

Mitchell Highway (Cobra Street) and Fitzroy Street Intersection Upgrade

Review of Environmental Factors

Roads and Maritime Services | December 2018



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Prepared by GHD Pty Ltd and Roads and Maritime Services

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Approval and authorisation

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Executive summary

The proposal

Roads and Maritime Services (Roads and Maritime) proposes to upgrade the intersection of Mitchell Highway (Cobra Street) and Fitzroy Street in Dubbo (the proposal). The proposal would involve the removal of the existing roundabout and replacing it with a signalised intersection.

Need for the proposal

The intersection of the Mitchell Highway (Cobra Street) and Fitzroy Street forms part of the National Land Transport Network. The capacity and safety of this intersection has declined over time due to increases of traffic flow and saturation during peak periods. The intersection has a very unstable traffic flow and experiences excessive queue lengths, whilst the pavement is approaching the end of its serviceable design life.

Proposal objectives and development criteria

The objectives of the proposal are to:

- Upgrade the intersection at Cobra Street and Fitzroy Street to achieve an acceptable Level of Service (LoS) for a 20-year period
- Provide traffic control signals at the intersection of Cobra Street and Fitzroy Street, with protected right turn bays at all intersection legs
- Remove the existing roundabout and provide a heavy duty pavement within the vicinity of the intersection for a minimum 40 year design life
- Improve pedestrian connectivity and access for vulnerable road users
- Reduce traffic congestion
- Improve traffic safety
- Minimise adverse impacts on the environment and community.

Options considered

Five options were considered as part of the development of the proposal. These included four upgrade options involving signalling the intersection. These options differed in terms of the number of lanes in the Fitzroy Street approach and departures to the intersection.

The 'do nothing' option was also considered. This involved not undertaking any works and maintaining the existing arrangement at the intersection (ie a metered roundabout).

The upgrade option that included three lanes on the southern leg of the intersection was considered to best meet the proposal objectives, particularly in relation to the level of service at the intersection, associated congestion, motorist accesses and safety issues.

Statutory and planning framework

The proposal is categorised as development for the purpose of a road and road infrastructure facilities, and is being carried out by, or on behalf of Roads and Maritime Services. Therefore the proposal is permissible without consent in accordance with clause 94 of *State Environmental Planning Policy (Infrastructure) 2007*. The proposal is not State significant infrastructure or State significant development. The proposal can be assessed under Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

Roads and Maritime is the determining authority for the proposal. This review of environmental factors (REF) fulfils Roads and Maritime's obligations under section 5.5 of the

EP&A Act, including to examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the activity.

No additional licences, approvals or permits are required for the proposal.

Community and stakeholder consultation

Roads and Maritime has informed the community about the proposal during consultation in 2014 and 2015.

This proposal forms part of the Dubbo Project Launch package including other significant neighbouring projects within Dubbo to provide continued community awareness. An overarching Dubbo communications campaign launch was developed. This will include an additional website and communications collateral covering all projects, which will be distributed to Dubbo and the surrounding communities. A design display and “Have your Say” period is planned for early 2019. This will include hardstand and community pop-up sessions, allowing opportunities for the Dubbo community consultation.

Consultation with a number of government agencies and stakeholders has also been undertaken. Details of this consultation and the issues raised are summarised in chapter 5.

Environmental impacts

The proposal would have short-term noise and traffic impacts as a result of construction due to partial road closures and traffic detours. Amenity impacts would potentially be experienced due to the presence of a work site and also the removal of vegetation including the removal of mature street trees along Fitzroy Street.

The safeguards and management measures detailed in this REF would minimise the potential impacts identified. The proposal would reduce congestion, improve safety for road users, improve intersection performance during operation and improve pedestrian access and safety.

No significant environmental impacts have been identified by the REF. As a result, an environmental impact statement (in accordance with section 5.7 of the EP&A Act) is not required.

Justification and conclusion

The proposal is considered to be justified due to the traffic benefits it provides. These benefits are considered to outweigh the potential adverse impacts or risks associated with the proposal. Potential environmental impacts would be minimised by implementing the safeguards and management measures listed in section 7.2.

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. 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 sought from the Minister for Planning under Division 5.2 of the EP&A Act. A biodiversity development assessment report or species impact statement is not required. The proposal is subject to assessment under Division 5.1 of the EP&A Act. Consent from Dubbo Regional Council is not required.

Contents

Executive summary	i
1. Introduction	1
1.1 Proposal identification.....	1
1.2 Purpose of the report	4
2. Need and options considered	6
2.1 Strategic need for the proposal	6
2.2 Existing infrastructure	9
2.3 Proposal objectives and development criteria	12
2.4 Alternatives and options considered.....	13
2.5 Preferred option	18
2.6 Design refinements	19
3. Description of the proposal	20
3.1 The proposal.....	20
3.2 Design	22
3.3 Construction activities	29
3.4 Ancillary facilities.....	34
3.5 Public utility adjustment.....	36
3.6 Property acquisition, adjustments and leasing	36
4. Statutory and planning framework	39
4.1 Environmental Planning and Assessment Act 1979	39
4.2 Other relevant NSW legislation	40
4.3 Commonwealth legislation	41
4.4 Confirmation of statutory position.....	41
5. Consultation	42
5.1 Consultation strategy	42
5.2 Community involvement.....	42
5.3 Aboriginal community involvement.....	43
5.4 ISEPP consultation	43
5.5 Government agency and stakeholder involvement.....	43
5.6 Ongoing or future consultation	43
6. Environmental assessment	45
6.1 Noise and vibration	45
6.2 Traffic, transport and access	57
6.3 Biodiversity and trees.....	65
6.4 Soils, landform and water quality	70
6.5 Air quality	76
6.6 Landscape character and visual impacts	78
6.7 Property, land use and socio-economic impacts	81
6.8 Aboriginal heritage	88
6.9 Non-Aboriginal heritage	89
6.10 Waste management.....	91

6.11	Climate change.....	93
6.12	Hazards and risk.....	94
6.13	Cumulative impacts.....	96
7.	Environmental management.....	99
7.1	Environmental management plans (or system)	99
7.2	Summary of safeguards and management measures	99
7.3	Licensing and approvals	99
8.	Conclusion.....	117
8.1	Justification.....	117
8.2	Objects of the EP&A Act.....	117
8.3	Conclusion.....	119
9.	Certification.....	121
10.	References.....	122
	Terms and acronyms used in this REF.....	123

Tables

Table 2.1	Existing and anticipated level of service	7
Table 3.1	Design criteria for the proposal	22
Table 3.2	Indicative parking loss due to proposal	28
Table 3.3	Heavy vehicle detour roads to Mitchell Highway towards Orange	32
Table 3.4	Proposed property acquisition.....	37
Table 4.1	Land use zones and objectives	40
Table 6.1	Measured RBL L_{A90} and Ambient Noise Level L_{Aeq}	45
Table 6.2	Measured RBL L_{A90} and Ambient Noise Level L_{Aeq}	46
Table 6.3	Proposal specific construction noise management levels.....	47
Table 6.4	Human comfort intermittent vibration limits (BS 6472-1992).....	48
Table 6.5	Guidance on effects of vibration levels for human comfort (BS 5228.2 – 2009).....	48
Table 6.6	Guideline values for short-term vibration on structures.....	48
Table 6.7	Construction activities and equipment sound power levels.....	49
Table 6.8	Construction activities and equipment sound power levels – mobile asphalt plant	51
Table 6.9	Predicted asphalt plant levels at residential receivers	51
Table 6.10	Vibration safe working buffer distances	52
Table 6.11	Additional mitigation measures.....	56
Table 6.12	Generalised lithology encountered	70
Table 6.13	Summary of Contaminated Land: Record of Notices within one kilometres of the investigation area	71
Table 6.14	Property acquisition – summary of potential socio-economic impacts.....	85
Table 6.15	Heritage items located in the vicinity of the proposal	89
Table 7.1	Summary of safeguards and management measures	100
Table 8.1	Objects of the EP&A Act	117

Figures

Figure 1.1	Location of the proposal	2
Figure 1.2	The proposal	3
Figure 2.1	Cobra Street looking west from the north-east corner of intersection.....	10
Figure 2.2	Cobra Street looking west towards the intersection from Hopetoun Street.....	11
Figure 2.3	Fitzroy Street looking south towards Cobra Street intersection.....	12
Figure 2.4	Option 1 intersection layout	14
Figure 2.5	Option 2 intersection layout	15
Figure 2.6	Option 3 intersection layout	16
Figure 2.7	Option 4 intersection layout	17
Figure 3.1	The proposal	21
Figure 3.2	Typical cross sections of Cobra Street west of intersection	24
Figure 3.3	Typical cross sections of Cobra Street east of intersection	24
Figure 3.4	Typical cross sections of Fitzroy Street south of intersection.....	25
Figure 3.5	Typical cross sections of Fitzroy Street north of intersection.....	25

Figure 3.6	Heavy vehicle detours	33
Figure 3.7	Proposed property acquisition	38
Figure 6.1	Existing impacts to access due to Jacaranda trees	62
Figure 6.2	Vegetation in centre of existing roundabout.....	65
Figure 6.3	Mature Jacaranda trees located along Fitzroy Street.....	66
Figure 6.4	Significant bottle tree on Quinn Street	67

Appendices

Appendix A	Detailed design plans
Appendix B	Consideration of clause 228(2) factors and matters of national environmental significance
Appendix C	Noise and vibration assessment
Appendix D	Statutory consultation checklist
Appendix E	Detailed site investigation
Appendix F	Stage 1 PACHCI clearance letter

1. Introduction

1.1 Proposal identification

1.1.1 The proposal

Roads and Maritime Services NSW (Roads and Maritime) proposes to upgrade the intersection of Cobra Street and Fitzroy Street in Dubbo. Cobra Street forms part of the Mitchell Highway (the A32), which extends through Dubbo.

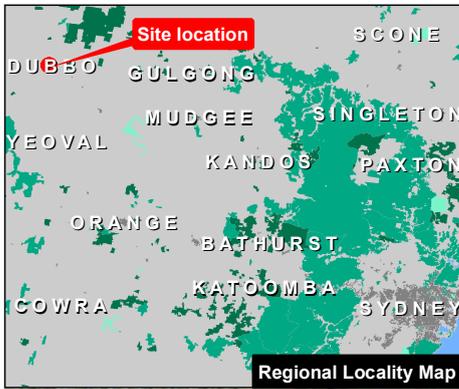
The proposal would involve removing the existing roundabout and replacing it with a signalised intersection. The proposed works would locate in the following sections of Cobra and Fitzroy streets, which are centred on the existing intersection (ie roundabout):

- Cobra Street between Sterling Street (about 220 metres east of intersection) and Gipps Street (about 210 metres west of intersection)
- Fitzroy Street between south of Goode Street (about 170 metres south of intersection) and Bultje Street (about 200 metres north of intersection).

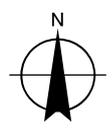
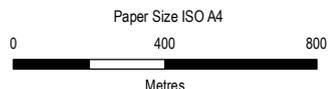
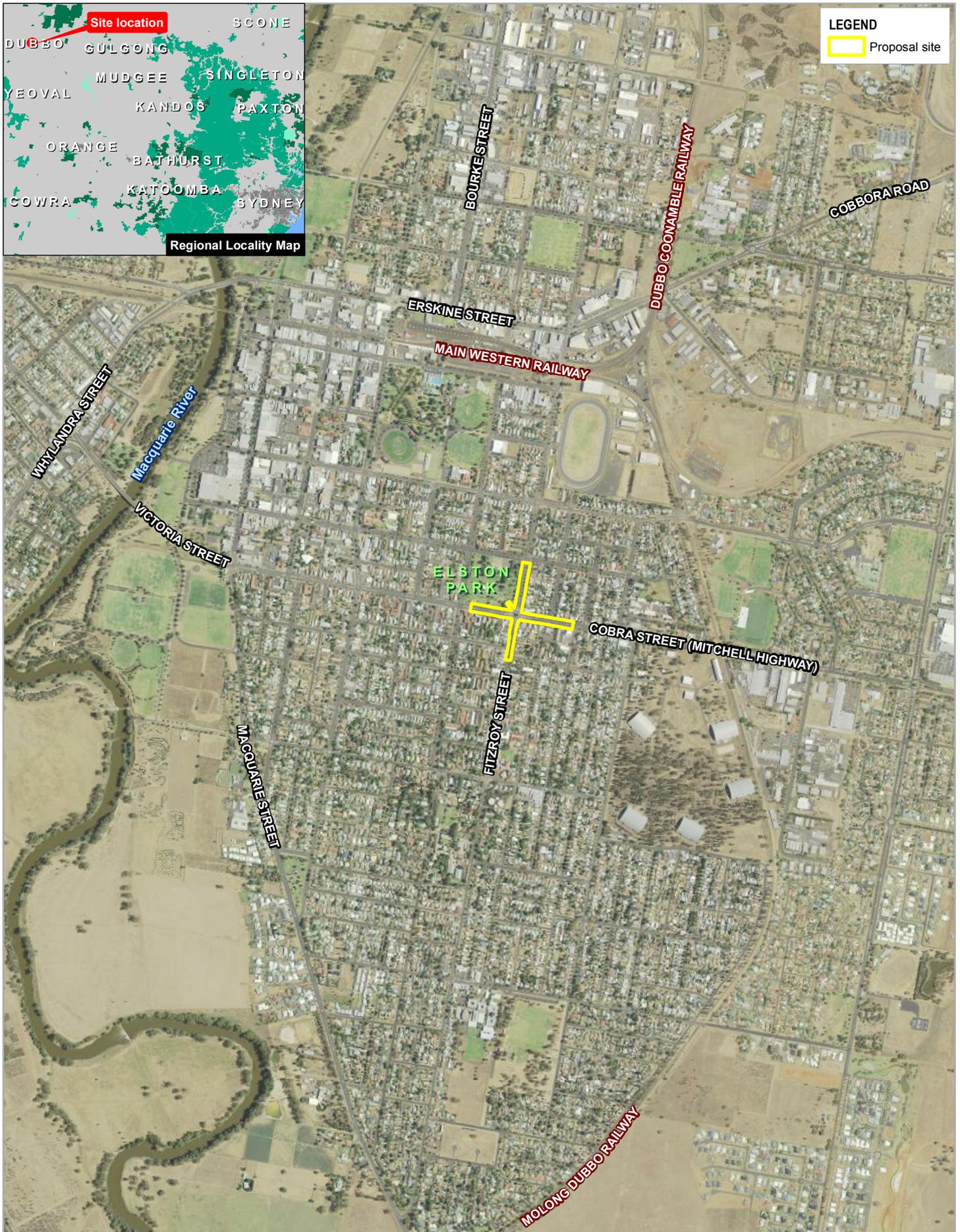
Key features of the proposal would include:

- Removing the existing roundabout and associated landscaping
- Installing a new signalised intersection with incorporated signalised pedestrian crossings at all legs of the intersection
- Adjusting each leg of the intersection to provide three approach lanes, including dedicated right turn lanes on all legs
- Installing new central medians on all legs of the intersection, with designated pedestrian crossings
- Providing a new dedicated right turn lane into Hopetoun Street
- Providing a new heavy duty pavement within the intersection to satisfy a 40 year design traffic loading and providing a new flexible pavement with a minimum 20 year traffic loading design on all approaches
- Removing 21 jacaranda trees along Fitzroy Street north of the intersection to improve motorist sight distances and accommodate pedestrian parking
- Improvements to island pedestrian facilities
- Adjusting the existing pedestrian path within Elston Park to realign with the new signalised crossing at the north-west corner of the intersection
- Upgrade to existing overhead street lighting
- Establishment of a construction compound within proposal area including Elston Park.

The location of the proposal is presented in Figure 1.1, and an overview of the proposal is provided in Figure 1.2. Section 3 describes the proposal in more detail.



LEGEND
 Proposal site



**Roads and Maritime
 Cobra Street and Fitzroy Street
 Intersection Upgrade REF**

Project No. 21-27394
 Revision No. -
 Date 30/11/2018

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

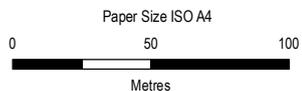
Location of the proposal

FIGURE 1.1

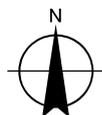
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 Data source: Aerial imagery - SIX maps 2018 (); General topo - NSW LPI DTDB 2017, 2015 & 2012; Design data - RMS; Inset - Geoscience Australia. Created by: jprice
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Subject to detailed design



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



Roads and Maritime
Cobra Street and Fitzroy Street
Intersection Upgrade REF

Project No. 21-27394
Revision No. -
Date 30/11/2018

The proposal

FIGURE 1.2

1.1.2 Location and context of the proposal site

The proposal is located about one kilometre south-east of the Dubbo town centre, and about 1.6 kilometres east of the Macquarie River. Dubbo is located in the Orana region of NSW, about 390 kilometres north-west of Sydney, within the local government area of the Dubbo Regional Council (Council). The location of the proposal is shown in Figure 1.1.

The proposal site (the area that would be directly impacted by construction of the proposal) is centred on the intersection of Cobra Street and Fitzroy Street. The proposal site also includes works on the following sections of these two streets:

- Cobra Street between Sterling Street (about 220 metres east of intersection) and Gipps Street (about 210 metres west of intersection)
- Fitzroy Street between Goode Street (about 170 metres south of intersection) and Bultje Street (about 200 metres north of intersection).

These roads and other nearby roads are described in section 2.2.

Dubbo is located at the junction of the Golden Highway, Newell Highway and Mitchell Highway. The Mitchell Highway connects Dubbo with Orange and Bathurst to the south-east, and Nyngan, Bourke and Queensland to the north-west.

The proposal site is located adjacent to the south-east corner of Elston Park (community and recreation area). Service stations are located on all other corners of the intersection.

The surrounding area is mainly residential, with some scattered commercial businesses (including residential dwellings). The closest school to the proposal site is located about 380 metres south of the site. The Fitzroy Street campus of TAFE Western Dubbo Collage is located about 20 metres north of the northern extent of the proposal site, north of the Bultje Street and Fitzroy Street intersection.

The proposal site has been heavily modified as a result of urban development, which includes utility and road infrastructure construction. Due to previous development activities, no native vegetation is present within or in the vicinity of the proposal site, with the majority of the vegetation planted along roads or within adjacent gardens (including mature Jacaranda street trees located along Fitzroy Street). Further information on vegetation within the proposal site is provided in section 6.3.

1.2 Purpose of the report

This review of environmental factors (REF) has been prepared by GHD Pty Ltd on behalf of Roads and Maritime Regional Maintenance. For the purposes of these works, Roads and Maritime is the proponent and the determining authority under Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

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

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

In doing so, the REF helps to fulfil the requirements of section 5.5 of the EP&A Act including that 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 5.2 of the EP&A Act
- The significance of any impact on threatened species as defined by the BC Act and/or FM Act, in section 1.7 of the EP&A Act and therefore the requirement for a Species Impact Statement or a Biodiversity Development Assessment Report
- The significance of any impact on nationally listed biodiversity matters under the EPBC Act, including whether there is a real possibility that the activity may threaten long-term survival of these matters, and whether offsets are required and able to be secured.

The potential for the proposal to significantly impact any other matters of national environmental significance or Commonwealth land and the need, subject to the EPBC Act strategic assessment approval, to make a referral to the Australian Government Department of the Environment and Energy for a decision by the Commonwealth Minister for the Environment on whether assessment and approval is required under the EPBC Act.

2. Need and options considered

2.1 Strategic need for the proposal

The intersection of and Cobra Street and Fitzroy Street forms part of the National Land Transport Network (road corridors) located on the Sydney to Dubbo corridor. The capacity and safety at the intersection has steadily declined over time. The existing intersection (operating as a roundabout) has a very unstable flow and a high degree of saturation particularly during peak travel periods.

The roundabout is approaching the end of its effective design life and requires an upgrade to facilitate traffic efficiency, manage congestion, and improve road safety at this location. The proposal would provide a new pavement, which would reduce maintenance costs for a minimum 40-year design life within the intersection.

As vehicle movements through the intersection increase, the predicted Level of Service (LoS) would decrease. It is predicted that the level of service would decrease from a level of service of B (ie has stable flow and traffic can select own speed and make desired movements) to a level of service of F (ie intersection is well past capacity which results in queuing and delays) based on traffic growth projections by 2035. The proposal would improve the intersection's LoS rating and reduce forecast saturation.

The existing and modelled level of service (as modelled in 2013 using the 2015 traffic projections) is presented in Table 2.1.

The existing intersection is also subject to a large number of crashes as a result of increased congestion. In the five-year period between 2013 to 2017 (inclusive) a total of 20 reported crashes (motor vehicle accidents) along Cobra Street between Gipps Road and Sterling Street. Further information on these crashes is provided in Section 6.2.1. The proposal would improve safety at the intersection.

Table 2.1 Existing and anticipated level of service

	Morning peak	Afternoon peak
Existing level of service		
Level of service in the year 2035 as modelled by Sidra® (lane-based micro-analytical model)		

2.1.1 Consistency with strategic planning

Premier’s Priorities

The Premier has developed 18 state priorities, which aim to make the state of NSW better. One of these priorities is to improve road travel reliability and to ensure that 90 per cent of peak travel on key road routes arrives at their destination on time.

The proposal to upgrade the existing roundabout at the intersection of the Cobra Street and Fitzroy Street is considered to be consistent with this priority as it would seek to improve movements and increase capacity through the intersection by providing a signalised intersection.

State Infrastructure Strategy 2018-2038

The State Infrastructure Strategy (Infrastructure NSW 2018) identifies policies and strategies for infrastructure to meet the demands of a growing population and economy. The strategy identifies a vision to provide a more efficient transport network model between growing regional centres, to reduce road trauma, and ensure the efficient movement of freight.

The strategy targets freight productivity upgrades on key routes of the National Land Transport Network, of which the Mitchell Highway forms part. The proposal is considered to be consistent with this priority, as it would seek to improve freight transport through the intersection.

Future Transport Strategy 2056

Future Transport Strategy 2056 (Transport for NSW 2018a) is an overarching strategy to ensure NSW's transport system is prepared for rapid changes in technology and innovation. It aims to create and maintain a world class, safe, efficient and reliable transport system over the next 40 years.

Future Transport Strategy 2056 aims to optimise the movement of people along transport corridors. A priority of the strategy is to improve the customer experience to provide greater levels of responsiveness, safety and reduce congestion. The proposal to upgrade the existing roundabout at the intersection of the Cobra Street and Fitzroy Street is considered to be consistent with this priority as it would seek to reduce congestion at intersection by providing more efficient traffic movements through the intersection.

NSW Draft Freight and Ports Plan

The operation of NSW freight and ports network is considered to be fundamental to our economy. Due the importance of the freight and ports networks the Draft Freight and Ports Plan (Transport for NSW 2018) has been developed to ensure the movement of goods can occur in an efficient, safe and environmentally sustainable manor and therefore providing successful outcomes for both communities and industry.

The proposal is considered to be consistent with the priority action area to provide safe, efficient and sustainable freight access to places. The proposal would assist this as it would improve movements through the intersection which would improve road safety.

Upgrades to the Mitchell Highway (ie Cobra Street) are not specifically mentioned in the plan, however the role of the Mitchell Highway within the National Freight Network is important and therefore any improvements to this road are considered to benefit the wider freight network.

Regional NSW Services and Infrastructure Plan

The Regional Services & Infrastructure Plan (Transport for NSW 2018b) is the NSW Government's blueprint for transport in regional NSW to 2056. The plan forms part of the Future Transport Strategy 2056. It sets out the NSW Government's thinking on the big trends, issues, services and infrastructure needs for transport in regional NSW.

The plan identifies areas to improve key drivers of economic growth by considering the needs of improved road infrastructure in regional NSW. The freight industry is one of the key drivers of economic growth in regional NSW, with freight traffic movements expected grow over the next 20 years. The proposal is considered to be consistent with this priority as it would seek to improve the movement of freight along the Mitchell Highway and through Dubbo to other regional transport hubs.

Central West Regional Transport Plan

The Central West Regional Transport Plan (Transport for NSW 2013) identifies specific challenges for the region's transport networks, and prioritises actions to address these challenges. The broad actions are under three themes: better transport services; ensuring effective regulation; and improving transport infrastructure. The plan provides a detailed analysis of local transport needs and priorities and responds to issues raised during regional consultation to develop the Master Plan.

The plan targets opportunities to improve the road network and maintain road freight efficiency. In particular in Dubbo, work to improve journey reliability is identified for a variety of roads and intersections, including the intersection of Cobra Street and Fitzroy Street.

Central West and Orana Regional Plan 2036

The Central West and Orana Regional Plan 2036 (NSW Government 2017) is a 20-year blueprint for the future of the Central West and Orana region. A key goal is to deliver quality freight, transport and infrastructure networks in the region.

The plan targets improving freight connections to markets and global gateways, by enhancing the capacity and efficiency of freight transport. It also targets enhancing road freight links in regional NSW by prioritising projects that recognise impediments to the regional freight network.

The proposal is considered to be consistent with these priorities as it would provide for future increases in volume of freight and reduced congestion along the Mitchell Highway (ie Cobra Street).

2.2 Existing infrastructure

Cobra Street (Mitchell Highway)

The Mitchell Highway is a state highway located in the central and south-western regions of Queensland and the northern and central western regions of NSW. The Mitchell Highway extends from the Landsborough Highway near Augathella in south-western Queensland, to the junction of the Mid-Western and Great Western highways in Bathurst, a distance measuring about 1,105 kilometres.

The southern part of the Mitchell Highway forms part of the National Highway A32 corridor, which stretches from Sydney to Adelaide via Dubbo and Broken Hill. The Mitchell Highway extends through Dubbo on the southern side of the town centre. Within Dubbo, the highway is referred to as Cobra Street from the south of the L.H Ford Bridge Highway intersection to Victoria Street, north of the L.H. Ford Bridge.

Cobra Street mainly consists of a two lane road with single lanes in each direction, with a widened central right-turn median and widened kerbside shoulders between Palmer Street and Macquarie Street. The highway is orientated in an east–west direction through Dubbo and the proposal site.

West the intersection (in the eastbound direction), the road widens into two lanes to accommodate a shared left turn/through lane and a shared right turn/through lane (shown in Figure 2.1), with a single departure lane on the eastern side of the intersection (shown in Figure 2.2). A single exit lane from the roundabout is provided on the western leg of the intersection in the westbound direction.

West of the intersection (between the intersection and Gipps Street) a shared right turn lane in the centre of road (median) is provided to ensure access to commercial and residential properties located along the southern side of Cobra Street. Designated right and left turn lanes into Gipps Street (from both directions along Cobra Street) are provided at the western extent of the proposal.

East of the intersection (in the eastbound direction) two exit lanes are provided out of the roundabout. The northernmost of these two lanes merges into the southern lane just east of the intersection, with a single lane then being provided to the western extent of the proposal (with the exception of the below mention turning facilities). A single westbound lane enters the existing roundabout (shown in Figure 2.2).

Further east of the intersection the following turning movements and lanes are provided:

- Left turn lane into Hopetoun Street (north of Cobra Street) for eastbound traffic
- Shared right turn lane in the centre of road (median) for east and westbound traffic between the intersection and Sterling Street for vehicles wanting to turn into adjacent properties and Hopetoun Street
- Designated right turn lane into Sterling Street for eastbound traffic, a left turn lane is also provided into Sterling Street for westbound traffic.

Within the proposal site there are four pedestrian crossings located along Cobra Street:

- 30 metres east of intersection consisting of a median refuge and a curb ramp on both sides of the road
- 160 metres east of intersection (between Hopetoun and Sterling Streets) consisting of a median refuge and a curb ramp on both sides of the road
- 20 metres west of the intersection consisting of a median refuge and a curb ramp on both sides of the road
- 160 metres west of the intersection (near Gipps Street) consisting of a median refuge and a curb ramp on both sides of the road.

On-street (kerbside) parking is located along both sides of Cobra Street within the road shoulder. Traffic volumes and crash data are discussed in section 6.2.1.



Figure 2.1 Cobra Street looking west from the north-east corner of intersection



Figure 2.2 Cobra Street looking west towards the intersection from Hopetoun Street

Fitzroy Street

Fitzroy Street is a wide local street that runs in a north–south direction through Dubbo. Fitzroy Street is generally a two-lane road with a single lane in each direction, however some turn bays are provided on both the northern and southern legs of the Cobra Street intersection.

North of the intersection, the single southbound lane diverges into a left turn lane and a shared right/through lane (shown in Figure 2.3) at the intersection. A single northbound lane is provided as an exit from the roundabout. Mature street trees (jacarandas) are located in the proposal footprint within the existing road reserve north of the intersection. Parking is also available on both sides of the street as shown in Figure 2.3. Currently the parking orientations are not delineated and can be used as either parallel or angled parking.

South of the intersection, the single northbound lane becomes two lanes with one dedicated right turn lane and a shared left turn/through lane at the intersection. A single departure lane is provided for southbound traffic. South of the intersection, on-street parking is available on both sides of the street in the form of parallel parking.

Within the site, there are two pedestrian road crossings located along Fitzroy Street. They are set back about 10 metres on the north and south side of the intersection and consist of refuges between the two carriageways. Both crossings are currently positioned so that the existing driveways of each of the three service stations are required to be used to access the crossing resulting in potential vehicle and pedestrian conflicts.



Figure 2.3 Fitzroy Street looking south towards Cobra Street intersection

2.3 Proposal objectives and development criteria

2.3.1 Proposal objectives

The objectives of the proposal are to:

- Upgrade the intersection at Cobra Street and Fitzroy Street to achieve an acceptable Level of Service (LoS) for a 20-year period.
- Provide traffic control signals at the intersection of Cobra Street and Fitzroy Street, with protected right turn bays at all intersection legs
- Remove the existing roundabout and provide a heavy duty pavement within the vicinity of the intersection for a minimum 40 year design life
- Improve pedestrian connectivity and access for vulnerable road users
- Reduce traffic congestion
- Improve traffic safety
- Minimise adverse impacts on the environment and community.

2.3.2 Development criteria

As stated in section 2.1 the capacity and safety of this intersection has declined and requires improvement to return to and maintain an acceptable level of efficiency reflected in the level of service through this intersection.

