so, would remain able to negotiate the road.

#### 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 road. Clearing and opening up of new vegetation edges can facilitate the recruitment of weed species and provide opportunity for the establishment of other weed species. While this is the case, edge effects beyond those that are currently occurring within the proposal footprint are not expected to be exacerbated due to the proposal.

#### Invasion and spread of weeds

With the implementation of appropriate safeguards, the proposal is not expected to result in the further spread of weeds at the site.

#### Invasion and spread of pests

Several introduced fauna species were recorded within the proposal site and adjacent areas during the investigation. Beyond existing levels, the proposal is unlikely to introduce or increase the presence of pest species within the study area.

#### Invasion and spread of pathogens and disease

There is a risk that the proposal would introduce, spread or exacerbate the plant diseases *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.

#### 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 road network, 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 BC Act or FM Act 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 EPBC Act.

#### 6.5.4 Safeguards and management measures

Table 6-33: Safeguards and management measures – Biodiversity

Impact	Environmental safeguards	Responsibility	Timing	Reference
Biodiversity impacts	A Flora and Fauna Management Plan will be prepared in accordance with the <i>Biodiversity Guidelines: Protecting and Managing Biodiversity on RTA Projects</i> (RTA, 2011) and will be implemented as	Contractor	Pre-construction	Section 4.8 of QA G36 Environment Protection

Impact	Environmental safeguards	Responsibility	Timing	Reference
	<p>part of the CEMP. The Flora and Fauna Management Plan will include, but not be limited to:</p> <ul style="list-style-type: none"> <li>Plans showing areas to be cleared and areas to be protected, including exclusion zones, protected habitat features and revegetation areas</li> <li>Pre-clearing survey requirements</li> <li>Procedures for unexpected threatened species finds and fauna handling</li> <li>Procedures in the event of injury to native fauna</li> <li>Protocols to manage weeds and pathogens</li> <li>Measures for the protection of aquatic habitats.</li> </ul>			
Biodiversity impacts	<p>Pre-clearing survey will be conducted and will:</p> <ul style="list-style-type: none"> <li>Confirm clearing boundaries, exclusion zones, protected habitat features and revegetation areas prior to starting work</li> <li>Identify, in toolbox talks, where biodiversity controls are located on the site.</li> </ul>	Contractor	Pre-construction	Additional measure
Spread of weeds	<p>Weed management will occur in accordance with the <i>Biodiversity Guidelines, Guide 6</i> (Roads and Maritime, 2016) and include:</p> <ul style="list-style-type: none"> <li>The Identification of weeds on site (confirmed during pre-clearing survey)</li> <li>Weed management priorities and objectives, exclusion zones, protected habitat features and revegetation areas prior to starting work within or directly next to the site</li> <li>The location of weed infested areas</li> <li>Weed control methods</li> <li>Measures to prevent the spread of weeds, including machinery hygiene procedures and disposal requirements</li> <li>A monitoring program to measure the success of weed management</li> <li>Communication with local Council noxious weed representative.</li> </ul>	Contractor	Pre-construction	Additional measure
Spread of diseases affecting plants	<p>Management measures will be implemented to control and/or prevent the introduction and/or spread of</p>	Contractor	Construction	Additional measure

Impact	Environmental safeguards	Responsibility	Timing	Reference
	disease-causing agents such as bacteria and fungi in accordance with the <i>Biodiversity Guidelines, Guide 7</i> (Roads and Maritime, 2016)			
Unexpected threatened species finds	If unexpected flora or fauna are discovered on site stop work immediately and implement the Roads and Maritime <i>Unexpected Threatened Species Find Procedure</i> in the <i>Biodiversity Guidelines, Guide 1</i> (Roads and Maritime, 2016).	Contractor	Construction	Additional measure

### 6.5.5 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. Offsets under the Guideline for Biodiversity Offsets are therefore not required.

## 6.6 Hydrology, flooding and groundwater

### 6.6.1 Methodology

The assessment of potential hydrology, flooding and groundwater impacts was carried out with reference to available existing information including the Tamworth City-Wide Flooding Investigation (Lyll and Associates, 2019).

### 6.6.2 Existing environment

#### *Catchments and watercourses*

Tamworth is located on the Peel River in the headwaters of the Namoi River basin. The Peel River has a catchment area of about 3,080 square kilometres, which includes the Cockburn River (1,130 square kilometres) and Goonoo Goonoo Creek (662 square kilometres) catchments (Lyll and Associates, 2019).

Large parts of the Peel River and Cockburn River catchments have been cleared for agricultural purposes, although wooded areas are located in their steeper headwater regions. Two water supply dams are located in the Peel River catchment upstream of Tamworth, the largest of which is Chaffey Dam which controls a catchment area of about 406 square kilometres (Lyll and Associates, 2019).

The proposal footprint is within the Goonoo Goonoo Creek catchment and traverses Barnes Gully, which is a second order stream (under the Strahler stream classification system). Barnes Gully passes beneath Goonoo Goonoo Road through a five cell box culvert that is about 20 metres wide.

#### *Flooding*

Tamworth City-Wide Flooding Investigation (Lyll and Associates, 2019) indicates some inundation upstream and downstream of the Barnes Gully culvert in the 100 year Annual Recurrence Interval flood event (depths to about 0.5 metres) with Goonoo Goonoo Road remaining above the flood level. Some highly localised flooding in the same area is identified for the 100 year Annual Recurrence Interval flood event (with depths

to about 0.3 metres). More substantial inundation would affect the areas north of Barnes Gully, including Goonoo Goonoo Road (to depths greater than 1.0 metre) in the Probable Maximum Flood.

It is understood that during the larger wet weather events, the current road formation directs flows to the frontage of residential properties on the eastern side of Goonoo Goonoo Road, north of Barnes Gully.

### **Groundwater**

Groundwater beneath the site is expected to be present in a semi-confined or confined aquifer within residual clays or bedrock, at depths greater than 10 metres below ground surface.

Groundwater beneath the site is anticipated to flow generally to the east and north-east and discharge to Barnes Gully and further to Goonoo Goonoo Creek and the Peel River about 3.5 kilometres from the site.

## **6.6.3 Potential impacts**

### **Construction**

There is some potential for a broader flood event to affect the proposal footprint during construction. The impact of a large flood would depend on the stage of construction at the time of the event, and the intensity of the rainfall event.

Flooding during construction could potentially impact areas within and near the construction area (including the construction compound) and/or cause damage to construction plant and equipment. Construction sites could also increase potential runoff to the catchments during heavy rainfall due to an increase of impermeable surface. However, this increase would be relatively small in terms of the overall catchment area, and unlikely to significantly increase the severity of any flood events.

Construction compounds and materials stockpiles may also increase potential runoff to the catchments. The potential impact would be localised and most likely to occur as a result of poorly located stockpiles or compound sites, for example, locating compounds or stockpiles in drainage paths.

During construction, there is also the potential for existing drainage infrastructure to be partially blocked or temporarily diverted due to earthwork and other construction activities. Blocking or diverting local drainage lines may result in local flooding upstream of the construction areas. Diverting drainage lines may also create local areas of flooding and scour.

Any interception of groundwater during construction would be minor and unlikely to affect groundwater levels in the locality.

The temporary potential impacts referred to above expected to be minor if they occur and would be managed through the implementation of the proposed safeguards.

### **Operation**

#### **Hydrology and drainage**

The proposal would result in a moderate increase in impermeable surfaces (and therefore some additional runoff) due the construction of widened and additional road surfaces. Provision of kerb and gutter may also increase the velocity of flows to Barnes Gully. The drainage design (longitudinal and cross drainage) would be developed to adequately accommodate increased flows and any changes in flow characteristics. The need for downstream treatments of Barnes Gully (to minimise scour potential would be determined during detailed design.

## Flooding

The proposal would change the existing road formation, increase the extent of impermeable surfaces and result in some changes to flow characteristics. Further assessment will be carried out during detailed design to identify any increases in flood extents or depths on private property. The detailed design will respond to any identified flooding impacts.

## Groundwater

The proposal is not expected to result in any appreciable changes to existing groundwater levels (though groundwater drawdown or changes to groundwater recharge) or to the groundwater contribution to the base flow in nearby watercourses.

### 6.6.4 Safeguards and management measures

Table 6-34: Safeguards and management measures – Hydrology, flooding and groundwater

Impact	Environmental safeguards	Responsibility	Timing	Reference
Flooding and hydrology	Staging for the construction of the proposal will consider adequate stormwater flow paths (including diversions and temporary connections as required) to be implemented and maintained during construction to minimise the potential on-site or upstream flooding.	Contractor	Construction	Additional measure
Flooding and hydrology	A flood management procedure will be prepared to detail procedures to be implemented where extreme weather is predicted and where there is a risk of flooding affecting the work site and compound, including removal and storage of plant and equipment and securing of site.	Contractor	Construction	Additional measure
Flooding and hydrology	Further investigation into any flooding impacts on private property will occur with the purpose of avoiding or minimising impacts.	Transport for NSW	Detailed design	Additional measure

## 6.7 Soils, contamination and water quality

### 6.7.1 Methodology

Soils information was sourced from available reference material including soil landscape maps and soils data from the Department of Planning, Industry and Environment eSpade system. Emphasis was placed on identifying relevant limitations that would affect the construction or operation of the proposal.

The assessment of contamination was informed by the Phase 1 Preliminary Site Investigation conducted by Hazmat Services and included in Appendix H.

## 6.7.2 Existing environment

### Soils

Soils within the investigation area are identified as being within the Duri soil landscape (Banks, 2001). The Duri soil landscape is a residual soil landscape which is dominated by sites where deep soils have formed from in situ weathering of parent materials. The landscape limitations are identified as including gully erosion risk, inherent erosion risk; localised permanently high water tables, localised known discharge area, localised known recharge area, localised high run-on, localised dryland salinity, localised seasonal waterlogging, localised shallow soils, sheet erosion risk, localised wind erosion risk (under traditional cultivation).

