

Parkes Bypass

Review of environmental factors

Roads and Maritime Services | July 2019



Roads and Maritime Services

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July 2019

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Executive summary

The proposal

Roads and Maritime Services (Roads and Maritime) proposes to build a new 10.5 kilometre bypass about 1.5 to 2.0 kilometres west of the existing Newell Highway in Parkes, NSW (the proposal).

The proposal's key features include:

- A new two-lane bypass (one lane in each direction) with four key intersections comprising:
 - T-intersections where the new bypass connects to the existing highway near Barkers Road (south) and Maguire Road (north)
 - A staggered T-intersection at London Road
 - A four-way roundabout at Condobolin Road
- A bridge over the Broken Hill and Parkes to Narromine rail lines and Hartigan Avenue and a shared pedestrian/cycleway bridge over the Parkes Bypass connecting Victoria Street and Back Trundle Road
- An extension of Hartigan Avenue that would connect to Brolgan Road (west of the bypass) and Condobolin Road
- Changes to local roads to tie in with the new bypass.

It is anticipated that construction would start in 2021 and would take about three years to complete. This would be subject to funding, weather and access considerations.

Need for the proposal

Parkes is a strategic freight transportation location in NSW, situated at the intersection of the Newell Highway and the rail lines connecting Broken Hill and Parkes to Narromine. These rail lines run between Parkes and Perth and are suitable for long and double stacked freight trains. The Newell Highway is a NSW State Road of great significance, providing a direct link between Melbourne and Brisbane for the transport of freight and livestock. The Newell Highway also caters to domestic and international tourists, is a critical route for emergency service vehicles and is an important road linking local and wider communities in Regional NSW. Further to this, the Parkes Special Activation Precinct (SAP) is being developed to the west of the proposal creating development opportunities and employment growth for the transfer of freight between road and rail, enhancing the area's existing profile in the freight and agricultural industries.

Heavy vehicles travelling through Parkes town centre on the Newell Highway are currently constrained by level crossings, potentially dangerous interactions with local traffic and pedestrians, and narrow road widths which currently do not provide for Performance Based Standard 3a (PBS3a) heavy vehicles to safely navigate around four 90-degree bends.

The Newell Highway Corridor Strategy (the strategy) includes a plan to build a bypass at Parkes as the highway is an essential freight route which must be maintained for industry growth. The strategy maintains that building a bypass would avoid the heavy vehicle constraints in Parkes town centre and improve the interstate movement of freight between Victoria and Queensland.

Proposal objectives

The proposal's key objectives are to:

- Enable safe access for PBS3a freight vehicles through Parkes to improve freight efficiency and productivity
- Improve safety of the railway level crossings and reduce or eliminate the travel delays caused by railway operations
- Facilitate future connectivity improvements to Parkes SAP as and when the traffic demand warrants
- Improve the amenity and pedestrian access in Parkes in the vicinity of the existing Newell Highway alignment (secondary objective).

Options considered

Roads and Maritime developed five strategic corridor options and a 'do nothing' option for investigation. The options included potential alignments to the west and east of the Parkes town centre as well as the option of upgrading the existing Newell Highway in Parkes. The options were investigated with respect to several considerations including property, traffic, road safety, environmental constraints, project risk and whether they could meet the proposal objectives. The western alignment option was preferred because it best met the proposal objectives.

Following this, Roads and Maritime developed several intersection options which were evaluated at a value management workshop on 11 April 2017. The options included different intersection types, such as T-intersections, roundabouts and bridges, as well as different intersection locations and layouts. The benefits and disadvantages of each option were identified including consideration of traffic flow and access, future demand, project delivery constraints, property impacts and other environmental impacts. The preferred intersections from the value management workshop were then further refined taking into account the principles of Health and Safety in Design (HSiD), and constructability considerations, and included in the proposal design.

Statutory and planning framework

The potential environmental impacts of the proposal have been identified through this review of environmental factors (REF) and will be assessed by Roads and Maritime under Division 5.1 of the *Environmental Planning & Assessment Act 1979* (EP&A Act). Clause 94, Section 1 of the State Environmental Planning Policy (Infrastructure) 2007 (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. In assessing the proposal, Roads and Maritime will consider Sections 5.5 and 5.6 of EP&A Act and Clause 228 of the *Environmental Planning and Assessment Regulation 2000*.

An assessment of the proposal concluded that it would not significantly impact on the matters of national environmental significance protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) or significantly affect threatened species or ecological communities and their habitats under the *Biodiversity Conservation Act 2016* (BC Act).

The proposal is a valid development to be taken forward under Division 5.1 of the EP&A Act and no other planning pathway requirements would be triggered.

Community and stakeholder consultation

The community and stakeholder consultation activities undertaken for this proposal included:

- Public display of the strategic concept design for the proposal followed by community drop in sessions and a 'have your say' community survey to invite community feedback
- Meetings with stakeholder groups and surveying the public and local businesses
- Preparation of a community consultation report.

The key issues raised in the community feedback received included:

- Design suggestions on the initial strategic concept design
- The need to ensure connectivity to the Parkes SAP and maintain safe and efficient east-west access
- Comments on the potential economic impacts including the potential loss of passing trade
- The perceived benefits of the proposal on amenity and traffic congestion within Parkes town centre
- The perceived amenity and access impacts on Parkes Golf Course and residents near the bypass.

The key issues raised were considered in the proposal design and/or addressed in the REF. Roads and Maritime will continue to seek feedback from businesses, the local community, Parkes Shire Council, the freight industry, and other key stakeholders as the design progresses. Following the public display of the REF, Roads and Maritime will collate and consider any submissions received and determine whether any changes are required. A submissions report will then be published that will respond to any comments received.

Environmental impacts

Traffic and transport

During construction, it is anticipated that traffic on the local road network will increase. Existing traffic volumes on the surrounding roads are low, and as such, the anticipated increase in traffic is generally unlikely to cause major congestion or delays. A temporary and minor impact on local access and travel times would result from lane closures or diversions affecting local traffic, cyclists and pedestrians. Local bus routes and rail services may also be affected during the construction of the bridge over the rail lines. This would be minimised through staging and by scheduling the work to occur outside of peak traffic and rail periods.

The proposal will directly benefit freight transportation operations by providing heavy vehicles with a separate route which will bypass the level crossings and 90-degree bends within Parkes town centre. It will reduce heavy vehicle volumes along the existing Newell Highway, increase safety for road users and pedestrians within Parkes town centre and reduce the congestion at the level crossings. It is important to note, however, that the proposal suggests there may be slightly increased travel times for residents affected by the closure and adjustment of local roads. This includes regular users of Thomas Street, Moulden Street, Victoria Street, Back Trundle Road, London Road and Brogan Road. The reduced direct vehicular access to Back Trundle Road may slightly increase travel times to the Parkes Christian School, however access for pedestrians and cyclists would be maintained by the shared pedestrian/cycleway bridge over the bypass. These impacts would be minimised through implementation of a traffic management plan, a road dilapidation and condition report, scheduling of construction traffic outside of peak periods, adequate signage and establishment of alternative property access routes where required.

Socio-economic

Socio-economic impacts during construction would generally be minor. These include:

- Acquisition of property including relocation of some agricultural sheds and infrastructure
- Local traffic and access impacts affecting familiar travel patterns for the local community
- Impacts to the amenity of the Parkes Golf Course
- Access impacts to the Parkes Christian School to and from Parkes town centre
- Generation of jobs and increased demand for rental accommodation, goods and services.

During operation, there may be a perception of separation between the Parkes town centre and the residential area west of the bypass and loss of amenity to the Parkes Golf Course. The proposal may also reduce passing trade to the town centre. However, Parkes has several characteristics, such as a diverse economic base and strong regional identity, that suggests any reduction is likely to be short-term. Potential socio-economic benefits include the improved amenity and safety in the Parkes town centre from reduced heavy vehicle traffic as well as a safer, more efficient route along the Newell Highway for freight and agriculture. These impacts would be minimised through preparation of a communication plan and ongoing community consultation with key stakeholders.

Noise and vibration

Preliminary assessments indicate the potential for some properties to be affected by noise impacts during construction including several residential properties near the bypass, Parkes Christian School, Kingdom Hall of Jehovah's Witness, commercial and active recreational receivers as well as Essential Energy. Site establishment, corridor clearing, bulk earthworks, blasting, installation of drainage, bridge construction, and paving/asphalting would cause the most noise management level exceedances. Sleep disturbance, increased road traffic noise and vibration related impacts may also occur. These potential impacts would be temporary for the duration of the construction works.

The operation of the proposal would likely reduce road traffic noise along the existing Newell Highway in Parkes town centre. It is important to note here that some residential properties near the bypass may be affected. A number of properties within or near the proposal's footprint currently experience low traffic noise impacts. Once the proposal is complete, these properties may experience increased road traffic noise impacts. Maximum noise levels are likely to occur when a truck passes by, accelerates away from the roundabout, or uses engine compression braking to decelerate at either end of the Parkes Bypass or at the roundabout at Condobolin Road.

These impacts would be minimised through mitigation measures including road design and traffic management, quieter road pavement surfaces, noise barriers and at-property treatments that will be considered for the project as part of detailed design.

Landscape character and visual

During construction, temporary landscape character and visual impacts would occur as a result of vegetation clearing, earthworks and ground disturbance as well as equipment and construction pads. Farmland and rural residential areas will experience the most visual impacts during major earthwork phases. During operation, the proposal will benefit the character and amenity of the town by reducing the number of heavy vehicles passing through the town centre. However, the proposal would introduce components west of Parkes town centre that would contrast the existing land use.

Overall, the visual impacts would be greatest where the bypass is close to residential dwellings, including houses on London Road, Bogan Road, Ballerdee Lane and Rosewood Avenue. The greatest landscape character impacts would be on the rural residential zone to the west of Parkes, the zones of remnant bushland and farmland as well as Parkes Golf Course. These impacts would be minimised through urban design and landscaping.

Biodiversity

The proposal is not likely to significantly impact any threatened species, populations or ecological communities or their habitats. The construction of the proposal would result in the removal of about 61.44 hectares of vegetation, of which about two per cent is native and 98 per cent is made up of pasture grassland, cropping and landscape plantings. Of the native vegetation to be cleared, about 0.94 hectares is consistent with a threatened ecological community listed under the BC Act and EPBC Act, Western Grey Box (PCT 80/BVT LA153) or White Box (PCT 267/BVT LA218). This vegetation removal would cause the loss of threatened fauna habitat, including the removal of ten live hollow-bearing trees and potential foraging habitat.

These impacts would be minimised through preparation of a flora and fauna management plan that outline exclusion zones for land clearing and following Roads and Maritime procedures including for habitat removal, unexpected species finds and restoration of native vegetation.

Other impacts

Other notable impacts associated with the construction of the proposal are:

- Erosion, sediment discharge, soil quality and contamination impacts associated with the earthworks
- Property impacts on private landowners due to land acquisition and property access changes
- Temporary loss of access to the travelling stock route.

Other notable impacts associated with the operation of the proposal are:

- Minor contamination from chemical and fuel spillage due to traffic, maintenance, accidents as well as runoff of oils, greases and hydrocarbons from the road
- Fragmentation of properties intersected by the proposal
- Land use changes through development of supporting roadside infrastructure.

Justification and conclusion

The proposal is justified as it best meets the objectives and needs for the improvement of freight efficiency through Parkes and interstate transportation of freight. It would also improve amenity and road safety within Parkes town centre by diverting heavy vehicles onto a bypass without any substantial negative impact on society, the economy or the biophysical environment.

The proposal will complement the other Newell Highway upgrades planned by Roads and Maritime and is supported by strategic policies and government strategies. A range of safeguards identified in this REF will be undertaken to manage and minimise the proposal's impacts on the receiving environment. This includes traffic management controls, consultation with landowners, amenity planting, noise management and mitigation measures.

The Parkes Bypass meets statutory criteria, and is considered road development, pursuant to the meaning and definition of Clause 94, Section 1 of the State Environmental Planning Policy (Infrastructure) 2007 that can be determined under Division 5.1 of the EP&A Act. The proposal would not significantly impact on matters of national environmental significance and so has not been referred to the Department of the Environment and Energy under the EPBC Act.

Display of the review of environmental factors

This REF is on display for comment between 1 July 2019 and 2 August 2019. You can access the documents in the following ways:

Internet

The documents are available as pdf files at www.rms.work/parkesupgrade.

Printed copies

The documents can be viewed at the following locations:

- Parkes Shire Council, 2 Cecile Street, Parkes NSW
- Parkes Library, Bogan Street, Parkes NSW
- Parkes Service Centre, 51-55 Currajong Street, Parkes NSW.

Staffed displays

- Discount Daves, Shop 3, 250 Clarinda Street, Parkes on:
 - 2 July 2019 from 10 am to 1 pm
 - 10 July 2019 from 9 am to 12 pm
 - 18 July 2019 from 11 am to 2 pm
 - 22 July 2019 from 9 am to 12 pm
 - 31 July 2019 from 10 am to 1 pm
 - 8 August 2019 from 11 am to 2 pm
- Woolworths Metro Plaza, 299 Clarinda Street, Parkes on:
 - 2 July 2019 from 3 pm to 6 pm
 - 10 July 2019 from 1 pm to 4 pm
 - 18 July 2019 from 5 pm to 8 pm
 - 22 July 2019 from 2 pm to 5 pm
 - 31 July 2019 from 3 pm to 6 pm
 - 8 August 2019 from 3 pm to 6 pm.

How can I make a submission?

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

PO Box 334, Parkes NSW 2870
newell.upgrade@rms.nsw.gov.au

Submissions must be received by Friday 2 August 2019. Submissions will be managed in accordance with the Roads and Maritime Privacy Statement which can be found here:

<https://www.rms.nsw.gov.au/about/access-to-information/my-privacy.html>

What happens next?

Roads and Maritime will collate and consider the submissions received during public display of the REF.

After this consideration, Roads and Maritime 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, Roads and Maritime will continue to consult with the community and stakeholders prior to and during construction.

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1 Introduction

This chapter introduces the proposal and provides the context of the environmental assessment. In introducing the proposal, the objectives and project development history are detailed and the purpose of the report is provided.

1.1 Proposal identification

Roads and Maritime Services (Roads and Maritime) proposes to build a new 10.5-kilometre bypass about 1.5 to 2.0 kilometres west of the existing Newell Highway in Parkes (the proposal).

Parkes is a town in central-west New South Wales (NSW) located at the intersection of the Newell Highway and two major rail lines that run between Parkes and Perth, via Broken Hill, Adelaide and Darwin. It is located within the Parkes Shire Local Government Area (LGA). The Parkes Bypass is one of several upgrades proposed for the Newell Highway as part of the Newell Highway Corridor Strategy (refer to section 2.1).

A key objective of the strategy and proposal is to enable safe access for Performance Based Standard 3a (PBS3a) freight vehicles through Parkes and therefore improve the highway as an inland freight route between Queensland and Victoria via NSW. The proposal would improve freight efficiency around Parkes by avoiding the need for heavy vehicles to travel through Parkes town centre by diverting them onto a bypass. Delays in Parkes town centre for heavy vehicles are currently due to:

- Level crossings at the intersection of the Newell Highway and the rail lines, especially when the gates are closed for train movements
- Interaction with local traffic and pedestrians
- The inability of PBS3a heavy vehicles to safely navigate around four 90-degree bends.

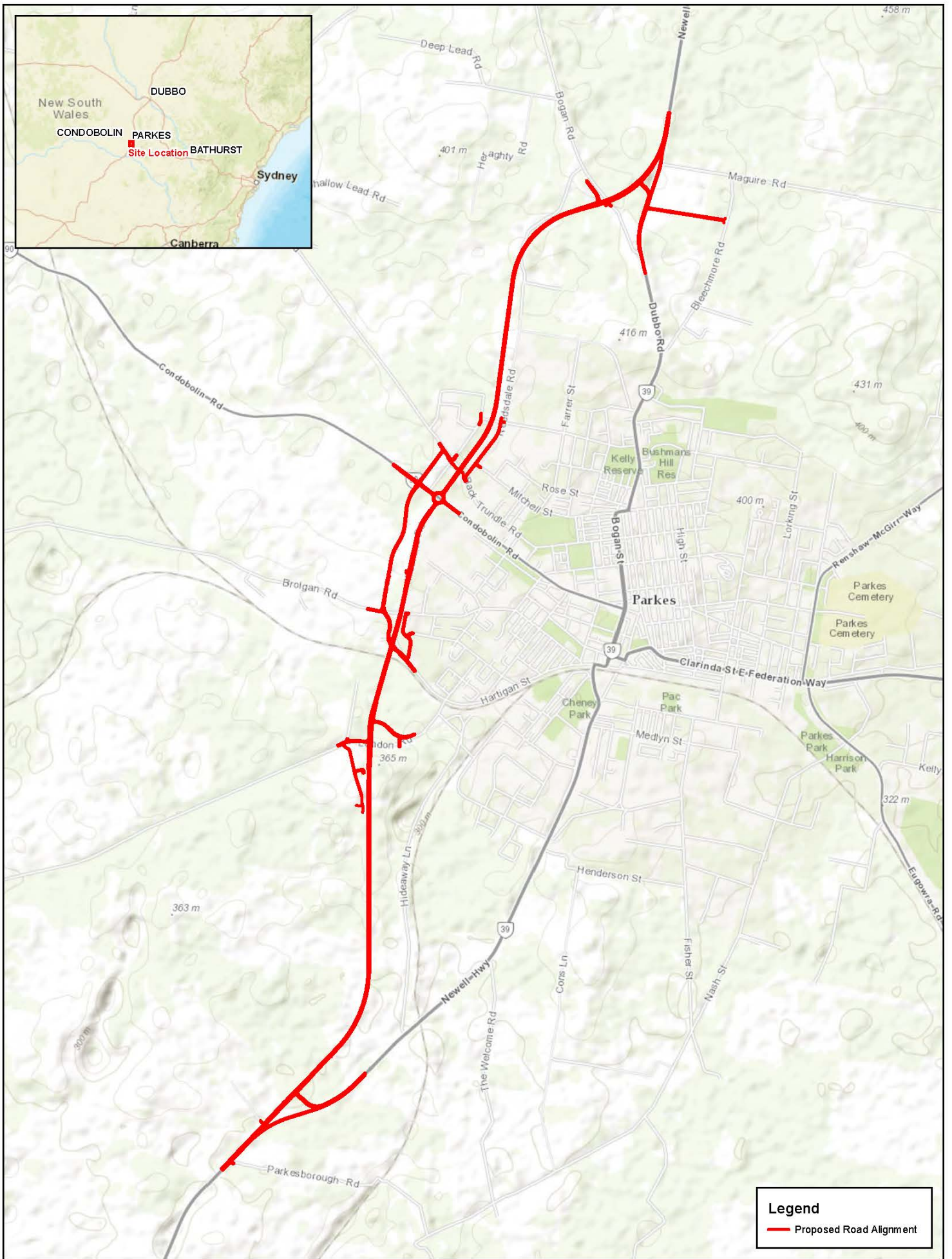
The proposal would also improve:

- Future connectivity to the Parkes Special Activation Precinct
- The amenity of the town centre in terms of it being a quieter and more pleasant place to live
- Pedestrian access in Parkes in the vicinity of the existing Newell Highway alignment.

The proposal's key features include (refer to chapter 3 for more detail):

- A new two-lane bypass (one lane in each direction) with four key intersections comprising:
 - T-intersections where the new bypass connects to the existing highway near Barkers Road (south) and Maguire Road (north)
 - A staggered T-intersection at London Road
 - A four-way roundabout at Condobolin Road
- A bridge over the Broken Hill and Parkes to Narromine rail lines and Hartigan Avenue and a shared pedestrian/cycleway bridge over the Parkes Bypass connecting Victoria Street and Back Trundle Road
- An extension of Hartigan Avenue that would connect to Brolgan Road (west of the bypass) and Condobolin Road
- Changes to local roads to tie in with the new bypass.

Figure 1-1 shows the location of the proposal.



Legend

— Proposed Road Alignment

Map: 2270437A_GIS_004_A2	Author: David Naiken		 1:30,000
Date: 30/08/2018	Approved by: Isabella.See		
Data source: ESRI Topographic Map, ESRI World Street Map		Coordinate system: GD A1994 MGA Zone 55 Scale ratio correct when printed at A3	



Parkes Bypass
Figure 1.1
 Proposal Overview

1.2 Purpose of the report

This review of environmental factors (REF) has been prepared by WSP on behalf of the Roads and Maritime. For the purposes of these works, Roads and Maritime is the proponent and the determining authority under Division 5.1.1 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 protective measures to be implemented.

The description of the proposed work and associated environmental impacts have 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 Division 5.1 of the Environmental Planning and Assessment Act 1979* (Is an EIS required? Guidelines, Department of Urban Affairs and Planning, DUAP, 1995/1996), the *Biodiversity Conservation Act 2016* (BC 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 that Roads and Maritime examine and take into account, to the fullest extent possible, all matters affecting, or likely to affect, the environment by reason of the activity.

The findings of the REF would be considered when assessing:

- Whether the proposal is likely to have a significant impact on the environment and therefore the necessity for an environmental impact statement to be prepared and approval to be sought from the Minister for Planning under Division 5.1 of the EP&A Act
- The significance of any impact on threatened species or ecological communities, or their habitats, by applying a test of significance as defined by the BC Act, which is required under section 1.7 of the EP&A Act. This would determine the necessity to apply to the Biodiversity Offsets Scheme or prepare a species impact statement (SIS)
- The significance of any impact on nationally listed biodiversity matters under the EPBC Act, including whether there is a real possibility that the activity may threaten long-term survival of these matters, and whether offsets are required and able to be secured
- The potential for the proposal to significantly impact any other matters of national environmental significance or Commonwealth land and the need, subject to the EPBC Act strategic assessment approval, to make a referral to the Australian Government Department of the Environment and Energy for a decision by the Commonwealth Minister for the Environment and Energy on whether assessment and approval is required under the EPBC Act.

2 Need and options considered

This chapter describes the need for the proposal in terms of its strategic setting and operational need. It identifies the various options considered and the selection of the preferred option for the proposal.

2.1 Strategic need for the proposal

2.1.1 The importance and need for the proposal

The Newell Highway is a major route between Melbourne and Brisbane for the transport of freight and livestock and use by tourists, emergency service vehicles and residents. Due to its importance as a freight route, the Newell Highway Corridor Strategy was developed to set the direction for managing the Newell Highway in the future (refer to Section 2.1.3). The strategy included a plan to build a bypass at Parkes (Transport for NSW, 2015). To support this, the State Government has invested \$500 million as part of the NSW State Infrastructure Strategy (refer to Section 2.1.3) to upgrade the Newell Highway as an inland freight route (NSW Government, 2016).

The Newell Highway runs through the town centre of Parkes. Parkes is also located at the intersection of two major rail lines, the Broken Hill rail line from Sydney to Perth and the Parkes-Narromine rail line. Both lines are suitable for double stacked and long freight trains. Double stacking is where containers are loaded two layers high onto freight trains. This allows the transportation of freight to be more efficient compared to single stacked freight trains. To take advantage of Parkes' ideal location for freight transportation, the Parkes National Logistics Hub has been developed on Broilgan Road, which will form part of NSW Government's first Special Activation Precinct. The Parkes Special Activation Precinct (Parkes SAP) will create jobs, attract businesses and investors and encourage economic development in Parkes, to strengthen Parkes as a centre to transfer freight between road and rail.

The Newell Highway in Parkes currently constrains the movement of freight due to congestion and delays caused by the level crossings and the 90-degree bends in the road, which cannot be safely navigated by PBS3a heavy vehicles. The level crossing in Parkes town centre averages 28 train movements per day for an average of 70 minutes of closure per day which causes congestion on local roads (Transport for NSW, 2015). Building a bypass would therefore avoid these constraints and improve the movement of freight around Parkes. It would also support efficient freight transportation across NSW and interstate.

2.1.2 History of the proposal

The importance of Parkes as a strategic transportation location, and the need to improve freight efficiency along the Newell Highway, has long been recognised by local council and successive State Governments.

Parkes Shire Council first proposed a ring road to divert heavy and freight vehicle traffic away from the town centre in the 1950s (Virtue, 2014). However, this proposal did not gain sufficient traction to be completed.

In 2011, Parkes Shire Council proposed and prepared a REF for a new 8.5 kilometre 'Western Ring Road' to bypass the existing Newell Highway. The ring road would have followed the Travelling Stock Route (TSR) for most of the alignment and Hideaway Lane at the southern end. Parkes Shire Council was unable to continue with the proposal due to cost constraints. However, it realised the importance and need for a ring road/bypass and sought for it to be included in the Newell Highway Corridor Strategy (refer to section 2.1.3, Virtue, 2014).

In March 2015, the Premier of NSW announced \$50 million for a truck bypass at Parkes as part of a broader commitment to improving road safety and freight efficiency on the Newell Highway.

In 2016, Roads and Maritime investigated options for upgrading the Newell Highway at Parkes.

Parkes Shire Council's Western Ring Road alignment was not chosen due to its inadequate stopping sight distance at the southern tie-in intersection and because it did not avoid three level crossings. This meant it would only be able to achieve low speeds and would not adequately improve freight efficiency. The proposed Parkes Bypass alignment is based on the Western Ring Road alignment, but includes a bridge over the rail lines to avoid the level crossings and a different alignment at the southern tie-in to achieve adequate sight distance.

2.1.3 Supportive government strategies

The proposal is supported under the policies, goals, objectives and targets of several strategic planning documents as summarised below.

Newell Highway Corridor Strategy

The Newell Highway Corridor Strategy was prepared in 2015 by Transport for NSW and Roads and Maritime (Transport for NSW, 2015). It sets out the objectives, current performance and issues in managing the Newell Highway corridor over the long term. This includes an aim for the increased use of the highway by Higher Productivity Vehicles (HPV, which include double road trains, B-triples, and AB triples). The strategy also includes solutions to improve the safety, infrastructure, and traffic along the highway in the future.

The Parkes Bypass is included as a short-term priority in the strategy as it would avoid two level crossings and three intersections which currently prevent PBS3a heavy vehicles from using this section of the Newell Highway. The Parkes Bypass would therefore form part of the solution to improve the productivity, efficiency and performance of the Newell Highway.

NSW Future Transport Strategy 2056

The Future Transport Strategy 2056 (Transport for NSW, 2018) is an update of the Long Term Transport Master Plan for NSW (Transport for NSW, 2012). It is a 40-year strategy, supported by plans for Greater Sydney and Regional NSW, which sets the vision, directions and outcomes for customer mobility. The Future Transport Strategy sets six state-wide outcomes to guide investment, policy and reform and service provision, which includes:

- Customer focused
- Successful places
- A strong economy
- Safety and performance
- Accessible services
- Sustainability.

The Parkes Bypass particularly supports the desired strong economy outcome, as it would help strengthen the transportation links from primary industries to global export markets.

Central West Regional Transport Plan

This plan was developed to supplement the NSW Long Term Transport Master Plan and to support the local transport needs and priorities for the Central West Region of NSW (NSW Government, 2013). One of the actions from this plan is to invest in the road network by focusing on improving safety, increasing accessibility and enhancing freight efficiency. The Parkes Bypass is aligned with this action as it would remove heavy vehicles passing through Parkes town centre which directly improves safety, accessibility and freight efficiency.

NSW: Making it Happen

NSW: Making it Happen explains the NSW Government's priorities for action and resource allocation across NSW. It sets out 12 Premier's priorities and 18 State priorities, with 30 associated targets (NSW Government, 2015). This proposal is relevant to the Premier's Priority 'Building Infrastructure', which aims to deliver key infrastructure projects on time and on budget across the state. It is also relevant to the state priority 'Improving road travel reliability'. The proposal would help to achieve these priorities by providing a key piece of infrastructure to reduce delays for heavy vehicles travelling through Parkes and improve the reliability of freight transportation along the Newell Highway.

State Infrastructure Strategy 2018-2038

The strategy identifies the NSW Government's infrastructure vision for the state over the next 20 years, across all sectors. It is supported by the Future Transport Strategy 2056. The strategy aims to create a 'hub and spoke' regional transport network model in NSW. This 'hub and spoke' model includes transport links that connect to surrounding towns and communities (spokes) from strategic centres and cities (hubs). The Parkes Bypass would support this by helping to strengthen the regional transportation connections in Western NSW, particularly for the efficient and safe transportation of PBS3a heavy vehicles.

NSW Road Safety Strategy 2012–2021

This strategy is to reduce the annual deaths and serious injuries from road crashes by at least 30 per cent by 2021 and identifies various ways to achieve this aim (Transport for NSW, 2012). The proposal is relevant to two key aims of the strategy:

- Elevate road safety across the design, construction and maintenance of the road network – the design of the Parkes Bypass will be made suitable for PBS3a heavy vehicles unlike the existing Newell Highway through Parkes which requires PBS3a heavy vehicles to go around tight 90-degree bends
- Highlight the need for greater respect and improved interactions among road users – the Parkes Bypass would divert heavy vehicles away from the town centre, making it easier for cyclists, pedestrians and cars to travel through the town centre as well as for heavy vehicles to transport freight efficiently without interacting with other road users.

20-year Economic Vision for Regional NSW

The NSW Government developed this vision to accelerate growth in key sectors and help drive the future of regional economies, by providing the right infrastructure and services to support that growth. It brings together other long-term planning strategies including the Future Transport Strategy 2056, the NSW State Infrastructure Strategy and the Regional Development Framework.

Support for freight infrastructure in Parkes is a key feature of this vision with Parkes being named the first 'Special Activation Precinct'.

NSW Freight and Ports Strategy

The NSW Freight and Ports Strategy was developed to guide the decisions and investments in the freight and logistics network over 20 years (Transport for NSW, 2013). The proposal supports this strategy by:

- Improving the movement of freight
- Bypassing the 90-degree bends in Parkes by creating a new road outside of Parkes town centre
- Improving the productivity of the road and freight network by improving heavy vehicle efficiency.

2.2 Existing infrastructure

2.2.1 Existing road network

Table 2-1 summarises the existing road network surrounding the proposal footprint and Figure 3-1 shows these roads.

Table 2-1 Key roads in the local area

Road	Description
Newell Highway (A39)	<ul style="list-style-type: none"> • A key north-south inland arterial road between Victoria, New South Wales and Queensland for freight and passengers • The longest highway in NSW at 1,058 km through the state • Part of the Federal National Land Transport Network • On average 3,700 vehicles travel along the Newell Highway between Parkes and Forbes each day, of which 20 per cent are heavy vehicles (Roads and Maritime, 2016).
Barkers Lane	<ul style="list-style-type: none"> • A small unsealed 'no through road' providing access to local agricultural properties • Intersects with the Newell Highway to the south of Parkes.
London Road	<ul style="list-style-type: none"> • Undivided and unmarked two lane sealed road (one lane in each direction) • Provides east-west access across the Parkes Bypass for Westlime Quarry, farming and rural properties, Parkes Golf Course and Parkes town centre.
Hartigan Avenue	<ul style="list-style-type: none"> • A classified road that runs perpendicular for part and parallel for part of the bypass • Generally, two lanes including a seven-metre-wide spray seal road surface and one metre wide gravel shoulder on both sides • Includes a level crossing with boom gates and warning lights.
Brolgan Road	<ul style="list-style-type: none"> • Provides access to the Parkes SAP.
Condobolin Road/Henry Parkes Way	<ul style="list-style-type: none"> • A classified road that intersects the bypass • Two lanes including a seven-metre-wide spray seal road surface and a gravel shoulder on both sides • Connects the Escort Way near Orange to Condobolin, intersecting the Newell Highway at Parkes.
Back Trundle Road	<ul style="list-style-type: none"> • A local road that provides access to Parkes Christian School, the residents of Shallow Rush and other western Parkes areas • Runs perpendicular to is bisected by the proposed bypass (however a shared pedestrian/cycleway bridge would be constructed at this location over the bypass) • Approved for PBS3a heavy vehicles • Two lanes including a six-metre-wide spray seal road surface and two metre gravel shoulders on both sides.
Victoria Street	<ul style="list-style-type: none"> • A local road that runs perpendicular to is bisected by the proposed bypass (however a shared pedestrian/cycleway bridge would be constructed at this location over the bypass) • Two lanes including a six-metre-wide spray seal road surface and two metre gravel shoulders on both sides.

Road	Description
Thomas Street	<ul style="list-style-type: none"> • A local road that runs perpendicular to and is bisected by the proposed bypass • Two lanes with a spray seal road surface width of 3.8 metres and gravel shoulders on both sides • Approved for PBS3a heavy vehicles.
Bogan Road	<ul style="list-style-type: none"> • A local road that runs to Northparkes mine • Two lanes with a seven-metre-wide spray seal road surface and 1.5-metre-wide gravel shoulders on both sides • An average of 9,100 vehicles per day, of which 15 per cent are heavy vehicles (1,300 heavy vehicles – 2013 figures, Roads and Maritime, 2016).
Moulden Street	<ul style="list-style-type: none"> • A local road that connects Condobolin Road/Henry Parkes Way, Back Trundle Road and Thomas Street • Two-way, two-lane road that runs parallel to the bypass • Approved for PBS3a heavy vehicles

Figure 2-1 to Figure 2-5 shows the current types of infrastructure and landscape along the proposed new road alignment.



Figure 2-1 Barkers Lane intersection with the existing Newell Highway, six kilometres south of Parkes



Figure 2-2 Local access road along the TSR north of Brolgan Road



Figure 2-3 Heavy vehicle travelling along London Road towards Hartigan Avenue, which is an example of one of the vehicle types the Parkes Bypass would be designed for



Figure 2-4 Victoria Street, Parkes, looking south. Photo demonstrates types of existing local roads and existing shared pedestrian/cycleway



Figure 2-5 Northern section of the proposed route of the new road. Existing TSR facing north

2.2.2 Existing rail lines

Parkes is located on two major rail lines:

- The Broken Hill rail line that runs between Orange, through Broken Hill to South Australia
- The Parkes to Narromine rail line that will form part of the Inland Rail and runs between Cootamundra on the Main South line and Werris Creek on the Main North line.

2.3 Proposal objectives and development criteria

The following section describes the objectives and criteria that were adopted and used to develop options and select a preferred option.

2.3.1 Proposal objectives

The proposal's key objectives are to:

1. Enable safe access for PBS3a heavy vehicles through Parkes to improve freight efficiency and productivity
2. Improve safety of the railway level crossings and reduce or eliminate the travel delays caused by railway operations
3. Facilitate future connectivity improvements to Parkes SAP as and when the traffic demand warrants
4. Improve the amenity and pedestrian access in Parkes in the vicinity of the existing Newell Highway alignment (secondary objective).

2.3.2 Development criteria

The development criteria are designed to achieve all project objectives. The key development criteria adopted for the proposal include:

- Supporting heavy vehicles up to 36.5-metres in length (PBS3a heavy vehicles)
- Designing the road to remain open during a notable flood event (ie a storm event that would typically occur once every 20 years for the longitudinal drainage next to the road and every 10 years for transverse drainage off the road surface).

2.3.3 Urban design objectives

The urban design objectives for the proposal are taken from *Beyond the Pavement* (Roads and Maritime, 2010), which sets out urban design policy, requirements and principles for the proposal. Table 2-2 summarises the nine urban design principles, and their relevance to the proposal as discussed in the landscape character and visual impact assessment (Clouston, 2017).

Table 2-2 Design principles for the proposal

Principle	Summary of principle	Relevance to the proposal
Principle One – contributing to urban structure and revitalisation	This principle looks at the opportunities for restructuring the urban environment at a town/regional level. It provides the opportunity to reduce traffic volumes and create streets and boulevards that provide a sense of place.	The Parkes Bypass allows Parkes Shire Council to investigate opportunities for: <ul style="list-style-type: none"> • First impression route improvements on the Newell Highway and Condobolin Road through town • Urban street improvements for Parkes town centre.
Principle Two – fitting into the built fabric	This principle seeks to minimise the impact of the road on the existing build environment including through minimising road footprints, including noise controls, avoiding adverse visual impacts and considering the adjoining land.	<ul style="list-style-type: none"> • Minimise the acquisition footprint of the bypass • Mitigate adverse noise impacts • Reduce the visual impact of the elevated sections of the road through tree planting.
Principle Three – connecting modes and communities	This principle deals with connectivity to the surrounding environment, with different modes of transport and the quality of road crossings points.	<ul style="list-style-type: none"> • Clearly signal the road entry to the Parkes SAP • Provide opportunities for cycleway linkages along Victoria Street and pedestrian connectivity in Parkes town centre.
Principle Four – fitting in with the landform	This principle addresses the need to design the road and its earthworks to respond sensitively to landform.	<ul style="list-style-type: none"> • Grade cut and fill batters as gently as possible • Investigate opportunities for shallower slopes to better integrate the road into the landscape • Round off/feather in tops of cuts and the bottom of fill batters • Provide a consistent width cut batter to vary cut batters rather than generating a constant 1:3 side slope.
Principle Five – responding to natural pattern	This principle addresses the need to respond sensitively to natural patterns and processes that underpin ecological systems and biodiversity. This includes connections of natural systems and habitats, creeks, rivers, waterways and the use of local materials.	<ul style="list-style-type: none"> • Integrate the road into its rural context – using native species adapted to the region to replicate the scattered woodland vegetation character • Utilise the highway road corridor for potential habitat linkages to existing highway road corridor landscapes • Investigate opportunities for habitat restoration • Where feasible, protect remnant vegetation and hollow bearing trees and provide opportunities for nesting hollows in new woodland areas.

Principle	Summary of principle	Relevance to the proposal
Principle Six – incorporating heritage and cultural contexts	This principle addresses the need to understand the heritage and cultural context of a road and outlines ways to incorporate this understanding in its design.	<ul style="list-style-type: none"> Retain and protect the identified nearby heritage sites (refer to sections 6.6 and 6.7) Maintain the function and use of the TSR Consider heritage stories for artworks.
Principle Seven – designing an experience in movement	This principle underlines the need to design road infrastructure that provides a physically and visually stimulating travel experience, avoids boredom, assists in wayfinding and best allows an appreciation of the values of the landscape.	<ul style="list-style-type: none"> Utilise scattered clusters of trees rather than continuous avenues. This allows for some failure without impacting the design intent Optimise views from elevated landscapes Build gateway experience using tree planting Utilise the novelty of the bridge over the Parkes Bypass as a signature opportunity.
Principle Eight – creating self-explaining road environments	This principle describes how roads signify their function through their design.	<ul style="list-style-type: none"> Make the signage at road decision points clear and legible.
Principle Nine – achieving integral and minimal maintenance design	This principle deals with the need to achieve well designed proposals that require minimal maintenance.	<ul style="list-style-type: none"> Utilise appropriate species selection/native planting combined with appropriate weed management options.

Overall, the three key urban design outcomes are to:

- Fit sensitively with the landform and the built, natural and community environments in which they are situated
- Contribute to the accessibility and connectivity of communities and a general permeability of movement through areas
- The design and management of road projects must contribute to the overall quality of the public domain for the community, including transport users.

2.4 Alternatives and options considered

This section describes the design alternatives and options considered to deliver the above objectives.

2.4.1 Methodology for selection of preferred option

The selection of the preferred option involved three stages each consisting of several steps as described below.

Stage 1: selection of the preferred strategic corridor option

Six strategic corridor options and a ‘do nothing’ option were identified by Roads and Maritime for investigation. Some of the options were discounted early in the strategic design process. Then the remaining options were investigated in more detail with respect to several considerations including:

- Property
- Traffic
- Road safety
- Environmental constraints
- Risk (including project delay, ability to meet the project objectives, cost, and other considerations)

- Economic appraisal
- Project objectives, and whether the option achieved them or not.

Following this, a single option was chosen and presented to the Newell Highway Upgrade Program Steering Committee for endorsement as the preferred corridor.

Stage 2: selection of preferred intersection options

Once the preferred strategic corridor was identified, the preferred design for the intersections was chosen. The process for identifying, analysing and recommending options for the preferred intersection design involved three main steps:

1. Identifying intersection options by Roads and Maritime, including design options which adopted suggestions from the community consultation feedback (refer to section 5)
2. Preparing a paper that included the background to the proposal, the identified intersection design options, and an initial list of the benefits, disadvantages, implications and costs for each
3. Holding a value management workshop on 11 April 2017 in Parkes, with representatives from Parkes Shire Council, Roads and Maritime as well as environmental and stakeholder engagement specialists, to review and discuss the intersection options and recommend a preferred option.

Stage 3: refinement of design following Health and Safety in Design (HSiD) and constructability assessment

The preferred intersections were investigated in further detail to determine their constructability. As a result of the constructability findings, the design was refined and additional intersection options were generated including:

- Five options for the bridge over the rail lines and Hartigan Avenue
- Three options for the extension of Hartigan Avenue and connection to the surrounding road network
- Two options for the shared pedestrian/cycleway bridge connecting Victoria Street and Back Trundle Road.

2.4.2 Strategic corridor options

Identification of strategic corridor options

Table 2-3 below summarises the five strategic corridor options and ‘do nothing’ option identified for investigation.

Table 2-3 Identified strategic corridor options

Option	Description
Option A) Full Newell Highway Bypass option with bridge over rail line and Hartigan Avenue	This option involves building the Parkes Bypass, which is a new 10.5 kilometres long bypass that would divert heavy vehicle traffic out of Parkes town centre. It would be built about 1.5 to 2 kilometres west of the existing Newell Highway and include one lane in each direction. The bypass would depart from the existing Newell Highway alignment to the south of Barkers Road and would re-join the existing Newell Highway alignment to the north of Parkes near Maguire Road.
Option B) “Reverse Priority” bypass option	This option involves building a 9.3 kilometre long heavy vehicle bypass of Parkes along the same route as Option A. The alignment of Option B only differs at the connections to the existing highway. Under this option, traffic would continue to be directed into Parkes and would have the option of turning off onto the Bypass.
Option C) Bypass option with level crossing at the rail line and at-grade intersection at Hartigan Ave	This option involves building a 10.5 kilometre long bypass of Parkes, with a level crossing across the Sydney-Broken Hill rail line instead of an overbridge. The rail sidings need to be relocated away from the level crossing site (as they often have rollingstock sitting in them).

Option	Description
Option D) Upgrade of the existing Newell Highway and the Hartigan Avenue level crossing	This option is an upgrade of the existing highway route through Parkes, including improving the alignment of tight right-angle bends to allow for the tracking of 36.5 metre PBS 3A vehicles and upgrading the existing level crossing at Hartigan Avenue. Option D also includes level crossing upgrades at Welcome and Tichborne to allow for PBS3a heavy vehicles.
Option E) Upgrade of existing Newell Highway through Parkes with low-level bridge over rail line	This option involves a minor realignment of the existing Newell Highway in town to allow provision of a bridge over the rail line immediately to the west of the Parkes Railway Station.
Option F) Upgrade of Existing Newell Highway through Parkes with high level bridge over rail line	As per Option E, but with ARTC's desired minimum clearance under the rail bridge of 7.1m.
Do nothing	No change to the current configuration of the Newell Highway in Parkes or construction of additional road infrastructure.

Analysis of strategic corridor options

Table 2-4 summarises the initial analysis undertaken on the five strategic corridor options identified.

Table 2-4 Summary of initial analysis of the strategic corridor options

Option	Analysis
Option A) Full Newell Highway Bypass option with bridge over rail line and Hartigan Avenue	Option A allows for uninterrupted through traffic journeys, removing delays associated with the railway level crossing, the ninety degree turns, and the interaction with local traffic that occurs on the current configuration. The bypassed sections of the existing road would have significantly less heavy vehicle traffic and would operate with improved amenity. It meets the primary objective of providing a route suitable for PBS 3A vehicles.
Option B) "Reverse Priority" bypass option	Option B gives Newell Highway traffic the option of turning onto the bypass rather than directing them onto it and giving them the option of turning off. Due to the different intersection arrangement at either end of the bypass, the expected travel time savings and crash cost reductions are lower for Option B than they are for Option A.
Option C) Bypass option with level crossing at the rail line and at-grade intersection at Hartigan Ave	Option C has added complications of constructing embankments and bridges in close proximity to bypass traffic and wouldn't have the same traffic benefits as Option A.
Option D) Upgrade of the existing Newell Highway and the Hartigan Avenue level crossing	Option D reduces delays by improving the railway level crossing efficiency and improving the travel paths, particularly for heavy vehicles. It meets the primary objective of providing a route suitable for PBS 3A vehicles. However, it wouldn't improve the amenity surrounding the existing Newell Highway in Parkes.
Option E) Upgrade of existing Newell Highway through Parkes with low-level bridge over rail line	Option E would have a large property impact on existing businesses, including McDonalds, KFC and the existing BP service station/truck stop. Additionally, the low-level bridge would not allow for double-stacked containers on the Parkes-Narromine rail line. This would be inconsistent with the aims of the Parkes SAP and strategic use of Parkes as a centre for the transfer of double-stacked freight containers. The bridge approaches would have gradients of about 7 per cent, which would be problematic for large trucks, particularly on the northern approach. The restricted sight distance and steep downgrade to the proposed signals at Grenfell Street would introduce road safety issues, particularly in conjunction with queues at the signals.

Option	Analysis
Option F) Upgrade of Existing Newell Highway through Parkes with high level bridge over rail line	Option F would allow for double-stacked containers on the Parkes-Narromine Line, however it would create an increased road safety risk due to restricted sight distances and increased gradients (8.5%) on the bridge approaches. This option would also have a greatly increased visual impact due to the increased height of the bridge.
Do nothing	This option would continue the situation of network inefficiency, the inability of PBS3a heavy vehicles to navigate ninety degree turns and excessive delays due to the current railway level crossing configuration.

Preferred strategic corridor option

The preferred strategic corridor option for the proposal is Option A because it best meets all the project objectives and is considered to have a lower environmental impact than the other options.




2.4.3 Intersection design options

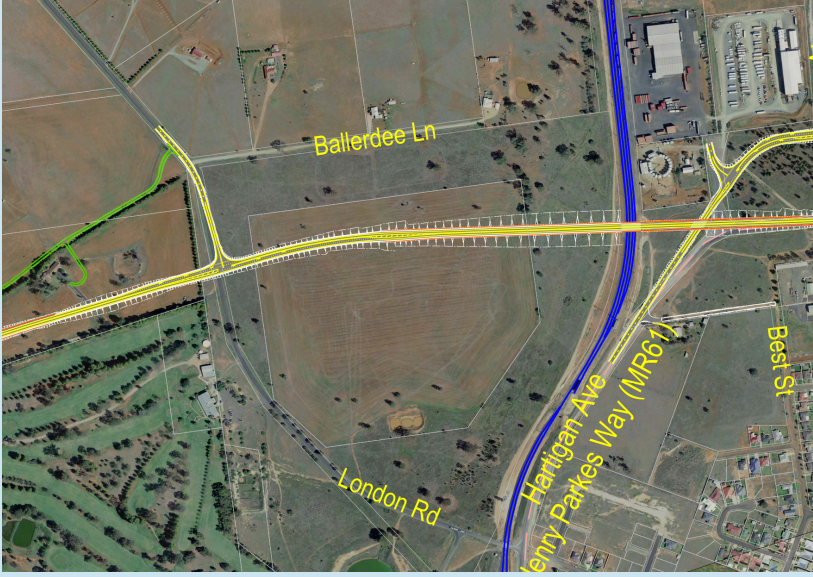
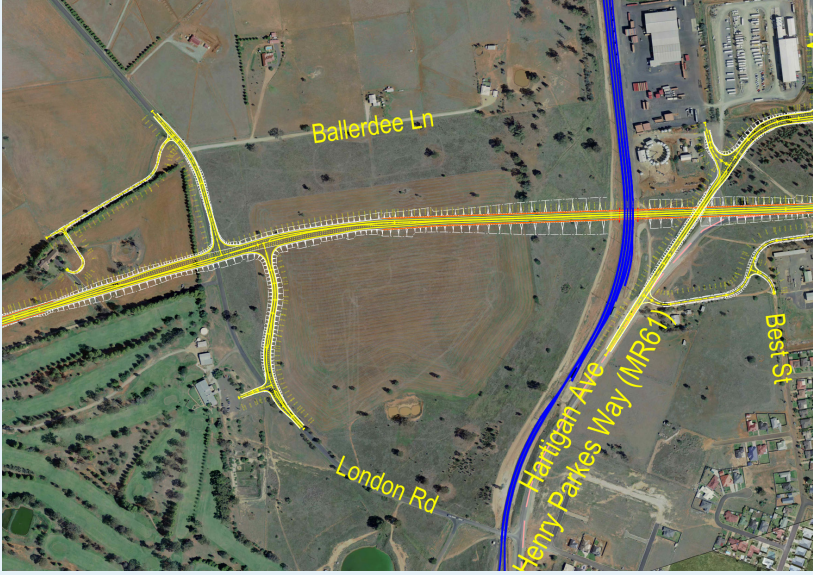
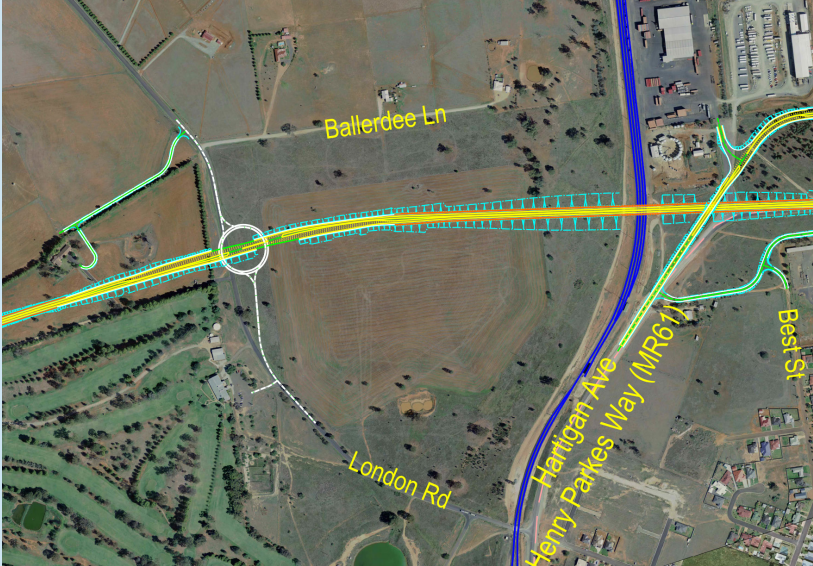
Identification of intersection design options on preferred corridor

The intersection design options that were developed by Roads and Maritime for analysis at the value management workshop are outlined below. These options included the suggestions received from the community consultation from December 2016 to February 2017 where possible (refer to Section 5.2.2).




Table 2-5 Intersection design options

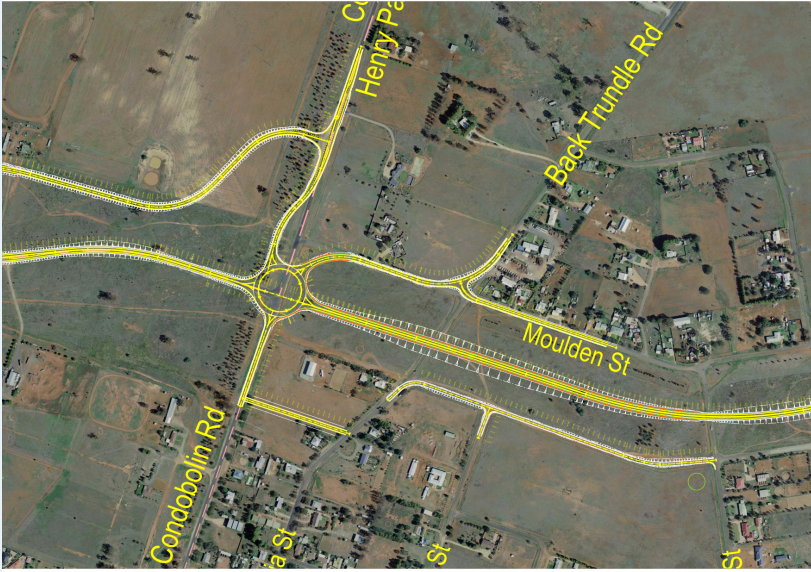

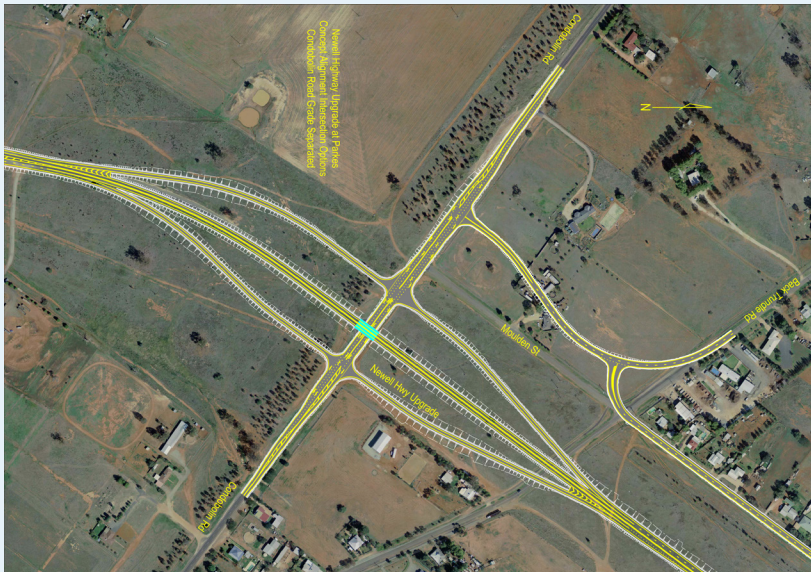
Intersection location	Option	Image
Southern tie-in	A1: T-intersection with slip lanes with priority given to the Parkes Bypass and land acquisition for a future ramp/bridge	




Intersection location	Option	Image
	A2: Roundabout north of Barkers Road	
	A3: T-intersection with priority given to the existing highway into Parkes	
	A4: T-intersection with a ramp and bridge for vehicles going to Parkes	

Intersection location	Option	Image
London Road	B1: T-intersection with no eastern connection to London Road	
	B2: Staggered T-intersection with an east and west connection to London Road	
	B3: Four-way roundabout at London Road	

Intersection location	Option	Image
Hartigan Avenue / Brolgan Road	C1: A bridge over Hartigan Avenue connected to a T-intersection with the Parkes Bypass	
	C2: A bridge over Hartigan Avenue connected to a T-intersection with the Parkes Bypass and a link road to Condobolin Road	
	C3: A bridge over Hartigan Avenue connected to Condobolin Road via a link road	

Intersection location	Option	Image
	<p>C4: Three separate staggered T-intersections at Hartigan Avenue, Billy Mac Place and Brolgan Road</p>	
<p>Condobolin Road/Back Trundle Road</p>	<p>D1: Staggered T-intersection at Condobolin Road with a pedestrian/cycle bridge to Back Trundle Road and land acquisition</p>	
	<p>D2: Staggered T-intersection at Condobolin Road with a shared pedestrian/cycleway bridge to Back Trundle Road</p>	

Intersection location	Option	Image
	<p>D3: Five-way roundabout with a shared pedestrian/cycleway bridge to Back Trundle Road</p>	
	<p>D4: Four-way roundabout with a shared pedestrian/cycleway bridge to Back Trundle Road</p>	
	<p>D5: Bridges and ramps separating traffic along the Parkes Bypass from traffic along Condobolin Road</p>	

Intersection location	Option	Image
Maguire Road and the northern tie-in	E1: T-intersection with slip lanes with priority given to the bypass	
	E2: Roundabout at Bogan Road	
	E3: T-intersection with priority given to the existing highway into Parkes	

Preferred intersection design options

The preferred intersection designs were:

- Option A1: At the Southern tie-in: T-intersection with continuous traffic flow along the bypass
- Option B2: At London Road: Staggered T-intersection with an east and west connection
- Option C1: At Hartigan Avenue/Brolgan Road: Bridge over Hartigan Avenue connected to a T-intersection with the Parkes Bypass near Brolgan Road
- Option D4: At Condobolin Road/Back Trundle Road: Four-way roundabout with a shared pedestrian/cycleway bridge to Back Trundle Road
- Option E1: At Maguire Road/Northern tie-in: T-intersection with continuous traffic flow along the bypass.

Option A1 was preferred because it was simple, easy for drivers to understand and could be upgraded to Option A4 in the future, which was a better engineering solution but not as good value for money.

Option B2 was preferred because it improved the east-west access for the local community and emergency services with minimal impact on the Parkes Bypass performance.

Option C1 was preferred because it provided the best value for money. It would also reduce traffic volumes at Condobolin Road and discourage heavy vehicle access into Parkes town centre.

Option D4 was preferred because it could be an opportunity to develop an entrance statement to Parkes and the community feedback suggested a roundabout instead of a staggered T-intersection. A four-way roundabout would be simpler for people to negotiate compared to a five-way roundabout.

Option E1 was preferred because it would make the Parkes Bypass more efficient and requires less land than the other options.

2.4.4 Further design refinement options

Identification of further design refinement options

On completion of the 50% concept design and further assessment of constructability and safety in design, the following design refinements were considered:

- Five options for the bridge over the rail lines at Hartigan Avenue
 - Option 1 – 80 metre long, 3 span bridge with super-T girders and piers in rail corridor
 - Option 2 – 135 metre long, 3 span bridge with steel trough girders and piers outside rail corridor
 - Option 3 – 184 metre long, 6 span bridge with super-T girders and piers inside rail corridor
 - Option 4 – 172 metre long, 5 span bridge with super T-girders and piers inside rail corridor
 - Option 5 – 100 metre long, 2 span bridge with composite steel trough girders and piers outside rail corridor
- Three options for the extension of Hartigan Avenue and connection to the surrounding road network
 - Option 1 – Extension of Hartigan Avenue connected to a T-intersection with the bypass near Brolgan Road
 - Option 2 – Extension of Hartigan Avenue connected to Moulden Street at an intersection with capacity for B-doubles
 - Option 3 – Extension of Hartigan Avenue connected to Moulden Street at an intersection with capacity for PBS3a heavy vehicles
- Two options for the bridge connecting Victoria Street and Back Trundle Road:
 - Option 1 – bridge with light vehicle access as well as a shared pedestrian/cycle path
 - Option 2 – bridge with shared pedestrian/cycle path only.

Preferred design refinements

The preferred design refinements, which were adopted in the proposed design included:

- Option 4 for the bridge over the rail lines at Hartigan Avenue which includes a 5 span bridge with super T-girders and piers inside the rail corridor. This is because it:
 - Avoided private property acquisition
 - Offered value for money compared to the other bridge options
 - Avoided the need for major utility adjustments
- Option 3 for the extension of Hartigan Avenue connected to Moulden Street at an intersection with capacity for PBS3a heavy vehicles. This was because it would:
 - Eliminate a T-junction with the bypass which would improve traffic flow and reduce the number of potential vehicle conflict points
 - Reduce traffic impacts during construction by avoiding traffic staging on Westlime Road
 - Remove sharp horizontal and vertical curves in the approach to the intersection with the bypass
 - Facilitate the potential future use of the land between the Bypass and the Hartigan Avenue extension as a rest area or service centre
- Option 2 for the bridge connecting Victoria Street and Back Trundle Road with a shared pedestrian/cycle path only.