2.3.3 Urban design objectives

The objective of the proposal is to where possible ensure that the existing streetscape is maintained. Any additional urban design elements would be guided by the following objectives:

- Build a proposal that fits in with the surrounding and changing natural and built environment
- Avoid conflicts between planting and utilities
- Integrate vertical elements with the road corridor (trees, overhead lights and power lines)
- Deliver a solution that improves connectivity and improves accessibility.

However, due to limited available land, the inclusion of landscaping within the proposal is considered limited. Offset planting of trees within Elston Park has already occurred to ensure that the eastern edge of the park remains defined, a function the existing trees along Fitzroy Street assist in doing. The relocation of these trees also improves safety due to improved site distances.

2.4 Alternatives and options considered

2.4.1 Methodology for selection of preferred option

The identified options were assessed to determine which option (described in section 2.4.2) would best meet the proposal objectives. Assessment criteria included minimising disruption to the community, maintenance costs, and benefits to traffic movements and safety.

2.4.2 Identified options

This section outlines the options considered as part of the proposal development process. It is noted that sub-options for each of Options 2 and 3 were considered, however these sub-options involved different options for phasing of signals at the intersection and therefore details of these sub-options are not provided. Further consideration of light phasing during operation may occur at a later stage.

Option 1 – Full Layout

This option would involve replacing the roundabout with a signalised (ie traffic signals) intersection. The lane arrangements for this option included the provision of three entry lanes at all legs of the intersection. All legs would have dedicated right turn and through lanes, with a shared through and left turn lane. All legs would have two exit lanes.

The proposed layout of the lanes is shown in Figure 2.4.

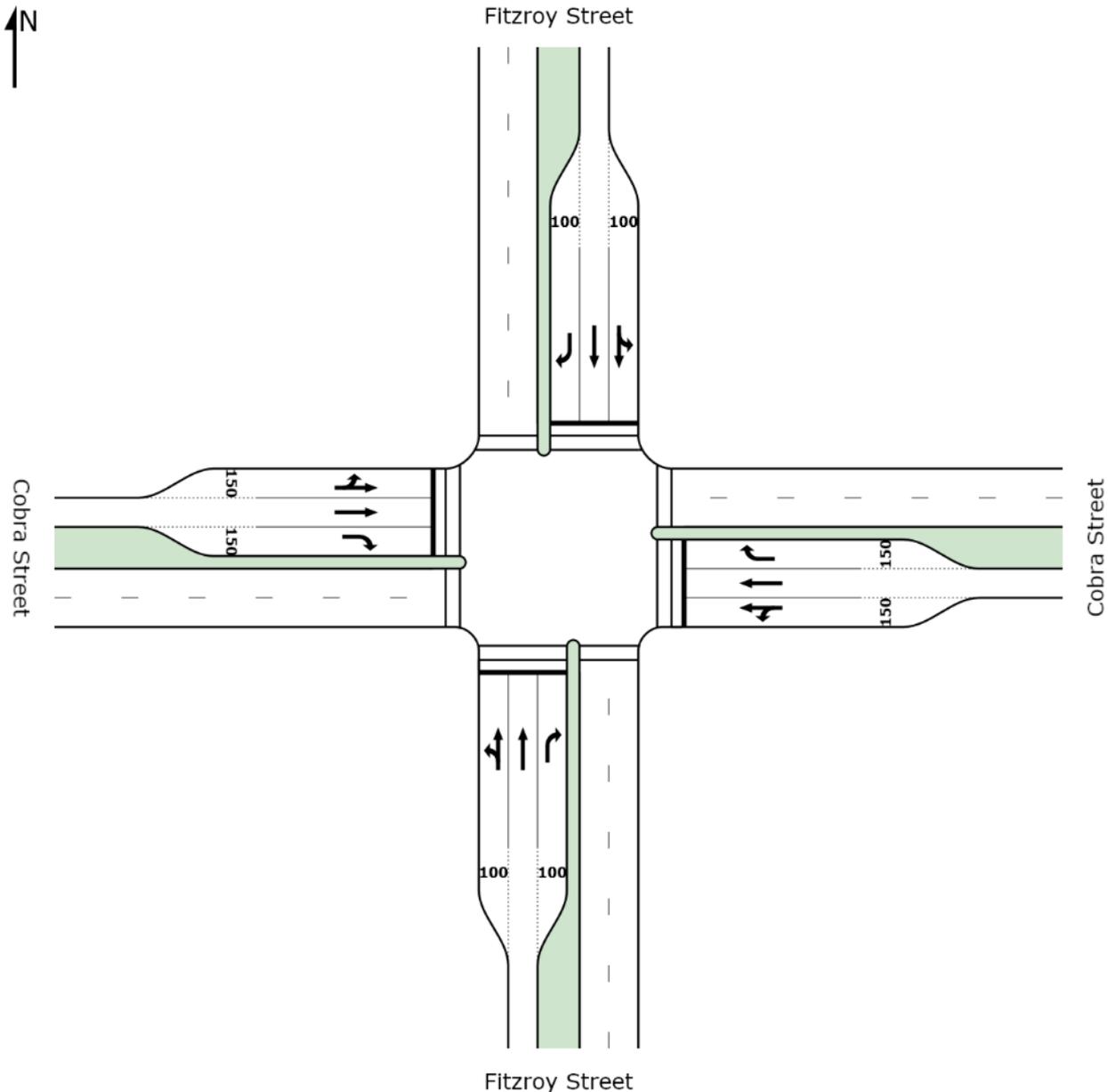


Figure 2.4 Option 1 intersection layout

Option 2 – Upgrade to signalised intersection with three lanes on all legs

This option would involve replacing the roundabout with a signalised (ie traffic signals) intersection. The lane arrangements for this option included the provision of three entry lanes on all legs of the intersection. All legs would have dedicated right turn and through lanes. Three legs of the intersection (excluding the northern leg) would have a shared through and left turn lane, while the northern leg would have a dedicated left turn lane. All legs of the intersection would have two exit lanes, excluding the southern leg which would have a single exit lane.

The proposed layout of the lanes is shown in Figure 2.5.

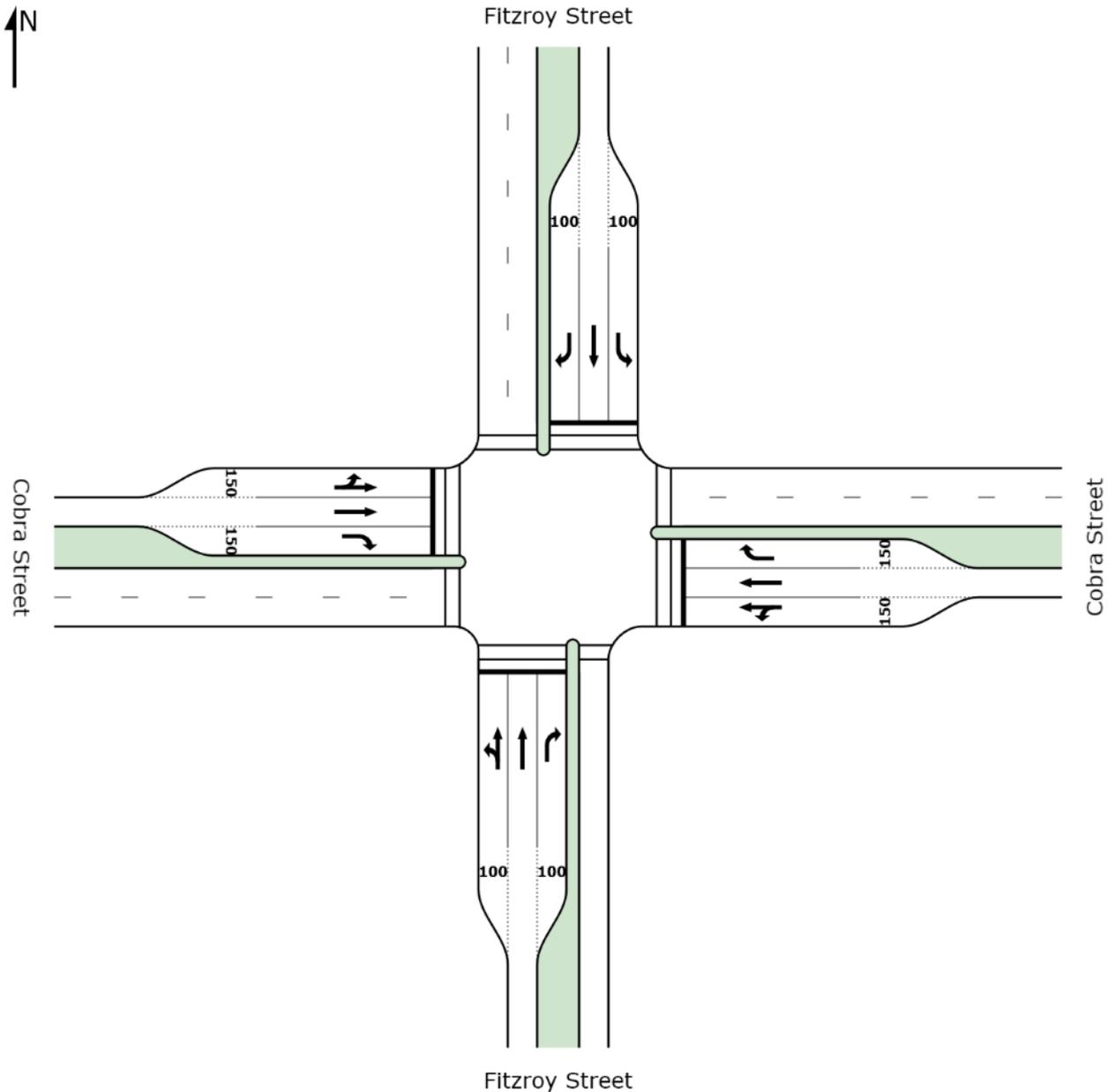


Figure 2.5 Option 2 intersection layout

Option 3 – Upgrade to signalised intersection with three lanes on all legs except for two on southern leg

This option is similar to Option 2 in that the western, northern and eastern legs of the intersection would have three entry lanes. However, this option would only have two entry lanes on the southern leg of the intersection. These lanes would be configured with a dedicated right turn lane and a shared through and left turn lane. This option would also have a single exit lane for southbound and northbound traffic along Fitzroy Street.

The proposed layout of the lanes is shown in Figure 2.6.

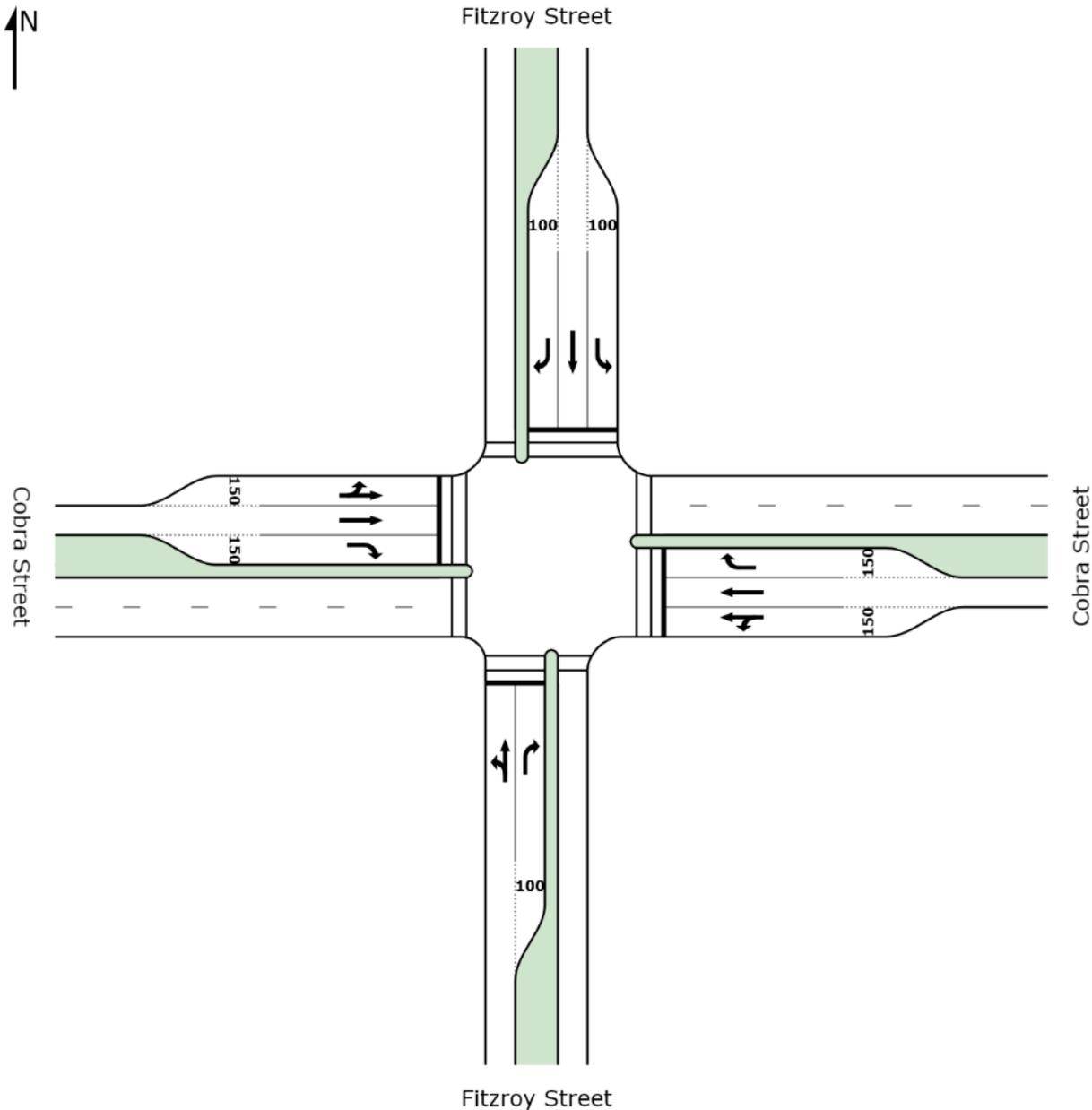


Figure 2.6 Option 3 intersection layout

Option 4 – Restricted Northern Leg

This option would involve replacing the roundabout with a signalised (ie traffic signals) intersection. This option would have the same layout as Options 1 to 3 for Cobra Street. This option would however only consist of two entry lanes in each direction along Fitzroy Street, with dedicated right turn lanes provided and shared left turn and through lanes. This option would also consist of single exit lanes on both the northern and southern legs of the intersection.

The proposed layout of the lanes is shown in Figure 2.7.

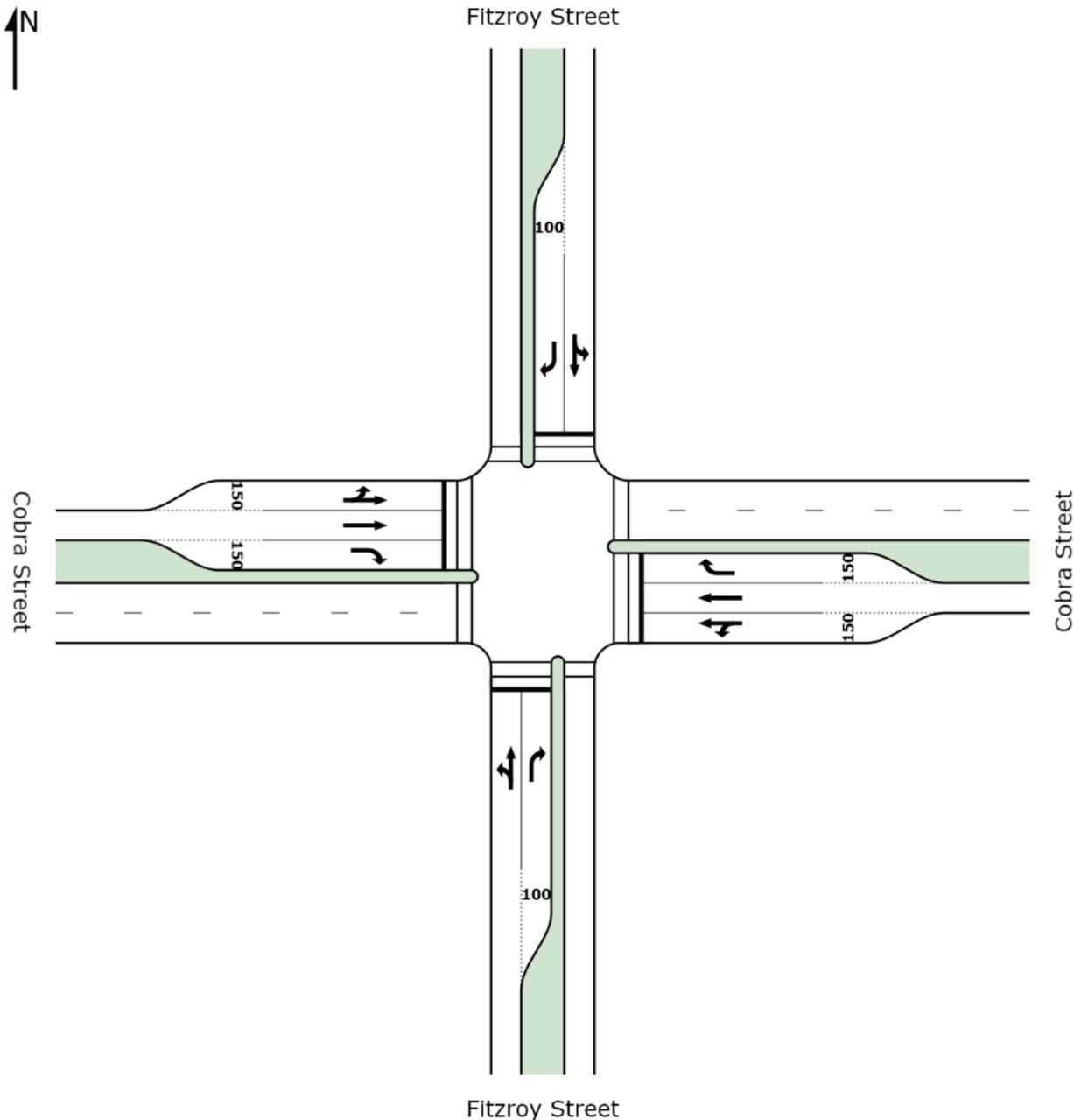


Figure 2.7 Option 4 intersection layout

Option 5 – Do nothing

This option would involve not upgrading the intersection. The intersection would continue to operate as a metered roundabout. This option would also not change any of the lane arrangements of the intersection legs. Consideration of some metering of the roundabout was considered as part of this option, however for the purposes of this option assessment it was assume that no works would be required.

2.4.3 Analysis of options

Option 1 – Full Layout

This option would result in the greatest construction footprint of the five options due to the requirement of additional land to facilitate three lanes at all intersection approaches and departures. This would increase

the area of property acquisition required to accommodate the additional lanes. This option would also result in the loss of trees along Fitzroy Street (north of intersection), as well as adverse impacts on kerbside parking.

This option would result in an improved level of service in the year 2035, with a level of service B (during both peaks) compared to a level of service F (during both peaks) for the do nothing option.

Option 2 – Upgrade to signalised intersection with three lanes on all legs

This option has a similar construction footprint to Option 1 and would require additional land acquisition to facilitate three lanes at all legs of the intersection. This option would also result in the loss of trees along Fitzroy Street (north of intersection), as well as adverse impacts on kerbside parking.

This option would result in an improved level of service in the year 2035, with a level of service B (during both peaks) compared to a level of service F (during both peaks) for the do nothing option.

Option 3 – Upgrade to signalised intersection with three lanes on all legs except for two on southern leg

This option shared a similar proposal footprint to Option 2 however the reduction of the number of lanes on the southbound approach would reduce the footprint of this options and therefore acquisition requirements compared to Option 2. This option would also result in impacts to street trees and parking on Fitzroy Street to the north of the intersection. This option would result in an improved level of service in the year 2035.

The existing intersection layout in 2035 is predicted to have level of service of F (during both peaks), while with the implementation of Option 3 this would improve to a level of service D in the morning peak and B in the afternoon peak.

Option 4 – Restricted northern leg

This option would have a similar footprint as the current intersection. This option would not result in impacts to street trees and parking on Fitzroy Street to the north of the intersection.

This option would result in an improved level of service in the year 2035, with a level of service of E and C (during the afternoon and morning peaks respectively) compared to a level of service F (during both peaks) for the do nothing option.

Option 5 – Do nothing

The 'do nothing' option was eliminated based on the nil road safety and traffic efficiency benefits. This treatment was not considered value for money, and presented increase of whole-of-life maintenance costs. Although this option presents no initial capital expenditure, the travelling public would endure costs of localised congestion and the increased risk of crashes. The severity of congestion would worsen based on a forecast annual growth of vehicle movements through the intersection.

2.5 Preferred option

Option 2 was selected as the preferred option. When assessed according to the evaluation criteria, it was considered to best meet the objectives of the proposal. Option 2 was considered to provide the best traffic benefits, with a level of service of B during both the morning and afternoon peaks. This compares favourably to Option 3, which would only offer a level of service D in the morning peak.

Option 2 would result in some acquisition however it would result in less acquisition when compared to Option 1. Though acquisition required for this option is greater than Options 3 to 5, the traffic benefits which this option provides are considered to outweigh the increase acquisition compared with these options.

2.6 Design refinements

Ongoing design development has occurred since selection of the preferred option. No major design refinements have occurred.

3. Description of the proposal

3.1 The proposal

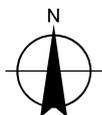
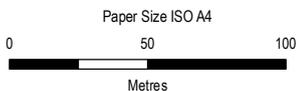
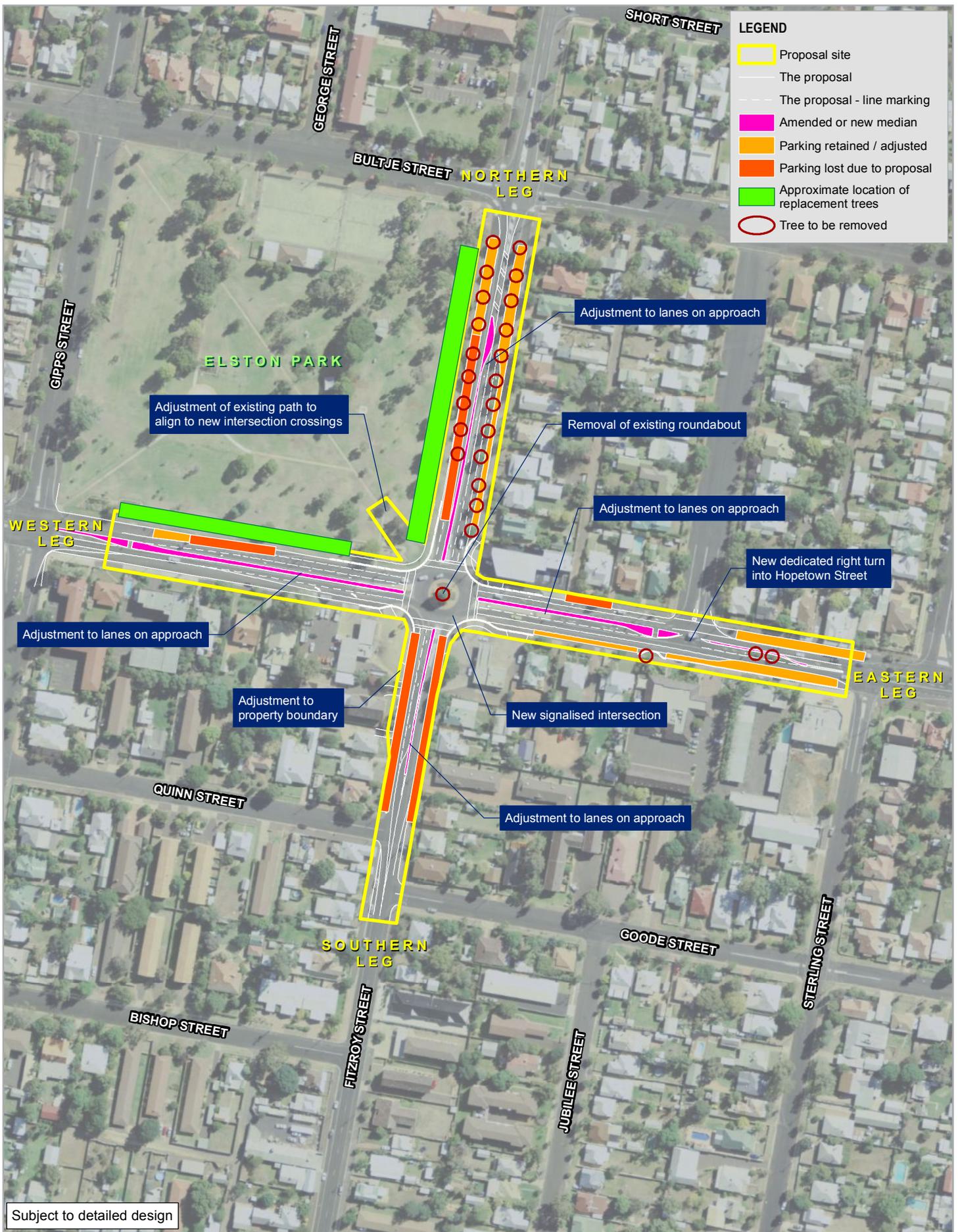
Roads and Maritime proposes to upgrade the intersection of the Cobra Street and Fitzroy Street in Dubbo.

Key features of the proposal would include:

- Removing the existing roundabout and associated landscaping
- Installing a new signalised intersection with incorporated signalised pedestrian crossings at all legs of the intersection
- Adjusting each leg of the intersection to provide three approach lanes, including dedicated right turn lanes on all legs
- Installing new central medians on all legs of the intersection, with designated pedestrian crossings
- Providing a new dedicated right turn lane into Hopetoun Street
- Providing a new heavy duty pavement within the intersection to satisfy a 40 year design traffic loading and providing a new flexible pavement with a minimum 20 year traffic loading design on all approaches
- Removing 21 jacaranda trees along Fitzroy Street north of the intersection to improve motorist sight distances and accommodate pedestrian parking
- Improvements to island pedestrian facilities
- Adjusting the existing pedestrian path within Elston Park to realign with the new signalised crossing at the north-west corner of the intersection
- Upgrade to existing overhead street lighting
- Establishment of a construction compound within proposal area.

To undertake the proposal, strip acquisition from six properties adjacent to the existing roadways would be required. Further temporary leases would also be required for ancillary construction facilities such as compounds, stockpiles areas, a site office and a mobile batching. Property acquisition and other land requirements are discussed in section 3.6.

The proposal is shown in Figure 3.1. Detailed design drawings are included in Appendix A.



Roads and Maritime
Cobra Street and Fitzroy Street
Intersection Upgrade REF

Project No. 21-27394
Revision No. -
Date 13/12/2018

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

The proposal

FIGURE 3.1

3.2 Design

The description provided in this section is based on 80 percent detailed design drawings as at June 2018. The design may be subject to further ongoing design development.

The current design drawings are provided in Appendix A.

3.2.1 Design criteria

The design of the proposal has been prepared in accordance with a Design Management System certified under *AS/NZS ISO 9001:2008 Quality Management Systems – requirements*, and with reference to:

- Austroads Guide to Road Design
- Roads and Maritime Supplements to Austroads
- Australian Design Standards; AS 1742 and AS 1743
- Roads and Maritime Delineation Manual
- Roads and Maritime Traffic Signal Design
- Roads and Maritime CADD Standard.

Consideration of the above guidelines and standards was undertaken in the order outlined above, with the Guide to Road Design (and Roads and Maritime Supplements) used where possible. Where a particular criteria was not available in this document, the remaining guidelines and standards were referenced.

Table 3.1 summarises the key design criteria used to develop the design. These criteria would continue to guide further detailed design development for the proposal.

Table 3.1 Design criteria for the proposal

Criteria	Description
<i>Cobra Street</i>	
Design/Posted speed limit	60 km/h
Lane widths	3.5 metres
Median widths	As required (minimum 1.5m)
Turning lane widths	3.5 metres
Shoulder widths (both kerbside and median side)	As required
Design/Checking Vehicle type	B- Double (26 metres) Passenger car (5.2 metres)
Cross Fall	Constraints based on existing kerb and guttering
Stopping Sight Distance	On approach to the intersection: 100 metre visibility
<i>Fitzroy Street</i>	
Design/posted speed limit	50 km/h

Criteria	Description
Lane widths	3.3 metres (minimum)
Median widths	As required
Turning lane widths	3.2 metres (minimum)
Shoulder widths (both kerbside and median side)	As required
Design/checking vehicle type (for movement from main carriageway to local road)	B- semi-articulate (19 metres)
Cross Fall	Constraints based on existing kerb and guttering
Stopping Sight Distance	On approach to the intersection: 100 metre visibility

Figure 3.2 to Figure 3.5 shows typical cross section for Cobra Street and Fitzroy Street with the vicinity of the intersection. Further cross sections are presented in the design drawings in Appendix A.

3.2.2 Engineering constraints

The engineering constraints for design and construction are as follows:

- The width of the existing road reserve limits the works that can be undertaken. Property acquisition needs to be considered, however minimised where possible
- Presence of below ground infrastructure at a number of nearby properties, such as underground fuel storage tanks and domestic utility connections
- The presence of existing structures near the boundaries of adjacent properties limits the availability of land that does not require the removal of structures
- Limited space is available within the road reserve to relocate utilities
- The need to maintain traffic flows for the majority of the construction period
- Need to maintain access to businesses and residences during both construction and operation, particularly the three service stations located at the intersection.