The erodibility of topsoils in this landscape is identified as high for both concentrated and non-concentrated flows and very low for wind.

### 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 footprint is class 4 (Moderate capability). Class 4 land is defined as follows:

*Moderate capability land: Land has moderate to high limitations for high-impact land uses. Will restrict land management options for regular high-impact land uses such as cropping, high-intensity grazing and horticulture. These limitations can only be managed by specialised management practices with a high level of knowledge, expertise, inputs, investment and technology.*

### Salinity

Salinity is the accumulation of salts in soil and water to levels that impact on human and natural assets (e.g. plants, animals, aquatic ecosystems, water supplies, agriculture and infrastructure). Salinity occurs where salt in the landscape is mobilised and redistributed closer to the soil surface and/or into waterways by rising groundwater. Rising groundwater is commonly caused by removal of deep-rooted vegetation such as trees and perennial pasture. It is also caused by changes in soil permeability and structure which restrict groundwater movement. Compaction and cut / fill works can be contributors.

Soil sampling sites (eSpade) on Barnes Gully (both upstream and downstream) of the proposal footprint have recorded salting as either evident or strongly evident.

### Contamination

The Phase 1 Preliminary Site Investigation for the proposal identified five Areas of Environmental Concern (AEC). These AECs and associated contaminants of potential concern (CoPCs) are described in Table 6-35. For reporting purposes the proposal footprint has been divided into the following sections:

- Section 1: Between Calala Lane and The Ringers Road; and
- Section 2: Between The Ringers Road and Jack Smyth Drive.

Table 6-35: Areas of Environmental concern

Section	AEC	Potential contaminating activity	Contaminants of concern*	Risk of contamination
1, 2	Goonoo Goonoo Road and associated intersection upgrades	Uncontrolled importation of fill of unknown origin	Heavy metals, TRH, BTEX, PAH, OCP, PCB, asbestos	Low
1	BP Truckstop	Fuel leakages from underground petroleum storage system	TRH, BTEX, PAH	Low / medium
1	Barnes Gully Drainage Structure	Unknown contamination status of water	Heavy metals, TRH, BTEX, PAH, OCP, OPPs, nutrients (nitrogen and phosphorus)	Low
2	United Petroleum	Petroleum leakages from underground petroleum storage system	TRH, BTEX, PAH	Low
2	Caltex petrol station	Petroleum leakages from underground petroleum storage system	TRH, BTEX, PAH	Medium

\* Heavy metals = arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc; TRH = Total Recoverable Hydrocarbons, BTEX = Benzene, Toluene, Ethylbenzene and Xylenes; PAH = Polycyclic Aromatic Hydrocarbons; OCP = Organochlorine Pesticides; PCB = Polychlorinated Biphenyls; OPP = Organophosphorus Pesticides

### Water quality

The quality of the water entering local waterways within the investigation area would be largely a function of the contaminants on roads and activities on adjacent areas. Common road runoff pollutants include gross pollutants and litter, sediment and suspended solids, toxic organics, nutrients, heavy metals and hydrocarbons. Runoff from agricultural lands commonly includes nitrogen, phosphorus, and sediment.

### 6.7.3 Potential impacts

#### Construction

##### Water quality

Potential water quality impacts would mainly relate to soil loss from erosion of exposed soils and stockpiles, and potential sedimentation of surrounding land and waterways, including Barnes Gully which cross the proposal footprint. Work activities with the potential to expose soils include:

- Earthworks within the construction impact area
- Drainage works
- Vehicle movements
- Removal and installation of general fill material
- Stockpiling
- Vegetation removal
- Grubbing processes

- Landscaping.

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.

Saline soils could impact on sub-surface structures constructed for the proposal, impact on vegetation growth and make reuse of soil excavated for the proposal unsuitable.

## Contamination

The risk of contamination for most of AECs was considered to be low. There is potential for complete exposure pathways to human and ecological receptors should soil and surface water contamination exist. Potential sources, pathways and receptors of contamination are summarised in Table 6-36.

Table 6-36: Potential sources, pathways and receptors of contamination

Source	Pathway	Receptor	Comment
Potentially contaminated fill	Ingestion and dermal contact	Current and future site users	There is potential for site users to come in direct contact with contaminated fill, therefore a complete pathway potentially exists.
	Inhalation of dust and vapours	Current and future site users and surrounding site users	There is potential for site users and surrounding land users to be exposed to dust and vapours from the site and therefore a complete pathway potentially exists.
	Leaching of contaminants into shallow soils	Soil biota, native plants and transitory wildlife across the Site	There is potential for surface and shallow soils to be present which may be impacted by contaminating activities, and therefore a complete pathway potentially exists to ecological receptors.
	Leaching of contaminants into groundwater	Groundwater beneath the Site and Barnes Gully	Given that contaminated soils, if present, are likely to be in surface or shallow soils, and the groundwater beneath the Site is anticipated to at depths greater than 10 metres below ground surface, a potentially complete pathway is not considered to exist.
	Surface water runoff	Drainage channels and Barnes Gully	Barnes Gully is the main drainage channel for the site and any contaminants are likely to run across impermeable bitumen to stormwater or via downward percolation through soils. There is potential for contaminated surface water runoff to enter Barnes Gully. Therefore, a potentially complete pathway is considered to exist.

Source	Pathway	Receptor	Comment
Fuel leakages from underground petroleum storage system / vehicles	Ingestion and dermal contact	Current and future site users	There is potential for site users and surrounding land users to be exposed to hydrocarbons due to the leakages from the underground petroleum storage systems and vehicles. Therefore, a complete pathway potentially exists.
	Inhalation of dust and vapours	Current and future site users and surrounding Site users	There is potential for site users and surrounding land users to be exposed to hydrocarbons due to the leakage from underground petroleum storage systems. Therefore, a complete pathway potentially exists.
Unknown contamination status of water in Barnes Gully	Leaching of contaminants into groundwater	Groundwater beneath the site and Barnes Gully	Given that contaminated soils, if present, are likely to be in surface or shallow soils, and the groundwater beneath the Site is anticipated to at depths greater than 10 metres below ground surface, a potentially complete pathway is not considered to exist.
	Leaching of contaminants into shallow soils	Soil biota, native plants, and transitory wildlife across the site	There is potential for surface and shallow soils to be impacted by due to leaking underground petroleum storage systems, therefore a complete pathway potentially exists to ecological receptors.
	Ingestion and dermal contact	Current and future site users	There is potential for site users to come into direct contact with water of unknown contamination status in Barnes Gully. Therefore, a complete pathway potentially exists.
Unknown contamination status of water in Barnes Gully	Progression of water from surfaces	Stormwater systems	There is a potential for contaminated runoff from the site to infiltrate nearby stormwater systems, therefore a complete pathway potentially exists to ecological receptors.
	Leaching of contaminants into ground surface	Soil biota, native plants, and transitory wildlife across the site	There is potential for surface and shallow soils to be impacted by contaminated water; therefore, a complete pathway potentially exists to ecological receptors.
	Leaching of contaminants into groundwater	Groundwater and soils beneath the site and Barnes Gully	Contaminated soils and water, if present, are likely to be on the surface or sub-surface. The groundwater beneath the Site is anticipated to at depths greater than 10 metres below ground surface, a potentially complete pathway is not considered to exist.

### Land and soil capability

While the proposal would affect moderate capability agricultural land, the area to be affected is small in the context of the wider supply of this type of land in the locality. The loss of this land also needs to be seen in the context of the proposed future urbanisation of the area to the east of Goonoo Goonoo Road.

### Operation

There is expected to be minimal impact on soils and water quality following completion of construction, once disturbed areas have been stabilised and scour protection has been installed at the proposed new culvert location. The additional road space proposed is relatively small in the context of the broader road network and the receiving catchment and therefore changes in water quality due to road runoff are expected to be minor.

It is not expected that the proposal would have any ongoing contaminated land impacts after the completion of construction because any identified contaminated material would be removed off site to be legally disposed of or managed safely onsite.

#### 6.7.4 Safeguards and management measures

Table 6-37: Safeguards and Management measures – soil and water

Impact	Environmental safeguards	Responsibility	Timing	Reference
Soil and water	A Soil and Water Management Plan (SWMP) will be prepared and implemented as part of the CEMP. The SWMP will identify all reasonably foreseeable risks relating to soil erosion and water pollution and describe how these risks will be addressed during construction.	Contractor	Detailed design Pre-construction	Section 2.1 of QA G38 Soil and Water Management
Soil and water	A site specific Erosion and Sediment Control Plan/s will be prepared and implemented as part of the Soil and Water Management Plan	Contractor	Detailed design Pre-construction	
Contamination	A Detailed Site Investigation (“DSI”) will be undertaken prior to construction works commencing, targeting the AECs where exposure pathways are potentially complete. The DSI should include, but not be limited to: <ul style="list-style-type: none"> <li>An assessment of the extent and nature of uncontrolled filling material throughout the road corridor of the Site (as well as the verge and intersections);</li> <li>An assessment of soil and groundwater contamination across the areas of the Site adjacent to the service stations; and</li> <li>An assessment of surface water contamination within the Barnes Gully drainage structure.</li> </ul>	Transport for NSW	Detailed design	Additional measure
Contamination	If contaminated areas are encountered during construction, appropriate control measures will be implemented to manage the immediate risks of contamination. All other work 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 Environment Manager and/or EPA.	Contractor	Detailed design Pre-construction	Section 4.2 of QA G36 Environment Protection
Accidental spills	A site specific emergency spill plan will be developed, and include spill management measures in accordance with the Transport for NSW <i>Code of</i>	Contractor	Detailed design Pre-construction	Section 4.3 of QA G36 Environment Protection

Impact	Environmental safeguards	Responsibility	Timing	Reference
	<i>Practice for Water Management</i> (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 Transport for NSW and EPA officers).			
Salinity	Soil salinity testing will be carried out at the area to be disturbed around Barnes Gully prior to construction to further assess salinity risks and implement appropriate controls.	Contractor	Detailed design Pre-construction	Additional measure

## 6.8 Air quality

### 6.8.1 Methodology

A qualitative assessment of potential changes in local air quality during the construction of the proposal is provided in this section. Potential impacts on local air quality and nearby sensitive receivers were identified and assessed through a desktop review of the construction impact area, potential pollutants generated by construction, available background monitoring data and local meteorological data.