3 Description of the proposal

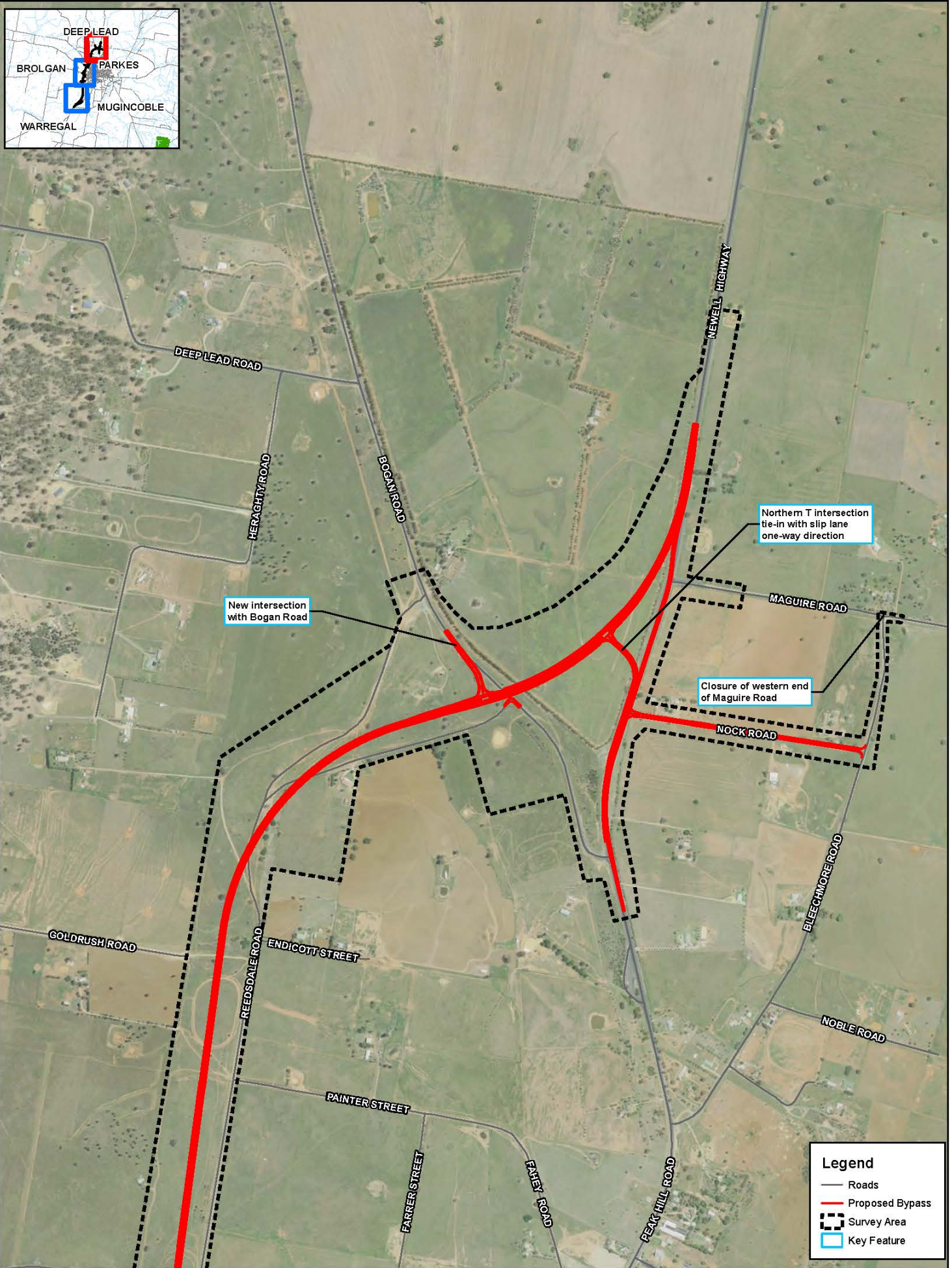
This chapter describes the proposal, its design and the construction method that would be used to build it.

3.1 The proposal

The proposal involves the construction of a 10.5-kilometre bypass of the Newell Highway at Parkes (the Parkes Bypass). The Parkes Bypass would divert heavy vehicle traffic out of Parkes town centre. It would be located about 1.5 to two kilometres west of the existing Newell Highway and would generally include one lane in each direction. The Parkes Bypass would depart from the existing Newell Highway to the south of Barkers Road and would re-join the highway to the north of Parkes near Maguire Road. Figure 3-1 shows the key features of the proposal.

Key features of the proposal would include:

- A new two-lane bypass (one lane in each direction) with four key intersections comprising:
 - T-intersections where the new bypass connects to the existing highway near Barkers Road (south) and Maguire Road (north)
 - A staggered T-intersection at London Road
 - A four-way roundabout at Condobolin Road
- A bridge over the Broken Hill and Parkes to Narromine rail lines and Hartigan Avenue and a shared pedestrian/cycleway bridge over the Parkes Bypass connecting Victoria Street and Back Trundle Road
- An extension of Hartigan Avenue that would connect to Brolgan Road (west of the bypass) and Condobolin Road
- Changes to local roads to tie in with the new bypass.

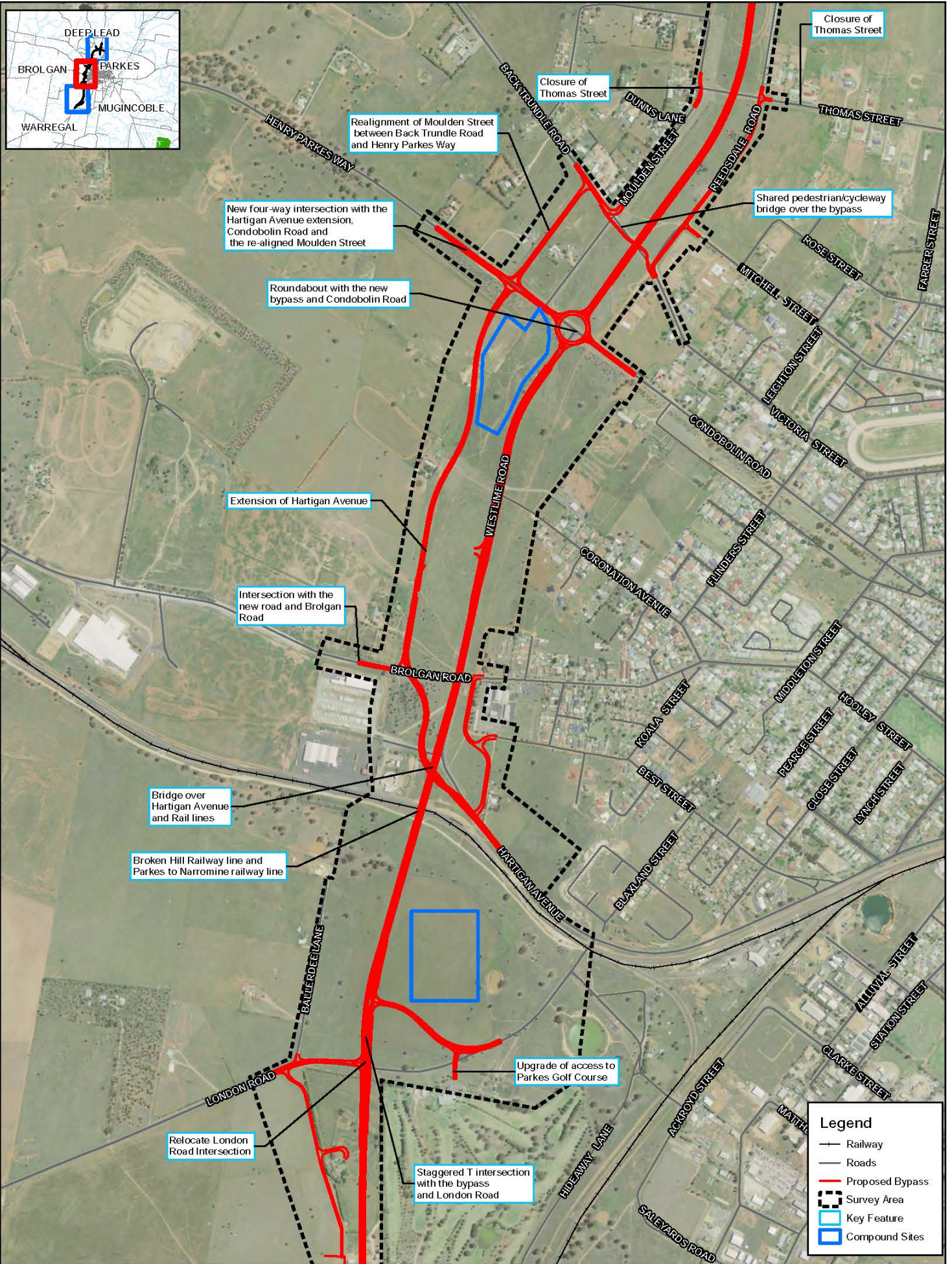


Map: 2270437A_GIS_005_A8	Author: David Naiken		
Date: 28/09/2018	Approved by: Z. McLaughlin		
Data Source: Imagery @ Land and Property Information (LPI), 2017		Coordinate system: GDA1994 MGA Zone 55 Scale ratio correct when printed at A3	



Parkes Bypass

Figure 3.1
Key Features of the Proposal



Map: 2270437A_GIS_005_AB	Author: David.Naiken		 1:10,000 Coordinate system: GDA 1994 MGA Zone 55 Scale ratio to correct when printed at A3
Date: 28/09/2018	Approved by: Z.McLaughlin		
Data Source: Imagery © Land and Property Information (LPI), 2017			

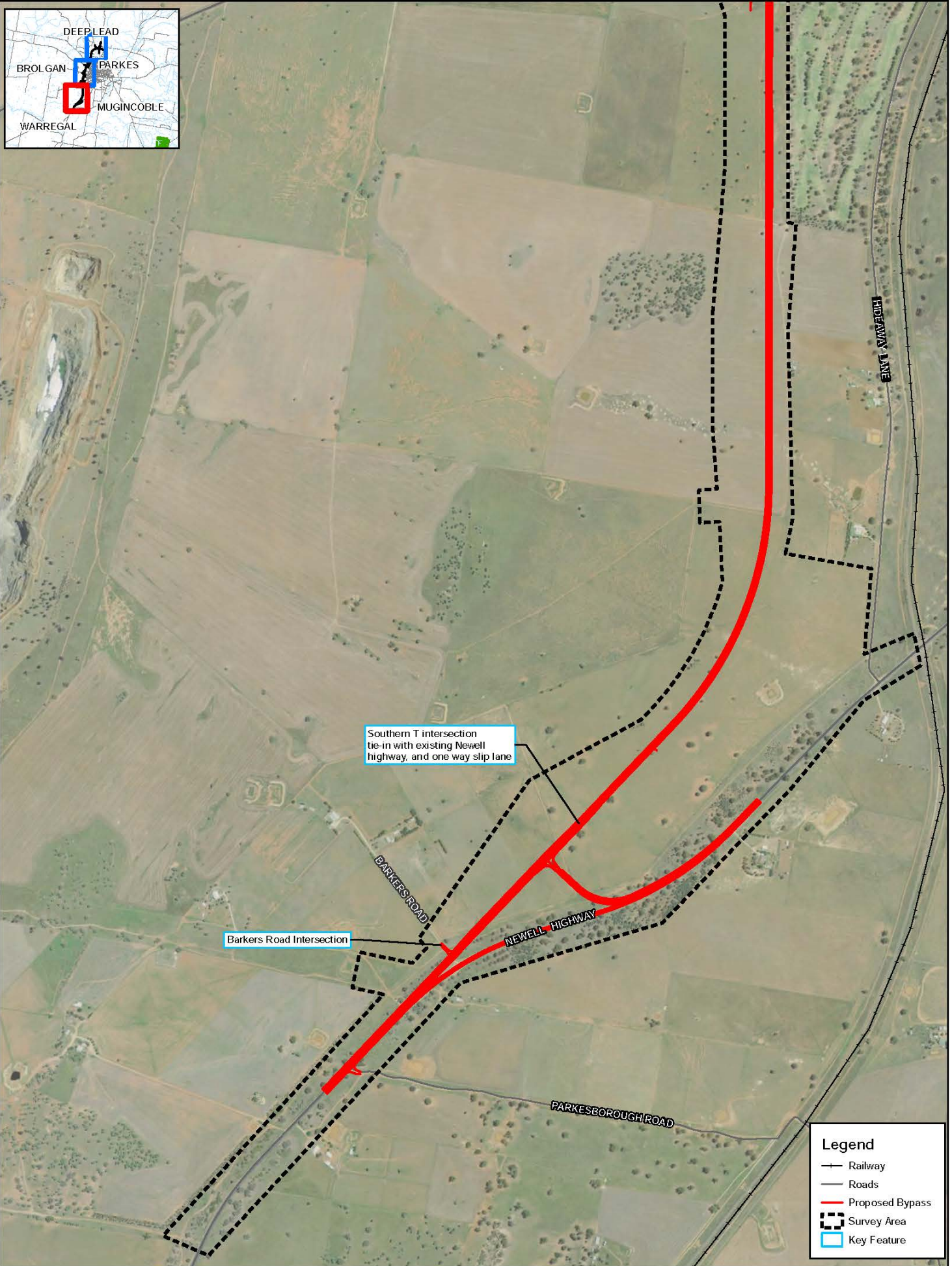
RMS

Parkes Bypass

Figure 3.1
Key Features of the Proposal

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Legend

- Railway
- Roads
- Proposed Bypass
- Survey Area
- Key Feature

Map: 2270437A_GIS_005_AB	Author: David.Naiken		 1:10,000 Coordinate system: GDA 1994 MGA Zone 55 Scale ratio correct when printed at A3
Date: 28/09/2018	Approved by: Z.McLaughlin		
Data Source: Imagery © Land and Property Information (LPI), 2017			



Parkes Bypass
 Figure 3.1
 Key Features of the Proposal
 Page 3 of 3

3.2 Design

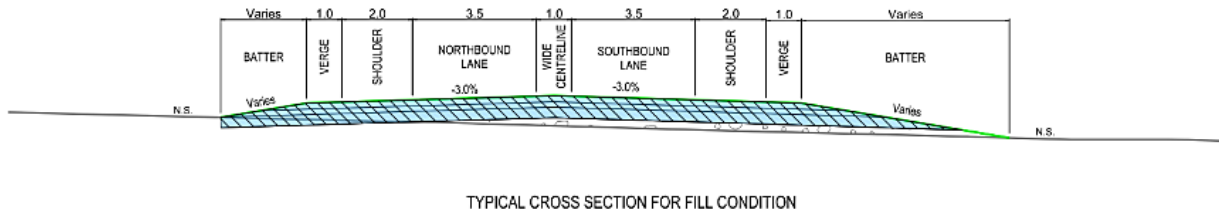
The concept design is described below and would be further refined during detailed design as result of ongoing design investigation and consideration of environmental safeguards described in chapter 6.

3.2.1 Design criteria

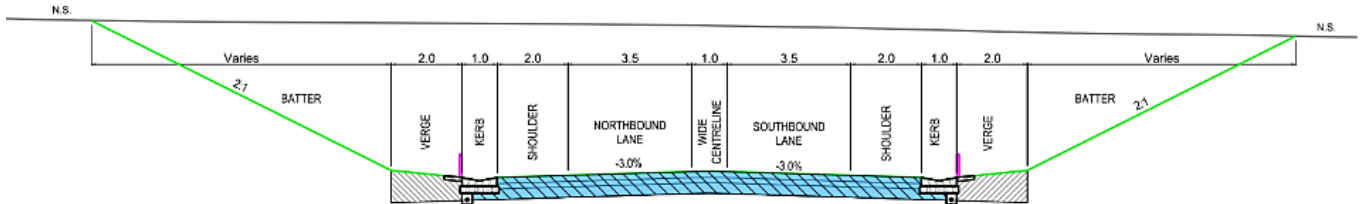
The proposal has been designed to NSW and Australian engineering, road safety, environmental and transport planning standards developed by Roads and Maritime and Austroads. These standards describe the criteria that should be adopted for specific road classifications and conditions. The criteria have been developed to ensure all roads are designed to be safe, effective, well-planned and easily maintained. Table 3-1 shows the design criteria that has been adopted in the proposal's concept design for the main bypass road.

Table 3-1 Design criteria for the bypass

Criteria	Description
Speed limit	<p>Design speed limit:</p> <ul style="list-style-type: none"> • 120 km/h north of Back Trundle Road and south of London Road • 90 km/h in the middle section of the bypass • 60 km/h on the extension of Hartigan Avenue to Condobolin Road. <p>Posted speed limit:</p> <ul style="list-style-type: none"> • 110 km/h north of Back Trundle Road and south of London Road • 80 km/h in the middle section of the bypass • 50 km/h on the extension of Hartigan Avenue to Condobolin Road.
Cross section (as shown on Figure 3-2)	<ul style="list-style-type: none"> • Lane width – 3.5 m (minimum) • Shoulder width – 2 m (one shoulder on each side) • Centreline – up to 1 m median (may be of varying width) • Verge – 1 m • Reserve fence lines – 60 m (30 m each way from the centreline) • Provision of a standard clear zone with any plantings outside of this • The slope of the fill batters varies from 6:1 to 2:1 • The slope of the cut batters – 2:1.
Design vehicle	Vehicles up to 36.5 m in length.
Grade	Maximum of 2.5 per cent grade for the bridge over the rail lines and Hartigan Avenue.
Road surface type	Majority spray-seal with a small section of asphalt
Barrier type	<ul style="list-style-type: none"> • Thrie Beam (a guardrail in the shape of three waves) between bridges • Australian standard bridge barriers on the bridge over the rail lines and the bridge over Hartigan Avenue • W Beam (a guardrail in the shape of two waves) on the approaches to the bridges.



TYPICAL CROSS SECTION FOR FILL CONDITION



TYPICAL CROSS SECTION FOR CUT CONDITION

Figure 3-2 Typical project cross section of roadway

3.2.2 Engineering constraints

Table 3-2 lists the main constraints to development and how they have been addressed in the concept design.

Table 3-2 Engineering and development constraints

Constraint	Concept design provision
Rail line clearance: the need for the bridge to have a clearance of 7.2 metres over the existing rail lines to accommodate double container stacking in the future.	The bridge over the rail lines and Hartigan Avenue would be at least nine metres high to provide the necessary clearance to allow double stacked containers to pass underneath.
Design capacity: the need for the road and intersections to be designed for use by PBS3a heavy vehicles up to 36.5 metres in length.	The design geometry and layout has been developed to allow heavy vehicles up to 36.5 metres in length to navigate the Parkes Bypass and intersections.
Topography: the need to allow for changes in the ground level to achieve the tie-in heights and build the bridge approaches. The design should also aim to minimise the earthworks required during construction to reduce costs.	There are four locations with 6.5 metre cuts or greater, one location with a 2.5 metre cut and a 10-metre embankment near the bridges over the rail lines and Hartigan Avenue.
Speed limit design standards: the need to abide by speed limit design standards including the NSW Speed Zoning Guidelines (Roads and Maritime, 2016). For example, the inclusion of a roundabout in the design requires the posted speed limit to be reduced to 80 km/h or lower, which is less than the 110 km/h speed limit initially proposed for the bypass.	In the central section of the Parkes Bypass between London Road and Back Trundle Road, the posted speed limit has been reduced from 110 km/h to 80 km/h.
Local roads: the Parkes Bypass would sever several east-west roads that currently cross the proposal footprint.	As outlined in section 3.2.3, the design includes several road adjustments/realignments, road closures and building link roads to deal with the severance issues.
TSR and Crown Land: the need to follow the existing TSR alignment and Crown Land to minimise private property impacts.	The Parkes Bypass alignment follows the existing TSR alignment and nearby Crown Land where possible. The land acquisition required is outlined in Table 3-5, and the property impact is discussed in Section 6.9.

3.2.3 Major design features

Roadway

The bypass would be 14 metres wide plus batter slopes. This would generally include two traffic lanes, one in each direction, and a one metre median. The horizontal and vertical alignment of the Parkes Bypass has been designed to allow for PBS3a heavy vehicles up to 36.5 metres in length. It would tie in with the existing road network, achieve the required clearances over the Broken Hill and Parkes-Narromine rail lines and comply with the relevant guidelines.

Bridges

Two bridges would be built as part of the new bypass:

- A bridge over the Broken Hill (Sydney to Perth) and Parkes-Narromine rail lines and Hartigan Avenue
- A shared pedestrian/cycleway bridge for cyclists and pedestrians over the Parkes Bypass connecting Victoria Street and Back Trundle Road.

The bridge over the rail lines and Hartigan Avenue would be at least nine metres high to provide the required clearance over double stacked container trains. This bridge would be suitable for heavy vehicles, designed for a posted speed limit of 50 kilometres per hour (km/h) and be built to the same design standard as the new bypass. Grades for the southern and northern approaches to these two bridges would be 2.5 per cent and one per cent respectively.

The bridge linking Victoria Street and Back Trundle Road is a shared pedestrian/cycleway bridge designed for local pedestrians and cyclists to travel east-west over the bypass, including to access Parkes Christian School.

Parking, public transport and active transport

The off-road cycleway between Victoria Street and Back Trundle Road would be maintained by including a shared path bridge.

All bus routes would be preserved under the proposal along with existing bus stop provisions.

It is expected that police, emergency vehicle and breakdown bays would be included as part of the detailed design.

Urban and landscape design

The urban and landscape design strategy (refer to chapter 7 of Appendix F) responds to the objective of promoting Parkes as an attractive place to live and work. The road would therefore be designed and landscaped to be functional in its future context and setting while also providing an environment that people can easily navigate around and that can be easily maintained.

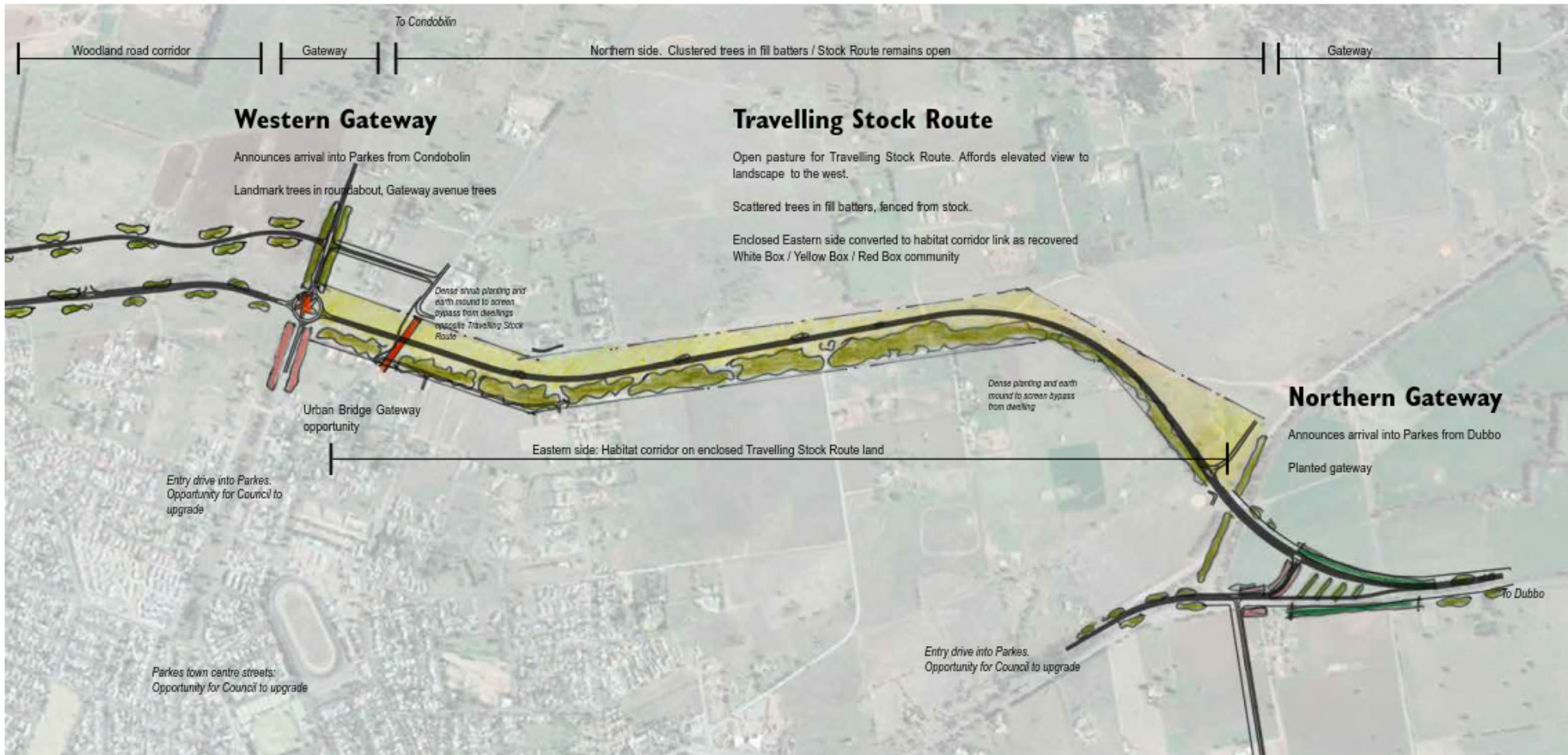
The urban design objectives are described in Table 2-2 as taken from *Beyond the Pavement* (Roads and Maritime, 2010).

Figure 3-3 and Figure 3-4 show the landscape concept plan for the proposal.



Source: Clouston Associates 2018

Figure 3-3 Indicative landscape concept design (southern end)



Source: Clouston Associates 2018

Figure 3-4 Indicative landscape concept design (northern end)

Drainage

An average recurrence interval (ARI) of 1-in-10 years has been adopted for the design of road surface water drainage and 1-in-20 years for the longitudinal drainage. Design for the cross-drainage culverts running under the road (and associated drainage) has adopted an ARI of 1-in-100 years.

As part of the drainage work, new cross-drainage culverts would be needed. Scour protection would be needed at the outlets of all the cross-drainage culverts. This would prevent erosion and scour and would likely take the form of rock rip-rap aprons with energy dissipation structures.

During construction, additional erosion and sediment controls may be needed (refer to section 6.9). These will be designed in accordance with *The Blue Book: Managing Urban Stormwater: Soils and Construction, Volume 2* (Landcom, 2008).

Cut and fill

To allow for changes in road height compared to the natural ground level, sections of road would need to be built up above the natural ground level on imported 'fill' material or embankments. Where the ground level rises, the road would need to be cut in below the natural ground level by removing material (termed 'cutting'). Blasting may be required to break through the hard sedimentary and basic rock material.

The potential use of retaining walls in areas where there is property encroachment or sensitivities would be investigated as the design is refined further.

Supporting infrastructure

The specifics of the supporting road infrastructure, lighting, signage and street furniture would be confirmed during the detailed design. It would likely include:

- Provision of lighting at intersections and bridges, designed in accordance with relevant guidelines and standards to minimise light spillage into residential properties, minimise glare that could impact on driver visibility and with a design life of 20 years
- Appropriate signage and line marking
- Modification of existing safety barriers and provision of new safety barriers as required in accordance with relevant standards and guidelines.

Signage strategy

A signage strategy for the Parkes Bypass would be confirmed during detailed design. It would include a strategy for general wayfinding as well as additional signage on the approach to Parkes from the highway to attract people to visit and stop-over.

The signage strategy would be discussed with Parkes Shire Council to identify the best way to create an entrance statement. The community consultation feedback and socio-economic assessment also reflected the importance of an effective signage strategy to attract visitors to Parkes to reduce any potential loss of passing trade (refer to chapter 5).

3.3 Construction activities

This section summarises the likely method, staging, work hours, plant and equipment, and associated activities that would be used to build the proposal. For this REF, an indicative construction method is provided.

The detailed construction staging plans and methods would be determined by the contractor during detailed design. The actual method may vary from the description in this chapter due to:

- Identification and location of underground utilities and services
- On-site conditions identified during pre-construction activities
- Ongoing refinement of the detailed design
- Outcomes of community consultation including submissions on the REF.

3.3.1 Work methodology

The proposal would be built under Roads and Maritime construction specifications as managed by a contractor.

Staging

The proposal would be likely built in sections and stages to reflect contractor, material and equipment availability. The staging process would also allow for effective site management from the point of not placing too much demand on the ancillary facilities and haul routes. It is also possible that certain sections of the Parkes Bypass would be built at the same time.

Proposal work activities

Table 3-3 summarises the likely construction activities and their sequencing for the construction of the Parkes Bypass, as well as the plant and equipment that would be likely used to build the proposal. The plant and equipment needed to build the proposal would be typical to any major road construction site. It would vary depending on the construction activity. The construction activities and plant and equipment list would be finalised by the contractor following detailed design.

Table 3-3 Indicative construction activities

Activity	Associated work	Indicative plant and equipment	
Preparation and enabling	<ul style="list-style-type: none"> Obtain leases and licences (refer to chapter 4) Complete property acquisition (refer to section 3.6) Survey the construction site Relocate fencing Notify the community and stakeholders before work starts Establish the site compounds and access routes Fence the site boundaries and areas to be used for stockpile sites Protect sensitive areas as defined by the REF and the construction environmental management plan Install temporary erosion, sediment and water quality controls, including silt fences, and stormwater diversion drains Mark trees that would need to be removed or trimmed, and mark any 'no-go' areas Install traffic management controls including any road closures and diversions Install noise mitigation measures and safeguards (refer to section 6.3.5). 	<ul style="list-style-type: none"> Light vehicles Trucks Excavators Generators Graders Site sheds 	<ul style="list-style-type: none"> Back hoes Water carts Cranes Hand tools Low loaders
Utilities	<ul style="list-style-type: none"> Adjust/relocate utility infrastructure (water, Gas, electricity and telecommunications) where required. 	<ul style="list-style-type: none"> Light vehicles Trucks Hand tools Concrete saws 	<ul style="list-style-type: none"> Generators Back hoes Water carts Elevated work platforms (EWP)
Surface preparation	<ul style="list-style-type: none"> Remove and mulch vegetation in stages along the new road alignment Strip and stockpile topsoil in stages Prepare the surface using graders, dozers and other equipment. 	<ul style="list-style-type: none"> Light vehicles Trucks Excavators Chainsaws Mulchers Rollers 	<ul style="list-style-type: none"> Generators Back hoes Water carts Cranes Hand tools
Blasting	<ul style="list-style-type: none"> Blasting of hard rock material Removal of spoil material 	<ul style="list-style-type: none"> Drill rig Trucks 	<ul style="list-style-type: none"> Light vehicles Hand tools

Activity	Associated work	Indicative plant and equipment	
Earthworks	<ul style="list-style-type: none"> Excavate cuttings Create fill embankments Place select materials Construct roadside cuts and fill batters Prepare batter treatments Erect batters for rail overpass Dispose of unsuitable and/or surplus material from the proposal site. 	<ul style="list-style-type: none"> Excavators Dump trucks Compactors Graders Front-end loaders Rollers 	<ul style="list-style-type: none"> Water carts Profilers Bulldozers Vibratory rollers Rock breakers
Bridges	<ul style="list-style-type: none"> Site preparation Construction of abutments Place bridge girders using crane Construct bridge deck and kerbs Complete road approaches for new bridge. 	<ul style="list-style-type: none"> Concrete trucks Concrete pumps Generators Hand tools 	<ul style="list-style-type: none"> Trucks Cherry pickers Welding equipment Cranes
Drainage	<ul style="list-style-type: none"> Install/extend culverts Install catch drains Install scour protection. 	<ul style="list-style-type: none"> Excavators Concrete pumps Concrete trucks Graders 	<ul style="list-style-type: none"> Trucks Bulldozers Cranes
Road surface	<ul style="list-style-type: none"> Gravel base/sub-base layers and asphaltic concrete paving Apply spray-seal. 	<ul style="list-style-type: none"> Concrete trucks Concrete pumps Vibratory rollers Compactors Concrete saws Compressors Bitumen sprayers 	<ul style="list-style-type: none"> Generators Milling machines Trucks Asphalt paving machines Asphalt trucks Rollers Batch plants
Tie in and road markings	<ul style="list-style-type: none"> Remove section of old road surface at each intersection and complete road widening and tie-in the new road to existing roads. 	<ul style="list-style-type: none"> Light vehicles Trucks Hand tools 	<ul style="list-style-type: none"> Generators Line marking machines
Finishing works	<ul style="list-style-type: none"> Conclude property access Complete tie-ins Install safety barriers Install kerbs, gutters and verges Rehabilitate disturbed areas and landscape in accordance with the landscaping planting strategy Install line marking, signs and guide posts Decommission temporary facilities (eg compound sites) Clean-up the site and dispose of all surplus waste materials Installation of street lighting and signage. 	<ul style="list-style-type: none"> Generators Trucks 	<ul style="list-style-type: none"> Cranes Light vehicles

3.3.2 Construction hours and duration

It is anticipated that construction would start in 2021 and would take about three years to complete. This duration would be subject to funding, weather, securing the necessary access to build over the rail lines, and coordinating with other activities and events in Parkes. Construction would be largely carried out in accordance with standard construction working hours:

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

To minimise disruption to daily traffic and disturbance to surrounding land owners and businesses, it would be necessary to carry out some work outside of these hours. The following activities are likely to be carried out outside standard construction working hours:

- Placement of asphalt
- Intersection and tie-in activities
- Deliveries of oversized materials or equipment
- Delivery and installation of bridge elements such as girders
- Line marking
- Installation and adjustment of barriers and signage for construction zones during each construction stage
- Work within the rail corridor.

Any work carried out outside of standard working hours would be in accordance with the *Interim Construction Noise Guideline* (DECC, 2009) and the *Construction Noise and Vibration Guideline* (Roads and Maritime, 2016). The allowable hours for this work would be defined under the provisions of an environmental protection licence (EPL) (refer to section 6.3). Prior advice would be given to the community if any work is planned to be carried out outside standard construction working hours.

3.3.3 Earthworks

The proposal would require major earthworks along some sections of the Parkes Bypass to create the required cut and fill profile described in section 3.2.3. Earthworks generally involve removal and temporary stockpiling of suitable material for fill and grading work elsewhere. Movement of materials between work sites would be required, from cutting, to fill and embankment areas, and batter treatments. The earthwork volumes will be determined during detailed design.

Excavated materials would be managed and stored (stockpiled) in accordance with Roads and Maritime protocol as described in detail in section 6.8.4. This would include the testing and classification of material in accordance with the Waste Classification Guidelines (DECCW, 2014).

In the event that not all material excavated during construction is suitable for reuse as fill, imported fill may be needed. This material would be obtained from other local suppliers in the region where possible.

3.3.4 Source of materials

Various standard construction materials that are readily available across NSW would be needed to build the proposal. Certain design components, such as the kerb and drainage infrastructure, would arrive pre-formed, while other materials, such as stone and aggregate, would be delivered to one of the site compounds (refer to section 3.4).

Materials needed to build the proposal include:

- Soil and fill
- Road base and sub-base materials such as stone and aggregate
- Road pavement materials such as bitumen, asphalt, and including spray seals
- Pre-cast Super T's and bridge elements
- Kerbing, drainage infrastructure (pipes, pits and culverts), barriers, paving and signage footings
- Steel for girders, railings, signage, lighting posts and fencing
- Landscaping materials including trees, seedlings, chippings and turf.

The quantity of materials required to build the proposal would be confirmed during detailed design.

3.3.5 Traffic management and access

Traffic management and access controls would be developed during the detailed design and implemented under a construction traffic management plan (TMP) (refer to section 6.1.4).

Staging and traffic management

The purpose of building the proposal in stages is to reduce any impacts on traffic on the Newell Highway and surrounding local roads. The staging process will be confirmed by the construction contractor. Certain work activities would also likely take place at night to minimise any traffic-related impacts (refer to section 3.3.2).

A traffic management plan (TMP) would be prepared in accordance with the *Traffic Control at Work Sites Manual Version 4* (RTA, 2010) and approved by Roads and Maritime before implementation. The TMP would provide details of the traffic management to be implemented during construction to ensure traffic flow on the surrounding network is maintained where possible.

Access

Property accesses would be maintained as far as possible throughout construction and there would be no disruption to bus services. Heavy vehicle movements on local roads would be minimised or detoured where possible.

Construction and delivery traffic and workforce vehicles

The proposal would generate heavy vehicle movements at regular intervals during construction. These heavy vehicle movements would mainly be associated with:

- Delivery of construction materials
- Site compound construction
- Water delivery
- Spoil and waste removal
- Delivery and removal of construction equipment and machinery.

Table 3-4 provides the indicative number and timing of construction traffic movements. These numbers would be confirmed during the detailed design.

Table 3-4 Indicative construction traffic movements

Vehicle types and association	Use	Vehicle daily numbers		Typical movement pattern
		Average	Maximum	
Rigid trucks 12.5 metres 30 tonnes general mass limit (GML)	Earthworks (cut and fill)	95	130	Spaced throughout the day
	Aggregate delivery			
	Road base delivery			
	Sand delivery			
	Asphalt delivery			
	Cement delivery			
	Fly ash delivery			
	Precast concrete delivery			
Semi-trailers 19 metres 42 tonnes GML	Steel Prefabricated units Oversized units	Occasional: potentially up to 50 over the course of the construction program.		
Incidental deliveries	Various	2	5	
Light vehicles				
Workforce	N/A	100	300	Typically, at the start and end of the working day between 6am and 7am, and 6pm and 7pm
Incidental deliveries	Various	2	5	Spaced throughout the day

Parking

The contractor would be required to include off-road parking provisions within the proposal footprint. Sufficient parking would be provided for the project to prevent workers from parking on public roads.

3.4 Ancillary facilities

Several site compounds within the proposal footprint and some located on public (Crown) land would be needed to store equipment, machinery and vehicles to build the proposal. The specific requirements for each site would depend on the stage of construction and the associated work activities. Site compound facilities would include portable buildings with amenities, such as lunch facilities and toilets, secure and bunded storage areas for site materials, including fuel and chemicals, office space, and associated parking.

Figure 3-1 shows potential ancillary facility and laydown locations for the proposal. The main site compound is likely to be located to the south-west of the roundabout on Council owned land, with a secondary compound south of the Broken Hill rail line near the Parkes Golf Course. Lay down crane pads would be located on either side of the Broken Hill rail line. Minor ancillary sites would also be needed to reduce the distance for transport of materials. The potential impacts associated with these locations have been assessed in chapter 6 of this REF.

Where feasible and reasonable, the location of all ancillary facilities has been selected to best respond to the following criteria:

- At least 40 metres away from the nearest waterway
- Of low ecological and heritage conservation significance
- At least 100 metres away from residential dwellings and other land uses that may be sensitive to noise
- On relatively level ground
- Outside the 1-in-10-year ARI floodplain.

Stockpile locations would be refined during the detailed design phase using the criteria above. Any additional or revised compound and/or stockpile sites proposed by the contractor would be discussed with Roads and Maritime's Project Environment Manager to determine if any additional environmental assessment is needed. Where any of these criteria cannot be satisfied, Roads and Maritime would carry out an assessment to qualify any impacts and identify safeguards and mitigation measures.

Site compounds would be securely fenced with temporary fencing. Signage would be erected advising the general public of access restrictions. Upon completion of construction, the temporary site compound, work areas and stockpiles would be removed, the site cleared of all rubbish and materials and rehabilitated. Stockpiles would be managed in accordance with Management of road construction and maintenance wastes (Roads and Maritime, 2016) and QA Specification R44 – Earthworks.

3.5 Public utility adjustment

Existing utilities have been identified and located as part of the development of the concept design to incorporate utility authority requirements for relocations and/or adjustments.

Preliminary investigations identified that some public utility assets would be affected by the proposal. Preliminary information was obtained from Dial Before You Dig searches and utilities surveys. Water, gas, electricity and telecommunications infrastructure would be affected by the proposal. Confirmation of the relocation of utilities and associated strategies would be carried out in consultation with utility authorities during detailed design.

Prior to the commencement of works:

- The location of existing utilities and relocation details will be confirmed following consultation with the affected utility owners
- Any proposed utility relocation works outside of the assessed proposal scope and footprint would be discussed with Roads and Maritime's Project Environment Manager to determine if any additional environmental assessment is needed.

3.5.1 Stockpile locations and management

Stockpiles would be managed in accordance with the Management of road construction and maintenance wastes (Roads and Maritime, 2016) and QA Specification R44 – Earthworks. Section 6.8.4 describes the key safeguards from these documents that would be implemented to ensure the stockpiles are located and managed to provide environmental protection, and comply with the *Protection of the Environment Operations Act 1997* and the *Waste Avoidance and Resource Recovery Strategy 2007*, which relate to any waste generation, storage and/or disposal activities. The temporary storage of excavated reusable topsoil and subsoil would be managed in accordance with NSW resource recovery exception requirements.

3.5.2 Security

The ancillary facilities sites would be securely fenced with temporary fencing. Signage would be erected advising the public of access restrictions.

3.6 Property acquisition

Land would need to be permanently acquired from the Government and private owners to build the proposal. Roads and Maritime would also need to temporary lease or agree access over land for construction. While the final land purchase would be confirmed during the detailed design, it would be carried out in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991*, the supporting NSW Government Land Acquisition Reform 2016 and the Land Acquisition Guide (Roads and Maritime, 2012). Table 3-5 shows the property acquisition needed for the proposal footprint.

Table 3-5 Proposed property acquisition

Lot and DP	Property owner
Lot 388 DP 750179	Private
Lot 387 DP 750179	Private
Lot 517 DP 750179	
Lot 2 DP 1129859	
Lot 1 DP 1129859	
Lot 2 606056	
Lot 683 DP 750179	
Lot 1 DP 1098082	Parkes Shire Council
Lot 1 DP 870752	
Lot 554 DP 750179	
Lot 155 DP 750152	Private
Lot 1085 DP 750152	Private
Lot 2 DP 1012623	
Lot 1 DP 838430	Private
Lot 781 DP 750152	
Lot 784 DP 750152	
Lot 1037 DP 750152	Private
Lot 907 DP 750152	
Lot 837 DP 750152	

Lot and DP	Property owner
Lot 7019 DP 1077038	Crown Land
Lot 7071 DP 1058313	
Lot 7073 DP 1077021	
Lot 543 DP 750179	
Lot 7071 DP 1058313	
Lot 7330 DP 1147447	
Lot 7329 DP 1147447	
Lot 7328 DP 1147447	
Lot 7333 DP 1147355	
Lot 7332 DP 1147355	
Lot 7045 DP 1059946	
Lot 7044 DP 1059946	
Lot 7008 DP 1030636	
Lot 7303 DP 1143523	

4 Statutory and planning framework

This chapter provides the statutory and planning framework for the proposal and considers the provisions of relevant state environmental planning policies, local environmental plans and other legislation.

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 Roads and Maritime, it can be determined as an activity under Division 5.1 of the *Environmental Planning and Assessment Act 1979*. Development consent from council is not needed.

The proposal is not located on land reserved under the *National Parks and Wildlife Act 1974* and does not affect land or development regulated by State Environmental Planning Policy No. 14 – Coastal Wetlands, State Environmental Planning Policy No. 26 – Littoral Rainforests, State Environmental Planning Policy (State and Regional Development) 2011 or State Environmental Planning Policy (State Significant Precincts) 2005. This means the proposal can progress with the provisions of the ISEPP prevailing over other State and local policy. However, this does not remove the need to assess the significance of any environmental impacts or the need to consider if the proposal should progress as State significant infrastructure (SSI) under Division 5.1 of the EP&A Act.

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

State Environmental Planning Policy No.44: Koala Habitat Protection

The policy encourages the conservation and management of natural vegetation in areas that provide suitable habitat for naturally occurring koala populations. In combination, Schedule 1 and Schedule 2 describe locations in NSW and the tree types for which the policy applies. While these provisions only apply to consented development, they remain relevant in relation to assessing potential impacts to koala populations and/or core koala habitat.

Parkes Shire LGA is listed in Schedule 1 of SEPP 44 as a location where koalas are known to exist. One tree species, *Eucalyptus albens* (White Box), which is listed in Schedule 2 as a known tree species that koala feed on, was recorded within 50 kilometres the biodiversity assessment survey area (refer to section 6.5.2). However, the recorded patch size of White Box is very small and isolated. Also, there was a lack of evidence of recent koala sightings within the survey area. Therefore, it is unlikely that koalas regularly inhabit or rely on the White Box as a resource within the survey area and therefore the loss of, or impact on, native vegetation due to the proposal, would not disturb core koala habitat as protected under the provisions of this SEPP.

4.1.2 Local Environmental Plans

Parkes Local Environment Plan 2012

The proposal is located within the Parkes Shire LGA. Local development control, and land use zoning and planning in the LGA is governed under the respective LEP and supporting development controls plans (DCPs). As development without consent, the proposal is not subject to local environmental planning policy or development control. However, the LEPs are useful in identifying the proposal's consistency with their land use and planning policy as described in Table 4-1.

Table 4-1 Relevant Parkes LEP land use zoning policies

Objective	Proposal consistency
SP2: infrastructure: applies to the existing Newell Highway corridor and the Broken Hill and Parkes to Narromine rail lines	
<ul style="list-style-type: none"> Provide infrastructure Prevent development that is not compatible with or that may detract from the provision of infrastructure. 	<ul style="list-style-type: none"> Partially involves the upgrade of existing transport infrastructure Would not affect access to, or the provision/operation of the rail lines or existing Newell Highway.
RU1: primary production applies to most of the proposal footprint	
<ul style="list-style-type: none"> Encourage sustainable and a diversity of primary industry production and enterprises by maintaining/enhancing natural resources Minimise land fragmentation Minimise land use conflict Minimise development-related visual impacts Provide recreation/tourist activities that support agricultural/environmental/land use conservation. 	<ul style="list-style-type: none"> While the proposal conflicts with many of the objectives of this land use zone, the selection of a preferred option considered outcomes that would minimise land fragmentation and environmental impacts Visual and socio-economic impacts have been assessed in sections 6.4 and 6.2 of this REF.

4.2 Other relevant NSW legislation

Table 4-2 lists the NSW legislation relevant to the proposal or the land on which the proposal would be built.

Table 4-2 Other relevant NSW legislation

Legislation and application	Relevance to the proposal and further requirements
National Parks and Wildlife Act 1974: provides for the protection of Aboriginal heritage values, national parks and ecological values. Makes it an offence to harm Aboriginal objects, places or sites without permission.	The study area has the potential to contain Aboriginal objects or sites that could be impacted by the proposal. Assessment site walkover was conducted for the proposal and did not identify any Aboriginal objects or sites. As such no permit under Part 6 of this Act would be required. An unexpected finds procedure and other appropriate safeguards would be implemented to prevent any damage to any Aboriginal objects, places or sites due to the proposal (refer to section 6.6.4).

Legislation and application	Relevance to the proposal and further requirements
<p>Heritage Act 1977: provides for the protection of conservation of buildings, works, maritime heritage (wrecks), archaeological relics and places of heritage value through their listing on various State and local registers. Makes it an offence to harm any non-Aboriginal heritage values without permission</p>	<p>The proposal would:</p> <ul style="list-style-type: none"> • Have no significant impact on any items of local or state heritage value (refer to section 6.7) • Potentially impact on undiscovered archaeology. <p>Approval for the proposal under the <i>Heritage Act 1977</i> is not needed. Safeguards would be implemented to prevent any damage to any heritage sites due to the proposal (refer to section 6.7.4).</p>
<p>Aboriginal Land Rights Act 1983: was designed to address the dispossession of Aboriginal peoples in NSW. It includes provisions allowing Aboriginal land councils to claim Crown Land where it can be: lawfully sold or leased under <i>Crown Lands Act 1989</i>; is not lawfully used or occupied; is not needed for essential public purposes; or is not subject to a registered claim for native title.</p>	<p>Section 36 of the Act allows the relevant Local Aboriginal Land Council (LALC) or NSW Aboriginal Land Council (NSWALC) to claim Crown Land on behalf of LALC members. A traditional connection to the land is not a prerequisite for entitlement. Several Aboriginal land claims have been submitted under the Act that are relevant to this proposal. The claims from north of Condobolin Road to the Newell Highway have been denied as the land is needed for the Parkes Bypass which serves an essential public purpose. The land claims south of Condobolin Road to west of Parkes Golf Course have also been resolved.</p>
<p>Roads Act 1993: provides for the construction and maintenance of public roads. Requires consent to dig up, erect a structure or carry out work in, on or over a road</p>	<p>The proposal would require work on several existing roads in the local area: the Newell Highway, London Road, Hartigan Avenue, Brolgan Road, Condobolin Road, Henry Parkes Way, Back Trundle Road, and Bogan Road. As such, Roads and Maritime would need a Road Occupancy Licence from Parkes Shire Council and the Transport Management Centre to ‘occupy’ the above roads (refer to section 6.1).</p>
<p>Noxious Weed Act 1993: provides for the control of noxious weeds Places a responsibility on land owners to control, remove and eradicate noxious weeds</p>	<p>Three weeds listed as noxious weeds within the Parkes LGA were recorded within the proposal survey area. These species are the St. John’s wort, African boxthorn and silver-leaf nightshade. All three are classified as ‘Class 4 regionally controlled weeds’ and the African boxthorn and silver-leaf nightshade are also listed as weeds of national significance. Roads and Maritime would need to include safeguards to manage and prevent the spread of classified noxious weeds, as described and allowed for in section 6.5.</p>
<p>Biodiversity Conservation Act 2016 (BC Act): includes provisions to maintain a healthy, productive, and resilient environment for the community, now and in the future consistent with the principles of ecologically sustainable development (ESD).</p>	<p>The <i>Biodiversity Conservation Act 2016</i> came into effect on the 25 August 2017. This Act repealed the <i>Threatened Species and Conservation Act 1995</i> (TSC Act), <i>Native Vegetation Act 2003</i> and parts of the <i>National Parks and Wildlife Act 1974</i>.</p> <p>The BC Act outlines the framework for addressing impacts on biodiversity from development and clearing. It establishes a framework to avoid, minimise and offset impacts on biodiversity from development through the Biodiversity Offsets Scheme. The Biodiversity Offsets Scheme creates a transparent, consistent and scientifically based approach to biodiversity assessment and offsetting for all types of development that are likely to have a significant impact on biodiversity (Office of Environment and Heritage 2017).</p> <p>The biodiversity assessment has been prepared in accordance with the requirements of the Biodiversity Assessment Methodology (BAM) under the BC Act. Significant impact assessments, in accordance with the BC Act, have been undertaken for threatened species and endangered ecological communities recorded within the study area and considered likely to be impacted upon by the Proposal. These assessments concluded that the Proposal is unlikely to have a significant impact on threatened biodiversity.</p>

Legislation and application	Relevance to the proposal and further requirements
<p>Protection of the Environment Operations Act 1997: focuses on environmental protection and provisions for the reduction of water, noise and air pollution and the storage, treatment and disposal of waste. Introduces licencing provisions for scheduled activities that are of a nature and scale that have a potential to cause environmental pollution. Also includes measures to limit pollution and manage waste.</p>	<p>The proposal would involve the excavation of more than 30,000 tonnes of material which is a scheduled activity listed in Schedule 1 of the Act.</p> <p>Therefore, due to the earthwork volumes there is a need to obtain an environmental protection licence (EPL) from the NSW Environment Protection Authority (EPA) under section 43 of the above Act before work. The EPL will set parameters and conditions controlling construction.</p>
<p>Local Land Services Act 2013 served to establish 11 regional Local Land Services (LLS) who are responsible for the integrated management of TSRs. The LLS is able to manage TSRs and issue use permits. Where the proposed use of a TSR sits outside of the authorities afforded to a LLS under this Act, consultation with, and the approval of, the NSW Department of Industry: Lands (DPI – Lands) is needed. This is considered under provisions of the <i>Crown Lands Management Act 2016</i>.</p>	<p>A large portion of the proposed modification footprint falls within a TSR managed by the Central West LLS. The Act provides for a level of delegated statutory management, protection and sustainable use of TSRs. This focuses on retaining TSRs for their intended use and function. Despite these provisions, the LLS does not have the delegated powers to allow the TSR to be developed as a road. This is afforded to the Minister of the DPI – Lands under the Acts described below. Nonetheless, the LLS remains a key stakeholder that has been consulted and will continue to be consulted as the proposal is developed. Chapter 5 discusses the detail of this consultation.</p>
<p>Crown Lands Management Act 2016 and the Crown Land Legislation Amendment Act 2017: set out the requirements for ownership, use and management of Crown Land. They describe the permissions and authorisation needed when planning the development of activities on Crown Land. They also include provisions relating to specific controls and restrictions on the development of Crown Land for Division 5.1 activities.</p>	<p>Both Acts set out a process of strategic land use assessment to determine how Crown Land should be best used in the public interest before there is any decision to sell or lease it. Accordingly, the Minister of DPI – Lands can attach conditions on the sale or lease of Crown Land. The Minister can also create an easement over Crown Land for access (including public access).</p> <p>To build the proposal, existing leases on the land would need to be surrendered/forfeited. Roads and Maritime may then need to secure the required lease to have access of Crown Land during construction and secure acquisition before starting work. The <i>Crown Lands Management Act 2016</i> describes the process for the acquisition of crown land.</p>

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 needed 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 needed for proposed road activities that may affect nationally listed threatened species, populations, endangered ecological communities and migratory species. This is because requirements for considering impacts to these biodiversity matters are the subject of a strategic assessment approval granted under the EPBC Act by the Australian Government in September 2015. Potential impacts to these biodiversity matters are also considered as part of chapter 6 of the REF and Appendix G.

Findings – matters of national environmental significance (other than biodiversity matters)

The assessment of the proposal's impact on matters of national environmental significance and the environment of Commonwealth land found that there is unlikely to be a significant impact on relevant matters of national environmental significance or on Commonwealth land. Accordingly, the proposal has not been referred to the Australian Government Department of the Environment under the EPBC Act.

Findings – nationally listed biodiversity matters

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

4.4 Confirmation of statutory position

The proposal is categorised as development for the purpose of a road and is being carried out by or on behalf of a public authority. Under clause 94 of the ISEPP, the proposal is permissible without consent. The proposal is also not state significant infrastructure, state significant development nor does it trigger the provisions requiring the preparation of an SIS or biodiversity development assessment report. As such, the proposal can be determined as an activity under Division 5.1 of the EP&A Act.

Roads and Maritime is the determining authority for the proposal. This REF helps Roads and Maritime fulfil its obligation under clause 5.5 of the EP&A Act to “examine and take into account to the fullest extent possible all matters affecting, or likely to affect, the environment by reason of the activity”.

5 Consultation

This chapter discusses the consultation carried out to date for the proposal and the consultation proposed for the future.

5.1 Consultation strategy

Roads and Maritime has prepared a community consultation and stakeholder engagement plan for the proposal. The plan's objectives are to:

- Advise directly-affected stakeholders and the community about the proposal, its potential impacts, and how they can obtain further information
- Brief parties affected by any temporary traffic management controls, access restrictions and local road closures
- Ensure issues relating to the proposal are identified and effectively managed
- Identify local issues to ensure the proposal aligns with community needs
- Inform and consult impacted and interested stakeholder groups and businesses
- Involve key Government agencies and stakeholders
- Receive comments from affected parties
- Record and respond to enquiries and concerns in an open, transparent and timely manner
- Seek community ideas for inclusion in the development of the detailed design.

Figure 5-1 shows the six main steps of the consultation process.

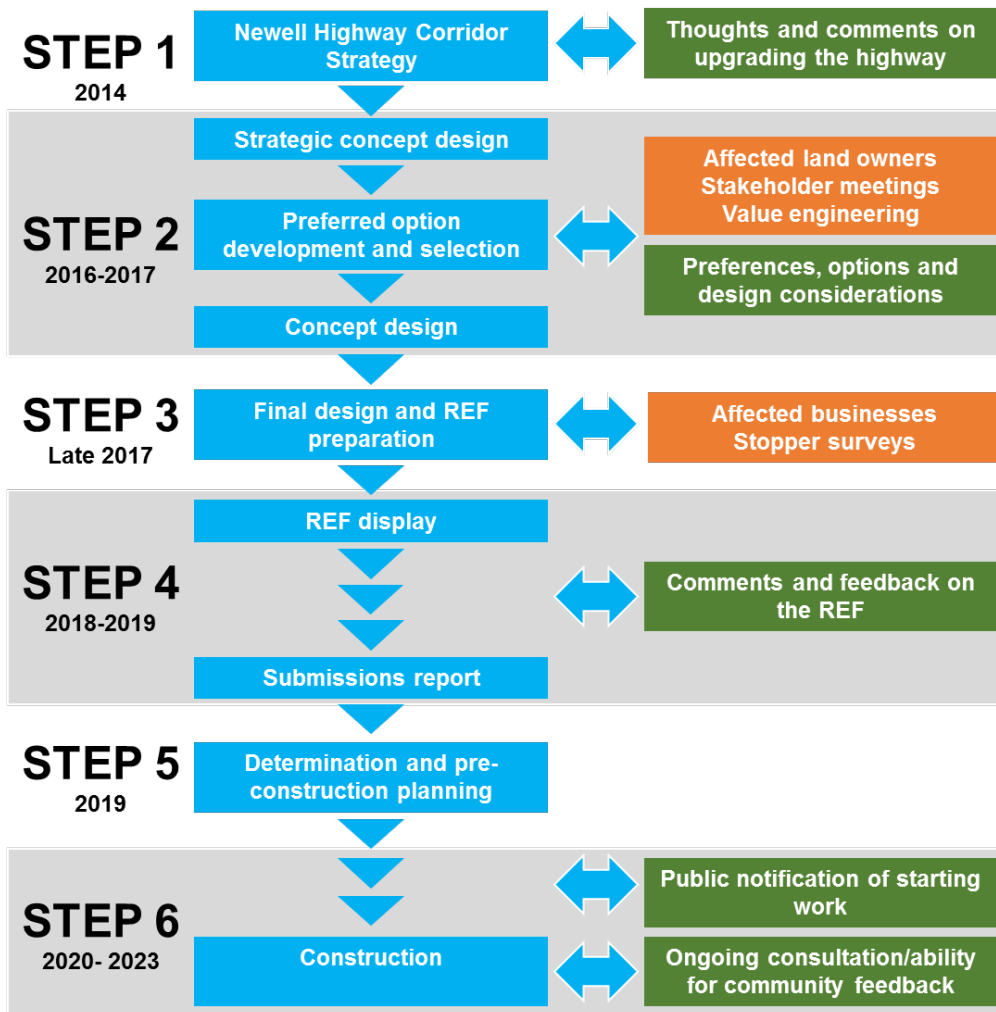


Figure 5-1 Consultation process

5.2 Community involvement

5.2.1 Community consultation activities

Newell Highway Corridor Strategy

The community consultation report for the Newell Highway Corridor Strategy was published in May 2015. The report summarised the feedback provided by the community in response to the public exhibition of the draft strategy between May 2014 and June 2014. In total, Roads and Maritime received 25 submissions on the draft strategy, which covered a range of topics.

Parkes Bypass strategic concept design and consultation

In December 2016, Roads and Maritime released its strategic concept design for the proposal and invited comment from the community and other stakeholders. Table 5-1 shows a timeline of this consultation.