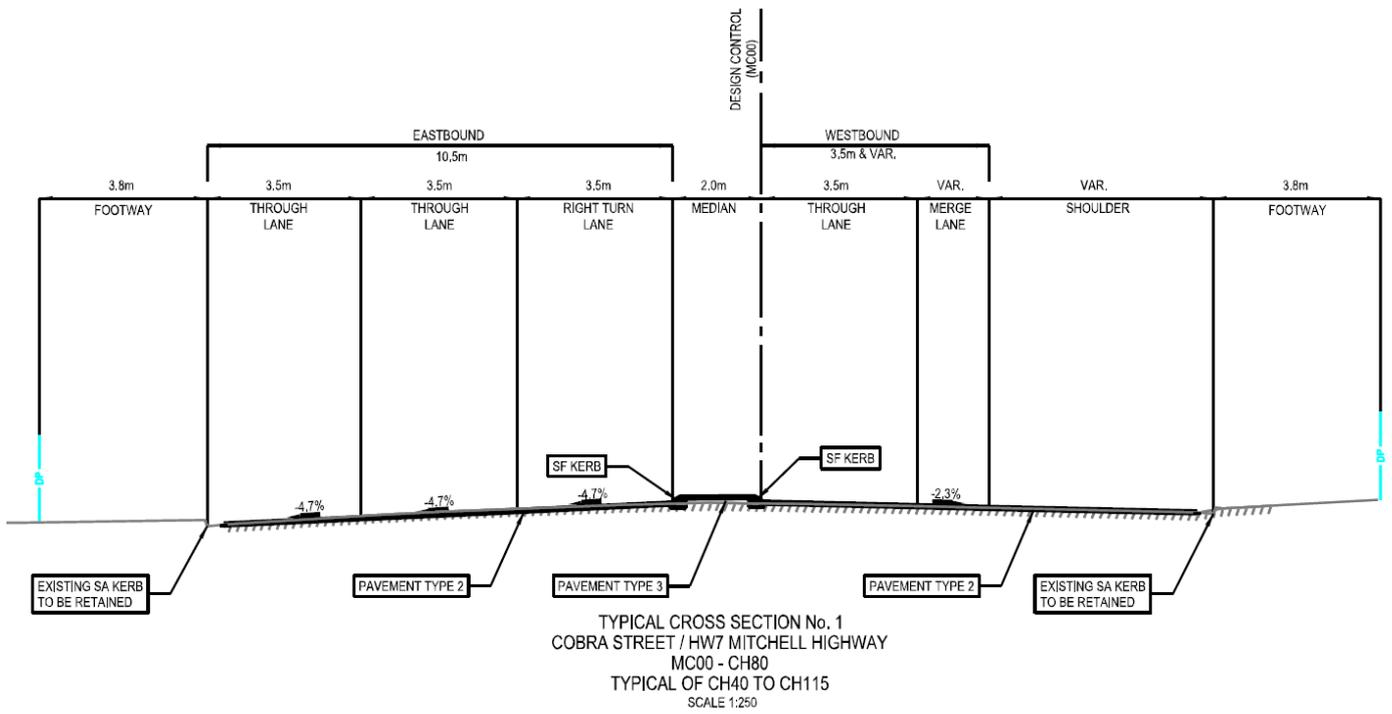


Figure 3.2 Typical cross sections of Cobra Street west of intersection

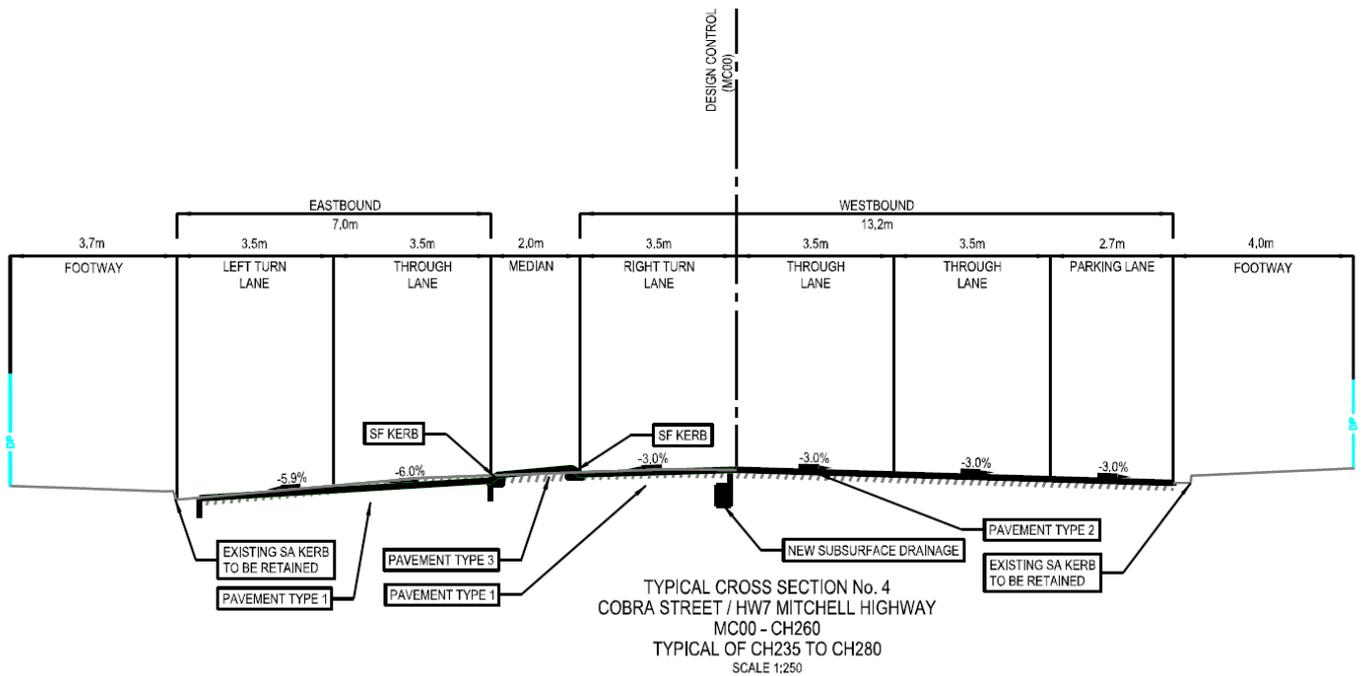


Figure 3.3 Typical cross sections of Cobra Street east of intersection

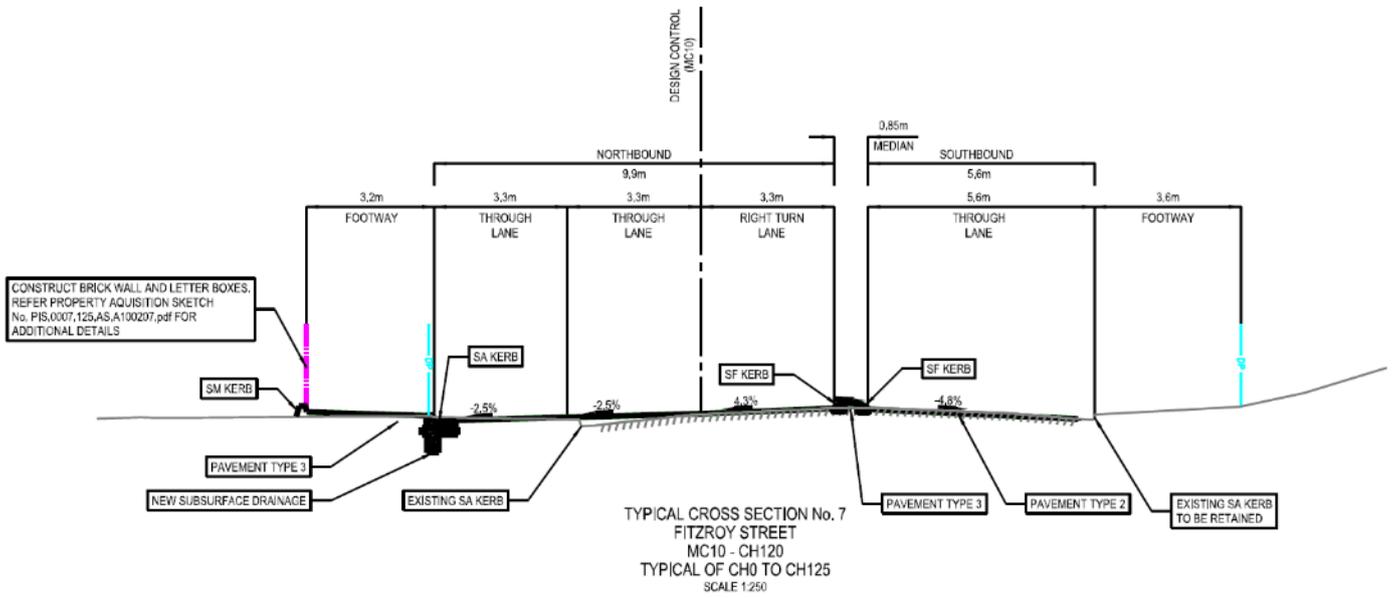


Figure 3.4 Typical cross sections of Fitzroy Street south of intersection

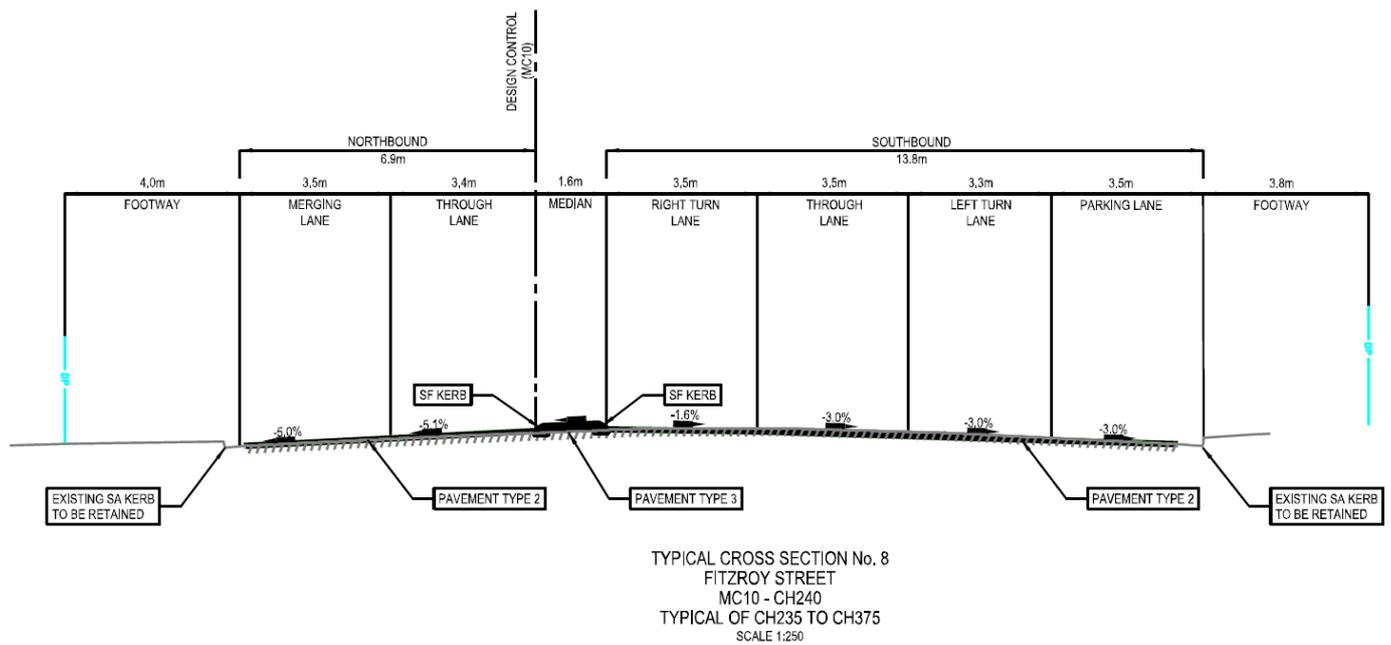


Figure 3.5 Typical cross sections of Fitzroy Street north of intersection

3.2.3 Major design features

The major design features of the proposal are described below.

Horizontal alignment of new intersection and approaches

The horizontal alignment would be similar to the existing alignment of Cobra and Fitzroy streets due to the need for the upgraded intersection to tie in with the existing sections of these streets (including kerb lines and existing travel lanes). Changes in the horizontal alignment of the two streets are also limited by adjacent residential properties. Localised widening of the roadway would occur at each corner of the intersection and along the western side of Fitzroy Street to the south of the intersection.

The key change to the horizontal alignment is the proposed removal of the existing roundabout, which would be replaced with a four leg signalised intersection. The proposed lane layout configurations for each of the four legs is outlined below. The layout of the new intersection and the associated approaches is shown in Figure 3.1.

Vertical alignment of new intersection and approaches

The vertical alignment of the intersection and approaches would be largely unchanged from the existing alignment due to the need to tie in with the existing street surface levels adjoining the proposal.

Cross-falls associated with the proposal would be similar to the existing roadways and where achievable address any current non-conforming cross fall issues. Additional drainage structures have been implemented where existing kerb and gutter alignments prevent the free drainage of stormwater to outside lane kerb and guttering.

Lane layout

The proposed lane arrangements for each leg of the intersection are outlined below.

Eastern leg of intersection (Cobra Street)

The following lane arrangement would be provided on the eastern leg of the intersection:

- Westbound direction:
 - Two through lanes which diverge from a single lane between Hopetoun Street and the eastern extent of the proposal near Sterling Street
 - Right turn slip lane commencing west of Hopetoun Street, beyond pedestrian crossing
 - Designated right turn slip lane to provide access to Hopetoun Street
- Eastbound direction:
 - One through lane between the intersection and the limit of works near Sterling Street
 - Merge lane into Hopetoun Street (between the intersection and Hopetoun Street).

A new central median would be provided along this section of road between the intersection and the eastern extent of the proposal. Median breaks would be provided at Hopetoun Street to facilitate right-turn movements, and for a pedestrian refuge located to the west of Hopetoun Street.

The layout of this leg of the intersection is shown in Figure 3.1.

Western leg of intersection (Cobra Street)

The following lane arrangement would be provided on the western leg of the intersection:

- Westbound direction:
 - Two through lanes with including a left merge lane extending approximately 100 metres west of the intersection, tapering to a single westbound lane
- Eastbound direction:
 - Two through lanes at the intersection (left lane also facilitating left turn vehicle movements into Fitzroy Street) that diverge from a single lane about 100 metres west of the intersection. A single lane would be provided west of this divergence. A designated right turn lane would commence about 140 metres west of the intersection.

A new central median would be provided along this section of road between the intersection and the western extent of the proposal. A pedestrian refuge area would be provided in the median about 150 metres west of the intersection.

The layout of this leg of the intersection is shown in Figure 3.1.

Northern leg of intersection (Fitzroy Street)

The following lane arrangement would be provided on the northern leg of the intersection:

- Northbound direction:
 - Two through lanes at the intersection, with the kerbside lane merging into a single lane about 120 metres north of the intersection
- Southbound direction:
 - One through lane between the intersection and the roundabout at Bultje Street
 - Right turn lane commences about 120 metres north of the intersection
 - Left turn lane commences about 120 metres north of the intersection.

A new central median would be provided along this section of road between the intersection and about 140 metres north of the intersection. A painted median would be provided north of the concrete median continuing to the existing pedestrian island at the Bultje Street roundabout.

The layout of this leg of the intersection is shown in Figure 3.1.

Southern leg of intersection (Fitzroy Street)

The following lane arrangement would be provided on the southern leg of the intersection:

- Northbound direction:
 - Two through lanes at the intersection (left lane also used for left turn to Cobra Street) that diverge from a single lane about 40 metres north of Quinn Street. The single lane would commence from the southern extent of the proposal.
 - Right turn lane commencing about 40 metres north of Quinn Street
- Southbound direction:
 - One through lane from the intersection to the southern extent of the proposal.

A new central concrete median would be provided along this section of road between the intersection and about 30 metres north of Quinn Street. A painted median would be provided south of the median extending to Goode Street. A brake would be provided in the painted median to facilitate right hand turns into Quinn Street.

The layout of this leg of the intersection is shown in Figure 3.1.

Pedestrian, cyclist and bus infrastructure

Pedestrian facilities

Signalised pedestrian crossings would be provided on all legs of the intersection. All four crossings will be audio tactile post push button crossings and will include lantern lighting posts.

Additionally an uncontrolled pedestrian crossing would be provide in the vicinity of the existing crossing located on Cobra Street east of the intersection, east of Hopetoun Street. The crossing will consist of a pedestrian refuge and kerb ramps to either side. The southern kerb ramp would include a kerb extension (or nib) to increase pedestrian visibility. The existing pedestrian refuge near Gipps Street would be retained as part of the proposal.

Adjustments to all pedestrian paths would occur where the width of the existing roadway is adjusted (ie along Fitzroy Street) to facilitate new vehicle turn paths. These paths would have a minimum width of 3.5 metres from the kerb to the edge of the road corridor and positioned behind the concrete kerbing.

The existing pedestrian path within Elston Park would also be adjusted to align the path to the new crossings at the intersection. The existing section of path providing access to the existing pedestrian crossing refuge on the western approach to the intersection would be removed and re-landscaped.

The location of pedestrian facilities are shown in Figure 3.1.

Cyclist facilities

No additional provision for cyclists is proposed. Cyclists would be able to use the shoulders and travel lanes along Cobra Street and Fitzroy Street, similar to the existing intersection service. The proposal would however negate the need for cyclists to negotiate an optional roundabout and vehicle turn paths.

Bus facilities

The proposal would not impact any existing bus facilities.

Car Parking

Due to the widening of the roadway and the limited road reserve available for any additional lanes, impacts to existing on-street car parking is expected. Table 3.2 outlines the indicative areas of parking which would be impacted by the proposal. The location of these areas of parking loss are shown in Figure 3.1.

Table 3.2 Indicative parking loss due to proposal

Section of road	Total spaces	Spaces lost	Spaces retained
<i>Cobra Street</i>			
Western leg – westbound shoulder	24	0	24
Western leg – eastbound shoulder	16	6	10
Eastern leg – westbound shoulder	16	9	7
Eastern leg – eastbound shoulder	0	0	0
<i>Fitzroy Street</i>			
Northern leg – northbound shoulder	18	5	13

Section of road	Total spaces	Spaces lost	Spaces retained
Northern leg – southbound shoulder	0	0	0
Southern leg – northbound shoulder	23	21	2
Southern leg – southbound shoulder	20	18	2
Total	117	59	58

Retention of additional kerbside parking spaces may be assessed, based on hazards of operational safety and community and stakeholder consultation.

Property access adjustment

Property acquisition required as part of the proposal (refer to section 3.6) in some locations would require the adjustment to property access points. In all cases the existing access locations would be maintained, however they would be shifted to match the new property boundary. This includes adjustments to existing ingress/egress areas at each service station; to facilitate refuelling operations and vessel accessibility vehicle sizes (ie refuelling vessels) can access each of the properties.

Removal of trees along Fitzroy Street

To adjust the lane arrangement on the northern leg to the intersection (on Fitzroy Street), 21 existing trees located within the road reserve would need to be removed. This would include nine trees on the western side of Fitzroy Street, and 12 on the eastern side of Fitzroy Street. The removal of the tree avenue will facilitates increased kerbside parallel parking, improved sight distances, improved residential access and improved maintenance accessibility.

3.3 Construction activities

3.3.1 Work methodology

Construction activities would be guided by a construction environmental management plan (CEMP) to ensure works are carried out to Roads and Maritime environmental specifications within the specified area of work, and are completed in accordance with all safeguards described in this REF (summarised in section 7.2). Detailed work methodologies would be determined during construction planning. An indicative construction methodology for the proposal is outlined below:

- Early works
 - Property adjustments including any changes to state survey markers (as required)
 - Relocate and/or adjust affected utilities, services and signage (as intermittently required throughout construction staging). This includes testing of new utilities and decommissioning of redundant assets/services.
- Site establishment:
 - Establish permanent and temporary fencing, work compounds and stockpile sites
 - Install traffic management measures including temporary traffic signs and roadside safety barriers

- Commencing pre-construction mitigation measures outlined in the CEMP, such as installing erosion, sediment and water quality controls, as discussed in section 6.4
- Removal of vegetation within the proposal site
- Footpath or nature strip works associated with utility relocation
- Approaches to the intersection:
 - Remove kerb blisters
 - Excavate, remove and replace unsuitable material from the road reserve
 - Protect drainage infrastructure
 - Place and compact a full depth asphalt pavement
 - Place wearing surface
 - Install kerb and guttering, subsoil drainage and concrete medians where required
- Intersection construction:
 - Remove the roundabout and installation of portable traffic signals
 - Excavate, remove and replace unsuitable material
 - Protect drainage infrastructure
 - Foundation treatments and place full depth of asphalt concrete layer and wearing surface
- Installation of traffic signals:
 - Install control box and power
 - Cut in the detector loops and conduits
 - Install signal posts and lanterns
- Decommissioning site:
 - Rehabilitate disturbed areas and landscape (as required)
 - Decommissioning stockpile and compound site
 - Line marking, signage and delineation
 - Final site clean-up and associated restoration activities.

3.3.2 Construction hours and duration

Construction hours

Where possible, construction would be undertaken during recommended standard hours as outlined in the Interim Construction Noise Guideline (DECC 2009). The recommended standard hours for construction are:

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

Due to the high traffic volumes along Cobra Street, the majority of works would occur outside of standard construction hours. The NSW Office of Environment and Heritage (OEH) *Interim Construction Noise Guidelines*, identifies activities recommended for outside the recommended standard hours. As the work is for maintenance and repair of public infrastructure, where the level of traffic disruption does not feasibly allow work in standard hours, the night work is justified in accordance with the ICNG.

The out-of-hour work would be completed in accordance with the ICNG and the Roads and Maritime Services' *Environmental Noise Management Manual 2001 - Practice Note 7*. This would include notifying

the local community in advance of any work planned to be undertaken outside of standard construction hours. Notices would be placed in the local papers as well as mobile signage boards in the vicinity of the proposal.

Construction duration

Construction is anticipated to commence in mid-2019 and is currently forecasted to be open to traffic by mid-2020. The duration of the works would be subject to weather conditions during the construction period, sub-contractor availability, access to operational businesses and possible peak utility demands i.e. peak water consumption periods.

3.3.3 Workforce

It is estimated that up to 15 construction and site management personnel would be required on-site each day. This number is indicative and would be confirmed by Roads and Maritime, Regional and Freight, Western Plains Regional Maintenance Division and the appointed construction contractor, during construction planning and staging assessments.

3.3.4 Plant and equipment

The plant and equipment required for construction would be determined during construction phase planning. The following equipment is anticipated to be required:

- Excavators
- Front end loaders
- Backhoe
- Watercarts
- Handpaving for concrete work
- Hand tools
- Saw-cutting
- Profiler for milling
- Asphalt paver
- Shuttlebuggy
- Rollers/compactors (static and vibratory)
- Grader
- Tipper trucks
- Kerb machine
- Road sweepers
- Generators
- Trenching machine
- Under boring rig
- Line marking truck
- Concrete trucks
- Drill rigs
- Portable lighting
- Elevated Work Platforms
- Vacuum Excavation Trucks (suction trucks).

3.3.5 Earthworks

The final finished road surface levels would be similar to existing. Based on the intended pavement treatments, limited earthworks would be required.

3.3.6 Source and quantity of materials

Materials required to construct the proposal would include sand, asphalt concrete and concrete. Construction materials would be sourced from local quarries and commercial suppliers within or near

Dubbo. About 2,240 cubic metres of asphalt would be required, while about 460 cubic metres of concrete would be required for medians, kerbs, pathways and driveways.

Asphalt concrete would be sourced from either local suppliers or a mobile asphalt batching plant which is being considered near Dubbo Regional Airport or local quarries. The establishment of the mobile batching plant would be considered further, and is likely to service a number of Roads and Maritime projects in Dubbo. Further details of this batching plant are provided in section 3.4.1.

3.3.7 Traffic management and access

Traffic generation

Construction would require heavy vehicle movements for the transport of construction machinery and equipment, and the import and movement of materials. It is estimated that about 10 heavy vehicles would be required on-site per day, resulting in about 20 heavy vehicle movements in and out of the site per day. During peak periods, such as during asphaltting, these numbers would increase to around 40 vehicle movements per day.

Light vehicle movements would be generated by staff accessing the proposal site. It is estimated that there would be around 30 light vehicle movements per day (ie up to 15 workers accessing the proposal site).

Traffic management

A construction traffic management plan would be prepared in accordance with Roads and Maritimes' *Traffic Control at Work Sites Manual Version 5* (RTA 2018) and Roads and Maritime Specification *G10 - Control of Traffic* (RTA 2006). The plan would provide the traffic management measures to be implemented during construction to ensure that traffic flow on the surrounding network is maintained where possible. The plan would also ensure the safe separation of workers on site from vehicles on surrounding streets. Traffic impacts and safeguards are considered in section 6.2.3.

Where possible, traffic movements through the proposal site would be maintained during construction, however light vehicle and heavy vehicle detours and partial road closures may be required as described below.

Detours

It is proposed that heavy vehicles would be redirected around the proposal site to relieve congestion and to improve worker safety. Table 3.3 outlines the proposed heavy vehicle detour routes. These detours are shown in Figure 3.6. Alternate detour routes have been identified for some movements should vehicles fail to follow posted signage for the preferred detour route, or require local operations within detour routes. All the detours in Table 3.3 would be reversed for vehicles travelling in the reverse direction (excluding the use of the alternate detour routes).

Table 3.3 Heavy vehicle detour roads to Mitchell Highway towards Orange

Source of traffic	Proposed detour route
Newell Highway from Parkes	<p><i>Preferred</i> Newell Highway, Erskine Street, Cobbora Road, Myall Street, Wheelers Lane</p> <p><i>Alternate</i> Mitchell Highway (Victoria Street) and Darling Street facilitating passage through to the above route</p>

Source of traffic	Proposed detour route
Mitchell Highway from Narromine	<p><i>Preferred</i> Thompson Street, Newell Highway, Erskine Street, Cobbora Road, Myall Street, Wheelers Lane</p> <p><i>Alternate</i> Mitchell Highway (Victoria Street) and Newell Highway/Darling Street through to the above route</p>
Newell Highway from Gilgandra	Erskine Street, Cobbora Road, Myall Street, Wheelers Lane

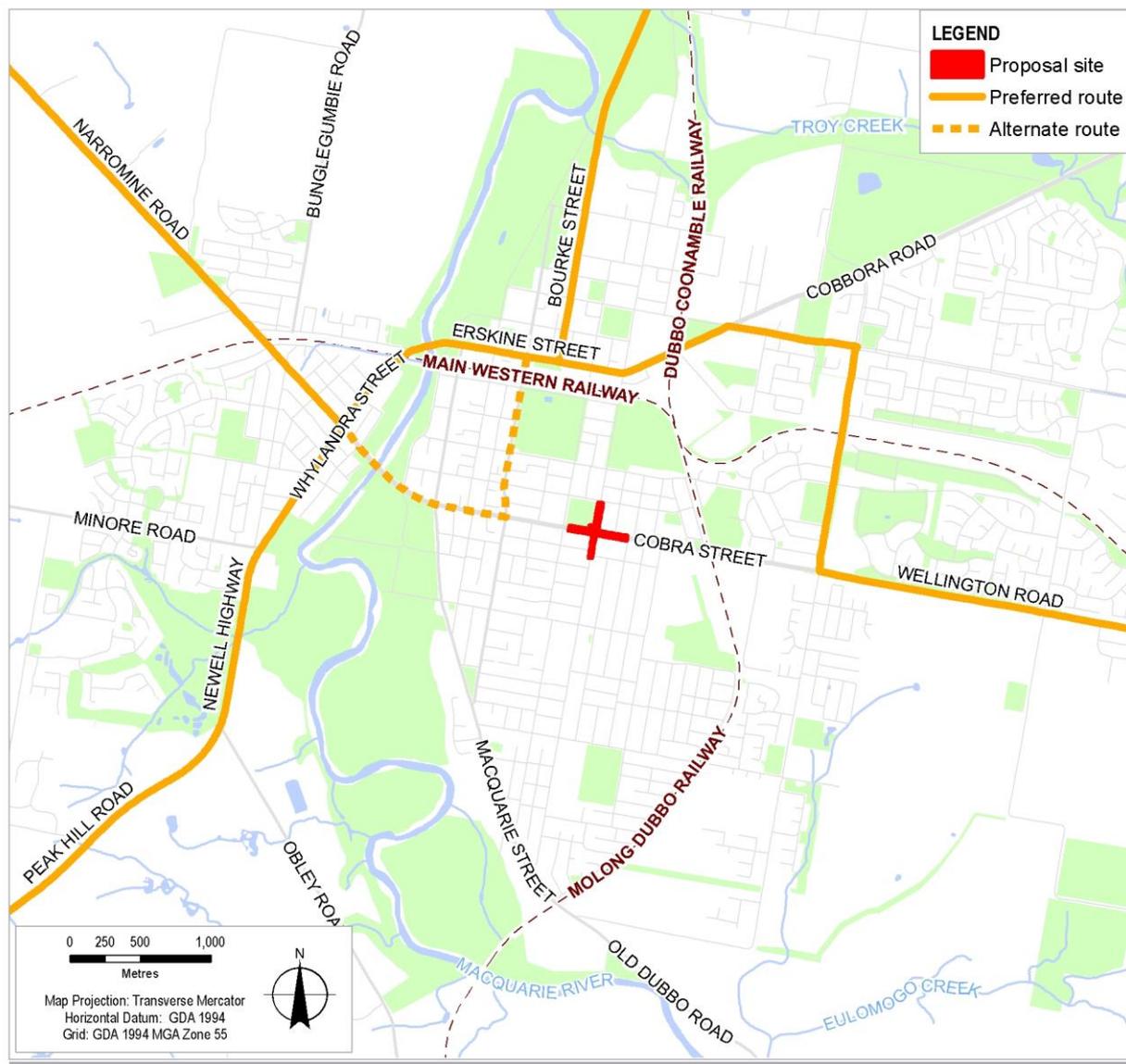


Figure 3.6 Heavy vehicle detours

Local detours around proposal site

Where possible traffic flows would be maintained in all directions with speed zone restrictions and traffic chicanes and calming devices. Closure of half the proposal site to through traffic is proposed to facilitate

construction, this would permit traffic movement along Cobra Street in a single direction, including signposted speed restrictions. Proposed road closures would, for example, consist of closing the southern side of Cobra Street and the southbound approach to Fitzroy Street whilst work is undertaken in this area. During such lane closures, detours would be in place to direct vehicles to adjacent side streets such as Bultje Street or Goode Street/Quinn Street, to facilitate westbound and eastbound motorist passage around the proposal site. Details of these detours would be confirmed during construction planning and would be defined by approved traffic management plans and traffic control plans. Additional temporary side road closures and access restrictions may be in place during the construction. Notifications about any detours and closures would be provided to the community through the Roads and Maritime website and as traffic alerts via mobile apps such as 'Live Traffic'.