To assess potential operational air quality impacts, dispersion modelling was undertaken using the Transport for NSW Tool for Roadside Air Quality (TRAQ) model. The model has been specifically developed for roadside air quality impact assessments and uses a conservative approach to estimate the concentrations of air pollutants near to roadways. It should also be noted that like any other screening model, the TRAQ model will inherently overestimate the likely emissions, but more accurately shows the relative change that can occur when changes are made to a road.

For the TRAQ assessment, two-way traffic of 11,364 vehicles per day was assumed (current volumes), with a speed of 60 kilometres per hour, a flat grade and a link length of 1.5 kilometres. The model was run for both the existing two-lane undivided road and the proposed four lane divided road.

### 6.8.2 Existing environment

Sensitive receivers for air quality include known or likely future locations where people are likely to work or reside. This includes but is not limited to dwellings, schools, hospitals, offices or public recreational areas. The following sensitive receivers have been identified:

- Residences along the eastern side of Goonoo Goonoo Road, north of Barnes Gully
- Accommodation providers on the western side of Goonoo Goonoo Road
- Commercial premises on the western side of Goonoo Goonoo Road
- Pedestrians and cyclists.

The nearest EPA air quality monitoring site is in Hyman Park, off Robert Street and Hillvue Road. Background monitoring data collected from this site includes data for fine particulate matter with aerodynamic diameters of 10 micrometres ( $\mu\text{m}$ ) or less ( $\text{PM}_{10}$ ) and 2.5  $\mu\text{m}$  or less ( $\text{PM}_{2.5}$ ). A review of 2020 data identified eight exceedances of EPA assessment criteria for  $\text{PM}_{10}$  and four exceedances for  $\text{PM}_{2.5}$ .

### 6.8.3 Criteria

Relevant EPA air quality assessment criteria in the publication Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (Environment Protection Authority, 2016) is summarised in Table 6-38.

Table 6-38: Air quality impact assessment criteria

Pollutant	Averaging period	Concentration	
Sulfur dioxide (SO <sub>2</sub> )	10 minutes	25 pphm	712 µ/m <sup>3</sup>
	1 hour	20 pphm	570 µ/m <sup>3</sup>
	24 hours	8 pphm	228 µ/m <sup>3</sup>
	Annual	2 pphm	60 µ/m <sup>3</sup>
Nitrogen dioxide (NO <sub>2</sub> )	1 hour	12 pphm	246 µ/m <sup>3</sup>
	Annual	3 pphm	62 µ/m <sup>3</sup>
Photochemical oxidants (as ozone)	1 hour	10 pphm	214 µ/m <sup>3</sup>
	4 hours	8 pphm	171 µ/m <sup>3</sup>
PM <sub>2.5</sub>	24 hours	-	25 µ/m <sup>3</sup>
	Annual	-	8 µ/m <sup>3</sup>
PM <sub>10</sub>	24 hours	-	50 µ/m <sup>3</sup>
	Annual	-	25 µ/m <sup>3</sup>
Carbon monoxide (CO)	15 minutes	87 ppm	100 mg/m <sup>3</sup>
	1 hour	25 ppm	30 mg/m <sup>3</sup>
	8 hours	9 ppm	10 mg/m <sup>3</sup>
Deposited dust	Annual	2 gm <sup>2</sup> /month	4 gm <sup>2</sup> /month
		Max increase	Max total

### 6.8.4 Potential impacts

#### Construction

Potential impacts associated with the proposal include minor emissions from machinery (e.g. delivery vehicles, construction plant) and dust. Emissions from construction vehicles/ equipment would be minor and short term. Dust could be generated from a variety of activities including:

- Clearing vegetation
- Earthworks
- Stripping, stockpiling and managing topsoil
- Road sub-grade preparation
- Transportation and handling of soils and materials
- Line marking.

The total amount of dust would depend on the silt and moisture content in the soil, prevailing weather conditions and the types of activities being carried out. Depending on wind speed and direction, short-term impacts could be experienced at all nearby sensitive receivers.

Nuisance dust can be expected to impact on residential and commercial areas when annual average dust deposition levels exceed 4g/m<sup>2</sup>/month. The mobilisation of dust associated with the proposal is expected to be below nuisance levels through the implementation of appropriate mitigation measures.

During the application of asphalt and line marking, odours may be generated that impact adjacent residential areas or users of open space areas. These impacts would be limited to the duration of certain activities during construction and no long-term odour impacts would result from the proposal.

### Operation

While general traffic growth is expected to impact on local air quality through vehicle emissions, the proposal could reduce emissions associated with idling of vehicles and stop start movements, which typically characterise congested conditions. This is likely to represent an air quality benefit during peak periods.

The model predictions for carbon monoxide, nitrogen dioxide and particulate matter concentrations during operation of the proposal at opening were all compliant with the relevant EPA criteria, including concentrations at the kerb.

With the provision of sealed shoulders and kerb/gutter, there would be reduced dust mobilisation from the currently unsealed road shoulders / verges due to high winds or vehicles accelerating or braking.

### 6.8.5 Safeguards and management measures

Table 6-39: Safeguards and management measures – air quality

Impact	Environmental safeguards	Responsibility	Timing	Reference
Air quality	<p>An Air Quality Management Plan (AQMP) will be prepared and implemented as part of the CEMP. The AQMP will include, but not be limited to:</p> <ul style="list-style-type: none"> <li>• Potential sources of air pollution (including site compound operation)</li> <li>• Air quality management objectives consistent with any relevant published EPA guidelines</li> <li>• Mitigation and suppression measures to be implemented</li> <li>• Methods to manage work during strong winds or other adverse weather conditions.</li> </ul>	Contractor	Construction	Section 4.4 of QA G36 Environment Protection

## 6.9 Socio-economic

### 6.9.1 Methodology

The socio-economic assessment was prepared in accordance with the Environmental Impact Assessment Practice Note: Socio-economic assessment (Transport for NSW, 2020). The proposal is anticipated to have some short-term localised impacts (and longer-term benefits) to the communities surrounding the proposal site and therefore a basic level of socio-economic assessment was carried out.

The socio-economic assessment:

- Identified the existing socio-economic characteristics of the locality through desktop research including reference to 2016 Census data and local council websites.
- Identified the types and locations of social infrastructure that could be affected by the proposal
- Identified the location of businesses that could be affected by the proposal
- Considered the outcome of other assessments containing relevant socio-economic themes, namely traffic/transport (Section 6.1), noise/vibration (Section 6.2) and landscape/visual (Section 6.3).

Consistent with the practice note, the socio-economic assessment has evaluated the significance of impacts by reference to sensitivity (vulnerability to change and capacity to adapt) and magnitude (scale, duration, intensity and scope of the proposed works).

## 6.9.2 Existing environment

### *Population and demography*

Key population and demographic information for Tamworth Significant Urban Area (SUA) is summarised below in Table 6-40. It is notable that the Aboriginal and/or Torres Strait Islander make up a substantially higher percentage (around four times higher) of population when compared to NSW (2.9 per cent) and Australia (2.8 per cent).

Table 6-40: Key population and demographic information (2016 Census)

Indicator	Tamworth SUA
Population	41,006
Age 0-14 years	20.5%
Age 15-65 years	61.7 %
Age 65 and over	17.8%
Aboriginal and/or Torres Strait Islander	11.3%

### *People with disability*

The number of people who need assistance in their day to day lives (self-care, body movements or communication) because of a disability, long-term health condition, or old age was recorded as 2,362 (5.8 per cent). The percentage of people requiring assistance for NSW is recorded as 4.6 per cent.

### *Travel to work*

Travel to work data for Tamworth SUA is as follows:

- Car as driver – 72.7% (NSW 57.8%, Australia 61.5%)
- Car as passenger – 6.4% (NSW 4.3%, Australia 4.6%)
- Worked at home – 3.4% (NSW 4.8%, Australia 4.7%)
- Walked only – 3.3% (NSW 3.9%, Australia 3.5%)
- Truck – 1.3% (NSW 1%, Australia 0.8%)
- Public transport – 0.7% (NSW 16%, Australia 11.5%)

This data shows a high level of reliance on the car and a limited role for public transport.

## ***Income and employment***

Key income and employment information for Tamworth SUA is summarised in Table 6-41.

Table 6-41: Key income and employment data (2016 Census)

<b>Indicator</b>	<b>Tamworth SUA</b>
Median household income (weekly)	\$1,184 (NSW \$1,486, Australia \$1,438)
Unemployment	6.4%
Major employment industries	Hospitals (except Psychiatric Hospitals) 5.6% Secondary Education 3.1% Supermarket and Grocery Stores 2.8% Takeaway Food Services 2.5% Meat Processing 2.4%

## ***Community values***

The Tamworth Regional Council Community Strategic Plan 2017-2027 (Tamworth Regional Council, 2017) identifies the following six guiding principles which are expected to be indicative of widely held community values:

- Governance
- Social justice
- Equity
- Access
- Participation
- Rights.

Based on an understanding of the locality characteristics it is expected that community values held by local residents and workers would also include:

- Employment security for local residents and workers
- Continued viability for local businesses
- Maintained or improved local character and amenity
- Maintained or improved community safety and security
- Continued or improved recreational opportunities
- Continued or improved access and connectivity to facilities and services.

The above values relating to businesses, connectivity and safety were prominent in the community feedback received on the concept design. Refer to Chapter 5 (Consultation).

## ***Social infrastructure***

Key social infrastructure and/or community facilities have been identified within or immediately adjacent to the proposal footprint include (refer also to Figure 6-7):

- Tamworth Regional Entertainment Centre, Greg Norman Drive, Hillvue
- Australian Equine and Livestock Events Centre, 503 Goonoo Goonoo Road, Hillvue
- Northern Inland Centre of Sporting Excellence, Jack Smythe Drive, Hillvue

- Tamworth Truck Drivers Memorial, Hillvue
- Places of worship.