Table 5-1 Timeline of consultation activities for the bypass

Date	Activity
8 December 2016	<ul style="list-style-type: none">The proposed route was announced by, then Minister for Roads, Maritime and Freight, Minister Duncan Gay.
December 2016	<ul style="list-style-type: none">Newell Highway upgrade at Parkes community updateHave your say opportunities and community survey releasedDistribution of postcards.
13 and 15 December 2016	<ul style="list-style-type: none">Drop in sessions at Metro Plaza (near Woolworths).
16 December 2016	<ul style="list-style-type: none">Drop in session at Clarinda Street (in front of Discount Daves).
17 December 2016	<ul style="list-style-type: none">Drop in session at Metro Plaza (near Woolworths).
31 January and 2 February	<ul style="list-style-type: none">Drop in Sessions at Metro Plaza (near Woolworths) and Clarinda Street (in front of Discount Daves).
10 February 2017	<ul style="list-style-type: none">Last day for 'have your say' survey feedback.

Roads and Maritime sought feedback via an online survey and by holding nine community drop-in sessions. This resulted in 220 people responding to the survey and about 800 people attending the drop-in sessions.

Between December 2016 and March 2017, Roads and Maritime also met with stakeholder groups, including emergency services, bus and taxi operators, the local chamber of commerce, Northparkes Mines and Parkes Shire Council, and any directly affected landowners for feedback. Section 5.5 summarises the feedback from these meetings. The supporting community consultation report was published in December 2017.

Business and stopper surveys

The key concern raised by the community about the proposal following release of the strategic concept design was the perceived loss of passing trade to local businesses in Parkes town centre due to the bypass. In response, Roads and Maritime surveyed 105 local businesses in July 2017 and asked randomly selected members of the public questions about how the proposal may impact on local businesses. Appendix F includes the corresponding summary report. Table 5-2 summarises the feedback from the business and stopper surveys.

5.2.2 Summary of community consultation feedback

Table 5-2 summarises the key issues raised by the community during the community consultation activities, how they are relevant to the proposal, and how they have been addressed in the proposal design and/or REF.

Table 5-2 Summary of issues raised by the community

Issue raised	Design response and/or where it is addressed in the REF
Newell Highway Corridor Strategy Community Consultation Report (NSW Government, 2015)	
Road design and geometry issues to consider including: <ul style="list-style-type: none"> • Road width and line markings • Speed limits • The ability for heavy vehicles to negotiate the intersections • Signposting to and within Parkes. 	<ul style="list-style-type: none"> • Section 3.2 outlines the Parkes Bypass road design and geometry which would be in accordance with the relevant standards • The speed limit would be reduced to 80 km/h through Parkes for safety and local vehicle access and to 50 km/h along Hartigan Avenue. The alignment would be suitable for PBS3a heavy vehicles. A signposting strategy will be developed.
Urban amenity considerations including: <ul style="list-style-type: none"> • Improved amenity for residents in Parkes from bypassing the town centre • Road traffic noise impacts • Existing traffic congestion in Parkes town centre. 	<ul style="list-style-type: none"> • Section 6.2 outlines the socio-economic impact of the proposal, which includes amenity considerations. Section 6.3 includes an assessment of the noise impacts due to the proposal • Section 6.1 includes an assessment of the traffic impacts due to the proposal.
Providing sufficient rest areas along the highway.	Provision of rest areas near the Parkes Bypass will be considered during detailed design.
Improving access for PBS3a heavy vehicles along the highway.	The Parkes Bypass would be suitable for PBS3a heavy vehicles along its entire length.
The road surface condition and how this will be affected and maintained in the future.	The proposal was designed to NSW and Australian engineering and road safety standards developed by Roads and Maritime and Austroads (refer to section 3.2). The surface would be suitable for the predicted number and type of vehicles. It would be regularly maintained.
Need to provide more overtaking lanes on the Newell Highway to help with journey time reliability, safety, and to reduce driver frustration.	The Newell Highway Potential Overtaking Lane Study was completed in 2011 to identify potential sites. These are being taken forward in to the concept designs being developed for each section of the Newell Highway upgrade.
The susceptibility of the highway to flooding and the need to prevent this.	Section 3.2.3 outlines the flood immunity and drainage measures for the bypass.
Delays and safety issues due to the level crossings with the existing Newell Highway at Parkes.	The level crossings would be bypassed by the proposal.
The need for efficient access to the Parkes SAP.	The intersection at Hartigan Avenue/Brolgan Road has been designed specifically to provide efficient access to and from the Parkes SAP.
Other comments focussed on: <ul style="list-style-type: none"> • Response times and access during an emergency or incident • Provision of dedicated cycling provisions around Parkes • Rubbish collection along the highway. 	<ul style="list-style-type: none"> • Emergency access has been considered in the design. For instance, the eastern and western connection to London Road was chosen because of its importance for emergency access • A shared pedestrian/cycleway bridge over the Parkes Bypass to Back Trundle Road to support and encourage children to cycle to Parkes Christian School • Rubbish would be collected along the highway.

Issue raised	Design response and/or where it is addressed in the REF
Parkes Bypass community consultation on the strategic concept design	
Impacts on the local economy:	
Loss of passing trade from traffic bypassing Parkes.	Section 6.2 summarises a socio-economic assessment which considered potential impacts on the local economy and bulk transport providers.
Loss of job security from businesses relocating outside of Parkes to other regional town centres.	
Opportunity for bulk transport providers.	
Property and land value impacts along the bypass.	Section 6.9 outlines the expected property and land impacts due to the bypass.
Safety issues for local road users, pedestrians and cyclists including:	
The potential loss of safe access to the Parkes Christian School for students, parents and teachers.	The intersection design at Condobolin Road/Back Trundle Road was modified from the strategic concept design to include a shared pedestrian/cycleway bridge for pedestrians and cyclists to safely access Parkes Christian School.
Improvements in the town centre from reducing heavy vehicle traffic.	The Parkes Bypass is expected to improve safety in the town centre due to reduced heavy vehicle numbers.
Access to and around the town including:	
The reduced ability for residents, farmers and others to travel east to west through Parkes once the Parkes Bypass is built due to local road access changes.	Section 2.4 outlines how east-west access was considered in the selection of the preferred option. Section 6.1 outlines the expected traffic, transport and access impacts due to the bypass.
Freight access improvements to the Parkes SAP.	The extension of Hartigan Avenue to connect to Brolgan Road has been designed specifically to provide efficient access to and from the Parkes SAP (refer to section 2.4).
The loss of direct access to GrainCorp from the west during harvest time.	Maintaining east-west access, including for vehicles travelling to and from GrainCorp was considered in the selection of the intersection designs.
The need for emergency vehicles and residents living west of the Parkes Bypass to quickly and safely access the hospital and other community services in Parkes town centre.	The intersection design at London Road was modified from the strategic concept design to have both an east and west connection to address these issues (refer to section 2.4).
Other comments	
Potential improved travel times and amenity within the town centre from the reduction in heavy vehicles and reduced congestion at the level crossings.	Section 6.1 outlines the expected traffic, transport and access impacts due to the bypass. Sections 6.2 and 6.1 include discussion of the amenity impacts due to the bypass.
The need to balance freight needs with community needs.	Section 2.3.1 outlines the proposal objectives that consider both freight and community needs.
Ensuring there would be enough budget to design and build the proposal without compromising on quality.	Section 2.4 outlines how the function and quality of the Parkes Bypass was considered together with the cost of the options to choose the preferred option.

5.3 Aboriginal community involvement

Table 5-3 Summary of Roads and Maritime procedure for Aboriginal Cultural Heritage Consultation and Investigation

Stage	Description
Stage 1	Initial Roads and Maritime assessment
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

A site survey was carried out in line with Stage 2 of the Procedure for Aboriginal Cultural Heritage Consultation and Investigation (PACHCI, Roads and Maritime, 2011). Surveys as part of Stage 2 assessment are carried out with relevant Aboriginal stakeholders to assess a project's potential to harm Aboriginal cultural heritage, and to determine whether formal Aboriginal community consultation and a cultural heritage assessment report is needed. Representatives of the Peak Hill Local Aboriginal Land Council (PHLALC) were present during the field surveys carried out for the proposal.

Several scarred trees were observed in the survey area. The representatives of the PHLALC agreed that the scars present on these trees, apart from those already recorded as Aboriginal sites, were the result of branch tears or fauna activity and did not represent new Aboriginal sites. Similarly, three potential grinding stones were noted in the northern section of the survey area. The PHLALC representatives considered that the marks on these stones were either natural or machine made.

No further issues were identified by the representatives of the PHLALC during surveys.

5.4 ISEPP consultation

Clause 94 of the ISEPP provides that “development on behalf of a public authority for the purpose of a road or road infrastructure facilities may be carried out without consent” providing that certain key parties are consulted and/or notified about the work. Parkes Shire Council has been consulted about the proposal as per the requirements of Clause 13 of the ISEPP. This Clause requires that consultation is needed in relation to “development that may have impacts to council stormwater management and drainage systems”. Appendix B contains an ISEPP consultation checklist that documents how ISEPP consultation requirements have been considered.

Roads and Maritime conducted a stakeholder engagement meeting with Parkes Shire Council in July 2017 as part of the Community Consultation Strategy for the proposal (refer to section 5.1). Written notice from Roads and Maritime to Parkes Shire Council occurred on 28 February 2017 in accordance with Clause 13 of the ISEPP. No response has been received to date from Council.

5.5 Government agency and stakeholder involvement

Various Government agencies and stakeholders have been consulted about the proposal at stakeholder meetings (refer to section 5.2.1), including:

- Parkes Shire Council
- Emergency services (fire, ambulance and police)
- Parkes Golf Course
- Parkes Chamber of Commerce
- Bus and taxi operators
- Northparkes Mines
- Directly affected landowners.

Table 5-4 outlines the issues that have been raised during consultation with these agencies and stakeholders.

Table 5-4 Issues raised through stakeholder consultation

Agency	Issue raised	Response	Section addressed in REF
Parkes Shire Council	The need to support the Federal Government's Smart Cities Plan.	The Parkes Bypass aligns with the goal to plan for regional cities and the long-term built infrastructure.	Section 2.1.3
	The need to include features that encourage visitors to Parkes.	Signage would be installed at the main entrances into Parkes to attract visitors.	Section 3.2.3
	Include a quality and effective landscape strategy.	The landscape planting strategy for the proposal would minimise the proposal's visual impact by reinforcing a natural landscape character.	Section 6.4
	Improve pedestrian and cycling links and facilities, as per Parkes Pedestrian and Cycling Strategy 2016.	A shared pedestrian/cycleway bridge on Back Trundle Road would be provided for pedestrians and cyclists.	Section 3.2.3
	Include planned opportunities for services at strategic locations for travellers to stop, rest, research and find services in Parkes.	These service opportunities for the Parkes Bypass will be investigated during detailed design.	N/A – will be addressed in detailed design
	Include additional connections to local roads.	The design was modified from the strategic concept design to include additional connections to local roads at London Road and other local road links.	Section 2.4
	Support access to industrial area at the southern end of Parkes to attract businesses.	The eastern connection at London Road was included to provide access to the industrial area at the southern end of Parkes.	Section 2.4
	Allow for east-west movements of local traffic across Parkes.	The intersections allow for east-west movements of local traffic across Parkes.	Section 2.4
Emergency services	Reduce the proposed speed along the Parkes Bypass to increase safety.	The posted speed limit in the middle section of the Parkes Bypass has been reduced to 80 km/h from 110 km/h to increase safety.	Section 1
	Locate an area for police to safely stop traffic for police operations.	This area will be investigated as the design progresses.	N/A – will be addressed in detailed design
	Include a location for a service centre and adequate parking, security and amenities.	This location will be investigated in collaboration with Parkes Shire Council as the design progresses.	N/A – will be addressed in detailed design

Agency	Issue raised	Response	Section addressed in REF
	Need fast access routes to quickly respond to emergencies.	The intersection locations and designs considered the need for fast access routes through Parkes This resulted in the inclusion of an east-west connection at the London Road intersection.	Section 2.4
	Ensure emergency vehicle access, including a connection to London Road.	The strategic concept design was modified to include an eastern connection at London Road.	Section 2.4
	Consider roundabouts as they are easier for emergency vehicles to navigate.	Roundabouts were considered at most intersection locations and was selected at Condobolin Road.	Section 2.4
Chamber of Commerce	Consider and assess the potential loss of passing trade.	The REF includes an assessment of socio-economic impact from the proposal including the potential for the loss of passing trade.	Section 6.2
	Consider access to industrial areas in the south of Parkes and safe access to the local schools.	The intersection designs at London Road and Condobolin Road were modified from the strategic concept design to maintain access for industry, residents and school children.	Section 2.4
	Consider access to the west of Parkes for residents.	The shared pedestrian/cycleway bridge over the Parkes Bypass between Victoria Street and Back Trundle Road was selected to provide cyclist and pedestrian access for residents west of Parkes town centre.	Section 2.4
	Consider installing traffic lights on Bogan Street at Church Street to reduce traffic congestion after the Parkes Bypass is constructed.	These suggestions are considered separate to the proposal. The proposal would reduce congestion within Parkes town centre due to the reduction in heavy vehicles.	N/A – this is outside of the proposal scope
	Install signs at each end of the Parkes Bypass to direct tourists and visitors into Parkes.	The signage strategy includes signs to attract tourists and visitors into Parkes.	Section 3.2.3
	Consider traffic noise impacts on residents living in the west of Parkes along the bypass.	The REF considers and assesses the traffic noise impacts due to the bypass, and it describes the safeguards that would be introduced to mitigate adverse noise levels to prevent any material impact on people living to the west of Parkes.	Section 6.3
	Consult key stakeholders in designing the proposal.	Key stakeholders have been consulted to inform the design.	Section 5.2
	Consider the Western Ring Road designed by Parkes Shire Council instead of a bypass to support locals over the freight community.	The proposal is a modified version of the Western Ring Road. The changes from the Western Ring Road were needed to achieve the proposal objectives.	Section 2.4

Agency	Issue raised	Response	Section addressed in REF
Bus and taxi operators	Consider the impact of choosing roundabouts due to the restricted speed limit and travel efficiency.	A roundabout was chosen at Condobolin Road because good east-west access was prioritised over a high-speed limit.	Section 2.4
	The strategic concept design limits safe access to Parkes Christian School for children via Back Trundle Road.	The intersection design was changed to a roundabout with a shared pedestrian/cycleway pedestrian and cyclist bridge to Back Trundle Road to provide safe and efficient access to Parkes Christian School.	Section 2.4
Northparkes Mines	Consider the effect of peak traffic volumes include during shift changes.	The traffic and transport impact assessment for the proposal considered peak traffic volumes.	Section 6.1
	Ensure access for local trucks and vehicles to and from the mine and freight corridor.	A connection to and from the Parkes Bypass at Bogan Road is provided for mine access.	Section 2.4
	Proposed speed limit on the highway may pose safety concerns.	The intersection designs are suitable for vehicles, including PBS3a heavy vehicles, to navigate safely at the posted speed limit.	Section 1
Parkes Golf Club	Consider the amenity and user enjoyment of the golf course which may be affected by traffic and truck braking noise and the bypass' visual impact.	The noise and visual impact due to the proposal was assessed including to users of Parkes Golf Course. A range of standardised and specific safeguards have been proposed to mitigate against any adverse noise and visual amenity impacts.	Sections 6.3 and 6.4
	It may result in a reduction in air quality from the road traffic.	The REF assesses the air quality impact from the proposal, concluding that the volumes of traffic would be insufficient to notably affect local air quality.	Section 6.11
	The safety issue of stray golf shots along the western boundary of the course landing on the bypass.	The need for fencing along the western boundary of the golf course will be considered during detailed design.	N/A – will be addressed in detailed design
	Provision of east-west access along London Road for easier access to the course.	The design was changed to include an eastern connection to London Road which will provide better access to the golf course.	Section 2.4

Agency	Issue raised	Response	Section addressed in REF
Directly affected landowners	Consider the property value impacts due to a loss of amenity once the road is built.	Safeguards are proposed to mitigate against any adverse impacts, including a landscape and planting strategy to minimise the proposal's visual impact by reinforcing the natural landscape character.	Section 6.4
	Consider the change in landscape character and visual amenity once the proposal is built.	The REF assesses the likely visual amenity and landscape character impacts from construction and operation of the proposal. Safeguards and mitigation measures are recommended to reduce adverse visual amenity impacts, including introduction of a landscape and planting strategy.	Section 6.4
	Consider the amenity, disruption, and access-related impacts while the proposal is being built including noise, vibration, visual and dust impacts.	Chapter 6 assesses the potential amenity, access, noise and vibration and dust impacts from constructing the proposal. Chapter 7 summarises the safeguards and mitigation measures to reduce these construction-related impacts, which would be introduced by the future contractor(s) in the form of an environmental management plan.	Chapters 6 and 7
	Consider the effects of road traffic noise on the local environment.	Section 6.3 outlines the noise impacts due to the proposal. It also sets out the safeguards needed to mitigate against any adverse impacts to ensure the residual effects are acceptable.	Section 6.3
	Consider the potential fauna impacts once the road is built.	Section 6.5 outlines the potential fauna impacts and strategies to minimise them to acceptable levels.	Section 6.5
	Consider issues with waste and debris from vehicles using the bypass	Section 6.11 considers the potential operational waste-related impacts and outlines safeguards needed to minimise any adverse waste impacts.	Section 6.11
	Consider the potential loss of access to Parkes town centre	Section 6.1 outlines an assessment of the access impacts due to the bypass.	Section 6.1
	A lack of confidence in the proposal and its management.	Roads and Maritime has carried out numerous consultation activities to increase community awareness, build confidence and encourage feedback on the design and process.	Chapter 5

5.6 Ongoing or future consultation

Roads and Maritime will continue to seek feedback from businesses, the local community, Parkes Shire Council, residents, the freight industry, and other key stakeholders as the design progresses.

The REF will be displayed for comment. Roads and Maritime will also hold community information sessions during this period. Following the public display period, Roads and Maritime will collate and consider the submissions received then determine whether the proposal should proceed as described in the REF, or whether any changes are required. A submissions report will then be published, which will respond to the comments received. Roads and Maritime will notify those who made submissions and distribute a community update. The update will summarise the submissions report and the actions Roads and Maritime took to address these comments.

6 Environmental assessment

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

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

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

6.1 Traffic, transport and access

This section describes the traffic, transport and access impacts that are predicted to occur from building and operating the proposal. This section summarises the Traffic and Transport Assessment prepared for the proposal by WSP that is included in Appendix D.

6.1.1 Methodology

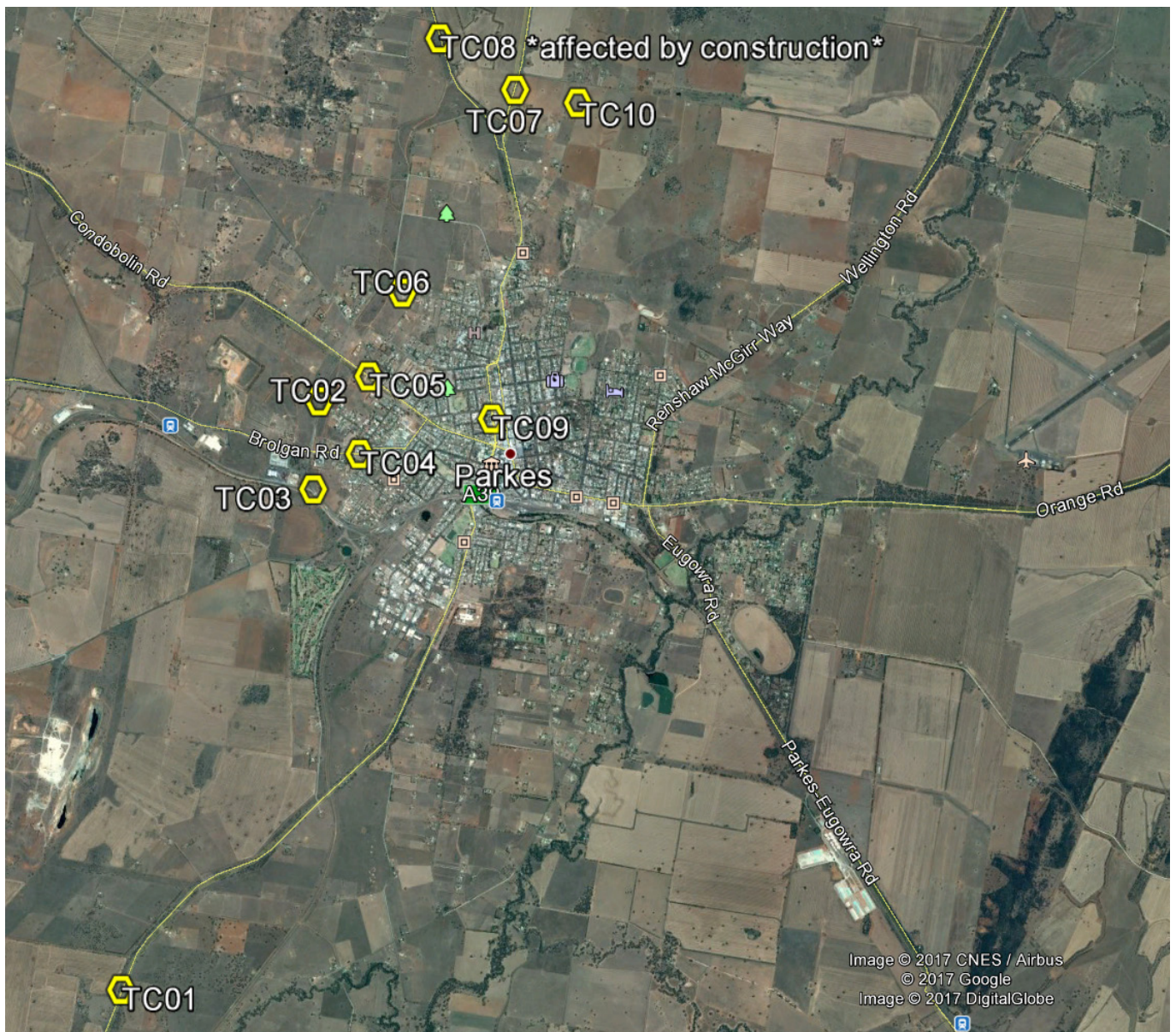
The traffic and transport assessment was based on a desktop review of available information and data. The following data and information sources were used to inform the assessment:

- The results of traffic counts collected on behalf of WSP at 10 mid-block sites on the existing Newell Highway and proposed bypass alignment in December 2016. The locations of the traffic counts are shown in Figure 6-1
- Origin destination surveys provided by Roads and Maritime to forecast the likely use of the bypass
- Other traffic data collected by Roads and Maritime and Parkes Shire Council including (the locations of which are summarised on Figure 6-2 including:
 - The results of the cross-boundary traffic counts survey carried out in August 2012 by Roads and Maritime in Parkes. The survey sites included the Newell Highway to Forbes and Dubbo, as well as Henry Parkes Way to Orange
 - The results of continuous tube counts on Brolgan Road and Westlime Road carried out between 5 March to 15 May 2014 by Parkes Shire Council
 - The results of a three-week survey on Back Trundle Road and Condobolin Road in April and May 2017 by Roads and Maritime
- The results of the survey carried out for Roads and Maritime in July to September 2014 by Skyhigh Traffic Surveys which covered the major travel routes through Parkes (the survey locations are shown on Figure 6-3)
- Crash data for the Newell Highway in Parkes from the Roads and Maritime for a five-year period between January 2012 and December 2016 to understand existing crash history.

Modelling was carried out by WSP to estimate the redistribution of traffic on the road network with and without the bypass. The assessment assumed the following:

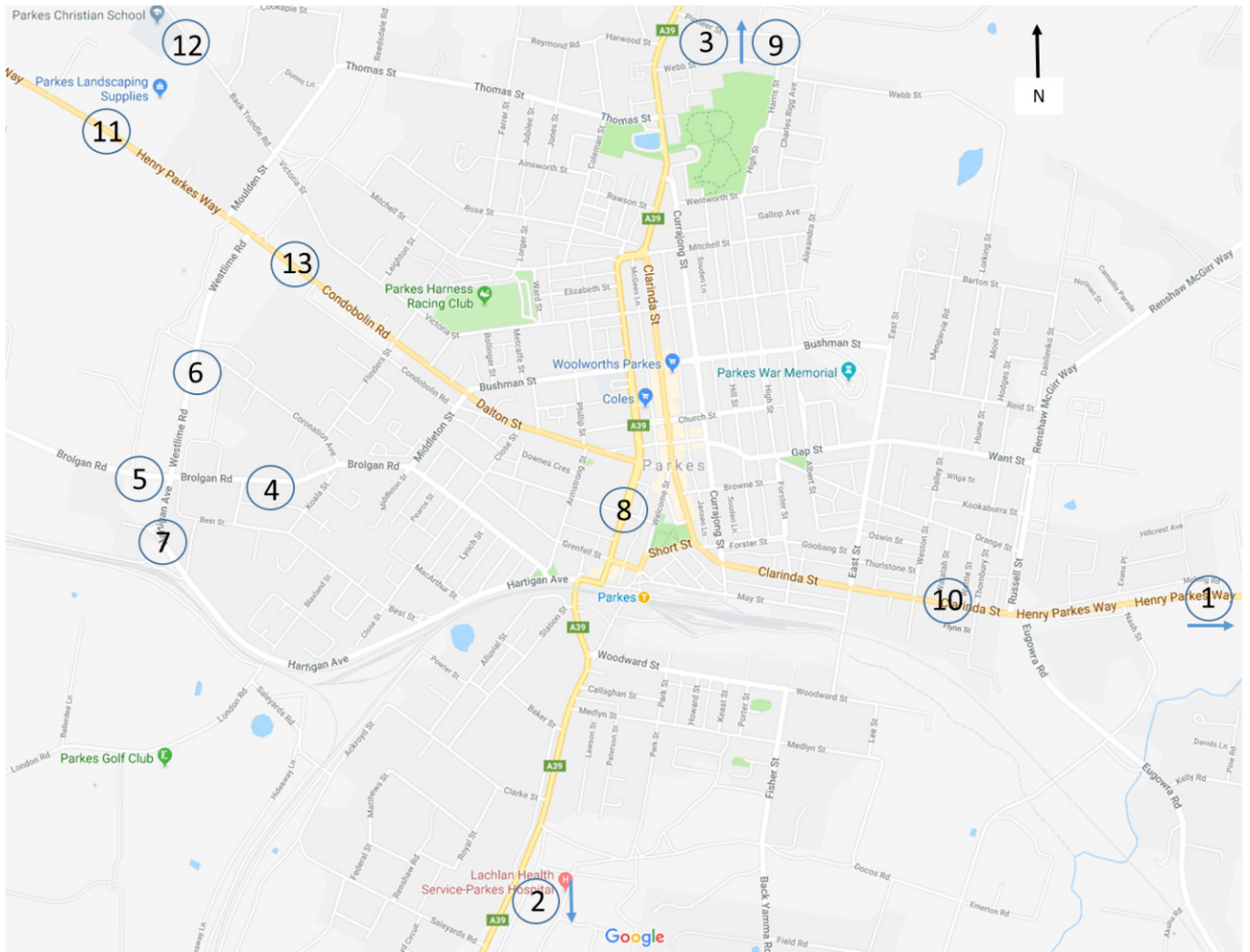
- The proposed opening year of the Parkes Bypass is 2023 and the design year is 2033
- A yearly traffic growth rate of two per cent per annum for light vehicles and 2.4 per cent per annum for heavy vehicles.

This modelling was used to help determine the impacts of the proposal on traffic and transport during both construction and operation. The assessment did not involve any site inspection, intersection, microsimulation or mesoscopic traffic modelling.



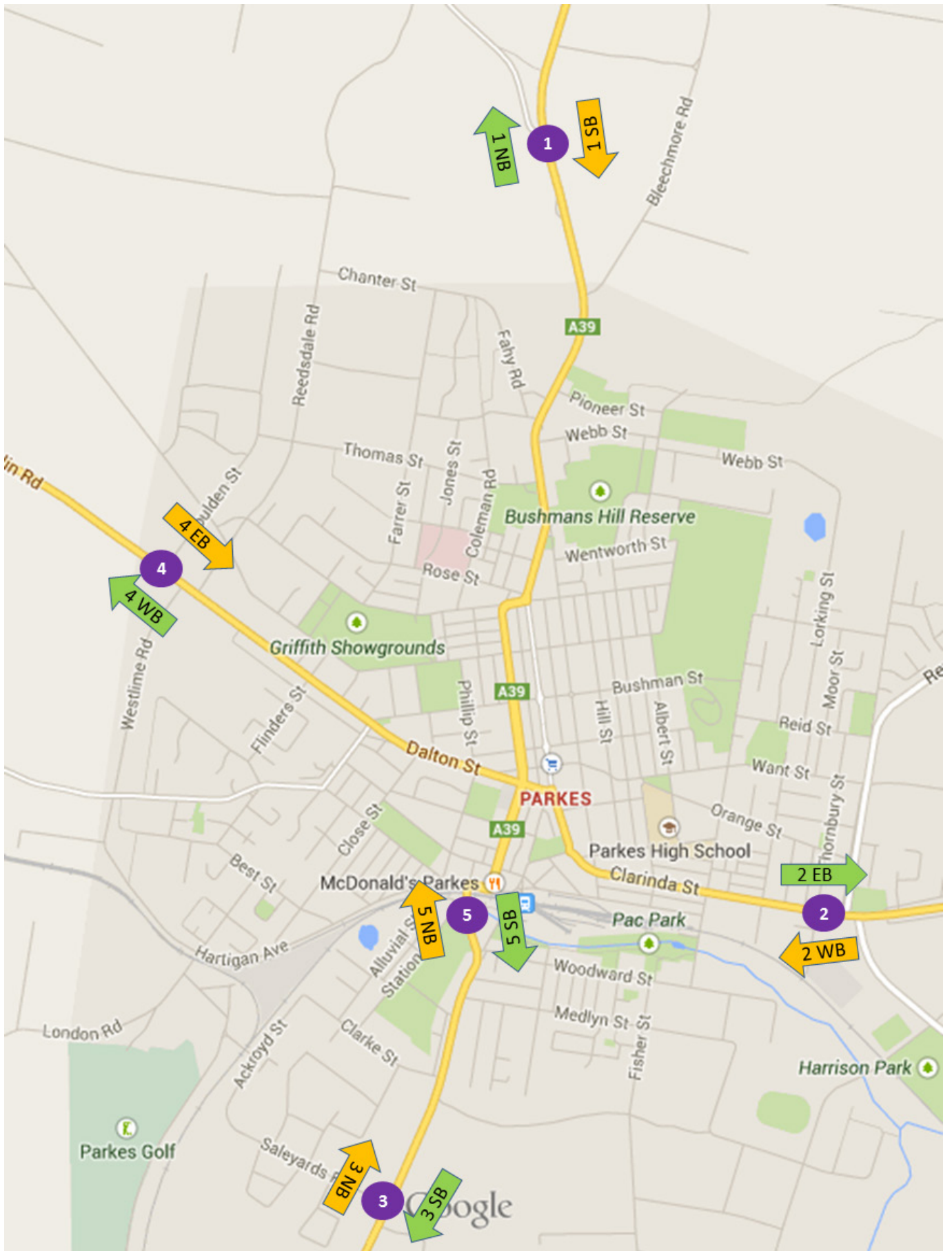
Source: WSP

Figure 6-1 Mid-block traffic count locations in Parkes (December 2016)



Source: WSP

Figure 6-2 Mid-block traffic count locations in Parkes sourced from Roads and Maritime and Parkes Shire Council (various dates)



Source: Roads and Maritime (2014)

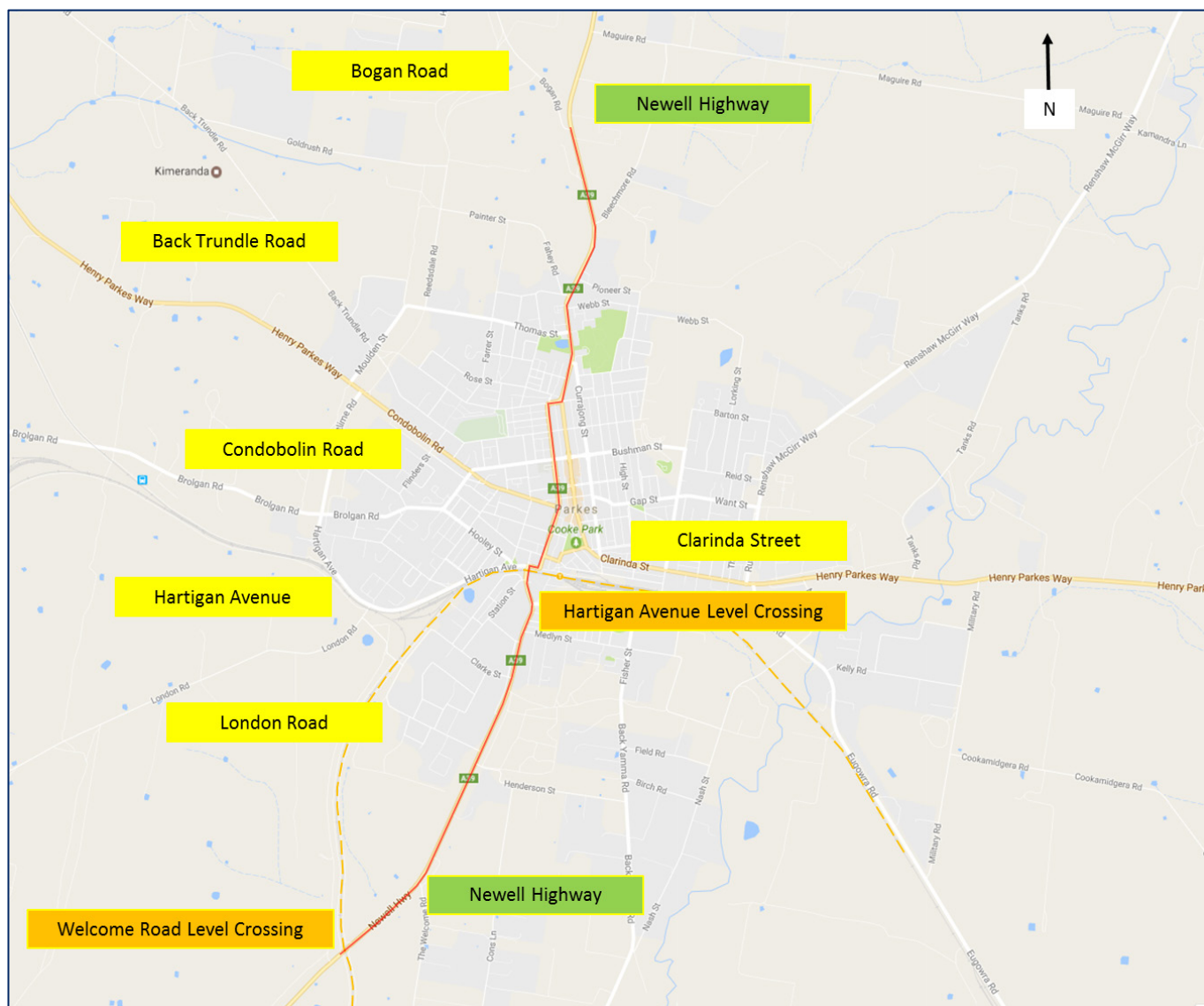
Figure 6-3 Origin-destination survey locations (2014)

6.1.2 Existing environment

Road network

Road network surrounding the existing Newell Highway

The Newell Highway is a key arterial road serving Parkes as well as rural areas of Victoria, NSW and Queensland. It is an essential road connection for the Central West region of NSW and is part of the Federal National Land Transport Network providing an important link between towns and city centres including for the transportation of agricultural products. The total length of the Newell Highway is 1,058 km south to north through NSW. PBS3A heavy vehicles make up over 20 per cent of the traffic on the Newell Highway, including the section within Parkes. The section of the Newell Highway that would be bypassed by the proposal is between Hideaway Lane (south of Parkes) and Bogan Road (north of Parkes) as outlined in red on Figure 6-4 below.



Source: WSP

Figure 6-4 Road network within Parkes

The Newell Highway includes sections called Forbes Road and Bogan Street in Parkes. It is intersected by many roads. The key intersections with the Newell Highway in Parkes as described further in Table 2.1 in Appendix D are:

- Hartigan Avenue which consists of a S-bend priority intersection with two sharp 90 degree turns that cannot be safely navigated by PBS3A heavy vehicles (shown on Figure 6-5)
- Cecile Street which consists of a four-way priority intersection with priority given to Bogan Street (shown on Figure 6-6)
- Dalton Street which consists of a priority controlled seagull intersection with priority given to Bogan Street (shown on Figure 6-7)
- Mitchell Street and Clarinda Street which consists of a S-bend priority intersection with two sharp 90 degree turns that cannot be safely navigated by PBS3A heavy vehicles (shown on Figure 6-8)
- Grenfell Street which consists of a four-way cross intersection with priority given to movements along Bogan Street. It connects Parkes railway station, Parkes town centre as well as Clarinda Street and Henry Parkes Way
- Bushman Street which consists of a four-way cross intersection with priority given to the movements along Bogan Street. It is an approved B-Double road between Bogan Street and the Condobolin Road/Dalton Street intersection.

As traffic volumes on the Newell Highway and the intersecting side streets are relatively low, it is expected that these intersections would have little delay and queueing.



Figure 6-5 Forbes Road/Hartigan Avenue and Hartigan Avenue/Brogan Street



Figure 6-6 Bogan Street and Cecile Street



Figure 6-7 Bogan Street and Dalton Street



Figure 6-8 Bogan Street and Mitchell Street

The existing Newell Highway in Parkes also involves two level crossings with the Broken Hill rail line (shown in orange on Figure 6-9 and Figure 6-10):

- The Welcome Road level crossing which is about 4.5 kilometres south of Parkes town centre and crossed by about seven rail services each day (shown on Figure 6-9). It is within a 110 km/h speed zone
- The Hartigan Avenue level crossing which is about 200 metres west of Parkes Station and crossed by about 28 rail services each day (shown on Figure 6-10). It is within a 50 km/h speed zone.

These level crossings cause localised congestion and delays on the surrounding road network when the barriers are closed for cars and trucks to allow the trains to pass safely. The Hartigan Avenue level crossing has an average delay to vehicular traffic of about 2.5 minutes per train movement resulting in an average total delay of 70 minutes per day (GTA, 2014; ARTC, 2017). The level crossing near Welcome Road has fewer train movements and therefore less delay each day.



Source: WSP

Figure 6-9 Welcome Road level crossing (crossing the Newell Highway)



Source: WSP

Figure 6-10 Hartigan Avenue level crossing (crossing Newell Highway)

Traffic volumes and travel times

From the mid-block traffic count data (refer to section 2.4.1 in Appendix D) it was concluded that:

- Average daily traffic volumes during the weekday are higher than average daily traffic volumes during the weekend
- The average daily traffic volume on the Newell Highway observed on a weekday is between 4,000 and 5,000 vehicles per day with around 19 per cent heavy vehicles
- More heavy vehicles are recorded on the southern section of the Newell Highway
- All intersecting roads of the Newell Highway have a traffic volume no more than 2,000 vehicles per weekday, and have a heavy vehicle proportion of no more than 21 per cent.

Table 6-1 below provides a summary of the traffic count data relevant to the proposal.

Table 6-1 Traffic count summary

No	Road name	Location	Average weekday traffic volume (vh/day)			Average weekly traffic volume (vh/day)			Survey time
			All vehicle	Heavy vehicle	Heavy vehicle %	All vehicle	Heavy vehicle	Heavy vehicle %	
1	Henry Parkes Way	10 m west of Billabong Creek, east Parkes	2,175	413	19%	1,998	336	17%	2 August to 20 August 2012
2	Newell Highway	Forbes/Parkes LGA Boundary	4,004	1,039	26%	3,689	923	25%	31 March to 24 April 2012
3	Newell Highway	Narromine/Parkes LGA Boundary	2,902	949	33%	2,731	857	31%	31 March to 24 April 2012
4	Brolgan Road	East of Westlime Road	737	106	14%	696	90	13%	5 March to 15 May 2014
5	Brolgan Road	West of Westlime Road	833	190	23%	791	155	20%	5 March to 15 May 2014
6	Westlime Road	North of Brolgan Road	556	139	25%	510	112	22%	5 March to 15 May 2014
7	Westlime Road	South of Brolgan Road	652	231	35%	564	184	33%	5 March to 15 May 2014
8	Newell Highway	100 m north of Cecile Street	9,286	1,275	14%	8,446	1,127	13%	15 August to 11 September 2014
9	Newell Highway	5 km north of Parkes	3,782	899	24%	3,608	837	23%	20 August to 11 September 2014
10	Henry Parkes Way	West of Russell Street	5,440	767	14%	5,260	656	12%	20 August to 10 September 2014
11	Condobolin Road	West of Moulden Street	1,334	233	17%	1,274	214	17%	20 August to 2 September 2014
12	Back Trundle Road	Eastern 40 km/h school zone approach to Christian School	810	70	9%	695	60	9%	May 2017
13	Condobolin Road	East of Moulden Street	1,493	283	19%	1,387	230	17%	May 2017

Travel times were calculated from the origin-destination survey conducted in 2014. It was calculated that northbound traffic would take an average of seven minutes to travel between Newell Highway at Saleyards Road intersection (OD3 station) and the Bogan Road intersection (OD1 station) which equates to a travel speed of 47 km/h. Travel times for southbound traffic from station OD1 to OD3 was similar at an average of six minutes which equates to an average travel speed of 55 km/h. Longer travel times of 17-18 minutes were also recorded in some instances, which was likely due to vehicles stopping within Parkes or vehicles being delayed due to the Hartigan Avenue level crossing.

Crash statistics

The key findings from the analysis of the crash statistics for the Newell Highway between Parkesborough Road and Maguire Road from 2012 to 2016 are summarised below and in Figure 6-11 and include:

- There was a total of 29 crashes were recorded on this section of the Newell Highway during the study period of which:
 - No crashes were fatal
 - 20 (69 per cent) crashes resulted in an injury
 - Nine (31 per cent) resulted in only property damage
- The number of non-casualty crashes has remained relatively stable at one or two per year over the 5 year period except for five in 2013
- 13 (45 per cent) of the crashes involved a heavy vehicle while heavy vehicle only represented nine per cent of the traffic mix on Newell Highway within Parkes city centre and 19–20 per cent along rural sections to the south and north of Parkes city centre in 2016
- Four crashes led to serious injury, three involving heavy vehicles resulted in serious injury
- 86 per cent of crashes occurred during daylight hours and 79 per cent under dry weather conditions
- 21 per cent of crashes occurred during 4pm to 5pm and 24 per cent during 8am to 10am, which seems to show a strong relationship between peak traffic volumes and crashes.

Despite a growth in traffic volumes, the total number of crashes shows a falling trend from a high of seven to 11 crashes in 2012 and 2013 to five crashes in 2016. This could be due to road safety measures or strategies implemented aiding to reduce crashes in this area or section of road.

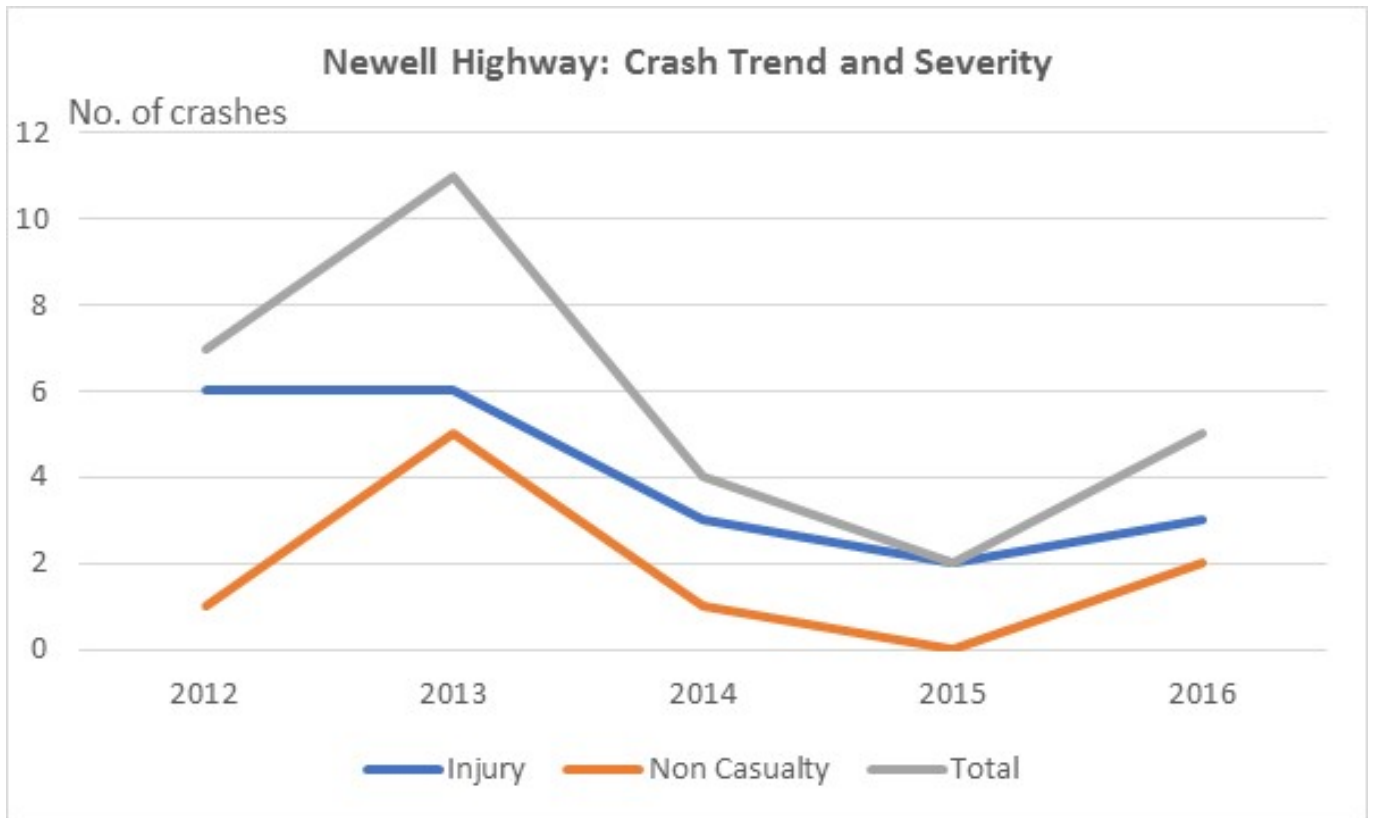


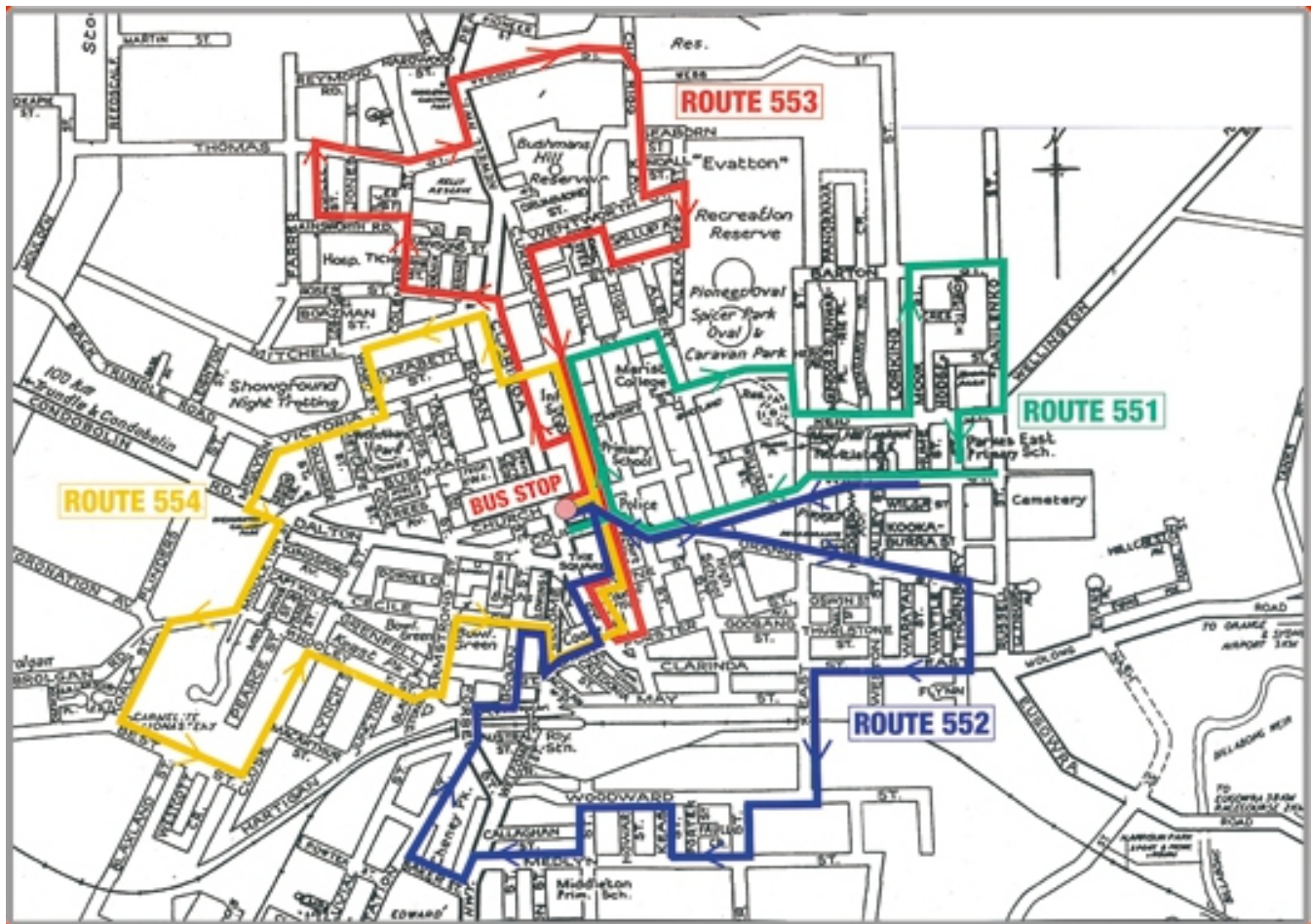
Figure 6-11 Newell Highway between Parkesborough Road and Maguire Road: Crash Trend and Severity (2012-2016)

Public transport

Bus services

The main bus operator in Parkes is Western Road Liners which operates:

- Twenty-two (22) regular school services which cover all schools within Parkes LGA as well as Red Bend Catholic College Forbes and Forbes High School
- Four town routes, Routes 551, 552, 553 and 554, which all start and end at the Church Street bus stop as shown in Figure 6-12 and operate three times a day
- Five regional coach services which are jointly run by Transport for NSW TrainLink and operate daily between Parkes and Sydney, Dubbo and Lithgow.



Source: Western Road Liners Website

Figure 6-12 Western Road Liners bus routes in Parkes

Rail services

Parkes is an important freight rail location, particularly for freight transportation between Sydney and Perth. There are two passenger services per week operating to and from Parkes Station, one on Monday at 12.48pm to Broken Hill and one on Tuesday at 2.43pm to Sydney (Central). There are also two passenger services which go through Parkes without stopping on the way to or from Broken Hill. The remaining rail services are freight services.

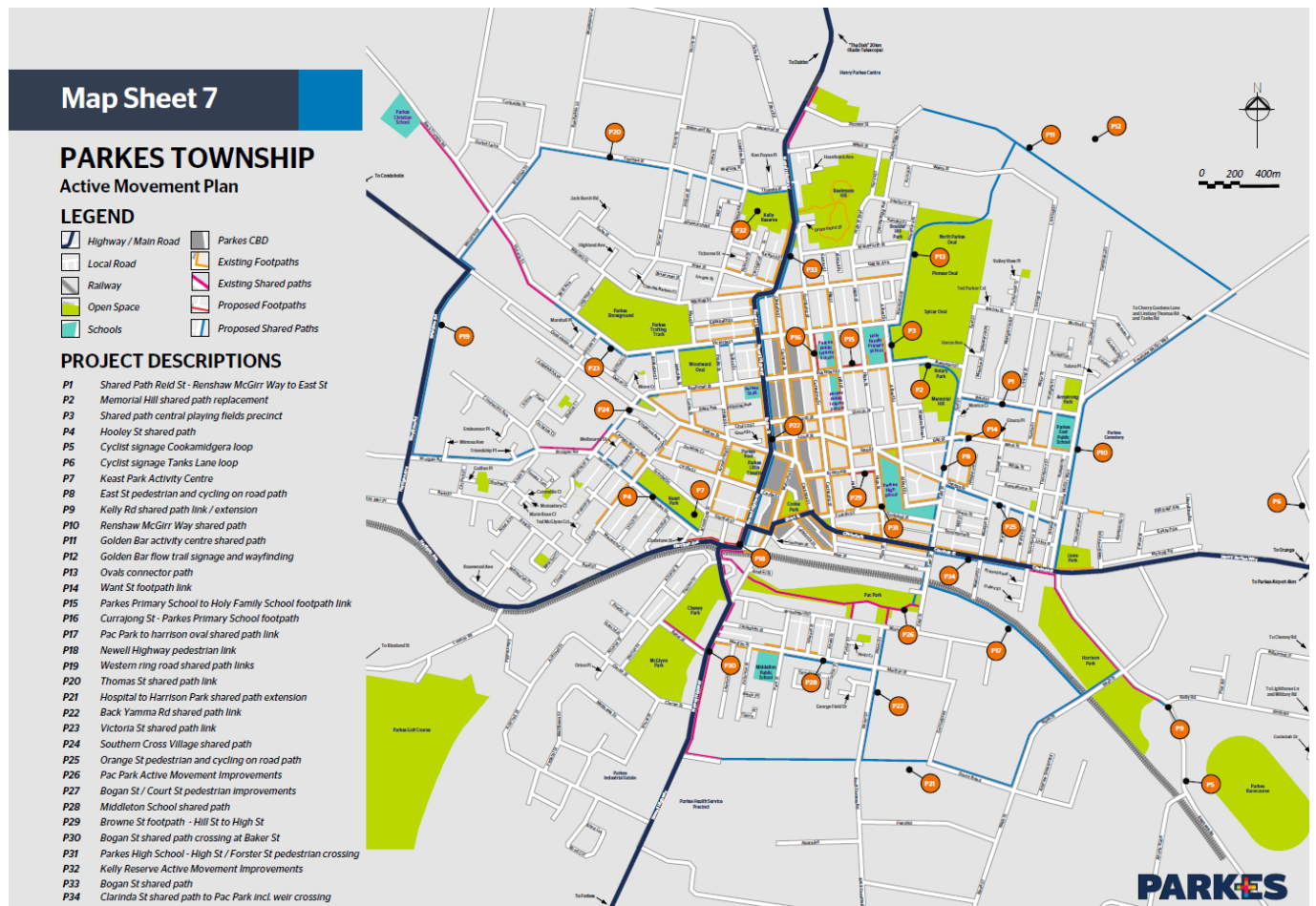
There are two level crossings that intersect the Newell Highway within Parkes as described above. It is expected that most of the services passing through the level crossings are freight trains. Therefore, it is assumed that there is about one freight train every hour over a daily period.

Active transport

Parkes Shire Council promotes the use of active transport through their Pedestrian and Cycling Strategy 2016 (Parkes Shire Council, 2016). This strategy focuses on providing safer methods of travel for pedestrians including pedestrian crossings, kerbs, refuges and stairs. The existing coverage of pedestrian footpaths and promotion of active movement is substantial across the Parkes region, particularly along the Newell Highway and local residential streets that connect with the Newell Highway.

Existing cycling access is not as extensive but there are shared pedestrian and cycle paths for some segments of the Newell Highway, particularly at either end of the suburban region. There are shared paths on the Newell Highway from Clarke Street to Hartigan Avenue and another from Webb Street to Pioneer Street both on the eastern side of the road. A shared pedestrian/cycleway is also located on Back Trundle Road and Victoria Street on the southern side of the road.

Figure 6-13 below shows the existing and proposed footpaths, shared pedestrian/cycleways and regular walking and cycling routes within Parkes.



Source: *Parkes Pedestrian and Cycling Strategy (Parkes Shire Council, 2016)*

Figure 6-13 Active movement plan within Parkes

6.1.3 Potential impacts

Construction

As discussed in section 3.3.5, the proposal would generate heavy vehicle movements at regular intervals during the construction period and include traffic management controls. Table 6-2 summarises the likely impacts associated with these activities to build the proposal.

Table 6-2 Proposal impact during construction

Category	Impact	Impact rating
Road	<p>There would be increased vehicle traffic, on average about 200 vehicles per day up to 440 including both light and heavy vehicles per day (see Table 3-4), on the road network due to construction vehicle and construction staff traffic. This would primarily affect roads such as the Newell Highway, Hartigan Avenue, Westlime Street, Broilgan Road, London Road, Condobolin Road and Bogan Road.</p> <p>Construction traffic (excluding workforce traffic) would be staged throughout the day and would enter and leave the site via the designated haul routes. This equates to no more than about 10–20 vehicles arriving and leaving per hour on average.</p> <p>The construction workforce would arrive and leave site at the start and end of each day. This means there may be up to 300 vehicles travelling on local roads during this period, however on average it would be less than 100 vehicles per day. While this increase would be noticeable, it is unlikely to affect local traffic performance.</p> <p>Overall, given the existing traffic volumes on the road network within Parkes are relatively low and the vehicles would be spaced throughout the day, the road network and intersections would have capacity to temporarily accommodate the increased vehicle traffic due to construction.</p>	Minor
	<p>Diversions of local road traffic to alternative routes during construction would cause increased congestion elsewhere in the road network and likely increased travel times for general traffic. The existing road network allows for local road diversions if needed for construction purposes. The impact is therefore likely to be minor and temporary. Any impacted land uses along the diversion routes will be identified and managed through the measures in section 6.1.4.</p>	Minor
	<p>There may be damage to the local road network caused by construction related traffic due to the increased traffic and heavy vehicle movement on key access and haulage routes to construction sites. This would be minimised through implementation of mitigation measures in section 6.1.4.</p>	Minor
Parking	<p>Construction staff parking would be provided at the site compounds. This would include enough space for some 100 vehicles, equivalent to the maximum number of people onsite at any one time (refer to section 3.3.2).</p>	Negligible
Local access	<p>There may be disruptions and reduced access due to the construction of the bridges, the re-alignment of Moulden Street, the extension of Hartigan Avenue and the Condobolin Road roundabout. This may result in increased travel times due to construction works where road or lane closures are required.</p> <p>Construction works will be planned and staged to minimise the impact to local road access where possible for road users.</p>	Low
Rail	<p>Disruptions to rail services including the Parkes to Broken Hill and Parkes to Narromine rail lines may occur due to the construction of the bridge over the rail lines and the need for rail possessions. Construction works will be planned and staged to minimise the impact where possible to the rail network and occur outside of peak rail periods.</p>	Minor

Category	Impact	Impact rating
Bus	Bus routes including 551, 552, 553 and 554 are likely to be impacted by construction traffic due to the proposed construction vehicle traffic travelling along the same roads as local bus routes. Route 554 is likely to be most impacted as it is positioned the closest to the proposal and likely construction access routes. Construction traffic will be spread across a working day and therefore be limited during peak bus service periods.	Minor
Pedestrians	Given the low volume of pedestrian activity and low volumes of construction traffic anticipated, minimal impacts are expected to pedestrians. Suitable alternative detours will be provided for pedestrians if required for existing and proposed footpaths.	Minor
Cyclists	Given the low volume of cyclist activity and low volumes of construction traffic anticipated, minimal impact is expected to cyclists. Suitable alternative detours will be provided for pedestrians and cyclists if required for existing and proposed shared pedestrian/cycleways.	Minor

Operation

Overall, the proposal would have a positive traffic and transport impact including:

- Travel time saving benefits due to bypassing the level crossings
- Reduced north-south vehicle traffic, particularly heavy vehicles, through Parkes town centre
- Road user safety benefits
- Road network reliability improvements.