Due to the implementation of the heavy vehicle detour routes discussed in the above section, the use of local detours are considered to largely impact light vehicles which would continue to use the proposal site. Endeavors will be made to ensure access is limited to periods where traffic control is maintained.

Access

Access to the proposal site

Access to the proposal site would be via the existing road network, in particular Mitchell Highway. Access points and designated heavy vehicle routes would be defined by the traffic management plan.

Access to properties adjacent to the proposal site

Access to properties would be maintained as far as practicable during construction. As a result of the proposed temporary partial road closures to facilitate construction, access to the three service stations at the intersection has the potential to be affected. Temporary access changes and accessibility provisions would be discussed with the relevant property owners and occupants during periodic consultation to confirm their requirements or potentially identify alternative arrangements.

Further information on potential access and property impacts is provided in sections 6.2 and 6.7.

Access management

The final construction traffic management and construction access arrangements would be identified by the construction contractor and managed in accordance with the construction traffic management plan. Notifications regarding any partial road closures would be undertaken by the construction contractor in accordance with the construction traffic management plan.

3.4 Ancillary facilities

A construction compound area outside of the proposal area has not been finalised an area within Elston Park may be made available. The approved compound area will be required to be identified as part of the preparation of the Construction Environmental Management Plan (CEMP) and proposal finalisation.

Construction compounds and stockpile sites would be confirmed by the contractor during the construction planning phase. Should any additional compounds be required to the one outlined above, the selection of compound and stockpile sites would be undertaken with consideration of the following criteria:

- Not prone to flash flooding and more than 40 metres from a watercourse, where possible
- Distance between compound and nearby residential receivers is to be maximised where possible with a distance of 50 metres considered optimal where possible
- In previously disturbed areas that do not require the clearing of native vegetation
- In plain view of the public to deter theft and illegal dumping

- Outside the drip line of trees and on level ground wherever possible
- Away from areas of heritage conservation value.

Once the location of the site compound and any stockpile areas are confirmed by the contractor, consultation with the Roads and Maritime Environment Branch would be undertaken to confirm the suitability of the locations and whether any additional environmental assessment is required.

All compounds and stockpile sites would be established in accordance with relevant Roads and Maritime guidelines.

3.4.1 Mobile asphalt batching plant

There is potential for the need to establish a mobile asphalt batching plant to supply asphalt during construction. This plant would also potentially be used for other Roads and Maritime projects in Dubbo.

It is proposed to locate a mobile batching plant at local quarries or on Dubbo Regional Airport land which is located off Arthur Butler Drive. The Dubbo Regional Airport land location for the batching plant is considered as this area has previously been used for the operation of a similar plant by Dubbo Regional Council for the resurfacing of the Dubbo City Regional Airport runways.

The batching plant would, where possible, be operated during standard construction hours. However, due to the likely need for the plant to support roadworks occurring at night, the operation of the plant at night is considered likely. The Council run plant on Dubbo Regional Airport land was operated during the night time period.

Consultation with Dubbo Regional Council would be undertaken to confirm the use of this land or local quarry sites and any approvals required to be obtained for the operation of a mobile batching plant.

3.5 Public utility adjustment

Consultation with public utility authorities is being undertaken as part of the design process to identify and locate existing utilities. Consultation is would also confirm any utility authority requirements for the relocation and/or adjustment of their assets.

Preliminary investigations and consultation have indicated that a number of utilities would need to be relocated or adjusted. Consultation with the Roads and Maritime Environmental Branch would be undertaken to seek advice regarding the need for further assessment should also utility relocation or adjustment works be located outside the proposal site assessed as part of this REF.

The following utilities are currently known as being required to be relocated or adjusted as part of the proposal:

- Electricity both above and belowground
- Gas (high pressure and low pressure)
- NBN
- Telstra
- Optic Fibre
- Water infrastructure (potable water, sewer and stormwater).

3.6 Property acquisition, adjustments and leasing

3.6.1 Acquisition

The proposal would largely be contained within the existing road reserve. However, there would be the need for some partial strip acquisition/adjustments to occur to accommodate the proposed works on all legs of the intersection due to the additional lanes proposed as part of the proposal. In total, it is estimated that the proposal would require partial acquisition of, or adjustments to, up to six properties due to their proximity to the proposal site.

The properties with the potential to be directly affected by acquisition are listed in Table 3.4 and shown in Figure 3.7. The table and figure also show the acquisition that has occurred to date to facilitate the proposal.

The extent of acquisition required would be refined and confirmed as an outcome of the detailed design. Potential impacts of acquisition are considered in section 6.7.

All acquisition would be undertaken in accordance with Roads and Maritime's Land Acquisition Policy and compensation would be based on the requirements of the *Land Acquisition (Just Terms Compensation) Act 1991*. Property adjustment plans to facilitate the acquisition and ongoing property access would be developed in consultation with the property owner.

Table 3.4 Proposed property acquisition

Property and type	Property location	Lot/DP	Indicative area of acquisition (m ²)	Type of acquisition
United Petroleum service station (commercial)	138 Cobra Street, Dubbo	Lot 8 DP 412017	3.8	Strip/partial
Shell service station (commercial)	131-133 Cobra Street, Dubbo	Lot 12 DP 229245	15.3	Strip/partial
Inland Petroleum service station (Commercial)	125 Cobra Street, Dubbo	Lot 41 DP 525437	96.1	Strip/partial
Elston Park (Open space)	Cobra Street, Dubbo	Lot 1 DP 1120677 ¹	57.4	Strip/partial
Private residence	217 Fitzroy Street, Dubbo	Lot 43 DP 572537 ²	81.8	Strip/partial
Private residence	219 Fitzroy Street, Dubbo	Lot 3 DP 393978 ³	28.5	Strip/partial

Note: 1. Property already acquired by Roads and Maritime Services. Acquired land is now identified as Lot 7 DP 1213064
 2. Property already acquired by Roads and Maritime Services. Acquired land is now identified as Lot 10 DP 1213064
 3. Property already acquired by Roads and Maritime Services. Acquired land is now identified as Lot 11 DP 1213064

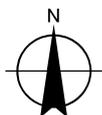
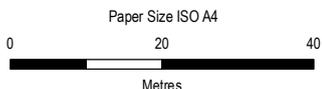
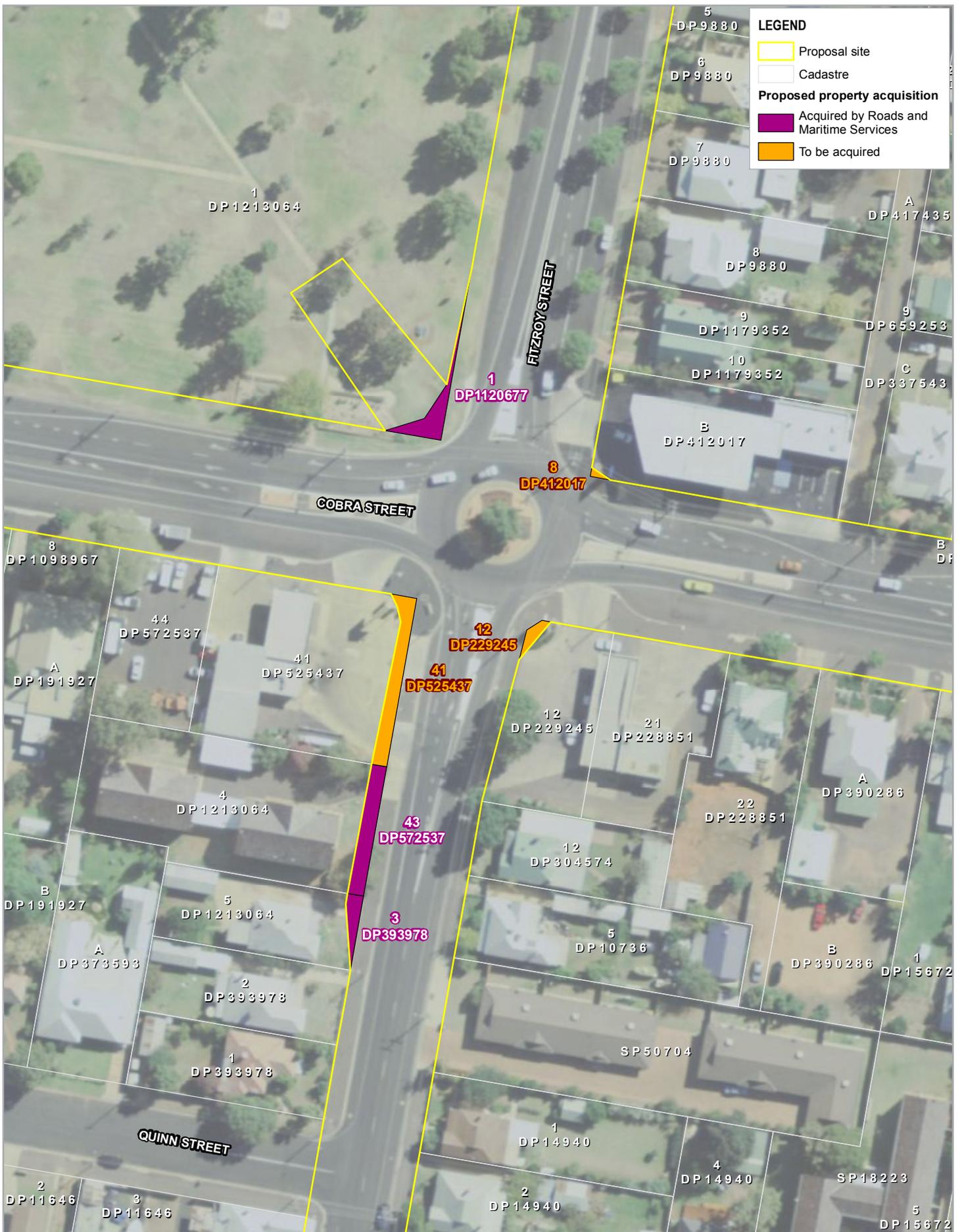
3.6.2 Leasing

Any construction compound and stockpile sites identified by Western Plains Regional Maintenance Division or contractor (as outlined in section 3.4) where not within the proposal area would be leased for the duration of construction. For the proposed mobile asphalt batching plant should Dubbo Regional Airport land be used this land would also need to be leased. Details of these leases would be confirmed with the respective landowners following confirmation of the location of compound and stockpile sites and the positioning of the mobile batching plant.

As described in section 3.3.7, partial road closures may be implemented to facilitate construction. Partial road closures would have the potential to affect access to the service stations located adjacent to the proposal site. One of the options that would be considered (in consultation with owners/lessees of each service station) to mitigate this potential impact would be for Roads and Maritime to temporarily lease the property for the duration of the affected closure.

Further information on potential access and property impacts is provided in sections 6.2 and 6.7.

Figure 3.7 Proposed property acquisition



Roads and Maritime
Cobra Street and Fitzroy Street
Intersection Upgrade REF

Project No. 21-27394
Revision No. -
Date 30/11/2018

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

Proposed property acquisition

FIGURE 3.7

4. Statutory and planning framework

4.1 Environmental Planning and Assessment Act 1979

4.1.1 State Environmental Planning Policies

State Environmental Planning Policy (Infrastructure) 2007

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

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

As the proposal is for a road and road infrastructure facilities and is to be carried out by or on behalf of Roads and Maritime, it can be assessed under Division 5.1 of the EP&A Act. Development consent from council is not required.

The proposal is not located on land reserved under the *National Parks and Wildlife Act 1974* and does not affect land or development regulated by *State Environmental Planning Policy (Coastal Management) 2018*, *State Environmental Planning Policy (State and Regional Development) 2011* or *State Environmental Planning Policy (Major Development) 2005*.

Part 2 of the ISEPP contains provisions for public authorities to consult with local councils and other public authorities prior to the commencement of certain types of development. Consultation, including consultation as required by ISEPP (where applicable), is discussed in section 5.4 of this REF.

4.1.2 Local Environmental Plans

Dubbo Local Environmental Plan 2011

The proposal is located within the Dubbo local government area and therefore the *Dubbo Local Environmental Plan 2011* (Dubbo LEP) applies to the proposal site. Table 4.1 lists the land use zones under the Dubbo LEP on which the proposal site is located. The consistency of the proposal against the zone objectives is outlined in Table 4.1.

The zone provisions provide that the proposal would be permitted without consent in the zones in which the proposal site is located. However, clause 5.12 of the LEP states that '...this Plan does not restrict or prohibit, or enable the restriction or prohibition of, the carrying out of any development, by or on behalf of a public authority, that is permitted to be carried out with or without development consent, or that is exempt development, under *State Environmental Planning Policy (Infrastructure) 2007*'. As the proposal is permitted without consent under ISEPP (refer section 4.1.1), the consent requirements of the LEP does not apply.

Table 4.1 Land use zones and objectives

Zoning	Objectives	Proposal's consistency with objectives
SP2 - Infrastructure (Classified Road)	<ul style="list-style-type: none"> To provide for infrastructure and related uses. To prevent development that is not compatible with or that may detract from the provision of infrastructure. 	The proposal would be for the purpose of road infrastructure, which would improve traffic flow through the intersection and surrounding areas.
SP3 - Tourist	<ul style="list-style-type: none"> To provide for a variety of tourist-oriented development and related uses. To recognise the importance of the Taronga Western Plains Zoo as a key tourist facility with the area of the City of Dubbo. To facilitate tourist-oriented development along major transport corridors and at key nodes throughout the City of Dubbo. To ensure that further tourism related development in the Cobra Street and Whylandra Street precincts will not interfere with established uses on adjoining residentially zoned land. To ensure that development in the Camp Road precinct will not interfere with the continued operation of the Taronga Western Plains Zoo. 	<p>The proposal would benefit tourist related land uses, as it would improve the operation of the intersection and improve access to key tourist areas within Dubbo.</p> <p>The proposal would not result in any long-term impacts on the operation of tourist-oriented development (eg service station and hotels).</p>
R1	<ul style="list-style-type: none"> To provide for the housing needs of the community To provide for a variety of housing types and densities To enable other land uses that provide facilities or services to meet the day to day needs of residents To ensure development is consistent with the character of the immediate locality 	The proposal would result in minor impacts to this zone in the form of some strip acquisition along the front of two properties fronting the Fitzroy Street (south of intersection). These impacts would not affect the existing and future use of land for residential purposes.
RE1	<ul style="list-style-type: none"> To enable land to be used for public open space or recreational purposes To provide a range of recreational settings and activities and compatible land uses To protect and enhance the natural environment for recreational purposes To provide for facilities and amenities to enhance the use of public open space 	The proposal would result in minor impacts to this zone in the form of minimal strip acquisition along the Fitzroy Street frontage of Elston Park. This impact would not affect the existing and future use of this land for recreation purposes.

4.2 Other relevant NSW legislation

With the exception of the *Biosecurity Act 2015* described below no other NSW legislation is considered relevant to the assessment and approval of the proposal.

4.2.1 Biosecurity Act 2015

The NSW *Biosecurity Act 2015* regulates pests, diseases and weeds in NSW. The primary object of the Act is to provide a framework for the prevention, elimination and minimisation of biosecurity risks posed by biosecurity matter, dealing with biosecurity matter, carriers and potential carriers, and other activities that involve biosecurity matter, carriers or potential carriers.

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

Weeds would potentially be required to be removed as part of the proposal. This would be undertaken in accordance with the safeguards and management measures outlined in section 6.3.3.

4.3 Commonwealth legislation

4.3.1 Environment Protection and Biodiversity Conservation Act 1999

Under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) a referral is required to the Australian Government for proposed 'actions that have the potential to significantly impact on matters of national environmental significance or the environment of Commonwealth land. These are considered in and section 6.3 and Appendix B.

Findings – matters of national environmental significance

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

4.4 Confirmation of statutory position

The proposal is categorised as development for the purpose of a road and road infrastructure facilities and is being carried out by or on behalf of a public authority. Under clause 94 of the ISEPP the proposal is permissible without consent. The proposal is not State significant infrastructure or State significant development. The proposal can be assessed under Division 5.1 of the EP&A Act.

Roads and Maritime is the determining authority for the proposal. This REF fulfils Roads and Maritime's obligation under section 5.5 of the EP&A Act including to examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the activity.

5. Consultation

5.1 Consultation strategy

This project forms part of the Dubbo Project Launch package which includes a number of other significant projects in Dubbo. The proposal forms part of an overarching communications campaign developed for all projects designed to provide continued community awareness. This will include an additional website and communications covering all projects, which will be distributed to Dubbo and the surrounding communities. Consultation with affected property owners (by means of acquisition, access or identified potential disturbance) has commenced, which includes a presentation of the proposed design and corridor alignment to affected owners prior to public proposal display.

A Communication Plan has been prepared for the program of works being undertaken by Roads and Maritime in the Dubbo urban area (including the proposal). The plan would be reviewed and updated by the Roads and Maritime Project Officer as required. The plan provides details about:

- Key issues for community involvement
- Aspects of the proposed solution that would impact the community and stakeholders
- Communication objectives of the project
- Key messages and target audience
- Key challenges
- Identified stakeholder groups.

The communication objectives for the project are to:

- Create awareness of the proposed changes at the intersection of Cobra Street and Fitzroy Street, Dubbo
- Make sure that customers (the travelling public) are aware of any road network changes or traffic delays during construction
- Make sure that local residents and business owners are aware of any changes to access that might be experienced during construction.

5.2 Community involvement

The following consultation activities were undertaken by Roads and Maritime during preparation of the REF:

- A letterbox drop community notification in December 2014
- A media release was released to local papers in June 2015
- A community update released in June 2015 via a letterbox drop
- Owners of the properties to be acquired were consulted between July and December 2016
- Door knocking of nearby residents has commenced in August 2018, this will be completed in February 2019.

Owners of the properties to be acquired have been consulted/notified. No feedback was received by the community during consultation.

5.3 Aboriginal community involvement

Due to the disturbed nature of the proposal site, no specific Aboriginal community consultation has been undertaken as part of the proposal.

5.4 ISEPP consultation

Clauses 13 to 16 of ISEPP specify the requirements for consultation with councils and other public authorities for infrastructure development carried out by or on behalf of a public authority. Consultation is required in relation to specified development (clause 16) or development that impacts on:

- Council related infrastructure or services (Clause 13)
- Local heritage (Clause 14)
- Flood liable land (Clause 15).

As the proposal has the potential to impact on the local road network, water infrastructure (including wastewater and stormwater) and Council-owned land, consultation in accordance with ISEPP was undertaken with Dubbo Regional Council. Appendix D contains an ISEPP consultation checklist that documents how ISEPP consultation requirements have been considered.

A letter was sent to Council on 5 July 2018. The letter provided information on the proposal and requested input in terms of any issues or concerns. To date no response has been received. Council has been involved throughout the development of the design of the proposal as a key stakeholder (as outlined in section 5.5).

5.5 Government agency and stakeholder involvement

Roads and Maritime has consulted with Council since the design development stages of the proposal. Council was initially presented details of the proposal in December 2015. Feedback was received from Council and incorporated into the design. The following feedback was received:

- Council's Works and Services Committee (the committee) recommended that Council endorse the proposal
- The committee recommended that the preferred option include an avenue of jacaranda trees along the eastern and southern frontages of Elston Park to offset the proposal's impacts to the existing trees, and the historical connection between the trees and Fitzroy Street
- The committee recommended that Roads and Maritime undertake community consultation with the residents and business owners in the surrounding area.

In addition, Roads and Maritime has undertaken consultation with relevant utility operators to determine the presence of their assets within the proposal site and any relocation or adjustment requirements.

Consultation has also been undertaken with the owners and operators of the three service stations located adjacent to the proposal site to identify options to mitigate the potential impacts of construction.

5.6 Ongoing or future consultation

Future community consultation would occur prior to construction commencing. Consultation activities would include discussions and meetings with affected property owners, letter box drops, community updates, door knocking and advertising in the local newspaper.

A design display and “Have your Say” period is planned for February 2019. This will include hardstand and community pop-up sessions, allowing opportunities for the Dubbo community to directly access the project development/delivery team.

A Roads and Maritime contact number would be available for the community throughout the construction period, to ensure any construction issues can be raised.

A website will be established along with a mobile app to allow the community to receive updates, including details of any traffic disruptions. Details of disruptions would also be included in the live traffic website and app.

Roads and Maritime (and the selected contractor) would continue to consult the community and any affected landowners regarding the start date of work, alternative parking, property and business access arrangements, and (if required) proposed detour routes. Regional bus and truck companies would also be contacted as soon as practicable to notify them of the proposed timing of work, including any detours or times when the intersection would be under traffic control.

All consultation activities will be recorded in Roads and Maritime’s communication register to ensure the approach management and response to any issues raised.

6. Environmental assessment

6.1 Noise and vibration

GHD carried out a construction noise and vibration assessment in July 2018. The below section provides a summary of the assessment which is located in Appendix C.

It is noted that Practice Note 1 of the *NSW Environmental Noise Management Manual* (RTA, 2001) states that safety projects such as roundabouts, traffic signals, turning lanes and lane widening usually do not significantly increase noise levels (ie an increase of 2 dB(A) or more to the existing daytime $L_{Aeq, (15hr)}$ and night-time $L_{Aeq, (9hr)}$ noise levels) and therefore are not subject to noise level targets under the NSW Road Noise Policy. Therefore no quantities operational noise assessment has not been undertaken as part of the proposal.

6.1.1 Existing environment

Sensitive receivers

Noise sensitive receivers have been identified in the vicinity of the proposal and are shown in Figure 2.2 of Appendix C. The majority of the proposal site is surrounded by residential receivers, however a number of non-residential sensitive receivers are located in the vicinity of the proposal site including along both Cobra and Fitzroy streets. Details of all the sensitive receivers located in the vicinity of the proposal are identified in Section 2.2.1 and 2.2.2 of Appendix C.

The proposal potentially involves the establishment of a mobile asphalt plant near Dubbo City Regional Airport. Sensitive receivers in the vicinity of the site of the plant consist of three residential dwellings which are located along Cooreena Road. These dwellings are located between 400 and 650 metres from plant site within the airport. Two industrial receivers along the Narromine Road (ie Mitchell Highway) in the assessment outlined below.

Existing noise environment

Intersection site

Monitoring was undertaken at 192 Fitzroy Street, Dubbo by GHD in 2015 as part of an early design development of the proposal. Noise monitoring results, as well as site observations, indicate that the existing noise environment is dominated by noise sources typical of a suburban environment. These include road traffic, birds and neighbourhood noise. The measured noise levels are shown in Table 6.1.

Table 6.1 Measured RBL L_{A90} and Ambient Noise Level L_{Aeq}

Rating Background Level, L_{A90}			Ambient Noise Level, L_{Aeq}		
Day 7 am to 6 pm	Evening 6 pm to 10 pm	Night 10 pm to 7 am	Day 7 am to 6 pm	Evening 6 pm to 10 pm	Night 10 pm to 7 am
41	41	35	50	48	45

Mobile asphalt plant site

Monitoring was undertaken at 7L Cooreena Road, Dubbo by GHD in 2018. Noise monitoring results, as well as site observations, indicate that the existing noise environment is dominated by road traffic along the

Mitchell Highway and Dubbo City Regional Airport operations (including some construction activities at the airport). The measured noise levels are shown in Table 6.2.

Table 6.2 Measured RBL L_{A90} and Ambient Noise Level L_{Aeq}

Rating Background Level, L_{A90}			Ambient Noise Level, L_{Aeq}		
Day 7 am to 6 pm	Evening 6 pm to 10 pm	Night 10 pm to 7 am	Day 7 am to 6 pm	Evening 6 pm to 10 pm	Night 10 pm to 7 am
37	30	25	52	46	45

6.1.2 Criteria

Construction noise management levels

Proposal specific construction noise management levels (refer to Table 6.3) were developed in accordance with the *Interim Construction Noise Guideline* (ICNG) (DECC, 2009) for each identified sensitive receiver.

For work during recommended standard hours:

- The 'noise affected level' represents the point above which there may be some community reaction to noise. The noise affected level is calculated by adding 10 dB(A) to the rating background level
- The 'highly noise affected level' represents the point above which there may be strong community reaction to noise. The ICNG specifies that the highly noise affected level is 75 dB(A).

For work outside recommended standard hours:

- A strong justification would typically be required for works outside the recommended standard hours
- The proponent should apply all feasible and reasonable work practices to meet the noise affected level
- Where all feasible and reasonable practices have been applied and noise is more than five dB(A) above the noise affected level, the proponent should negotiate with the community.

For work outside recommended standard hours, the construction noise management level is calculated by adding five dB(A) to the rating background level.

The INP application notes regarding sleep disturbance recommend that where the $L_{A1(1min)}$ or L_{Amax} exceeds the $L_{A90(15min)}$ by more than 15 dB(A) outside the bedroom window, a more detailed analysis is required.

The *Road Noise Policy* provides further guidance, which indicates that:

- Maximum internal noise levels below 50 to 55 dB(A) are unlikely to cause awakening reactions
- One or two noise events per night with maximum internal noise levels of 65–70 dB(A) are not likely to significantly affect health and wellbeing.

For this assessment the background level plus 15 dB(A) criteria has been used as a screening level assessment of sleep disturbance which is consistent with the *Industrial Noise Policy* application notes.

Table 6.3 Proposal specific construction noise management levels

Receiver type	Time of day	Management level
Residential	Recommended standard hours	Noise affected: 51 dB(A)
		Highly affected: 75 dB(A)
	Outside recommended standard hours	Day /Evening : 46 dB(A)
		Night: 40 dB(A)
Commercial	When in use	External noise level 70 dB(A)
Classrooms at educational institutions	When in use	External noise level 55 dB(A)
Hospital wards and operating theatres	When in use	External noise level 55 dB(A)
Places of worship	When in use	External noise level 55 dB(A)
Active recreation areas	When in use	External noise level 65 dB(A)

Note 1: Noise management levels are based on a 45 dBA internal noise management level and an assumption of a 10 dBA reduction from the exterior to the interior of the building.

Sleep disturbance criteria

The ICNG states that where construction works are planned to extend over more than two consecutive nights, the analysis should include maximum noise levels and the extent and number of times the maximum exceeds the rating background levels. The *Noise Policy for Industry* (NPI) (EPA, 2017) provides the following screening criteria to determine whether a detailed assessment is required.

- $L_{Aeq,15min}$ 40 dBA or the prevailing RBL plus 5 dBA, whichever is greater; and/or
- L_{AFmax} 52 dBA or the prevailing RBL plus 15 dBA, whichever is greater.

Construction vibration criteria

Human comfort criteria

Human comfort vibration criteria have been set with consideration to *Assessing Vibration: A Technical Guideline* and British Standard (BS) 6472 – 1992, *Guide to Evaluation of Human Exposure to Vibration in Buildings (1 Hz to 80 Hz)* which is recognised by the Office of Environment and Heritage as the preferred standard for assessing the 'human comfort to vibration'. Table 6.4 summarises the BS 6472 human comfort peak vibration criteria and intermittent vibration dose values for the frequency range of 1 Hz to 80 Hz.

British Standard (BS) 5228.2 – 2009, Code of Practice for noise and vibration control on construction and open sites: Part 2 Vibration, recognises that higher vibration levels are tolerable for short-term construction projects as undue restriction on vibration levels can substantially prolong construction works and result in greater annoyance. The guidance values recommended by BS 5228.2 are presented in Table 6.5.

Table 6.4 Human comfort intermittent vibration limits (BS 6472-1992)

Receiver type	Period	Intermittent vibration doe value (m/s ^{1.75})	
		Preferred value	Maximum value
Residential	Day	0.2	0.4
	Night	0.13	0.26
Educational institutes	When in use	0.4	0.8

Note 1: Day is between 7 am and 10 pm and night is between 10 pm and 7 am

Table 6.5 Guidance on effects of vibration levels for human comfort (BS 5228.2 – 2009)

Vibration level	Effect
0.14 mm/s	Vibration might just be perceptible in most sensitive situations for most vibration frequencies associated with construction
0.3 mm/s	Vibration might be just perceptible in residential environments.
1.0 mm/s	It is likely that vibration at this level in residential environments will cause complaints, but can be tolerated if prior warning and explanation has been given to residents.
10 mm/s	Vibration is likely to be intolerable for any more than a very brief exposure.

Structure damage criteria

Table 6.6 presents the German Standard *DIN 4150-3: 1999 Structural Vibration – Part 3: Effects of vibration on structures* minimum safe levels of vibration at different frequencies for commercial, residential buildings.

Based on DIN 4150-3, a measured value exceeding those listed in Table 6.6 “...does not necessarily lead to damage; should they be significantly exceeded, however, further investigations are necessary.”

Table 6.6 Guideline values for short-term vibration on structures

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

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

6.1.3 Potential impacts

Construction noise

Intersection site

Construction activities would result in a short-term increase in localised noise levels, particularly for sensitive receivers close to the proposal site. Noise impacts may be associated with the construction activities and equipment outlined in Table 6.7.

Modelled sound power levels for significant noise generating equipment are listed in Table 6.7. Sound power level data has been sourced from *AS 2436- 2010 Guide to noise and vibration control on construction, demolition and maintenance sites*.

Table 6.7 Construction activities and equipment sound power levels

Equipment	Sound power level dB(A)	Construction scenario					
		Early works	Site establishment	Works on approaches	Intersection construction	Traffic signal installation	Site decommissioning
Asphalt paver	103	-	-	1	-	-	-
Backhoe	99	1	-	1	-	-	-
Concrete saw (5 minutes)	112	-	-	-	-	1	-
Crane (mobile)	99	-	-	-	1	1	-
Excavator	92	1	-	1	1	-	-
Front end loader	99	1	-	-	1	-	-
Generator diesel	97	-	-	-	2	3	-
Hand tools (electric)	103	-	-	1	-	-	-
Roller	102	-	1	1	-	1	1
Truck (>20 tonne)	110	1	-	1	1	-	-
Truck (dump)	102	-	-	1	-	-	-
Truck (water cart)	100	-	-	-	1	1	-
Pavement profiler	103	-	-	-	1	-	-
Line marking truck	108	-	-	-	-	-	1
Overall scenario sound power level		110	102	111	111	112	109

As noted in section 3.3.2, the majority of construction activities would be undertaken outside the recommended standard hours. Under the *Interim Construction Noise Guideline* (DECC, 2009), the works are classified as 'works for which it can be demonstrated that there is a need to operate outside the recommended standard hours'.