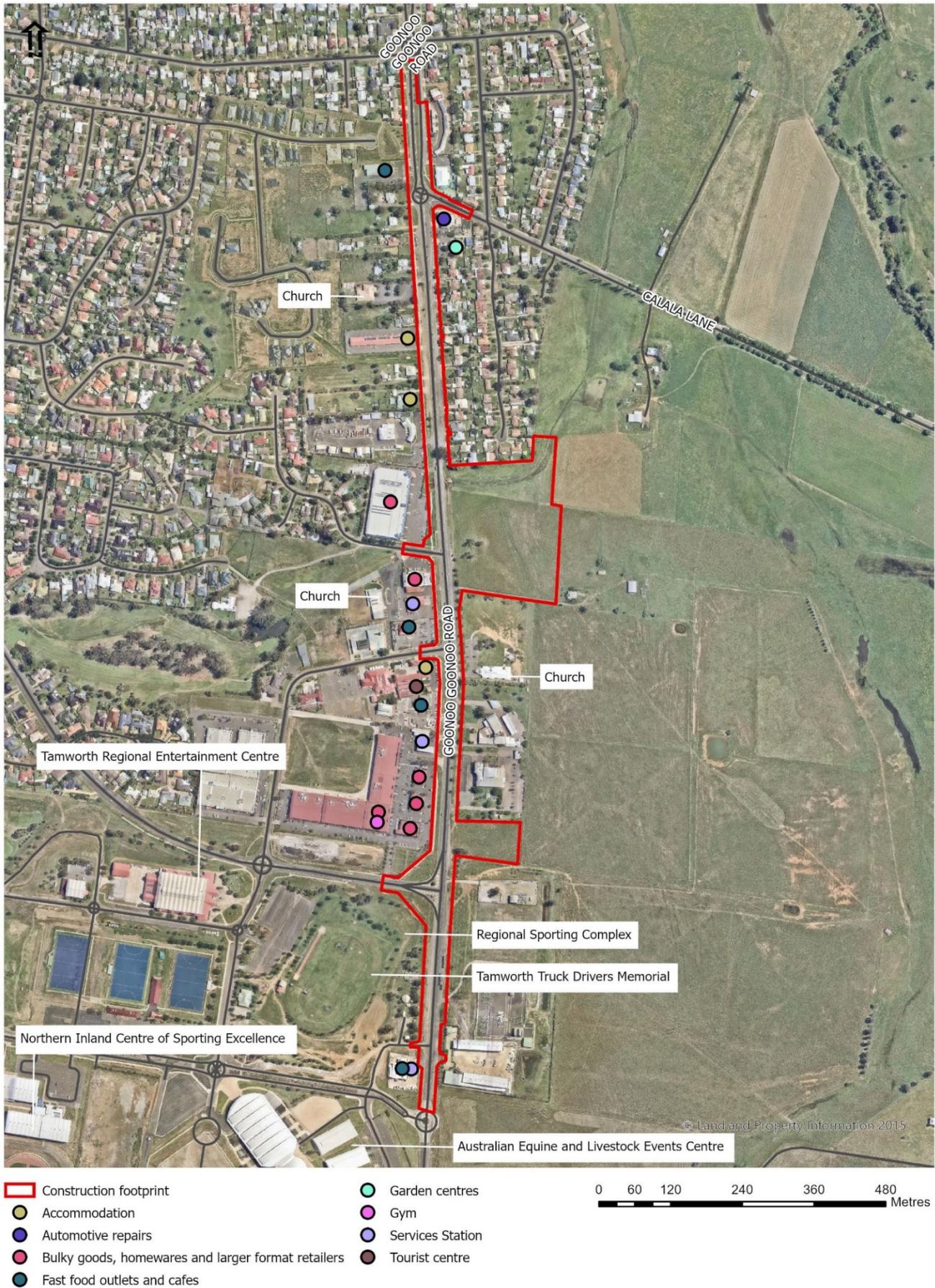


Figure 6-7: Social infrastructure and businesses

## Business and industry

Tamworth has a Gross Regional Product of \$3.65 billion, provides more than 29,000 jobs and has 5,683 businesses (ID Community, 2021).

Businesses adjacent to the proposal footprint include (type and (number)):

- Automotive services (1)
- Garden centres (1)
- Accommodation providers (motels, motor inns) (3)
- Bulky goods, homewares and larger format retailers (about 10)
- Services stations (3)
- Fast food outlets and cafes (about 5)
- Gym (1)
- Tourist centre (1).

### 6.9.3 Potential impacts

#### Construction

Construction activities are associated with the proposal and would be localised and extend over a period of up to about 12 months. No substantial impacts on community values or changes to way of life or health and wellbeing are expected. The potential socio-economic impacts that could occur during construction are assessed in Table 6-42.

Table 6-42: Potential socio-economic impacts – construction

Issue	Comment	Sensitivity	Magnitude	Significance
Property impacts	The proposal does not require acquisition of any residential dwellings and the partial acquisition would allow business operations to continue. There are no expected impacts associated with property acquisition such as relocation, severance and/or reduced community cohesion.	Low High capacity to absorb change.	Negligible	Negligible
Local amenity	During construction there would be some temporary socio-economic impacts related to noise and loss of amenity (for residences and businesses fronting Goonoo Goonoo Road). Measures to address these impacts have been detailed in Section 6.2 (noise), Section 6.3 (visual) and Section 6.7 (air quality).	Moderate Some ability to absorb or adapt over the duration of the works.	Moderate Noise impacts over the construction period due to proximity of receivers and night works contribute to this rating.	Moderate
Access and connectivity	During construction there would be temporary pedestrian/cyclist diversions	Low High ability to absorb or adapt over	Low	Low

Issue	Comment	Sensitivity	Magnitude	Significance
	to ensure safety around the construction site.	the duration of the works	Diversions would be relatively short.	
Business impacts (access changes and parking)	<p>During construction there may be some temporary changes to business access (for example access under traffic control). Without appropriate mitigation, businesses and business access points may become less visible.</p> <p>There would be some temporary loss of on street parking along Goonoo Goonoo Road to allow for road construction activities. Most adjacent businesses have adequate of street parking provided consistent with local planning controls.</p>	<p>Low</p> <p>High ability to absorb or adapt over the duration of the works.</p>	<p>Low</p> <p>Any changes would be minor and confined to business operating hours where possible.</p>	Low
Business impacts (reduced amenity)	<p>Noise, vibration, visual impacts or dust generated at construction sites may impact businesses which are more reliant on a specific type of working environment or external environment. Businesses most likely to be impacted are those that have more sensitive uses such as educational establishments, health facilities, therapists or those that are more reliant on a quiet outside environment such as cafes and restaurants.</p>	<p>Low</p> <p>High ability to absorb or adapt over the duration of the works.</p>	<p>Low</p> <p>Due to set back distances amenity impacts (primarily noise) are expected to be manageable.</p>	Low
Social infrastructure	There are not expected to be direct impacts on the social infrastructure identified in Section 6.2.2. Access to regional sporting and entertainment facilities, and to the Tamworth Truck Drivers Memorial would remain available during construction.	<p>Moderate</p> <p>Some ability to absorb or adapt over the duration of the works.</p>	<p>Low</p> <p>Access would remain available. Some amenity impacts which are manageable.</p>	Moderate-Low

### Operation

Following completion of the proposal, there are expected to be few adverse social economic impacts, although some operational noise and visual impacts have been identified (refer to Section 6.2 and Section 6.3 respectively). Socio-economic benefits from the proposal would include:

- Enhanced connectivity and safety for pedestrians (with improved crossings, shared paths and footpaths)
- Improved public domain with more space for pedestrians and improved landscaping

- Improved safety and traffic efficiency for road users
- Improved access for residents, businesses and event venues.

The proposed left-in left-out only from The Ringers Road to Goonoo Goonoo Road (southbound) may represent a minor inconvenience for some people. This is adequately offset by the improved safety. The alternatives to this movement would be a U-turn at the proposed Craigends Lane roundabout, or a right turn from Greg Norman Drive to Goonoo Goonoo Road.

#### 6.9.4 Safeguards and management measures

Table 6-43: Safeguards and management measures – socio-economic

Impact	Environmental safeguards	Responsibility	Timing	Reference
Socio-economic	<p>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):</p> <ul style="list-style-type: none"> <li>• Mechanisms to provide details and timing of proposed activities to affected residents, including changed traffic and access conditions</li> <li>• Contact name and number for complaints.</li> </ul> <p>The CP will be prepared in accordance with the <i>Community Involvement and Communications Resource Manual</i> (RTA, 2008)</p>	Contractor	Detailed design / pre-construction	Standard measure

## 6.10 Other impacts

### 6.10.1 Existing environment and potential impacts

Table 6-44: Existing environment and potential impacts – other issues

Environmental factor	Existing environment	Potential impacts
Climate change	<p>The Australian climate is likely to experience a greater frequency and severity of extreme weather events due to climate change. Increased average temperatures and reduced annual rainfall are also expected.</p>	<p>The following construction activities would result in the release of greenhouse gas emissions:</p> <ul style="list-style-type: none"> <li>• Fossil fuel combustion relating to the use of plant, equipment and vehicles</li> <li>• Electricity use</li> <li>• Embedded emissions from manufacture and delivery of materials</li> </ul> <p>Given the scope and duration of the proposal, the impact of the emissions would be minor in nature.</p> <p>No climate change adaption requirements have been identified for the proposal.</p>
Waste and resource use	<p>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 <i>Waste Avoidance and Resource Recovery Act 2001</i>. These resource management hierarchy principles, in order of priority are:</p> <ul style="list-style-type: none"> <li>• Avoid unnecessary resource consumption as a priority</li> <li>• Avoidance is followed by resource recovery (including reuse of materials, reprocessing, recycling and energy recovery)</li> <li>• Disposal is undertaken as a last resort (in accordance with the Waste Avoidance and Resource Recovery Act 2001).</li> </ul> <p>By adopting the above principles, Transport for NSW aims to efficiently reduce resource use, reduce costs, and reduce environmental harm in accordance with the principles of ecologically sustainable development.</p>	<p>The proposal is not expected to generate large quantities of waste materials. The following waste streams have been identified:</p> <ul style="list-style-type: none"> <li>• Spoil</li> <li>• Removed vegetation</li> <li>• Waste concrete / asphalt</li> <li>• General garbage and refuse.</li> </ul>