However, the proposal would have a negative impact on access for local residents within Parkes due to road access changes.

Travel time saving benefits

Survey data from the Hartigan Avenue level crossing indicated that the boom barriers closed 28 times per day with the average closure lasting for around 2 minutes 30 seconds. There was a ten percent chance that the closure would last more than 5 minutes, and a one percent chance that it would last more than ten minutes. The longest boom barrier closure is 12 minutes and 52 seconds while the shortest is 21 seconds.

The proposal would bypass the level crossings, other cross streets and local traffic within Parkes, and their associated delays, which would result in some moderate travel time savings.

Traffic redistribution impacts

The operation of proposal would cause a shift of some of the traffic from the existing Newell Highway to the bypass. Utilising the survey data, the percentages of traffic that currently use the Newell Highway that would use the Parkes Bypass was calculated (refer to Figure 6-14 and Figure 6-15). The assumptions used in the calculations are outlined in section 4.2.2.1 in Appendix D and show the forecast traffic distribution and traffic volumes schematically with the inclusion of the Parkes Bypass in 2023 and 2033.

Overall, the volume of traffic travelling north-south through Parkes is expected to reduce by about 46 per cent for all traffic, of which a reduction of 74 per cent in heavy vehicles is expected. This would remove through traffic including many heavy vehicles from residential areas and so improve safety for vulnerable road users and for those living along or near the route. Heavy vehicles account for about 45 per cent of crashes in Parkes on the Newell Highway. By redirecting heavy vehicles to the proposed bypass, the number of crashes is anticipated to lower by a similar margin particularly within Parkes town centre.

Currently the road section of Newell Highway from Hartigan Avenue to the southern end of the proposed Bypass has no effective alternative routes. If there are any major incidents which cause traffic interruption on the existing Newell Highway, the Parkes Bypass would offer an effective alternative route to maintain the reliability of transportation through Parkes.

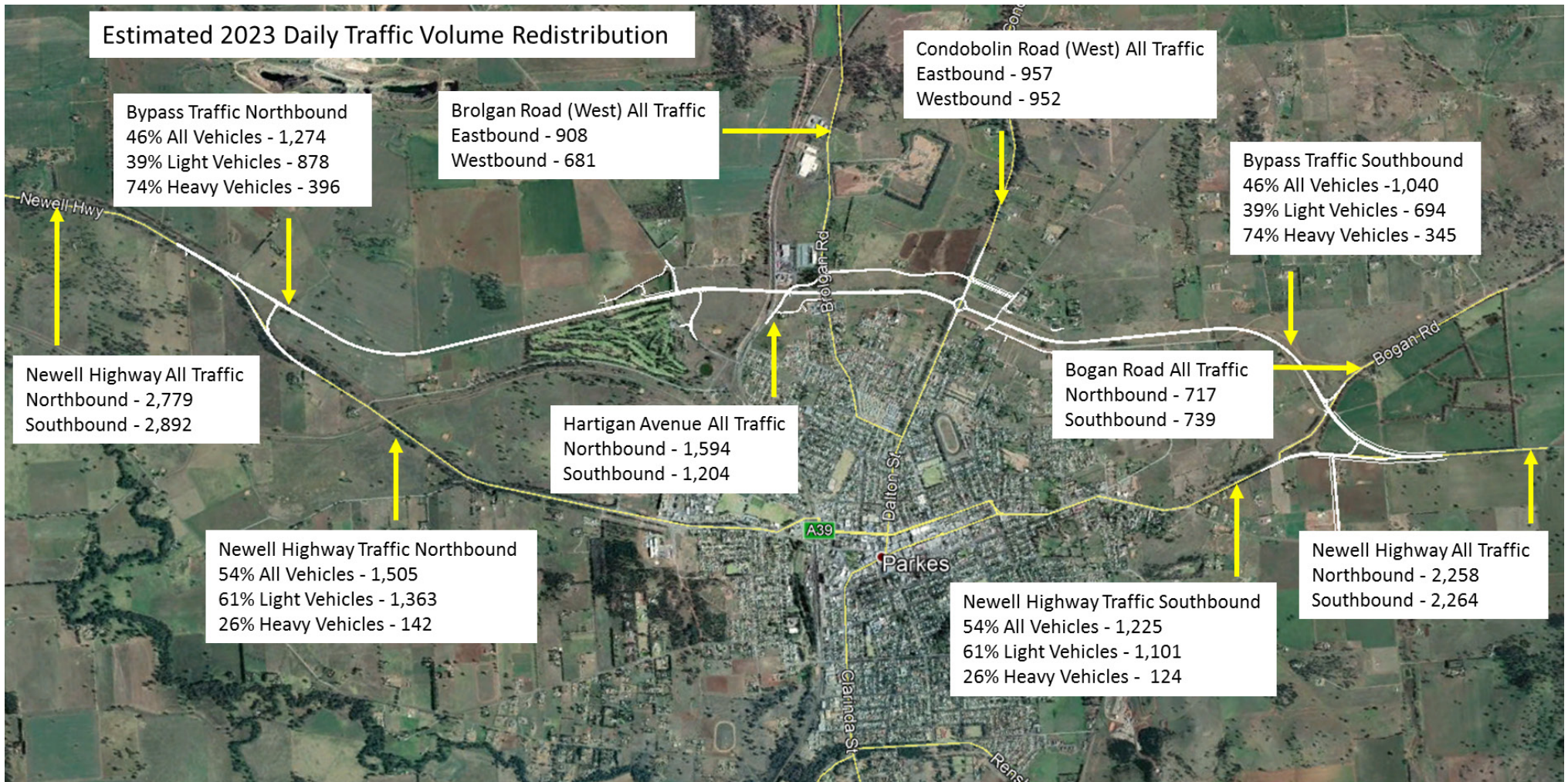


Figure 6-14 Forecast daily traffic distributions with the inclusion of the Parkes Bypass – 2023

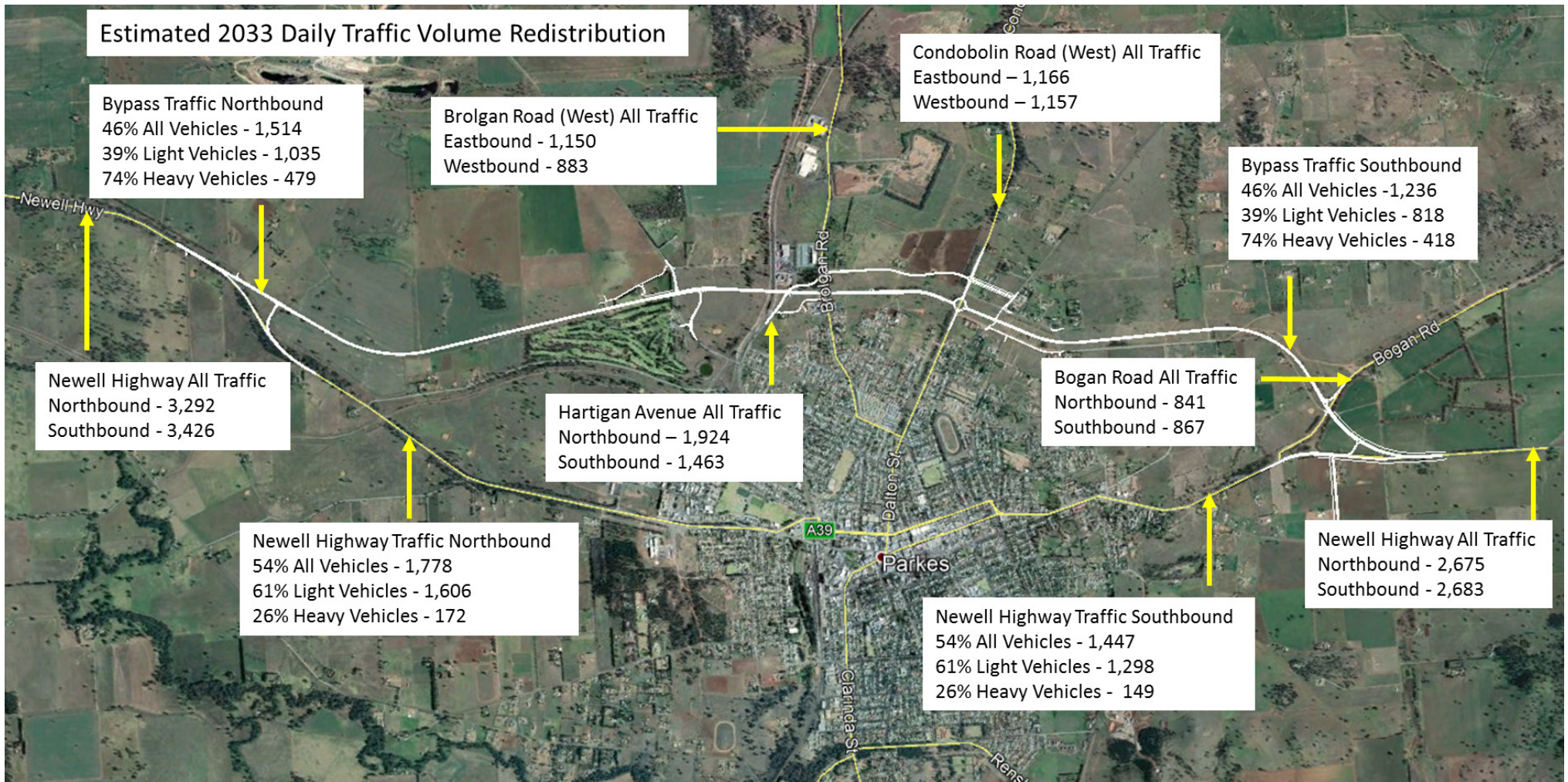


Figure 6-15 Forecast daily traffic distributions with the inclusion of the Parkes Bypass – 2033

Road access changes

As summarised in Table 3-3 in section 3.2.3, the Parkes Bypass would involve several road adjustments/realignments, constructing new link roads, local road closures and access changes. Table 6-3 summarises the impacts associated with the road access changes due to operation of the bypass.

Overall, the Parkes Bypass would be able to reduce vehicle conflicts along the existing Newell Highway still in operation due to the reduction in traffic volumes. However, there may be some slightly increased travel times for residents affected by closure of local roads. Any potentially negative impacts would be minimised through detailed design and implementation of the mitigation measures in section 6.1.4.

Table 6-3 Potential impacts due to road access changes from the bypass

Change	Impact	Impact rating
Closure of Thomas Street at its western end	This may result in reduced vehicle accessibility for residents to Moulden Street Road and Back Trundle Road and could impact on access to Parkes Christian School.	Low
Re-aligning Moulden Street south of Back Trundle Road to Condobolin Road	This would result in an upgraded road section between Back Trundle Road and Condobolin Road. It would also provide a heavy vehicle link between Hartigan Avenue, Back Trundle Road and Condobolin Road as it is approved for PBS3a heavy vehicles. However, the realignment and connection to the new intersection may result in increased heavy vehicle movements and potential congestion on Moulden Street. It would also result in a less direct route for through traffic along Moulden Street due to the introduction of new road curves. Additionally, there may be greater potential for cyclist, pedestrian and vehicle interactivity and risk of collisions due to the shared pedestrian/cycleway bridge joining onto Moulden Street.	Moderate
Hartigan Avenue extension and the new four-way intersection of Condobolin Road, realigned Moulden Street and Hartigan Avenue extension	This intersection would provide connectivity between Condobolin Road, Moulden Street and Hartigan Avenue for light and heavy vehicles, including PBS3a heavy vehicles. However, the intersection may result in occasional queuing on Condobolin Road or the Hartigan Avenue extension. It may also impact on private property access for residents near the proposed Hartigan Avenue extension.	Low
A shared pedestrian/cycleway bridge for cyclist and pedestrians over the Parkes Bypass connecting Victoria Street and Back Trundle Road.	This would result in the removal of direct access for vehicles between Back Trundle Road and Victoria Street. This would impact about 700 heavy vehicles per day as well as residents in Shallow Rush and staff/students of Parkes Christian School that would be redirected via Moulden Street and Condobolin Road. It may also lead to a slight increase in travel times for vehicle traffic wanting to access Victoria Street or Condobolin Road east of the bypass. However, this would provide pedestrian and cyclist access via the local bridge.	Moderate
A four-way roundabout at Condobolin Road with the proposed bypass	The intersection would require bypass traffic to slow and stop at the roundabout. This would impact on traffic flow requiring vehicles travelling at 80 km/h to slow in a high-speed environment. A major reduction in vehicle speed may introduce additional safety risks. However, it would improve vehicle access to the Newell Highway east, west, north and south Parkes via this roundabout and along the bypass. It also creates an effective gateway to access Parkes while reserving the possibility of building a grade separate interchange in the future if traffic volumes significantly increase. The roundabout would be designed to accommodate PBS3a heavy vehicles and be of sufficient capacity for the expected traffic volumes.	Moderate

Change	Impact	Impact rating
T-intersections connecting the Parkes Bypass with Bogan Road and the Newell Highway	Increased travel times may occur for northbound traffic from the Newell Highway to Bogan Road and from Bogan Road to the Newell Highway for southbound travel due to staggered T-intersections. There would be improved vehicle accessibility and route choice for motorists using Bogan Road as they can use the Parkes Bypass for travel to and from the south of Parkes without having to travel through the Parkes town centre. Travel to Parkes town centre would overall be similar to the existing conditions.	Low
Closure of Brolgan Road at Hartigan Avenue and Westlime Road. Brolgan Road east would be connected to Hartigan Avenue with new road link. Brolgan Road west connected to the Hartigan Avenue extension as a T-intersection	This would result in reduced vehicle accessibility to Brolgan Road west of the Parkes Bypass from Brolgan Road east with slightly increased travel times for cross traffic. It could also increase traffic on Hartigan Avenue. Removal of the existing four-way priority controlled intersection at Brolgan Road, Hartigan Avenue and Westlime Road and implementation of T-intersections at Hartigan Avenue would improve safety due to reduction in conflicting vehicle movements. It would also remove heavy vehicle traffic from Brolgan Road east of the bypass.	Low
A bridge over Hartigan Avenue and the rail lines	This intersection would provide a continuous grade separated flow route for road traffic across the rail line removing road and rail conflict. It would also reduce road traffic at the existing level rail crossing at Hartigan Avenue on the Newell Highway.	Low
Two staggered T-intersections at London Road	This intersection may cause increased delay for through traffic along London Road which would be required to stop twice at the Parkes Bypass intersections for east-west travel. This increases vehicle conflicts and the potential for crashes. However, it also offers improved accessibility to the Newell Highway north and south of Parkes due to the proposed direct connections with the Parkes Bypass and therefore improved travel times for travel towards Parkes and Dubbo without having to travel through Parkes town centre. There is expected to be less road traffic at the existing London Road (Blaxland Street) level rail crossing. Overall, travel to north and south of Parkes town centre would be improved despite an additional intersection that would need to be negotiated.	Low
T-intersections connecting the Parkes Bypass with Barkers Road and the Newell Highway	This intersection may lead to increased travel times for southbound travel from the Newell Highway to Barkers Road and vice versa due to staggered T intersections. There would be improved vehicle accessibility and route choice for motorists using Barkers Road (including access to local farms) as they can utilise the Parkes Bypass for travel to/from the north of Parkes without having to travel through the Parkes town centre. Travel to north of Parkes town centre would be improved.	Low

6.1.4 Safeguards and management measures

Table 6-32 describes the proposed safeguards that would be introduced to manage the predicted impacts described above. Appendix D contains further details on the specifics of the safeguards and management measures.

Table 6-4 Traffic, transport and access safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Standard/additional safeguard
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 Roads and Maritime <i>Traffic Control at Work Sites Manual</i> (RTA, 2010) and <i>QA Specification G10 Control of Traffic</i> (Roads and Maritime, 2008). The TMP will include:</p> <ul style="list-style-type: none"> • Confirmation of haulage routes • Measures to maintain access to local roads and properties • Site specific traffic control measures (including signage) to manage and regulate traffic movement • Measures to maintain pedestrian and cyclist access • Requirements and methods to consult and inform the local community of impacts on the local road network • Access to construction sites including entry and exit locations and measures to prevent construction vehicles queuing on public roads. • A response plan for any construction traffic incident • Consideration of other developments that may be under construction to minimise traffic conflict and congestion that may occur due to the cumulative increase in construction vehicle traffic • Monitoring, review and amendment mechanisms. 	Contractor	Detailed design/ pre-construction	Core standard safeguard TT1 <i>Section 4.8 of QA G36 Environment Protection</i>
Changes to bus services	Any affected bus stops or routes would be relocated or re-routed with consultation undertaken with bus companies	Contractor	Construction	Additional safeguard TT2

Impact	Environmental safeguards	Responsibility	Timing	Standard/additional safeguard
Road closures	The necessary permits or licences will be obtained for road or lane closures or rail possessions.	Contractor	Construction	Additional safeguard TT3
Changed traffic conditions	Adequate advisory and warning signage will be provided of the road conditions ahead.	Contractor	Construction	Additional safeguard TT4
Changed local road access	Current traffic movements and property accesses are to be maintained during the works as far as practical. Any disturbance is to be minimised to prevent unnecessary traffic delays. Detour signage to Moulden Street and Back Trundle Road via Condobolin Road and Henry Parkes Way will be provided. This will include local road network connections with Condobolin Road.	Roads and Maritime	Detailed design	Additional safeguard TT5
Changes to property access	Alternate temporary and/or permanent property access routes would be provided (as required) in consultation with the relevant land owners/occupiers to maintain private property access during construction and operation.	Roads and Maritime	Construction and operation	Additional safeguard TT6

6.2 Socio-economic

This section describes the socio-economic impacts that are predicted to occur from building and operating the proposal. This section summarises the Socio-economic Assessment that was prepared for the proposal by WSP and is included in Appendix F.

6.2.1 Methodology

Section 1.4 of Appendix F describes the detailed methods used to carry out the socio-economic assessment.

Study area and information sources

The study area comprised five aspects:

- 2016 Australian Bureau of Statistics Census data from within the Parkes (NSW) Statistical Area Level 2 (SA2) covering Parkes as shaded blue in Figure 6-16
- Social and recreational infrastructure, and places of community significance within Parkes
- Community values held by the people that live and work in Parkes
- Business survey information collected from 105 local businesses throughout Parkes between 17 July 2017 and 4 August 2017, all of which fall within the blue shaded areas in Figure 6-16
- Stopper survey information collected from 75 passers-by between 22 July 2017 and 28 July 2017 in several locations in Parkes, including at the town centre, the Dish, the hockey sports centre and at businesses along the Newell Highway.

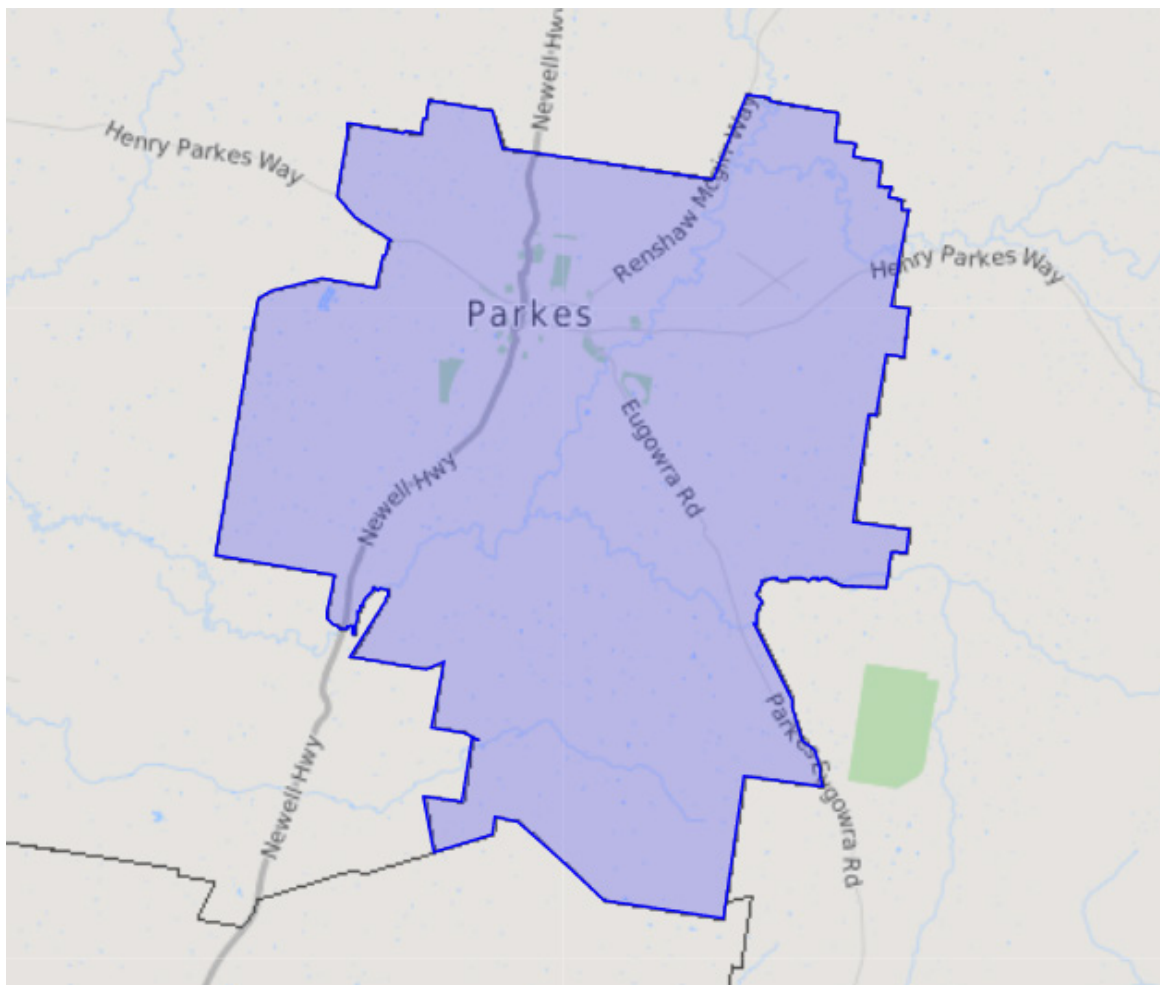


Figure 6-16 Parkes (NSW) SA2 boundary comprising the study area (shaded blue) *Source: ABS, 2016*

Impact ratings

In assessing the level of impact, consideration was given to the sensitivity of the existing socio-economic environment (determined by qualities that influence its resilience to change and capacity to adapt), and the magnitude of change, including the scale, duration, intensity and scope of the proposal.

The overall ratings were based on the combination of the environmental sensitivity and impact magnitude.

6.2.2 Existing environment

Parkes is in the Parkes Shire LGA in central west NSW at the intersection of the Newell Highway and two major rail lines, the Broken Hill rail line (Sydney to Perth) and the Parkes to Narromine rail line. As such it provides access to markets across the east coast of Australia and it is estimated that 80 per cent of the Australian population is within a 12-hour drive of Parkes.

Local and regional population characteristics

The population of Parkes as of the 2016 census was 10,983 people living in 4924 dwellings. The population in Parkes LGA was 14,608 of which the town of Parkes makes up 75.18 per cent. Population growth in the LGA is expected to remain relatively static and reach a population of 15,700 residents by 2036 (Department of Planning and Environment, 2017). Most of the residential population is concentrated in the town to the east of the proposal footprint, with a much lower residential density to the west of the proposal.

Families are the most common household type (68.3 per cent), consistent with Parkes LGA (68.5 per cent). Couples with children are the most common type of family making up 40.1 per cent of households, there are also a high number of single parent households, with Parkes (20 per cent) slightly higher than the LGA (18.1 per cent).

Migration data for the 2016 Census was unavailable at the time of writing, however at the 2011 Census, 55 per cent of residents in Parkes LGA were living in the same dwelling as they were five years previously, higher than the Australian average of 51 per cent. Of the 31 per cent of LGA residents who had moved in the previous five years, more than half had moved from elsewhere within the LGA. This indicates a comparatively lower rate of population mobility than the national average.

The Parkes community is characterised by a stable population and higher than average rates of community participation and engagement. This suggests that, like many regional centres, Parkes has a comparatively cohesive community and social networks.

A quarter of the residents of the study area have completed year 12, this is lower than the LGA where a third of residents hold the same qualification.

Local income and employment

Individual average weekly incomes in Parkes study area were \$579 in 2016. This was slightly higher than the individual average weekly incomes in the Shire at \$554 but below the Central West regional average of \$594. It is also notably below the State-average weekly income of \$664.

Where a household is paying 30 per cent or more of its income on rent or mortgage repayments, this is defined as rental or mortgage stress. In Parkes, 3.6 per cent of households are classified as experiencing mortgage stress and 10.2 per cent are experiencing rental stress, consistent with the LGA.

Business and industry

The top industries of employment in Parkes in 2015/16 were agriculture, forestry and fishing, retail trade and healthcare and social assistance (11 per cent), education and training (nine per cent), mining (eight per cent), accommodation and food services and public administration (seven per cent).

Agriculture, forestry and fishing

The agricultural sector in Parkes is primarily comprised of sheep grazing and the production of grain crops such as wheat and barley. The agricultural sector is a major employer and economic contributor in Parkes. In 2010/11 the sector employed 878 people and had a gross value of production of \$173 million, about 23 per cent of Parkes total Gross Regional Product. The majority of the proposal footprint is currently used for agriculture. Most of this (about 55 per cent) comprises the TSR, where there is a retained legal right to move and temporarily graze stock during drought. TSRs may also be used for public recreation and conservation.

Retail

The retail sector in Parkes is also a major employer, employing 766 people (in 2015/16) about 12 per cent of the workforce and injects about \$39 million into the economy annually (based on 2015/16 estimates).

Based on case studies of the economic impacts on town bypasses (refer to chapter 2 of Appendix F), the following types of businesses are likely to attract passing trade:

- Accommodation e.g. hotels, motels, caravan parks
- Eateries (eg restaurants, cafes, fast food, take-away, pubs)
- Food stores e.g. grocery and convenience stores
- Other retail e.g. gift shops
- Service stations
- Automotive services.

Most of the 105 surveyed businesses responded that they cater to local and regional markets, visitors to Parkes as well as passing highway trade. While it is noted that the surveys were only indicative of the business environment of Parkes, it suggests that highway trade is not the major source of income for many businesses in Parkes. Over two thirds of the surveyed businesses were estimated to have less than 25 per cent of their income generated from passing trade.

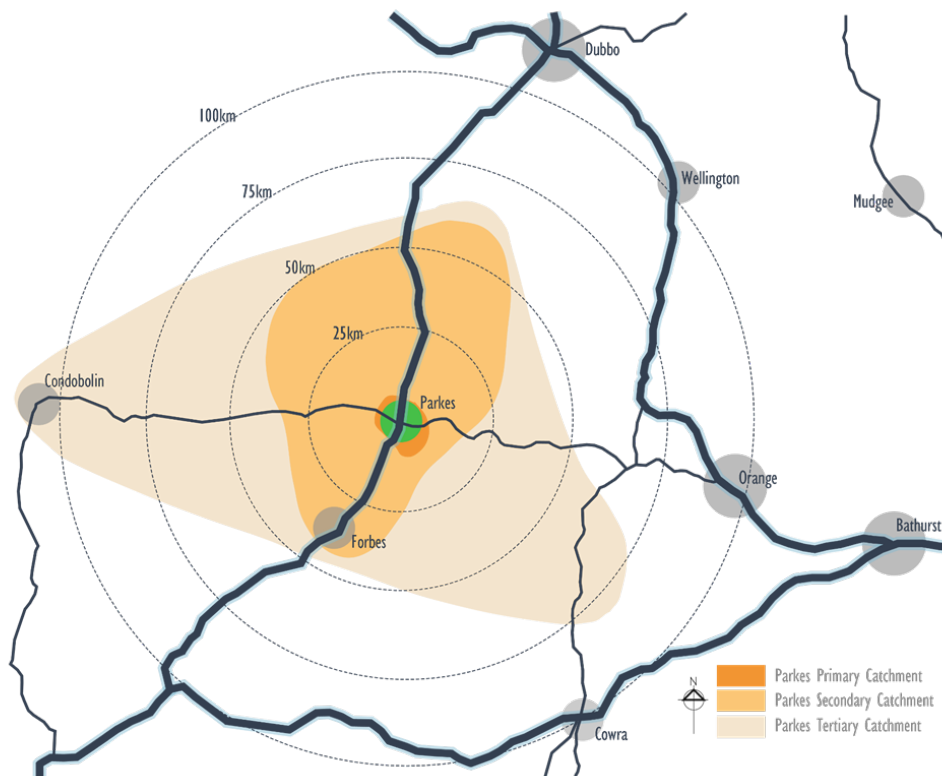


Figure 6-17 Parkes town centre catchment areas (Source: Parkes Shire Council)

The Parkes Shire Council recently completed a CBD Vibrancy Strategy to plan for the long-term viability of the town centre of Parkes. The CBD Vibrancy Strategy identified that the Parkes retail sector caters for three main catchment areas. Shows the three main catchment areas:

- The primary catchment encompasses the Parkes town centre as well as the surrounding large residential lots and farms. This catchment is the area from which Parkes town centre draws regular daily trade for household goods, away-from-home food and drinks and entertainment and services for people in this catchment
- The secondary catchment tend to use the major supermarkets (e.g. Aldi, Cunninghams, Coles, Woolworths) as well as local bakers and butchers
- The tertiary catchment extends up to 100 kilometres from Parkes as far as Condobolin and Forbes. It is the area from which occasional trade is drawn to Parkes town centre for various reasons. Major retail stores such as Harvey Norman, Big W and Target are important for this market.

Public sector and healthcare

About 28 per cent of jobs in Parkes are in the public sector (including public administration, education and healthcare). Key employers include the Roads and Maritime Western Region Head Office, Department of Education, Centrelink and Department of Children Services.

Mining

Mining employs about eight per cent of Parkes' workforce. The Northparkes Mines, located about 25 kilometres north-west of Parkes, currently employs 342 staff on site (Northparkes Report, 2016), 271 of whom live in Parkes. In 2014 the Northparkes Mines was given approval from the NSW and Commonwealth Governments to continue its operations until 2032. Parkes Shire Council economic data confirm that the mining industry is the most productive in Parkes LGA, contributing \$169 million or 24 per cent of total value added in the 2015-16 financial year.

Tourism

Parkes has a strong tourism industry, with peak visitors in January for the well-known Elvis festival. The tourism industry also benefits from many visitors to the Dish, which receives over 100,000 visitors per year, and other major annual events including Tullamore Irish Festival, Trundle's Bush Tucker Day, and the ABBA Festival, as well as major sporting fixtures, car rallies and conventions.

In 2011, 347 people were employed in the tourism industry (accommodation, events, attractions) in Parkes. Overall, the tourism industry contributed \$56 million in sales in Parkes in 2015-16, with total value added of \$28.2 million (four per cent of the total for Parkes LGA).

For the four-year annual average period up until September 2014 there were 223,000 overnight and domestic day trip visitors to Parkes, and a further 105,000 overnight visitors staying a total of 300,000 nights (Destination NSW, 2016). Domestic overnight visitors stayed an average of three nights while international visitors stayed an average of 19 nights. Visitor expenditure was an average of \$376 per trip for domestic visitors and \$955 per trip for international visitors. The average spend per night for visitors was around \$145 for domestic overnight tourists and \$49 for international tourists (Destination NSW, 2016).

Transport, postal and warehousing

Transport, postal and warehousing employs about seven per cent of the LGA's work force. This reflects the importance of logistics to the local economy and the Parkes geographical advantage from its location on the Newell Highway and two major rail lines. In 2006, Parkes Shire Council rezoned 516 hectares for the development of the Parkes National Logistics Hub which will provide a centralised storage and distribution point for freight traffic. A development application is currently being considered for a new freight logistics terminal as part of the broader Parkes SAP.

Social and recreational infrastructure

Parkes is the largest town and service centre in the Parkes LGA. As such it contains a high number of social, community and recreational facilities.

Educational facilities in the town includes three state primary schools, the only dedicated state high school in the LGA and a regional branch of TAFE. All schools are located centrally within Parkes except for Parkes Christian School, which is located on Back Trundle Road to the west of the proposal footprint. Health care infrastructure includes the Parkes Hospital, opened in 2015, which provided a new base for regional emergency and public health care.

The town features several sporting facilities including:

- The Northparkes Oval which features track and field infrastructure (Alexandra Street)
- Cheney Park – International standard hockey facilities (Baker Street)
- McGlynn Park – hard court netball complex (Station Street)
- Parkes Aquatic Centre (Dalton Street)
- Several reserves catering for rugby, cricket, AFL and other sports.

Social and recreational facilities include:

- Neighbourhood Central (Currajong Street) which offers a place for Council-led community services such as Aboriginal, disability and aged and home care services
- The Henry Parkes Centre (Peak Hill Road) a multipurpose tourist and cultural hub in Parkes. The centre hosts museums and cultural and social events
- The Little Theatre (Bogan Street) a Council-owned arts and theatre space which hosts community-led productions during the year and provides space for meetings and community activities
- The Parkes Showground (Victoria Street) located north-west of the town, which hosts the Parkes Show every August, a regional community gathering and celebration as well as other events and activities during the year
- The Parkes Golf Course (London Road) which operates an 18-hole championship Golf Course and licensed club house and hosts annual regional championship competitions.

Places of community significance

Places of community significance are places that contribute to a sense of community identity and the broader social relationships within communities. Places of community significance in Parkes include:

- The Dish (the CSIRO Observatory) famous for being one of the receiving transmitters for the 1969 moon landing. It is a major tourist attraction and is the town's most identifiable site
- Northparkes Mine (a copper and gold mine location 27 kilometres north west of the Parkes town centre) which owns and operates over 8,000 hectares of agricultural land and employs over 270 people
- A range of local and regional attractions including:
 - Within the town centre: Henry Parkes Museum, Parkes Aviation Museum, Parkes Craft Corner and the NSW Modern Mining Trail
 - Outside of the town centre: Lachlander Museum, the Peak Hill FM Community Radio Station, Lake Cargelligo, Kings Grave, the Wiradjuri Study centre, Mount Tilga, Bug Fish Fossil Hut at Peak Hill, Burrabadine Walking Track, Peak Hill Open Cut Experience, Gum Bend Lake, and the Peak Hill Art Gallery.

Community values

Community values are those ideals regarded as important by members of the community for quality of life and well-being. Community values include things such as physical elements (e.g. parks, landscapes and pedestrian connectivity), as well as intangible qualities (e.g. sense of place and community cohesion).

Overall, Parkes is thriving commercial centre supported by its location at the hub of several major transport corridors. The town is built on a rich history in gold mining and the community proudly celebrates this history. A sense of community cohesion and belonging is important in Parkes with nationally recognised events, community days, local initiatives and a booming tourism industry creating a progressive, vibrant and welcoming environment for families and individuals.

Safety education programs for schools and the community are focal points for the area, especially with large infrastructure developments such as the Parkes Bypass, Pacific National Parkes Logistics Terminal, and ARTC Inland Rail Parkes to Narromine projects taking place on Parkes' doorstep.

The above context helps define the key community values in Parkes. These values were further defined through consultation with the local community (Roads and Maritime, 2017). This was used to seek feedback on how the proposal may impact on the things people hold true in terms of their quality of life and well-being. Overall the key values in the context of the proposal are:

- Community cohesion (ie the connection and relationship between individuals, groups and neighbours) and participation
- Sense of community and belonging and a desire for placemaking (eg the action of communities working together to develop their shared public spaces to support the local community)
- Safety and security with a focus on road safety for all users and specifically the safety of school children
- Amenity, character and lifestyle associated with the area's liveability, tranquillity and rural character.

6.2.3 Potential impacts

Construction

Property and access impacts

The Parkes Bypass would require the acquisition of land from Government and private landowners. This would include the acquisition of lots from six private landowners and partial or full acquisition of 14 Crown land lots (refer to section 3.6). All lots to be acquired are zoned as RU1 Primary Production, R5 Large Lot Residential, SP2 Infrastructure or are Crown Land.

The properties to be acquired are predominantly used for low intensity, small scale agriculture or lifestyle properties. Partial acquisition of one of these properties would require the relocation of existing agricultural sheds and other non-residential structures. Consultation with the affected property owners confirms that these structures could be relocated to other areas of the property without having any impact on their ability to farm. As such the partial acquisition of these properties is not expected to impact their farm operations and long-term viability, however there is likely to be low to moderate, negative impacts associated with the inconvenience of moving these buildings.

Up to 30 percent of the TSR, which is 60 metres wide, would be acquired for the construction of the proposal. The existing TSR is wide enough to accommodate the proposal footprint and provide for continued use as a TSR after the proposal is completed. During construction, there may be low to moderate, short term impacts related to access diversions and traffic management controls.

There may be also some temporary land use changes during construction to accommodate compounds and ancillary facilities. The selected location of the compounds and ancillary facilities has considered

land use impacts where feasible and reasonable, which has led to their placement on Crown Land or unoccupied/low-productivity agricultural land.

There may be some changes or restrictions to private property access during the construction of the proposal, particularly as a result of road closures for construction of bridges, the extension of Hartigan Avenue, the re-alignment of Moulden Street and the Condobolin Road roundabout. This may result in increased travel times for general traffic, however, construction works will be planned and staged to minimise the impact to local road access where possible for road users. Roads and Maritime has also engaged with landowners to determine new access points to the local road network. Affected private land owners would need to access their properties via alternative routes which would add minor additional travel time to and from Parkes.

One property, located to the west of the proposal footprint, comprises a new dwelling and a heavy vehicle driver training school that relies on the local road network to provide certified training routes. Until the final proposed design is confirmed it is not possible to confirm if alternative certified routes would be available from the property. As such, the impact is unknown and additional consultation and assessment will be required to mitigate against any negative outcomes. This will be undertaken during detailed design.

Population impacts

The construction of the proposal is expected to have a temporary, positive impact through creation of local employment opportunities. A small increase in the local workforce is also expected during construction due to a short-term increase in non-resident workers required for specialist services.

Given the predominance of family households and low migration in Parkes, it is possible that construction would result in a minor change to the overall population profile as construction workforces tend to be dominated by males of a young working age. The profile and scale of the worker population would fluctuate throughout the construction period in response to works being undertaken – from 100 to 400 depending on the project program. However even if the entire workforce was migrant, there is sufficient provision of core services such as doctors, hospital beds, and other services that it would be unlikely to have any impact on the level of service available for the local population.

Employment and business impacts

Construction of the proposal is expected to take about three years and generate up to 400 jobs. As such construction of the proposal would provide local employment opportunity. Local businesses would be expected to experience a positive impact as the non-residential workforce would increase demand for goods and services and short-term and residential rental accommodation. This would be expected to have a low to moderate, positive impact. Conversely it may result in a low, negative impact once the proposal becomes operational, particularly if businesses have come to rely on an increased customer base.

There is potential that the increase in workforce would cause an increase in private room and house rental prices, as demonstrated by the Pacific Highway Upgrade project. However, recent studies on the Pacific Highway Upgrade project have shown that that “rental increases had not occurred in similar locations” where road upgrade projects had taken place (Pacific Complete, 2015). The report also notes that such concerns can be easily addressed by having an effective accommodation strategy providing alternative accommodation, such as self-contained accommodation, hotel/motel space, tourist parks, and/or purpose-built accommodation, to minimise the loss of affordable rental properties (Pacific Complete, 2015).

Given the population fluctuations for major events such as the Elvis Festival, it is likely that the retail and hospitality industries of Parkes are adaptable to temporary changes in demand. A construction workforce of 400 would only add about two per cent (compared to the 20,000 tourists that visit Parkes each year) to the demand on resources in Parkes over this period. It is unlikely to prevent visitors from finding accommodation or to impact the availability of resources during peak periods. It is also unlikely to have

any amenity impact on any major events, even including travel time delays in to Parkes as the proposal would be largely built offline away from where any events are held.

It is not anticipated that construction of the proposal would impact the existing regional freight, mining or agricultural industry. Access along the existing Newell Highway would be maintained during construction except for a temporary impact when the tie-ins and intersections with the new bypass are completed. This would involve traffic management controls such as stop-go signs, temporary traffic lights or short-term diversions to allow completion of the work. The traffic controls and diversions would be adapted to account for critical points during the year such as the harvest time to manage impact. As such, impacts to traffic and access during construction would be limited to minor travel time delays and inconveniences, which would not have any material impact to businesses or employment.

At a regional level the loss of agricultural land due to property acquisition is considered minimal and would have negligible impact on the profitability and sustainability of the agriculture industry in the region.

Impacts to existing rail operations would be avoided through construction of a bridge over the rail lines in co-ordination with ARTC to prevent any service or access loss.

Social infrastructure impacts

No social infrastructure facilities would be directly impacted by acquisition required for the construction of the proposal. The Parkes Golf Course, located next to the proposal, would experience short-term moderate adverse impacts due to reduced amenity from noise, dust and visual impacts due to construction activities, such as movement of construction machinery.

The construction of the proposal would create a barrier to east-west travel to the Parkes Christian School, which is located on the western side of the proposal. This would impact access to the school for parents, teachers and students. There may be moderate, short-term impacts to travel times for those travelling by car because of traffic management controls such as diversions during the construction period. Students who currently walk or cycle to the school via Victoria Street would experience a moderate negative impact during the construction of the proposal as it is unlikely that an alternative could be provided until the shared pedestrian/cycleway bridge is completed.

Access to properties to the west of the proposal footprint would be altered during construction due to temporary traffic management measures or diversions. As such, emergency services routes would be regularly reviewed and modified to ensure that emergency vehicles can safely access the local and regional road network.

Community value impacts

Road safety

Temporary traffic controls, diversions and access changes would cause temporary impacts to pedestrian and cyclist movements near the construction work.

East-west pedestrian and cyclist access along Back Trundle Road and Victoria Street would be temporarily impacted during the construction period. This would particularly affect those who routinely use this route to access work or other amenities in the area such as students accessing the Parkes Christian School.

Community cohesion and participation

Barriers to movement and access

The construction of the proposal may be perceived to create a barrier to the west of Parkes, particularly for residents surrounding the proposal footprint. This may increase their sense of isolation from Parkes and disconnect from the sense of community participation and engagement. There would also be

temporary road/lane closures, diversions and speed limits during construction of the proposal, which may impact habitual travel patterns for residents and visitors.

Sense of community and placemaking

Given the relatively stable population of Parkes, it is possible the temporary construction worker population would be perceived as a new or unfamiliar group in the community. Encouraging workers to stay in the town and use local facilities would help dissolve barriers between new and existing residents and strengthen the local community.

Amenity and lifestyle

Residents, businesses, facilities and land uses closest to the proposal footprint have the highest likelihood of experiencing direct adverse impacts during construction. These impacts would be loss of value and enjoyment of the area due to noise and vibration, dust and emissions, access changes, littering and visual impacts. These impacts are anticipated to be short term, minor and localised except for visual impacts which would endure until landscape planting matures.

As a linear proposal, construction would be progressive and impacts would be transient and therefore less impactful than a single source of impact over the same proposal program. The exception would be at construction compounds where impacts would last for the duration of the construction period. The impacts to amenity would vary depending on the proximity of receivers to the construction work, however the overall direct and indirect amenity impacts to the local community are expected to be low to moderate. The construction program would comply with relevant guidelines and standards and the works would be managed in accordance with approved management plans (refer to chapter 7). Residents and businesses would also be consulted to ensure impacts are understood and anticipated well ahead of time and that mitigation measures are appropriately implemented.

Operation

Property and access impacts

As discussed in the construction section above, a portion of properties would be permanently acquired for the proposal. Given the low intensity of agricultural usage of the lots affected, there would be negligible impact on farming activities and the existing land uses. Any impacted infrastructure such as fences or sheds would be replaced or relocated by Roads and Maritime in consultation with the landowners.

No houses would be subject to acquisition for the proposal. There is potential for amenity impacts through noise, traffic and visual impacts, to some residential properties located close to the proposal. These impacts and the proposed safeguards and mitigation measures are discussed in sections 6.1, 6.3 and 6.4. Impacts would vary depending on the individual circumstances of each landowner and consultation with landowners would continue throughout detailed design in accordance with the Land Acquisition Information Guide (Roads and Maritime, 2013) to ensure that impacts are minimised.

The existing TSR would remain operational following completion of the bypass.

Population impacts

The operation of the proposal would not impact the local population profile of Parkes as the proposal would require minimal maintenance staff. It is unlikely that the operation workforce would represent a nominal increase over the current workforce as the proposal would come under existing maintenance schedules. Given that the proposal transects primarily agricultural land, it is unlikely to generate population changes as a result of changed land use.

Employment and business impacts

Once the proposal is operational, it is not expected to directly generate any employment. As there is minimal operational workforce required for the bypass, there would not be any ongoing demand on local accommodation facilities or goods and service providers. There may be some opportunity for development of roadside business including service stations and food providers and amenities along the proposal. As shown in review of other bypassed towns, indirect economic benefits may be expected as “in most cases, bypasses have resulted in economic development benefits for towns which have been bypassed” (Parolin, 2012). This suggests that follow-on employment or other economic benefits may occur because of development associated with the proposal such as a highway service centre. The economic benefit of this is hard to quantify however, as it relies on several factors.

The Parkes CBD Vibrancy Strategy (Parkes Shire Council, 2016), notes a current perception that the attractiveness of the Parkes town centre is affected the Newell Highway as it gives priority to road traffic over pedestrians, cyclists and the local community. This suggests that the proposal could provide an opportunity to improve Parkes’ appeal as a stopping place. Traffic modelling carried out for the proposal predicts that there would be a 46 per cent reduction in traffic travelling north-south through Parkes, including a 74 per cent reduction in heavy vehicle traffic (refer to section 6.1.3). As such, the proposal would improve amenity for people and businesses on the existing Newell Highway in Parkes and provide additional business opportunities such as improved street frontages and outdoor seating areas for businesses in the town centre.

Anecdotally, business and stopper surveys reported that business owners were concerned about a potential reduction in passing motorist trade because of the proposal. While there is anticipated to be a reduction in traffic through Parkes, 61 per cent of light vehicles are expected to continue to travel through Parkes town centre and many of these motorists would continue to visit local businesses and amenities. In addition, traffic modelling did not consider the effects of any mitigation strategies such as signage improvements that are successful in preventing loss of passing trade (refer to chapter 2 of Appendix F). Signage strategies would be investigated and implemented in consultation with the Council.

Parkes also benefits from a diverse economy and strong regional identity. Local employment and business opportunities in sectors such as agriculture, mining, tourism, health services, retail and education and attractions and events such as the Elvis Festival and the Dish would continue to draw visitors and tourists from the Parkes LGA and outside the Parkes region. Case studies indicate that impacts of a bypass on local businesses are often short term, and most towns recover (refer to chapter 2 of Appendix F). As such, impacts to passing trade would be expected to be low and short-term as people as the community adjusts to changes.

Once operational the Parkes Bypass is anticipated to have a low to moderate positive impact on regional freight industries. It would provide a safer and more efficient route along the Newell Highway and improved access to the Parkes SAP which would further galvanise the multimodal freight resources in the region.

At a regional level, the loss of agricultural land due to property acquisition is minimal and this would have negligible impact on the viability, profitability, productivity and sustainability of the agricultural businesses.

Social infrastructure impacts

Visitors to the Parkes Golf Course would experience some low to moderate negative amenity impacts in the form of noise and visual impacts from the operation of the proposal. Some holes would directly overlook the Parkes Bypass (refer to section 6.4.3). However, the proposal includes an eastern connection to London Road which would improve access to the Golf Course and indirectly benefit the Golf Course.

Centrally located institutions are not anticipated to be affected by the bypass. Parents and teachers driving to the Parkes Christian School would experience a minor negative impact as they would need to

access the school via Condobolin Road not the current route via Victoria Street. The provision of a shared pedestrian/cycleway bridge from Back Trundle Road from Victoria Street would provide a direct beneficial impact for pedestrian and cyclist access to the Parkes Christian School.

Emergency service facilities are centrally located within Parkes and are not directly impacted by the operational stages of the bypass.

Community value impacts

Road safety

The provision of a shared-use pedestrian and cyclist bridge between Back Trundle Road and Victoria Street would be a low and potentially positive impact for pedestrians and cyclists who routinely travel along these roads.

The operation of the proposal would provide a moderate indirect positive impact as there would be an anticipated improvement in safety for pedestrians, cyclist and light vehicles in the Parkes town centre. It would also provide an opportunity to improve pedestrian and cycling links and facilities in line with the Parkes Shire Pedestrian and Cycling Strategy 2015 (refer to Appendix F). This could include the provision of services at strategic locations for travellers to stop, rest, research and find services in Parkes.

The proposal would include opportunities to enhance access and connectivity between Parkes and towns within the regional network, to the industrial area at the southern end of Parkes. The inclusion of roundabouts and reduced speed limits would enhance efficiency and safety for school bus routes, including those servicing the Parkes Christian School.

Community cohesion and participation

Barriers to movement and access

Reduction of heavy vehicle traffic through the town centre would reduce perceived barriers and improve pedestrian access across roads that were previously considered dangerous. This would improve connectivity across the town and encourage greater community cohesion.

However, there would be a perception of the proposal forming a barrier to the west. It is expected that community members would be concerned about reduced access into and out of Parkes. The proposal would create a point of severance in the landscape, which would be visible to the people in the low density residential areas to the west. This may increase their sense of isolation from Parkes and disconnect from the sense of community participation and engagement.

Sense of community and placemaking

The proposal would present a change to the sense of community in Parkes, both negatively to the west and positively in the town centre. Changes, including partial property acquisition and change to the land use and landscape to the west of Parkes may alter the sense of place for residents of this area.

It is not anticipated that the Parkes Bypass would significantly impact sense of community for the general population of Parkes as community facilities and population centre in town would be largely unaffected.

There is opportunity through the changes introduced under the proposal (ie the reduction of traffic in the town centre) for Council, the Chamber of Commerce and other stakeholders to activate and improve streetscapes on the existing north-south roads, enhance social and business activity within the town centre, and provide meeting places for community. These changes would be likely to positively influence the community's sense of pride and belonging and sense of community within the area.

It is noted that the sense of community and place would continue to evolve with as part of a wider transformation in the area that would include the proposal and the construction of the Parkes Logistics Terminal and Inland Rail.

Amenity and lifestyle impacts

The operation of the proposal would result in a permanent change to the local amenity around the proposal footprint and within the Parkes town centre.

For those around the proposal footprint, the Parkes Bypass would be a notable massive man-made structure in a previously rural setting. The impact would be most notable for people living and working close to the proposal footprint as they would see or hear the road and associated traffic. These impacts are sufficient to warrant mitigation and management measures such as urban design and noise treatments, as discussed in sections 6.3 and 6.4.

The reduction in heavy vehicles passing through the Parkes town centre would improve the amenity of Parkes, reducing visual impacts and air quality impacts from heavy vehicles and improving the streetscape and user experience for pedestrians and cyclists. Over time, it anticipated that businesses, dwellings and facilities located along the existing Newell Highway would capitalise on the improved amenity resulting from reduced congestion and heavy vehicle traffic by improving street frontages. This also supports council's vision to encourage street dining and activation of retail street frontages within the town centre. As such, the Parkes Bypass is anticipated to have a positive impact on town amenity during operation.

6.2.4 Safeguards and management measures

Table 6-5 describes the proposed safeguards that would be introduced to manage the predicted impacts described above. Appendix F contains further details on the specifics of the safeguards and management measures.

Table 6-5 Socio-economic safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Standard/additional safeguard
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"> • Mechanisms to provide details and timing of proposed activities to affected residents, including changed traffic and access conditions • Contact name and number for complaints. <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	Core standard safeguard SE1

Impact	Environmental safeguards	Responsibility	Timing	Standard/additional safeguard
Amenity impacts	<p>Roads and Maritime will consult with the following key stakeholders to address the following socio-economic- related impacts and opportunities:</p> <ul style="list-style-type: none"> • Local businesses and Council to provide signage infrastructure at bypass and intersections interchanges to attract business people from the Parkes Bypass into Parkes • Parkes Golf Club to address construction and operational amenity-related impacts for users of the golf course • Parkes Christian School to develop a safe alternative for children to walk and cycle to school when Victoria Street is closed • Bus operators to develop safe access routes to the Parkes Christian School during the construction and operation of the proposal • The emergency services to ensure access routes are included in the construction delivery plans and associated management plans, as well as, the inclusion of specific emergency access routes in to and out of Parkes once the Parkes Bypass is operational • Pedestrian and cyclist groups to notify them of planned diversions and road configuration changes and to understand any specific needs requirements that will need including under the detailed design • Pedestrian and cyclist groups to notify them of planned diversions and road configuration changes. 	Roads and Maritime	Detailed design and pre-construction	Additional safeguard SE2
Access changes to the travelling stock route	Continued access to the travelling stock route would be provided during construction and once the Parkes Bypass is operational. Where necessary, Roads and Maritime will consult with relevant agricultural stakeholders (including the Department of Industry: Lands) and/or recreational users of the travelling stock route to notify them of any change in access points, which will be additionally advertised in the media and around the proposed work sites.	Roads and Maritime	Pre-construction	Additional safeguard SE3

Impact	Environmental safeguards	Responsibility	Timing	Standard/additional safeguard
Perceived passing trade loss in Parkes	Roads and Maritime would continue to work with the Chamber of Commerce, Council and other business-groups to ensure ongoing concerns are listed to and acted upon.	Roads and Maritime	Detailed design	Additional safeguard SE4
Perceived passing trade loss in Parkes	Roads and Maritime will develop and implement a Signage Strategy in consultation with the Chamber of Commerce, Council and other business-groups as part of the detailed design. The strategy will review previous bypassed towns to confirm the most effective way to attract people in to the town.	Roads and Maritime	Detailed design	Additional safeguard SE5
Private property acquisition, severance, residual functional use, and amenity-related impacts	<p>Roads and Maritime would continue consulting with directly (acquisition) and indirectly (amenity-related) impacted residents.</p> <p>Roads and Maritime would develop final property fencing, driveway and other property infrastructure adjustments in consultation with the affected property owners and this will be reflected in the detailed design.</p> <p>The impact of land acquisition will be assessed in accordance with <i>Land Acquisition (Just Terms Compensation) Act 1991</i>, the Land Acquisition Reform 2016, and the Land Acquisition Information Guide (Roads and Maritime, 2014).</p> <p>The assessment would consider each owner's remaining holdings accounting for the impacts of severance and/or the residual functional use of any remaining land. Roads and Maritime will engage an appropriately qualified property and/or agricultural specialist to assess these impacts and to identify alternative opportunities for their remaining holdings.</p> <p>Roads and Maritime would manage any residual land in accordance with its disposal processes. This will involve considering landowner requests for land swaps.</p>	Roads and Maritime	Detailed design	Additional safeguard SE6
Temporary access restrictions, diversions and traffic management controls	Roads and Maritime will work with the freight and agricultural industries to identify critical times during the year where access reliability is critical (e.g. harvest time). These will be included in the Traffic Management Plan.	Roads and Maritime	Detailed design	Additional safeguard SE7
Private property access changes	Roads and Maritime will work with the property owners whose accesses will be impacted by the proposal to discuss their needs. The final access arrangement will be agreed and they will form part of the detailed design.	Roads and Maritime	Detailed design	Additional safeguard SE8

Other safeguards and management measures that would address socio-economic impacts are identified in sections 6.1, 6.3, 6.4, 6.9 and 6.11.

6.3 Noise and vibration

6.3.1 Methodology

This section describes the noise and vibration monitoring, modelling and assessment methods. The overall assessment method involved:

- Identifying the noise and vibration assessment study area and associated sensitive receivers
- Describing the existing noise environment
- Defining the assessment criteria adopted to assess the proposal's noise and vibration impacts
- Presenting the predicted construction noise and vibration levels associated with building the proposal
- Presenting the predicted operational road traffic noise levels at the identified sensitive receivers
- Presenting the feasible and reasonable safeguards and management measures that should be introduced to mitigate noise and vibration impacts when building and operating the proposal.

The assessment has been prepared by referring to the following guidelines and documentation:

- Noise Policy for Industry (NPfi) (EPA, 2017)
- Environmental Noise Management Manual (ENMM, Roads and Maritime, 2001)
- Assessing Vibration, A Technical Guideline (EPA, 2006)
- Interim Construction Noise Guideline (ICNG, EPA, 2009)
- Construction Noise and Vibration Guidelines (CNVG, Roads and Maritime, 2016)
- Road Noise Policy (RNP, EPA, 2011)
- Procedure – Preparing an Operational Traffic and Construction Noise and Vibration Assessment Report (Roads and Maritime, 2016)
- Noise Criteria Guideline (NCG, Roads and Maritime, 2015)
- Noise Mitigation Guideline (NMG, Roads and Maritime, 2015)
- Noise Model Validation Guideline (NMVG, Roads and Maritime, 2018).

Noise monitoring and analysis

Background data was collected to determine ambient noise levels in and around Parkes and the proposal footprint. This involved carrying out short-term attended and long-term unattended noise monitoring in December 2016 and December 2018. Figure 6-18 shows the noise monitoring locations. Each monitoring location was chosen to represent a noise catchment area (NCA), which is defined as an area that contains a group of receivers that may be similarly affected by noise from the proposal. Accordingly, the modelling assessed the predicted impacts on a given noise catchment area (NCA) rather than individual properties. The potentially worst affected locations within each NCA were selected to predict the impact. These are often the closest location between a noise source and the NCA. Table 6-6 describes the location of the 10 NCAs adopted for this proposal.

The measured ambient noise levels were then used to establish construction noise management levels (NMLs) in accordance with the CNVG. These NMLs form the criteria that the proposal's noise and vibration construction impacts would be assessed to (refer to section 6.3.3).

The noise monitoring results were also used to measure the existing road traffic noise levels at sensitive receivers, which was used for the assessment of operational impacts.