Noise levels have been predicted for the worst-case construction scenario at the most-affected receiver location and are provided in Appendix C.

It should be noted that during any given period, equipment would operate at maximum sound power levels for only brief periods. At other times, the machinery may produce lower sound levels while carrying out activities not requiring full power. It is likely that certain types of construction machinery would be present within the proposal site for only brief periods during construction. Therefore, noise predictions are considered to be worst case.

Safeguards and management measures detailed in section 6.1.4 would be implemented where feasible and reasonable to reduce noise impacts outlined in the below sections.

During standard construction hours

The results indicate that, without mitigation, construction noise may exceed the noise management levels at residential sensitive receivers. Works along all legs of the intersection would result in the greatest number of exceedances. Exceedances are expected at a maximum of 53 receivers (of the 390 receivers modelled), with 208 Fitzroy Street predicted to be the worst-affected receiver. It is noted that the highly noise affected criteria would not be exceeded at any sensitive receivers.

Impacts on non-residential receivers would be limited to exceedances at one commercial property (receiver R2 (Shell service station)) for works at the intersection including installation of traffic signals. These exceedances occur as a result of works at the intersection only.

Outside standard construction hours

The results indicate that, without mitigation, construction noise may exceed the noise management levels at residential sensitive receivers. Works along all legs of the intersection and due to the installation of traffic signals would result in the greatest number of exceedances.

The day-time and evening noise management levels are expected to be exceeded at up to 109 residential receivers. The maximum exceedance of the noise management level is predicted to be 24 dBA. The night-time noise management level is expected to be exceeded at up to 266 residential receivers. The maximum exceedance of the noise management level is predicted to be 30 dBA

Impacts on non-residential receivers would be limited to exceedances at one commercial property (receiver R2 (Shell service station)) for works at the intersection including installation of traffic signals. These exceedances occur as a result of works at the intersection only.

Sleep disturbance

Construction noise would also have the potential to exceed the sleep disturbance criteria of 52 dB(A) at residential receivers in the area. This criteria is exceeded at 47 residential receivers.

The RNP states that maximum internal noise levels between 50 to 55 dBA are unlikely to awaken people from sleep. Typically a window will provide a 10 dBA reduction when partially open and a 20 dBA reduction when closed. For a conservative assessment, the windows have been assumed to be partially open to assess sleep disturbance impacts. Based on the above 30 residential receivers are expected to experience sleep disturbance. The location of these receivers is outlined in Table 4.7 of Appendix C.

Mobile asphalt plant site

Noise impacts may be associated with the construction activities and equipment outlined in Table 6.8.

Table 6.8 Construction activities and equipment sound power levels – mobile asphalt plant

Equipment	Source height, m	Operational frequency			Sound power level, dBA
		Day	Evening	Night	
Main burner	2.5	100%	100%	100%	105
Exhaust fan casing	2.5	100%	100%	100%	105
Exhaust stack	19.0	100%	100%	100%	109
Virgin screen/vibrator	15.0	100%	100%	100%	103
Air compressor	3.0	100%	100%	100%	94
Front end loader	2.0	100%	100%	100%	107
Trucks	1.5	66%	66%	66%	108

The operation of the mobile asphalt plant would primarily operation outside of the recommended standard hours, due to the need for the plant to support other works being undertaken outside of the recommended standard hours. However the below assessment has considered daytime operation as well.

Noise levels have been predicted for the worst-case construction scenario at the most-affected receiver location.

Safeguards and management measures detailed in section 6.1.4 would be implemented where feasible and reasonable to reduce noise impacts outlined in the below sections.

During standard construction hours

The results indicate that, without mitigation, the operation of the mobile asphalt plant during standard construction hours would not result in any exceedances of the criteria at any residential receivers) as outlined in Table 6.9. No exceedance of the industrial criteria are expected at any of the nearby receivers. No management measures are recommended for operations during standard hours.

Table 6.9 Predicted asphalt plant levels at residential receivers

Receiver	Predicted $L_{Aeq(15\ min)}$ noise level, dBA			
	Standard hours	Outside standard hours		
	Day	Day	Evening	Night
NML	47	42	35	35
4L Cooreena Road	43	43 (1)	43 (8)	43 (8)
7L Cooreena Road	40	40	40 (5)	40 (5)
8L Cooreena Road	37	37	37 (2)	37 (2)

Note: Exceedances in **bold** with level of exceedance in brackets

Outside standard construction hours

The potential asphalt plant noise impacts have been assessed for out-of-hours works during the day, evening and night-time periods. The predicted noise levels indicates that operations are likely to exceed the noise management levels during all OOHW time periods.

The predicted exceedance of the OOHW noise management levels are provided in Table 6.9. Additional mitigation measures have been recommended and are based on the level of exceedance above the noise management level.

Sleep disturbance

Sleep disturbance is only considered to be an issue for the proposed plant where residences are located within 170 metres of a rural property (as detailed in the Construction Noise and Vibration Guideline (Roads and Maritime, 2016)). The nearest residential receivers are located over 400 metres from the plant site and therefore sleep disturbance is not considered to be an issue.

Construction traffic noise

A significant increase in traffic volumes would be needed in order to increase road traffic noise by 2 dBA (as an example a doubling in traffic corresponds to an approximate 3 dBA increase). The majority of construction traffic movements would be during standard construction hours and unlikely to be significant when compared with the existing vehicle numbers in the area. As a result, no noise impacts from construction traffic movements are expected.

It is recommended that a traffic management plan be prepared by the contractor which detail specific routes that construction traffic and local traffic would follow throughout the construction phase and where feasible and reasonable, avoid the use of local roads.

Construction vibration

Safe working buffer distances to comply with the human comfort, cosmetic damage and heritage structural damage criteria were taken from the CNVG are provided in Table 6.10. Safe working buffer distances for heritage buildings were estimated by doubling the buffer distance for standard structures.

Table 6.10 Vibration safe working buffer distances

Activity	Human comfort	Structural damage	
		Heritage building/structure	Standard structures
Vibratory roller (>18 tonnes)	100 m	50 m	25 m
Vibratory roller (13-18 tonnes)	100 m	40 m	20 m
Vibratory roller (7-13 tonnes)	100 m	30 m	15 m
Vibratory roller (4-6 tonnes)	40 m	24 m	12 m
Vibratory roller (2-4 tonnes)	20 m	12 m	6 m
Vibratory roller (1-2 tonnes)	15 m	10 m	5 m
Small hydraulic hammer	7 m	4 m	2 m
Jackhammer	Avoid contact with structure	2 m (nominal)	1 m (nominal)

Based on the safe work buffers outlined in Table 6.10 and the assumption that rollers would be used primarily in close proximity to the existing intersection, the following receivers are located within the safe work buffer for structural damage:

- 138 – 146 Cobra Street
- 141 – 113 Cobra Street
- 194 – 216 Fitzroy Street
- 217 – 223 Fitzroy Street.

The following receivers are located within the safe work buffer for human comfort:

- 109 - 149 Cobra Street
- 138 – 159 Cobra Street
- 186 – 222 Fitzroy Street
- 217 – 231 Fitzroy Street
- 1 Goode Street
- 2 – 6 Goode Street
- 36 – 44 Quinn Street
- 13 – 21 Hopetoun Street
- 8 – 14 Hopetoun Street.

Works within the vicinity of the above locations would be considered further to determine whether alternative equipment can be used to minimise the risk of vibration impacts.

Operational noise

The proposal is for an upgraded intersection, and will not increase the overall traffic carrying capacity of nearby roads. It is expected that noise levels after the introduction of the upgraded intersection will remain similar to existing levels. It can be concluded that the traffic noise levels will not increase by 2 dBA over existing levels and will therefore meet the requirements of the ICNG minor works criteria.

6.1.4 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing
Pre-construction			
Construction noise and vibration	<p>A construction noise and vibration management plan would be prepared as part of the construction environmental management plan. This plan would include, but not be limited to:</p> <ul style="list-style-type: none"> • A map indicating the locations of sensitive receivers including residential properties • Management measures to minimise the potential noise impacts from the quantitative noise assessment and for potential works outside of standard working hours (including implementation of <i>Interim Construction Noise Guidelines</i> (DECC, 2009) • A risk assessment to determine potential risk for activities likely to affect receivers (for 	Construction contractor	Pre-construction and construction

Impact	Environmental safeguards	Responsibility	Timing
	<p>activities undertaken during and outside of standard working hours)</p> <ul style="list-style-type: none"> • Mitigation measures to avoid noise and vibration impacts during construction activities including those associated with truck movements • A process for assessing the performance of the implemented mitigation measures • A process for documenting and resolving issues and complaints • A process for updating the plan when activities affecting construction noise and vibration change • Identify in toolbox talks where noise and vibration management is required • An out of hours works procedure in accordance with the requirements of the <i>Interim Construction Noise Guideline</i> (DECC, 2009) and the <i>Environmental Noise Management Manual Practice</i> (RTA, 2001a) • Restrictions on construction delivery times to minimise noise impacts to receivers near the compound site • Scheduling works to complete noisiest activities during the day wherever possible (i.e. concrete saw cutting). 		
	<p>The out of hours procedure would as a minimum include:</p> <ul style="list-style-type: none"> • Background levels for noise criteria in accordance with the <i>Interim Construction Noise Guideline</i> (DECC, 2009) • Locations of the works • Locations of sensitive receivers • Predicted noise levels • Communications plan • Triggers for the provision of respite and a respite schedule. <p>Management measures where works are unable to comply with <i>Interim Construction Noise Guideline</i> (DECC, 2009) and the <i>Environmental Noise Management Manual Practice</i> (RTA, 2001a).</p>	Construction contractor	Pre-construction and construction
Construction			
Construction noise	Noise impacts would be minimised in accordance with Practice Note 7 in Roads and Maritime Services' <i>Environmental Noise Management Manual</i> and <i>Environmental fact sheet No. 2- Noise management and Night Works</i> .	Construction contractor	Construction

Impact	Environmental safeguards	Responsibility	Timing
Construction noise from machinery and equipment	All plant and equipment would be appropriately maintained to ensure optimum running conditions, with periodic monitoring.	Construction contractor	Construction
	Noise-emitting plant would be directed away from sensitive receivers where possible.	Construction contractor	Construction
	Traffic flow, parking and loading and unloading areas would be planned to minimise reversing movements within the proposal site.	Construction contractor	Construction
	Reversing alarms that have a tonal noise character are to be avoided during out of hours activities. Quacker style or 'smart' reversing alarms are to be used during night time activities (pending safety approvals).	Construction contractor	Construction
Construction noise from construction compound	Temporary hoarding would be erected around the selected construction compound where deemed required.	Construction contractor	Construction
Mobile asphalt plant	Investigate the use of a 2 to 3 metre acoustic screen around the asphalt burner unit.	Construction contractor	Construction
	Position aggregate stockpile areas to shield noise between the asphalt plant equipment and the residential receivers to the north-west.	Construction contractor	Construction
	The front-end loaders on site should be fitted with exhaust mufflers.	Construction contractor	Construction
Construction noise from inappropriate practices	Site inductions would be provided to train staff on ways to minimise construction noise impacts on-site. Responsible working practices include: <ul style="list-style-type: none"> • Avoid the use of outdoor radios during the night-time period • Avoid shouting and slamming of doors • Where practical, operate machines at low speed or power and switched off when not being used rather than left idling for prolonged periods • Minimise reversing • Avoid dropping materials from height and avoid metal to metal contact on material. 	Construction contractor	Construction
Construction vibration	Quieter and less noise/vibration emitting construction methods would be used where feasible and reasonable.	Construction contractor	Construction

Impact	Environmental safeguards	Responsibility	Timing
	Compliance vibration monitoring would be undertaken in response to complaints or when vibration generating activities occur within the structural damage buffer distances. The results of the vibration monitoring would be compared to the structural damage criteria presented in Table 6.6 considering frequency content.	Construction contractor	Construction
	Building condition surveys would be undertaken when vibration generating activities occur within the structural damage buffer distances. The properties to be assessed are to be confirmed in consultation with Roads and Maritime Services.	Construction contractor	Construction
	Verify that nearby medical practices do not possess vibration sensitive equipment such as micro surgery, eye surgery or neurosurgery tools.	Construction contractor	Construction
Noise and vibration impacts and appropriate complaints handling	The local community would be contacted and informed of the proposed work, location, duration of work, and hours involved. The contact would be made a minimum five days before work starts as per RMS ENMM Practice Note 7 requirements.	Construction contractor and Roads and Maritime	Construction
	Communications material such as the project website and community notification would include a contact person and phone number to enable complaints to be received and responded to.	Construction contractor	Construction

Additional mitigation measures

In circumstances where the noise levels are predicted to exceed construction noise management levels after implementation of the general work practices, the relevant additional mitigation measures detailed in Table 6.11 should be considered where feasible and reasonable. Based on the predicted noise levels, additional mitigation measures are likely to be required for works during standard construction hours and outside of standard construction hours. Houses identified as Moderately Intrusive or Highly Intrusive (based on Appendix A of Appendix C) during the day time would be eligible for letter box drops or compliance noise monitoring as per the table below. Additional mitigation measures would be required for any night time works where feasible and reasonable.

Table 6.11 Additional mitigation measures

Criteria	Time period	LAeq(15 min) noise level above rating background level			
		0 to 10 dBA	10 to 20 dBA	20 to 30 dBA	>30 dBA
		Noticeable ¹	Clearly audible	Moderately intrusive	Highly intrusive
Standard	Weekday (7 am– 6 pm)	-	-	LB, M	LB, M
	Saturday (8 am – 1 pm)				

Criteria	Time period	LAeq(15 min) noise level above rating background level			
OOHW Period 1	Weekday (6 pm–10 pm)	-	LB	M, LB	M, IB, LB, PC, SN
	Saturday (1 pm – 10 pm)				
	Sunday (8 am – 6 pm)				
OOHW Period 2	Weekday (10 pm–7 am)	LB ¹	M, LB	M, IB, LB, PC, SN	AA, M, IB, LB, PC, SN
	Saturday (10 pm – 8 am)				
	Sunday (6 pm – 7 am)				

Monitoring (M): Compliance noise monitoring

Individual Briefings (IB): Individual briefings are used to inform stakeholders about the impacts of high noise activities and mitigation measures that will be implemented. Communications representatives from the contractor would visit identified stakeholders at least 48 hours ahead of potentially disturbing construction activities. Individual briefings provide affected stakeholders with personalised contact and tailored advice, with the opportunity to comment on the Proposal.

Letter box drops (LB): Letter box drops or media advertisements.

Phone Calls (PC): Phone calls detailing relevant information would be made to identified/affected stakeholders within seven days of proposed work. Phone calls provide affected stakeholders with personalised contact and tailored advice, with the opportunity to provide comments on the proposed work and specific needs.

Specific Notifications (SN): Specific notifications are letterbox dropped or hand distributed to identified stakeholders no later than seven days ahead of construction activities that are likely to exceed the noise objectives. This form of communication is used to support periodic notifications.

Alternative accommodation (AA): Alternative accommodation options would be offered to residents.

Source: *Construction Noise Strategy (Rail Projects)*, (TfNSW, 2012)

Note 1: A minimum of 5 dBA exceedance above the background level was used for determining the 'Noticeable' level.

6.2 Traffic, transport and access

6.2.1 Existing environment

A description of the key roads within the proposal site is provided in section 2.2. Other information on the existing traffic and transport environment is provided below.

Traffic volumes

Roads and Maritime engaged Austraffic Pty Ltd to carry out a 12 hour traffic count at the intersection of Fitzroy Street and Cobra Street on 9 October 2012. An approximate vehicle count of 21,600 vehicles were recorded during the study between 6 am and 6 pm. Approximately 2,300 vehicles were during the afternoon peak period (3.30 pm to 4.30 pm).

Crash history

In a five year period between 2013 a 2017, a total of 20 crashes occurred along Cobra Street between Gipps Road and Sterling Street. No accidents were recorded within the proposal site along Fitzroy Street. From the 20 crashes recorded, seven required vehicle(s) tow-away and 13 involved mild (medical) injury, and three medically serious injury crashes. Twelve of these crashes were classified as rear end crashes, which is typically associated with a congested intersection where traffic starts and stops frequently.

Car parking

On-street car parking is located along the majority of the kerb side areas on Cobra and Fitzroy streets, with the exception of shoulder areas close to the intersection and at access points near to adjacent properties. Parking along the western side of Fitzroy Street is used by visitors to Elston Park. Parking along Fitzroy Street in the vicinity of 200 Fitzroy Street (an existing café) is also heavily used. Parking along Fitzroy Street north of intersection does not have any specific parking orientation (ie parallel or angled parking) and therefore is used for various type of parking.

Public transport

Limited public transport services operate in the vicinity of the proposal site. One bus route (572A) travels through the intersection, operating between every hour around during peaks, and every two hours in the middle of the day. Three services also operate on weekends. No stops for this service are located in the proposal site. School buses also travel through the intersection during school drop-off and pick-up times.

Pedestrian and cyclist access

Pedestrian paths (formal footpaths) are located along the following roads within the proposal site:

- Cobra Street
 - Southern side for the length of the proposal site
 - Northern side between the intersection and the eastern extent of the proposal site
- Fitzroy Street
 - Eastern side for the length of the proposal site
 - Western side between the intersection and the southern extent of the proposal site.

Pedestrian paths are located within Elston Park including a path, which connects to the pedestrian refuge crossing located on the western leg to the intersection.

Pedestrian movements at the intersection are currently available via the use of pedestrian refuges located on each approach of the intersection. This arrangement required pedestrians to cross the roads, and requires pedestrians to navigate brakes in traffic across multiple travel lanes.

No formal cycle routes are located within or intersecting the proposal site. Due to the existing widened road shoulders within the proposal site, cyclists would be able to utilise these roads. It is considered that other routes (i.e. surrounding local roads) may be more appealing as a result of lower traffic volumes. This is reflected by the existing cycle routes mapped by Dubbo Regional Council along roads parallel to the proposal site. Existing on road bike routes run along Gipps Street to the west, Bultje Street to the north and Hampden and Palmer streets to the east.

6.2.2 Potential impacts

Construction

The proposed approach to traffic management during construction is outlined in section 3.3.7. Potential construction related impacts would be mainly associated with changes to traffic flow and access arrangements, including detours and partial road closures. These potential impacts have been considered below.

Construction traffic generation and impacts on the road network

As described in section 3.3.7, construction would generate around 20 heavy vehicle and around 30 light vehicles movements per day. During peak periods, such as during asphalt paving works, heavy vehicle movements could increase to around 40 vehicle movements per day. The majority of these movements would take place outside peak periods.

Cobra Street (as part of the Mitchell Highway) already accommodates high traffic volumes (described in section 6.2.1), including high volumes of heavy vehicles. The number of vehicles generated by construction would be a very small proportion of existing traffic volumes, and within the anticipated of daily variation in traffic volumes on these roads.

Access to and from the proposal site would be via Cobra Street, which is a designated heavy vehicle route. Transporting asphalt from the asphalt plant (described in section 3.4.1) would increase the number of vehicles travelling along the Mitchell Highway from the airport. As these roads already carry high volumes of traffic, the additional traffic generated by construction would have a negligible impact on their service operation.

The use of the proposed haul routes would be short term and temporarily managed through staged construction and paving planning activities. The route between the asphalt plant and the proposal site would only be used when asphalt is required. It is also likely that asphalt would be delivered at night.

As a result of the potential need for partial road closures and speed restrictions within the proposal site (described in section 3.3.7), traffic flows along Cobra and Fitzroy streets would be affected. This has the potential to increase travel times and congestion in the vicinity of the proposal site, particularly for heavy vehicles travelling along the Mitchell Highway through Dubbo. This impact would be managed by implementing the proposed heavy vehicles detours (described in section 3.3.7). The potential impacts of the proposed detours are considered below.

Impacts of heavy vehicle detours

The proposed detours (described in section 3.3.7) would increase the number of heavy vehicles using roads along the routes. However, these roads are designated heavy vehicle routes, which already carry high volumes of traffic and provide connectivity to alternative freight routes. A number of heavy vehicles already use these roads to avoid traffic congestion in the centre of Dubbo (including at the intersection of Cobra and Fitzroy streets). As a result, it is not expected that there would be a substantial increase in traffic volumes along these roads. The additional traffic generated by the temporary detours is not expected to result in significant impacts to the operation of roads.

Use of the detours would result in a small increase to travel distances for heavy vehicles travelling through Dubbo. The increase in distance would be about 1.5 kilometres for Mitchell Highway traffic, and about 3.5 kilometres for Newell Highway traffic. These increases would be offset by the potential time savings associated with motorists avoiding the proposal site.

Impacts of local vehicle detours

As described in section 3.3.7, partial road closures during construction may require detours to be implemented for local traffic. Use of the local detour routes would result in short term and temporary increases in traffic volumes along roads that form part of the detour routes. The amount of the increase on these roads is not expected to be significant, given that heavy vehicles would be required to use the heavy vehicle detour routes described above. In addition, it is also expected that some drivers would adjust their routes to other streets to better suit their destinations. This would further reduce the volume of traffic likely to use the nominated local detours.

Potential impacts associated with the use of local detours would be managed by implementing the measures provided in section 6.2.3, including the construction traffic management plan.

Further consideration of the potential impacts of detours would be undertaken once the detour routes are confirmed during development of the traffic management plan. The need for any further assessment of impacts would be confirmed by with Roads and Maritime's Environment Branch.

Impacts to access

Potential impacts associated with construction of the proposal would include access disruptions for properties directly fronting the proposal site.

Access to properties would be maintained as far as practicable during construction, including any adjacent motels which rely on vehicular access. This may include access under traffic control or, potentially, establishing alternative access arrangements where possible. Temporary access changes would be discussed with the relevant property owners and occupants to confirm their requirements and identify alternative arrangements where required.

As a result of the proposed temporary partial road closures to facilitate construction, access to the three service stations at the intersection has the potential to be affected for the duration of the closures. Prior to any unavoidable disruption to access, consultation would be undertaken with the respective owners/lessees of each service station to discuss the options to mitigate this potential impact. This could include establishing alternative access arrangements where possible, or leasing the properties for the duration of the partial closures.

The proposed partial property acquisition/adjustments (described in section 3.5) may result in impacts to the existing access points to properties. These impacts are considered minimal as any access points impacted would be adjusted in a similar manner to the existing situation. Property adjustment plans would be developed in consultation with the affected property owners.

Further information on potential property impacts is provided in section 6.7.

Impacts on access to adjacent streets (eg Hopetoun Street, Quinn Street and the rear lane located between Fitzroy Street and Hopetoun Street) would be minimised as far as practicable. In the event that access to these roads is impacted, alternative access routes would be available via surrounding streets. Such detours would result in a minor, short-term increase in travel times. The community would be notified in advance of any changes to access arrangements in accordance with the requirements of the construction traffic management plan and project community engagement plan.

Potential access impacts would be managed by implementing the measures provided in section 6.2.3, including the construction traffic management plan.

Parking impacts

During construction, informal on-street parking would not be available in the vicinity of work sites. This would result in temporary reductions in the availability of on-street parking in the vicinity of work sites. Alternative on-street parking would be available in surrounding streets.

Public transport impacts

Existing bus services may experience a minor increase in travel times and potential detours during the day time period. As night work is proposed to reduce traffic impacts for the majority of the proposal, impacts to bus services would be limited.

No bus stops would be impacted.

Pedestrian and cyclist access

Pedestrian and cyclist access would be maintained as far as possible, however temporary diversions would be required around some work areas. Potential impacts to pedestrians and cyclists would be managed by the implementation of the measures provided in section 6.2.3.

Operation

Future intersection performance

The proposal would improve traffic movement efficiency at the intersection. The intersection is often congested, particularly during peak periods. The proposal would improve traffic flows and functional benefits of a regulated flow of traffic through the intersection during service. The proposal would also improve the movement of heavy vehicles through the intersection as they would not have to negotiate a roundabout.

Impacts on local roads and access

The proposal would include construction of additional medians along both roads, to prevent the movement of vehicles on the wrong side of the road. The positioning of these medians would not impact access to adjacent side streets, as the design includes gaps in the median where required.

Impacts on property access

The proposal would not result in any loss to access to adjacent properties. However, some changes to how properties are accessed may occur as a result of the proposed medians. In most cases, this would require only a slight adjustment to the direction of arrival (ie for refuelling vessels accessing the service stations) or use of nearby roundabouts (eg at Bultje Street) to turn around to access properties on the opposite side of the median (eg the café at No. 200 Fitzroy Street).

No significant changes to access are expected, and any increases in travel times would be minimal.

The proposed partial property acquisition/adjustments (described in section 3.5) may include the need to relocate/adjust some property accesses. Property adjustment plans would be developed in consultation with the affected property owners.

Potential access impacts would be managed by implementing the measures provided in section 6.2.3, including consultation with affected property owners to ensure that access requirements are met as far as possible.

The proposal would also improve access to some properties along Fitzroy Street (north of intersection) due to the removal of the Jacaranda Trees which in some case are currently impacting on access to properties (refer to **Figure 6.1**).



Figure 6.1 Existing impacts to access due to Jacaranda trees

Impacts to car parking

The proposal would result in the permanent loss of some informal on-street parking in the immediate vicinity of the new intersection as a result of the new traffic lanes. Parking would be lost over a total area of about 350 metres along both Cobra and Fitzroy streets (shown in Figure 3.1). Parking in these areas varies with no formal orientation of parking identified with vehicles parking at angles between 45 degree to the kerb and parallel to the kerb. The loss of on-street car parking has the potential to impact residents and visitors to properties fronting Cobra and Fitzroy streets that currently use this parking. For the most part, these impacts would be minimal as the majority of the areas are not heavily used, and other parking is available in surrounding areas. Where on-street parking is currently more heavily used (such as adjacent to Elston Park or café), the loss of on-street parking would have the potential to impact parking availability in the immediate vicinity of the park and cafe during peak periods. However, alternative on-street parking is available in surrounding areas. It is recognised that use of alternative parking would result in some increases in travel distance for some park visitors during peak times. The café on Fitzroy Street also has some parking behind the property off the rear lane (about nine spaces), this parking would assist in offsetting any impacts.

Road user safety

The proposal would improve safety for road users during operation. It would reduce the incidence of rear-end crash incidents and improve pedestrian safety (described below).

Pedestrian and cyclist access

The proposal would improve pedestrian access as signalised pedestrian crossings would be provided to replace the existing pedestrian refuges on all legs to the intersection. The new crossings would improve safety for pedestrians, as crossings would be controlled by signals rather than undertaken during gaps in traffic. Existing Pedestrian crossings to the west (near Gipps Street) and east (near Hopetoun Street) already provide improved access for prams and therefore these would be maintained or relocated as part of the proposal.

The proposal would include an adjustment to the existing path within Elston Park to connect with the new signalised crossing. This would ensure that access to the park from the intersection is maintained and that the desired pedestrian route is serviced by a formal path.

6.2.3 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing
Pre-construction			
General traffic management	<p>A detailed traffic management plan would be prepared and implemented in accordance with the <i>Traffic Control at Work Sites technical Manual (2018)</i> and <i>Specification G10 Control of Traffic</i>. The plan would be approved by Roads and Maritime before implementation to provide a comprehensive and objective approach to minimise any potential impacts on road and pedestrian operations during construction.</p> <p>The plan would include:</p> <ul style="list-style-type: none"> • Confirmation of haulage routes, including routes to the asphalt plant, to minimise impacts on local roads and traffic • Measures to minimise impacts to access to local roads and properties • Site specific traffic control measures (including signage) to manage and regulate traffic movement • Measures to manage the potential impacts of detours and diversions and maintain safety along these routes • Measures to maintain pedestrian and cyclist access • Requirements and methods to consult and inform the local community of changes to access arrangements and travel routes • Access to works sites including entry and exit locations and measures to prevent construction vehicles queuing on public roads • Determine temporary speed restrictions to ensure safe driving environments around work sites • A response plan for any construction traffic incident • Traffic barrier requirements and placement • Include the need to consult with emergency services on access changes • Consideration of other developments to minimise traffic conflict and congestion that may occur due to the cumulative increase in construction vehicle traffic • Monitoring, review and amendment mechanisms. 	Construction contractor	Pre-construction

Impact	Environmental safeguards	Responsibility	Timing
	Consultation would be undertaken with local bus operators before and during construction.	Roads and Maritime	Pre-construction and construction
	The community would be kept informed about construction and any changes to access arrangements or travel routes, through advertisements in the local media and prominently placed advisory notices or variable message signs.	Roads and Maritime	Pre-construction and construction
Access to properties	Property owners and occupants would be consulted regarding potential impacts to property access (during construction and/or operation) and alternative arrangements.	Roads and Maritime	Pre-construction
Construction			
Access	Where possible, partial road closures would occur at night when traffic volumes are at a minimum.	Construction contractor	Construction
	Access to side streets would be maintained as far as possible during construction.	Construction contractor	Construction
	Consultation would be undertaken with Dubbo Regional Council in relation to the timing of partial road closures.	Construction contractor	Construction
	Access would be maintained for emergency vehicles in the vicinity of construction works. Ongoing consultation would be undertaken with emergency services during construction to ensure that potential impacts are identified and appropriately managed.	Construction contractor	Construction
Pedestrian and cyclist management	Pedestrian access would be maintained during construction. Where changes to access are required, alternative access routes would be identified and notified to the community.	Construction contractor	Construction
	Where access for cyclists is removed signage would direct cyclist to the nearest designated cycle route (ie Bultje Street or Gipps Street south of Fitzroy Street).	Construction contractor	Construction
Congestion and safety	Where possible, vehicle movements (in particularly heavy vehicles) to the proposal site would be avoided during the morning and afternoon peaks and during school finishing times.	Construction contractor	Construction
Property access	Property access would be maintained throughout the construction period as far as possible. Where changes to access arrangements are required, property owners/tenants would be consulted to confirm access requirements and alternative arrangements.	Construction contractor and Roads and Maritime	Construction

6.3 Biodiversity and trees

6.3.1 Existing environment

Vegetation within and close to the proposal site

The proposal site consists of an existing road corridor which is largely devoid of vegetation. Sealed road surfaces occupy the majority of the site. The main areas of existing vegetation are located in the roundabout, along road verges/nature strips and in Elston Park.

Within the roundabout there is a large planted Hybrid Black Poplar (*Populus x canadensis*) and groundcover (shown in Figure 6.2).