Environmental factor	Existing environment	Potential impacts
Hazards and risk	<p>Existing hazards and risks are associated with operation of the road network and include the risk of crashes.</p> <p>The proposal site is not adjacent to any high bushfire risk land.</p> <p>Parts of the proposal site could be affected by larger storm events (refer to Section 6.5.2)</p>	<p>Hazards and risks associated with the construction of the proposal would potentially include:</p> <ul style="list-style-type: none"> <li>• Carrying out work within or next to a busy road and areas with high pedestrian activity</li> <li>• Carrying out work near existing services and utilities (e.g. power lines and gas mains)</li> <li>• The use and storage of hazardous materials</li> <li>• The use of heavy machinery</li> <li>• Unexpected excavation of contaminated land</li> <li>• Sparks and/or hot works causing fire, particularly during dry, hot periods</li> <li>• Unauthorised access to the construction work site.</li> </ul> <p>Construction hazards and risks are manageable through the application of standard mitigation measures, which would be developed by the construction contractor prior to construction.</p> <p>Hazards or risks associated with the operation of the proposal would be limited to the potential for changed motorist behaviour associated with road and messaging changes.</p> <p>Potential flooding impacts during construction and operation are considered in Section 6.6.3.</p>
Non-Aboriginal heritage	<p>There are no non-Aboriginal heritage items (statutory listings) within or adjoining the proposal footprint.</p>	<p>The proposal is not expected to affect non-Aboriginal heritage.</p>

## 6.10.2 Safeguards and management measures

Table 6-45 Safeguards and management measures – other issues

Impact	Environmental safeguards	Responsibility	Timing	Reference
Waste	<p>A Waste Management Plan (WMP) will be prepared and implemented as part of the CEMP. The WMP will include but not be limited to:</p> <ul style="list-style-type: none"> <li>• measures to avoid and minimise waste associated with the project</li> <li>• classification of wastes and management options (re-use, recycle, stockpile, disposal)</li> <li>• statutory approvals required for managing both on and off-site waste, or application of any relevant resource recovery exemptions</li> <li>• procedures for storage, transport and disposal</li> <li>• monitoring, record keeping and reporting.</li> </ul> <p>The WMP will be prepared taking into account the <i>Environmental Procedure - Management of Wastes on Transport for NSW Land</i> (Transport for NSW, 2014) and relevant Transport for NSW Waste Fact Sheets.</p>	Contractor	Detailed design / pre-construction	Section 4.2 of QA G36 <i>Environment Protection</i>
Utilities	<p>Prior to the commencement of works the location of existing utilities and relocation details will be confirmed following consultation with the affected utility owners.</p> <p>If the scope or location of proposed utility relocation works falls outside of the assessed proposal scope and footprint, further assessment will be undertaken.</p>	Contractor	Detailed design / pre-construction	
Hazards and risk management	<p>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:</p> <ul style="list-style-type: none"> <li>• details of hazards and risks associated with the activity</li> <li>• measures to be implemented during construction to minimise these risks</li> <li>• 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</li> <li>• a monitoring program to assess performance in managing the identified risks</li> <li>• contingency measures to be implemented in the event of unexpected hazards or risks arising, including emergency situations.</li> </ul> <p>The HRMP will be prepared in accordance with relevant guidelines and standards, including relevant Safe Work Australia Codes of Practice, and Environment Protection Authority publications.</p>	Contractor	Detailed design / pre-construction	

Impact	Environmental safeguards	Responsibility	Timing	Reference
Non-Aboriginal heritage	<p>The Standard Management Procedure – <i>Unexpected Heritage Items</i> (Roads and Maritime Services, 2015) will be followed in the event any unexpected heritage items, archaeological remains or potential relics of non-Aboriginal origin are encountered.</p> <p>Work will only re-commence once the requirements of that Procedure have been satisfied.</p>	Contractor	Construction	Section 4.10 of QA G36 Environment Protection

## 6.11 Cumulative impacts

### 6.11.1 Study area

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 was carried out in September 2021 for the Tamworth local government area. A search of the Tamworth Regional Council tracking system was carried out for the suburbs of Hillvue and South Tamworth for the period 1 September 2018 to 3 September 2021. Those projects of a scale and location that may result in cumulative impacts are identified in Section 6.11.2.

Other developments likely to occur within the locality (beyond the scope of these searches) would likely be small-scale projects and would be unlikely to result in a cumulative impact with the proposal.

### 6.11.2 Other projects and developments

Table 6-46: Past, present and future projects

Project	Construction impacts	Operational impacts
<p>Tamworth Battery Energy Storage System (BESS). 200 megawatt (MW) utility-scale battery storage project and connections to the electricity grid. Proposed to be located at 696 Burgmanns Lane, Tamworth. State Significant Development Application lodged July 2021 and Environmental Impact Statement in preparation.</p>	<ul style="list-style-type: none"> <li>Water quality risks associated with construction disturbance</li> <li>Construction noise and vibration</li> <li>Moderate volumes of construction traffic with some potential network impact (estimated to peak at 40 light vehicles and 5 heavy vehicles per day). A total of 16 oversize and/or overmass (OSOM) vehicle return trips are also expected to be required during construction</li> <li>Localised visual impacts during construction</li> <li>Some impacts on potential habitat for threatened fauna.</li> </ul>	<p>Limited operational impacts. Traffic generation expected to be a maximum of one return vehicle trip per day, with an average of 1 to 2 return vehicle trips per week.</p>
<p>Residential care facility (144 beds) at 30-40 The Ringers Road, Hillvue.</p>	<ul style="list-style-type: none"> <li>Water quality risks associated with construction disturbance</li> <li>Construction noise and vibration</li> <li>Localised visual impacts during construction</li> </ul>	<p>Traffic generation on The Ringers Road seeking to access Goonoo Goonoo Road.</p>

### 6.11.3 Potential impacts

Table 6-47: Potential cumulative impacts

Environmental factor	Construction	Operation
Traffic and transport	<p>Multiple projects which generate construction traffic can combine to result in cumulative delays and affect people's ability to access places of employment, services, family and friends.</p> <p>Construction traffic generated by the proposal is moderate and would occur primarily outside of peak periods. There are not expected to be broader network impacts even with construction traffic generated by nearby projects.</p>	<p>The proposal would improve safety and traffic efficiency. It would not increase operational traffic volumes, composition or distribution and is therefore not expected to have cumulative operational traffic impacts.</p>
Noise	<p>There is the potential for the proposal to occur concurrently with and near construction works associated with other projects.</p> <p>There is the potential for cumulative noise impacts (i.e. a higher noise level than for any individual project) where works are carried out at the same time, and both are predicted to exceed noise management levels at the same receivers.</p> <p>Cumulative noise impacts, if they occur, would only be experienced for short periods at a time, with the implementation of appropriate management measures and respite. It is also expected that works for other projects would only be during standard construction hours.</p> <p>There is also the potential for consecutive impacts, where a receiver is affected by one project and then by another project shortly after. This can be minimised through coordination between projects</p>	<p>No cumulative operation stage noise impacts are expected as a result of the proposal.</p>
Visual	<p>Multiple projects which introduce new visual elements to the environment could result in an overall cumulative increase in visual impacts.</p> <p>Cumulative impacts are not expected noting that the planned residential care facility on The Ringers Road would not have a direct frontage to Goonoo Goonoo Road.</p>	<p>No additional cumulative visual impacts beyond those identified for the construction stage are expected.</p>
Biodiversity	<p>The biodiversity assessment did not identify any construction stage cumulative impacts associated with the proposal.</p>	<p>The biodiversity assessment did not identify any construction stage cumulative impacts associated with the proposal.</p>

## 6.11.4 Safeguards and management measures

Table 6-48: Safeguards and management measures – cumulative impacts

Impact	Environmental safeguards	Responsibility	Timing	Reference
Cumulative impacts	<p>Current and upcoming projects with the potential to interact with the proposal will be monitored. Where potential cumulative impacts are identified, the scheduling of works will be coordinated with interacting projects to minimise potential impacts. This will include:</p> <ul style="list-style-type: none"> <li>Scheduling works to allow suitable respite periods for construction noise</li> <li>Scheduling of works to minimise consecutive construction noise impacts, where feasible</li> <li>Coordinating lane closures and pedestrian/cyclist diversions to minimise the overall number of occasions where disruption occurs.</li> </ul>	Transport for NSW Project Manager	Construction	Additional measure

## 6.12 Sustainability

During detailed design and construction procurement a range of sustainability initiatives will be considered for the proposal. Table 6-49 identifies some of the initiatives that would be considered.

Table 6-49: Sustainability initiatives for consideration

Category	Initiative	Comment
Energy management	Use sustainable construction site facilities that use energy efficient fittings and appliances.	Opportunity. Consider during construction procurement.
Energy management	Use at least 10% alternative fuels to reduce greenhouse gas emissions in construction vehicles.	Opportunity. Consider during construction procurement.
Energy management	All vehicles, plant and equipment are selected and operated for optimum energy efficiency.	Opportunity. Consider during construction procurement.
Biodiversity	Investigate opportunities for green infrastructure (vegetation planting, water sensitive urban design).	Opportunity. Consider during detailed design.
Pollution control	Ensure waste is recycled / disposed of safely.	Adopted. Refer to Section 6.9.
Climate change resilience	Design for forecast climatic conditions including potential extreme weather events, increased flood events and increases in annual average temperatures and heatwave events.	Address during detailed design.
Liveable communities	Provision of trees and landscaping to cool paths in summer and provide scenic	Address during detailed design.