Table 6-6 Noise catchment areas

NCA ID	Representation background monitoring location	Approximate number of receivers in NCA	Description of NCA
NCA01	NM01	7	<ul style="list-style-type: none"> • Medium density single and multi-storey residential receivers east of the proposal • Ambient noise is dominated by road and rail traffic noise from the Newell Highway and Narromine rail line • Contains one commercial receiver, Parkes Golf Club, which is located on London Road.
NCA02	NM01	3	<ul style="list-style-type: none"> • Three residential receivers and one shed located west of the proposal on Newell Highway and Barkers Road • The catchment area is predominantly open farmlands.
NCA03	NM03	8	<ul style="list-style-type: none"> • Low density residential receivers and sheds located west of the proposal on London Road, Ballerdee Lane and Coronation Avenue • The catchment area is predominantly open farmlands.
NCA04	NM02	239	<ul style="list-style-type: none"> • Medium density single and multi-storey residential receivers east of the proposal • Industrial receiver identified as Country Energy and substations located 60 metres east of the proposal boundary on Brolgan Road.
NCA05	NM03	121	<ul style="list-style-type: none"> • Medium density single and multi-storey residential receivers east of the proposal • Outdoor passive recreational and child care centre located on Victoria Street.
NCA06	NM04	35	<ul style="list-style-type: none"> • Low density single storey and multi-storey residential receivers west of the proposal • Educational building, outdoor active recreational and place of worship at Back Trundle Road (Parkes Christian School).
NCA07	NM04	34	<ul style="list-style-type: none"> • Open farmlands and low density single storey and multi-storey residential receivers within 630 metres east of the proposal.
NCA08	NM06	7	<ul style="list-style-type: none"> • Catchment area is predominantly farmlands • Residential receivers along Heraghty Road, Moulden Street and Noble Road located west of the proposal.
NCA09	NM05	17	<ul style="list-style-type: none"> • Catchment area is predominantly open farmlands • Low density one-storey residential receivers and sheds identified east of the proposal.
NCA10	NM06	1	<ul style="list-style-type: none"> • Catchment area is predominantly open farmlands • One one-storey residential receiver and shed identified on Bogan Road located north west of the proposal boundary.

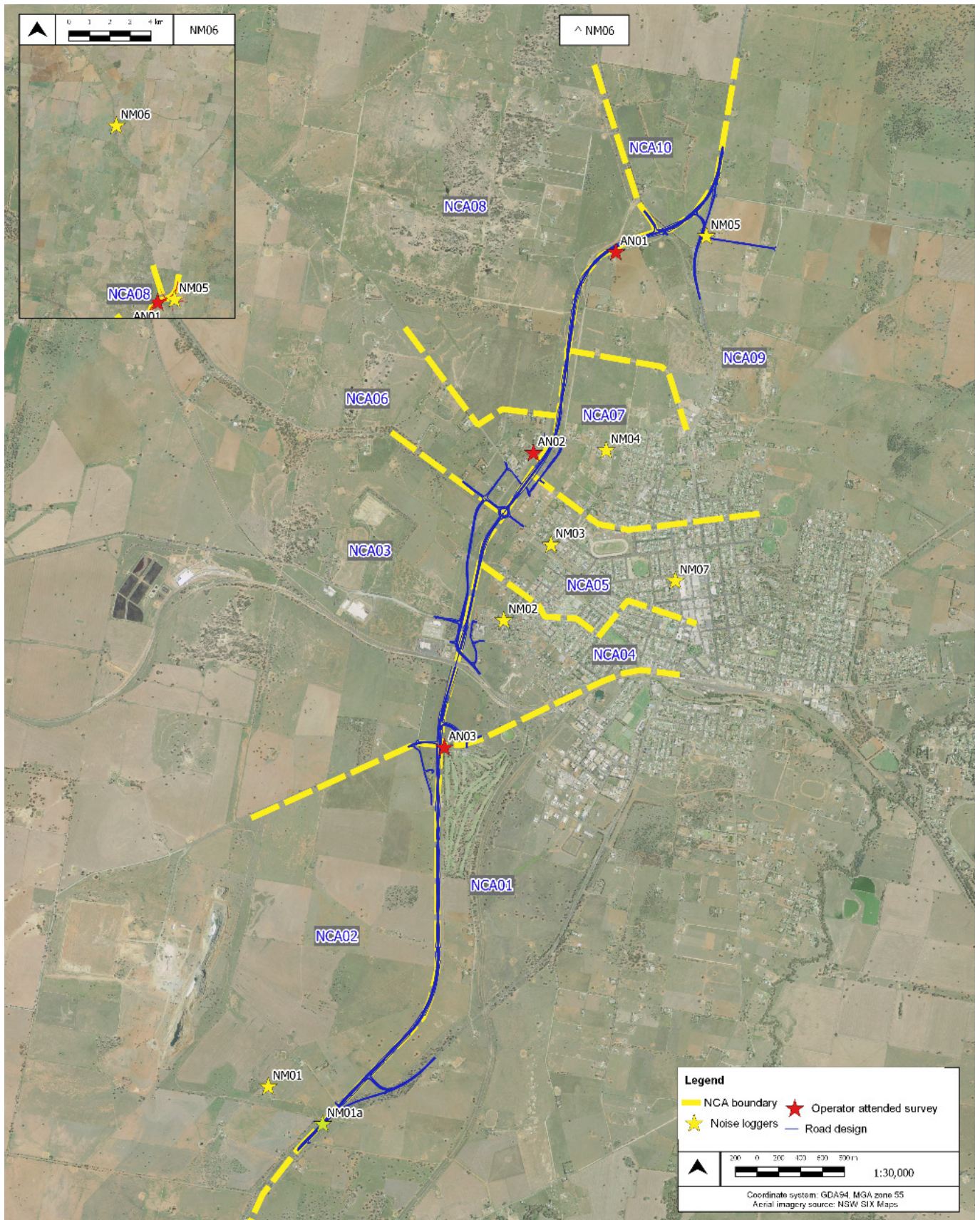


Figure 6-18 Noise catchment areas and monitoring locations

Construction noise and vibration

The construction assessment reviewed how the proposed activities, methods and scheduling described in chapter 3 would affect noise and vibration sensitive receivers in the local area. The assessment was completed in accordance with the CNVG. The CNVG defines the assessment methods and suggests noise management measures based on the length of the work, the number of people affected, and the time the work would take place.

Modelling was used to predict the noise levels that would be generated from carrying out construction work including use of equipment. The model considered noise sources, receivers and the effect of distance, ground topography, atmospheric attenuation and obstacles such as barriers and buildings.

For the modelling, the proposed construction work activities were categorised into and assessed as 12 construction scenarios. Indicative sound power levels for the different equipment that may be used during the construction scenarios were adopted from the CNVG and used in the modelling. Table 6-7 presents a summary of the work activities and construction scenarios adopted in the modelling.

Table 6-7 Summary of work activities and construction scenarios

Scenario reference	Work activity	Location	Scenario noise levels SWL, dBA		Proposed work period ²			
			15-minute equivalent (L_{Aeq})	Instantaneous maximum noise level (L_{Amax}) ¹	D	DOOH	E	N
SC01	Site establishment	Main alignment	115	116	x			
SC02	Corridor clearing	Main alignment	121	122	x			
SC03	Bulk earthworks	Main alignment	123	130	x			
SC04	Drainage infrastructure	Main alignment	115	117	x			
SC05	Paving/asphalting (including concrete sawing)	Main alignment	120	130	x	x	x	x
SC06A	Bridge works (Rail)	Bridge A	120	124	x	x	x	x
SC06B	Bridge works main (Local)	Bridge B	120	124	x	x	x	x
SC07A	Construction Compound Site Establishment (1)	Compound 1	122	123	x			
SC07B	Construction Compound Site Establishment (2)	Compound 2	122	123	x			
SC07C	Construction Compound Site Establishment (3)	Compound 3	122	123	x			
SC07D	Construction Compound Site Establishment (a&b)	Compound (a&b)	122	123	x			
SC07E	Construction Compound Site Establishment (c)	Compound (c)	122	123	x			

(1) The presented L_{Amax} parameter is referring to the instantaneous maximum produced by the loudest plant equipment within the proposed scenario.

(2) Daytime (D), Daytime out of hour (DOOH), Evening (E) and Night-time (N).

Operational noise

The operation of the proposal would generate road traffic noise. To predict the increase in traffic noise, a model was developed that took into account changes to traffic volumes and composition, vehicle speed, road gradient, pavement surface, ground absorption and shielding, and reflections from topography, buildings and barriers. The traffic volumes used in the assessment are outlined in Tables C.3 to C.6 in Appendix E.

The model was used to predict the proposal’s operational road traffic noise impacts at the point of the Parkes Bypass opening in 2023 and then 10 years later in 2033 for two scenarios:

- A ‘no build’ scenario where the proposal is not built and heavy vehicle traffic would continue to pass through Parkes town centre
- A ‘build’ scenarios where the proposal is built and a large percentage of heavy vehicle traffic would travel along the bypass, not through Parkes town centre.

Section 6.1 of Appendix E outlines the assumptions used in the model.

6.3.2 Existing environment

Ambient noise levels

The ambient noise levels close to the proposal footprint were low and typical of a quiet rural environment. The ambient noise environment was observed to be mostly affected by:

- Natural factors such as rustling trees and wildlife noise
- Light and heavy vehicle traffic on the Newell Highway and other roads in the area
- Residential and commercial activities
- Other intermittent noise sources including freight trains and planes passing over head.

Table 6-8 provides the background monitored noise levels across the study area from the unattended noise monitoring. The data are reported as the average equivalent continuous average sound levels ($L_{eq(15min)}$) and rating background levels (RBL) as defined in the NPfI (EPA, 2017).The observations from the operator attended noise monitoring results are provided in Table 4.3 in Appendix E.

Table 6-8 Unattended noise monitoring results

Measurement location	Measured noise level, dBA					
	Day		Evening		Night	
	$L_{eq(Day)}$	RBL	$L_{eq(Evening)}$	RBL	$L_{eq(Night)}$	RBL
NM01	52	33	49	31	40	30
NM01a	72	38	70	33	67	30
NM02	54	39	52	37	47	31
NM03	58	41	56	38	50	32
NM04	56	37	48	31	48	30
NM05	61	40	60	32	57	30
NM06	51	31	48	30	47	30
NM07	66	51	65	45	61	35

Background road traffic noise levels

Table 6-9 reports the background road traffic noise levels at the monitoring locations where traffic noise was identified to be a dominant noise source in the study area.

Table 6-9 Unattended traffic noise monitoring results

Measurement location	Measured traffic noise level	
	Day (7 am to 10 pm) dBA $L_{eq}(15hr)$	Night (10 pm to 7 am) dBA $L_{eq}(9hr)$
NM01A	71	67
NM02	51	47
NM03	56	50
NM05	61	57
NM06	51	47

It is noted that Brolgan Road (NM02), Condobolin Road (NM03) and Bogan Road (NM06) carry low traffic volumes with minimal heavy vehicles. It is therefore likely that the noise environment is subjected to influence of other ambient noise sources. This is particularly likely to occur at night where insect noise and rustling leaves can dominate the sound scape during quiet periods. This means that there may not be enough road traffic noise compared to other ambient noises to be able to compare the measured road noise level with a prediction of road noise level.

Sensitive receivers

Noise and vibration has the potential to negatively affect a range of sensitive receivers in the local area as described below. This may be in the form of a noise reduction for receivers alongside the existing highway through Parkes town centre or a noise increase for the people that live to the west of Parkes.

Typically, there is a high density of existing noise and vibration sensitive receivers close to the existing Newell Highway through Parkes, and a comparatively low density of receivers near the proposal where it passes through open agricultural land and the TSR to the west of Parkes town centre.

Most of the residential properties are located east of the proposal footprint, west of Parkes town centre. West of the proposal footprint, residential properties are typically isolated low-density rural residential dwellings. Most of the residential dwellings near the proposal are single storey with some isolated two storey dwellings. The nearest residential property has been identified as a dwelling on Hartigan Avenue, located about 20 metres from the proposal.

Table 6-10 summarises the other non-residential or commercial and industrial receivers that may be affected by the noise and vibration generated from the construction and/or operation of the proposal. Vibration can also affect sensitive structures, including certain heritage listed buildings. No heritage listed buildings have been identified within the study area of proposal.

Table 6-10 Non-residential and commercial and industrial sensitive receivers near the proposal

Receiver	Location	Land use type	Approximate distance to the proposal (m)
Parkes Golf Course	99 London Road, Parkes	Commercial and outdoor active recreational	50
Commercial buildings	East of the proposal on Condobolin Road and Bogan Street	Commercial	-
Country Energy and substation	East of the proposal on Brolgan Road	Industrial	50
Child Care	97-105 Victoria Street, Parkes	Child care centre and outdoor passive recreational	380
Scoble Place Park	Scoble Place, Parkes	Outdoor active recreational	330
Parkes Christian School	Back Trundle Road, Parkes	Educational	550
Kingdom Hall of Jehovah's Witnesses	25 Bushman Street, Parkes	Places of worship	300

6.3.3 Criteria

This section outlines the construction and operational noise assessment criteria used in this assessment.

Construction

Assessment periods

The CNVG specifies that construction NMLs are defined using the method specified in the ICNG. They are based on the measured RBL as defined in the INP plus an additional allowance of 10 dB during the standard work hours and 5 dB outside of standard hours. The ICNG also states that where construction noise levels are above 75 dBA at residential receivers during standard hours, they are considered 'highly noise affected' and require additional consideration in terms of noise mitigation and management measures.

Table 6-11 presents the CNVG assessment time periods that were adopted in the assessment.

Table 6-11 CNVG assessment periods

Name	Time periods	Assessment period
Standard hours (SH)	Monday to Friday: 7am to 6pm Saturday: 8am to 1pm Sunday/public holidays: no work	Daytime (D)
Out-of-hours work: period 1 (OOHW 1)	Monday to Friday: 6pm to 10pm Saturday: 7am to 8am and 1pm to 10pm Sunday/public holiday: 8am to 6pm	Daytime OOHW (DOOH)
		Evening (E)
Out-of-hours work: period 2 (OOHW 2)	Monday to Friday: 10pm to 7am Saturday: 10pm to 8am Sunday/public holiday: 6pm to 7am	Evening (E)
		Night-time (N)

Noise management levels

Table 6-12 lists the project-specific NMLs for the residents living in each NCA for each assessment period.

Table 6-12 Noise management levels at residential receivers

NCA	NML $L_{eq(15min)}$ dBA ^{1,2}					
	Highly noise affected	SH	OOHW1		OOHW2	
		D	DOOH	E	E	N
NCA01	75	43	38	36	36	35
NCA02		43	38	36	36	35
NCA03		51	46	43	43	37
NCA04		49	44	42	42	36
NCA05		51	46	43	43	37
NCA06		47	42	36	36	35
NCA07		47	42	36	36	35
NCA08		50	45	37	37	35
NCA09		50	45	37	37	35
NCA10		50	45	37	37	35

(1) Daytime (D), Daytime out of hour (DOOH), Evening (E) and Night-time (N).

Table 6-13 lists the standard NMLs that apply to other receiver types that may be impacted by the proposal. The NMLs apply when the premises are in use during any assessment period.

Table 6-13 Noise management levels at sensitive land uses (other than residences)

Land use	NML $L_{eq(15 min)}$ dBA
Commercial ¹	70
Industrial ¹	75
Place of worship	55
Child care centre	55 ²
School classrooms	55 ²
Active recreation area	65
Passive recreation area	60

(1) The external noise levels should be assessed at the most affected occupied point on the premises

(2) A 10 dB correction has been applied to the internal noise levels to reflect external noise levels as detailed in ICNG

Construction traffic noise

Construction activities would result in additional heavy and light vehicle movements on public roads. It would also result in the use of temporary traffic management controls as described in Section 3.3.5. Both factors would temporarily affect traffic movements, volumes and types on roads in the local area. An initial screening test has been provided in the CNVG which states the following:

“For Roads and Maritime projects an initial screening test should first be applied by evaluating whether noise levels will increase by more than 2 dB due to construction traffic or a temporary reroute due to a road closure. Where increases are 2 dB or less then no further assessment is needed.

Where noise levels increase by more than 2 dB (less than 2.1 dB) further assessment is needed using Roads and Maritime’s Criteria Guideline.”

Where exceedance due to construction traffic has been determined, corresponding noise mitigation as outlined in Appendix B and Appendix C of CNVG and the CNVG application notes should be considered.

Sleep disturbance

The ICNG discusses the method for assessing and managing sleep disturbance. It also refers to the criteria included in the RNP. The RNP indicates that people may potentially wake up where internal building noise levels are above 50-55 dBA. The RNP also realises that noise levels can decrease by up to 10 dB from the outside to the inside of a building. Sleep disturbance can therefore occur where the maximum external noise levels (L_{max}) are above 65 dBA, at which point feasible and reasonable noise treatments should be considered.

The sleep awakening screening criteria is the night RBL +15 dB.

Vibration

The use of vibration generating equipment during construction such as piling rigs and hammer drills can lead to:

- Cosmetic building damage (and structural damage in extreme cases)
- Loss of amenity due to perceptible vibration, termed human comfort
- Impacts on the condition and structural integrity of key infrastructure.

Importantly, cosmetic damage is regarded as minor in nature; it is readily repairable and does not affect a building’s structural integrity. If there is no significant risk of cosmetic building damage then structural damage is not considered a significant risk and is not assessed.

There is currently no Australian Standard that provides guidance for assessing cosmetic building damage caused by vibration. As such, German Standard DIN 4150 Part 3 Structural Vibration - Effects of Vibration on Structures has been adopted. Amenity based impacts are measured using the vibration dose values set out in Assessing Vibration: A Technical Guideline (EPA, 2006).

The CNVG has translated the above in to a series of safe working distances (refer to Table 6-14). These are the set for nominated construction plant to minimise the impacts of cosmetic building damage and amenity based (human comfort) impacts. They are indicative and based on the impact from a continuous vibration source.

Table 6-14 Recommended safe working distances for vibration intensive plant

Plant item	Rating/description	Minimum working distance (metres)	
		Cosmetic damage ^{1,3,4}	Human response ²
Vibratory roller	< 50 kN (Typically 1-2 tonnes)	5 m	15 m to 20 m
	< 100 kN (Typically 2-4 tonnes)	6 m	20 m
	< 200 kN (Typically 4-6 tonnes)	12 m	40 m
	< 300 kN (Typically 7-13 tonnes)	15 m	100 m
	> 300 kN (Typically 13-18 tonnes)	20 m	100 m
	> 300 kN (> 18 tonnes)	25 m	100 m
Hydraulic hammer	(300 kg - 5 to 12t excavator)	2 m	7 m
	(900 kg – 12 to 18t excavator)	7 m	23 m
	(1600 kg – 18 to 34t excavator)	22 m	73 m
Vibratory pile driver	Sheet piles	2 m to 20 m	20 m
Pile boring	≤ 800 mm	2 m (nominal)	4 m

(1) Referenced from British Standard BS 7385 Part 2-1993 Evaluation and measurement for vibration in buildings Part 2

(2) Referenced from EPA's Assessing Vibration: a technical guideline (EPA, 2006)

(3) Referred to 15 mm/s vibration limit

(4) More stringent conditions may apply to vibration sensitive structures

Blasting

It is proposed to use blasting at two locations along the alignment for the purpose of excavating a cut for the bypass. As details of the proposed blasting parameters are not available at this stage of the project, the assessment has calculated the highest mass of explosive that would be able to be used and still meet the blasting overpressure or vibration limits at the nearest sensitive receivers for each cut.

Calculations have been carried out in accordance with AS 2187 in order to determine the likely levels of ground-borne vibration and airblast overpressures from the proposed blasting.

Ground vibration and overpressure generated by construction blasting are assessed according to the CNVG. The nominated Australian Standard for blasting criteria is AS 2187.2:2006 "*Explosives – Storage and use Part 2: Use of Explosives*".

The blasting criteria associated with human comfort limits and structural damage limits adopted for the proposal are outlined in Section 7.3 of Appendix E.

Operation

The NCG define a range of assessment criteria that are to be considered when assessing road traffic noise impacts. Receivers identified to exceed these criteria are considered eligible for noise treatment in accordance with the NMG. Table 5.1 in Appendix E provides the definition for what the NCG classifies as a new road and a redeveloped existing road. It also defines transition zones to account for where a new road meets a redeveloped existing road.

The NCG details the implementation of the RNP assessment criteria for sensitive receivers affected by road traffic noise. For receivers that are not buildings (ie sports fields), the noise criteria applies at the property/facility boundary.

Residential properties

The criteria in Table 6-15 was applied to assess the operational road traffic noise impacts predicted to be caused by the proposal. The criteria represent the average levels of noise that occur over a 15-hour period during the day and a nine-hour period at night.

Table 6-15 Road traffic noise assessment criteria for residential land uses

Road category	Type of project/land use	Assessment criteria	
		Day (7 am – 10 pm)	Night (10 pm – 7 am)
Freeway/arterial/sub-arterial/collector ¹ roads	Existing residences affected by noise from redevelopment of existing freeway/arterial/sub-arterial roads	60 dBA $L_{eq(15hr)}$	55 dBA $L_{eq(9hr)}$
	Existing residences affected by noise from new freeway/arterial/sub-arterial road corridors	55 dBA $L_{eq(15hr)}$	50 dBA $L_{eq(9hr)}$
	Existing residences affected by noise from a transition zone between new and redeveloped roads	55–60 dBA $L_{eq(15hr)}$	50–55 dBA $L_{eq(9hr)}$

1. According to the NCG, collector roads are considered the same category as sub-arterial roads.

The criteria in Table 6-16 supplement the above criteria. They were applied to assess the increase in noise levels relative to the situation before the proposal was built. These relative increase criteria (RIC) are intended to protect residential amenity from an excessive increase in noise from building new roads. The criteria apply to all roads that are either built or redeveloped under the proposal.

Table 6-16 Relative increase criteria for residential land uses

Road Category	Type of project/land use	Total traffic noise level increase dBA	
		Day (7am-10pm)	Night (10pm-7am)
Freeway/arterial/sub-arterial/collector roads	New road corridor/ redevelopment of existing road	Existing traffic $L_{Aeq(15hr)} +12$ dB	Existing traffic $L_{Aeq(9hr)} +12$ dB

Other receivers

Table 6-17 provides a summary of the criteria used to assess the operational road traffic noise impacts for non-residential noise sensitive receivers.

Table 6-17 Road traffic noise assessment criteria for non-residential sensitive land uses

Existing sensitive land use	Assessment criteria dBA ($L_{eq(1hr)}$) (external)	
	Day (7am–10pm)	Night (10pm–7am)
School classrooms	50	–
School play areas	55	–
Places of worship	50	50
Open space (active)	60 $L_{Aeq(15hr)}$	–
Child care facility sleeping rooms	45	–
Child care facility indoor play areas	50	–
Child care facility outdoor play areas	55	–

6.3.4 Potential impacts

Construction

Activity based noise impacts

Table 6-18 summarises the maximum predicted noise exceedances during construction. For simplicity, the table shows the maximum daytime and night time exceedances against the NMLs. The **bolded results** show where receivers may be highly noise affected. The **red text** shows where there is predicted to be a noise exceedance. Negative numbers show where there is predicted to be no impact. Table 8.4 in Appendix E describes the range of predicted noise exceedances for each specific activity carried out during construction.

Table 6-18 Predicted noise impacts and exceedances

NCA	NML			Scenarios with exceedances	Max noise levels (dBA) across all scenarios	Max exceedance (dB)	
	HNA ¹	Standard hours	Out of hours			Standard hours	Out of hours
Residential receivers							
NCA01	75	43	35	SC01-SC05, SC07C	69	26	34
NCA02	75	43	35	SC01-SC05, SC07C	53	10	18
NCA03	75	51	37	SC01-SC06B, SC07B, SC07D, SC07E	86	35	49
NCA04	75	49	36	SC01-SC06B, SC07B, SC07D, SC07E	89	40	53
NCA05	75	51	37	SC01-SC06B, SC07B, SC07D, SC07E	87	36	50
NCA06	75	47	35	SC01-SC06B, SC07D, SC07E	87	39	52
NCA07	75	47	35	SC01-SC06B, SC07B, SC07D, SC07E	75	28	40
NCA08	75	50	35	SC01-SC05, SC06B, SC07A, SC07E	68	18	33
NCA09	75	50	35	SC01-SC05, SC07A	65	15	30
NCA10	75	50	35	SC01-SC05, SC07A	68	18	33
Educational institution							
NCA06	–	55	–	SC03	56	1	N/A
Child Care Centre							
NCA05	–	55	–	None	53	-2	N/A
Place of Worship							
NCA06	–	55	–	SC01-SC05, SC06B	73	18	N/A
Commercial receivers							
NCA01	–	70	–	SC01-SC05	80	10	N/A
NCA05	–	70	–	None	61	-9	N/A

NCA	NML			Scenarios with exceedances	Max noise levels (dBA) across all scenarios	Max exceedance (dB)	
	HNA ¹	Standard hours	Out of hours			Standard hours	Out of hours
Active recreational areas							
NCA01	–	65	–	SC01-SC05	81	16	N/A
NCA04	–	65	–	None	56	-9	N/A
NCA06	–	65	–	None	52	-13	N/A
Passive recreational areas							
NCA05	–	60	–	None	51	-9	N/A
Industrial receivers							
NCA04	–	75	–	SC02, SC03, SC05	80	5	N/A

(1) The standard hour NMLs cover the daytime period in Table 6-10. The out of hours NMLs cover the night time (OOHW2) period in Table 6-10 as this is the lowest, and therefore most conservative, noise limits.

The above table confirms that there is the potential for the construction work activities to have some effect on the sensitive receivers in the local area. There is also the potential for several residents to be highly affected during the construction work. This extends to the potential for out-of-hours impacts.

Sleep disturbance

As noted in section 6.3.3, there is the potential risk for sleep disturbance where the noise level is above L_{max} 65 dBA. Table 8.6 in Appendix E describes which noise-generating activities have the potential to cause sleep disturbance. All eight scenarios are reported for completeness. Table 6-19 provides a summary of those activities that have the potential to cause sleep disturbance (in blue shaded cells) or sleep awakening (in bold text).

Table 6-19 Predicted sleep disturbance noise impacts

NCA	Sleep disturbance screening	Sleep awakening screening	Predicted highest noise level range per scenario (dBA L _{Amax})											
			SC01	SC02	SC03	SC04	SC05	SC06A	SC06B	SC07A	SC07B	SC07C	SC07D	SC07E
Residential dwellings														
NCA01	65	50	<30 to 62	36 to 68	38 to 76	30 to 63	35 to 76	<30 to 34	<30	<30	<30 to 34	<30 to 68	<30	<30
NCA02		50	38 to 46	44 to 52	46 to 60	39 to 47	44 to 60	<30		<30	<30	30 to 39	<30	<30
NCA03		52	45 to 65	51 to 71	53 to 79	46 to 66	51 to 79	43 to 65	<30 to 49	<30	40 to 61	<30 to 31	41 to 56	35 to 87
NCA04		51	35 to 82	41 to 88	43 to 96	35 to 83	40 to 96	39 to 66	30 to 49	<30	40 to 63	<30	36 to 76	37 to 63
NCA05		52	38 to 80	44 to 86	46 to 94	38 to 81	43 to 94	<30 to 51	38 to 89	<30	30 to 44	<30	32 to 49	34 to 62
NCA06		50	41 to 80	47 to 86	49 to 94	41 to 81	46 to 94	30 to 40	39 to 70	<30 to 33	<30 to 35	<30	31 to 38	42 to 59
NCA07		50	40 to 68	46 to 74	48 to 82	40 to 69	45 to 82	<30 to 42	40 to 60	<30 to 34	<30 to 37	<30	31 to 41	38 to 49
NCA08		50	40 to 61	46 to 67	48 to 75	41 to 62	46 to 75	<30 to 32	<30 to 47	36 to 41	<30	<30	<30	<30 to 40
NCA09		50	41 to 58	47 to 64	49 to 72	42 to 59	47 to 72	<30	<30 to 39	40 to 51	<30	<30	<30	<30 to 34
NCA10		50	60 to 61	66 to 67	68 to 75	61 to 62	66 to 75	<30	<30	up to 52	<30	<30	<30	<30

From the above, activities taking place at night have the potential to affect several residents across one or more NCA. Specifically:

- Sleep disturbance impacts are predicted for all construction scenarios except for site compound activities in scenarios SC07A and SC07B, where only sleep awakening is likely
- People living in NCA03 to NCA07 are the most likely to be affected by night work
- Carrying out site establishment (SC01), corridor clearing (SC02), bulk earthworks (SC03), and pavement and road surfacing (SC05) at night are activities that are likely to cause the widest level of noise disturbance close to the proposal footprint.

Predicted construction road traffic noise assessment

Table 3-4 provides an indication of the construction traffic volumes that would be generated by the proposal. Typically, a change in traffic noise level of more than 2 dB requires an increase in total traffic volume of more than 60 per cent. Based on the construction traffic estimates, the modelling found that existing roads carrying less than about 800 vehicles per day would likely experience a possible notable increase in road noise level during the peak construction period. This includes Hartigan Avenue, Bogan Road, Barkers Road, Hideaway Lane, London Street and Moulden Street.

Vibration assessment

As described in section 9.1 in Appendix E, the following vibration generating equipment would be used under the following scenarios.

Table 6-20 Vibration generating equipment used onsite

Scenario ref	SC01	SC02	SC03	SC04	SC05	SC06	SC07
Plant item							
Hydraulic hammer			☑				
Vibratory pile driver						☑	
Pneumatic hammer						☑	☑
Smooth drum roller					☑		
Vibratory roller				☑			☑

As described in Table 6-14, there is the risk of amenity-related impacts occurring up to 100 metres from where any of the above equipment would be in use, and a risk of cosmetic building damage up to 25 metres away. Therefore, the receivers that would be located within the minimum working distances during construction of the proposal may be affected by vibration related impacts.

The potentially affected receivers would include (refer to Figure 9.1 in Appendix E):

- Five residential receivers at risk of cosmetic building damage (closer than 25 metres from the proposal)
- 30 receivers at risk of amenity-related impacts (closer than 100 metres from the proposal) including 21 residential receivers and nine non-residential receivers.

The minimum working distances are indicative only and are based on continuous vibration generated by typical equipment use in typical geotechnical conditions. By selecting a lower powered/smaller machine and restricting when the machine is used, particularly when near the minimum working distances of the nominated sensitive receivers, the vibration impacts can be reduced.

Blasting assessment

The calculated maximum charge in order to meet the ground-borne vibration limits and airblast limits for the closest receivers is presented in Table 6-21 for cut 1 and Table 6-22 for cut 2. The most onerous vibration limit has been used for each receiver.

Table 6-21 Ground-borne vibration maximum MIC for cut 1 chainage 34045 to 34475

Nearest receiver	Receiver type	Distance to receiver (metres)	Groundborne vibration limit (mm/s)	Ground vibration max MIC (kg)	Airblast limit (dB)	Airblast max. mass (kg)
447	Shed	220	5	54	133	5.2
525	Residential	125	5	17	115	0.01

Table 6-22 Ground-borne vibration maximum MIC for cut 2 chainage 32920 to 33700

Nearest receiver	Receiver type	Distance to receiver (metres)	Vibration limit (mm/s)	Ground vibration max MIC (kg)	Airblast limit (dB)	Airblast max. mass (kg)
406	Shed	75	5	6.3	133	0.2
405	Residential	80	5	7.2	115	0.003

Given that the maximum explosive mass for airblast overpressure are substantially lower than those for ground-borne vibration, it is recommended that the airblast overpressure limits be used to limit the explosive mass.

The calculations are considered conservative, with the use typical blasting factors, and do not account for any topographical shielding or other blast controls. It is recommended that further blast design and assessment law is carried out prior to construction.

Cumulative noise impacts

It is noted that a combination of construction scenarios was not directly assessed. For example, the cumulative noise impact for the event where establishment of construction compounds occurs at the same as bulk earthworks was not modelled. However, the assessment of individual construction scenarios triggered the highest level of construction noise management and mitigation measures being required. Therefore, any potential cumulative increase in noise impact would not change the outcome of the assessment or need for mitigation.

Operation

The results of the operational noise assessment are provided in Appendix E including:

- Appendix E-1, daytime and night time noise contour maps for both the no build and build scenarios in 2023 and 2033
- Appendix E-2, tabulated results of predicted noise levels for 2023 and 2033
- Appendix E-3, map indicating residential receivers eligible for consideration of noise mitigation.

Table 6-23 presents the results of the noise modelling for the operation of the proposal in 2033.

Based on the predicted noise levels for the operation of the proposal in 2033, 19 residential properties, and one non-residential land use were identified to be eligible for consideration of additional mitigation.

Table 6-23 Description of the predicted noise levels and results for the design year of 2033

NCA	Description of NCA	Predicted noise level increases and/or exceedances	Properties that qualify for further consideration of mitigation
NCA01	This area is located at the southern-most end of the proposed bypass. The proposed bypass would generally divert traffic farther away from most residential properties, which would result in a decrease, or only a minor increase, in road noise levels for these properties.	<ul style="list-style-type: none"> Noise level increases up to 7 dB at residential properties The active recreational area criteria was exceeded for the Parkes Golf Course. 	The Parkes Golf Course qualified for further consideration of mitigation however it is not typical for road infrastructure project to provide further mitigation for such land uses.
NCA02	This area has a relatively small number of isolated residential properties.	<ul style="list-style-type: none"> Noise level increases up to 6 dB. 	None
NCA03	This area has a relatively small number of isolated residential properties.	<ul style="list-style-type: none"> Noise level increases of more than 12 dB Exceedances of the NCG criteria at four residential properties. 	Four residential properties
NCA04	This area has groups of properties considered to be closely spaced together. Most of these properties are currently impacted by existing road noise (Brolgan Road, Coronation Drive).	<ul style="list-style-type: none"> No notable noise level increase for the majority of the properties. Exceedances of the NCG criteria greater than 2 dB for some properties 	Eleven residential properties
NCA05	This area has groups of properties considered to be closely spaced together. Most of these properties are currently impacted by existing road noise (Coronation Drive, Condobolin Road, Mitchell Street).	<ul style="list-style-type: none"> Average noise level increases of up to 3 dB Noise level increase of up to 10 dB at the property closest to the proposal. 	None
NCA06	This area houses groups of properties considered to be closely spaced together. Road traffic noise is generally not a dominant feature of the existing acoustic environment.	<ul style="list-style-type: none"> Noise level increases in exceedance of the criteria. 	Eleven residential properties, primarily along Moulden Street
NCA07	This area houses groups of properties considered to be closely spaced together. Road traffic noise is generally not a dominant feature of the existing acoustic environment.	<ul style="list-style-type: none"> Noise level increases in exceedance of the criteria. 	Four residential properties
NCA08	This area contains properties generally considered to be isolated. Road traffic noise is generally not a dominant feature of the existing acoustic environment.	<ul style="list-style-type: none"> Noise level increases in exceedance of the criteria. 	Two residential properties
NCA09	This area contains properties generally considered to be isolated. Road traffic noise is generally not a dominant feature of the existing acoustic environment.	<ul style="list-style-type: none"> Noise level increases in exceedance of the criteria. 	Three residential properties
NCA10	This area contains one isolated dwelling, which is located at the northern-most end of the proposed bypass and currently experiences noise from the existing Newell Highway.	<ul style="list-style-type: none"> No noise level increases in exceedance of the criteria. 	None

Predicted maximum noise levels for a truck passby on the Parkes Bypass indicates that 16 properties located closer than 100 metres from the Parkes Bypass may experience maximum noise levels above 65 dBA, and potential sleep disturbance. These properties are mostly within NCA06. Receivers located closer than 50 metres from the Parkes Bypass may also experience a difference of 15 dB or more between the equivalent noise level ($L_{eq(1hr)}$) of the predicted unmitigated night time noise levels for year 2033 and the maximum noise level (L_{max}) of a truck passby. This is would be defined as a maximum noise event. There are ten properties at risk of maximum noise events from the proposal which consist of eight from NCA06 on Moulden Street, one from NCA03 and one from NCA05.

Compression braking should be avoided near residential receivers as the sudden onset of engine braking may cause sleep disturbance when occurring near a residential receiver. The proposal includes one roundabout about 320 metres south of NCA06 and an area of minor gradient changes associated with the bridge over the rail lines. These areas are at risk of triggering compression braking compared to other areas of the proposal where the road is generally straight and flat. The noise modelling indicates that noise sensitive receivers in NCA01 and NCA03 to NCA07 are at risk of being exposed to maximum noise levels above 65 dBA when a truck uses engine compression braking to decelerate at either end of the Parkes Bypass or at the proposed roundabout at Condobolin Road.

The operation of the proposal is also likely to reduce the road traffic noise along the existing Newell Highway in Parkes town centre by diverting about 74 per cent of the heavy vehicles to the bypass. This indicates that the commercial and residential sensitive receivers in Parkes town centre would benefit from a reduction in noise. However, the overall changes in road traffic noise in the town centre due to traffic switching onto the Parkes Bypass cannot be quantified due to lack of detailed traffic flow data at the road and intersection level. This likely benefit would be further assessed and quantified during detailed design.

Operational noise mitigation options assessment

An operational noise mitigation assessment was conducted to determine the possible mitigation measures to control operational noise impact. The preferred order of mitigation in line with the NMG, for the design year of 2033, is as follows:

1. Road design and traffic management, which includes consideration of shielding the road with the natural landscape, minimising the need for compression release engine braking (such as by reducing the number of signalised intersections) and signage
2. Quieter road pavement surfaces, which includes consideration of dense graded asphalt (DGA, which reduces noise by -3 dB compared to concrete) and low noise stone mastic asphalt or open graded asphalt (LNSMA or OGA, which reduces overall noise emissions by -5 dB compared to concrete)
3. Noise barriers, which includes consideration of noise walls or mounds
4. At property treatment, which includes consideration of architectural upgrades such as sealing windows, mechanical ventilation or localised screening.

In accordance with the NMG, quieter road pavement surfaces should only be considered where there are four or more closely spaced eligible receivers (between 20 and 100 metres apart and not considered isolated). Therefore, it has only been considered for qualifying receivers in NCA04, NCA06 and NCA07. The results of the assessment were as follows:

- If DGA is used, the number of properties requiring further mitigation would be:
 - Eleven for NCA04
 - Eleven for NCA06
 - Four for NCA07

- If LNSMA or OGA is used, the number of properties requiring further mitigation would be:
 - Six for NCA04
 - Eight for NCA06
 - Two for NCA07.

Noise barriers should only be considered where there are four or more eligible receivers in a group of closely spaced receivers. Based on the operational assessment results, a noise barrier was considered for the qualifying dwellings in NCA04 and NCA06. The length of the barrier was determined to be approximately 700 and 800 metres for NCA04 and NCA06 respectively. Recommended options for the potential location and height of the noise barrier is provided in Section 6.7.3 in Appendix E.

At property treatment should only be considered where all other noise mitigation options would not be reasonable or feasible, or where they are residual impacts.

The mitigation options presented in this section would be further investigated during detailed design, including consideration of whether they would be reasonable and feasible to implement. It is noted that no mitigation is recommended for Parkes Golf Course as it is typically not considered reasonable to provide mitigation for this type of receiver.

6.3.5 Safeguards and management measures

Table 6-24 describes the proposed safeguards that would be introduced to manage the predicted impacts described above. Chapter 11 in Appendix E contains further details on the specifics of the safeguards and management measures.

Table 6-24 Noise and vibration safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Standard/additional safeguard
Noise and vibration	<p>A Construction Noise, Vibration and Blasting Management Plan (CNVBMP) will be prepared and implemented as part of the CEMP. The CNVBMP will generally follow the approach in the <i>Interim Construction Noise Guideline</i> (ICNG, DECC, 2009) and identify:</p> <ul style="list-style-type: none"> • All potential significant noise and vibration generating activities associated with the activity • Feasible and reasonable mitigation measures to be implemented, taking into account Beyond the Pavement: urban design policy, process and principles (Roads and Maritime, 2014) • A monitoring program to assess performance against relevant noise and vibration criteria • Arrangements for consultation with affected neighbours and sensitive receivers, including notification and complaint handling procedures • Contingency measures to be implemented in the event of non-compliance with noise and vibration criteria. 	Contractor	Detailed design/ pre-construction	<p>Core standard safeguard NV1</p> <p>Section 4.6 of QA G36 <i>Environment Protection</i></p>

Impact	Environmental safeguards	Responsibility	Timing	Standard/additional safeguard
Noise and vibration	<p>All sensitive receivers (eg schools, residents) likely to be affected will be notified at least seven-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"> • The project • The construction period and construction hours • Contact information for project management staff • Complaint and incident reporting • How to obtain further information. 	Contractor	Detailed design/ pre-construction	Core standard safeguard NV2
Operational noise impact	<p>Further assessment of the following possible noise mitigation strategies will be carried out to address the receivers identified to qualify for consideration of mitigation (strategies listed in the order of decreasing preference):</p> <ul style="list-style-type: none"> • Road design and traffic management • Quieter road pavement • Noise barriers • At-property treatments. 	Roads and Maritime	Detailed design	Additional safeguard NV3
Construction traffic noise	<p>When further information becomes available, a review of the potential road traffic noise impact on the existing road network from construction vehicles or changes to the road network during construction will be carried out.</p>	Roads and Maritime	Pre-construction	Additional safeguard NV4

6.4 Landscape character and visual impacts

This section describes the landscape character and visual impacts that are predicted to occur from building and operating the proposal. This section summarises the Landscape Character and Visual Impact Assessment prepared for the proposal by Clouston Associates that is included in Appendix C.

6.4.1 Methodology

The assessment was carried out in accordance with the *Guidelines for Landscape Character and Visual Impact Assessment* (Roads and Maritime, 2013) and urban design guideline *Beyond the Pavement* (Roads and Maritime, 2010). It involved a desktop analysis and site visit. The assessment focussed on the temporary visual amenity impacts during construction and the long-term visual impacts on selected viewpoints and the area's rural landscape character from the bypass' operation.

Landscape character impact considers a combination of an area's built, natural and cultural character as well as sense of place. It is measured by a combination of the area's sensitivity and the magnitude of change by using a matrix (refer to Appendix C).

Visual impact is based on specific viewpoints and considers the sensitivity of the viewer and the magnitude of the proposal. For this visual impact assessment, the magnitude of the change was assessed using four factors; size of view, distance of view, period of view and scale of change.

The sensitivity ratings used for the assessment are defined by factors including the:

- Existing land use
- Pattern and scale of landscape
- Visual openness of the landscape and distribution of viewers
- Value placed on the landscape.

Areas with high sensitivity tend to be those with substantial natural landscape features or heritage or cultural values.

The magnitude of effects is rated based on the:

- Existing built form in the landscape and how closely the development matches its bulk, scale and form
- Scale or degree of change to the landscape
- Nature of and duration of change.

6.4.2 Existing environment

Regional landscape context

The proposal sits within the rural, agricultural and pastoral landscape of central NSW. The landscape is characterised by open low-lying flat to gently undulating landform and shaped by a mixture of transitioning agricultural, recreational, rural residential, industrial and commercial land uses, which are, in parts, broken by areas of remnant woodland and native vegetation.

There are several distinct landmarks in the wider regional landscape that provide distinction and context to the area's history and current uses. They include the:

- Preserved linear north-south running TSR to the west of Parkes that provides a boundary to, and sets the limits of the town's western edge
- Industrial development along the town's western fringe, which is contained and distinct in character to anywhere else in the local landscape
- Parkes Golf Course to the south-west which is distinct for its different planting mixtures and managed landscape.

The area is also characterised by a network of minor and key roads that feed in to Parkes from the west, which serve to segment and isolate the landscape in to distinguishable areas. The final key features are the two main rail lines (Broken Hill and Parkes to Narromine) that run west to east across the study area. The rail corridor is supported by a range of ancillary rail infrastructure, which makes it clearly distinguishable in its landscape setting. This provides a clear reference to Parkes prominence as a key transport hub.

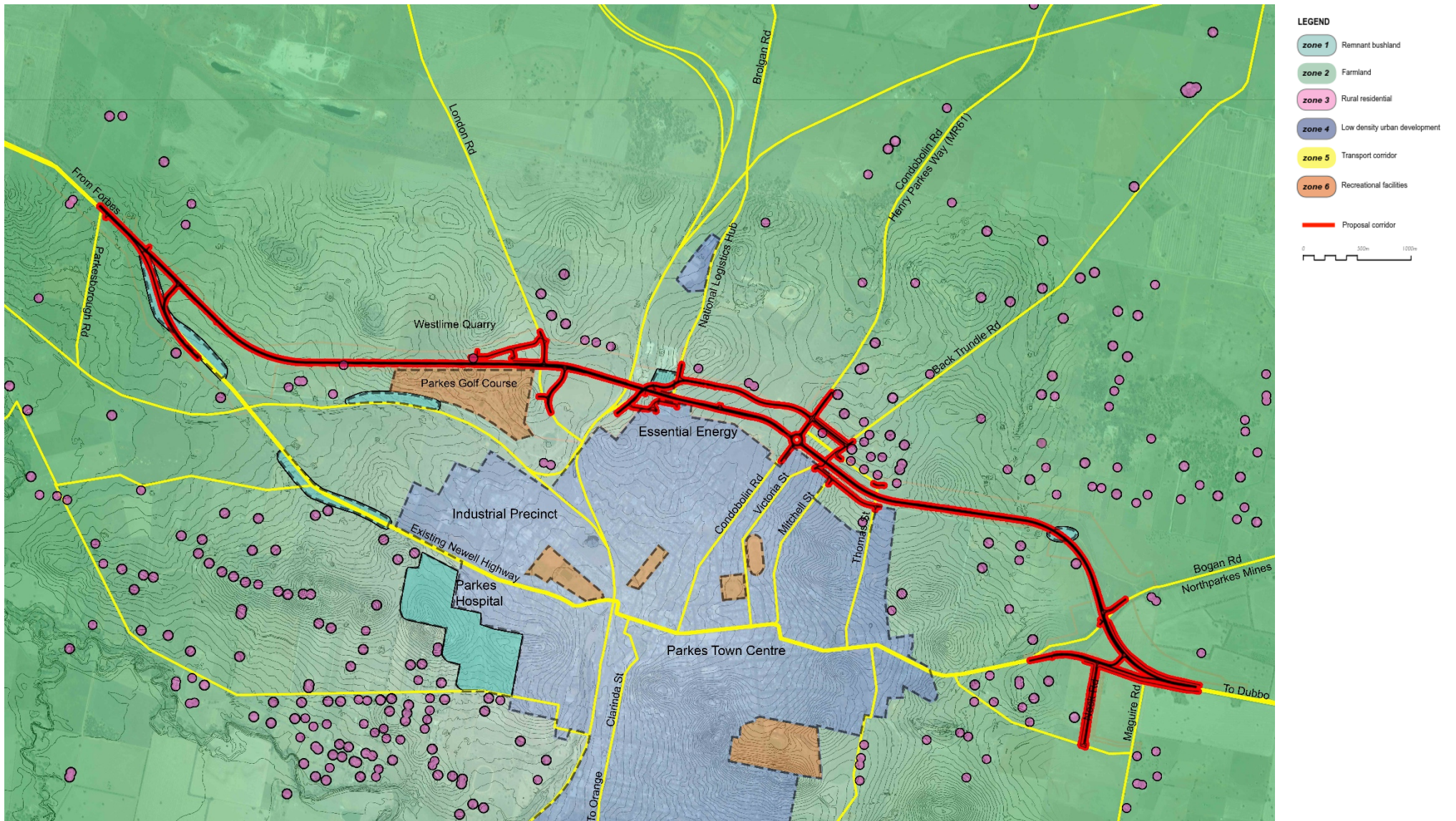
Landscape character zones

To characterise these differences, the landscape has been divided into six zones that have distinct and recognisable components and patterns. Table 6-25 describes each zone, its characteristics and sensitivity to change. Figure 6-19 shows the location of each landscape character zone (LCZ).

Table 6-25 Landscape character zones

Zone	Zone	Land use characteristics	Sensitivity to change
LCZ1	Remnant bushland: northern and southern limits of the proposal	<ul style="list-style-type: none"> Occurs as small, fragmented stands of native trees and grass at the northern and southern limits of the survey area Includes a patch of Western Grey Box woodland located in the southern section of the survey area and a small patch of White Box woodland located in northern section of the survey area. Both are classified as a TEC under State legislation Generally used for agriculture and contains no built forms. 	<p>High sensitivity:</p> <p>The area has a low ability to accommodate change and any vegetation removal may substantially affect the area.</p>
LCZ2	Farmland across most of the study area including the TSR	<ul style="list-style-type: none"> Large scale and mostly open in nature with a gently rolling landform Lot sizes typically increase farther from Parkes town centre Comprises a pattern of bounded fields with the pasture being uniform, smooth and regular Trees present in small stands or otherwise isolated. 	<p>Moderate sensitivity:</p> <p>Any new development as the potential to stand out within the zone however the large scale of the zone could absorb some change.</p>
LCZ3	Rural residential: isolated throughout the area	<ul style="list-style-type: none"> Dispersed across the study area comprising residential properties and farm buildings Properties typically isolated and located on large lots Certain properties (in the north west of the study area) hold a prominent elevated position. As such, they are both clearly visible in the landscape but they also have far reaching views over the landscape Vegetation often planted as windbreaks surrounding properties. 	<p>High sensitivity:</p> <p>The isolated large plots and lack of surrounding development define the zone's values. Any new development may alter the characteristics of the zone.</p>

Zone	Zone	Land use characteristics	Sensitivity to change
LCZ4	Low-density urban development: along the eastern fringe of the study area forming the western limit of Parkes	<ul style="list-style-type: none"> • Low-density single-storey residential properties, commercial premises, and light industrial development • Often surrounded by amenity planting • Characteristic and typical of fringe town development offering reference to the urban character of Parkes • Provide a clear barrier to the urban limit of Parkes. 	<p>Moderate sensitivity:</p> <p>The zone is generally set within an urban context, and has limited long distance views. It can accommodate some change without impacting its character.</p>
LCZ5	Transport corridor: comprising the Newell Highway and the Parkes to Narromine and Broken Hill rail lines	<ul style="list-style-type: none"> • Characteristics and typical of major linear transport infrastructure • Provides reference and division in the landscape, while also breaking up the existing components • Limited value other than allowing people travelling through the area to value the landscape. The zone detracts from the rural character of the wider area (LCZ2) and its enjoyment and use for the people living in it. 	<p>Low sensitivity:</p> <p>The proposal would be of a similar nature to the existing infrastructure in this zone.</p>
LCZ6	Recreational: Parkes Golf Course	<ul style="list-style-type: none"> • The only recreational facility in the survey area • Characteristic of a highly managed landscape of manicured fairways and greens, interspersed with non-native vegetation of mixed types, heights and densities. 	<p>Moderate sensitivity:</p> <p>Recreational facilities provide valuable amenity for Parkes.</p>



Source: Clouston Associates

Figure 6-19 Landscape character zones

Viewpoints and receivers

The proposal would see the introduction of a major new component into the landscape that would be in contrast the natural landform. The Parkes Bypass would cross the fields that make up the transition area between rural farmland and the residential/commercial area of Parkes.

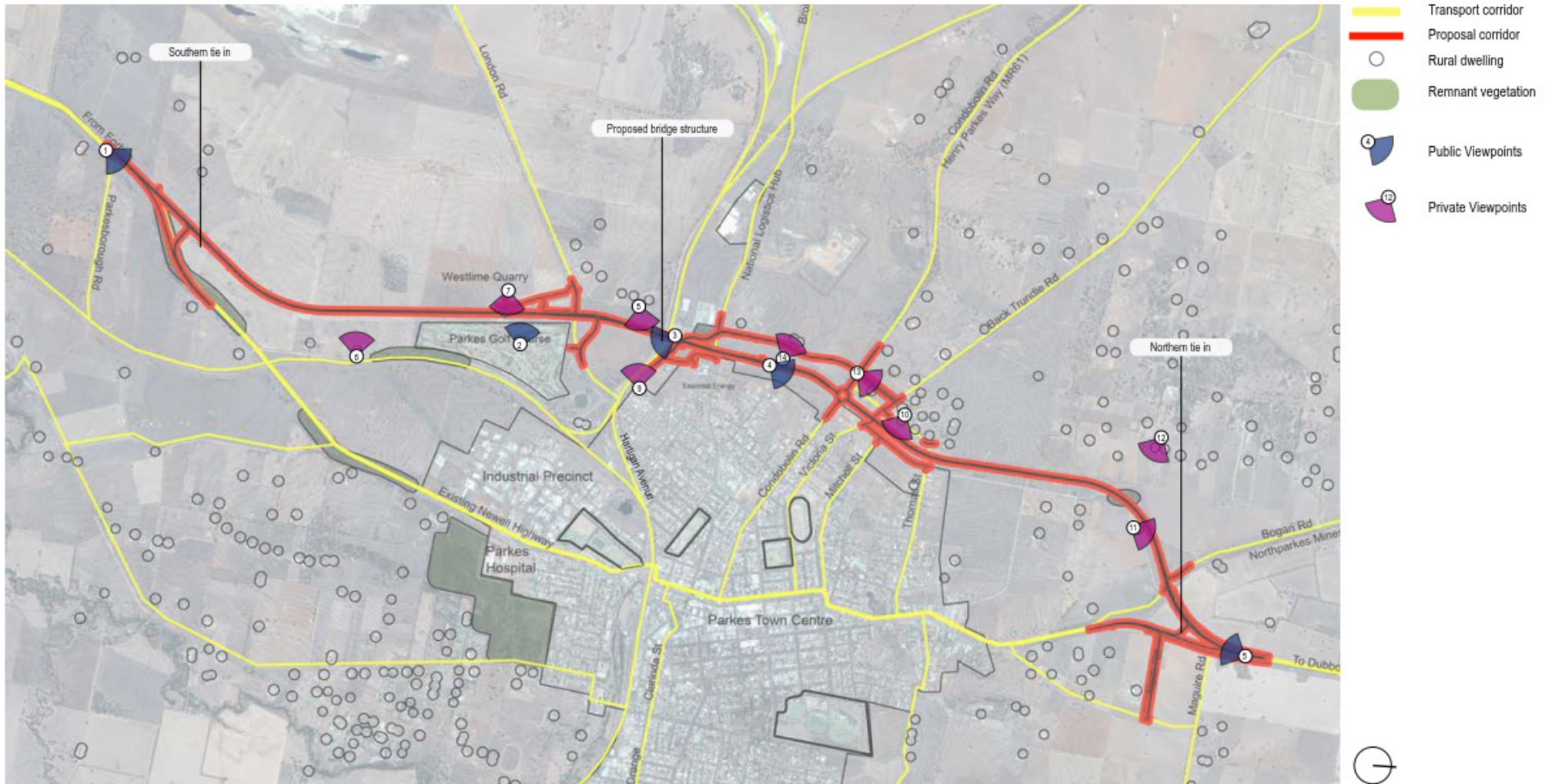
It would be visible over a wide area and would have potential to impact the following receivers:

- Residents and workers on the western fringe of Parkes
- Rural residents and farmsteads to the west of Parkes
- Motorists and other road users on the Newell Highway and the other roads that cross the proposal footprint to the west refer to section 2.2.1)
- Users of the Parkes Golf Course.

Fourteen (14) viewpoints were selected from both private and public viewpoints to represent the above receivers. These viewpoints are shown on Figure 6-20 and described in Table 6-26.

Table 6-26 Visual receivers (viewpoints)

Viewpoint and location		Receiver representation and sensitivity
Public land		
VP1	Newell Highway south of Parkes, looking north	Motorists and other road users: low
VP2	Parkes Golf Course	Golfers: moderate
VP3	Hartigan Avenue, looking south	Motorists and other road users: low
VP4	Westlime Road, looking north	Motorists and other road users: low
VP5	Newell Highway north of Parkes, looking south	Motorists and other road users: low
Private land		
VP6	Properties off Hideaway Lane	Two residential properties: moderate
VP7	Properties off London Road	Various residential properties: high
VP8	Properties off Ballerdee Lane	Three residential properties: high
VP9	Properties off Rosewood Avenue	Various residential properties: high
VP10	Properties off Moulden Street	About 11 residential properties: moderate
VP11	Properties off Bogan Road	Various residential properties: high
VP12	Properties off Heraghty Road	About nine residential properties: high
VP13	Properties off Henry Parkes Drive/Condobolin Road	Two residential properties: high
VP14	Property off Westlime Road	One residential dwelling: moderate



Source: Clouston Associates

Figure 6-20 Viewpoints

6.4.3 Potential impacts

Construction

Certain landscape character and visual impacts would first occur during construction because of:

- Vegetation clearance, earthworks and ground disturbance
- Introduction of equipment, work platforms, cranes and construction pads along the road corridor.

This work would have the greatest impact on the values associated with the farmland (LCZ2) and rural residential areas (LCZ3) where the effects would be:

- Loss of the composition of the landscape character and its setting
- Fragmentation and isolation of key natural landscape features
- Temporary introduction of machinery and equipment into the landscape, affecting overall amenity and setting.

The proposal's construction would temporarily affect the visual amenity of most the receivers in Table 6-26. This would be most notable for those residents overlooking the construction works (VP9, VP10, VP11, VP13 and VP14) who may be affected for up to three years. The magnitude of impact would depend on the stage of construction and proximity of the work. It is expected that the greatest amenity impacts would take place during the major earthworks phases. Once this has taken place, the impacted areas would be reinstated and landscaped; the impact and benefit of which is described below.

Operation

Landscape character assessment

Table 6-27 summarises the landscape character impact assessment, with more detail provided in Appendix C.

Table 6-27 Landscape character assessment

Zone	Description of changes to LCZ	Sensitivity	Magnitude	Impact
LCZ1 remnant bushland	The proposal would involve clearance of a small area of the remnant native vegetation. While the magnitude of this change is rated moderate, there is limited remaining remnant bushland and as such this area has a high sensitivity to change.	High	Low	Moderate
LCZ2 farmland	The Parkes Bypass may slightly alter the area's rural character, by increasing the scale and bulk of built (transport) infrastructure in the area and splitting some parts of the area.	Moderate	Moderate	Moderate
LCZ3 rural residential	The proposal would increase the extent of the built environment to the west of Parkes. This would affect the rural character of the area. As such, it would affect the rural outlook from the properties within this zone.	High	Moderate	Moderate-high

Zone	Description of changes to LCZ	Sensitivity	Magnitude	Impact
LCZ4 low density urban development	As with LCZ3 the proposal would affect the rural outlook for people living on the fringe of Parkes. However, by reducing traffic volumes through the centre of Parkes, it would improve the overall character and amenity of the town centre, which is defined by this zone.	Moderate	Low	Moderate-low
LCZ5 transport corridor	The proposal would increase the scale of transport infrastructure in the area. However, it would not impact on the character of the existing transport corridors other than at the tie-in and intersection points. The amenity of the existing roads through Parkes would improve by diverting traffic on to the bypass.	Low	Negligible	Negligible
LCZ6 recreational	The Parkes Bypass would run parallel to the golf course's western boundary. This would affect its current rural setting, through the introduction of road infrastructure, traffic and associated noise. The impacts would be somewhat managed by using landscape treatments.	Moderate	Low	Moderate-low

Overall, the proposal would have the greatest impact on the rural residential landscape (LCZ3) as the proposal would introduce a new piece of infrastructure into the landscape for several properties within this landscape.

Areas of farmland (LCZ2) have a greater ability to absorb change due to the zone's large scale and the presence of existing transport infrastructure, reducing the magnitude of change associated with the proposal. Although the Parkes Bypass may split some fields, the overall integrity of this landscape zone is not expected to be significantly affected.

The proposal would involve clearance of a small area of the remnant native vegetation. While the magnitude of this change is rated low, this zone (LCZ1) has high sensitivity to change as there is limited remaining remnant bushland and so the overall impact is rated moderate.

The proposal would have a moderate to low impact to the western boundary of the Parkes Golf Course (the recreational landscape, LCZ6) as it would impact the rural characteristic of this side of the course. Screen planting in this location would assist in reducing these impacts.