As shown in Figure 6.3, a 21 mature Jacaranda trees (*Jacaranda mimosifolia*) are located within the proposal site, along both sides of Fitzroy Street north of the intersection.

Within that part of the proposal site located at the south-east corner of Elston Park, vegetation consists of mown lawn with scattered tree plantations.

Rows of recently planted Jacarandas are located along the eastern and southern edge of the park (adjacent to Cobra and Fitzroy streets) near the north-west corner of the intersection. Twenty-six trees were planted by Roads and Maritime to offset the loss of street trees as a result of the proposal. These trees are located outside the proposal site.

Other vegetation within and adjoining the proposal site includes the nature strip, front gardens of residential properties, and scattered stands of trees (mainly planted street trees) over a mown lawn understorey with some herbaceous exotic annual groundcover species. A number of other street trees are located along Cobra Street in close proximity to the proposal site.



Figure 6.2 Vegetation in centre of existing roundabout



Figure 6.3 Mature Jacaranda trees located along Fitzroy Street

Flora, fauna and vegetation communities

A search of the NSW OEH Bionet database was undertaken on 25 May 2018 for endangered and critically endangered species, listed under the BC Act, with the potential to be located within a 10 kilometre radius of the proposal site. The search identified:

- 29 threatened fauna species, including 21 bird species, six bat species and one mammal species
- One threatened flora species.

A search of the Australian Department of the Environment and Energy's Protected Matters Online Search Tool, for matters of national environmental significance listed under the EPBC Act, was undertaken on 25 May 2018. The search identified five listed threatened ecological communities, 26 listed threatened species, 14 listed migratory species and 22 listed marine species with the potential to be located within a 10 kilometre radius of the proposal site.

None of these species are likely to be present within the proposal site, due to the highly disturbed nature of the proposal site and the lack of potential habitat.

The proposal site is unlikely to provide suitable habitat or foraging for threatened fauna species due to the lack of native vegetation being present. The trees and vegetation may provide some foraging resources and substrate for some general fauna species. These habitat resources are only likely to be used by common and widespread fauna species that are known to occur in urban environments. Alternate habitats are located within Elston Park adjacent to the proposal site and within adjacent private properties.

Significant tree register

One tree listed on Council's significant tree register (which forms part of Council's 2018 Tree Preservation Order) is located outside the proposal site (about 10 metres from the proposal site). A Queensland Bottle Tree (*Brachycition rupestris*), located in Quinn Street, between Quinn Street west of Fitzroy Street (shown in Figure 6.4). The tree is believed to be about 40 years old, and appears to be in good condition. It has been listed as a result of its importance as a street tree and its species.



Figure 6.4 Significant bottle tree on Quinn Street

Noxious weeds

The NSW Department of Primary Industries noxious weed declarations lists a large number of weeds declared to be noxious in the control area for Dubbo Regional Council. These weeds may be present within the proposal site.

6.3.2 Potential impacts

Construction

Vegetation removal

The proposal would require removal of the following vegetation:

- The Hybrid Black Poplar tree in the centre of the existing roundabout
- 21 mature Jacaranda trees along both sides of Fitzroy Street
- Two small trees within the median of Cobra Street between Hopetoun Street and Sterling Street
- Grass and other groundcover vegetation from within road verges and also the eastern edge of Elston Park (due to construction compound and intersection works)
- Tree in southern footpath west of Hopetoun Street for new pedestrian crossing relocation

- Shell/Coles express service station, vegetation to be removed to accommodate new southern driveway.

The location of trees that would need to be removed are shown in Figure 3.1.

As these trees do not constitute an endangered ecological community, no assessments of significance are required. Although there would be minimal biodiversity impacts associated with the removal of the above vegetation, the removal of the mature street trees, particularly the Jacarandas along Fitzroy Street, has the potential to impact on the visual character and amenity of the local area. These potential impacts are considered further in section 6.6.

To mitigate this potential impact, as noted in section 6.3.1, Roads and Maritime previously planted a number of Jacarandas within Elston Park. These trees were planted during the initial planning phases for the proposal and were planted as semi-mature trees around June 2016. This early planting has ensured that these trees would have time to mature further prior to the need to remove the trees along Fitzroy Street. The planting of an additional four street within the park compared to the 21 removed along Fitzroy Street is considered to further offset any impacts.

The proposal would not result in any impacts to any trees within Elston Park as a result of a potential construction compound. All trees within potential construction compound area would be fenced off to ensure the protection of these trees. Some impacts to groundcover vegetation (ie grass) would occur. Following construction all disturbed areas would be rehabilitated in consultation with Dubbo Regional Council.

There is the potential for construction to adversely impact planted trees close to the boundaries of the proposal site (particularly in Cobra Street) through damage to tree roots and soil compaction. Mitigation measures have been provided to minimise the risk of potential impacts to trees outside of the proposal site, including accidental damage to vegetation from large construction plant (refer section 6.3.3).

The significant Bottle Tree would not be directly impacted during construction. Safeguards would be implemented to minimise the potential for impacts (refer section 6.3.3).

Threatened biota impacts

The proposal would not significantly impact threatened species or ecological communities or their habitats, within the meaning of the BC Act or FM Act. As a result, neither a species impact statement or biodiversity development assessment report would be required.

The proposal would not significantly impact threatened species, ecological communities or migratory species, within the meaning of the EPBC Act.

Noxious weeds

Although the proposal site may contain weed species, it is not expected that significant clearing of noxious weeds would be required. Any noxious weeds found within the proposal site would be managed in accordance with the *RTA Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects* (2011).

Operation

The study area is already of limited habitat value for most native species and no additional adverse impacts on biodiversity are anticipated during operation.

6.3.3 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing
Construction			
General biodiversity management	The CEMP would identify locations for laydown and stockpile areas, and the proposed disturbance footprint, including the vegetation that would be impacted. Laydown and stockpile areas, worker amenities, equipment and vehicles would be located outside of vegetation drip lines.	Construction contractor	Construction
	All trees located in the vicinity of the proposal site which are not to be removed (ie trees along Cobra Street) would be appropriately fenced off and identified in the CEMP.	Construction contractor	Construction
	If any damage occurs to vegetation outside of the nominated work area (as shown in the CEMP), the project manager and environmental representative would be notified to determine a suitable course of action.	Construction contractor	Construction
Weed management	Should noxious weeds be encountered during the removal of vegetation, weeds would be controlled in accordance with contemporary bush regeneration principles and practices and the <i>RTA Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects</i> (2011), to ensure construction does not promote the spread of weeds. Any weeds encountered on site would be disposed at an appropriate waste facility.	Construction contractor	Construction
Tree protection	The bottle tree listed on the Dubbo Council Tree Preservation Order 2015 and trees within Elston Park would be appropriately delineated for the construction period. This would include: <ul style="list-style-type: none"> – Installing para webbing around the tree protection zone (as calculated using AS 4970—2009: Protection of trees on development sites). – Discussing the location of the tree in toolbox talks when working around the tree. – Mapping the location of the tree in the CEMP and mud map plans. 	Construction contractor	Construction

6.4 Soils, landform and water quality

6.4.1 Existing environment

Topography

The topography of the proposal site is relatively flat, however there is a slight incline from south of the intersection up towards the intersection and further north along Fitzroy Street and through Elston Park. According to the *NSW Globe KML Data* from Land and Property Information, the proposal site is located at an elevation of approximately 272 metres Australian Height Datum (AHD).

Soil landscapes

The 1:250,000, *Soil Landscape Series Sheet S155-4* (Murphy and Lawrie 1998) indicates that the proposal site is underlain by soils of Bunglegumbie origin. This landscape is characterised by level to slightly undulating plains on red-brown earths. Soils are red chromosols, yellow chromosols, red kandosols and black vertosols. Soils have limited to moderate fertility, are weakly structured surface soils, and have a moderate to high water holding capacity.

The geological units present on site as listed on the geology map of the area (NSW Department of Industry, Resources and Energy) mesozoic finely laminated quartzose sandstone and siltstone interbedded with thick, massive or cross bedded quartzose sandstone and minor conglomerate (Napperby Formation).

Soil was examined by GHD during drilling works at eight soil bores. Detailed descriptions of the site lithology including visual and olfactory observations, sample identifications along with the well construction details and elevations are presented in borehole logs contained in Appendix E. The general lithology of the site is summarised in Table 6.12.

Table 6.12 Generalised lithology encountered

Approximate depth range (m bgl)	Lithology
0.0 – 0.07	Asphalt
0.07 – 0.5	Fill, consisting of silty Clay/clayey Silt (re-worked natural material in some locations)
0.07 – 0.5	Fill, consisting of angular, well graded, dark grey gravel (road base)
0.5 – 2.0	Silty Clay, low plasticity, red-brown, dry, firm

The soil profile at soil bore site was similar in all investigation locations. Fill materials were identified at almost all investigation locations with the exception of two sites. The fill material varied in thickness and generally contained reworked natural material consisting of red brown silty clay/clayey silt with varying inclusions of rounded quartz gravels and pebbles. Shallow fill containing angular blue metal road base gravels was encountered at three soil bore sites to a maximum depth of 0.5 metres below ground level.

Alluvium was encountered in all soil bores at depth from between 0.06 metres and 0.85 metres below ground level. The alluvium generally consisted of red-brown low plasticity silty Clay/clayey Silt or medium plasticity clay under Elston Park. Bedrock was not encountered in the investigation locations.

Mapping on the Australian Soil Resource Information System identified the proposal site as having a low risk for acid sulphate soils.

The Dubbo urban area has been broadly identified as having salinity issues. The area in the vicinity of the proposal is not considered to have substantial salinity issues due largely to the depths of natural groundwater as outlined in the section below.

Geology

The *Dubbo 1:100,000 Geological Sheet (2000)* (Raymond et al 1999) indicates the proposal site is underlain by Napperby formation from the Gunnedah Basin. The proposal site is underlain by siltstone thinly interbedded with fine to medium-grained lithic-quartz sandstone, minor conglomerate; with bioturbation and burrows common.

Contamination

Searches of the following contamination databases and lists were undertaken:

- Contaminated Land Record
- List of NSW contaminated sites notified to the NSW Environment Protection Authority (EPA).

No sites were identified on the List of NSW Contaminated Sites notified to the EPA within one kilometre of the investigation area as of the 24 August 2018. Three results were found within one kilometre of the site and are summarised in Table 6.13 below:

Table 6.13 Summary of Contaminated Land: Record of Notices within one kilometres of the investigation area

Property name / address	Address	Management Class	Distance from site	Direction
Shell Coles Express Service Station	131 – 133 Cobra Street, Dubbo	Regulation under CLM Act not required	Directly adjacent	South east
Caltex Service Station, Dubbo	Cnr Brisbane Street and Cobra Street, Dubbo	Contamination currently regulated under CLM Act	824 m	West
United (former Volume Service Plus) Service Station	219 – 223 Cobra Street, Dubbo	Regulation under CLM Act not required	925 m	East

The sites appearing on the EPA "List of NSW contaminated sites notified to the EPA" indicate that the notifiers consider that the sites are contaminated and warrant reporting to EPA. However, the contamination may or may not be significant enough to warrant regulation by the EPA. The EPA needs to review information before it can make a determination as to whether the site warrants regulation.

The site investigation also identified the three adjacent service stations as potential sources of contaminations. Additionally, there is the possibility of fill materials to be present across parts of the site associated with the importing of fill material for road base and during the previous construction of the road. The potential historical and current sources of contamination include:

- Contamination from historical and current offsite fuel retail activities.
- Contamination from the use of fill materials onsite.

Contaminants of potential concern (COPC) related to the historical and current land use include:

- Hydrocarbons including total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene and xylene (BTEX).
- Polycyclic aromatic hydrocarbons (PAH).
- Asbestos (in soil only).
- Heavy metals, including arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc.

The assessment recorded that there were no observed visual or olfactory indications of contamination during the investigation. Laboratory analytical results of the soil samples at the eight locations (refer to Appendix E) indicated that all concentration of contaminants in the soil are below the adopted human health screen levels and management limits for commercial and industrial land use. The soil contamination assessment did not identify any potential health risks to construction workers for the proposed intersection upgrade works and future intrusive maintenance workers.

Surface water

The proposal site is drained by the stormwater network. No natural drainage lines are located close to the proposal site.

The closest major watercourse is the Macquarie River which is located about 1.6 kilometres west of the proposal site. The river forms part of the Macquarie-Barwon catchment within the Murray-Darling basin.

The proposal site is not identified in Dubbo LEP mapping as being subject to flooding.

The site is generally flat and sealed so surface water runoff is expected to run off towards surrounding developed drainage systems on or off-site. Natural drainage of surface water in this area has largely been altered due to the presence of the railway infrastructure and surrounding developments.

Surface water flow is expected to follow the local topography on-site and flow northwest towards the Macquarie River or be intercepted by drainage lines located in the investigation area. The nearest waterway is an unnamed dry water course approximately 650 metres east to southeast.

Groundwater

The Dubbo LEP identifies the proposal site as being subject to moderately-high groundwater vulnerability. A review of Water NSW's groundwater data indicates that groundwater depths are around 15 metres based on nearby bores, including two located within Elston Park. On the 25 May 2018, the groundwater monitoring bore within Elston Park had a registered groundwater depth of over 10 metres (below the existing natural ground level).

6.4.2 Potential impacts

Construction

Erosion and sedimentation

The proposal would involve excavation and ground surface disturbance during construction. Excavation and stockpiling activities, if not adequately managed, may result in the following impacts:

- Erosion of exposed soil and stockpiled materials
- Dust generation from excavation, backfilling and vehicle movements over exposed soil
- An increase in sediment loads entering the stormwater system and/or local runoff, and therefore nearby receiving waterways, including Macquarie River.

Such impacts would generally occur in areas which have been disturbed previously. The proposal would not require any substantial excavation, with impacts generally limited to milling of the existing pavement and, in some locations, excavations to alter the level of the ground or for foundations for infrastructure (such as traffic signals). Overall ground disturbance and stockpiling would be minimal, and the footprint of excavation and/or ground disturbance would be minimised, where possible. Potential impacts would be minimised by implementing the measures provided in section 6.4.3.

Upon completion of the works, all disturbed areas would be restored to their pre-works condition or better, thereby negating the risk of long term erosion impacts.

Landform

The proposal would generally be undertaken at the existing ground level, however some localised changes in ground level would occur. These changes are considered minimal and would not result in any impacts on landform in the vicinity of the proposal site.

Contamination

Although there is considered to be minimal potential for widespread contamination to occur in the proposal site, there is potential for contaminated soil to be encountered in the vicinity of the three service station sites. Waste classification is required once the volumes of waste requiring offsite disposal during construction are confirmed. Waste soils would be classified in accordance with the NSW EPA (2014) Waste Classification Guidelines. The assessment concluded that based on the sampling and analysis conducted on fill in the investigation area, the results indicate that the likely in situ preliminary waste classification for the material is general solid waste (GSW) and not contaminated material.

Excavation works would be required within the service station site, and this would have the potential to expose contaminated material. Potentially contaminated material may also be encountered from the ingress of groundwater or exposure of material causing release of odours.

An approach to managing any unexpected contaminated material that may be uncovered would be specified in the construction environmental management plan.

Soil contamination could occur as a result of any accidental spills or leaks of fuels, oils and other chemicals from equipment and vehicles during construction. To avoid this potential impact, fuels and chemicals would be managed in accordance with the management measures provided in section 6.4.3.

Water quality

Pollutants such as sediment, soil nutrients and construction waste have the potential to mobilise and enter drainage lines, particularly during high rainfall events.

Water quality impacts could also potentially occur from fuel or chemical spills from construction equipment. Such impacts are considered minimal as the facilities would be positioned to ensure that any potential leaks would not impact on downstream waters.

The risk of water quality impacts, and the significance of any impacts that may occur, would be minimised by implementing the safeguards and management measures provided in section 6.4.3.

Surface water

The proposal would result in some short-term changes to existing surface water movements, due to the proposed earthworks and stockpiling. Any changes to surface water flows during construction would be minor and short-term only and flows would be redirected around the proposal site where possible. Additionally, existing stormwater infrastructure would be retained during construction where possible to appropriately manage any surface water within the proposal site.

Groundwater

Groundwater is unlikely to be encountered during construction as there are limited deep excavations proposed and due to the depth of ground water being about 15 metres below the existing natural/finished surface level.

Operation

The proposal would be constructed to ensure that all surface water within the intersection and the legs is appropriately diverted to the stormwater system to ensure that the roadway is largely free of water during rainfall events.

Operation would not result in significant impacts on landform or soils. The risk of soil erosion during operation would be minimal as all areas impacted during construction would be sealed. Where impacted areas are not within the roadway, these areas would be stabilised which would prevent soil erosion from occurring.

6.4.3 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing
Pre-construction			
Erosion and sedimentation	<p>A soil and water management plan (SWMP) will be prepared as part of the construction environmental management plan in accordance with the requirements of Roads and Maritime Services contract specification G38 prior to the commencement of construction. The SWMP will also address the following:</p> <ul style="list-style-type: none"> Roads and Maritime Services Code of Practice for Water Management, the Roads and Maritime Services' <i>Erosion and Sedimentation Procedure</i> The NSW Soils and Construction – Managing Urban Stormwater Volume 1 '<i>the Blue Book</i>' (Landcom, 2004) and Volume 2D (DECC, 2008) 	Construction contractor	Pre-construction

Impact	Environmental safeguards	Responsibility	Timing
	<ul style="list-style-type: none"> Roads and Maritime Services Technical Guideline: <i>Temporary Stormwater Drainage for Road Construction, 2011</i> Roads and Maritime Services Technical Guideline: <i>Environmental Management of Construction Site Dewatering, 2011.</i> 		
Contamination of soil	<p>The CEMP will include a contaminated land management plan, prepared in accordance with:</p> <ul style="list-style-type: none"> <i>Contaminated Land Management Act 1997 (NSW)</i> <i>Road and Maritime Contaminated Land Management Guideline</i> <i>Roads and Maritime Environmental Incident Classification and Reporting Procedure</i> EPA guidelines on contaminated land management. <p>The contaminated land management plan will provide measures to manage:</p> <ul style="list-style-type: none"> Areas of known contamination (if any) Unexpected contamination finds. 	Construction contractor	Pre-construction
Contamination of soils and waterways	An emergency spill plan will be developed and incorporated into the construction environmental management plan. The plan will include measures to avoid and manage spillages of fuels, chemicals, and fluids onto any surfaces or into stormwater inlets and an emergency response procedure.	Construction contractor	Pre-construction
Erosion and sedimentation	All stockpiles will be designed, established, operated and decommissioned in accordance with Roads and Maritime Services' Stockpile Management Procedures (RTA 2011a).	Construction contractor	Pre-construction
Construction			
Contamination of soils and waterways	In the event that indicators of contamination are encountered during construction (such as odours or visually contaminated materials), work in the area will cease until an environmental consultant can advise on the need for remediation or other action.	Construction contractor	Construction
	Vehicle wash downs and/or concrete truck washouts will be undertaken within a designated bunded area of an impervious surface or undertaken off-site.	Construction contractor	Construction
	Machinery will be checked daily to ensure there are no oil, fuels or other liquids leaking from the machinery.	Construction contractor	Construction
	There is to be no release of dirty water into drainage lines and/or waterways.	Construction contractor	Construction

Impact	Environmental safeguards	Responsibility	Timing
	The refuelling of plant and maintenance of machinery would be undertaken in impervious bunded areas in the designated compound area.	Construction contractor	Construction
	Final waste classification is required once the volumes of waste requiring offsite disposal during construction are confirmed. Waste soils should be classified in accordance with the NSW EPA (2014) Waste Classification Guidelines.	Construction contractor	Construction
Sediment transported off site	All stockpiles would be designed, established, operated and decommissioned in accordance with the Blue Book.	Construction contractor	Construction
Heavy rainfall management	Weather conditions will be monitored daily, and no works will be conducted if there is an imminent threat of a heavy rainfall event. In the event of a rainfall event, works will cease if there is a risk of sediment loss off site or ground disturbance due to waterlogged conditions	Construction contractor	Construction

6.5 Air quality

6.5.1 Existing environment

Air quality in the vicinity of the proposal site is considered to be typical of an urban area located within a rural setting (ie no extensive development and a relatively low population). Local air emissions are dominated by motor vehicles travelling along Cobra and Fitzroy streets, and other roads in the study area. Local air quality would also be affected by the presence of three service stations, which can generate frequent petrol fumes.

A search of the National Pollution Inventory (2016/2017 reporting period) in June 2018 for the local government area of Dubbo indicated that there are a total of 12 facilities, emitting 37 substances. The nearest of these facilities is the Inland Petroleum Depot located about 900 metres north of the proposal site on Erskine Street.

6.5.2 Potential impacts

Construction

During construction the following activities would have the potential to affect air quality:

- Clearing of vegetation
- Site establishment
- Earthworks, particularly excavation of existing road surface
- Road sub-grade preparation and road pavement works
- Transport and handling of soils and materials
- Use of construction vehicles leading to the creation of exhaust fumes

- Potential to expose odorous material during works at the service station sites.

Potential air quality impacts during construction would predominately be associated with the generation of dust associated with excavation activities, movements of trucks on exposed road surfaces and any other activities that involve disturbance. Air quality impacts as a result of dust generation are considered to be minor as they would be short-term, would result from a small area, and would be minimised through the implementation of the measures provided in section 6.5.3.

Construction equipment and other construction vehicles would emit exhaust fumes. The impact of these emissions would be temporary. Such impacts would not differ substantially from the emissions generated by vehicles (in particular heavy vehicles) using the surrounding road network.

Odours may be generated during application of asphalt and line marking. This may affect nearby receivers during these activities. These impacts would be short term, limited to a few days when such works occur, and only likely to affect the immediate vicinity of the work area.

Overall, potential air quality impacts during construction would be short-term and minimised by implementing the measures provided in section 6.5.3.

Operation

The proposal is not expected to directly result in an increase in traffic along either Cobra or Fitzroy streets, and is therefore not anticipated to increase emissions as a result of traffic using the upgraded intersection. During operation, the proposal may improve air quality by reducing queuing and idling of vehicles during peak periods.

6.5.3 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing
Construction			
General air quality	An air quality management plan would be prepared as part of the construction environmental management plan. The plan would include but not be limited to: <ul style="list-style-type: none"> • A map identifying locations of sensitive receivers • Identification of potential risks/impacts due to the work/activities as dust generation activities • Management measures to minimise risk including a progressive stabilisation plan • A process for monitoring dust on-site and weather conditions • A process for altering management measures as required. 	Construction contractor	Pre-construction
Dust emissions	Dust suppression measures would be implemented as per the air quality management plan.	Construction contractor	Construction
	Stockpiled materials would be covered, stabilised or stored in areas not subject to high wind.	Construction contractor	Construction
	All trucks would be covered when transporting material to and from the site.	Construction contractor	Construction

Impact	Environmental safeguards	Responsibility	Timing
	Work activities would be reprogrammed if the mitigation measures are not adequately restricting dust generation.	Construction contractor	Construction
	Works would not be carried out during strong winds or in weather conditions where high levels of dust or air borne particulates are likely.	Construction contractor	Construction
	Stabilisation of disturbed surfaces would take place as soon as practicable.	Construction contractor	Construction
Exhaust emissions	Construction plant and equipment would be maintained in a good working condition in order to limit impacts on air quality.	Construction contractor	Construction
	All construction plant and machinery would be fitted with emission control devices complying with Australian design standards.	Construction contractor	Construction
	Plant and machinery would be turned off when not in use.	Construction contractor	Construction
	All trucks would be covered when transporting material to and from the site.	Construction contractor	Construction
Impacts on sensitive receivers	Local residents would be advised of hours of operation and duration of work and supplied with a contact name and number for queries regarding air quality.	Construction contractor	Construction

6.6 Landscape character and visual impacts

6.6.1 Existing environment

The landscape and visual environment of the proposal site and surrounding area is dominated by the existing roadways (Cobra and Fitzroy streets), road infrastructure (including the roundabout, signage, lighting and pedestrian footpaths), the three service stations, and Elston Park.

The street trees located along Fitzroy Street (north of intersection) and Cobra Street (east of intersection) assist in softening the visual dominance of the roadways. The mature Jacaranda street trees in particular provide a characteristic feature contributing to the visual amenity of Fitzroy Street in this location.

Elston Park assists in softening the visual landscape and contributing to the character of this area. Vegetation located in adjacent properties also contributes to the visual amenity of the proposal site.

Sensitive visual receivers are individuals and/or groups of people whose views may be affected by a proposal. For the proposal, potentially sensitive receivers would include:

- Pedestrians and motorists using the roads through and around the proposal site
- Users of Elston Park
- Customers and employees of the service stations
- Nearby residents with views to the proposal site

- Local neighbouring small businesses and their customers.

6.6.2 Potential impacts

Construction

During construction, the presence of work sites, disturbed areas, plant and equipment, and compound sites within view of neighbouring properties and existing road users would result in minor, temporary visual impacts. These potential impacts would be temporary, and would be minimised by implementing the measures provided in section 6.6.3. The selection of the compound site/s would, where possible, seek to minimise the potential for visual impacts. This could include locating the compound within an existing Roads and Maritime facility.

The proposed night works (described in section 3.3.2) would involve lighting the construction area. This has the potential to result in light spill impacts for adjacent properties. These potential impacts would be short-term and temporary, and would be minimised by implementing the measures provided in section 6.6.3.

The proposal would require removal of some street trees and landscaping within the road corridor (as described in section 6.3.2), which would occur during construction. This potential impact is considered below.

Operation

The proposal would result in an intensification of existing road infrastructure in the proposal site, which has the potential to affect visual amenity and impact sensitive visual receivers. Permanent visual impacts would be mainly associated with the following features of the proposal:

- Wider road corridor on the southern leg of the intersection on Fitzroy Street
- Changes in traffic movements associated with the additional turning lanes on all legs including extension of existing turning lanes
- New traffic signals and lighting
- Removal of the existing roundabout
- Removal of mature street trees.

In general, the impact of the majority of the proposal on the landscape and visual environment is expected to be relatively limited, as the proposal mainly involves a lateral extension of an existing road, and the extent of new road would be mainly located within existing paved areas. Features associated with the proposal (such as new turning lanes and traffic signals) are common features in the study area. The presence of awnings at the three service stations would also assist with minimising the visual impacts of the new traffic signals, as they would be of a similar height and a larger bulk compared to the new infrastructure.

The main impacts on visual amenity would occur as a result of the proposed vegetation removal. The removal of vegetation and the tree from the roundabout would reduce the amount of green space at this location, and would remove a tree that is considered by some to be a local landmark and point of reference. However, the loss of this tree would not substantially change the visual landscape in the vicinity of the proposal site, as views to this area are already dominated by the existing roadways.

The removal of the 21 mature Jacarandas street trees along Fitzroy Street would impact the visual character and amenity of this area. It would result in a change in the visual landscape, as these trees are a dominant feature, providing an 'avenue' of trees along the road, which also ties-in with landscaped areas in Elston Park.

To mitigate this potential impact, as noted in section 6.3.1, previously 20 replacement Jacarandas were planted within Elston Park. These trees were planted during the initial planning phases for the proposal and were planted as semi-mature trees around June 2016. This early planting has ensured that the trees would have time to mature further prior to the need to remove the trees along Fitzroy Street. It would also allow the new trees to contribute to the visual landscape of the local area prior to the removal of the street trees, minimising the potential impacts on overall landscape character.

The new planted trees would also assist in reinforcing the eastern edge of the park as the existing trees currently do along Fitzroy Street.

Due to a lack of space along the Fitzroy Street frontage (within Elston Park), some replacement trees have also been planted along the southern edge of the park adjacent to Cobra Street. These trees would enhance the southern section of the park, improve visual amenity from Cobra Street, and assist in defining the edge of the roadway.

Removing the two trees from the median of Cobra Street is not expected to substantially change the visual landscape, as views to this area are dominated by the existing roadways. These trees are also considered to limit views along the road, resulting in some safety issues.

The other potential impact associated with removing the mature street trees from Fitzroy and Cobra streets would be to increase views to the road from adjacent residences, as the existing trees currently filter the views. This would lead to temporary visual impacts during construction until the works are complete and disturbed areas rehabilitated. Where possible consideration of screening vegetation within the road verges would be considered.

6.6.3 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing
Construction			
Visually intrusive works	The footprint of the proposal will be minimised where possible to minimise the dominance of the works.	Construction contractor	Construction
Compound management	The construction compound will be left in a clean and tidy state at the end of each working day.	Construction contractor	Construction
Long term visual amenity	The study area will be returned to its current state after construction to ensure the visual landscape is similar to the existing intersection.	Construction contractor	Construction
Light spill	Directional lighting would be mounted to avoid light spill into adjoining residences at night time.	Contractor	Construction
Operation			
Screening vegetation	Planting of appropriate screening vegetation in the road verges would occur where it is safe and practicable to do so. New plantings would incorporate locally occurring species that reflect existing landscape character. New plantings would be selected and positioned such that they do not present safety hazards.	Construction contractor	Operation

6.7 Property, land use and socio-economic impacts

6.7.1 Existing environment

Land use

The proposal site is located within a predominantly residential area, to the east of Dubbo's town centre. The study area within which the proposal site is located includes a mix of residential, commercial, education, recreation/open space and infrastructure land uses.

The following land uses are located within the proposal site:

- The existing road reserve of Cobra and Fitzroy streets (the dominant land use)
- Small piece of Elston Park on north-western corner of the intersection
- A strip of private residential land along the western side of Fitzroy Street on the southern leg of the intersection
- Small piece of land located within each of the three service stations located on corners of the intersection.

The following land uses adjoin the proposal site:

- Commercial:
 - Three service stations (Coles Express, United, Inland Petroleum) located on the north-eastern, south-eastern and south-western corners of the intersection respectively
 - Alchemy Art Food Hub located on the eastern side of Fitzroy Street north of the intersection.
 - Commercial properties located on both sides of Cobra Street near Sterling Street, including a laundromat, car audio store, fish and chip shop and a small grocery store
- Recreation:
 - Elston Park located north-west of the intersection and along the northern side of Cobra Street
- Education:
 - TAFE Western located on the north-west corner of the Fitzroy Street and Bultje Street intersection
- Accommodation:
 - Cascades Motor Inn on southern side of Cobra Street east of the intersection near Hopetoun Street
 - Fountain View Motel on the southern side of Cobra Street west of the intersection
 - Best Western Bluegum Motel at the western extent of the works
- Place of worship:
 - Dubbo Seventh Day Adventist Church located on the corner of Cobra Street and Sterling Street.