Category	Initiative	Comment
	changes along the route (low water demand plants).	
Liveable communities	Actively engage with local communities, potential customers and other stakeholders in the development and implementation of the project.	Adopted. Refer to Chapter 5.
Resource management	Pavement from recycled asphalt, glass, plastics or similar. Trial new materials.	Opportunity. Consider during detailed design.
Resource management	Develop designs that demonstrate a reduction in material lifecycle impacts from business as usual practices. Therefore, reducing embodied carbon emissions.	Opportunity. Consider during detailed design.
Resource management	Prioritise the use of low carbon materials.	Opportunity. Consider during detailed design.
Resource management	Use supplementary cementitious materials to replace Portland cement	Opportunity. Consider during detailed design.
Resource management	Elevate durability requirements to maximise asset life and minimise early retirement of plant, equipment and materials.	Opportunity. Consider during detailed design.
Resource management	Use recycled steel, including in concrete reinforcing.	Opportunity. Consider during construction.
Resource management	Beneficially reuse 100 per cent of spoil.	Opportunity. Consider during construction.
Resource management	Use non-potable water or alternative methods for dust suppression.	Opportunity. Consider during construction.
Resource management	Implement rainwater harvesting and reuse systems at construction sites.	Opportunity. Consider during construction.
Resource management	Establish targets for non-potable water use.	Opportunity. Consider during construction procurement.
Resource management	Use landscape species which do not require significant quantities of water once established.	Opportunity. Consider during detailed design.
Corporate sustainability	Incorporate sustainability criteria into project contracts and tender evaluation criteria.	Opportunity. Consider during construction procurement.
Corporate sustainability	Prioritise local suppliers to support local employment.	Opportunity. Consider during construction procurement.
Corporate sustainability	Develop a workforce diversity culture to encourage industry to develop an inclusive workforce that addresses issues such as employment inclusiveness, diversity, capability development and safety.	Opportunity. Consider during construction.

## 7. Environmental management

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### 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, Northern 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 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	<p>A CEMP will be prepared and submitted for review and endorsement of the Transport for NSW Environment Manager prior to commencement of the activity.</p> <p>As a minimum, the CEMP will address the following:</p> <ul style="list-style-type: none"> <li>any requirements associated with statutory approvals</li> <li>details of how the project will implement the identified safeguards outlined in the REF</li> <li>issue-specific environmental management plans</li> <li>roles and responsibilities</li> <li>communication requirements</li> <li>induction and training requirements</li> <li>procedures for monitoring and evaluating environmental performance, and for corrective action</li> <li>reporting requirements and record-keeping</li> <li>procedures for emergency and incident management</li> <li>procedures for audit and review.</li> </ul> <p>The endorsed CEMP will be implemented during the undertaking of the activity.</p>	Contractor / Transport for NSW 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 / Transport for NSW project manager	Pre-construction	
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.	Contractor / Transport for NSW project manager	Pre-construction / detailed design	

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		<p>Site-specific training will be provided to personnel engaged in activities or areas of higher risk. These include</p> <ul style="list-style-type: none"> <li>• areas of Aboriginal heritage sensitivity</li> <li>• threatened species habitat</li> <li>• adjoining residential areas requiring particular noise management measures</li> </ul>			
TT1	Traffic and transport	<p>A Traffic Management Plan (TMP) will be prepared and implemented as part of the CEMP. The TMP will be prepared in accordance with the Traffic Control at Work Sites Manual (Transport for NSW, 2020) and QA Specification G10 Control of Traffic (Transport for NSW, 2020). The TMP will include:</p> <ul style="list-style-type: none"> <li>• Confirmation of haulage routes</li> <li>• Measures to maintain access to local roads and properties</li> <li>• Site-specific traffic control measures (including signage) to manage and regulate traffic movement</li> <li>• Measures to ensure emergency services vehicles can negotiate the project area during construction</li> <li>• Measures to maintain pedestrian and cyclist access</li> <li>• Requirements and methods to consult and inform the local community of impacts on the local road network</li> <li>• Access to construction sites including entry and exit locations and measures to prevent construction vehicles queuing on public roads</li> <li>• A response plan for any construction traffic incident</li> <li>• 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.</li> </ul>	Contractor	Pre-construction	Section 4.8 of QA G36 Environment Protection
NV1	Construction noise and vibration	<p>A Noise and Vibration Management Plan (NVMP) will be prepared and implemented as part of the CEMP.</p> <p>The NVMP 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:</p> <ul style="list-style-type: none"> <li>• Key potential noise and vibration generating activities associated with the activity</li> <li>• Feasible and reasonable mitigation measures to be implemented</li> </ul>	Contractor	Pre-construction	Section 4.6 of QA G36 Environment Protection

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		<ul style="list-style-type: none"> <li>• A monitoring program to assess performance against relevant noise and vibration criteria</li> <li>• A review process scheduling and assessing out-of-hours activities including consideration of alternatives to out-of-hours work, plant selection, work locations and screening to minimise impacts</li> <li>• A working schedule which records respite periods for extended out-of-hours works</li> <li>• Arrangements for consultation with affected neighbours and sensitive receivers, including notification and complaint handling procedures</li> <li>• Contingency measures to be implemented in the event of non-compliance with noise and vibration criteria.</li> </ul>			
NV2	Construction vibration	<p>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 (including heritage fabric). 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).</p> <p>If recommended minimum working distances cannot be met by selecting smaller plant, vibration monitoring will occur to quantify and help manage vibration. If necessary, trial vibration measurements will be conducted to further assess any possible impacts and buffer distances that may be required.</p>	Contractor	Construction	Additional measure
NV3	Construction noise and vibration	<p>All sensitive receivers likely to be affected will be notified at least five working days prior to commencement of any works associated with the activity that may have an adverse noise or vibration impact. The notification will provide details of:</p> <ul style="list-style-type: none"> <li>• The proposal</li> <li>• The construction period and construction hours</li> <li>• Contact information for project management staff</li> <li>• Complaint and incident reporting</li> <li>• How to obtain further information.</li> </ul>	Contractor	Pre-construction	Standard measure
LCV1	Landscape character and visual impact	An Urban Design Plan (including detailed urban design drawings and landscape plans) will be prepared to support the final detailed project design.	Transport for NSW	Detailed design	Standard measure

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		<p>The Urban Design Plan will present an integrated urban design for the project, providing further practical detail on the application of design principles and objectives identified in this REF. The Plan will confirm design treatments for:</p> <ul style="list-style-type: none"> <li>• Location and identification of existing vegetation and proposed landscaped areas, including species to be used</li> <li>• Details of the staging of landscape works taking account of related environmental controls such as erosion and sedimentation controls and drainage</li> <li>• Procedures for monitoring and maintaining landscaped or rehabilitated areas.</li> </ul> <p>The Urban Design Plan will be prepared in accordance with relevant guidelines, including:</p> <ul style="list-style-type: none"> <li>• Beyond the Pavement urban design policy, process and principles (Transport for NSW, 2020)</li> <li>• Landscape Design Guideline (Roads and Maritime Services, 2018).</li> </ul>			
LCV2	Visual impacts	Where reasonable and feasible trees will be retained in design.	Transport for NSW	Detailed design	Additional measure
LCV3	Visual impacts	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.	Contractor	Construction	Additional measure
LCV4	Impacts on street trees	<p>Tree protection zones would be implemented to minimise the impact to street trees (identified for retention).</p> <p>Tree protection structure would be implemented to protect trees if construction is required to occur within the Tree Protection Zones.</p> <p>Any excavation within Tree Protection Zones (of trees identified for retention) or pruning trees (or tree roots) is to occur under the supervision of an AQF5 qualified arborist and in accordance with a pre-agreed methodology.</p> <p>Vehicles, plant or equipment would not be parked or stored within the tree protection zone, if parking or storage is required additional mitigation measures would be implemented to minimise the impact to the vegetation</p>	Contractor	Construction	Additional measure
LCV5	Impact from lighting	Construction site and compound lighting will be oriented to minimise the risk of light spill impacts on any nearby residences.	Contractor	Construction	Additional measure

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
LCV6	Impacts from lighting	The design of new street lighting will consider potential light spill impacts on adjacent properties.	Transport for NSW	Detailed design	Additional measure
AH1	Aboriginal cultural heritage	An application for an Aboriginal Heritage Impact Permit (AHIP) will be made under section 90A of the National Parks and Wildlife Act 1974 for the land and associated objects within the boundaries of the study area.	Transport for NSW	Detailed design	Additional measure
AH2	Aboriginal heritage	An Aboriginal Heritage Management Plan (AHMP) will be prepared in accordance with the <i>Procedure for Aboriginal cultural heritage consultation and investigation</i> (Roads and Maritime Services, 2011) and <i>Standard Management Procedure - Unexpected Heritage Items</i> (Transport for NSW, 2015) and implemented as part of the CEMP. It will provide specific guidance on measures and controls to be implemented for managing impacts on Aboriginal heritage. The AHMP will be prepared in consultation with all relevant Aboriginal groups.	Contractor	Detailed design / pre-construction	Section 4.9 of QA G36 <i>Environment Protection</i>
AH3	Aboriginal heritage	<i>The Standard Management Procedure - Unexpected Heritage Items</i> (Transport for NSW, 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	Detailed design / pre-construction	Section 4.9 of QA G36 <i>Environment Protection</i>
BIO1	Biodiversity impacts	A Flora and Fauna Management Plan will be prepared in accordance with the <i>Biodiversity Guidelines: Protecting and Managing Biodiversity on RTA Projects</i> (RTA, 2011) and will be implemented as part of the CEMP. The Flora and Fauna Management Plan will include, but not be limited to: <ul style="list-style-type: none"> <li>Plans showing areas to be cleared and areas to be protected, including exclusion zones, protected habitat features and revegetation areas</li> <li>Pre-clearing survey requirements</li> <li>Procedures for unexpected threatened species finds and fauna handling</li> <li>Procedures in the event of injury to native fauna</li> <li>Protocols to manage weeds and pathogens</li> <li>Measures for the protection of aquatic habitats.</li> </ul>	Contractor	Pre-construction	Section 4.8 of QA G36 <i>Environment Protection</i>
BIO2	Biodiversity impacts	Pre-clearing survey will be conducted and will:	Contractor	Pre-construction	Additional measure