Beneficial impacts may be experienced within the transport corridors (LCZ5) and low density urban development zones (LCZ4). The reduction in traffic, particularly heavy vehicles from these areas has the potential to improve the character of the town and provide a more pleasant environment for pedestrians and motorists.

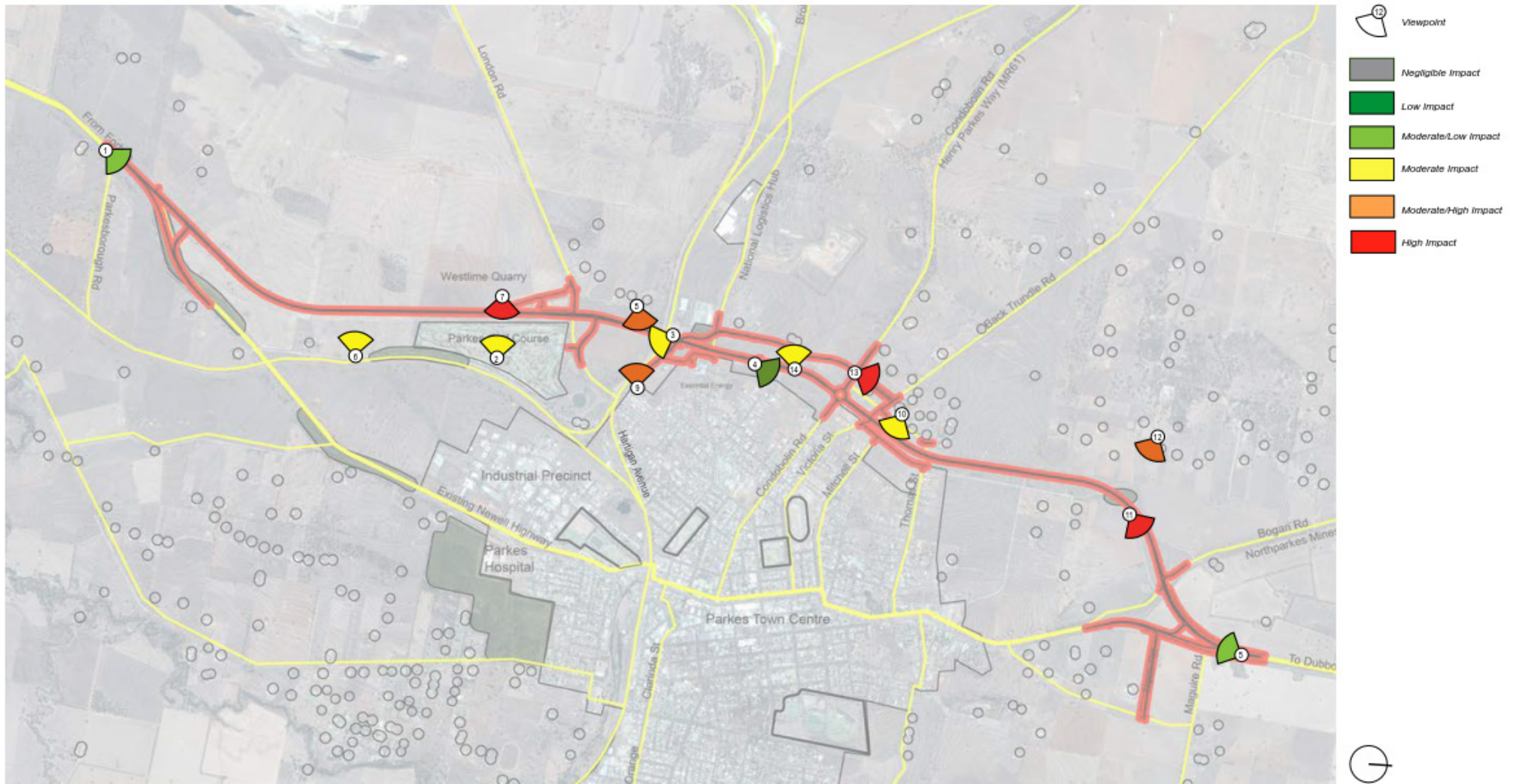
Visual impact assessment

Table 6-27 summarises the assessed sensitivities, magnitude of impact and overall visual impact at each viewpoint. Figure 6-21 summarises the proposal's predicted visual impact at each viewpoint without any mitigation measures. More detail of the assessment is provided in Appendix C.

Table 6-28 Visual impact ratings

ID	Viewpoint location	Type of receiver	Sensitivity	Magnitude	Impact rating
Public viewpoints					
1	Newell Highway south of Parkes, looking north	Road users	L	M	Moderate/low
2	Parkes Golf Course	Golfers	M	M	Moderate
3	Hartigan Avenue, looking south	Road users	L	H	Moderate
4	Westlime Road, looking north	Road users	L	L	Low
5	Newell Highway north of Parkes, looking south	Road users	L	M	Moderate/low
Private viewpoints					
6	Properties off Hideaway Lane	Residents	M	M	Moderate
7	Properties off London Road	Residents	H	H	High
8	Properties off Ballerdee Lane	Residents	H	M	Moderate/high
9	Properties off Rosewood Avenue	Residents	H	M	Moderate/high
10	Properties off Moulden Street	Residents	M	M	Moderate
11	Properties off Bogan Road	Residents	H	H	High
12	Properties off Heraghty Road	Residents	H	M	Moderate/high
13	Properties off Condobolin Road / Henry Parkes Way	Residents	H	H	High
14	Property off Westlime Road	Resident	M	M	Moderate

H: high, M: moderate, L: low



Source: Clouston Associates

Figure 6-21 Visual impact summary

Three viewpoints (VP7, VP11 and VP13) were assessed to experience a High impact rating. These are private viewpoints.

VP 7 is a dwelling located on the western side of the Parkes Bypass with views over open fields to the Parkes Golf Course (as shown in Figure 6-22). The proposal would be located close to this dwelling and this receiver would have direct views of the new road, batters and the traffic and signage on the bypass. A high visual impact would be expected due to the proximity of the Parkes Bypass and the high magnitude of change to the visual scene.



Figure 6-22 Location of VP7

VP11 is an isolated dwelling located close to the proposal and would have view of the Parkes Bypass to the north and north-west (as shown in Figure 6-23). Existing garden planting to the west would partially obscure westward views and some northern views, however high visual impact would be expected due to the proximity of the Parkes Bypass and the high magnitude of change to the visual scene.



Figure 6-23 Location of VP11

VP13 includes two dwellings situated on large blocks close to the proposal which overlook agricultural lands and the travelling stock route. The northern property is likely to have views of the Parkes Bypass which faces south west/north east (as shown in Figure 6-24), whilst the southern property would have limited views of the Parkes Bypass due to high back fences and local topography screening the road to the north.



Figure 6-24 Location of VP13

Moderate to high impacts would be experienced at three viewpoints:

- The residents off Ballerdee Lane and Rosewood Avenue (VP8 and VP9) would have their rural views affected by the introduction of the Parkes Bypass and rail over road bridge
- Residents off Heraghty Road (VP12) have elevated views over the rural landscape which would be impacted by the introduction of the road.

Moderate impacts would be experienced at five viewpoints:

- Receivers on sections of Hartigan Avenue close to the bridge over the rail line (VP3) would experience moderate impacts. This is due to the introduction of a large structure at height in this location. This would also limit and reduce the value of some of the existing long-distance open views in the area
- Receivers at the western boundary of the Parkes Golf Course (VP2) as the proposal would be partially visible through the existing boundary tree planting
- The Parkes Bypass would be located at the rear of properties at Hideaway Lane (VP6) and be visible through existing vegetation
- The Parkes Bypass would be located close to properties at Moulden Street (VP10) however, it would be partially located in a cutting which would obscure the road from line of sight and reduce the visual impact. At the north of these properties, the Parkes Bypass would rise to ground level; however, it is likely that only vehicles, not the road surface, would be visible
- The Parkes Bypass would be located close to a property at Westlime Road however, it would be partially screened by vegetation along the property boundary.

Moderate to low impacts would be experienced at two viewpoints:

- The Parkes Bypass would be highly visible at the two tie-ins with the existing Newell Highway (VP1 and VP5) as some vegetation removal would be needed at these locations. However, motorists and road users would have low sensitivity and only experience a short view of the proposal that is consistent with other road infrastructure.

A low visual impact would be experienced by receivers looking north from Westlime Road (VP4). Motorists and road users would have low sensitivity and only experience a short view of the proposal that is consistent with other road infrastructure.

Overall, the visual impacts of the proposal are limited to a small area due to the relatively low density of residential and commercial receivers close to the proposal. Visual impacts would be greatest where the Parkes Bypass is closest to residential dwellings. Beyond a viewing distance of about one-kilometre, visual impacts are negligible due to the screening effect of local topography, vegetation and the size of the proposal.

Mitigation measures at receiver viewpoints

The application of these urban design and landscape treatments would assist in minimising the proposal’s visual impact to identified receivers and landscape. Table 6-29 outlines the mitigation measures proposed at each viewpoint.

Table 6-29 Proposed mitigation measures at viewpoints

ID	Viewpoint location	Impact rating	Proposed mitigation measures
1	Newell Highway south of Parkes, looking north	Moderate/low	<ul style="list-style-type: none"> • Planting of roadside trees along the bypass • Revegetating of disturbed areas.
2	Parkes Golf Course	Moderate	<ul style="list-style-type: none"> • Planting of scattered trees along the Parkes Bypass to provide a woodland character.
3	Hartigan Avenue, looking south	Moderate	<ul style="list-style-type: none"> • Flattening out the side batters for integration into the landscape • Planting trees on the side batters to reduce long-term impacts • Planting trees in the verges of the realigned road corridors to provide screening vegetation between residences, the logistics hub and the bridge and its elevated fill.
4	Westlime Road, looking north	Low	<ul style="list-style-type: none"> • Planting of new groups of trees on both sides of Westlime Road to maintain the character of the existing trees in the area.
5	Newell Highway north of Parkes, looking south	Moderate/low	<ul style="list-style-type: none"> • Planting of roadside trees along the bypass.
6	Properties off Hideaway Lane	Moderate	<ul style="list-style-type: none"> • Planting of roadside trees along the bypass.
7	Properties off London Road	High	<ul style="list-style-type: none"> • Direct screening of the Parkes Bypass with dense vegetation along the western side of the bypass.
8	Properties off Ballerdee Lane	Moderate/high	<ul style="list-style-type: none"> • Planting of new groups of trees in front of the Parkes Bypass and rail over road bridge to screen the bypass • Design of the embankments to transition into the landscape.

ID	Viewpoint location	Impact rating	Proposed mitigation measures
9	Properties off Rosewood Avenue	Moderate/high	<ul style="list-style-type: none"> Planting of new groups of trees in front of the Parkes Bypass and rail over road bridge to screen the bypass Design of the embankments to transition into the landscape.
10	Properties off Moulden Street	Moderate	<ul style="list-style-type: none"> Planting of low shrubs along the bypass Addition of gentle earth mounding where possible to screen the road from the travelling stock route.
11	Properties off Bogan Road	High	<ul style="list-style-type: none"> Consideration of construction of an elevated gentle fill berm on the southern edge of the Parkes Bypass to screen the Parkes Bypass and any headlights at night. Detailed design should investigate the possibility of raising this berm Screening of the Parkes Bypass with trees, tall shrubs and shrubs.
12	Properties off Heraghty Road	Moderate/high	<ul style="list-style-type: none"> Planting of clustered tree and shrub groups in the western road batters.
13	Properties off Condobolin Road / Henry Parkes Way	High	<ul style="list-style-type: none"> Screening of the Parkes Bypass with a new screen fence along the road verges for a limited distance.
14	Property off Westlime Road	Moderate	<ul style="list-style-type: none"> Planting of clustered tree and shrub groups.

Table 6-30 outlines the residual visual impact following the application of the above treatments and the mitigation measures.

Table 6-30 Residual visual impact following mitigation

ID	Viewpoint location	Type of receiver	Sensitivity	Magnitude	Impact rating
Public viewpoints					
1	Newell Highway south of Parkes, looking north	Road users	L	M	Low
2	Parkes Golf Course	Golfers	M	M	Moderate/low
3	Hartigan Avenue, looking south	Road users	L	H	Moderate/low
4	Westlime Road, looking north	Road users	L	L	Low
5	Newell Highway north of Parkes, looking south	Road users	L	M	Low
Private viewpoints					
6	Properties off Hideaway Lane	Residents	M	M	Moderate/low
7	Properties off London Road	Residents	H	H	Moderate/high
8	Properties off Ballerdee Lane	Residents	H	M	Moderate
9	Properties off Rosewood Avenue	Residents	H	M	Moderate
10	Properties off Moulden Street	Residents	M	M	Moderate/low
11	Properties off Bogan Road	Residents	H	H	Moderate/high
12	Properties off Heraghty Road	Residents	H	M	Moderate
13	Properties off Condobolin Road / Henry Parkes Way	Residents	H	M	Moderate/high
14	Property off Westlime Road	Resident	M	L	Moderate/low

H: high, M: moderate, L: low

6.4.4 Safeguards and management measures

Landscape treatments

Section 2.3.3 and chapter 7 of Appendix C describes urban design and landscape principles and treatments that are proposed to improve physical design of the proposal. Table 6-31 describes some of the urban design and landscape treatments that would be applied to the proposal.

Table 6-31 Urban design and landscape treatments

Area	Urban design and landscape treatment
Newell Highway tie-ins	<ul style="list-style-type: none"> • Creation of a distinct landscape to signal the entry to Parkes • Distinct colourful landscape planting (mainly trees) to create a marker along the highway • Use of gateway signage to attract people into Parkes town centre.
Bridge design	<ul style="list-style-type: none"> • Simple bridge design proportioned to integrate the bridge into the landscape • Use of materials that form part of the existing built environment • Integration of design with other elements of the road design including noise and traffic barriers and signage • Consideration of decorative treatments for concrete panels of the bridge to reduce their mass and scale • Lining the rail bridge batter with planted eucalypt trees to break up the mass and scale of the structure in its setting • Use of gentle batters to improve the bridge's setting.
Henry Parkes Way	<ul style="list-style-type: none"> • A distinct and identifiable roundabout with well-spaced palms to retain views (Henry Parkes Way) and overbridge (Victoria Street) • Use of gateway signage to attract people in to Parkes town centre.
TSR	<ul style="list-style-type: none"> • Retention and reinforcing of the linear and corridor nature of the stock route as a driving experience • Use of linear road side planting, while seeking opportunities for habitat restoration (refer to section 6.5.3).
Embankments	<ul style="list-style-type: none"> • Embankments shaped to respond to the natural topography including the use of shallow gradients to support landscape planting and reduce slope erosion • Top and toe of each embankment and batter would be gently rounded to improve their setting in the landscape.
Planting strategy	<ul style="list-style-type: none"> • Section 7.11 of Appendix C illustrates the proposed planting palette for the bypass. The palette has been chosen to respond to the landscape planting strategy objectives (refer to section 3.2).

Safeguards and management measures

Table 6-32 describes the proposed safeguards that would be introduced to manage the predicted impacts described above. Appendix C contains further details on the specifics of the safeguards and management measures.

Table 6-32 Landscape character and visual impact safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Standard/additional safeguard
Landscape character and visual impact	<p>An Urban Design Plan (UDP) will be prepared to support the final detailed project design and implemented as part of the CEMP.</p> <p>The UDP will present an integrated urban design for the project, providing practical detail on the application of design principles and objectives identified in the environmental assessment. The Plan will include design treatments for:</p> <ul style="list-style-type: none"> • Location and identification of existing vegetation and proposed landscaped areas, including species to be used • Built elements including retaining walls, bridges and noise walls • Pedestrian and cyclist elements including footpath location, paving types and pedestrian crossings • Fixtures such as seating, lighting, fencing and signs • Details of the staging of landscape works taking account of related environmental controls such as erosion and sedimentation controls and drainage • Procedures for monitoring and maintaining landscaped or rehabilitated areas. <p>The Urban Design Plan will be prepared in accordance with relevant guidelines, including:</p> <ul style="list-style-type: none"> • Beyond the Pavement urban design policy, process and principles (Roads and Maritime, 2014) • Landscape Guideline (RTA, 2008) • Bridge Aesthetics (Roads and Maritime 2012) • Noise Wall Design Guidelines (RTA, 2006) • Shotcrete Design Guideline (RTA, 2005). 	Contractor	Detailed design/ pre-construction	Core standard safeguard UD1

Impact	Environmental safeguards	Responsibility	Timing	Standard/additional safeguard
Operational light spill impacts	The lighting design specification will be developed to ensure the height and direction of any relocated lighting poles will not be next to any residential properties where feasible and reasonable. If there is any identified conflict, it will be considered if the lighting pole can be relocated. If the pole location cannot be relocated the aim will be to minimise light spill and light glare in accordance with the provisions of AS4282-1997 Control of the Obtrusive Effect of Outdoor Lighting (Standards Australia, 1997). This may require the use of directional lighting, cut-offs or filters.	Roads and Maritime	Detailed design	Additional safeguard: UD2
Landscape character and visual impact	The landscape plans will incorporate the design principles outlined in the landscape character and visual impact assessment and urban design technical study report.	Roads and Maritime	Detailed design	Additional safeguard: UD3
Planting and vegetation	<ul style="list-style-type: none"> Choose vegetation on embankments either side of the Parkes Bypass based on its ability to screen the built form and reduce the scale of the infrastructure. A selection of appropriate grasses, low groundcovers and groups of native trees should be utilised Maintain long vistas to distant hills where possible, ensuring that landscape planting does not block views Plant trees either side of the bridge structure to screen built form and reduce the scale of the infrastructure Reinforce the local semi-rural landscape character using appropriate vegetation Ensure planting conforms to sight lines and clear zone requirements Restore disturbed areas to match existing conditions Use slope stabilisation matting such as a textile mat to assist planting. 	Roads and Maritime, Contractor	Detailed design/ construction	Additional safeguard: UD4
Signage	<ul style="list-style-type: none"> Provide clear wayfinding signage for visitors wishing to travel into Parkes Consider entry or gateway treatments to the northern and southern entrances to Parkes. 	Roads and Maritime	Detailed design	Additional safeguard: UD5

Impact	Environmental safeguards	Responsibility	Timing	Standard/additional safeguard
Construction visual impacts	<ul style="list-style-type: none"> • Locate storage areas and associated works in cleared or otherwise disturbed areas away from vegetation • Avoid stockpiling materials in areas supporting vegetation where possible • Restrict vegetation clearing to those areas where it is necessary • Opportunities to minimise clearing should be part of the detailed design, further to any being considered currently • Trimming rather than the removal of trees to be undertaken where possible and to be conducted by a qualified arborist • Rehabilitate vegetated areas where ground is disturbed. 	Contractor	Construction	Additional safeguard: UD6
Construction visual impacts	Hoarding will be erected around the construction compound where possible, to reduce visibility.	Contractor	Construction	Additional safeguard: UD7
Construction visual impacts	The construction area will be kept clean and clear of rubbish.	Contractor	Construction	Additional safeguard: UD8
Operational visual and amenity impacts	Where feasible and reasonable, an integrated response to the design will be adopted that provides noise treatment in combination with visual mitigation.	Roads and Maritime	Detailed design	Additional safeguard: UD9
Tree management and removal	Any tree removal or pruning will be undertaken by a qualified specialist and in accordance with AS4970: 2009: Protection of Trees on Development Sites (Standards Australia, 2009) and AS4373:2007: Pruning of Amenity Trees and WorkCover Amenity Tree Industry Code of Practice 1998.	Contractor	Pre-construction construction	Additional safeguard: UD10

6.5 Biodiversity

This section describes the biodiversity impacts that are predicted to occur from building and operating the proposal. This section was informed by a Biodiversity assessment report that was prepared for the proposal by WSP and is included in Appendix G.

6.5.1 Methodology

A desktop search was carried out in November 2016 to identify threatened flora and fauna species, populations and ecological communities, Commonwealth listed migratory species or areas of outstanding biodiversity value previously recorded or predicted to occur within or near the survey area. These results helped to plan the field survey and identify the ecological groups likely to occur. The databases searches included:

- Using a 50-kilometre buffer search area centred on the proposal footprint:
 - BioNet Atlas of NSW Wildlife (OEH, 2017a)
 - EPBC Protected Matters Search Tool (Department of the Environment and Energy, 2017)
 - TSC Act Critical habitat register (now replaced by Areas of Outstanding Biodiversity (AOBVs) under the BC Act (OEH, 2017b)
 - FM Act Register of critical habitat (NSW Department of Primary Industries, NSW DPI, 2017)
 - EPBC Act Register of Critical Habitat for Sites
- Using a five-kilometre buffer search area centred on the proposal footprint:
 - Atlas of Groundwater Dependent Ecosystems (Australian Bureau of Meteorology, 2017)
 - Directory of Important Wetlands (Department of Environment and Energy, DEE, 2017)
 - Coastal Wetlands SEPP 14 spatial data (NSW Planning and Environment, 2006)
- Listed Threatened Species, Populations and Ecological Communities for the Lachlan Catchment (NSW DPI, 2017)
- OEH Vegetation Information System (VIS) and the Vegetation Types Database for Plant Community Types (PCTs) in the Bioregion (OEH, 2017).

A habitat assessment was carried out using information from the background research to determine the likelihood of occurrence of each threatened species, population and community (threatened biodiversity) that had the potential to occur in the survey area. The habitat assessment helped to identify the appropriate targeted surveys that were subsequently carried out.

The field survey was carried out between 8-10 November 2016 to ground-truth the results of the background research and habitat assessment. This involved:

- Vegetation composition and condition surveys to identify and classify native vegetation into PCTs, and map areas of non-native vegetation
- Observational fauna surveys including:
 - Nocturnal surveys using spotlighting, call playback, ultrasonic bat surveys, and amphibian surveys
 - Daytime bird surveys.

6.5.2 Existing environment

Plant community types

Table 6-33 outlines the PCTs that were recorded during the field survey within the survey. About six per cent of the survey area and two per cent of the proposal footprint area was recorded as native vegetation. The four miscellaneous communities had a low condition class while the condition class for the other communities was moderate-to-good. Section 3.3 in Appendix G provides more detail on each of the PCTs recorded within the study area.

Two of the vegetation communities, Western Grey Box (PCT 80/BVT LA153) and White Box (PCT 267/BVT LA218) were aligned with threatened ecological communities (TECs) listed under the BC Act and EPBC Act. Section 3.6 in Appendix G outlines a comparison between the PCT and the criteria used to meet the BC Act TEC status. Section 3.12 in Appendix G provides an overview for the condition threshold assessment for of each EPBC Act listed community recorded in the area. Table 6-33 describes if the PCTs met the definition of a TEC for classification under State and Commonwealth legislation.

Table 6-33 Plant community types within survey area

Name of community	Vegetation formation	Vegetation class	Location in survey area	BC Act status	EPBC Act status	Area (ha) in survey area	Area (ha) in proposal footprint
PCT80/ BVT LA153 Western Grey Box - White Cypress Pine tall woodland on loam soil on alluvial plains of NSW South Western Slopes Bioregion and Riverina Bioregion.	Grassy Woodlands	Floodplain Transition Woodlands	Southern portion of the survey area associated with the TSR and next to Ballerdee Lane south of the Broken Hill rail line.	Endangered: Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions.	Endangered: Grey Box (<i>Eucalyptus microcarpa</i>) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia.	18.85	0.84
PCT 267/ BVT LA218 White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion.	Grassy Woodlands	Western Slopes Grassy Woodlands	In patchy locations in the northern section of the survey area and was surrounded by Pasture Grasslands.	Endangered: White Box Yellow Box Blakely's Red Gum Woodland	Critically Endangered: White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	0.43	0.10
PCT 70/ BVT LA223 White Cypress Pine woodland on sandy loams in central NSW wheatbelt.	Grassy Woodlands	Floodplain Transition Woodlands	Associated with areas along the TSR in the central and southern sections of the survey area.	Not listed	Not listed	2.84	0.45
PCT 176/ BVT LA148 Green Mallee - White Cypress Pine very tall mallee woodland on gravel rises mainly in the Cobar Peneplain Bioregion.	Semi-arid Woodlands (Shrubby sub-formation)	Inland Rocky Hill Woodlands	Found in one occurrence in the most southern portion of the survey area fringing the Newell Highway.	Not listed	Not listed	1.17	0.00

Name of community	Vegetation formation	Vegetation class	Location in survey area	BC Act status	EPBC Act status	Area (ha) in survey area	Area (ha) in proposal footprint
Pasture Grasslands	Miscellaneous Ecosystem	Highly disturbed areas with no or limited native vegetation	Across most the TSR in the northern and central portion of the survey area.	Not listed	Not listed	208.06	36.17
Landscape Plantings	Miscellaneous Ecosystem	Highly disturbed areas with no or limited native vegetation	Various locations within the survey are often fringing roads.	Not listed	Not listed	16.33	1.94
Cropping	Miscellaneous Ecosystem	Highly disturbed areas with no or limited native vegetation	In the southern portion of the survey area associated with rural land holdings.	Not listed	Not listed	151.06	21.71
Farm Dams	Miscellaneous Ecosystem	Water bodies, rivers, lakes, streams (not wetlands)	Associated with agricultural land use and within Pasture Grassland, Cropping and Landscape Plantings.	Not listed	Not listed	1.53	0.22

Threatened flora species

No threatened flora species were recorded within the survey area during the field surveys. However, based on the habitat characteristics of the survey area, one threatened plant species *Austrostipa wakoolica* (a spear-grass) is considered to have a moderate likelihood of occurring within the survey area. This species is listed as endangered under both the BC Act and the EPBC Act.

Threatened fauna species

One threatened species of bird was recorded within the survey area during the field survey, the grey-crowned babbler (*Pomatostomus temporalis*). This species was recorded in the Grey Box woodland and understorey shrubby habitat in southern part of study area along the Newell Highway road reserve. It is listed as vulnerable under the BC Act.

Based on the habitat characteristics of the survey area, a further 17 threatened fauna species are - considered to have a moderate-to-high likelihood of occurring within the survey area. Table 6-34 lists these species.

Table 6-34 Threatened fauna species with a moderate to high likelihood of occurring within the survey area

Common name	BC Act status ¹	EPBC Act status ²	Potential occurrence
Birds³			
Regent honeyeater	CE	CE	Moderate. May occur within survey area in blossoming eucalypts during seasonal movements.
Swift parrot	E	E	
Dusky woodswallow	V	Not listed	Moderate. Potential foraging habitat in survey area in associated with remnant vegetation and roadside remnants.
Black-chinned honeyeater (eastern subspecies)	V	Not listed	
Brown treecreeper (eastern subspecies)	V	Not listed	
Varied sittella	V	Not listed	
Little lorikeet	V	Not listed	
Flame robin	V	Not listed	
Superb parrot	V	V	
Diamond firetail	V	Not listed	
Spotted harrier	V	Not listed	
Black falcon	V	Not listed	
Little eagle	V	Not listed	Moderate. Potential foraging habitat within survey area.
Barking owl	V	Not listed	

Common name	BC Act status ¹	EPBC Act status ²	Potential occurrence
Mammals			
Little pied bat	V	Not listed	Moderate. Potential foraging and roosting habitat within remnant vegetation.
South-eastern long-eared bat (Corben's long-eared bat and greater long-eared Bat)	V	V	
Yellow-bellied sheath-tail-bat	V	Not listed	

(1) Vulnerable (V), Endangered (E), Critically Endangered (CE) as listed on the BC Act

(2) Vulnerable (V), Endangered (E), Critically Endangered (CE), Migratory (M) as listed on the EPBC Act

(3) EPBC Migratory species that are not listed as Threatened have not been included in the table.

Migratory species listed under the EPBC Act

No migratory species listed under the EPBC Act have been recorded in the survey area during field surveys. A total of five migratory species listed under the EPBC Act were identified with a moderate likelihood of occurring within the survey area:

- Fork-tailed swift
- Cattle egret
- White-throated needletail
- Rainbow bee-eater
- Glossy ibis.

These species have the potential to use a wide variety of habitats, including disturbed and modified areas. The habitat within the survey area is unlikely to be important for any of the listed species as better-quality habitat exists nearby (eg Goobang National Park located about 20 kilometres north-east).

Noxious weeds

A total of 39 weed species were recorded within the survey area. Three of these, *Hypericum perforatum* (St. John's wort), *Lycium ferocissimum* (African boxthorn) and *Solanum elaeagnifolium* (Silver-leaf nightshade), are declared as noxious weeds within Parkes LGA under the *Noxious Weeds Act 1993*. *Lycium ferocissimum* (African boxthorn) and *Solanum elaeagnifolium* (Silver-leaf nightshade) are also listed as weeds of national significance (WoNS). All three species are classified as 'Class 4 regionally controlled weeds within the LGA. This means that their growth must be managed in a manner that continuously stops the ability of the weed to spread.

Aquatic habitat

Minor aquatic habitat exists within the proposal footprint in the form of ephemeral drainage lines and agricultural farm dams. Several common aquatic species were identified during the field survey, which included the smooth toadlet and Peron's tree frog. While most of the aquatic habitat was artificial and fragmented, it can still provide habitat for a range of fauna including birds, amphibians and reptiles that are mobile and adapted to using fragmented habitat.

Groundwater dependent ecosystems

Groundwater dependent ecosystems (GDEs) are communities of plants, animals and other organisms whose extent and life processes are dependent on groundwater. No GDEs were identified within or near the proposal footprint from the field surveys or background research.

Other

There are no listed world or national heritage places or wetlands of international importance within 20 kilometres of the survey area. There are also no areas of outstanding biodiversity value, wildlife corridors or potential koala habitat within or surrounding the survey area.

6.5.3 Potential impacts

Chapter 4 of Appendix G details the potential impacts of the proposal on biodiversity and outlines which specific threatened species most likely to be affected by each impact. The main impacts expected for the proposal are summarised below.

Construction

Table 6-35 outlines the main impacts likely to be associated with the construction of the proposal on biodiversity.

Table 6-35 Main construction impacts on biodiversity

Description of impact	Types of native and/or threatened flora and fauna likely to be affected
<p>About 61.44 hectares of vegetation would be removed as part of the proposal, of which about 1.39 hectares (two per cent is native and about 60.05 hectares (98 per cent forms miscellaneous ecosystems mainly made up of pasture grassland, cropping, landscape plantings).</p> <p>Of the vegetation to be cleared, about 0.94 hectares is consistent with a threatened ecological community.</p> <p>This would be a direct short to medium term impact.</p>	<ul style="list-style-type: none"> • Plant communities which are aligned with threatened ecological communities under the BC Act and EPBC Act: <ul style="list-style-type: none"> • Western Grey Box – White Cypress Pine tall woodland on loam soil on alluvial plains of NSW South Western Slopes Bioregion and Riverina Bioregion (PCT 80/BVT LA153) • White Box – White Cypress Pine – Western Grey Box shrub/grass/forb woodland in the NSW south western slopes bioregion) PCT 267/BVT LA218) • Native plant communities: <ul style="list-style-type: none"> • White Cypress Pine woodland on sandy loams in central NSW wheatbelt (PCT 70/BVT LA223) • Green Mallee – White Cypress Pine very tall mallee woodland on gravel rises mainly in the Cobar Penepplain Bioregion (PCT 176/BVT LA148).
<p>Loss of associated threatened fauna habitat from the vegetation removal within the proposal footprint. This would be a direct short-term impact in areas that are used for temporary construction activities and long term in greenfield areas used for the bypass.</p> <p>The small woodland birds, hollow-dependent birds, large predatory birds and insectivorous bats are only likely to use the habitat in the proposal footprint occasionally. Also, the extent of habitat to be impacted would be less than the home range of a single individual or breeding pair of any of these species.</p> <p>The migratory and/or nomadic blossom-feeding birds are unlikely to breed in the area and would only use the habitat in the footprint occasionally due to the extent of habitat available.</p>	<ul style="list-style-type: none"> • Migratory and/or nomadic blossom-feeding birds • Hollow-dependent birds • Small woodland birds • Large predatory birds with extensive home ranges • Insectivorous bats.

Description of impact	Types of native and/or threatened flora and fauna likely to be affected
<p>Removal of threatened fauna micro-habitat features from the proposal footprint including:</p> <ul style="list-style-type: none"> • Potential foraging habitat • Ten (10) live hollow-bearing trees • Dead wood and dead trees scattered throughout in low-densities. <p>This would be a direct long-term impact within the proposal footprint.</p>	<ul style="list-style-type: none"> • Barking owl • Hollow-dependent birds • Small woodland birds • Insectivorous bats.
<p>Injury and mortality of fauna during construction through:</p> <ul style="list-style-type: none"> • Removal of mature trees with hollows and dead standing trees • Removal of understorey, groundcover and topsoil • Machinery/plant and vehicle movements during construction. <p>This would be a direct minor short-term impact. Implementation of the safeguards in section 6.5.3 is expected to minimise, but not eliminate, the potential for this impact.</p>	<ul style="list-style-type: none"> • Hollow-dependent birds • Small woodland birds • Barking owl • Insectivorous bats • Arboreal, ground-dwelling and semi-aquatic mammals, reptiles and frogs.
<p>Edge effects native vegetation and habitat next to the proposal including:</p> <ul style="list-style-type: none"> • Noise and vibration due to construction equipment and methods • Soil moisture changes • Altered light conditions (artificial lighting) during construction. <p>This would be an indirect short-term minor impact.</p>	<ul style="list-style-type: none"> • Small woodland birds • Insectivorous bats including: • Other bats, frogs and nocturnal birds and mammals • Native plants.
<p>Invasion and spread of pests and pathogens associated with movement of vehicles and important of materials to the proposal footprint.</p>	All

Operation

Table 6-36 outlines the main impacts likely to be associated with the operation of the proposal on biodiversity.

Table 6-36 Main operation impacts on biodiversity

Description of impact	Types of native and/or threatened flora and fauna likely to be affected
<p>Fauna injury and mortality from roadkill. This would be a direct long-term impact.</p> <p>This would mainly affect ground-dwelling species, meaning the risk of any impact on threatened fauna is low given that most locally occurring species are birds. Nonetheless, some scavenging bird species often feed on roadkill there is still the risk of vehicle strikes. Overall, the proposal is unlikely to result in significant levels of fauna injury and mortality from roadkill.</p>	<ul style="list-style-type: none"> • Small woodland birds • Large predatory birds • Barking owl • Insectivorous bats • Terrestrial, semi-aquatic and arboreal reptiles, frogs and mammals.
<p>Edge effects on adjacent native vegetation and habitat including:</p> <ul style="list-style-type: none"> • Noise and vibration from vehicles along the bypass • Altered light conditions from artificial lighting, shading or reduced shading along the bypass • Weed invasion from soil disturbance and roadside littering. <p>This would be a short term minor indirect impact (associated with construction of the proposal) and a long-term impact (associated with operation of the proposal).</p>	<ul style="list-style-type: none"> • Small woodland birds • Insectivorous bats • Other bats, frogs and nocturnal birds and mammals • Native plants.

Conclusion on significance of impacts

Assessments of impact significance in accordance with Section 7.3 of the BC Act were conducted for all threatened species, populations and ecological communities considered likely to be affected by the proposal (refer to Appendix E of the biodiversity assessment, Appendix G).

The proposal is not likely to significantly impact threatened species, populations or ecological communities or their habitats, within the meaning of the BC Act or FM Act and therefore a Species Impact Statement (SIS) is not needed.

The proposal is not likely to significantly impact threatened species, populations, ecological communities or migratory species, within the meaning of the EPBC Act.

Based on an assessment of the proposal impacts against the Guideline for Biodiversity Offsets (Roads and Maritime, 2011) an offset for this proposal is not needed.

6.5.4 Safeguards and management measures

Table 6-37 describes the proposed safeguards that would be introduced to manage the predicted impacts described above. Appendix G contains further details on the specifics of the safeguards and management measures.

Table 6-37 Biodiversity safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Standard/additional safeguard
Biodiversity	<p>A Flora and Fauna Management Plan (FFMP) will be prepared in accordance with Biodiversity Guidelines: Protecting and Managing Biodiversity on RTA Projects (RTA, 2011) and implemented as part of the CEMP. It will include, but not be limited to:</p> <ul style="list-style-type: none"> Plans showing areas to be cleared and areas to be protected, including exclusion zones, protected habitat features and revegetation areas Requirements set out in the Landscape Guideline (RTA, 2008) Pre-clearing survey requirements Procedures for unexpected threatened species finds and fauna handling Procedures addressing relevant matters specified in the Policy and guidelines for fish habitat conservation and management (DPI Fisheries, 2013) Protocols to manage weeds and pathogens. 	Contractor	Detailed design/ pre-construction	Core standard safeguard B1 Section 4.8 of QA G36 <i>Environment Protection</i>
Biodiversity	Measures to further avoid and minimise the construction footprint and native vegetation or habitat removal will be investigated during detailed design and implemented where practicable and feasible.	Contractor	Detailed design	Core standard safeguard B2
Biodiversity	<p>Determine appropriate exclusion zones during pre-clearing surveys to minimise clearing of native vegetation.</p> <p>Pre-clearing surveys will be undertaken in accordance with Guide 1: Pre-clearing process of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (Roads and Traffic Authority, 2011).</p>	Contractor	Pre-construction	Additional safeguard B3

Impact	Environmental safeguards	Responsibility	Timing	Standard/additional safeguard
Biodiversity	Exclusion zones will be set up at the limit of clearing in accordance with Guide 2: Exclusion zones of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (Roads and Traffic Authority, 2011).	Contractor	Pre-construction	Additional safeguard B4
Biodiversity	Habitat will be replaced or re-instated in accordance with Guide 5: Re-use of woody debris and bushrock and Guide 8: Nest boxes of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (Roads and Traffic Authority, 2011).	Contractor	Post-construction	Additional safeguard B5
Biodiversity	Habitat removal will be will be carried out in accordance with Guide 4: Clearing of native vegetation and removal of bushrock of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (Roads and Traffic Authority, 2011).	Contractor	Post-construction	Additional safeguard B6
Biodiversity	Wherever practicable, within road safety limitations and provisions for utilities, native vegetation will be restored in areas along the existing road corridors with canopy and shrub species such as <i>Eucalypt sp.</i> , <i>Callistemon sp.</i> and <i>Grevillea sp.</i> Native vegetation will be re-established in accordance with Guide 3: Re-establishment of native vegetation of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (Roads and Traffic Authority, 2011).	Contractor	Post-construction	Additional safeguard B7
Biodiversity	The unexpected species find procedure is to be followed under Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (Roads and Traffic Authority, 2011) if threatened ecological communities, flora or fauna, not assessed in the biodiversity assessment, are identified in the proposal footprint.	Contractor	Construction	Additional safeguard B8
Biodiversity	Fauna (injury) will be managed in accordance with Guide 9: Fauna handling of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (Roads and Traffic Authority, 2011).	Contractor	Construction	Additional safeguard B9
Biodiversity	Changes to existing surface water flows will be minimised through detailed design.	Roads and Maritime	Detailed design	Additional safeguard B10

Impact	Environmental safeguards	Responsibility	Timing	Standard/additional safeguard
Biodiversity	Minimising roadkill will be considered in the detailed design of the road and associated infrastructure (eg culverts, fencing) and landscaping.	Roads and Maritime	Detailed design	Additional safeguard B11
Biodiversity	Weed species will be managed in accordance with Guide 6: Weed management of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (Roads and Traffic Authority, 2011).	Contractor	Construction	Additional safeguard B12
Biodiversity	Hygiene procedures will be implemented for the use of vehicles and material imports to the proposal footprint in accordance with Guide 7: Pathogen management of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (Roads and Traffic Authority, 2011).	Contractor	Construction	Additional safeguard B13
Biodiversity	The unexpected species find procedure is to be followed under Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (Roads and Traffic Authority, 2011) if threatened ecological communities, fauna, flora, not assessed in the biodiversity assessment, are identified in the proposal footprint.	Contractor	Construction	Additional safeguard B14

6.6 Aboriginal heritage

This section describes the Aboriginal heritage impacts that are predicted to occur from building and operating the proposal. This section was informed by the Aboriginal and Historic Heritage Assessment that was prepared for the proposal by OzArk Environmental & Heritage Management (OzArk) and is included in Appendix H.

6.6.1 Methodology

The assessment was carried out in accordance with:

- Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW referred to as ‘the Due Diligence guidelines’ (OEH, 2011)
- Code of Practice for the Archaeological Investigation of Aboriginal Objects in New South Wales referred to as ‘the Code of Practice’ (DECCW, 2010)
- Stage 1 and 2 of the PACHCI (Roads and Maritime, 2011).

A desktop search of the following databases was carried out in January 2017 to identify any potential previously recorded Aboriginal heritage objects, items or values within or surrounding the proposal footprint:

- Aboriginal Heritage Information Management System (AHIMS, OEH, 2017d)
- Commonwealth heritage listings in Parkes Shire LGA
- National native title claims
- Parkes LEP.

This information was also used to determine a predictive model for Aboriginal heritage site location within the proposal footprint.

The assessment also involved an archaeological field survey in February 2017, carried out by a qualified archaeologist and with representatives from Peak Hill Local Aboriginal Land Council and Roads and Maritime in attendance. Standard archaeological field survey methods were employed (Burke & Smith 2004). The aim of this survey was to identify and record objects or sites of Aboriginal heritage significance within the proposal footprint, as well as any landforms likely to contain further archaeological deposits.

The survey area for the assessment was defined by the following limits:

- North – 790 metres north of Maguire Road
- South and west – 680 metres south of Parkesborough Road
- East – 700 metres along Maguire Road from the intersection of Maguire Road and the Newell Highway.

Figure 6-25 shows the survey area and method which included:

- Spot checks in the areas of the proposal footprint assessed as ‘disturbed land’ to confirm the high-levels of disturbance and check any mature native vegetation in the area for cultural modification (as per the due diligence guidelines)
- A full pedestrian survey (as per the code of practice) with:
 - Surveyors spaced five metres apart in areas of high exposure
 - Surveyors spaced between 10 to 15 metres apart in areas where no exposure was present
 - Targeted inspection of the AHIMS sites recorded within the proposal footprint.

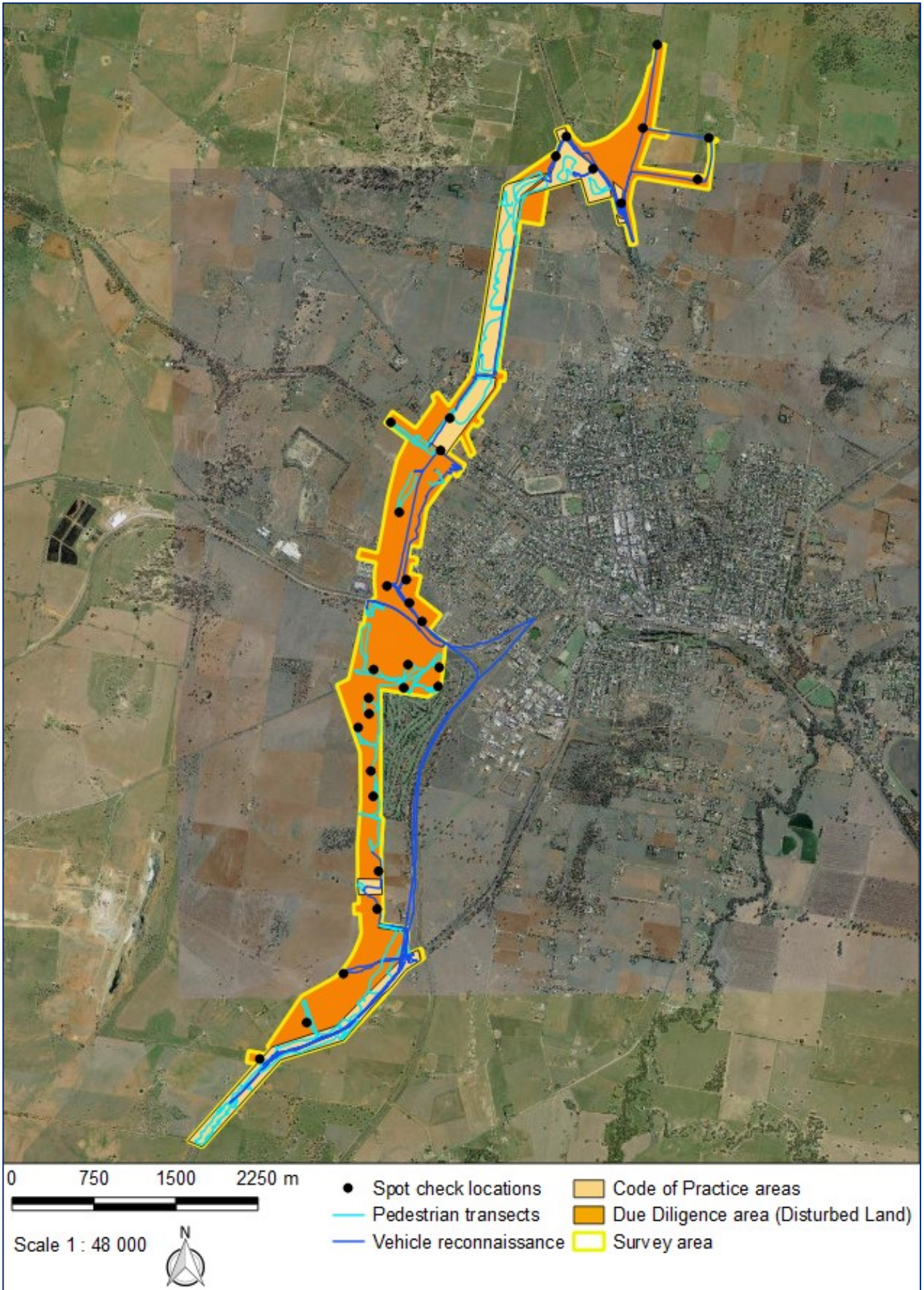


Figure 6-25 Survey area extent

6.6.2 Existing environment

History of Aboriginal occupation and sites in the area

At the time of European settlement, the proposal footprint was within the territory of people belonging to the Wiradjuri tribal and linguistic group (Tindale, 1974). From the early 1800s, there were records of early contact between Aboriginal and European cultures from the nearby Lachlan Valley, about 30 kilometres south. The traditional Aboriginal diet in the area consisted of possum, kangaroo, emu, fish, freshwater mussels and starchy plant roots. The Aboriginal population was affected by foreign diseases. There were also stories of conflicts with early white settlers in the area, including massacres of the natives and revenge attacks.

Likelihood of Aboriginal sites within the proposal footprint

Table 6-38 explains the type and location of Aboriginal site most likely to occur within the proposal footprint, the most prevalent of which are scatters and scarred trees.

Table 6-38 Predictive model for Aboriginal site types within the proposal footprint

Site type	Description	Likelihood within the proposal footprint
Isolated find	A single artefact that occurred from the random loss or deliberate discard of an object or from an artefact scatter.	Could occur anywhere particularly within disturbed land.
Open artefact scatter	Two or more artefacts that are not located within a rock shelter and are no more than 50 metres away from any other artefact. These artefacts are most likely to be made of mudstone, basalt and quartz. They may be associated with hunting and gathering, short or long-term camps or stone tools.	Artefact scatters are a dominant site type for the Parkes region. They are more likely near creek and drainage lines, particularly on flat or gently sloping land, or on the crests, saddles and benches of ridge spur landforms. The sites are likely to have a low-density of artefacts and low complexity tool types. They are likely to have been disturbed by land use practices.
Aboriginal scarred tree	Trees that have a scar as evidence of bark or wood removal in the past by Aboriginal people, for a wide range of reasons.	Scarred trees are a dominant site type for the Parkes region. They are possible where mature trees of scar bearing type exist. They are more likely to be located close to the drainage lines; however, can occur almost anywhere.
Quarry site	Typically consists of exposures of stone material that contain evidence of the obtaining of raw materials for making stone tools.	Quarries are possible if suitable sources of outcropping stone exist. Quarries near Parkes are more likely to be basalt quarries.
Burial	Burial sites that are generally found in soft sediments.	Burial sites are unlikely to occur because of the high levels of disturbance and lack of suitable soil types in the area.

Previously recorded Aboriginal sites

The AHIMS database search (for the search area defined by Eastings: 596900–616900, Northings: 6319700–6344700 and a buffer of 0 meters) showed that there were 70 recorded sites within the search area; two of which were located within the survey area. Table 6-39 outlines the recorded site type.

Table 6-39 AHIMS Aboriginal site types

Site type	Number
Artefact	36
Modified tree (carved or scarred)	32
Stone quarry	1
Modified tree; artefact	1
Total	70

The two AHIMS sites recorded within the survey area (AHIMS sites #43-4-0059 and #43-3-0061) were both scarred trees, which were originally recorded in 2004 in an archaeological survey for the Parkes National Logistics Hub. OzArk reviewed the AHIMS coordinates of these sites. Site #43-3-0059 was initially recorded as being on the corner of Reedsdale and Painter Streets.

The scarred tree was noted as being dead but still standing with a nail at the top of the scar. A corrected location of the site on the site card places it northeast of the AHIMS coordinates and outside the eastern boundary of the survey area. Further archaeological assessments in the area, including the field survey for this proposal, were unable to locate the site and it is suspected to have been chopped down. Site #43-3-0061 is described as containing two scars, with one being on the upper limb and one on the trunk of the tree. It was recorded as south-west of Parkes on London Road on the northern road verge, around 50 metres from a dam. However, the field study confirmed that the site was not within the survey area and it is thought to be about 2.2 kilometres northwest of the AHIMS coordinates. Therefore, none of the AHIMS sites are located within the proposal footprint.

There were no Commonwealth Heritage Listings, Native Title Claims or Aboriginal places on the Parkes LEP listed within or surrounding the proposal footprint.

Newly recorded Aboriginal sites

Two new Aboriginal sites, Barkers Road-ST1 and Westlime Road-ST1, were recorded during the field survey. Barkers Road-ST1 consists of a box tree with one elongated scar. The tree is alive and has a circumference of about 0.25 metres at the position of the scar. The scar displays steel axe marks on the dry face of the scar, which is heavily weathered.

Westlime Road-ST1 consists of a box tree with one elongated scar. The tree is alive and has a circumference of about 0.27 metres at the position of the scar. The scar has no stone or steel axe marks. Both these sites were within the survey area but not directly within the proposal footprint.

The value of both sites was assessed as follows:

- High social and cultural value as they provide a tangible link to Aboriginal ancestors and cultural practices
- Low scientific value as they are the region's most common site type
- Low aesthetic value as they are near disturbed areas from agriculture and development
- Barkers Road-ST1 has low historic value due to the steel axe marks
- Westlime Road-ST1 has no historic value.

Table 6-40 summarises the AHIMS sites that were previously and newly recorded within the study area.

Table 6-40 AHIMS sites

Site name	Site type	Previously recorded on AHIMS	Located within survey area	Located within proposal footprint
#43-3-0059	Modified tree (carved or scarred)	Yes	No	No
#43-3-0061	Modified tree (carved or scarred)	Yes	No	No
Barkers Road-ST1	Modified tree (carved or scarred)	No	Yes	No
Westlime Road-ST1	Modified tree (carved or scarred)	No	Yes	No

6.6.3 Potential impacts

Construction

None of the sites recorded on the AHIMS database are within the proposal footprint. While the newly identified scarred trees on Barkers Road and Westlime Road were within the survey area, they are not located in the proposal footprint. The tree on Barkers Road is about 25 metres northeast of the proposal footprint, while tree on Westlime Road is about 100 metres to the east of the proposal footprint. Therefore, the proposal is not expected to have any impact on Aboriginal heritage during construction.

However, there is the potential for discovering additional unexpected Aboriginal items, objects and values during construction.

Operation

No impact on Aboriginal heritage is expected during the proposal's operation.

6.6.4 Safeguards and management measures

Table 6-41 describes the proposed safeguards that would be introduced to manage the predicted impacts described above. Appendix H contains further details on the specifics of the safeguards and management measures.

Table 6-41 Aboriginal heritage safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Standard/additional safeguard
Aboriginal heritage	An Aboriginal Heritage Management Plan (AHMP) will be prepared in accordance with the Procedure for Aboriginal cultural heritage consultation and investigation (PACHCI, Roads and Maritime, 2012) and Standard Management Procedure – Unexpected Heritage Items (Roads and Maritime, 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	Core standard safeguard AH1 Section 4.9 of QA G36 <i>Environment Protection</i>
Aboriginal heritage	The Standard Management Procedure – Unexpected Heritage Items (Roads and Maritime, 2015) will be followed if an unknown or potential Aboriginal object(s), including skeletal remains, is found during construction. This applies where Roads and Maritime does not have approval to disturb the object (s) or where a specific safeguard for managing the disturbance (apart from the Procedure) is not in place. Work will only re-commence once the requirements of that Procedure have been satisfied.	Contractor	Detailed design/ pre-construction	Core standard safeguard AH2 Section 4.9 of QA G36 <i>Environment Protection</i>
Aboriginal heritage	A buffer zone (10 metres around each site as a minimum) will be created around Barkers Road-ST1 and Westlime Road-ST1 to ensure they are avoided during construction. High-visibility fencing should be used.	Contractor	Construction	Additional safeguard AH3
Aboriginal heritage	All land-disturbing activities must be confined to within the assessed survey area shown in Figure 6-25. Should the parameters of the proposed work extend beyond the assessed area then further archaeological assessment may be needed.	Contractor	Construction	Additional safeguard AH4
Aboriginal heritage	All construction personnel will be made aware of the location of Barkers Road-ST1 and Westlime Road-ST1 and inductions should be provided as to the location of the recorded sites and their legislative protection under the NPW Act.	Contractor	Construction	Additional safeguard AH5

6.7 Non-Aboriginal heritage

This section describes the non-Aboriginal heritage impacts that are predicted to occur from building and operating the proposal. This section was informed by the Aboriginal and Historic Heritage Assessment prepared for the proposal by OzArk that is included in Appendix H.

6.7.1 Methodology

The assessment was carried out in accordance with the Historical Archaeology Code of Practice (Heritage Council of NSW, 2006) and the Burra Charter (Australia ICOMOS, 2013).

A desktop search was used to identify whether non-Aboriginal heritage items are, or are likely to be, present within the proposal footprint. This included a review of the following databases in February 2017:

- National and Commonwealth Heritage Listings for Parkes Shire LGA
- NSW State Heritage Register (SHR) for Parkes Shire LGA (OEH, 2017e)
- NSW State Heritage Inventory (SHI) for Parkes Shire LGA (OEH, 2017f)
- Parkes LEP 2012.

The assessment also involved an archaeological field survey in February 2017, which was completed at the same time as the Aboriginal heritage field assessment. It also covered the same survey area shown in Figure 6-25.

6.7.2 Existing environment

History of Parkes

The first exploration of the Parkes district was in 1817. In the 1830s, squatters were found in the area despite it being outside the limits of settlement. Thomas Kite is recognised as the first squatter, taking up land at Burrawang, which was later called Coobang Station. By 1836, the Government assigned a commissioner to manage grazing in lands beyond the Limits of Settlement. This opened the area to European settlement and large land parcels were taken-up along river frontages.

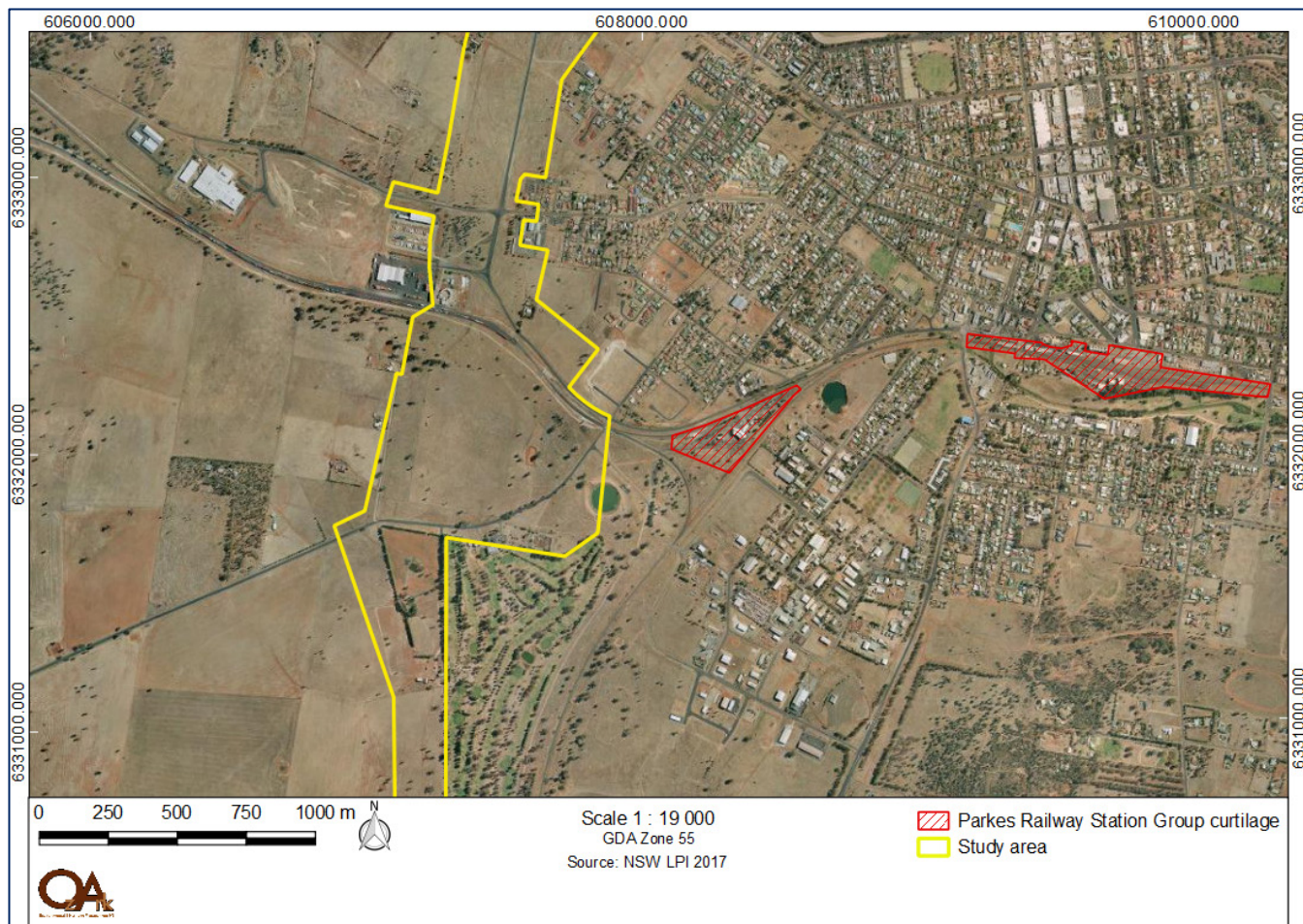
Transport was originally by hoof for all stock. TSRs through Parkes were the major transport connectors and formed the basis of the road network due to the pastoral nature of the economy. In the 1860s, gold mining became popular in the Bushmans area, later named Parkes.

Once Parkes was linked to Sydney by the rail line in 1893, and as the rail line was extended west, it became a centre for the bulk movement of wheat. In the 1920s this became an economic focus, as gold interest waned. The completion, in 1927, of the last link in the Broken Hill rail line increased the importance of Parkes as a rail centre. By 1981, seven million tonnes of freight passed through Parkes.