Land use surrounding the proposal site consists of primarily residential land uses. The following key non-residential land uses are located around the proposal site:

- A number of motels located west of Gipps Street along Cobra Street and also in Bourke Street, with the closest being about 50 metres west of the proposal site.
- Dubbo Showground located on the eastern side of Fitzroy Street north of Wingewarra Street about 260 metres north of the proposal site
- DPI Dubbo District Office located on the corner of Cobra Street and Hampden Road about 185 metres east of the proposal site

- Roads and Maritime Road Maintenance Division depot located on Hampden Road to the north of Cobra Street about 200 metres east of the proposal site.

Socio-economic

Key socio-economic characteristics of the study area are as follows:

- In 2016, the population of the Dubbo local government area was 38,943 (ABS 2016)
- The population is relatively stable, with a minimal increase of 0.36 per cent compared to the population in 2011 (38,805)
- The age profile of Dubbo is similar to the national median, with the median age being 36 compared to the national median of 38
- The majority of the population work full-time or part-time, comprising 62.7 per cent and 26.8 per cent of the population, respectively
- 73.8 per cent of the population drive to work and 37.0 per cent of dwellings have two registered motor vehicles.

Community infrastructure located close to the proposal site includes:

- Elston Park
- Dubbo Showground
- Wellington Aboriginal Corporation Health Service (corporate Office)
- TAFE Western.

As described above, there are a number of commercial properties located within the immediate vicinity of the proposal site.

6.7.2 Potential impacts

Construction

Land use and property

Direct impacts on land use would mainly relate to the presence of construction work within the proposal site.

The positioning of the construction compound within proposal area would result in minimising impacts on surrounding land during the construction period. This would result in public land and open space being available and accessible throughout construction.

Community impacts

Construction may result in temporary delays, increased travel time, and some changes to access arrangements for road users that travel on roads within and in the vicinity of the proposal site, including motorists, pedestrians and cyclists. Further information on potential traffic and access impacts is provided in section 6.2.2.

Business impacts

Nine businesses have the potential to be affected by construction. These include the three service stations that would be directly affected by acquisition (described above), and the other businesses listed in section 6.7.1. Potential impacts include:

- Changes to access arrangements, with the potential for temporary restrictions in some instances
- Loss of business if people avoid the area due to detours, delays and inconvenience caused by construction
- Reduced parking
- Amenity impacts such as noise, dust and vibration.

Potential impacts are considered below. The measures provided in section 6.7.3 would be implemented to minimise and manage the potential for business impacts during construction.

Impacts on service stations

As described in section 3.3.7, partial road closures may be implemented to facilitate construction. Partial road closures would have the potential to temporarily affect access to the service stations located adjacent to the proposal site for a period of up to a few months. The duration of these closures would be confirmed as part of construction planning, with the duration of any closures to be minimised where possible.

Prior to any unavoidable disruption to access, consultation would be undertaken with the respective owners/lessees of each service station to discuss the options to mitigate this potential impact. This could include establishing alternative access arrangements where possible. Another option that would be considered (in consultation with owners/lessees of each service station) to mitigate this potential impact would be for Roads and Maritime to temporarily lease the property for the duration of the closure. This would involve the use of temporary construction leases to ensure the owners/operators are adequately compensated for the loss of business. At least one service station would be able to remain open at any one time.

The proposed detours (described in section 3.3.7) also has the potential to impact these businesses as a result of the likely reduction in vehicles travelling through the proposal site.

Impacts on Alchemy Art and Food Hub

Partial road closures, detours and impacts to on-street parking also has the potential to impact on the Alchemy Art and Food Hub business, which fronts Fitzroy Street. These impacts would be short-term and temporary. Roads and Maritime would work with the owner of the business to minimise the potential impacts of construction, and ensure that access to the business is maintained during construction.

Impacts on motels and other business

The main potential for impacts to these motels and businesses would relate to access. Access would be maintained as far as practicable during construction. Any temporary access changes required would be discussed with the relevant property owners and occupants to confirm their requirements and identify alternative arrangements.

Roads and Maritime would work with the owner of these businesses to minimise the potential impacts of construction, and ensure that access to the business is maintained during construction.

Other socio-economic impacts

Construction would generate employment, with up to 15 personnel required during peak construction. On either side of this peak period. The source of the workforce is unknown; however, it is assumed that the majority of the workforce would come from Dubbo and the surrounding region.

Construction has the potential to benefit some local businesses as a result of additional business generated by the construction workforce – mainly in relation to meals and convenience shopping requirements, and also potentially temporary accommodation.

Amenity impacts

Construction may result in minor amenity impacts on the local community as a result of:

- Potential increase in traffic due to the delivery of plant, materials and construction personnel and disruptions to access
- Increase in noise due to the operation of plant and equipment and increased traffic
- Visual impacts and night spill
- Potential dust disturbance during minor excavation works.

These issues have been addressed in other sections of this report, as follows:

- Traffic and access (refer to section 6.2)
- Noise and vibration (refer to section 6.1)
- Visual impacts (refer to section 6.6)
- Air quality (refer to section 6.5).

Amenity impacts would be temporary and appropriately managed with the safeguards provided in sections 6.2.3, 6.1.4, 6.6.3 and 6.5.3. Amenity in the broader area is unlikely to be impacted by construction as impacts would be localised and limited to areas immediately adjacent to the proposal site.

Impacts to utilities

As described in section 3.5, a number of existing utilities would need to be relocated or adjusted during construction. The proposed approach to the management of utilities is provided in 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

Land use and property

As described in section 3.6, the proposal would directly affect six properties in the form of partial (strip) acquisition, which would require property adjustments to be undertaken. These include three properties from which acquisition has already been undertaken (two private residences and Elston Park), and three additional properties (the three service stations located at the intersection).

The indicative amount and location of the proposed acquisition is listed in Table 3.4 and shown in Figure 3.7.

Impacts associated with partial property acquisition/adjustment include the need to relocate property boundary fencing, driveway adjustments, and impacts to landscaped/paved areas. Property adjustment plans would be developed in consultation with the affected property owners.

The potential socio-economic impacts of this acquisition is described in Table 6.14.

All land acquisitions would be undertaken in accordance with the Roads and Maritime land acquisition policy and compensation would be based on the requirements of the *Land Acquisition (Just Terms) Compensation Act 1991*.

Table 6.14 Property acquisition – summary of potential socio-economic impacts

Property	Lot/DP and address	Potential impact
United Petroleum service station	Lot 8 DP 412017 138 Cobra Street, Dubbo	<p>Acquisition would affect the eastern frontage of the property to Fitzroy Street, including the south-west corner of the intersection. It would result in a small reduction in the paved area, and would require the existing access off Fitzroy Street to be adjusted to meet new kerbs.</p> <p>The land proposed for acquisition forms part of the paved frontage of the property, and is not critical to the overall operation of the property as a service station. Although minor adjustments to access are proposed, there would be no long term impacts to how the site is accessed or operated. As a result, no significant impacts to the property are expected as a result of the proposed acquisition.</p>
Shell service station	Lot 12 DP 229245 131-133 Cobra Street, Dubbo	<p>Acquisition would affect the north-west corner of this property where it fronts both Cobra and Fitzroy streets.</p> <p>The land proposed for acquisition forms part of the paved frontage of the property, this involved the installation of the new concrete median which changes the way tanks refuelling occurs and the way this vehicle exits the service station. As a result, no significant impacts to the property are expected as a result of the proposed acquisition.</p>
Inland Petroleum service station	Lot 41 DP 525437 125 Cobra Street, Dubbo	<p>Acquisition would affect the south-west corner of this property where it fronts both Cobra and Fitzroy streets.</p> <p>The land proposed for acquisition forms part of the paved frontage of the property, this involved the installation of the new concrete median which changes the way tanks refuelling occurs and the way this vehicle exits the service station. The pricing sign will also be required to be repositioned. As a result, no significant impacts to the property are expected as a result of the proposed acquisition.</p>
Elston Park	Lot 1 DP 1120677 Cobra Street, Dubbo	<p>Acquisition would affect the south-east corner of the park. It would result in a small reduction (0.1 per cent) in the overall area of open space available.</p> <p>This potential impact is considered to be minimal given the existing minimal use of the area to be acquired (a small area located between the existing roadway and garden bed), and the small size of the area relative to the overall park. It would not affect the existing use of the part, or the overall availability of open space within Dubbo. The inclusion of pedestrian crossing at the intersection would improve access to the park.</p>
Private residence	Lot 43 DP 572537 217 Fitzroy Street, Dubbo	<p>Acquisition would affect the front yard of the property adjoining Fitzroy Street. It would result in a small reduction in the grassed/landscaped area and overall property size (total reduction of 5.3 per cent). It would not impact the ongoing</p>

Property	Lot/DP and address	Potential impact
		use of this land or its development potential, as any subdivision would result in the same number of lots based on the minimum lot size requirements.
Private residence	Lot 3 DP 393978 219 Fitzroy Street, Dubbo	Acquisition would affect the front yard of the property adjoining Fitzroy Street. It would result in a small reduction in the grassed/landscaped area and overall property size (total reduction of 4.6 per cent). It would not impact the ongoing use of this land or its development potential, as any subdivision would result in the same number of lots based on the minimum lot size requirements.

Socio-economic impacts

The main potential for operational impacts relates to the change in access arrangements associated with the introduction of medians along both roads in the proposal site. The proposal would not result in any loss to access. However, there would be a change in the turning arrangements for some properties, which has the potential to result in slight increases in travel time.

The proposal would also result in the permanent loss of some informal on-street parking along both Cobra and Fitzroy streets.

Further information on potential access and parking impacts is provided in section 6.2.2.

The proposal has the potential for positive operational impacts on the community, by improving accessibility and safety for heavy vehicles, motorists and pedestrians travelling through the intersection. The proposal would improve:

- Congestion in the vicinity of the intersection
- Reduce the risk of crashes due to improvement of movements through the intersection
- Pedestrian access and connectivity across the intersection.
- Impacts to utilities
- The positioning of relocated utility assets (ie maintenance pits) would be selected to ensure that during any future maintenance works access to these assets would not impact on any access to property or movements along roads. Overall they would seek to minimise impacts on the surrounding community.

6.7.3 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing
Pre-construction			
Access and connectivity	Roads and Maritime would consult with potentially affected landholders to identify strategies to minimise the potential impacts to their properties, and ensure that access is maintained or alternative arrangements are provided.	Roads and Maritime	Detailed design
Property acquisition	All property valuations, lease fees and acquisition payments would be carried out in accordance with Roads and Maritime	Roads and Maritime	Pre-construction

Impact	Environmental safeguards	Responsibility	Timing
	Services Land Acquisition Policy (2011) and the <i>Land Acquisition (Just Terms Compensation) Act 1991</i> . Property acquisition plans would be prepared for each of the properties to be acquired.		
	Property adjustment plans would be developed in consultation with the affected property owners.	Roads and Maritime	Pre-construction
Construction impacts on the community	A communication plan would be prepared and included in the construction environmental management plan. The communication plan would include (as a minimum): <ul style="list-style-type: none"> • Requirements to provide details and timing of proposed activities to affected residents. • Complaints handling procedure, including the contact name and number for complaints. • Procedure to notify adjacent land users for changed conditions during the construction period such as traffic, pedestrian or driveway access. The communications plan would be prepared in accordance with G36 requirements and Roads and Maritime Services' Community Engagement and Communications Manual (Roads and Maritime 2012).	Roads and Maritime Construction contractor	Pre-construction
	Local residents and potentially affected businesses would be notified before work starts and would be kept regularly informed of construction activities during the construction process.	Construction contractor	Pre-construction and Construction
Impacts to utilities	If the scope or location of proposed utility relocation works falls outside of the assessed proposal scope and footprint, further assessment will be undertaken.	Roads and Maritime, contractor	Pre-construction
Impacts to utilities	Roads and Maritime would consult with utility providers and potentially affected landholders to ensure that impacts on utilities are minimised where possible. Consultation would include confirmation of utility access requirements.	Roads and Maritime	Pre-construction Construction
Construction			
Construction impacts on the community and businesses	During construction, the local community, road users, pedestrians, businesses and cyclists would be informed of any changed conditions.	Construction contractor	Construction
	The provision of temporary on-street parking outside Alchemy Art and Food Hub would be considered when works are not occurring during business hours.	Construction contractor	Construction
	Residents and businesses would be informed before any interruptions to utility services that may be experienced as a result of utilities relocation.	Construction contractor	Construction

Impact	Environmental safeguards	Responsibility	Timing
	Complaints received will be recorded and attended to promptly in accordance with the Roads and Maritime <i>Community Involvement Practice Notes and Resource Manual</i> .	Construction contractor	Construction

6.8 Aboriginal heritage

6.8.1 Existing environment

A search of the Aboriginal Heritage Information Management System (AHIMS) database maintained by OEH was undertaken on 3 July 2018. The search indicated that there are no listed Aboriginal heritage items within or directly adjacent to the proposal site.

6.8.2 Potential impacts

Construction

The proposal site has been subject to extensive ground disturbance associated with urban development. All of the proposed work would be carried out in previously disturbed areas.

There are no listed Aboriginal sites within or close to the proposal site. Additionally, proposal site does not contain any landscape features that could indicate the likely existence of any unknown Aboriginal objects.

Furthermore, due to the highly disturbed nature of the proposal site, it is unlikely that previously unrecorded Aboriginal objects or sites would be uncovered during construction. The proposal is not anticipated to have any impact on Aboriginal cultural heritage.

Appropriate safeguards are proposed in the case of unexpected finds during construction works (refer to section 6.8.3).

A clearance letter has been prepared for the proposal by Roads and Maritime to outline the risks identified from an Aboriginal heritage point of view. A copy of this letter is found in Appendix F.

Operation

No impacts on Aboriginal heritage are anticipated during operation.

6.8.3 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing
Construction			
Discovery of heritage	If Aboriginal heritage items are uncovered during the works, all works in the vicinity of the find must cease and Roads and Maritime's Aboriginal cultural heritage advisor and the Environment Manager contacted immediately. Steps in Roads and Maritime's Standard Management Procedure: Unexpected Heritage Finds must be followed.	Construction contractor	Construction
General construction management	Construction activities and machinery will be restricted to designated work areas.	Construction contractor	Construction

6.9 Non-Aboriginal heritage

6.9.1 Existing environment

A desktop assessment was undertaken in July 2018 which included searches of the following databases, heritage lists and registers:

- Australian heritage lists (National Heritage List and Commonwealth Heritage List)
- NSW State Heritage Register
- section 170 NSW Government agency heritage and conservation registers
- Dubbo Local Environmental Plan 2011 (LEP).

There are no listed heritage items located within the proposal site, however three items are located adjacent to the proposal site. Items located adjacent to the proposal site are listed in Table 6.15.

Table 6.15 Heritage items located in the vicinity of the proposal

Item	Listing	Address	Distance to proposal site
Edwardian brick residence	Dubbo LEP as Item I77	117 Cobra Street	Directly adjacent to proposal site
Edwardian house	Dubbo LEP as Item I78	121 Cobra Street	Directly adjacent to proposal site
Shop building	Dubbo LEP as Item I115	225 Fitzroy Street	Directly adjacent to proposal site
Cottage	Dubbo LEP as Item I116	222 Fitzroy Street	20 metres south of southern extent of proposal
Dubbo City Regional Airport	Dubbo LEP as Item I80	4 Cooreena Road	Within the site of the proposed asphalt plant

6.9.2 Potential impacts

Construction

The works at the intersection would not result in any direct impacts on any non-Aboriginal heritage items as none are located within the proposal site (see discussion regarding proposed asphalt plant below for impacts at this location).

The proposal would not directly impact any listed heritage items. There is limited potential for vibration impacts to the three listed buildings located adjacent to the proposal site. The potential for impacts to these structures would be minimal, given the distance from the works involving ground disturbance.

Further information on the potential for vibration impacts during construction is provided in section 6.1.3. Measures to manage potential vibration impacts are provided in section 6.1.4.

The presence of works would result in some minor visual impacts on adjacent heritage items, however these impacts would be short-term and temporary.

Due to the disturbed nature of the proposal site, the likelihood of any archaeological remains is considered to be minimal. A measure is provided in section 6.9.3 to manage any unexpected finds.

The proposed mobile asphalt plant would be located within the curtilage of the heritage listed Dubbo Regional Airport. While within the curtilage of this item, the proposed plant would be located on vacant land that is not considered to contribute to the significance of the item. The plant would potentially result in some visual impacts on the adjacent items of significance, however these impacts would be short term and temporary, and would only occur while the plant is operating and on site. It is noted that Council has recently used this area for a mobile batching plant. The proposed use of this land for a mobile asphalt plant would be consistent with this use.

Operation

No impacts to non-Aboriginal heritage are anticipated during operation as the proposal would not result in the roadway in the vicinity of these items being located any closer to the items.

6.9.3 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing
Construction			
Inadvertent impacts on heritage items	Environmental awareness training would include responsibilities under heritage legislation. Workers would be informed regarding the location of known heritage items, and the unanticipated finds procedure.	Construction contractor	Construction
	Construction activities and machinery would be restricted to designated work areas.	Construction contractor	Construction
Unanticipated archaeological finds	If unexpected archaeological remains are uncovered during the works, all works in the vicinity of the material/find must cease and Roads	Construction contractor	Construction

Impact	Environmental safeguards	Responsibility	Timing
	and Maritime's Standard Management Procedure: Unexpected Heritage Finds (2015) must be followed. Roads and Maritime's Environment Manager must be contacted immediately.		
Vibration impacts on heritage items	A construction noise and vibration management plan would be prepared as part of the construction environmental management plan to determine what construction methods would be used in the vicinity of heritage listed items. This would include measures to minimise the likelihood of vibration impacts.	Construction contractor	Construction
	Vibration management measures provided in section 6.1.4 would be implemented to minimise structural vibration impacts to heritage items.	Construction contractor	Construction

6.10 Waste management

6.10.1 Existing environment

Roads and Maritime is committed to the responsible management of unavoidable waste and promotes the reuse of such waste in accordance with the resource management hierarchy principles outlined in the *Waste Avoidance and Resource Recovery Act 2000*. These resource management hierarchy principles, in order of priority are:

- Avoidance of unnecessary resource consumption
- Resource recovery (including reuse, reprocessing, recycling and energy recovery)
- Disposal.

By adopting the above principles, Roads and Maritime aims to efficiently reduce resource use, reduce costs, and reduce environmental harm in accordance with the principles of ecologically sustainable development.

6.10.2 Potential impacts

Construction

Waste streams likely to be generated during construction of the proposal include:

- Excess spoil and pavement materials
- Green waste as result of vegetation removal
- Packaging and general waste from staff (lunch packaging, portable toilets etc)

- Chemicals and oils
- Redundant erosion and sediment controls.

Waste quantities are not likely to be significant due to the small scale of the proposal.

Waste would be managed in accordance with the resource management hierarchy and safeguards provided in section 6.10.3.

Operation

Operation of the new intersection is not expected to result in any changes to the waste management of the existing intersection.

6.10.3 Safeguard and management measures

Impact	Environmental safeguards	Responsibility	Timing
Pre-construction			
Waste minimisation	<p>A waste management plan will be prepared, which will include:</p> <ul style="list-style-type: none"> • Identification of all potential waste streams associated with the work • Opportunities to minimise the use of resources, and to reuse and recycle materials • Methods of disposal of waste that cannot be reused or recycled at appropriately licensed facilities • Methods of containment for waste streams to prevent escape to the environment. 	Construction contractor	Pre-construction
Construction			
Waste management	<p>The following resource management hierarchy principles will be followed:</p> <ul style="list-style-type: none"> • Avoid unnecessary resource consumption as a priority • Avoidance is followed by resource recovery (including reuse of materials, reprocessing, recycling and energy recovery) • Disposal is undertaken as a last resort (in accordance with the Waste Avoidance and Resource Recovery Act 2001). 	Construction contractor	Construction
Waste management	Waste bins will be provided and recycling of materials encouraged. Waste will be transported to an appropriate waste disposal facility.	Construction contractor	Construction
Waste management	There will be no disposal or re-use of construction waste on other land.	Construction contractor	Construction
Waste management	Waste will not be burnt on site.	Construction contractor	Construction

Impact	Environmental safeguards	Responsibility	Timing
Waste management	Waste material, other than vegetation and tree mulch, is not to be left on site once the works have been completed.	Construction contractor	Construction
Waste management	Working areas are to be maintained, kept free of rubbish and cleaned up at the end of each working day	Construction contractor	Construction

6.11 Climate change

6.11.1 Existing environment

Climate change refers to the warming temperatures and altered climate conditions associated with the concentration of greenhouse gases in the atmosphere. These changes to future climatic conditions have the potential to impact existing and new road infrastructure.

In 2014, the NSW Department of Environment and Heritage (OEH, 2014) published climate change snapshots for various regions throughout NSW. The snapshots identify projected changes in temperature, rainfall and fire probability. The snapshots are based on long term observation in weather between 1910 and 2011.

The Central West and Orana region is projected to continue to warm during the near future (2020–2039) and far future (2060–2079), compared to recent years (1990–2009). The warming is projected to be on average about 0.7°C in the near future, increasing to about 2.1°C in the far future. The number of hot days is projected to increase and the number of cold nights is projected to decrease.

The warming trend projected for the region is large compared to natural variability in temperature and is of a similar order to the rate of warming projected for other regions of NSW. The Central West and Orana currently experiences considerable rainfall variability across regions, seasons and from year-to-year and this variability is also reflected in the projections.

6.11.2 Policy setting

In NSW, responses to climate change are provided in various policy and guideline documents including the *NSW Greenhouse Plan* (NSW Government, 2005), the *NSW Sea Level Rise Policy Statement* (NSW Government, 2009) and the *NSW Coastal Planning Guideline: Adapting to sea level rise* (DoP, 2010).

To address the challenge of climate change, Roads and Maritime has developed a climate change plan which includes actions to:

- Reduce Roads and Maritime’s carbon footprint
- Help reduce the carbon footprint of NSW road transport
- Adapt the Road and Maritime road transport system to the impacts of climate change
- Manage Road and Maritime’s transition to a low carbon economy.

6.11.3 Potential impacts

Construction

Construction of the proposal would result in greenhouse gas emissions being produced, including:

- Carbon dioxide and nitrous oxide from liquid fuel use in plant and vehicles (diesel, petrol) during construction, disposal and transport of materials
- Use of materials such as concrete that have high embodied energy content.

It is anticipated that operation of construction equipment would be the main emissions source during construction.

The proposal would involve the removal and/or disturbance of exotic planted vegetation. Vegetation removal can result in an increase in carbon dioxide in the atmosphere as the carbon would no longer be stored in this vegetation through carbon sequestration. However, the potential loss of vegetation as a result of the proposal is considered to result in a negligible increase in carbon dioxide. The planting of trees within Elston Park is also considered to offset these impacts.

Operation

The proposal would not directly alter traffic volumes. Any climate change impacts associated with the proposal are considered to be minor.

6.11.4 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing
Pre-construction			
Greenhouse gas emissions	The use of alternative fuels and power sources for construction plant and equipment will be investigated and implemented, where appropriate.	Construction contractor	Pre-construction
Construction			
Greenhouse gas emissions	Materials will be delivered as full loads and local suppliers will be used where possible.	Construction contractor	Construction
Greenhouse gas emissions	Construction equipment, plant and vehicles will be appropriately sized for the task.	Construction contractor	Construction

6.12 Hazards and risk

6.12.1 Existing environment

Existing hazards and risks in the vicinity of the proposal are generally associated with the operation of the existing road network. This includes the risks associated with the operation of the existing intersection (as a roundabout) which is considered to be a safety hazard due to the number of accidents which have occurred at or near the intersection.

6.12.2 Potential impacts

Construction

Hazards and risks associated with construction include:

- Environmental hazards and risks, including:
 - Spills or leakage of contaminants such as fuels, chemicals and hazardous substances entering surface and groundwater or contaminating soils
 - Discharge of turbid run-off, resulting in pollution of waterways
 - Encountering utilities or contaminated material during earthworks
 - Spread of noxious weed material
 - Changed traffic conditions leading to incidents, including the movement of heavy vehicles through the proposal site including in potentially reduced lane widths
- Health and safety hazards and risks – including any activity or outcome that may affect the health and/or safety of construction personnel or the community.

A hazard and risk management plan (including an emergency response plan) for hazards and risks during construction would be incorporated into the construction environmental management plan.

Construction activities can create a risk for people moving in the vicinity of construction sites and vehicles. NSW workplace safety laws require construction sites to have adequate site security, which includes appropriate fencing. The construction contractor would ensure that construction sites are secure at all times, and would take all possible actions to prevent entry by unauthorised persons.

Health and safety risks during construction would be managed by the implementation of standard workplace health and safety requirements. Construction sites would be managed in accordance with the requirements of the WorkCover Authority of NSW and the *Work Health and Safety Act 2011* and the *Work Health and Safety Regulation 2011*. The detour of heavy vehicles around the proposal site is considered to assist with improving worker safety as the movement of these larger vehicles through the construction site pose a large safety risk.

Operation

The hazards and risks resulting from the operation of the proposal are considered to be similar that which is currently experienced at the existing intersection. There should however be a reduction in the likelihood of crashes occurring due to the proposal resulting in improved intersection operation.

6.12.3 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing
Construction			
General impacts	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:	Construction contractor	Construction

Impact	Environmental safeguards	Responsibility	Timing
	<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 proposal 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>		

6.13 Cumulative impacts

6.13.1 Study area

For the purpose of this assessment the study area is considered to encompass any major works occurring within the Dubbo CBD.

6.13.2 Broader program of work

Including the proposal, Roads and Maritime are currently undertaking five projects within the Dubbo urban area which seek to improve traffic flow through the town, with a focus on through traffic including heavy vehicles. These projects include the following in addition to the proposal:

- **New Dubbo Bridge:** Construction of a third high level river crossing to improve freight efficiency and productivity for movements through and around Dubbo. These works are proposed to commence in about 2022.
- **Mitchell Highway (Victoria Street) and Newell Highway (Whylandra Street) intersection:** Upgrade of the existing intersection from a roundabout to a signalised intersection. The utility relocation works are proposed to commence mid 2019 and all works are programed to be complete June 2020.
- **Newell Highway Upgrade West Dubbo:** Upgrade of pavement (to heavy duty pavement) along the Newell Highway between Golf Links Road and Baird Street: These works are currently underway

with utility relocations currently being undertaken and major work to be undertaken in two stages in August to October 2018 and 2019.

- LH Ford Bridge Improvements: Maintenance works will be undertaken on the existing bridge to maintain the design life of the bridge. The works include the construction of two new piers. These works are to be undertaken between late 2018 and late 2019.

6.13.3 Other projects and developments

The only other major project located within the Dubbo CBD is the redevelopment of Dubbo Base Hospital which is located off the Golden Highway at Myall Street about 1.7 kilometres north of the proposal. This project is in the late stages of construction and involves some redevelopment of an existing area of the hospital. However a modification to the project is yet to be approved by the Department of Planning and Environment. For the purposes of this assessment this development is considered to have limited interaction with the proposal and the other road developments being undertaken by Roads and Maritime.

6.13.4 Potential impacts

The cumulative impacts of all five road projects within Dubbo have been considered with the cumulative impacts outlined in the below section. All other environmental issues are considered to not result in any noticeable cumulative impacts.

Construction

Cumulative impacts of the five road projects within Dubbo are considered to be relatively minor as not all projects would be occurring simultaneously and the distance between some of the projects also reduces the likelihood of any cumulative impacts. Traffic and noise impacts are considered to be the key cumulative impacts to be experienced due to the construction of the above mentioned projects.

Traffic, transport and access

The construction of the proposal in parallel with any of the above projects would result in some cumulative impacts associated with the implementation of detours. Cumulative impacts would generally be experienced where detours for each of the projects are not considered as a whole resulting in a detour which then rejoins the existing highways to then just have another detours at the next project. Such actions would result in increased travel times for the community and in many instances one single detour maybe the preferred option particularly for traffic travelling through Dubbo. To minimise these impacts, discussion between all concurrent projects should occur to ensure that the number of detours put in place is minimised. Consideration should be given to implementing a small number of detours which could service a number of the projects. This would also limit the extent of impacts on the road network to a small number of roads. The detours outlined in section 3.3.7 have been developed taking into account both the proposal and the upgrade of the intersection of the Newell Highway and Mitchell Highway and also works associated with the LH Ford Bridge as these projects are likely to occur at a similar time and therefore one single detour has been developed to minimise movements through both intersections.

The projects (if undertaken in parallel or sequentially) would result in increased congestion around works sites and increased travel times due to reduced speeds through construction areas. These impacts would either be amplified due to parallel projects or prolonged due to sequential works. Overall these impacts are not considered to be substantial as traffic would be appropriately managed on all projects.

The construction of a number of projects would also increase the number of vehicles using the road network, in particular heavy vehicles. This increase is not considered to be substantial as the majority of movements would be via main roads like the Newell and Mitchell highways. These roads are generally

considered to have the capacity to handle the increase, and any increase in traffic would only be short-term. Both roads are also designated heavy vehicle routes.

Noise and air

In general the construction of the multiple road projects in Dubbo are not considered to result in noise and vibration impacts due to the distances between projects. The proposal is not proposed to be located in close proximity to any nearby other projects and therefore cumulative noise impacts resulting from the proposal is considered to be minimal.

Operation

During operation of the proposal, cumulative impacts would be negligible. The proposal as part of a broader program of upgrades would have positive cumulative effects in terms of improved road safety and reduced traffic delays.

6.13.5 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing
Cumulative impacts	Consultation between Roads and Maritime and contractors for each project is to be undertaken to ensure that any cumulative impacts are considered and minimised where possible. This would include programming of works to minimise day and night works at any one location due to separate project and establishment of detours which where possible can service multiple projects to minimise the number of roads impacts by the projects.	Roads and Maritime Contractor	Construction

7. Environmental management

7.1 Environmental management plans (or system)

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

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

The CEMP will be prepared prior to construction of the proposal and must be reviewed and certified by the Roads and Maritime Environment Officer, Regional Project Office, 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)* and QA Specification G10 – *Traffic Management*.