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		<ul style="list-style-type: none"> <li>• Confirm clearing boundaries, exclusion zones, protected habitat features and revegetation areas prior to starting work</li> <li>• Identify, in toolbox talks, where biodiversity controls are located on the site.</li> </ul>			
BIO3	Spread of weeds	<p>Weed management will occur in accordance with the <i>Biodiversity Guidelines, Guide 6</i> (Roads and Maritime, 2016) and include:</p> <ul style="list-style-type: none"> <li>• The Identification of weeds on site (confirmed during pre-clearing survey)</li> <li>• Weed management priorities and objectives exclusion zones, protected habitat features and revegetation areas prior to starting work within or directly next to the site</li> <li>• The location of weed infested areas</li> <li>• Weed control methods</li> <li>• Measures to prevent the spread of weeds, including machinery hygiene procedures and disposal requirements</li> <li>• A monitoring program to measure the success of weed management</li> <li>• Communication with local Council noxious weed representative.</li> </ul>	Contractor	Pre-construction	Additional measure
BIO4	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 <i>Biodiversity Guidelines, Guide 7</i> (Roads and Maritime, 2016)	Contractor	Construction	Additional measure
BIO5	Unexpected threatened species finds	If unexpected flora or fauna are discovered on site stop work immediately and implement the Roads and Maritime <i>Unexpected Threatened Species Find Procedure</i> in the <i>Biodiversity Guidelines, Guide 1</i> (Roads and Maritime, 2016).	Contractor	Construction	Additional measure
HF1	Flooding and hydrology	Staging for the construction of the proposal will consider adequate stormwater flow paths (including diversions and temporary connections as required) to be implemented and maintained during construction to minimise the potential on-site or upstream flooding.	Contractor	Construction	Additional measure
HF2	Flooding and hydrology	A flood management procedure will be prepared to detail procedures to be implemented where extreme weather is predicted and where there is a risk of flooding affecting the work site and compound, including removal and storage of plant and equipment and securing of site.	Contractor	Construction	Additional measure

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
HF3	Flooding and hydrology	Further investigation into any flooding impacts on private property will occur with the purpose of avoiding or minimising impacts.	Transport for NSW	Detailed design	Additional measure
SW1	Soil and water	A Soil and Water Management Plan (SWMP) will be prepared and implemented as part of the CEMP. The SWMP will identify all reasonably foreseeable risks relating to soil erosion and water pollution and describe how these risks will be addressed during construction.	Contractor	Detailed design Pre-construction	Section 2.1 of QA G38 Soil and Water Management
SW2	Soil and water	A site specific Erosion and Sediment Control Plan/s will be prepared and implemented as part of the Soil and Water Management Plan	Contractor	Detailed design Pre-construction	
SW3	Contamination	<p>A Detailed Site Investigation (“DSI”) will be undertaken prior to construction works commencing, targeting the AECs where exposure pathways are potentially complete. The DSI should include, but not be limited to:</p> <ul style="list-style-type: none"> <li>• An assessment of the extent and nature of uncontrolled filling material throughout the road corridor of the Site (as well as the verge and intersections);</li> <li>• An assessment of soil and groundwater contamination across the areas of the Site adjacent to the service stations; and</li> <li>• An assessment of surface water contamination within the Barnes Gully drainage structure.</li> </ul>	Transport for NSW	Detailed design	Additional measure
SW4	Contamination	If contaminated areas are encountered during construction, appropriate control measures will be implemented to manage the immediate risks of contamination. All other work 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 Environment Manager and/or EPA.	Contractor	Detailed design Pre-construction	Section 4.2 of QA G36 Environment Protection
SW5	Accidental spills	A site specific emergency spill plan will be developed, and include spill management measures in accordance with the Transport for NSW <i>Code of Practice for Water Management</i> (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 Transport for NSW and EPA officers).	Contractor	Detailed design Pre-construction	Section 4.3 of QA G36 Environment Protection

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
SW6	Salinity	Soil salinity testing will be carried out at the area to be disturbed around Barnes Gully prior to construction to further assess salinity risks and implement appropriate controls.	Contractor	Detailed design Pre-construction	Additional measure
AQ1	Air quality	<p>An Air Quality Management Plan (AQMP) will be prepared and implemented as part of the CEMP. The AQMP will include, but not be limited to:</p> <ul style="list-style-type: none"> <li>• Potential sources of air pollution (including site compound operation)</li> <li>• Air quality management objectives consistent with any relevant published EPA guidelines</li> <li>• Mitigation and suppression measures to be implemented</li> <li>• Methods to manage work during strong winds or other adverse weather conditions.</li> </ul>	Contractor	Construction	Section 4.4 of QA G36 Environment Protection
SE1	Socio-economic	<p>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):</p> <ul style="list-style-type: none"> <li>• Mechanisms to provide details and timing of proposed activities to affected residents, including changed traffic and access conditions</li> <li>• Contact name and number for complaints.</li> </ul> <p>The CP will be prepared in accordance with the <i>Community Involvement and Communications Resource Manual</i> (RTA, 2008).</p>	Contractor	Detailed design / pre-construction	Standard measure
WM1	Waste	<p>A Waste Management Plan (WMP) will be prepared and implemented as part of the CEMP. The WMP will include but not be limited to:</p> <ul style="list-style-type: none"> <li>• measures to avoid and minimise waste associated with the project</li> <li>• classification of wastes and management options (re-use, recycle, stockpile, disposal)</li> <li>• statutory approvals required for managing both on and off-site waste, or application of any relevant resource recovery exemptions</li> <li>• procedures for storage, transport and disposal</li> <li>• monitoring, record keeping and reporting.</li> </ul>	Contractor	Detailed design / pre-construction	Section 4.2 of QA G36 Environment Protection

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		The WMP will be prepared taking into account the <i>Environmental Procedure - Management of Wastes on Transport for NSW Land</i> (Transport for NSW, 2014) and relevant Transport for NSW Waste Fact Sheets.			
UM1	Utilities	<p>Prior to the commencement of works the location of existing utilities and relocation details will be confirmed following consultation with the affected utility owners</p> <p>If the scope or location of proposed utility relocation works falls outside of the assessed proposal scope and footprint, further assessment will be undertaken.</p>	Contractor	Detailed design / pre-construction	
HR1	Hazards and risk management	<p>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:</p> <ul style="list-style-type: none"> <li>• details of hazards and risks associated with the activity</li> <li>• measures to be implemented during construction to minimise these risks</li> <li>• 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</li> <li>• a monitoring program to assess performance in managing the identified risks</li> <li>• contingency measures to be implemented in the event of unexpected hazards or risks arising, including emergency situations.</li> </ul> <p>The HRMP will be prepared in accordance with relevant guidelines and standards, including relevant Safe Work Australia Codes of Practice, and Environment Protection Authority publications.</p>	Contractor	Detailed design / pre-construction	
NAH1	Non-Aboriginal heritage	<p>The Standard Management Procedure – <i>Unexpected Heritage Items</i> (Roads and Maritime Services, 2015) will be followed in the event any unexpected heritage items, archaeological remains or potential relics of non-Aboriginal origin are encountered.</p> <p>Work will only re-commence once the requirements of that Procedure have been satisfied.</p>	Contractor	Construction	Section 4.10 of QA G36 Environment Protection
CI1	Cumulative impacts	<p>Current and upcoming projects with the potential to interact with the proposal will be monitored. Where potential cumulative impacts are identified, the scheduling of works will be coordinated with interacting projects to minimise potential impacts. This will include:</p> <ul style="list-style-type: none"> <li>• Scheduling works to allow suitable respite periods for construction noise</li> </ul>	Transport for NSW Project Manager	Construction	Additional measure

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		<ul style="list-style-type: none"> <li>Scheduling of works to minimise consecutive construction noise impacts, where feasible</li> <li>Coordinating lane closures and pedestrian/cyclist diversions to minimise the overall number of occasions where disruption occurs.</li> </ul>			

### 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
<i>Roads Act 1993</i> (section 138)	Road occupancy licence	Prior to start of activity
National Parks and Wildlife Act 1974	Aboriginal Heritage Impact Permit under Section 90 of the <i>National Parks and Wildlife Act 1974</i> for the land and associated Aboriginal objects within the boundaries of the study area.	Prior to start of activity

## 8. Conclusion

### 8.1 Justification

The proposal has been developed to improve safety, increase road capacity, improve traffic flow and deliver better and more reliable journeys on Goonoo Goonoo Road, Hillvue and South Tamworth.

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

While there would be some temporary environmental impacts as a consequence of the proposal including visual impacts, traffic and transport impacts, construction noise, Aboriginal cultural heritage impacts, minor 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 reduce congestion and improve safety. Environmental impacts have been minimised.
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.
1.3(c) To promote the orderly and economic use and development of land.	The proposal is consistent with a range of strategic plans and policies including Tamworth Regional Blueprint 100 (Tamworth Regional Council, 2020).
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 and their habitats.	The proposal would have minor potential impacts on threatened and other species of native animals and plants, ecological communities and their habitats. Refer to Section 6.5.
1.3(f) To promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage).	Impacts on Aboriginal and non-Aboriginal heritage have been assessed as part of this REF (Section 6.4 and Section 6.9 respectively). Safeguards and mitigation measures have been proposed to address impacts.
1.3(g) To promote good design and amenity of the built environment.	The design of the built elements of the proposal would seek to improve the existing visual context.
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 proposal.

Object	Comment
1.3(i) To promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State.	The proposal has been developed with the involvement of Tamworth Regional Council.
1.3(j) To provide increased opportunity for community participation in environmental planning and assessment.	Consultation carried out to date and proposed ongoing consultation is outlined in Chapter 5.