Previously recorded non-Aboriginal heritage sites

A search of the Heritage Council of NSW administered heritage databases and the Parkes LEP 2012 found one State-listed (SHR/SHI) non-Aboriginal heritage site locally, the Parkes Railway Station Group. The group is also locally listed. Parkes Railway Station Group began to be built in 1881 and was opened on 18 December 1893. It is located about 730 metres east of the proposal footprint.

Figure 6-26 shows the location of the Parkes Railway Station Group in relation to the survey area.



Source: OzArk

Figure 6-26 Location of the Parkes Railway Station Group in relation to the survey area

Newly recorded non-Aboriginal heritage sites

Table 6-42 outlines the six sites recorded by during the archaeological field assessment though to be potential sites of non-Aboriginal heritage significance.

Table 6-42 Potential sites of non-Aboriginal heritage significance

Site name	Coordinates	Site type	Description
Reedsdale Road-HS01	608453E 6336095N	Gold mine (shafts)	A disused gold mine with six visible shafts. Most of the identified shafts appear to be backfilled with sediment or not excavated deep enough for use. The shafts have more recently been used by locals for the dumping of unwanted materials including water tanks and farm infrastructure.
Reedsdale Road-HS02	608607E 6336075N	Rubbish tip	An old rubbish tip from around the 1940s. The tip contains old vehicles, including Chevrolet and Holden models, and agricultural infrastructure that has been left along outcropping shale bedrock. The vehicles and infrastructure are heavily rusted and in poor condition.
Reedsdale Road-HS03	608321E 6335163N	Plough blade	A single plough blade that has been dislodged from a piece of larger machinery.
Reedsdale Road-HS04	608342E 6335148N	Ceramic pipe	A conjoined piece of ceramic pipe that features four parallel indentations.
Reedsdale Road-HS05	608269E 6334881N	Metal pipe	A metal pipe with a nut and bolt, likely used for agricultural purposes.
Reedsdale Road-HS06	608237E 6334856N	Metal frame	A rectangular frame made from metal, likely used for agricultural purposes.

The disused gold mine shafts (HS01) were assessed to have local heritage significance (refer to section 9.2 and section 9.3 in Appendix H). This is because they are physical examples of the expansion and decline of gold mining in the region; although it has no other features that could relate to its former use. The other sites in Table 6-42 were considered to have no significance as recorded heritage items and places.

6.7.3 Potential impacts

Construction

The rubbish tip (HS02) and other isolated find (HS03 to HS06) would be impacted by the proposal. However, given their lack of heritage significance and statutory protection under the Heritage Act, there would be no heritage impact.

Parkes Railway Station Group is too far from the proposal footprint to be impacted during construction works, including any setting or amenity impacts as the proposed work is outside the curtilage of the item. The disused gold mines (HS01) are not expected to be impacted by the proposal as they are outside the proposal footprint.

Operation

No items of non-Aboriginal heritage value are expected to be impacted by the operation of the proposal.

6.7.4 Safeguards and management measures

Table 6-43 describes the proposed safeguards that would be introduced to manage the predicted impacts described above. Appendix H contains further details on the specifics of the safeguards and management measures.

Table 6-43 Non-Aboriginal heritage safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Standard/additional safeguard
Non-Aboriginal heritage	A Non-Aboriginal Heritage Management Plan (NAHMP) will be prepared and implemented as part of the CEMP. It will provide specific guidance on measures and controls to be implemented to avoid and mitigate impacts to Non-Aboriginal heritage.	Contractor	Detailed design/ pre-construction	Core standard safeguard H1 Section 4.10 of QA G36 <i>Environment Protection</i>
Non-Aboriginal heritage	The Standard Management Procedure – Unexpected Heritage Items (Roads and Maritime, 2015) will be followed if any unexpected heritage items, archaeological remains or potential relics of Non-Aboriginal origin are encountered. Work will only re-commence once the requirements of that Procedure have been satisfied.	Contractor	Detailed design/ pre-construction	Core standard safeguard H2 Section 4.10 of QA G36 <i>Environment Protection</i>
Non-Aboriginal Heritage	The location of the disused gold mine shafts (Reedsdale Road-HS01) should be included on site sensitivity plans and a no-go exclusion zone will be established before construction work starts. If any part of the site cannot be avoided by the proposal the site will be subject to photographic archival recording.	Contractor	Construction	Additional safeguard H3
Non-Aboriginal Heritage	All contractors undertaking the work will be made aware of the legislative protection of historic heritage sites in the event unknown heritage items are encountered during the work. Accordingly, site inductions will be provided to workers on the project to inform them of the location of the recorded sites and their legislative protection under the <i>Heritage Act 1977</i> .	Contractor	Construction	Additional safeguard H4
Non-Aboriginal Heritage	All land-disturbing activities will be confined within the assessed survey area. Should impacts change such that the area to be impacted is altered then additional assessment may be required.	Contractor	Construction	Additional safeguard H5
Non-Aboriginal Heritage	All contractors undertaking the work will be made aware of the legislative protection of historic heritage sites in the event unknown heritage items are encountered during the work.	Contractor	Construction	Additional safeguard H6

6.8 Contamination, geology and soils

This section describes the contamination, geology and soil impacts that are predicted to occur from building and operating the proposal. This section was informed by a preliminary site investigation prepared for the proposal by WSP that is included in Appendix I.

6.8.1 Methodology

The preliminary site investigation reviewed the development history of the proposal footprint and a broader survey area, to identify potential historical contamination sources. This included a review of the following resources in June 2017:

- Historical aerial photographs
- NSW EPA contaminated land and the *NSW Protection of the Environment Operations Act 1997* public register records
- ASRIS – Acid Sulfate Risk Map (CSIRO, 2014)
- 1:100,000 Parkes Geological Series Sheet 8531 (Raymond, et al., 2000).

6.8.2 Existing environment

Geology and soils

The 1:100,000 Parkes Geological Series Sheet 8531 (Raymond, et al., 2000) suggests that the proposal footprint is underlain by material from the Quaternary and Tertiary periods. The material is described as alluvial slopes and sand ridges in southern portion of the proposal footprint and volcanic sandstone and conglomerate (also referred to as Parkes Volcanics) in the northern portion of the proposal footprint. The proposal footprint is situated at about 300 metres in Australian Height Datum (mAHD) at the southern end and 380 mAHD at the northern end of the route. The land generally rises towards the northern end of the proposal footprint.

The Soils Landscapes of Central and Eastern NSW 1:100,000 Sheet (King, 1998) shows that the proposal footprint is underlain by the Parkes soil group. This soil group is described as having shallow to moderately deep (less than 60 cm deep) red earth soils on side slopes and moderately deep (deeper than 80 cm) red brown earth soils on lower slopes.

The soil is considered to have low to very low fertility, low permeability and some localised hard setting surfaces. This soil group has a high erosion hazard risk and the topsoils are described as being unsuitable for structural earthworks.

Acid Sulfate Soils

Acid sulfate soil (ASS) is the name given to sediments and soils containing iron sulphides which when exposed to the air, generate sulphuric acid that can washout and cause environmental and human health impacts. They are typically formed in low-lying coastal floodplains, rivers and creeks. A review of the Australia Soil Resource Information System (CSIRO, 2017) showed that the proposal is located in a low-probability risk area (Class B4).

Saline soils

Areas prone to salinity are usually at low positions in the landscape, such as in valley floors and along floodplains. The OEH NSW Soil and Land Information System (OEH, 2017) indicated some localised levels of salinity.

Potential contamination sources

The following potential contamination sources exist locally:

- A disused gold mine shaft located to the north of Goldrush Road in the northern portion of the proposal footprint
- Dumped cars, rubbish and imported fill near Endicott Street
- The Broken Hill rail line located south of Hartigan Avenue
- A disused sheep dip between the proposal footprint and Parkes Golf Course.

Table 6-44 outlines the results of the historical aerial photograph review.

Table 6-44 Review of historical aerial photographs

Year	Land use in the proposal footprint	Land use in the search area
1973	<ul style="list-style-type: none"> • Most land south of the rail line is rural • Parkes Golf Course appears to be partially developed • Main roads have been paved including Hartigan Avenue and Condobolin Road. 	<ul style="list-style-type: none"> • The electrical substation at the corner of Hartigan Avenue and Brogan Road is present • Parkes town centre east of the proposal is well developed • Rail lines are present • A natural creek is present about 400 metres east of the proposal parallel to the rail line.
1977	No visible changes, except that Parkes Golf Course has been completed.	A portion of the storage facility south-west of Hartigan Avenue has been built.
1989	The proposal footprint remains largely unchanged.	No visible changes except that the storage facility appears to be developing to the west.
2014	The proposal footprint remains largely unchanged and in its current configuration.	The storage facility is completely developed.

The review of historic photographs shows that the proposal footprint was mainly used for rural and agricultural purposes. Agricultural activities typically have an associated low contamination potential. The key potential contaminants of concern include the use of pesticides, arsenic and DDT (a synthetic insecticide) associated with the presence of sheep dips.

The search of the NSW EPA contaminated land record database showed that there are no listed sites within one kilometre of the proposal footprint. Table 6-45 shows the results of the NSW EPA public register search. Three properties within a one kilometre of the proposal footprint hold current environmental protection licences, with one licence pending.

Table 6-45 Properties listed on the NSW EPA public register

Licence holder	Address	Activity	Status	Location from proposal
Australian Topmaking Services Limited	King Merino Road	Greasy wool or fleece processing	Licence surrendered in 2005	800 metres west of Westlime Road, 140 metres south of Brolgan Road.
B.M.D. Constructions Pty Ltd	Inland Rail – Parkes	Railway systems activities	Pending	Parkes-Narromine rail line
Neil Robert Unger	Mid-west piggery, "kildare", 83 Hideaway Lane	Pig accommodation	Licence in force until April 2020	600 metres east of the proposal footprint, 1.5 kilometres south of London Road.
Parkes Shire Council	Brolgan Road, Parkes	Waste disposal by application to land	Licence in force until 26 September 2018	700 metres west of the proposal footprint
Westline Pty Limited	London Road	Land-based extractive activity, crushing, grinding or separating	Licence in force until 28 October 2019	500 metres west of the proposal footprint, 280 metres west of Ballerdee Lane.

Table 6-46 and Figure 6-27 summarise the potential contamination sources within the survey area.

Table 6-46 Potential sources of contamination

Potential contamination source	Contaminant source	Potential contaminants of concern ¹
Dumped cars, rubbish and fill used in proposal footprint	Imported fill material	Heavy metals, TRH, BTEX, PAHs and asbestos containing material (ACM).
	Dumped cars and rubbish	
Roads	Emissions from vehicles using nearby roads	BTEX, TRH, PAHs, heavy metals, phenols.
	Bitumen from the road	BTEX, TRH, PAHs, heavy metals.
Parkes Golf Course	Use of pesticides or herbicides for maintenance	Heavy metals, OCPs, OPPs, herbicides.
Agricultural land	Use of pesticides to maintain land	Heavy metals, OCPs and OPPs.
	Sheep dip	DDT, synthetic pyrethroids, OPPs and OCPs.
Disused gold mine	Offset contamination from production of ores and emissions	Heavy metals particularly arsenic and mercury, sulfur and cyanide.
Rail line	Ballast material and train emissions	TRH, BTEX, PAHs, heavy metals, asbestos.
Electrical substation	Transformer oils	TRH, BTEX, heavy metals, PAHs, phenols and PCBs.
Storage facility adjacent to the proposal	Potential manufacturing and storage of chemicals	Building waste, TRH, BTEX, PAHs, ACM, OCPs, OPPs, VOCs and heavy metals.

(1) Abbreviations: asbestos containing materials (ACM), total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene, xylene (BTEX), polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs) and volatile organic compound (VOCs), organochlorine pesticides (OCPs) and organophosphate pesticides (OPP).

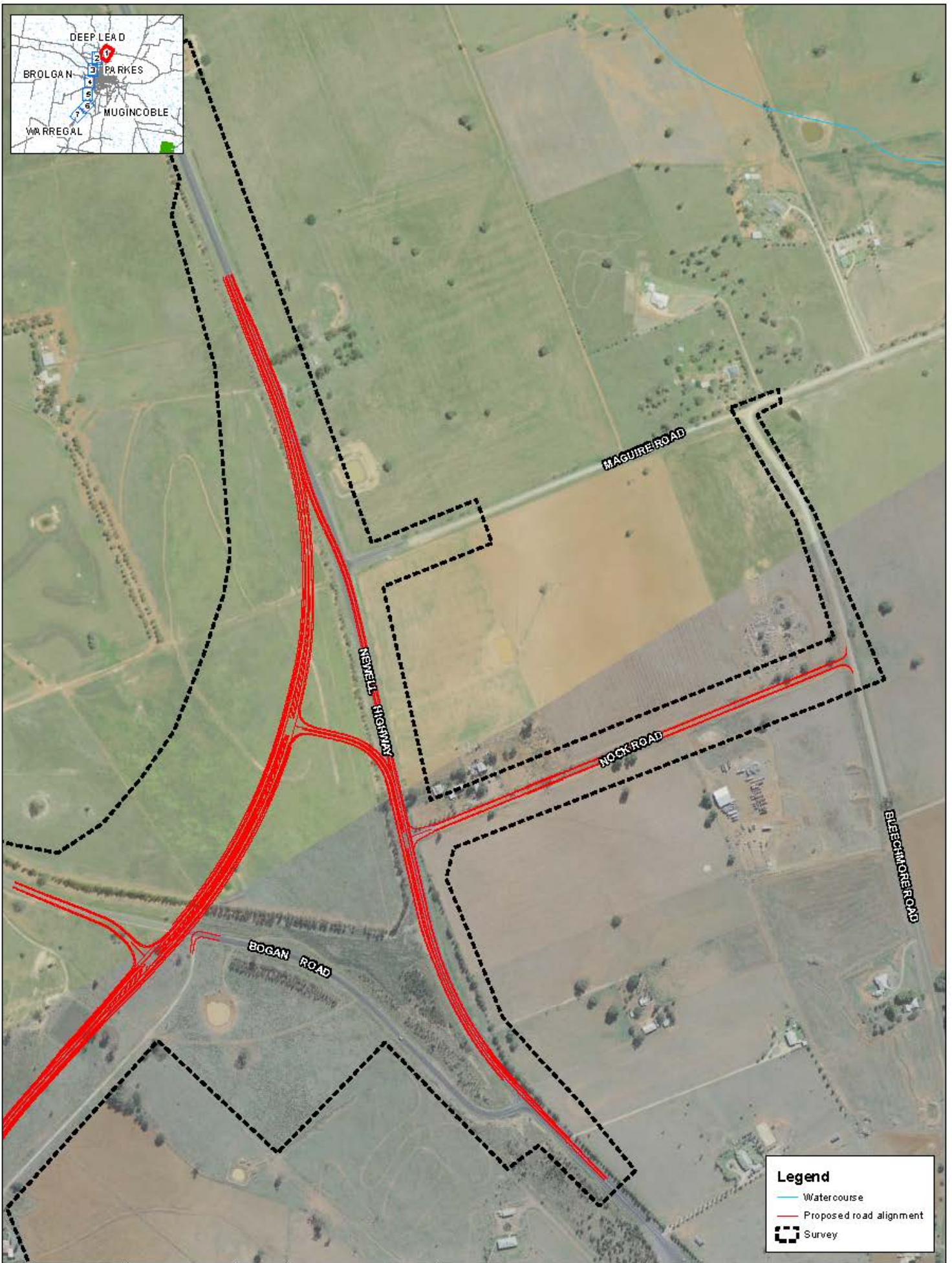
Exposure pathways

Based on the potential contaminants and receptors identified, the following potential exposure pathways exist:

- Direct contact with or ingestion of impacted surface or near surface soils by construction workers during the road construction or maintenance workers following construction
- Inhalation of dust, vapour or fibres by construction workers during the road construction or maintenance workers following construction
- Inhalation of dust, vapour or fibres by users of the road or of adjacent land
- Ingestion of or dermal contact with impacted groundwater if extracted for beneficial use by nearby site users
- Migration of impact into the groundwater or into Goobang Creek.



The potential for direct contact exposure by construction workers or future maintenance workers is a low risk, as these workers would be expected to adopt the appropriate safety controls to reduce risk. The potential for adjacent site users or road users to be exposed to dust, fibre or direct contact with soil is minimal once the road is constructed, as the roadway would act as a barrier. However, during the construction exposure is possible.

The potential for significant groundwater impact is considered to be low, however if groundwater is impacted it may be extracted for stock, irrigation or domestic uses based on the presence of nearby registered bores. The potential for impacted groundwater to migrate to Goobang Creek is low, based on the distance from the route. Groundwater impacts are further examined in section 6.10.



Legend

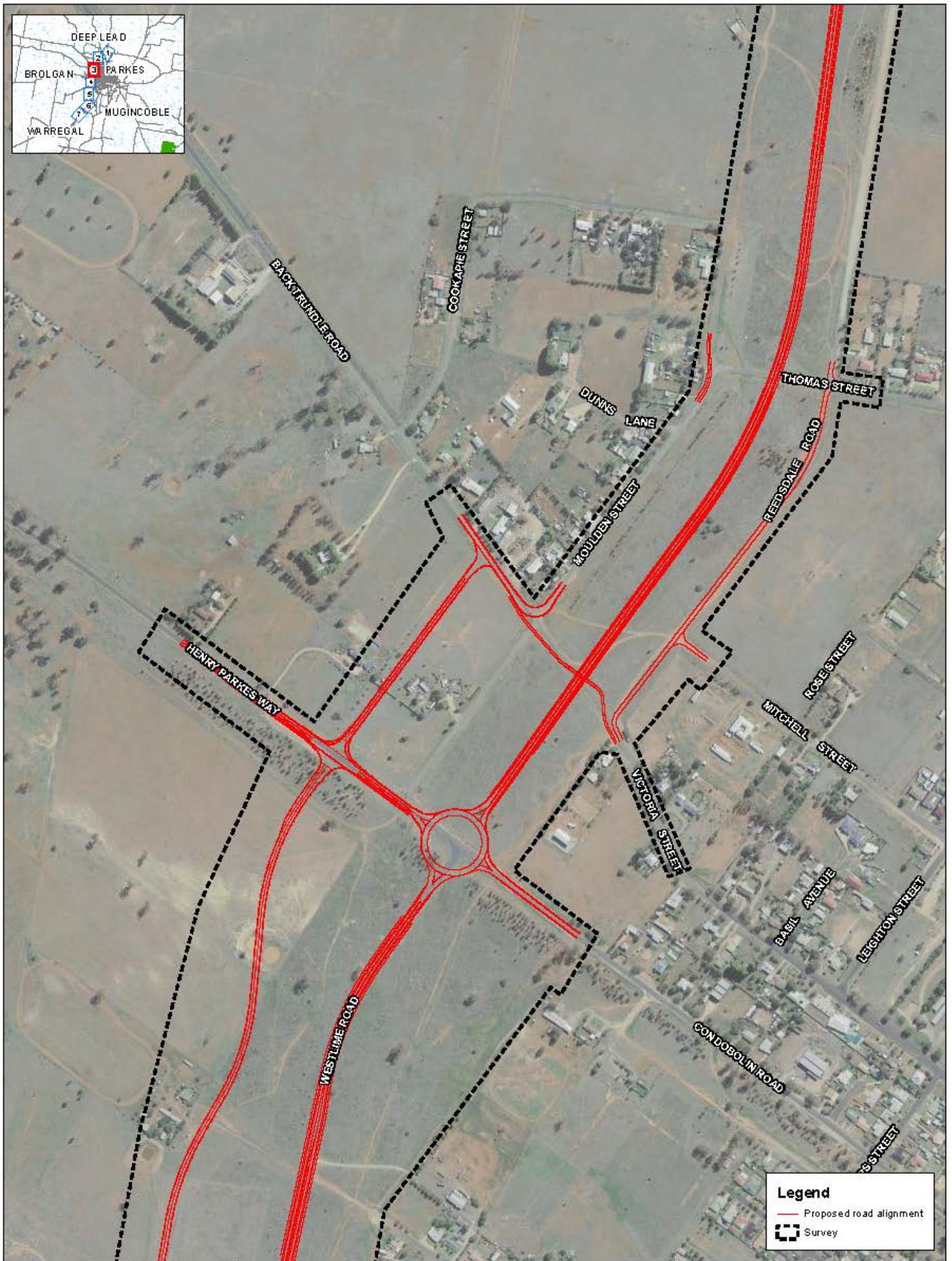
- Watercourse
- Proposed road alignment
- Survey

Map: 2270437A_GIS_002_A5	Author: ontasom	  1 : 5,000 Coordinate system: GDA 1984 MGA Zone 55 Scale also correct when printed at A3
Date: 31/08/2018	Approved by: Isabella See	
Data Source: Imagery © Land and Property Information 2017		



Parkes Bypass


Figure 6.27
Potential contamination sources in the survey area
Page 1 of 7



Legend

- Proposed road alignment
- Survey

Map: 2270437A_GIS_002_A5 Author: ortozsm
 Date: 31/08/2018 Approved by: Isabella See



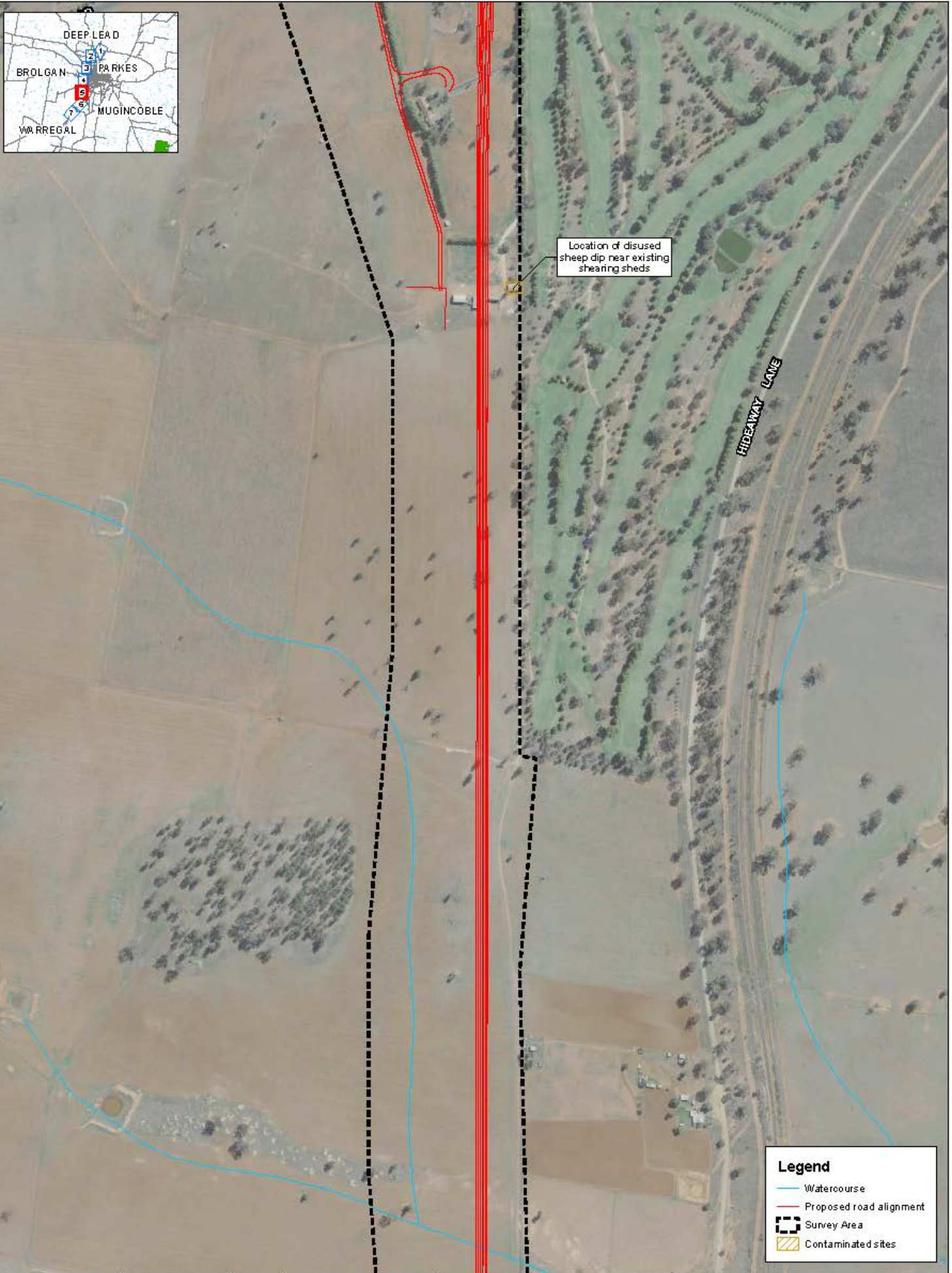
Scale bar: 0, 75, 150 M
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 Coordinate system: GDA 1984 MGA Zone 55
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Parkes Bypass

Figure 6.27
 Potential contamination sources in the survey area
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Map: 2270437A_GIS_002_A5 Author: ontosm
 Date: 31/08/2018 Approved by: Isabella See




Scale bar: 0, 75, 150 M
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Parkes Bypass

Figure 6.27
 Potential contamination sources in the survey area
 Page 5 of 7



Map: 2270437A_GIS_002_A5	Author: ontiosm
Date: 31/08/2018	Approved by: Isabella See
Data Source: Imagery © Land and Property Information 2017	



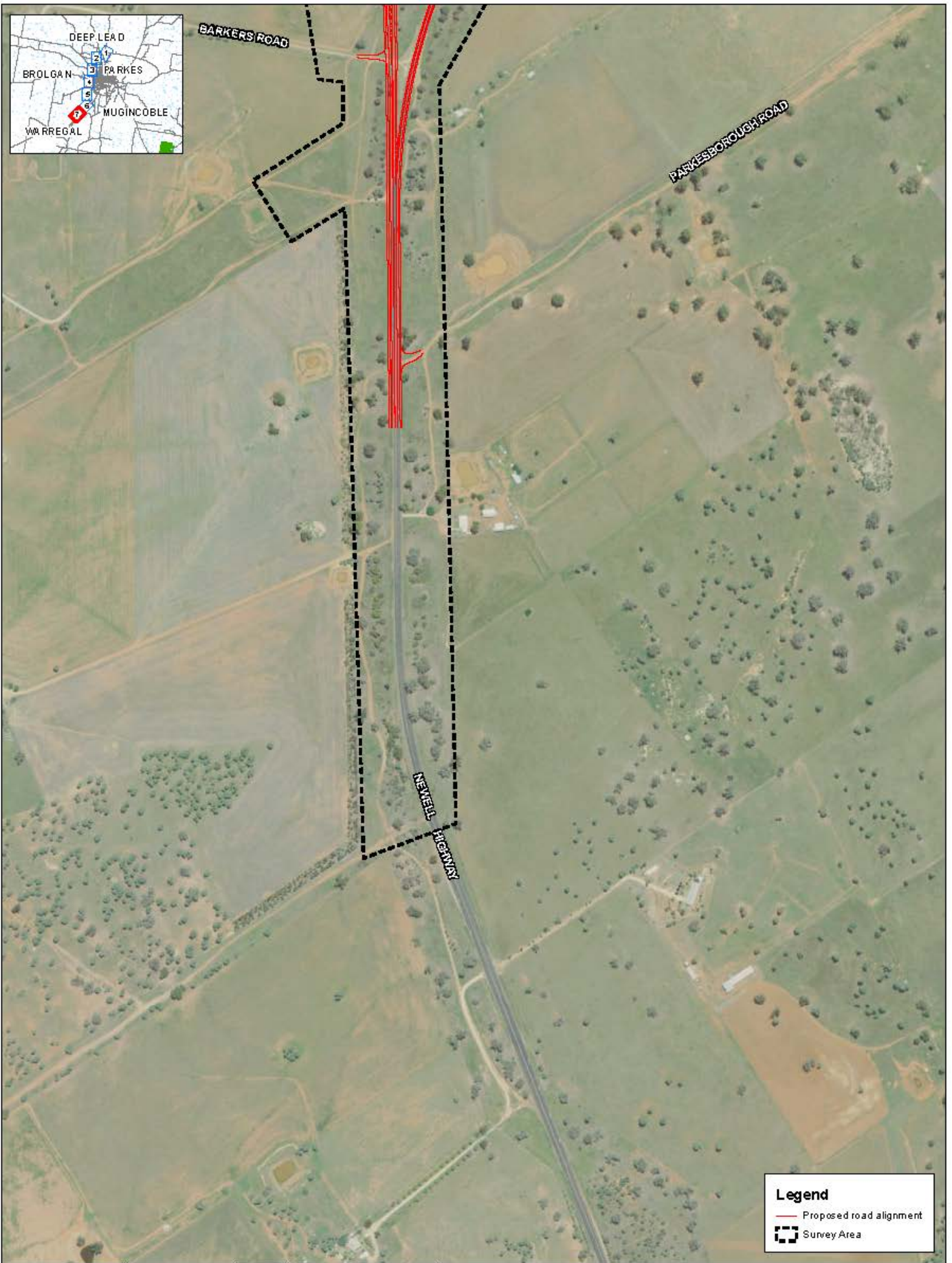
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Parkes Bypass

Figure 6.27
Potential contamination sources in the survey area
Page 6 of 7



Legend

- Proposed road alignment
- Survey Area

Map: 2270437A_GIS_002_A5	Author: ontiosm		 1 : 5,000
Date: 31/08/2018	Approved by: Isabella See		
Data Source: Imagery © Land and Property Information 2017		Coordinate system: GDA 1984 MGA Zone 55 Scale also correct when printed at A3	



Parkes Bypass

Figure 6.27
Potential contamination sources in the survey area
Page 7 of 7

6.8.3 Potential impacts

Construction

Soil quality and erosion

Under the proposal, the expected earthwork volumes would be about 310,000 m³ of cut material and 5000,000 m³ of fill material (refer to section 3.3.3). This would involve temporary stockpiling of top soil and sub soil at its point of excavation and its longer-term storage at one of the site compounds (refer to section 3.3). Vegetation clearing, tree removal and other earthwork activities would also be required during construction of the proposal. These activities would potentially lead to:

- Washout, erosion and sediment discharge of exposed soils
- Dust generation
- Loss of soil quality and condition during stockpiling
- Associated soil quality impacts through accidental spills caused by:
 - Use of chemicals outside of the contained areas
 - Traffic accidents, including loading and unloading risks
 - Leaks and drips from poorly maintained vehicles, machinery and equipment
 - Inadequate management of spoil and waste (leading to leaching).

The controls to manage sediment and erosion risks are standard and proven to be effective. Providing they are effectively implemented then the impacts would be avoided or appropriately mitigated.

Materials management

All earthwork and excavated materials would be managed under the following hierarchy:

- Reuse as engineering fill onsite
- Transfer to another Roads and Maritime project for use as engineering fill
- Storage at a Roads and Maritime stockpile site to allow for its future reuse
- Transfer to another construction site for use as engineering fill
- Transfer to a licenced waste recovery site where reasonable
- Disposal at a licenced facility.

Any materials reused onsite, or imported to site from another project, would be subject to testing and waste classification exemption provisions in accordance with the *Waste Classification Guidelines* (DECCW, 2009). Should the material be classified as a controlled or restricted waste, or found to contain contaminants of concern at elevated concentrations, it would not be classified for exemption and reuse. It would be stored in a contained separate location onsite before being transported offsite to a licenced facility.

Reusable topsoil and subsoil would be stored in designated and suitable locations. This would ensure the stockpiled material was located away from sensitive areas and flood-prone land, where feasible and reasonable. It would also provide the ability to install controls to manage any leaching, erosion, sediment dispersion and dust dispersion risks and impacts.

Contamination

The preliminary site investigation suggests that encountering extensive contamination within the proposal footprint is unlikely. The proposal footprint has mainly been used for rural and agricultural purposes which typically have an associated low contamination potential, however this would be confirmed through further investigation.

Despite the low expected potential for contamination in the proposal footprint, construction activities such as vehicle movements, excavation and stockpiling, clearing of open grassland and the importation of fill

have the potential to expose and release unknown contaminated soils. This would pose potential health risks and impacts to construction workers, nearby residents and the surrounding environment due to:

- Direct contact with or ingestion of contaminated soil near the surface by construction workers during road construction or maintenance workers following construction
- Inhalation of dust, vapour or fibres by construction workers during the road construction or maintenance workers following construction
- Inhalation of dust, vapour or fibres by users of the road or of adjacent land
- Ingestion of or skin contact with impacted groundwater if extracted for use by nearby site users
- Migration of impact into the groundwater or into Goobang Creek.

Construction activities, if not properly managed, may result in soil contamination through accidental fuel and/or chemical spills or leaks. During construction, there would be a need to store small quantities of such materials onsite. Standard management measures that are commonly applied to construction work for the storage and handling of hazardous materials and operation of machinery would be implemented. As these are proven to be effective in minimising the likelihood and potential for spills and leaks, providing that they are correctly implemented then the impacts would be avoided or appropriately mitigated.

It is recommended that a Phase 2 investigation to further assess the areas of potential contamination be carried out. The Phase 2 investigation would address the potential risks of fill material.

Operation

The following impacts are typical of any operational road and may result in some contamination impact to the soils and geology of the area surrounding the bypass:

- Chemical and fuel spillage from road traffic, maintenance or accidents
- Runoff of oils, greases and hydrocarbons from the road.

There would not be any additional erosion impacts as a result of the operation of the proposal.

6.8.4 Safeguards and management measures

Table 6-47 describes the proposed safeguards that would be introduced to manage the predicted impacts described above. Appendix I contains further details on the specifics of the safeguards and management measures.

Table 6-47 Contamination, geology and soils safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Standard/additional safeguard
Contaminated land	<p>A Contaminated Land Management Plan will be prepared in accordance with the Guideline for the Management of Contamination (Roads and Maritime, 2013) and implemented as part of the CEMP. The plan will include, but not be limited to:</p> <ul style="list-style-type: none"> • Capture and management of any surface runoff contaminated by exposure to the contaminated land • Further investigations required to determine the extent, concentration and type of contamination, as identified in the detailed site investigation (Phase 2) • Management of the remediation and subsequent validation of the contaminated land, including any certification required • Measures to ensure the safety of site personnel and local communities during construction. 	Contractor	Detailed design/ pre-construction	Core standard safeguard C1 Section 4.2 of QA G36 <i>Environment Protection</i>
Contaminated land	<p>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 stop until the nature and extent of the contamination has been confirmed and any necessary site-specific controls or further actions identified in consultation with the Roads and Maritime Environment Manager and/or EPA.</p>	Contractor	Detailed design/ pre-construction	Core standard safeguard C2 Section 4.2 of QA G36 <i>Environment Protection</i>
Accidental spill	<p>A site-specific emergency spill plan will be developed, and include spill management measures in accordance with the Code of Practice for Water Management (RTA, 1999) and relevant EPA guidelines. The plan will address measures to be implemented in the event of a spill, including initial response and containment, notification of emergency services and relevant authorities (including Roads and Maritime and EPA officers).</p>	Contractor	Detailed design/ pre-construction	Core standard safeguard C3 Section 4.3 of QA G36 <i>Environment Protection</i>

Impact	Environmental safeguards	Responsibility	Timing	Standard/additional safeguard
Identification of contaminated land	A targeted Phase 2 investigation providing general coverage of the proposed alignment and areas of potential contamination sources (including areas where fill will be encountered during construction) will be undertaken. This investigation will address the potential risk that fill material may pose to construction workers and future users of the site. Assessments will be carried out in accordance with guidance made or endorsed by the NSW EPA. The contaminated land investigations will be carried out and the report verified by a suitably qualified and experienced environmental consultant.	Roads and Maritime	Detailed design/ pre-construction	Additional safeguard C4
Soil and water impacts	<p>A soil and water management plan (SWMP) will be prepared and implemented as part of the CEMP. It will be prepared in accordance with relevant guidelines including:</p> <ul style="list-style-type: none"> The Blue Book: Managing Urban Stormwater (MUS): Soils and Construction, Volume 2 (Landcom, 2008). <p>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.</p> <p>The SWMP will be reviewed by a soil conservationist on the Roads and Maritime list of Registered Contractors for Erosion, Sedimentation and Soil Conservation Consultancy Services. The SWMP will then be revised to address the outcomes of the review.</p>	Contractor	Detailed design/ pre-construction	Core standard safeguard SW1 Section 2.1 of QA G38 <i>Soil and Water Management</i>
Erosion and sediment discharge impacts	<p>A site-specific Erosion and Sediment Control Plan(s) (ESCP) will be prepared and implemented as part of the Soil and Water Management Plan</p> <p>The Plan will include arrangements for managing wet weather events, including monitoring of potential high-risk events (such as storms) and specific controls and follow-up measures to be applied in the event of wet weather.</p>	Contractor	Detailed design/ pre-construction	Core standard safeguard SW2 Section 2.2 of QA G38 Soil and Water Management
Soil and water impacts	All stockpiles will be designed, established, operated and decommissioned in accordance with the Stockpile Site Management Guideline (Roads and Maritime, 2015), QA Specification Q44 – Earthworks and NSW resource recovery exception requirements.	Contractor	Pre-construction/ construction	Additional safeguard: SW3

Impact	Environmental safeguards	Responsibility	Timing	Standard/additional safeguard
Soil stockpiles	Any materials stockpiled for long than 28 days would be stabilised and compacted, covered with anchored fabrics, sprayed with stabiliser, or seeded with sterile grass. Potential stockpile runoff would be controlled using suitable sediment traps in the form of fencing or berms.	Contractor	Pre-construction/ construction	Additional safeguard: SW4

6.9 Property and land use

This section describes the property and land use impacts that are predicted to occur from building and operating the proposal.

6.9.1 Methodology

Land zoning maps from the Parkes LEP and publicly available information were used to understand the current land zoning and land uses. The assessment considered:

- Property acquisition requirements
- Temporary and permanent public and private property impacts
- Conflict or inconsistency with land use zoning provisions in the area
- Severance impacts.

6.9.2 Existing environment

Land zoning and use

The proposal is in the Parkes LGA. The Parkes LEP indicates that most of the LGA is zoned for primary (agricultural) production (RU1). In general, the land to the west of the proposal footprint falls within this zoning while the land to the east, including Parkes town centre, is zoned for residential use (R5 and R1). Figure 6-28 shows the zoning of the proposal footprint.

The land zoning across the proposal footprint is:

- RU1 Primary Production
- R5 Large Lot Residential
- SP2 Infrastructure: Road Infrastructure.

The main existing land uses in the area, which reflect the current zonings, include:

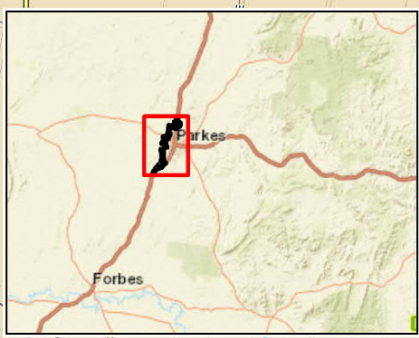
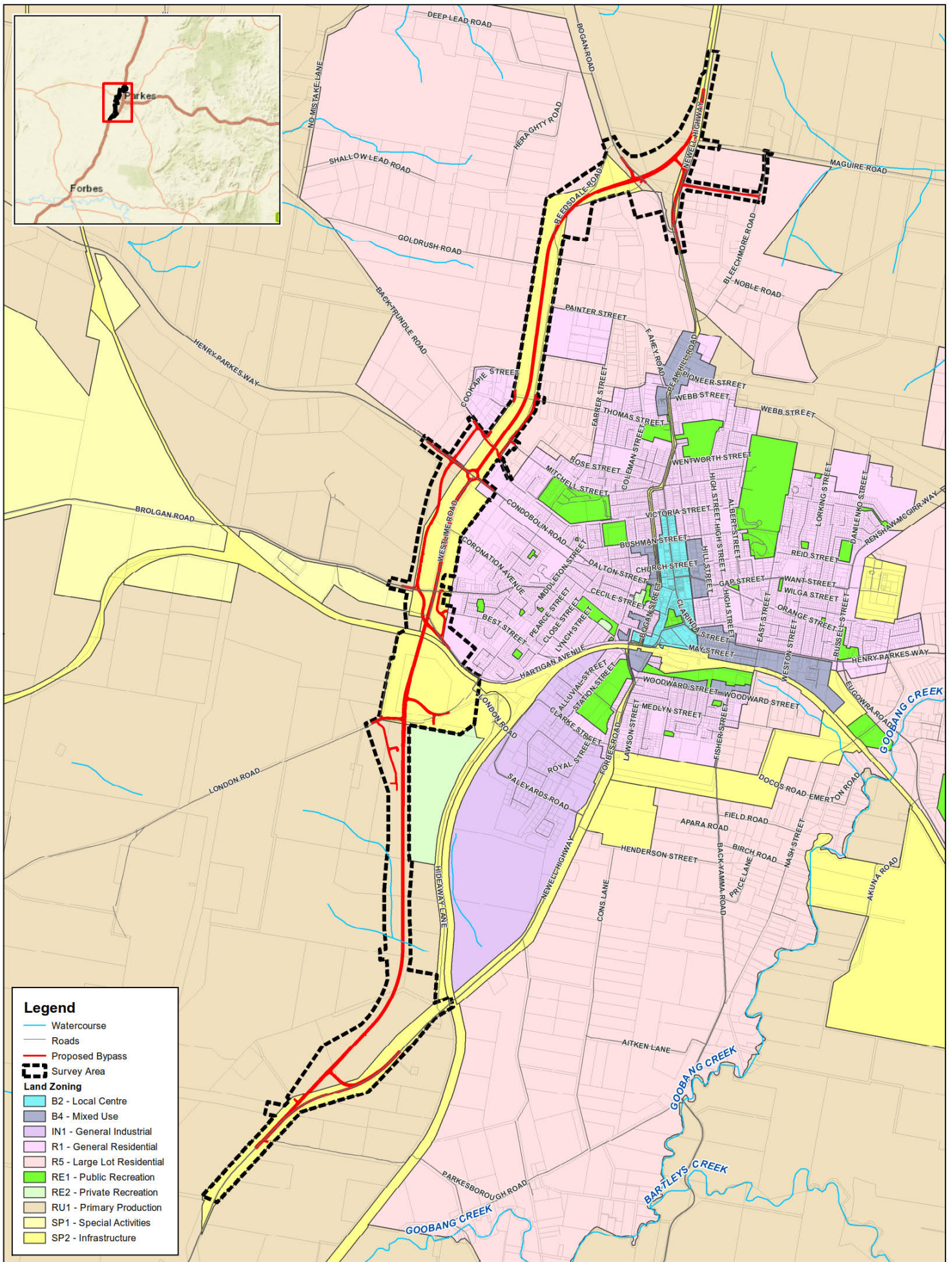
- Agriculture: grazing and crop production. The major crops grown in the area are cereals and oilseed winter crops including wheat, barley and canola
- Urban: Parkes largely comprises low-density residential dwellings, with a commercial centre located around the existing Newell Highway and the rail lines
- Industrial and transport infrastructure: as serviced and supported by the Stockinbingal-Parkes rail line, which is part of the main route for goods trains between Sydney and western NSW, and the Newell Highway; a major route for heavy vehicles through NSW.

The Parkes Shire Community Strategic Plan identifies developing the Parkes National Logistics Hub (part of the Parkes SAP) as one of its eight key directions for the future. In 2006, the Parkes Shire Council rezoned 516 hectares of land west of the town centre for the Parkes National Logistics Hub. This rezoning was critical in providing the opportunity for development of centralised storage, processing and distribution facilities to consolidate Parkes position as a major intermodal transport node.

Property

Most of the proposal footprint uses the existing TSR west of Parkes town centre. TSRs are parcels of Crown Land reserved under the *Local Land Services Act 2013* for use by travelling stock as pasture reserves (refer to section 4.2). The TSR within the proposal footprint is managed by the Central West Local Land Service.

In addition to the Crown Land, the proposal also traverses several private properties. These properties are all identified as large lots used for agricultural purposes.



Legend

- Watercourse
- Roads
- Proposed Bypass
- Survey Area

Land Zoning

- B2 - Local Centre
- B4 - Mixed Use
- IN1 - General Industrial
- R1 - General Residential
- R5 - Large Lot Residential
- RE1 - Public Recreation
- RE2 - Private Recreation
- RU1 - Primary Production
- SP1 - Special Activities
- SP2 - Infrastructure

Map: 2270437A_GIS_016_A3	Author: Naiken, David		
Date: 30/08/2018	Approved by: See, Isabella		
<small>Data Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, © OpenStreetMap contributors, and the GIS User Community</small>			Coordinate system: GDA 1994 MGA Zone 55 Scale ratio correct when printed at A3



**Parkes Bypass
Figure 6.28
Land Zoning**

6.9.3 Potential impacts

Construction

The proposal would require the acquisition of about land from the NSW Government and private owners. This would affect private landholders and 14 Crown Land lots, as outlined in section 3.6. Most of the private lots are zoned as Primary Production (RU1) and some are zoned Large Lot (R5). The Crown Land lots are zoned as Road Infrastructure (SP2) with a small amount zoned as Large Lot (R5) and Primary Production (RU1). While the need for property acquisition would be refined during detailed design, all acquisitions of privately owned land would be carried out in consultation with landowners and in accordance with the requirements of the *Land Acquisition (Just Terms Compensation) Act 1991* the supporting NSW Government Land Acquisition Reform 2016.

Temporary loss of or changes to access may be experienced by landholders during construction. Affected private land owners would need to access their properties via alternate routes which would add minor additional travel times to and from Parkes and Roads and Maritime has engaged with these landholders to identify new alternate access points. This impact and appropriate safeguards and management measures are also considered in section 6.1 and 6.2. There may be temporary land use changes during construction to accommodate the site compounds and other ancillary facilities (refer to section 3.4). The selection of the site compound locations would consider minimising impacts to land use where possible as described in section 3.4. Upon completion of construction, the temporary site compounds, work areas and stockpiles would be removed and the site would be rehabilitated with no loss in use or viability. As such the impact to the land would be neutral.

Construction would also impact on use of the TSR and may result in loss of access to parts of the TSR during periods of intensive construction activities. Where possible, these impacts would be minimised by implementing consultation with users of the TSR prior to start of construction and providing estimates of timing of activities and when access would be impacted. Additional measures would also be discussed and agreed with key stakeholders such as fencing or exclusion zones.

Construction activities have the potential to impact on existing utilities and services, underground services such as electricity, gas, and telecommunications (refer to section 3.5). Roads and Maritime would consult with relevant service providers during detailed design to identify possible interactions and develop procedures to be implemented to minimise the potential for service interruptions which have the potential to impact on existing land use.

Operation

Most of private property required for the proposal would be strip acquired from neighbouring properties. As such there would be minimal fragmentation of properties located along the proposal footprint. Any agricultural infrastructure impacted by the proposal would be relocated or reinstated by Roads and Maritime. The existing uses and intensity of use of properties are anticipated to be viable on the residual land not affected by acquisition given the low intensity agricultural use of affected properties. While impacts would depend on the circumstances of individual owners, overall impacts to the viability and productivity of properties would be expected to be minimal. Nonetheless, consultation with private landowners would continue during detailed design.

No houses would be subject to acquisition for the proposal. There is potential for amenity impacts including noise, traffic and visual impacts, to some residential properties located close to the proposal. These impacts and the propose safeguards and mitigation measures are discussed in sections 6.1, 6.3 and 6.4.

The TSR would remain operational after completion of the proposal. The proposal footprint is up to 60 metres wide which would allow sufficient room for continued use of the TSR and the road would be fenced along its length.

Operation of the proposal would result in a permanent change in land use from agricultural to road infrastructure. The land immediately next to the proposal footprint could continue to be used for its existing agricultural purposes. However, the operation of the Parkes Bypass may result in land use change surrounding the proposal through development of supporting roadside infrastructure including service stations, food providers and amenities. The economic impacts as a result of changes to land use, fragmentation and severance of property are further discussed in section 6.2.

6.9.4 Safeguards and management measures

Table 6-48 describes the proposed safeguards that would be introduced to manage the predicted impacts described above.

Table 6-48 Property and land use safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Standard/additional safeguard
Property acquisition	All property acquisition will be carried out in accordance with the Land Acquisition Information Guide (Roads and Maritime, 2012), the <i>Land Acquisition (Just Terms Compensation) Act 1991</i> and the supporting NSW Government Land Acquisition Reform 2016.	Roads and Maritime project manager	Pre-construction and construction	Core standard safeguard PL1
Land use impacts	Roads and Maritime will consult with affected landholders before and during construction to minimise the potential for impacts to land use.	Roads and Maritime	Detailed design	Additional safeguard PL2
TSR impact	Roads and Maritime will consult with key stakeholders for the TSR before and during construction to minimise the potential impacts.	Roads and Maritime	Pre-construction	Additional safeguard PL3

6.10 Surface water and groundwater

This section describes the surface and groundwater impacts that are predicted to occur from building and operating the proposal. This section was informed by a preliminary site investigation prepared for the proposal by WSP that is included in Appendix I.

6.10.1 Methodology

The Preliminary Site Investigation (WSP, 2017) included a review of the DPI Water registered groundwater bore database in June 2017 and Google Earth to understand the surface and groundwater characteristics locally.

6.10.2 Existing environment

The nearest named surface waterbody is Goobang Creek, which is located about 1.5 kilometres south of the proposal footprint at its nearest point. There are also some agricultural farm dams on private properties next to Hideaway Lane, and one located next to the Parkes Golf Course. Several similar dams are located at the northern end of the proposal footprint.

Table 6-49 provides the details of the 12 registered groundwater bores within 500 metres of the proposal footprint (Office of Water, 2017). These bores are mainly used as a stock and domestic drinking water supply.

Table 6-49 Groundwater bores

Bore ID	Approximate distance and direction from the proposal	Purpose	Total depth (m)	Standing water level (m)
GW002429	350 m west of the proposal (east of Bogan Road), 530 m north-west of Maguire Road	Unknown	34.80	30.80
GW704568	25 m east of the proposal (south of Bogan Road - Newell Highway), 70 m east of Currajong rest area	Stock/ domestic	57.00	27.00
GW703444	50 m west of the proposal (south of Bogan Road - Newell Highway), 90 m north of Currajong rest area	Stock/ domestic	56.00	Unknown
GW10688	150 m east of the proposal (south of Bogan Road - Newell Highway), 180 m south-east of Currajong rest area	Stock	52.70	30.50
GW704282	100 m east of the proposal (east of Reedsdale Road), 80 m south of Endicott Street	Stock/ domestic	45.00	25.00
GW702042	110 m east of the proposal (east of Reedsdale Road), 180 m north of Endicott Street	Stock/ domestic	50.00	25.00
GW702158	110 m east from the proposal (east of Reedsdale Road), 110 m north from Thomas Street	Stock/ domestic	42.00	27.00
GW704356	250 m east of the proposal (south of Thomas Street), 110 m south of Thomas Street	Stock/ domestic	53.00	Unknown
GW704588	450 m north of proposal (west of Moulden Street), 350 m west of Moulden Street	Stock/ domestic	35.00	24.00

Bore ID	Approximate distance and direction from the proposal	Purpose	Total depth (m)	Standing water level (m)
GW704643	100 m from the proposal (west of Moulden Street), 430 m west of Moulden Street	Stock/ domestic	66.00	27.00
GW703838	300 m south of proposal (west of Moulden Street), 200 m west of Moulden Street	Stock/ domestic	Unknown, assumed at 40.00 m	Unknown
GW020719	Within Parkes Golf Course, 430 m east of Ballerdee Lane	Stock	85.30	Unknown

Based on the groundwater bores, it is anticipated that the groundwater table is between 30 and 50 metres below ground level. Additional groundwater bores located in Parkes, suggest a shallower groundwater zone about 10 metres below ground level.

6.10.3 Potential impacts

Construction

As discussed in section 6.8, clearing of open grassland and earthworks during construction would expose soil and could lead to sedimentation and mobilisation of potential contaminants. However, the implementation of standard safeguards would mean that related impacts would be avoided and/or appropriately mitigated.

Transport of soils to stockpiles and construction site compounds would potentially result in runoff impacts, leading to increased pollution or turbidity in nearby farm dams and waterways. However, given Goobang Creek is located 1.5 kilometres from the proposal, it is unlikely to be impacted by the proposal.

Other potential surface water impacts include changed runoff and drainage patterns due to ground compaction and cut and fill work, as well as a risk of contamination due to chemical spills. However, the implementation of standard safeguards would mean that related impacts would be avoided and/or appropriately mitigated.

As the groundwater table is likely to be over 30 metres below the ground level, no impacts are expected because of the proposal.

Operation

The hard surface of the Parkes Bypass would lead to increased runoff. This would be channelled to specific outfall points. However, as the proposal's drainage design includes provisions for scour and runoff protection (refer to section 3.2.3) then the impacts would be avoided or otherwise appropriately mitigated.

6.10.4 Safeguards and management measures

The impacts described in the above section would be managed through the implementation of safeguards and management measures as described in section 6.8.4.

6.11 Other impacts

This section describes the environmental factors with negligible to minor impacts associated with building and operating roads. Their impacts can be safeguarded against and managed through adopting effective standard safeguards and mitigation measures (refer to section 6.11.2).

6.11.1 Existing environment and potential impacts

Table 6-50 describes the other potential impacts that may occur from building and operating the proposal.

Table 6-50 Other environmental aspects

Environmental factor	Existing environment	Potential impacts
Air quality	The existing air quality classification in the area is assessed as 'good-to-very good' (OEH, 2017). Some areas in Parkes along the Newell Highway experience a reduction in air quality due to idling of heavy vehicles and general traffic in localised congestion. Bushfires would also be a major influence on air quality in the area.	Temporary impacts may occur during construction, including generation of dust from earthworks, and emissions from the operation of equipment and construction vehicles.
Waste and resource use	<p>Section 3.3.4 describes the resources that would be needed to build the proposal. The final specifications and quantities of these resources would be defined during detailed design.</p> <p>Waste generated during construction would likely include:</p> <ul style="list-style-type: none"> Residual road material (concrete, asphalt, aggregate) Surplus building material (fencing, scrap material) Packing materials (pallets, crates, plastics) Food waste and general site waste and litter Wastewater from facilities, vehicle wash down and dust suppression Residual chemical (oils, lubricants, waste fuels, batteries) Green waste (trees and other vegetation). <p>The operation of the proposal may result in some additional roadside litter from vehicles using the bypass.</p>	<p>The generation of waste would have the potential to impact the local environment if not correctly managed. Potential impacts would include:</p> <ul style="list-style-type: none"> Ground contamination from spillages or runoff and waste transfer especially if there is stockpile mismanagement or poor waste storage Amenity impacts from littering and potential increased attraction of vermin and pest species Excessive waste being diverted to landfill. <p>Minimal amounts of resources would be needed to maintain and operate the road. These requirements would be consistent with the operation of all other major roads in the State. Opportunities would be taken where feasible to reuse:</p> <ul style="list-style-type: none"> Durable materials to limit replacement frequency Repurposed infrastructure such as signposts and lighting posts Recyclable and low-embodied energy materials.

Environmental factor	Existing environment	Potential impacts
Greenhouse gases and climate change	Vehicles travelling on the Newell Highway through Parkes currently experience delays due to the operation of two level crossings and two sets of 90-degree bends. As such, vehicle idling and inefficient running will increase the quantity of greenhouse gas emissions compared to when vehicles travel under free-flow conditions.	Building the proposal would result in minor greenhouse gases emissions through material consumption (including the embodied emissions in the production of materials), and through the use of plants and equipment. However, the operation of the proposal would cause a minor reduction in greenhouse gas emissions from vehicles by reducing the delays currently experienced through Parkes.
Utilities	Existing utilities including water, electricity and telecommunications infrastructure have been identified and located as part of the concept design.	<p>Water, electricity and telecommunications infrastructure would be affected by the proposal. There is the potential for damaging this infrastructure, causing network outages or safety hazards, if the appropriate standard safeguards and management measures are not implemented during construction.</p> <p>Confirmation of the protection or relocation of utilities and associated strategies would be carried out in consultation with utility authorities during detailed design</p>
Hazards and risk management	The current Newell Highway directs heavy traffic through the centre of Parkes, which results in the need to navigate sets of 90-degree bends. It also involves traffic travelling on roads through the town centre that are not optimally designed to support heavy vehicles. This presents a safety issues for road users. Also, the movement of high numbers of heavy vehicles through the Parkes town centre is also a hazard for pedestrians and cyclists.	Operation of the proposal would reduce heavy vehicle traffic in the Parkes town centre. This would lessen the inherent risks to drivers and other road users.

6.11.2 Safeguards and management measures

Table 6-51 describes the proposed safeguards that would be introduced to manage the predicted impacts described above.

Table 6-51 Other safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Standard/additional safeguard
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"> • Potential sources of air pollution • Air quality management objectives consistent with any relevant published EPA and/or OEH guidelines • Emission and dust mitigation and suppression measures to be implemented • Methods to manage work during strong winds or other adverse weather conditions • A progressive rehabilitation strategy for exposed surfaces. 	Contractor	Detailed design/ pre-construction	Core standard safeguard AQ1 Section 4.4 of QA G36 <i>Environment Protection</i>
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"> • Measures to avoid and minimise waste associated with the project • Classification of wastes and management options (re-use, recycle, stockpile, disposal) • Statutory approvals required for managing both on and off-site waste, or application of any relevant resource recovery exemptions • Procedures for storage, transport and disposal • Monitoring, record keeping and reporting. <p>The WMP will be prepared considering the Environmental Procedure - Management of Wastes on Roads and Maritime Services Land (Roads and Maritime, 2014) and relevant Roads and Maritime Waste Fact Sheets.</p>	Contractor	Detailed design/ pre-construction	Core standard safeguard W1 Section 4.2 of QA G36 <i>Environment Protection</i>

Impact	Environmental safeguards	Responsibility	Timing	Standard/additional safeguard
Waste	<p>The resource management hierarchy will be followed always throughout the proposal with the objective of:</p> <ul style="list-style-type: none"> • Avoiding resource consumption • Recovering recyclable materials for reuse • Disposing of material unable to be recycled. <p>If the material can be re-used, it would need to be sampled and tested to meet the criteria and conditions attached to the EPA's Excavated Public Road Material Exemption or Asphalt Exemption.</p>	Roads and Maritime	Pre-construction and construction	Additional safeguard W2
Waste	Waste accumulation, littering and general tidiness will be monitored during routine site inspections.	Contractor	Construction	Additional safeguard W3
Waste	Recycled, durable, and low embodied energy products will be used to reduce primary resource demand in instances where the materials are cost and performance competitive and comparable in environmental performance (eg where quality control specifications allow).	Contractor	Construction	Additional safeguard W4
Waste	Any material reused on site or imported to site from another project would be subject to testing and waste classification provisions in accordance with the Waste Classification Guidelines (DECCW, 2014). Should the material be classified as a controlled or restricted waste or found to contain contaminants of concern, it would not be classified for exemption and reuse. It would be stored in a contained separate location on site before being transported offsite to a licenced facility.	Contractor	Construction	Additional safeguard W5
Greenhouse gas/Climate change	Ensure efforts are made to reduce construction material requirements and to select recycled materials or materials with low-embodied energies where practical and possible.	Contractor	Pre-construction, construction	Additional safeguard GHG1
Utilities	<p>Prior to the commencement of works:</p> <ul style="list-style-type: none"> • The location of existing utilities and relocation details will be confirmed following consultation with the affected utility owners • If the scope or location of proposed utility relocation works falls outside of the assessed proposal scope and footprint, further assessment will be undertaken. 	Contractor	Detailed design/pre-construction	Core standard safeguard U1

Impact	Environmental safeguards	Responsibility	Timing	Standard/additional safeguard
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"> • Details of hazards and risks associated with the activity • Measures to be implemented during construction to minimise these risks • Record keeping arrangements, including information on the materials present on the site, material safety data sheets, and personnel trained and authorised to use such materials • A monitoring program to assess performance in managing the identified risks • Contingency measures to be implemented in the event of unexpected hazards or risks arising, including emergency situations. <p>The HRMP will be prepared in accordance with relevant guidelines and standards, including relevant Safe Work Australia Codes of Practice, and EPA or Office of Environment and Heritage publications.</p>	Contractor	Detailed design/ pre-construction	Core standard safeguard HAZ1

6.12 Cumulative impacts

This section describes the potential combined and interactive impacts of the proposal with other committed and approved development in the area.