7.2 Summary of safeguards and management measures

Environmental safeguards outlined in this document would be incorporated into the detailed design phase of the proposal and during construction and operation of the proposal, should it proceed. These safeguards would 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.

7.3 Licensing and approvals

No additional licences or approvals are required for the project with the exception of the environmental approval under Division 5.1 of EP&A Act.

Table 7.1 Summary of safeguards and management measures

No.	Impact	Environmental safeguards	Responsibility	Timing
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 and management measures 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
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
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.</p>	Contractor / Roads and Maritime project manager	Pre-construction / detailed design

No.	Impact	Environmental safeguards	Responsibility	Timing
NV1	Construction noise and vibration	<p>A construction noise and vibration management plan would be prepared as part of the construction environmental management plan. This plan would include, but not be limited to:</p> <ul style="list-style-type: none"> • A map indicating the locations of sensitive receivers including residential properties • Management measures to minimise the potential noise impacts from the quantitative noise assessment and for potential works outside of standard working hours (including implementation of <i>Interim Construction Noise Guidelines</i> (DECC, 2009)) • A risk assessment to determine potential risk for activities likely to affect receivers (for activities undertaken during and outside of standard working hours) • Mitigation measures to avoid noise and vibration impacts during construction activities including those associated with truck movements • A process for assessing the performance of the implemented mitigation measures • A process for documenting and resolving issues and complaints • A process for updating the plan when activities affecting construction noise and vibration change • Identify in toolbox talks where noise and vibration management is required • An out of hours works procedure in accordance with the requirements of the <i>Interim Construction Noise Guideline</i> (DECC, 2009) and the <i>Environmental Noise Management Manual Practice</i> (RTA, 2001a) • Restrictions on construction delivery times to minimise noise impacts to receivers near the compound site <p>Scheduling works to complete noisiest activities during the day wherever possible (i.e. concrete saw cutting).</p>	Construction contractor	Pre-construction and construction

No.	Impact	Environmental safeguards	Responsibility	Timing
NV2	Construction noise and vibration	<p>The out of hours procedure would as a minimum include:</p> <ul style="list-style-type: none"> • Background levels for noise criteria in accordance with the Interim Construction Noise Guideline (DECC, 2009) • Locations of the works • Locations of sensitive receivers • Predicted noise levels • Communications plan • Triggers for the provision of respite and a respite schedule. <p>Management measures where works are unable to comply with <i>Interim Construction Noise Guideline</i> (DECC, 2009) and the <i>Environmental Noise Management Manual Practice</i> (RTA, 2001a).</p>	Construction contractor	Pre-construction and construction
NV3	Construction noise	Noise impacts would be minimised in accordance with Practice Note 7 in Roads and Maritime Services' <i>Environmental Noise Management Manual</i> and <i>Environmental fact sheet No. 2- Noise management and Night Works</i> .	Construction contractor	Construction
NV4	Construction noise from machinery and equipment	All plant and equipment would be appropriately maintained to ensure optimum running conditions, with periodic monitoring.	Construction contractor	Construction
NV5	Construction noise from machinery and equipment	Noise-emitting plant would be directed away from sensitive receivers where possible.	Construction contractor	Construction
NV6	Construction noise from machinery and equipment	Traffic flow, parking and loading and unloading areas would be planned to minimise reversing movements within the proposal site.	Construction contractor	Construction
NV7	Construction noise from machinery and equipment	Reversing alarms that have a tonal noise character are to be avoided during out of hours activities. Quacker style or 'smart' reversing alarms are to be used during night time activities (pending safety approvals).	Construction contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
NV8	Construction noise from construction compound	Temporary hoarding would be erected around the selected construction compound where deemed required.	Construction contractor	Construction
NV9	Mobile asphalt plant	Investigate the use of a 2 to 3 metre acoustic screen around the asphalt burner unit.	Construction contractor	Construction
NV10	Mobile asphalt plant	Position aggregate stockpile areas to shield noise between the asphalt plant equipment and the residential receivers to the north-west.	Construction contractor	Construction
NV11	Mobile asphalt plant	The front-end loaders on site should be fitted with exhaust mufflers.	Construction contractor	Construction
NV12	Construction noise from inappropriate practices	Site inductions would be provided to train staff on ways to minimise construction noise impacts on-site. Responsible working practices include: <ul style="list-style-type: none"> • Avoid the use of outdoor radios during the night-time period • Avoid shouting and slamming of doors • Where practical, operate machines at low speed or power and switched off when not being used rather than left idling for prolonged periods • Minimise reversing Avoid dropping materials from height and avoid metal to metal contact on material.	Construction contractor	Construction
NV13	Construction vibration	Quieter and less noise/vibration emitting construction methods would be used where feasible and reasonable.	Construction contractor	Construction
NV14	Construction vibration	Compliance vibration monitoring would be undertaken in response to complaints or when vibration generating activities occur within the structural damage buffer distances. The results of the vibration monitoring would be compared to the structural damage criteria presented in Table 6.6 considering frequency content.	Construction contractor	Construction
NV15	Construction vibration	Building condition surveys would be undertaken when vibration generating activities occur within the structural damage buffer distances. The properties to be assessed are to be confirmed in consultation with Roads and Maritime Services.	Construction contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
NV16	Construction vibration	Verify that nearby medical practices do not possess vibration sensitive equipment such as micro surgery, eye surgery or neurosurgery tools.	Construction contractor	Construction
NV17	Noise and vibration impacts and appropriate complaints handling	The local community would be contacted and informed of the proposed work, location, duration of work, and hours involved. The contact would be made a minimum five days before work starts as per RMS ENMM Practice Note 7 requirements.	Construction contractor and Roads and Maritime	Construction
NV18	Noise and vibration impacts and appropriate complaints handling	Communications material such as the project website and community notification would include a contact person and phone number to enable complaints to be received and responded to.	Construction contractor	Construction
TT1	General traffic management	<p>A detailed traffic management plan would be prepared and implemented in accordance with the <i>Traffic Control at Work Sites technical Manual (2018)</i> and <i>Specification G10 Control of Traffic</i>. The plan would be approved by Roads and Maritime before implementation to provide a comprehensive and objective approach to minimise any potential impacts on road and pedestrian operations during construction.</p> <p>The plan would include:</p> <ul style="list-style-type: none"> • Confirmation of haulage routes, including routes to the asphalt plant, to minimise impacts on local roads and traffic • Measures to minimise impacts to access to local roads and properties • Site specific traffic control measures (including signage) to manage and regulate traffic movement • Measures to manage the potential impacts of detours and diversions and maintain safety along these routes • Measures to maintain pedestrian and cyclist access • Requirements and methods to consult and inform the local community of changes to access arrangements and travel routes 	Construction contractor	Pre-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
		<ul style="list-style-type: none"> • Access to works sites including entry and exit locations and measures to prevent construction vehicles queuing on public roads • Determine temporary speed restrictions to ensure safe driving environments around work sites • A response plan for any construction traffic incident • Traffic barrier requirements and placement • Include the need to consult with emergency services on access changes • Consideration of other developments to minimise traffic conflict and congestion that may occur due to the cumulative increase in construction vehicle traffic <p>Monitoring, review and amendment mechanisms.</p>		
TT2	General traffic management	Consultation would be undertaken with local bus operators before and during construction.	Roads and Maritime	Pre-construction and construction
TT3	General traffic management	The community would be kept informed about construction and any changes to access arrangements or travel routes, through advertisements in the local media and prominently placed advisory notices or variable message signs.	Roads and Maritime	Pre-construction and construction
TT4	Access to properties	Property owners and occupants would be consulted regarding potential impacts to property access (during construction and/or operation) and alternative arrangements.	Roads and Maritime	Pre-construction
TT5	Access	Where possible, partial road closures would occur at night when traffic volumes are at a minimum.	Construction contractor	Construction
TT6	Access	Access to side streets would be maintained as far as possible during construction.	Construction contractor	Construction
TT7	Access	Consultation would be undertaken with Dubbo Regional Council in relation to the timing of partial road closures.	Construction contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
TT8	Access	Access would be maintained for emergency vehicles in the vicinity of construction works. Ongoing consultation would be undertaken with emergency services during construction to ensure that potential impacts are identified and appropriately managed.	Construction contractor	Construction
TT9	Pedestrian and cyclist management	Pedestrian access would be maintained during construction. Where changes to access are required, alternative access routes would be identified and notified to the community.	Construction contractor	Construction
TT10	Pedestrian and cyclist management	Where access for cyclists is removed signage would direct cyclist to the nearest designated cycle route (ie Bultje Street or Gipps Street south of Fitzroy Street).	Construction contractor	Construction
TT11	Congestion and safety	Where possible, vehicle movements (in particularly heavy vehicles) to the proposal site would be avoided during the morning and afternoon peaks and during school finishing times.	Construction contractor	Construction
TT12	Property access	Property access would be maintained throughout the construction period as far as possible. Where changes to access arrangements are required, property owners/tenants would be consulted to confirm access requirements and alternative arrangements.	Construction contractor and Roads and Maritime	Construction
BIO1	General biodiversity management	The CEMP would identify locations for laydown and stockpile areas, and the proposed disturbance footprint, including the vegetation that would be impacted. Laydown and stockpile areas, worker amenities, equipment and vehicles would be located outside of vegetation drip lines.	Construction contractor	Construction
BIO2	General biodiversity management	All trees located in the vicinity of the proposal site which are not to be removed (ie trees along Cobra Street) would be appropriately fenced off and identified in the CEMP.	Construction contractor	Construction
BIO3	General biodiversity management	If any damage occurs to vegetation outside of the nominated work area (as shown in the CEMP), the project manager and environmental representative would be notified to determine a suitable course of action.	Construction contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
BIO4	Weed management	Should noxious weeds be encountered during the removal of vegetation, weeds would be controlled in accordance with contemporary bush regeneration principles and practices and the <i>RTA Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects</i> (2011), to ensure construction does not promote the spread of weeds. Any weeds encountered on site would be disposed at an appropriate waste facility.	Construction contractor	Construction
BIO5	Tree protection	The bottle tree listed on the Dubbo Council Tree Preservation Order 2015 and trees within Elston Park would be appropriately delineated for the construction period. This would include: <ul style="list-style-type: none"> – Installing para webbing around the tree protection zone (as calculated using AS 4970—2009: Protection of trees on development sites). – Discussing the location of the tree in toolbox talks when working around the tree. Mapping the location of the tree in the CEMP and mud map plans.	Construction contractor	Construction
SWQ1	Erosion and sedimentation	A soil and water management plan (SWMP) will be prepared as part of the construction environmental management plan in accordance with the requirements of Roads and Maritime Services contract specification G38 prior to the commencement of construction. The SWMP will also address the following: <ul style="list-style-type: none"> • Roads and Maritime Services Code of Practice for Water Management, the Roads and Maritime Services' <i>Erosion and Sedimentation Procedure</i> • The NSW Soils and Construction – Managing Urban Stormwater Volume 1 '<i>the Blue Book</i>' (Landcom, 2004) and Volume 2D (DECC, 2008) • Roads and Maritime Services Technical Guideline: <i>Temporary Stormwater Drainage for Road Construction, 2011</i> Roads and Maritime Services Technical Guideline: Environmental Management of Construction Site Dewatering, 2011.	Construction contractor	Pre-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
SWQ2	Contamination of soil	<p>The CEMP will include a contaminated land management plan, prepared in accordance with:</p> <ul style="list-style-type: none"> • <i>Contaminated Land Management Act 1997</i> (NSW) • Road and Maritime <i>Contaminated Land Management Guideline</i> • Roads and Maritime <i>Environmental Incident Classification and Reporting Procedure</i> • EPA guidelines on contaminated land management. <p>The contaminated land management plan will provide measures to manage:</p> <ul style="list-style-type: none"> • Areas of known contamination (if any) <p>Unexpected contamination finds.</p>	Construction contractor	Pre-construction
SWQ3	Contamination of soils and waterways	An emergency spill plan will be developed and incorporated into the construction environmental management plan. The plan will include measures to avoid and manage spillages of fuels, chemicals, and fluids onto any surfaces or into stormwater inlets and an emergency response procedure.	Construction contractor	Pre-construction
SWQ4	Erosion and sedimentation	All stockpiles will be designed, established, operated and decommissioned in accordance with Roads and Maritime Services' Stockpile Management Procedures (RTA 2011a).	Construction contractor	Pre-construction
SWQ5	Contamination of soils and waterways	In the event that indicators of contamination are encountered during construction (such as odours or visually contaminated materials), work in the area will cease until an environmental consultant can advise on the need for remediation or other action.	Construction contractor	Construction
SWQ6	Contamination of soils and waterways	Vehicle wash downs and/or concrete truck washouts will be undertaken within a designated bunded area of an impervious surface or undertaken off-site.	Construction contractor	Construction
SWQ7	Contamination of soils and waterways	Machinery will be checked daily to ensure there are no oil, fuels or other liquids leaking from the machinery.	Construction contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
SWQ8	Contamination of soils and waterways	There is to be no release of dirty water into drainage lines and/or waterways.	Construction contractor	Construction
SWQ9	Contamination of soils and waterways	The refuelling of plant and maintenance of machinery would be undertaken in impervious bunded areas in the designated compound area.	Construction contractor	Construction
SWQ10	Contamination of soils and waterways	Final waste classification is required once the volumes of waste requiring offsite disposal during construction are confirmed. Waste soils should be classified in accordance with the NSW EPA (2014) Waste Classification Guidelines.	Construction contractor	Construction
SWQ11	Sediment transported off site	All stockpiles would be designed, established, operated and decommissioned in accordance with the Blue Book.	Construction contractor	Construction
SWQ12	Heavy rainfall management	Weather conditions will be monitored daily, and no works will be conducted if there is an imminent threat of a heavy rainfall event. In the event of a rainfall event, works will cease if there is a risk of sediment loss off site or ground disturbance due to waterlogged conditions	Construction contractor	Construction
AQ1	General air quality	An air quality management plan would be prepared as part of the construction environmental management plan. The plan would include but not be limited to: <ul style="list-style-type: none"> • A map identifying locations of sensitive receivers • Identification of potential risks/impacts due to the work/activities as dust generation activities • Management measures to minimise risk including a progressive stabilisation plan • A process for monitoring dust on-site and weather conditions A process for altering management measures as required.	Construction contractor	Pre-construction
AQ2	Dust emissions	Dust suppression measures would be implemented as per the air quality management plan.	Construction contractor	Construction
AQ3	Dust emissions	Stockpiled materials would be covered, stabilised or stored in areas not subject to high wind.	Construction contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
AQ4	Dust emissions	All trucks would be covered when transporting material to and from the site.	Construction contractor	Construction
AQ5	Dust emissions	Work activities would be reprogrammed if the mitigation measures are not adequately restricting dust generation.	Construction contractor	Construction
AQ6	Dust emissions	Works would not be carried out during strong winds or in weather conditions where high levels of dust or air borne particulates are likely.	Construction contractor	Construction
AQ7	Dust emissions	Stabilisation of disturbed surfaces would take place as soon as practicable.	Construction contractor	Construction
AQ8	Exhaust emissions	Construction plant and equipment would be maintained in a good working condition in order to limit impacts on air quality.	Construction contractor	Construction
AQ9	Exhaust emissions	All construction plant and machinery would be fitted with emission control devices complying with Australian design standards.	Construction contractor	Construction
AQ10	Exhaust emissions	Plant and machinery would be turned off when not in use.	Construction contractor	Construction
AQ11	Exhaust emissions	All trucks would be covered when transporting material to and from the site.	Construction contractor	Construction
AQ12	Impacts on sensitive receivers	Local residents would be advised of hours of operation and duration of work and supplied with a contact name and number for queries regarding air quality.	Construction contractor	Construction
VIS1	Visually intrusive works	The footprint of the proposal will be minimised where possible to minimise the dominance of the works.	Construction contractor	Construction
VIS2	Compound management	The construction compound will be left in a clean and tidy state at the end of each working day.	Construction contractor	Construction
VIS3	Long term visual amenity	The study area will be returned to its current state after construction to ensure the visual landscape is similar to the existing intersection.	Construction contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
VIS4	Light spill	Directional lighting would be mounted to avoid light spill into adjoining residences at night time.	Contractor	Construction
VIS5	Screening vegetation	Planting of appropriate screening vegetation in the road verges would occur where it is safe and practicable to do so. New plantings would incorporate locally occurring species that reflect existing landscape character. New plantings would be selected and positioned such that they do not present safety hazards.	Construction contractor	Operation
LU1	Access and connectivity	Roads and Maritime would consult with potentially affected landholders to identify strategies to minimise the potential impacts to their properties, and ensure that access is maintained or alternative arrangements are provided.	Roads and Maritime	Detailed design
LU2	Property acquisition	All property valuations, lease fees and acquisition payments would be carried out in accordance with Roads and Maritime Services Land Acquisition Policy (2011) and the <i>Land Acquisition (Just Terms Compensation) Act 1991</i> . Property acquisition plans would be prepared for each of the properties to be acquired.	Roads and Maritime	Pre-construction
LU3	Property acquisition	Property adjustment plans would be developed in consultation with the affected property owners.	Roads and Maritime	Pre-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
LU4	Construction impacts on the community	<p>A communication plan would be prepared and included in the construction environmental management plan. The communication plan would include (as a minimum):</p> <ul style="list-style-type: none"> • Requirements to provide details and timing of proposed activities to affected residents. • Complaints handling procedure, including the contact name and number for complaints. • Procedure to notify adjacent land users for changed conditions during the construction period such as traffic, pedestrian or driveway access. <p>The communications plan would be prepared in accordance with G36 requirements and Roads and Maritime Services' Community Engagement and Communications Manual (Roads and Maritime 2012).</p>	<p>Roads and Maritime</p> <p>Construction contractor</p>	Pre-construction
LU5	Construction impacts on the community	Local residents and potentially affected businesses would be notified before work starts and would be kept regularly informed of construction activities during the construction process.	Construction contractor	Pre-construction and Construction
LU6	Impacts to utilities	If the scope or location of proposed utility relocation works falls outside of the assessed proposal scope and footprint, further assessment will be undertaken.	Roads and Maritime, contractor	Pre-construction
LU7	Impacts to utilities	Roads and Maritime would consult with utility providers and potentially affected landholders to ensure that impacts on utilities are minimised where possible. Consultation would include confirmation of utility access requirements.	Roads and Maritime	Pre-construction Construction
LU8	Construction impacts on the community and businesses	During construction, the local community, road users, pedestrians, businesses and cyclists would be informed of any changed conditions.	Construction contractor	Construction
LU9	Construction impacts on the community and businesses	The provision of temporary on-street parking outside Alchemy Art and Food Hub would be considered when works are not occurring during business hours.	Construction contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
LU10	Construction impacts on the community and businesses	Residents and businesses would be informed before any interruptions to utility services that may be experienced as a result of utilities relocation.	Construction contractor	Construction
LU11	Construction impacts on the community and businesses	Complaints received will be recorded and attended to promptly in accordance with the Roads and Maritime <i>Community Involvement Practice Notes and Resource Manual</i> .	Construction contractor	Construction
AH1	Discovery of heritage	If Aboriginal heritage items are uncovered during the works, all works in the vicinity of the find must cease and Roads and Maritime's Aboriginal cultural heritage advisor and the Environment Manager contacted immediately. Steps in Roads and Maritime's Standard Management Procedure: Unexpected Heritage Finds must be followed.	Construction contractor	Construction
AH2	General construction management	Construction activities and machinery will be restricted to designated work areas.	Construction contractor	Construction
NAH1	Inadvertent impacts on heritage items	Environmental awareness training would include responsibilities under heritage legislation. Workers would be informed regarding the location of known heritage items, and the unanticipated finds procedure.	Construction contractor	Construction
NAH2	Inadvertent impacts on heritage items	Construction activities and machinery would be restricted to designated work areas.	Construction contractor	Construction
NAH3	Unanticipated archaeological finds	If unexpected archaeological remains are uncovered during the works, all works in the vicinity of the material/find must cease and Roads and Maritime's Standard Management Procedure: Unexpected Heritage Finds (2015) must be followed. Roads and Maritime's Environment Manager must be contacted immediately.	Construction contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
NAH4	Vibration impacts on heritage items	A construction noise and vibration management plan would be prepared as part of the construction environmental management plan to determine what construction methods would be used in the vicinity of heritage listed items. This would include measures to minimise the likelihood of vibration impacts.	Construction contractor	Construction
NAH5	Vibration impacts on heritage items	Vibration management measures provided in section 6.1.4 would be implemented to minimise structural vibration impacts to heritage items.	Construction contractor	Construction
WAS1	Waste minimisation	<p>A waste management plan will be prepared, which will include:</p> <ul style="list-style-type: none"> • Identification of all potential waste streams associated with the work • Opportunities to minimise the use of resources, and to reuse and recycle materials • Methods of disposal of waste that cannot be reused or recycled at appropriately licensed facilities <p>Methods of containment for waste streams to prevent escape to the environment.</p>	Construction contractor	Pre-construction
WAS2	Waste management	<p>The following resource management hierarchy principles will be followed:</p> <ul style="list-style-type: none"> • Avoid unnecessary resource consumption as a priority • Avoidance is followed by resource recovery (including reuse of materials, reprocessing, recycling and energy recovery) <p>Disposal is undertaken as a last resort (in accordance with the Waste Avoidance and Resource Recovery Act 2001).</p>	Construction contractor	Construction
WAS3	Waste management	Waste bins will be provided and recycling of materials encouraged. Waste will be transported to an appropriate waste disposal facility.	Construction contractor	Construction
WAS4	Waste management	There will be no disposal or re-use of construction waste on other land.	Construction contractor	Construction
WAS5	Waste management	Waste will not be burnt on site.	Construction contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
WAS6	Waste management	Waste material, other than vegetation and tree mulch, is not to be left on site once the works have been completed.	Construction contractor	Construction
WAS7	Waste management	Working areas are to be maintained, kept free of rubbish and cleaned up at the end of each working day	Construction contractor	Construction
CC1	Greenhouse gas emissions	The use of alternative fuels and power sources for construction plant and equipment will be investigated and implemented, where appropriate.	Construction contractor	Pre-construction
CC2	Greenhouse gas emissions	Materials will be delivered as full loads and local suppliers will be used where possible.	Construction contractor	Construction
CC3	Greenhouse gas emissions	Construction equipment, plant and vehicles will be appropriately sized for the task.	Construction contractor	Construction
HR1	General impacts	<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 proposal 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>	Construction contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
CU1	Cumulative impacts	Consultation between Roads and Maritime and contractors for each project is to be undertaken to ensure that any cumulative impacts are considered and minimised where possible. This would include programming of works to minimise day and night works at any one location due to separate project and establishment of detours which where possible can service multiple projects to minimise the number of roads impacts by the projects.	Roads and Maritime Contractor	Construction

8. Conclusion

8.1 Justification

The Mitchell Highway (ie Cobra Street) plays key roles in the National Road Network and the National Freight Networks. The existing intersection at Cobra Street and Fitzroy Street results in congestion particularly during the morning and afternoon peaks. These congestion issues would increase in the future as traffic volumes increase through the intersection into the future. The upgrade of the intersection to include traffic signals would provide improved traffic flow through the intersection with the benefits being most visible in the future when traffic volumes increase. The upgraded intersection would also improve safety in the vicinity of the intersection and would improve pedestrian access in the vicinity of the intersection.

While there would be some potential environmental impacts as a consequence of the proposal (which are not experienced with 'do nothing' option), they have been avoided or minimised wherever possible through design and the proposed specific safeguards and management measures summarised outlined in Table 7.1. These safeguards and management measures would be implemented to minimise any impacts. Overall the benefits of the proposal, in particular the traffic and safety benefits, are considered to outweigh any environmental impacts predicted to be experienced. The benefits of the proposal are most evident when comparing the future traffic conditions should the proposal not be undertaken.

Overall, the benefits would outweigh the environmental impacts predicted to be experienced. Therefore, the proposal is considered justified.

8.2 Objects of the EP&A Act

Table 8.1 outlines how the proposal is considered to be consistent with the objects of the EP&A Act.

Table 8.1 Objects of the EP&A Act

Object	Comment
1.3(a) To promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources.	The proposal is located within an existing road corridor and therefore results in limited impact on the surrounding environment and community. The proposal does however provide community benefits through improved traffic through the intersection.
1.3(b) To facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment.	Ecologically sustainable development is considered sections 8.2.1 to 8.2.4.
1.3(c) To promote the orderly and economic use and development of land.	The proposal would maximise the use of an existing road corridor and improve traffic conditions at the intersection. These benefits would be experienced by all road users. The proposal would also result in some benefits for pedestrian due to improved pedestrian facilities at the intersection. The proposal also minimises ongoing congestion and capacity issues associated with the future growth of the area.

Object	Comment
1.3(d) To promote the delivery and maintenance of affordable housing.	Not relevant to the project.
1.3(e) To protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats.	The proposal would be located on land which has been heavily disturbed due to the construction of the existing road and other nearby development. The proposal would result in the clearance of some vegetation however this is considered to be offset by planting undertaken by Roads and Maritime within Elston Park. All vegetation removed is considered to be planted vegetation with no native present within the proposal site.
1.3(f) To promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage).	The proposal would be located on land which has been heavily disturbed due to the construction of the existing road and other nearby development. Due to this past development Aboriginal heritage items are not expected to be present on site and therefore would not be impacted.
1.3(g) To promote good design and amenity of the built environment.	The proposal seeks to ensure that urban design principles are factored into the design. Landscaping to be installed during the construction of the proposal would seek to be consistent with the surrounding areas. Planting which has already been undertaken as part of the proposal within Elston Park is also considered to be better enhance the visual landscape of the park.
1.3(h) To promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants.	The proposal involves works for the purpose of a road. All construction would be undertaken in accordance with relevant Roads and Maritime guidelines and Australian Standards.
1.3(i) To promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State.	Not relevant to the project.
1.3(j) To provide increased opportunity for community participation in environmental planning and assessment.	Details of the consultation undertaken as part of the proposal is outlined in section 5.

8.2.1 The precautionary principle

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

The design has sought to minimise impacts on the amenity of the study area while maintaining engineering feasibility and safety for all road users. A number of safeguards and management measures have been proposed to minimise potential impacts. These safeguards and management measures would be implemented during construction of the proposal. No safeguards and management measures have been postponed as a result of lack of scientific certainty.

A construction environment management plan would be prepared before construction starts. This requirement would ensure the proposal achieves a high-level of environmental performance. No safeguard or management mechanisms would be postponed as a result of a lack of information.

8.2.2 Intergenerational equity

This principle states, 'the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations'.

The proposal would not result in any impacts that are likely to adversely impact on the health, diversity or productivity of the environment for future generations. The proposal would benefit future generations by improving the operation of the intersection into the future and also improving road safety.

Should the proposal not proceed, the principle of intergenerational equity may be compromised, as future generations would inherit a lower level of service associated with the intersection. Travel times and public safety may be affected by future traffic incidents within the corridor.

8.2.3 Conservation of biological diversity and ecological integrity

This principle states the 'diversity of genes, species, populations and communities, as well as the ecosystems and habitats to which they belong, must be maintained and improved to ensure their survival'.

The environment in which the proposal would be undertaken is predominantly landscaped vegetation. The proposal would not result in the removal of any native vegetation with vegetation loss in generally limited to landscaped areas. All vegetation loss is considered to be offset by Roads and Maritime planting vegetation within Elston Park.

The proposal would not have a significant impact on biological diversity and ecological integrity.

8.2.4 Improved valuation, pricing and incentive mechanisms

This principle requires 'costs to the environment should be factored into the economic costs of a project'.

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

The concept design has been developed with an objective of minimising potential impacts on the surrounding environment. This indicates that the proposal is being developed with an environmental objective in mind.

8.3 Conclusion

The proposed upgrade of the Cobra Street and Fitzroy Street intersection at Dubbo is subject to assessment under Division 5.1 of the EP&A Act. The REF has examined and taken into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the proposed activity.

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

A number of potential environmental impacts from the proposal have been avoided or reduced during the concept design development and options assessment. The proposal as described in the REF best meets the project objectives but would still result in some impacts on traffic movements, property (acquisition and access impacts) and neighbouring properties (ie noise and vibration impacts and air quality impacts). Safeguards and management measures as detailed in this REF would ameliorate or minimise these expected impacts. The proposal would also result in improved operation of the intersection both now and in the future when traffic volumes are predicted to increase. The proposal would also result in safety benefits for both road users and pedestrians. On balance the proposal is considered justified and the following conclusions are made.

Significance of impact under NSW legislation

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

Significance of impact under Australian legislation

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

9. Certification

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

Ben James

Senior Environmental Planner

GHD Pty Ltd

Date: 30 November 2018

I have examined this review of environmental factors and accept it on behalf of Roads and Maritime Services.

Cammeron Harris

Project/Contract Manager

Regional Maintenance | Regional and Freight

Date:

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Terms and acronyms used in this REF

Term/Acronym	Description
BC Act	<i>Biodiversity Conservation Act 2016 (NSW)</i>
CEMP	Construction environmental management plan
DECC	Department of Environment and Climate Change
EIS	Environmental Impact Statement
EP&A Act	<i>Environmental Planning and Assessment Act 1979 (NSW)</i> . Provides the legislative framework for land use planning and development assessment in NSW
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)</i> . Provides for the protection of the environment, especially matters of national environmental significance, and provides a national assessment and approvals process.
ESD	Ecologically sustainable development. Development which uses, conserves and enhances the resources of the community so that ecological processes on which life depends, are maintained and the total quality of life, now and in the future, can be increased
FM Act	<i>Fisheries Management Act 1994 (NSW)</i>
ISEPP	State Environmental Planning Policy (Infrastructure) 2007
LEP	Local Environmental Plan. A type of planning instrument made under Part 3 of the EP&A Act.
LoS	Level of Service. A qualitative measure describing operational conditions within a traffic stream and their perception by motorists and/or passengers.
MNES	Matters of national environmental significance under the Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i> .
NSW	New South Wales
REF	Review of Environmental Factors
Roads and Maritime	NSW Roads and Maritime Services
RTA	Roads and Traffic Authority (now Roads and Maritime)
QA Specifications	Specifications developed by Roads and Maritime Services for use with road work and bridge work contracts let by Roads and Maritime Services.

Appendix A

Detailed design plans