## 8.2.1 Ecologically sustainable development

Ecologically sustainable development (ESD) is development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends. The principles of ESD have been an integral consideration throughout the development of the project.

ESD requires the effective integration of economic and environmental considerations in decision-making processes. The four main principles supporting the achievement of ESD are discussed below.

### *The precautionary principle*

The precautionary principle deals with reconciling scientific uncertainty about environmental impacts 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.

This principle was considered during options development and assessment (refer to Chapter 2). The precautionary principle has guided the assessment of environmental impacts for this REF and the development of mitigation measures.

Best available technical information, environmental standards and measures have been used to minimise environmental risks and conservative 'worst case' scenarios were considered while assessing environmental impact.

### *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 primarily short term and manageable. Benefits to road users in terms of reduced congestion and improved safety would be realised over the short and longer term. The following is also noted in relation to intergenerational equity are also noted:

- An Aboriginal cultural heritage assessment, including consultation with the local Aboriginal community, was carried out during the environmental assessment phase to avoid or minimise the potential for irreparable damage to occur to Aboriginal cultural heritage during the construction
- Issues associated with the loss of agricultural land have been considered as part of the environmental assessment.

### *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.

### ***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 the carrying out of a project, including air, water, land and living things.

The value placed on environmental resources within and around the proposal footprint 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 Goonoo Goonoo Road duplication at Tamworth is 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 including construction noise, construction related traffic delays and visual impacts. Safeguards and management measures as detailed in this REF would ameliorate or minimise these expected impacts. The proposal would also reduce congestion, improve safety and improve amenity for pedestrians and cyclists. 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 Agriculture, Water and the Environment is not required.

## 9. Certification

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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 Consultant

CCHD

Date: 9 November 2021

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



Gavin Rayward

Project Manager

Infrastructure and Place

Development, North

Date: 9 November 2021

## 10. References

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## Terms and acronyms used in this REF

Term / Acronym	Description
AEC	Area of Environmental Concern
AHIMS	Aboriginal Heritage Information Management System
AHMP	Aboriginal Heritage Management Plan
AQMP	Air Quality Management Plan
BC Act	<i>Biodiversity Conservation Act 2016 (NSW).</i>
CEMP	Construction environmental management plan
CoPC	Contaminants of potential concern
EIA	Environmental impact assessment
EPA	Environment Protection Authority
EP&A Act	<i>Environmental Planning and Assessment Act 1979 (NSW).</i> Provides the legislative framework for land use planning and development assessment in NSW
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth).</i> Provides for the protection of the environment, especially matters of national environmental significance, and provides a national assessment and approvals process.
ESD	Ecologically sustainable development. Development which uses, conserves and enhances the resources of the community so that ecological processes on which life depends, are maintained and the total quality of life, now and in the future, can be increased
FM Act	<i>Fisheries Management Act 1994 (NSW)</i>
Heritage Act	<i>Heritage Act 1977 (NSW)</i>
HRMP	Hazard and Risk Management Plan
ISEPP	State Environmental Planning Policy (Infrastructure) 2007
LALC	Local Aboriginal Land Council
LEP	Local Environmental Plan. A type of planning instrument made under Part 3 of the EP&A Act.
LoS	Level of Service. A qualitative measure describing operational conditions within a traffic stream and their perception by motorists and/or passengers.
LSC	Land and soil capability
NPW Act	<i>National Parks and Wildlife Act 1974 (NSW)</i>
PCT	Plant Community Type
SEPP	State Environmental Planning Policy. A type of planning instrument made under Part 3 of the EP&A Act.

<b>Term / Acronym</b>	<b>Description</b>
SUA	Significant Urban Area
TRAQ	Tool for Roadside Air Quality
WMP	Waste Management Plan
QA Specifications	Specifications developed by Transport for NSW for use with road work and bridge work contracts let by Transport for NSW.

## 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
<p>a) Any environmental impact on a community?</p> <p>The proposal would have impacts during construction (noise, traffic disruption). The proposal would improve safety, traffic efficiency and pedestrian / cyclist amenity.</p>	<p>Short-term negative</p> <p>Long-term positive</p>
<p>b) Any transformation of a locality?</p> <p>The proposal would transform the locality through construction activities and then ultimately the provision of a wider road formation with associated landscaping and road furniture. This would occur in the context of planned land use changes in the medium to long term in the area to the east, and would be consistent with the corridor treatment to the north.</p>	<p>Short-term negative</p> <p>Long-term positive</p>
<p>c) Any environmental impact on the ecosystems of the locality?</p> <p>The proposal would have some potential impacts on habitat for native animals and plants. Impacts have been assessed as not significant</p>	<p>Negative (not significant)</p>
<p>d) Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality</p> <p>The proposal would have some visual impacts associated with the new road. These would reduce over time with appropriate landscaping and urban design treatments.</p>	<p>Short-term negative</p>
<p>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?</p> <p>The proposal would result in be a 'partial loss' of value to one Aboriginal site and a 'total loss' of value to another. These Aboriginal sites are of significance to the Aboriginal community and considered to have low scientific research potential. The proposal would not affect non-Aboriginal heritage sites.</p>	<p>Short and long-term negative.</p>
<p>f) Any impact on the habitat of protected fauna (within the meaning of the <i>National Parks and Wildlife Act 1974</i>)?</p> <p>There would be some impact on habitat for native species. These species would not be solely reliant on the areas of affected habitat.</p>	<p>Minor short-term negative</p>
<p>g) Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air?</p> <p>The proposal would not endanger animals, plants or other forms of life.</p>	<p>Nil</p>
<p>h) Any long-term effects on the environment?</p> <p>The proposal would improve safety, traffic efficiency and pedestrian / cyclist amenity over the longer term.</p>	<p>Long-term positive</p>
<p>i) Any degradation of the quality of the environment?</p>	<p>Short-term negative</p>

Factor	Impact
<p>The proposal would result in a degradation of environmental quality in the short-term (visual impacts, noise, water quality risks). Safeguards and management measures have been proposed to address these risks.</p>	
<p>j) Any risk to the safety of the environment?</p> <p>The proposal does not represent a risk to the safety of the environment. The proposal would improve safety for road users, pedestrians and cyclists.</p>	Nil
<p>k) Any reduction in the range of beneficial uses of the environment?</p> <p>The proposal would not reduce the range of beneficial uses of the environment.</p>	Nil
<p>l) Any pollution of the environment?</p> <p>No pollution of the environment is expected to result from the proposal with the implementation of the proposed safeguards and mitigation measures.</p>	Nil
<p>m) Any environmental problems associated with the disposal of waste?</p> <p>Waste generated during construction would be removed from the site and disposed of legally. No environmental problems are anticipated for the disposal of waste.</p>	Nil
<p>n) Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply?</p> <p>The proposal would not increase demand for resources, which are, or are likely to become, in short supply.</p>	Nil
<p>o) Any cumulative environmental effect with other existing or likely future activities?</p> <p>There are potential cumulative noise and traffic impacts associated with other planned developments in the area. This can be adequately addressed through the proposed safeguards and management measures, including coordination with other projects where required.</p>	Short-term negative
<p>p) Any impact on coastal processes and coastal hazards, including those under projected climate change conditions?</p> <p>The proposal is not within the coastal zone and would not influence coastal processes and/or coastal hazards.</p>	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 Agriculture, Water and the Environment.

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 have any impact on a World Heritage property.	Nil
b) Any impact on a National Heritage place? The proposal would not have any impact on a National Heritage Place.	Nil
c) Any impact on a wetland of international importance? The proposal would not affect a wetland of international importance.	Nil
d) Any impact on a listed threatened species or communities? Some Commonwealth listed threatened species have the potential to occur in the local area. The nature, scale and location of the proposal is such that direct impacts on these species or their habitats are not expected. Indirect impacts are also not expected.	Nil
e) Any impacts on listed migratory species? Some Commonwealth listed migratory species have the potential to occur in the local area. The nature, scale and location of the proposal is such that impacts on these species or their habitats are not expected. Indirect impacts are also not expected.	Nil
f) Any impact on a Commonwealth marine area? The proposal would not have any impact on a Commonwealth marine area.	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 impact 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?	N/A		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 <i>substantial</i> 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 <i>strain</i> 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 <i>substantial</i> 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 <i>substantial</i> 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 <i>minor</i> or <i>inconsequential</i> disruption to pedestrian or vehicular flow?	Yes	Council Refer to Chapter 5	ISEPP cl.13(1)(e)
Road & footpath excavation	Will the works involve more than <i>minor</i> or <i>inconsequential</i> excavation of a road or adjacent footpath for which council is the roads authority and responsible for maintenance?	Yes	Council Refer to Chapter 5	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 <i>minor</i> or <i>inconsequential</i> ?	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 <i>minor</i> 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	Yes	State Emergency Service Refer to Chapter 5	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 <i>National Parks and Wildlife Act 1974</i> , or on land acquired under that Act?	No	Environment, Energy and Science, DPIE	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	Environment, Energy and Science, DPIE	ISEPP cl. 16(2)(b)
Aquatic reserves	Are the works adjacent to an aquatic reserve or a marine park declared under the <i>Marine Estate Management Act 2014</i> ?	No	Department of Planning, Industry and Environment	ISEPP cl.16(2)(c)
Sydney Harbour foreshore	Are the works in the Sydney Harbour Foreshore Area as defined by the <i>Sydney Harbour Foreshore Authority Act 1998</i> ?	No	Property NSW	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 <i>Mine Subsidence Compensation Act 1961</i> ?	No	Mine Subsidence Board	ISEPP cl. 16(2)(i)

# Appendix C

## Consultation Report

## Appendix D

### Aboriginal Cultural Heritage Assessment Report

# Appendix E

## Noise and Vibration Assessment

# Appendix F

## Landscape Character and Visual Impact Assessment

# Appendix G

## Biodiversity Assessment Report

## Appendix H

### Stage 1 Preliminary Site Investigation (contamination)