6.12.1 Study area

The study area was defined by considering other projects within Parkes that have the potential to contribute to cumulative impacts with the proposal. The timing of the construction is from 2021 to 2024 subject to availability of funding and other commitments. This assessment includes regional projects of similar scale and function and excluded local residential developments or minor road works for local council roads.

6.12.2 Broader program of work

The Newell Highway Program includes the improvement of the Newell Highway along its route from Victoria to Queensland. The Parkes Bypass as detailed in section 3.1 is part of the Newell Highway Corridor Strategy (Transport for NSW, 2015). Several other parts of work along the Newell Highway include:

- Town bypass
- Pavement improvements
- Speed sign reviews
- Lane width improvements
- Intersection improvements
- Improve heavy vehicle rest areas.

This project forms part of the medium-term strategy option of bypassing the rail crossings to improve freight productivity and other project objectives.

6.12.3 Other projects and developments

Table 6-52 lists the other committed and approved projects that would potentially be being built or would operate within the study area at the same time as the proposal.

Table 6-52 Past, present and future projects

Project	Construction impacts	Operational impacts
<p>Brisbane to Melbourne Inland Rail – Parkes to Narromine</p> <p>Upgrade of 106 km of rail and 6 km of new rail connection at Parkes.</p> <p>The EIS and response to public submissions are being reviewed prior to determination.</p>	<ul style="list-style-type: none"> • Clearing of 75.8 hectares of native vegetation including TECs listed under the TSC Act and/or EPBC Act • Construction noise exceeding the criteria at various receivers • Dust generation, erosion and sedimentation 	<ul style="list-style-type: none"> • Changes in delays at level crossings expected • Noise from the operation of the rail line exceeding the criteria by 2040 • Increased pollutants in the air from diesel operated freight trains • Potential cumulative impacts to local residents within Parkes from two major project-construction undertaken at same time. However, the timeframe is uncertain.

Project	Construction impacts	Operational impacts
ParkeS SAP	<ul style="list-style-type: none"> Represents the ongoing shift towards increased industry the broader Parkes region There is likely to be gradual development in the area in line with the Council's plan to support development of logistics, storage and distribution industry. 	<ul style="list-style-type: none"> Increased heavy vehicle movement along the Newell Highway on completion of the Parkes to Narromine Inland Rail.
ParkeS Solar Farm – 210 hectares of ground mounted solar panels	<ul style="list-style-type: none"> Direct loss of native vegetation including threatened species and Endangered Ecological Communities (EEC). 	<ul style="list-style-type: none"> There are no expected cumulative impacts from this proposal and the Parkes Solar Farm.

6.12.4 Potential impacts

Table 6-53 Potential impacts

Environmental factor	Construction	Operation
Noise	<ul style="list-style-type: none"> Construction of the Inland Rail at the same time as the Parkes Bypass would potentially lead to a short-term temporary increase noise impact experienced by sensitive receivers for the duration of the construction works, particularly those located near the existing rail line and around and to the north of Brogan Road Construction of the projects near one another would be likely to cause construction fatigue for the same receivers Increased heavy vehicles use during construction may cause noise impacts to sensitive receivers. 	The operation of the proposal would create benefits to Parkes residents by decreasing the number of heavy vehicles passing through the town centre, concurrent operation of the Inland Rail and Parkes Bypass may create some permanent impacts for those located within proximity of both.
Biodiversity	Cumulative removal of EEC vegetation for the projects, however, the vegetation identified for removal by the projects are fragmented and not identified as 'important areas' of EEC.	n/a
Visual amenity	The presence of site compounds, stockpiles and construction plant and equipment for concurrent projects would have temporary negative impact on the amenity of the area.	The above proposals and projects represent permanent changes to the visual landscape of the region, however both the Parkes Bypass and Parkes to Narromine Inland Rail proposal have low visual profiles. Consultation with local stakeholders and mitigation measures would be undertaken for landowners affected by views of the Parkes Solar Farm.
Traffic	There may be potential for impacts to traffic in the area as a result of construction traffic accessing the proposals, the surrounding roads currently operate at a good level of service and so cumulative impacts would not be expected.	n/a
Soils	There is potential for dust to be generated from large areas of exposed soils. The safeguards would mitigate these impacts	During operation soils would be protected through landscaping and vegetation management.

6.12.5 Safeguards and management measures

Table 6-54 describes the proposed safeguards that would be introduced to manage the predicted impacts described above.

Table 6-54 Cumulative impact safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Standard/additional safeguard
Cumulative impacts	Consult with other developers to obtain information about project timeframes and impacts. Identify and implement appropriate safeguards and management measures to minimise cumulative impacts.	Roads and Maritime	Pre-construction/ construction	Additional safeguard CL1
Cumulative impacts	Prepare all environmental management plans to consider other developments in the area.	Contractor	Pre-construction	Additional safeguard CL2
Cumulative visual impacts	The projects would be designed to minimise the visual presence of the proposal elements in the landscape and to minimise clearing as far as possible.	Roads and Maritime	Detailed design	Additional safeguard CL3

7 Environmental management

This chapter describes how the proposal will be managed to reduce potential environmental impacts throughout detailed design, construction and operation. A framework for managing the potential impacts is provided. A summary of site-specific environmental safeguards is provided and the licence and/or approval requirements required prior to construction are also listed.

7.1 Environmental management plans (or system)

Several safeguards and management measures have been identified in the REF to minimise adverse environmental impacts, including social impacts, which could potentially arise because 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 Roads and Maritime Environment Officer, Western region, prior to the commencement of any on-site works. The CEMP will be a working document, subject to ongoing change and updated as necessary to respond to specific requirements. The CEMP would be developed in accordance with the specifications set out in the: QA Specification G36 – Environmental Protection (Management System), QA Specification G38 – Soil and Water Management (Soil and Water Plan), QA Specification G10 – Traffic Management and QA Specification R44 – Earthworks.

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	Standard/additional safeguard
GEN1	General - minimise environmental impacts during construction	<p>A CEMP will be prepared and submitted for review and endorsement of the Roads and Maritime 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"> • Any requirements associated with statutory approvals • Details of how the project will implement the identified safeguards outlined in the REF • Issue-specific environmental management plans • Roles and responsibilities • Communication requirements • Induction and training requirements • Procedures for monitoring and evaluating environmental performance, and for corrective action • Reporting requirements and record-keeping • Procedures for emergency and incident management • Procedures for audit and review. <p>The endorsed CEMP will be implemented during the undertaking of the activity.</p>	Contractor/ Roads and Maritime project manager	Pre-construction/ detailed design	Core standard safeguard GEN1
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/ Roads and Maritime project manager	Pre-construction	Core standard safeguard GEN2

No.	Impact	Environmental safeguards	Responsibility	Timing	Standard/additional safeguard
GEN3	General – environmental awareness	<p>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.</p> <p>Site-specific training will be provided to personnel engaged in activities or areas of higher risk. These include [<i>the following are examples only</i>]:</p> <ul style="list-style-type: none"> • Areas of Aboriginal heritage sensitivity • Threatened species habitat • Adjoining residential areas requiring particular noise management measures]. 	Contractor/ Roads and Maritime project manager	Pre-construction/ detailed design	Core standard safeguard GEN3

No.	Impact	Environmental safeguards	Responsibility	Timing	Standard/additional safeguard
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 <i>Traffic Control at Work Sites Manual</i> (RTA, 2010) and <i>QA Specification G10 Control of Traffic</i> (Roads and Maritime, 2008). The TMP will include:</p> <ul style="list-style-type: none"> • Confirmation of haulage routes • Measures to maintain access to local roads and properties • Site specific traffic control measures (including signage) to manage and regulate traffic movement • Measures to maintain pedestrian and cyclist access • Requirements and methods to consult and inform the local community of impacts on the local road network • Access to construction sites including entry and exit locations and measures to prevent construction vehicles queuing on public roads. • A response plan for any construction traffic incident • Consideration of other developments that may be under construction to minimise traffic conflict and congestion that may occur due to the cumulative increase in construction vehicle traffic • Monitoring, review and amendment mechanisms. 	Contractor	Detailed design/pre-construction	Core standard safeguard TT1 Section 4.8 of QA G36 <i>Environment Protection</i>
TT2	Changes to bus services	Any affected bus stops or routes would be relocated or re-routed.	Contractor	Construction	Additional safeguard TT2
TT3	Road closures	The necessary permits or licences will be obtained for road or lane closures or rail possessions.	Contractor	Construction	Additional safeguard TT3
TT4	Changed traffic conditions	Adequate advisory and warning signage will be provided of the road conditions ahead.	Contractor	Construction	Additional safeguard TT4

No.	Impact	Environmental safeguards	Responsibility	Timing	Standard/additional safeguard
TT5	Changed local road access	<p>Current traffic movements and property accesses are to be maintained during the works as far as practical. Any disturbance is to be minimised to prevent unnecessary traffic delays.</p> <p>Detour signage to Moulden Street and Back Trundle Road via Condobolin Road and Henry Parkes Way will be provided. This will include local road network connections with Condobolin Road.</p>	Roads and Maritime	Detailed design	Additional safeguard TT5
TT6	Changes to property access	<p>Alternate temporary and/or permanent property access routes would be provided (as required) in consultation with the relevant land owners/occupiers to maintain private property access during construction and operation.</p>	Roads and Maritime	Construction and operation	Additional safeguard TT6
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"> • Mechanisms to provide details and timing of proposed activities to affected residents, including changed traffic and access conditions • Contact name and number for complaints. <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	Core standard safeguard SE1

No.	Impact	Environmental safeguards	Responsibility	Timing	Standard/additional safeguard
SE2	Amenity impacts	<p>Roads and Maritime will consult with the following key stakeholders to address the following socio-economic- related impacts and opportunities:</p> <ul style="list-style-type: none"> • Local businesses and Council to provide signage infrastructure at bypass and intersections interchanges to attract business people from the Parkes Bypass into Parkes • Parkes Golf Club to address construction and operational amenity-related impacts for users of the golf course • Parkes Christian School to develop a safe alternative for children to walk and cycle to school when Victoria Street is closed • Bus operators to develop safe access routes to the Parkes Christian School during the construction and operation of the proposal • The emergency services to ensure access routes are included in the construction delivery plans and associated management plans, as well as, the inclusion of specific emergency access routes in to and out of Parkes once the Parkes Bypass is operational • Pedestrian and cyclist groups to notify them of planned diversions and road configuration changes and to understand any specific needs requirements that will need including under the detailed design • Pedestrian and cyclist groups to notify them of planned diversions and road configuration changes. 	Roads and Maritime	Detailed design and pre-construction	Additional safeguard SE2
SE3	Access changes to the travelling stock route	<p>Continued access to the travelling stock route would be provided during construction and once the Parkes Bypass is operational. Where necessary, Roads and Maritime will consult with relevant agricultural stakeholders (including the Department of Industry: Lands) and/or recreational users of the travelling stock route to notify them of any change in access points, which will be additionally advertised in the media and around the proposed work sites.</p>	Roads and Maritime	Pre-construction	Additional safeguard SE3

No.	Impact	Environmental safeguards	Responsibility	Timing	Standard/additional safeguard
SE4	Perceived passing trade loss in Parkes	Roads and Maritime would continue to work with the Chamber of Commerce, Council and other business-groups to ensure ongoing concerns are listed to and acted upon.	Roads and Maritime	Detailed design	Additional safeguard SE4
SE5	Perceived passing trade loss in Parkes	Roads and Maritime will develop and implement a Signage Strategy in consultation with the Chamber of Commerce, Council and other business-groups as part of the detailed design. The strategy will review previous bypassed towns to confirm the most effective way to attract people in to the town.	Roads and Maritime	Detailed design	Additional safeguard SE5
SE6	Private property acquisition, severance, residual functional use, and amenity-related impacts	<p>Roads and Maritime would continue consulting with directly (acquisition) and indirectly (amenity-related) impacted residents.</p> <p>Roads and Maritime would develop final property fencing, driveway and other property infrastructure adjustments in consultation with the affected property owners and this will be reflected in the detailed design.</p> <p>The impact of land acquisition will be assessed in accordance with <i>Land Acquisition (Just Terms Compensation) Act 1991</i>, the Land Acquisition Reform 2016, and the Land Acquisition Information Guide (Roads and Maritime, 2014).</p> <p>The assessment would consider each owner's remaining holdings accounting for the impacts of severance and/or the residual functional use of any remaining land. Roads and Maritime will engage an appropriately qualified property and/or agricultural specialist to assess these impacts and to identify alternative opportunities for their remaining holdings.</p> <p>Roads and Maritime would manage any residual land in accordance with its disposal processes. This will involve considering landowner requests for land swaps.</p>	Roads and Maritime	Detailed design	Additional safeguard SE6
SE7	Temporary access restrictions, diversions and traffic management controls	Roads and Maritime will work with the freight and agricultural industries to identify critical times during the year where access reliability is critical (e.g. harvest time). These will be included in the Traffic Management Plan.	Roads and Maritime	Detailed design	Additional safeguard SE7

No.	Impact	Environmental safeguards	Responsibility	Timing	Standard/additional safeguard
SE8	Private property access changes	Roads and Maritime will work with the property owners whose accesses will be impacted by the proposal to discuss their needs. The final access arrangement will be agreed and they will form part of the detailed design.	Roads and Maritime	Detailed design	Additional safeguard SE8
NV1	Noise and vibration	<p>A Construction Noise, Vibration and Blasting Management Plan (CNVBMP) will be prepared and implemented as part of the CEMP. The CNVBMP will generally follow the approach in the <i>Interim Construction Noise Guideline</i> (ICNG, DECC, 2009) and identify:</p> <ul style="list-style-type: none"> • All potential significant noise and vibration generating activities associated with the activity • Feasible and reasonable mitigation measures to be implemented, taking into account Beyond the Pavement: urban design policy, process and principles (Roads and Maritime, 2014) • A monitoring program to assess performance against relevant noise and vibration criteria • Arrangements for consultation with affected neighbours and sensitive receivers, including notification and complaint handling procedures. • Contingency measures to be implemented in the event of non-compliance with noise and vibration criteria. 	Contractor	Detailed design/ pre-construction	<p>Core standard safeguard NV1</p> <p>Section 4.6 of QA G36 <i>Environment Protection</i></p>
NV2	Noise and vibration	<p>All sensitive receivers (eg schools, residents) likely to be affected will be notified at least seven-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"> • The project • The construction period and construction hours • Contact information for project management staff • Complaint and incident reporting • How to obtain further information. 	Contractor	Detailed design/ pre-construction	Core standard safeguard NV2

No.	Impact	Environmental safeguards	Responsibility	Timing	Standard/additional safeguard
NV3	Operational noise impact	<p>Further assessment of the following possible noise mitigation strategies will be carried out to address the receivers identified to qualify for consideration of mitigation (strategies listed in the order of decreasing preference):</p> <ul style="list-style-type: none"> • Road design and traffic management • Quieter road pavement • Noise barriers • At-property treatments. 	Roads and Maritime	Detailed design	Additional safeguard NV3
NV4	Construction traffic noise	When further information becomes available, a review of the potential road traffic noise impact on the existing road network from construction vehicles or changes to the road network during construction will be carried out.	Roads and Maritime	Pre-construction	Additional safeguard NV4

No.	Impact	Environmental safeguards	Responsibility	Timing	Standard/additional safeguard
UD1	Landscape character and visual impact	<p>An Urban Design Plan (UDP) will be prepared to support the final detailed project design and implemented as part of the CEMP.</p> <p>The UDP will present an integrated urban design for the project, providing practical detail on the application of design principles and objectives identified in the environmental assessment. The Plan will include design treatments for:</p> <ul style="list-style-type: none"> • Location and identification of existing vegetation and proposed landscaped areas, including species to be used • Built elements including retaining walls, bridges and noise walls • Pedestrian and cyclist elements including footpath location, paving types and pedestrian crossings • Fixtures such as seating, lighting, fencing and signs • Details of the staging of landscape works taking account of related environmental controls such as erosion and sedimentation controls and drainage • Procedures for monitoring and maintaining landscaped or rehabilitated areas. <p>The Urban Design Plan will be prepared in accordance with relevant guidelines, including:</p> <ul style="list-style-type: none"> • Beyond the Pavement urban design policy, process and principles (Roads and Maritime, 2014) • Landscape Guideline (RTA, 2008) • Bridge Aesthetics (Roads and Maritime 2012) • Noise Wall Design Guidelines (RTA, 2006) • Shotcrete Design Guideline (RTA, 2005). 	Contractor	Detailed design/ pre-construction	Core standard safeguard UD1

No.	Impact	Environmental safeguards	Responsibility	Timing	Standard/additional safeguard
UD2	Operational light spill impacts	The lighting design specification will be developed to ensure the height and direction of any relocated lighting poles will not be next to any residential properties where feasible and reasonable. If there is any identified conflict, it will be considered if the lighting pole can be relocated. If the pole location cannot be relocated the aim will be to minimise light spill and light glare in accordance with the provisions of AS4282-1997 Control of the Obtrusive Effect of Outdoor Lighting (Standards Australia, 1997). This may require the use of directional lighting, cut-offs or filters.	Roads and Maritime	Detailed design	Additional safeguard: UD2
UD3	Landscape character and visual impact	The landscape plans will incorporate the design principles outlined in the landscape character and visual impact assessment and urban design technical study report.	Roads and Maritime	Detailed design	Additional safeguard: UD3
UD4	Planting and vegetation	<ul style="list-style-type: none"> Choose vegetation on embankments either side of the Parkes Bypass based on its ability to screen the built form and reduce the scale of the infrastructure. A selection of appropriate grasses, low groundcovers and groups of native trees should be utilised Maintain long vistas to distant hills where possible, ensuring that landscape planting does not block views Plant trees either side of the bridge structure to screen built form and reduce the scale of the infrastructure Reinforce the local semi-rural landscape character using appropriate vegetation Ensure planting conforms to sight lines and clear zone requirements Restore disturbed areas to match existing conditions Use slope stabilisation matting such as a textile mat to assist planting. 	Roads and Maritime, Contractor	Detailed design/ construction	Additional safeguard: UD4
UD5	Signage	<ul style="list-style-type: none"> Provide clear wayfinding signage for visitors wishing to travel into Parkes Consider entry or gateway treatments to the northern and southern entrances to Parkes. 	Roads and Maritime	Detailed design	Additional safeguard: UD5

No.	Impact	Environmental safeguards	Responsibility	Timing	Standard/additional safeguard
UD6	Construction visual impacts	<ul style="list-style-type: none"> • Locate storage areas and associated works in cleared or otherwise disturbed areas away from vegetation • Avoid stockpiling materials in areas supporting vegetation where possible • Restrict vegetation clearing to those areas where it is necessary • Opportunities to minimise clearing should be part of the detailed design, further to any being considered currently • Trimming rather than the removal of trees to be undertaken where possible and to be conducted by a qualified arborist • Rehabilitate vegetated areas where ground is disturbed. 	Contractor	Construction	Additional safeguard: UD6
UD7	Construction visual impacts	<ul style="list-style-type: none"> • Hoarding will be erected around the construction compound where possible, to reduce visibility. 	Contractor	Construction	Additional safeguard: UD7
UD8	Construction visual impacts	<ul style="list-style-type: none"> • The construction area will be kept clean and clear of rubbish. 	Contractor	Construction	Additional safeguard: UD8
UD9	Operational visual and amenity impacts	<ul style="list-style-type: none"> • Where feasible and reasonable, an integrated response to the design will be adopted that provides noise treatment in combination with visual mitigation. 	Roads and Maritime	Detailed design	Additional safeguard: UD9
UD10	Tree management and removal	<ul style="list-style-type: none"> • Any tree removal or pruning will be undertaken by a qualified specialist and in accordance with AS4970: 2009: Protection of Trees on Development Sites (Standards Australia, 2009) and AS4373:2007: Pruning of Amenity Trees and WorkCover Amenity Tree Industry Code of Practice 1998. 	Contractor	Pre-construction/ construction	Additional safeguard: UD10

No.	Impact	Environmental safeguards	Responsibility	Timing	Standard/additional safeguard
B1	Biodiversity	<p>A Flora and Fauna Management Plan (FFMP) will be prepared in accordance with Biodiversity Guidelines: Protecting and Managing Biodiversity on RTA Projects (RTA, 2011) and implemented as part of the CEMP. It will include, but not be limited to:</p> <ul style="list-style-type: none"> Plans showing areas to be cleared and areas to be protected, including exclusion zones, protected habitat features and revegetation areas Requirements set out in the Landscape Guideline (RTA, 2008) Pre-clearing survey requirements Procedures for unexpected threatened species finds and fauna handling Procedures addressing relevant matters specified in the Policy and guidelines for fish habitat conservation and management (DPI Fisheries, 2013) Protocols to manage weeds and pathogens. 	Contractor	Detailed design/ pre-construction	Core standard safeguard B1 Section 4.8 of QA G36 <i>Environment Protection</i>
B2	Biodiversity	Measures to further avoid and minimise the construction footprint and native vegetation or habitat removal will be investigated during detailed design and implemented where practicable and feasible.	Contractor	Detailed design	Core standard safeguard B2
B3	Biodiversity	<p>Determine appropriate exclusion zones during pre-clearing surveys to minimise clearing of native vegetation.</p> <p>Pre-clearing surveys will be undertaken in accordance with Guide 1: Pre-clearing process of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (Roads and Traffic Authority, 2011).</p>	Contractor	Pre-construction	Additional safeguard B3
B4	Biodiversity	Exclusion zones will be set up at the limit of clearing in accordance with Guide 2: Exclusion zones of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (Roads and Traffic Authority, 2011).	Contractor	Pre-construction	Additional safeguard B4
B5	Biodiversity	Habitat will be replaced or re-instated in accordance with Guide 5: Re-use of woody debris and bushrock and Guide 8: Nest boxes of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (Roads and Traffic Authority, 2011).	Contractor	Post-construction	Additional safeguard B5

No.	Impact	Environmental safeguards	Responsibility	Timing	Standard/additional safeguard
B6	Biodiversity	Habitat removal will be carried out in accordance with Guide 4: Clearing of native vegetation and removal of bushrock of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (Roads and Traffic Authority, 2011).	Contractor	Post-construction	Additional safeguard B6
B7	Biodiversity	Wherever practicable, within road safety limitations and provisions for utilities, native vegetation will be restored in areas along the existing road corridors with canopy and shrub species such as <i>Eucalypt sp.</i> , <i>Callistemon sp.</i> and <i>Grevillea sp.</i> Native vegetation will be re-established in accordance with Guide 3: Re-establishment of native vegetation of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (Roads and Traffic Authority, 2011).	Contractor	Post-construction	Additional safeguard B7
B8	Biodiversity	The unexpected species find procedure is to be followed under Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (Roads and Traffic Authority, 2011) if threatened ecological communities, flora or fauna, not assessed in the biodiversity assessment, are identified in the proposal footprint.	Contractor	Construction	Additional safeguard B8
B9	Biodiversity	Fauna (injury) will be managed in accordance with Guide 9: Fauna handling of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (Roads and Traffic Authority, 2011).	Contractor	Construction	Additional safeguard B9
B10	Biodiversity	Changes to existing surface water flows will be minimised through detailed design.	Roads and Maritime	Detailed design	Additional safeguard B10
B11	Biodiversity	Minimising roadkill will be considered in the detailed design of the road and associated infrastructure (eg culverts, fencing) and landscaping.	Roads and Maritime	Detailed design	Additional safeguard B11
B12	Biodiversity	Weed species will be managed in accordance with Guide 6: Weed management of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (Roads and Traffic Authority, 2011).	Contractor	Construction	Additional safeguard B12

No.	Impact	Environmental safeguards	Responsibility	Timing	Standard/additional safeguard
B13	Biodiversity	Hygiene procedures will be implemented for the use of vehicles and material imports to the proposal footprint in accordance with Guide 7: Pathogen management of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (Roads and Traffic Authority, 2011).	Contractor	Construction	Additional safeguard B13
B14	Biodiversity	The unexpected species find procedure is to be followed under Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (Roads and Traffic Authority, 2011) if threatened ecological communities, fauna, flora, not assessed in the biodiversity assessment, are identified in the proposal footprint.	Contractor	Construction	Additional safeguard B14
AH1	Aboriginal heritage	An Aboriginal Heritage Management Plan (AHMP) will be prepared in accordance with the Procedure for Aboriginal cultural heritage consultation and investigation (PACHCI, Roads and Maritime, 2012) and Standard Management Procedure – Unexpected Heritage Items (Roads and Maritime, 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	Core standard safeguard AH1 Section 4.9 of QA G36 <i>Environment Protection</i>
AH2	Aboriginal heritage	The Standard Management Procedure - Unexpected Heritage Items (Roads and Maritime, 2015) will be followed if an unknown or potential Aboriginal object(s), including skeletal remains, is found during construction. This applies where Roads and Maritime does not have approval to disturb the object (s) or where a specific safeguard for managing the disturbance (apart from the Procedure) is not in place. Work will only re-commence once the requirements of that Procedure have been satisfied.	Contractor	Detailed design/ pre-construction	Core standard safeguard AH2 Section 4.9 of QA G36 <i>Environment Protection</i>
AH3	Aboriginal heritage	A buffer zone (10 metres around each site as a minimum) will be created around Barkers Road-ST1 and Westlime Road-ST1 to ensure they are avoided during construction. High-visibility fencing should be used.	Contractor	Construction	Additional safeguard AH3

No.	Impact	Environmental safeguards	Responsibility	Timing	Standard/additional safeguard
AH4	Aboriginal heritage	All land-disturbing activities must be confined to within the assessed survey area shown in Figure 6-25. Should the parameters of the proposed work extend beyond the assessed area then further archaeological assessment may be needed.	Contractor	Construction	Additional safeguard AH4
AH5	Aboriginal heritage	All construction personnel will be made aware of the location of Barkers Road-ST1 and Westlime Road-ST1 and inductions should be provided as to the location of the recorded sites and their legislative protection under the NPW Act.	Contractor	Construction	Additional safeguard AH5
H1	Non-Aboriginal heritage	A Non-Aboriginal Heritage Management Plan (NAHMP) will be prepared and implemented as part of the CEMP. It will provide specific guidance on measures and controls to be implemented to avoid and mitigate impacts to Non-Aboriginal heritage.	Contractor	Detailed design/ pre-construction	Core standard safeguard H1 Section 4.10 of QA G36 <i>Environment Protection</i>
H2	Non-Aboriginal heritage	The Standard Management Procedure – Unexpected Heritage Items (Roads and Maritime, 2015) will be followed if any unexpected heritage items, archaeological remains or potential relics of Non-Aboriginal origin are encountered. Work will only re-commence once the requirements of that Procedure have been satisfied.	Contractor	Detailed design/ pre-construction	Core standard safeguard H2 Section 4.10 of QA G36 <i>Environment Protection</i>
H3	Non-Aboriginal Heritage	The location of the disused gold mine shafts (Reedsdale Road-HS01) should be included on site sensitivity plans and a no-go exclusion zone will be established before construction work starts. If any part of the site cannot be avoided by the proposal the site will be subject to photographic archival recording.	Contractor	Construction	Additional safeguard H3
H4	Non-Aboriginal Heritage	All contractors undertaking the work will be made aware of the legislative protection of historic heritage sites in the event unknown heritage items are encountered during the work. Accordingly, site inductions will be provided to workers on the project to inform them of the location of the recorded sites and their legislative protection under the <i>Heritage Act 1977</i> .	Contractor	Construction	Additional safeguard H4
H5	Non-Aboriginal Heritage	All land-disturbing activities will be confined within the assessed survey area. Should impacts change such that the area to be impacted is altered then additional assessment may be required.	Contractor	Construction	Additional safeguard H5

No.	Impact	Environmental safeguards	Responsibility	Timing	Standard/additional safeguard
H6	Non-Aboriginal Heritage	All contractors undertaking the work will be made aware of the legislative protection of historic heritage sites in the event unknown heritage items are encountered during the work.	Contractor	Construction	Additional safeguard H6
C1	Contaminated land	<p>A Contaminated Land Management Plan will be prepared in accordance with the Guideline for the Management of Contamination (Roads and Maritime, 2013) and implemented as part of the CEMP. The plan will include, but not be limited to:</p> <ul style="list-style-type: none"> • Capture and management of any surface runoff contaminated by exposure to the contaminated land • Further investigations required to determine the extent, concentration and type of contamination, as identified in the detailed site investigation (Phase 2) • Management of the remediation and subsequent validation of the contaminated land, including any certification required • Measures to ensure the safety of site personnel and local communities during construction. 	Contractor	Detailed design/pre-construction	Core standard safeguard C1 Section 4.2 of QA G36 <i>Environment Protection</i>
C2	Contaminated land	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 stop until the nature and extent of the contamination has been confirmed and any necessary site-specific controls or further actions identified in consultation with the Roads and Maritime Environment Manager and/or EPA.	Contractor	Detailed design/pre-construction	Core standard safeguard C2 Section 4.2 of QA G36 <i>Environment Protection</i>
C3	Accidental spill	A site-specific emergency spill plan will be developed, and include spill management measures in accordance with the Roads and Maritime Code of Practice for Water Management (RTA, 1999) and relevant EPA guidelines. The plan will address measures to be implemented in the event of a spill, including initial response and containment, notification of emergency services and relevant authorities (including Roads and Maritime and EPA officers).	Contractor	Detailed design/pre-construction	Core standard safeguard C3 Section 4.3 of QA G36 <i>Environment Protection</i>

No.	Impact	Environmental safeguards	Responsibility	Timing	Standard/additional safeguard
C4	Identification of contaminated land	A targeted Phase 2 investigation providing general coverage of the proposed alignment and areas of potential contamination sources (including areas where fill will be encountered during construction) will be undertaken. This investigation will address the potential risk that fill material may pose to construction workers and future users of the site. Assessments will be carried out in accordance with guidance made or endorsed by the NSW EPA. The contaminated land investigations will be carried out and the report verified by a suitably qualified and experienced environmental consultant.	Roads and Maritime	Detailed design, Pre-construction	Additional safeguard C4
SW1	Soil and water impacts	<p>A soil and water management plan (SWMP) will be prepared and implemented as part of the CEMP. It will be prepared in accordance with relevant guidelines including:</p> <ul style="list-style-type: none"> The Blue Book: Managing Urban Stormwater (MUS): Soils and Construction, Volume 2 (Landcom, 2008). <p>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.</p> <p>The SWMP will be reviewed by a soil conservationist on the Roads and Maritime list of Registered Contractors for Erosion, Sedimentation and Soil Conservation Consultancy Services. The SWMP will then be revised to address the outcomes of the review.</p>	Contractor	Detailed design/pre-construction	<p>Core standard safeguard: SW1</p> <p>Section 2.1 of QA G38 <i>Soil and Water Management</i></p>
SW2	Erosion and sediment discharge impacts	<p>A site-specific Erosion and Sediment Control Plan(s) (ESCP) will be prepared and implemented as part of the Soil and Water Management Plan</p> <p>The Plan will include arrangements for managing wet weather events, including monitoring of potential high-risk events (such as storms) and specific controls and follow-up measures to be applied in the event of wet weather.</p>	Contractor	Detailed design/pre-construction	<p>Core standard safeguard SW2</p> <p>Section 2.2 of QA G38 <i>Soil and Water Management</i></p>
SW3	Soil and water impacts	All stockpiles will be designed, established, operated and decommissioned in accordance with the Stockpile Site Management Guideline (Roads and Maritime, 2015), QA Specification Q44 – Earthworks and NSW resource recovery exception requirements.	Contractor	Pre-construction/construction	Additional safeguard SW3

No.	Impact	Environmental safeguards	Responsibility	Timing	Standard/additional safeguard
SW4	Soil stockpiles	Any materials stockpiled for long than 28 days would be stabilised and compacted, covered with anchored fabrics, sprayed with stabiliser, or seeded with sterile grass. Potential stockpile runoff would be controlled using suitable sediment traps in the form of fencing or berms.	Contractor	Pre-construction/ construction	Additional safeguard SW4
PL1	Property acquisition	All property acquisition will be carried out in accordance with the Land Acquisition Information Guide (Roads and Maritime, 2012), the <i>Land Acquisition (Just Terms Compensation) Act 1991</i> and the supporting NSW Government Land Acquisition Reform 2016.	Roads and Maritime project manager	Pre-construction and construction	Core standard safeguard PL1
PL2	Land use impacts	Roads and Maritime will consult with affected landholders before and during construction to minimise the potential for impacts to land use.	Roads and Maritime	Detailed design	Additional safeguard PL2
PL3	TSR impact	Roads and Maritime will consult with key stakeholders for the TSR before and during construction to minimise the potential impacts.	Roads and Maritime	Pre-construction	Additional safeguard PL3
AQ1	Air quality	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: <ul style="list-style-type: none"> • Potential sources of air pollution • Air quality management objectives consistent with any relevant published EPA and/or OEH guidelines • Emission and dust mitigation and suppression measures to be implemented • Methods to manage work during strong winds or other adverse weather conditions • A progressive rehabilitation strategy for exposed surfaces. 	Contractor	Detailed design/pre-construction	Core standard safeguard AQ1 Section 4.4 of QA G36 <i>Environment Protection</i>

No.	Impact	Environmental safeguards	Responsibility	Timing	Standard/additional safeguard
W1	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"> Measures to avoid and minimise waste associated with the project Classification of wastes and management options (re-use, recycle, stockpile, disposal) Statutory approvals required for managing both on and off-site waste, or application of any relevant resource recovery exemptions Procedures for storage, transport and disposal Monitoring, record keeping and reporting. <p>The WMP will be prepared considering the Environmental Procedure – Management of Wastes on Roads and Maritime Services Land (Roads and Maritime, 2014) and relevant Roads and Maritime Waste Fact Sheets.</p>	Contractor	Detailed design/ pre-construction	Core standard safeguard W1 Section 4.2 of QA G36 <i>Environment Protection</i>
W2	Waste	<p>The resource management hierarchy will be followed always throughout the proposal with the objective of:</p> <ul style="list-style-type: none"> Avoiding resource consumption Recovering recyclable materials for reuse Disposing of material unable to be recycled. <p>If the material can be re-used, it would need to be sampled and tested to meet the criteria and conditions attached to the EPA's Excavated Public Road Material Exemption or Asphalt Exemption.</p>	Roads and Maritime	Pre-construction and construction	Additional safeguard W2
W3	Waste	Waste accumulation, littering and general tidiness will be monitored during routine site inspections.	Contractor	Construction	Additional safeguard W3
W4	Waste	Recycled, durable, and low embodied energy products will be used to reduce primary resource demand in instances where the materials are cost and performance competitive and comparable in environmental performance (eg where quality control specifications allow).	Contractor	Construction	Additional safeguard W4

No.	Impact	Environmental safeguards	Responsibility	Timing	Standard/additional safeguard
W5	Waste	Any material reused on site or imported to site from another project would be subject to testing and waste classification provisions in accordance with the Waste Classification Guidelines (DECCW, 2014). Should the material be classified as a controlled or restricted waste or found to contain contaminants of concern, it would not be classified for exemption and reuse. It would be stored in a contained separate location on site before being transported offsite to a licenced facility.	Contractor	Construction	Additional safeguard W5
GHG1	Greenhouse gas/Climate change	Ensure efforts are made to reduce construction material requirements and to select recycled materials or materials with low-embodied energies where practical and possible.	Contractor	Pre-construction, construction	Additional safeguard GHG1
U1	Utilities	<p>Prior to the commencement of works:</p> <ul style="list-style-type: none"> The location of existing utilities and relocation details will be confirmed following consultation with the affected utility owners. <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	Core standard safeguard U1

No.	Impact	Environmental safeguards	Responsibility	Timing	Standard/additional safeguard
HAZ1	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"> • Details of hazards and risks associated with the activity • Measures to be implemented during construction to minimise these risks • Record keeping arrangements, including information on the materials present on the site, material safety data sheets, and personnel trained and authorised to use such materials • A monitoring program to assess performance in managing the identified risks • Contingency measures to be implemented in the event of unexpected hazards or risks arising, including emergency situations. <p>The HRMP will be prepared in accordance with relevant guidelines and standards, including relevant Safe Work Australia Codes of Practice, and EPA or Office of Environment and Heritage publications.</p>	Contractor	Detailed design/ pre-construction	Core standard safeguard HAZ1
CL1	Cumulative impacts	Consult with other developers to obtain information about project timeframes and impacts. Identify and implement appropriate safeguards and management measures to minimise cumulative impacts.	Roads and Maritime	Pre-construction/ construction	Additional safeguard CL1
CL2	Cumulative impacts	Prepare all environmental management plans to consider other developments in the area.	Contractor	Pre-construction	Additional safeguard CL2
CL3	Cumulative visual impacts	The projects would be designed to minimise the visual presence of the proposal elements in the landscape and to minimise clearing as far as possible.	Roads and Maritime	Detailed design	Additional safeguard CL3

7.3 Licensing and approvals

Table 7-2 Summary of licensing and approvals required

Instrument	Requirement	Timing
<i>Protection of the Environment Operations Act 1997 (s43)</i>	Environment protection licence (EPL) for the excavation of more than 30,000 tonnes of material from the EPA.	Prior to commencement of construction
<i>Roads Act 1993</i>	Licence from Parkes Shire Council and the Transport Management Centre to occupy roads during construction.	Prior to the start of the activity
<i>Crown Lands Management Act 2016</i>	To secure acquisition of Crown Land.	Prior to the start of the activity

8 Conclusion

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

8.1 Justification

8.1.1 Social factors

As discussed in Section 6.1, the proposal would reduce the number of heavy vehicles travelling through the Parkes town centre. This would result in several social benefits for residents and visitors of Parkes including:

- Improved amenity in Parkes town centre including a potential reduction in noise and vehicle emissions from the existing Newell Highway
- Increased road safety for pedestrians, cyclists and drivers in Parkes town centre due to the reduction in heavy vehicle traffic volumes along the existing Newell Highway
- Faster travel from one end to the other of Parkes due to bypassing the level crossings
- Reduction in the likelihood of crashes on the existing Newell Highway in Parkes.

However, there would also be some minor negative social impacts including:

- Temporary inconvenience due to construction of the proposal associated with equipment noise and visual impacts as well as construction traffic and road diversions
- Route diversion and travel time increases for some residents and landowners due to the local road closures and re-alignments
- Property impacts to six private land owners due to the acquisition of about land
- Visual change to the agricultural landscape of the area surrounding Parkes, particularly from the bridge structures.

These minor negative impacts would be minimised where possible, such as by consulting with landowners, amenity landscape planning and other mitigation measures during design and construction. Overall, the social benefits of the proposal would outweigh the negative social impacts.

8.1.2 Biophysical factors

The proposal is expected to result in the removal of about 61.44 hectares of vegetation, of which about two per cent is native and about 98 per cent forms miscellaneous ecosystems mainly made up of pasture grassland, cropping, landscape plantings. Of the vegetation to be cleared, about 0.94 hectares is consistent with a TEC. This could lead to loss of threatened fauna habitat. There is also likely to be a risk of fauna injury and mortality from equipment operation, traffic along the Parkes Bypass and removal of vegetation. However, the proposal is not likely to significantly impact threatened species, populations or ecological communities or their habitats.

The Parkes Bypass would also involve a large amount of material to be excavated for the construction of the bypass. Any associated sediment, erosion and soil quality impacts would be temporary and minor. Any impact on heritage or water due to the proposal is expected to be negligible.

Therefore, the proposal is not expected to significantly impact the biophysical environment. Any impacts would be further minimised through implementation of safeguards and management measures.

8.1.3 Economic factors

A key objective of the strategy and proposal is to improve the highway as an inland freight route between Queensland and Victoria via New South Wales. The proposal would improve freight efficiency around Parkes by avoiding the need for heavy vehicles to travel through Parkes town centre by diverting them onto a bypass. It would also allow PBS3a heavy vehicles to safely travel through Parkes, as they are currently restricted by the 90-degree bends on the existing Newell Highway. Thus, it would improve the interstate transportation of freight and so support the wider economy in Australia. The operation of the Parkes Bypass may also result in further development of the land surrounding the proposal such as for supporting roadside infrastructure including service stations, food providers and amenities. It would also further establish Parkes as a key intermodal freight location. This would likely result in additional jobs and spending within Parkes, boosting the local economy.

However, there is the potential for a minor reduction in passing trade for businesses within Parkes town centre. This would be outweighed by the economic opportunities gained by the proposal.

8.1.4 Public interest

The proposal is justified to be in the public interest on the basis that it improves the amenity, safety and travel times within Parkes town centre and provides economic opportunities without any substantial negative impact on society, the biophysical environment or the local economy. The proposal would be considered complementary to the other Newell Highway upgrades planned by Roads and Maritime. It is also strongly supported by strategic policies and government strategies, which further suggests that it aligned with the public interest.

8.2 Objects of the EP&A Act

Table 8-1 describes how the proposal is consistent with or furthers 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,	<p>The proposal would contribute to the improved transportation of freight in NSW and provide further opportunities for development within Parkes. This would promote the economic welfare of the community and wider State and national economy. It would promote the social welfare of Parkes by improving the amenity and safety for pedestrians, cyclists and vehicles in the Parkes town centre by diverting heavy vehicles onto a bypass.</p> <p>As discussed in section 6.2, any impacts on passing trade for businesses within Parkes town centre are likely to be minor and temporary.</p>
1.3(b) to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment,	<p>Ecologically sustainable development is considered in sections 8.2.1 to 8.2.4 below.</p>

Object	Comment
1.3(c) to promote the orderly and economic use and development of land,	<p>The proposal would be an important piece of NSW transport infrastructure. It would be aligned with the development of the Parkes SAP and Inland Rail projects. In turn, it furthers the coordinated approach to economic use and development of land in Parkes as an intermodal transportation centre.</p> <p>As discussed in section 2.4, the proposal corridor which largely follows the TSR was chosen as it would minimise the loss of private property.</p>
1.3(d) to promote the delivery and maintenance of affordable housing,	Not relevant to the proposal.
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,	<p>Protection of the environment and any biodiversity impacts have been considered in section 6.5. There would not be any significant impact on threatened species, populations and ecological communities and their habitats.</p> <p>Roads and Maritime would work with Parkes Shire Council to consider provision of community services at strategic locations next to the Parkes Bypass for travellers to stop, rest and research facilities in Parkes.</p>
1.3(f) to promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage),	Protection and management of built and cultural heritage has been considered in sections 6.6 and 6.7. There would be no significant impacts to built or cultural heritage because of the proposal.
1.3(g) to promote good design and amenity of the built environment,	<p>As discussed in sections 2.3.3, 3.2.3 and 6.4 urban design and landscaping principles and strategies have been developed for the proposal to promote Parkes as an attractive place to live and work.</p> <p>Chapter 7 outlines the mitigation and management measures that would be carried out throughout detailed design to ensure a design that responds to the objectives of the proposal and considers the needs of the community.</p>
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.
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 is supported at both the local and State government levels as both Parkes Shire Council and Roads and Maritime have proposed a bypass around Parkes. This is discussed further in section 2.1.3.
1.3(j) to provide increased opportunity for community participation in environmental planning and assessment.	Chapter 5 outlines the extensive community consultation and notification program carried out in the lead up to preparing this REF. This REF will be on display and further consultation will be carried out with the community if the proposal is determined to proceed.

8.2.1 The precautionary principle

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

When applying the precautionary principle public and private decisions should be guided by:

- Careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment
- An assessment of risk-weighted consequences of various options.

A precondition for the operation of the precautionary principle is that there are threats of serious or irreversible environmental damage. This REF has demonstrated that such threats are not present for the proposal.

Regardless, the proposal has sought to take a precautionary approach to minimise environmental impacts. This has also been applied in the development of safeguards and management measures. Best available technical information, environmental standards and measures have been used to minimise identified environmental risks of the proposal.

Planning for the proposal involved a risk assessment process that evaluated the environmental risks. Measures to avoid the risks identified were then factored into the construction planning for the proposal. These measures include:

- An iterative design process and value management workshop for the development and selection of options. The process involved an examination of physical constraints and opportunities by a large and diversely skilled team of staff and contractors
- A consultation strategy with an extensive community consultation and stakeholder engagement program aimed at keeping directly-affected stakeholders and the community informed, identify issues relating to the proposal and seek ideas
- A comprehensive environmental impact assessment of the preferred option supported by specialist studies of these aspects which were considered likely to be major sources of project risk. Chapter 6 of this document provides this assessment.

8.2.2 Intergenerational equity

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

The proposal has integrated short and long-term social, financial and environmental considerations so that any likely impacts are not left to be addressed by future generations. Issues with potential long-term effects such as the noise and access changes, consumption of non-renewable resources, waste disposal, change to landscape character, heritage and biodiversity impacts have been avoided and/or minimised through construction planning and the application of safeguards and management measures described in chapter 7 of this REF.

The proposal would benefit both current and future generations by improving the access of PBS3a heavy vehicles in Parkes and in turn the transportation of freight through NSW as well as the safety and amenity in Parkes town centre by diverting away heavy vehicles. These significant benefits are considered to outweigh any residual impact for current and future generations.

8.2.3 Conservation of biological diversity and ecological integrity

Preserving biological diversity and ecological integrity requires that ecosystems, species, and biological diversity are maintained. As concluded in the biodiversity assessment (refer to section 6.5), the proposal would not significantly impact on threatened species, communities, populations or their associated habitat. Therefore, biological diversity and ecological integrity would be conserved by the proposal.

8.2.4 Improved valuation, pricing and incentive mechanisms

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

- Polluter pays, that is, those who generate pollution and waste should pay the cost to manage it
- The users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste
- Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.

Environmental issues have been considered in the strategic planning for the proposal and options assessment process (refer to section 2.4). The environmental goals of the proposal have been pursued in the most cost-effective way through the design and construction planning process. Mitigation measures for environmental impact during construction and operation are to be implemented.

8.3 Conclusion

The proposed Parkes Bypass 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, wilderness areas, areas of outstanding biodiversity, impacts on threatened species, populations and ecological communities and their habitats in accordance with the BC Act 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.

Several 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 on property, the local road network, visual landscape, noise and native vegetation. Safeguards and management measures as detailed in this REF would ameliorate or minimise these expected impacts. The proposal would also improve road safety and travel times and provide economic opportunities. On balance, the proposal is considered justified and the following conclusions are made.

8.3.1 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 under Division 5.1 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.

8.3.2 Significance of impact under Australian legislation

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

9 Certification

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



Andrea Zambolt
Principal Environmental Scientist
WSP

Date: 1 July 2019

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

Ben Orford
Project Development Manager
Regional Project Office | Technical Project Services

Date: 1 July 2019

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Terms and acronyms used in this REF

Term/Acronym	Description
6:1, 2:1	A ratio representing six metres horizontal to every one metre vertical, or every two metres horizontal to one metre horizontal
ACM	Asbestos containing materials
AHIMS	Aboriginal Heritage Information Management System
ARI	Average recurrence interval
BC Act	Biodiversity Conservation Act 2016
Broken Hill Rail line	Rail line from north to south near Broilgan Street Parkes
BTEX	Benzene, toluene, ethylbenzene, xylene
BVT	BioMetric Vegetation Type
CEMP	Construction environmental management plan
Double stacking	This is where containers are loaded two layers high onto freight trains
EIA	Environmental impact assessment
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i> (NSW). Provides the legislative framework for land use planning and development assessment in NSW
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Commonwealth). 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</i> (NSW)
GDE	Groundwater Dependent Ecosystems
GML	General mass limit
Haul route	The roads that construction traffic and delivery vehicles would use to enter and leave the area
Heavy vehicles	Vehicles classed as AB-triples, B-doubles, A triples, PS3A
Heritage Act	<i>Heritage Act 1977</i> (NSW)
ISEPP	State Environmental Planning Policy (Infrastructure) 2007
LALC	Local Aboriginal Land Council
Level crossing	Where a rail line crosses a road at the same level (ie no bridge or tunnel)
LEP	Local Environmental Plan. A type of planning instrument made under Part 3 of the EP&A Act.
LGA	Local Government Area
LoS	Level of Service. A qualitative measure describing operational conditions within a traffic stream and their perception by motorists and/or passengers.

Term/Acronym	Description
MNES	Matters of national environmental significance under the Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i> .
Noxious Weeds Act	<i>Noxious Weeds Act 1993 (NSW)</i>
NPW Act	<i>National Parks and Wildlife Act 1974 (NSW)</i>
NSW	New South Wales
NSW DPI	NSW Department of Primary Industries
OCP	Organochlorine pesticides
OEH	Office of Environment and Heritage
OPP	Organophosphate pesticides
PAH	Polycyclic aromatic hydrocarbons
Parkes SAP	Parkes Special Activation Precinct
PCB	Polychlorinated biphenyls
PCT	Plant community types
PBS3a heavy vehicles	A class of vehicles in the Roads and Maritime Performance Based Standards (PBS) national heavy vehicle scheme that meets: <ul style="list-style-type: none"> • PBS Performance Level 3 • Access class 'A', which is for vehicles that are less than or equal to 36.5 metres in length.
QA Specifications	Specifications developed by Roads and Maritime for use with road work and bridge work contracts let by Roads and Maritime
SEPP	State Environmental Planning Policy. A type of planning instrument made under Part 3 of the EP&A Act.
SEPP 14	<i>State Environmental Planning Policy No. 14 – Coastal Wetlands</i>
Spray-seal	A coat of bitumen that is sprayed over a prepared base. A layer of aggregate is then laid over the top.
Synthetic pyrethroid	An insecticide made from dried chrysanthemum flowers
TEC	Threatened ecological community
Thrie Beam	Guardrail in the shape of three waves
TRH	Total recoverable hydrocarbons
TSR	Travelling Stock Route which is an authorised strip of land on which livestock can be walked from one location to another
VIS	Vegetation information system
VOC	Volatile organic compound
W beam	Guardrail in the shape of two waves

Appendix A

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

Clause 228(2) Checklist

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

Factor	Impact
<p>a) <i>Any environmental impact on a community?</i></p> <p>The proposal would result in the following environmental impacts on the community in Parkes:</p> <ul style="list-style-type: none"> • Changes in noise levels and air quality due to the reallocation of heavy vehicles onto the bypass • Change to the landscape character and visual setting surrounding the proposal footprint for people living or visiting Parkes due to the road and bridge structures. 	<p>Long term moderate positive and negative impacts</p>
<p>b) <i>Any transformation of a locality?</i></p> <p>The proposal would result in the transformation of the locality given vehicles currently travel through the town centre. This would increase the attractiveness of Parkes as a place to live and work. The proposal would also remove most heavy vehicles from the town centre resulting in long-term positive amenity impacts in the locality.</p> <p>However, the proposal would also transform the agricultural nature of the area currently used by the TSR to a more urban setting, given the land would be used by the bypass.</p>	<p>Long term moderate positive impact</p> <p>Long term major negative impact</p>
<p>c) <i>Any environmental impact on the ecosystems of the locality?</i></p> <p>About 61.44 hectares of vegetation would be removed as part of the proposal, of which about two per cent is native and about 98 per cent forms miscellaneous ecosystems mainly made up of pasture grassland, cropping, landscape plantings.</p> <p>Of the vegetation to be cleared, about 0.94 hectares is consistent with a Threatened Ecological Community. Mitigation measures have been proposed in section 6.5.4.</p>	<p>Short-term and long term minor negative impact</p>
<p>d) <i>Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality?</i></p> <p>The proposal would likely reduce the aesthetics of adjacent areas including private properties and an area of recreation, Parkes Golf Course. Mitigation measures have been proposed in section 6.2.4.</p> <p>The proposal would have a minor impact to the environmental and scientific quality of the are through habitat and vegetation loss.</p> <p>The proposal would result in short-term reduction in the aesthetic quality of the area during the construction phase in the form of noise and visual impacts.</p>	<p>Short term and long-term moderate positive and negative impact</p>
<p>e) <i>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?</i></p> <p>The proposal is not anticipated to impact areas of aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance.</p>	<p>Nil</p>
<p>f) <i>Any impact on the habitat of protected fauna (within the meaning of the National Parks and Wildlife Act 1974)?</i></p> <p>The proposal would result in loss of habitat for potentially threatened fauna due to the removal of vegetation within the proposal footprint during construction and operation of the proposal. Mitigation measures have been proposed in section 6.5.4.</p>	<p>Short-term and long-term minor negative impact</p>

Factor	Impact
<p><i>g) Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air?</i></p> <p>The proposal may result in a potential for wildlife injury or mortality throughout the construction and operational phases. However, this would not be a major impact or endanger any species.</p>	Long-term minor negative impact
<p><i>h) Any long-term effects on the environment?</i></p> <p>The proposal would result in loss of vegetation due to the works, however this would not be a significant impact. Mitigation measures have been proposed in section 6.5.4.</p> <p>The proposal would result in an overall reduction of heavy vehicle movements through the Parkes town centre therefore increasing the amenity of the area.</p>	<p>Long-term minor negative impact</p> <p>Long-term minor positive impact</p>
<p><i>i) Any degradation of the quality of the environment?</i></p> <p>As for factor d). Mitigation measures would be implemented through use of a Construction Environmental Management Plan during the construction process.</p>	Short-term and long-term minor negative impact
<p><i>j) Any risk to the safety of the environment?</i></p> <p>The proposal would result in increased safety at level crossings and for drivers, pedestrians and cyclists in the town centre of Parkes. Additionally, the proposal would increase the efficiency and safety of freight through reducing the number of sharp turns and intersections PBS3a heavy vehicles would need to navigate.</p>	Long-term minor positive impact
<p><i>k) Any reduction in the range of beneficial uses of the environment?</i></p> <p>There will be no reduction in beneficial uses of the environment.</p>	Nil
<p><i>l) Any pollution of the environment?</i></p> <p>The proposal is not likely to result in noticeable pollution of the environment as long as the mitigation measures proposed are implemented during construction and operation.</p>	Nil
<p><i>m) Any environmental problems associated with the disposal of waste?</i></p> <p>The proposal is not likely to cause environmental problems associated with the disposal of waste. Mitigation measures have been proposed in section 6.11.2.</p>	Nil
<p><i>n) Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply?</i></p> <p>The proposal is not likely to result in increased demands on resources which are or are likely to become in short supply.</p>	Nil
<p><i>o) Any cumulative environmental effect with other existing or likely future activities?</i></p> <p>The proposal may contribute to the cumulative noise, amenity and traffic impacts experienced in the area throughout construction. Mitigation measures have been proposed in section 6.12.5.</p>	Short-term minor negative impact
<p><i>p) Any impact on coastal processes and coastal hazards, including those under projected climate change conditions?</i></p> <p>The proposal would not result in impacts to coastal processes or hazards including those projected under climate change conditions.</p>	Nil

Matters of National Environmental Significance

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

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

Factor	Impact
<p>a) <i>Any impact on a World Heritage property?</i> There are no World Heritage properties within or near the proposal footprint.</p>	Nil
<p>b) <i>Any impact on a National Heritage place?</i> There are no National Heritage places within or near the proposal footprint.</p>	Nil
<p>c) <i>Any impact on a wetland of international importance?</i> There are no wetlands of international importance within or near the proposal footprint.</p>	Nil
<p>d) <i>Any impact on a listed threatened species or communities?</i> The proposal is expected to have a direct impact on the endangered Western Grey Box - White Cypress Pine tall woodland on loam soil on alluvial plains of NSW South Western Slopes Bioregion and Riverina Bioregion and the critically endangered White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion communities through vegetation clearing. Several threatened flora and fauna species would also be impacted by the project (refer to section 6.5.3). through habitat removal, injury and mortality during construction and operation, edge effects and invasion/spread of pests. An assessment of significance was conducted for all threatened species, populations and ecological communities likely to be affected by the proposal which found that no significant impact is expected.</p>	Minor short to long term direct impacts are likely on listed threatened species or communities.
<p>e) <i>Any impacts on listed migratory species?</i> The proposal is expected to have a direct impact on listed migratory species through direct habitat removal. This impact is expected to be minor as these species are unlikely to breed in the area and would only use the habitat in the footprint occasionally due to the extent of habitat available.</p>	Minor short to long term direct impacts are likely on listed migratory species.
<p>f) <i>Any impact on a Commonwealth marine area?</i> There is no Commonwealth marine area within or near the proposal footprint.</p>	Nil
<p>g) <i>Does the proposal involve a nuclear action (including uranium mining)?</i> The proposal would not be associated with any nuclear action.</p>	Nil
<p>h) <i>Additionally, any impact (direct or indirect) on Commonwealth land?</i> There is no Commonwealth land within or near the proposal footprint.</p>	Nil

Appendix B

Statutory consultation checklists

Infrastructure SEPP

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	n/a	ISEPP cl.13(1)(a)
Traffic	Are the works likely to generate traffic to an extent that will <i>strain</i> the existing road system in a local government area?	No	n/a	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	n/a	ISEPP cl.13(1)(c)
Water usage	Will the works involve connection to a council owned water supply system? If so, will this require the use of a <i>substantial</i> volume of water?	No	n/a	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?	No	n/a	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	Parkes Shire Council	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 item/area are more than <i>minor</i> or <i>inconsequential</i> ?	No	n/a	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	n/a	ISEPP cl.15

Public authorities other than councils

Issue	Potential impact	Yes/No	If 'yes' consult with	ISEPP clause
National parks and reserves	Are the works adjacent to a national park or nature reserve, or other area reserved under the <i>National Parks and Wildlife Act 1974</i> ?	No	Office of Environment and Heritage	ISEPP cl.16(2)(a)
Marine parks	Are the works adjacent to a declared marine park under the <i>Marine Parks Act 1997</i> ?	No	Department of Planning and Environment	ISEPP cl.16(2)(b)
Aquatic reserves	Are the works adjacent to a declared aquatic reserve under the <i>Fisheries Management Act 1994</i> ?	No	Office of Environment and Heritage	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	Department of Planning and Environment	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)

Appendix C

Landscape character and visual impact assessment

Appendix D

Traffic, transport and access impact assessment

Appendix E

Noise and vibration impact assessment

Appendix F

Socio-economic impact assessment

Appendix G

Biodiversity impact assessment

Appendix H

Aboriginal and non-Aboriginal heritage impact assessment

Appendix I

Preliminary site investigation



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