NSW GOVERNMENT | Public Works Advisory

Bungendore Roundabout

Review of Environmental Factors

January 2020

Prepared for

QPRC

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Bungendore Roundabout

Review of Environmental Factors

Queanbeyan-Palerang Regional Council | December 2019

Prepared by Public Works Advisory using the Roads and Maritime Services REF template

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Approval and authorisation

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Draft v1	12 December 2019	Kristen Parmeter/ Martin James	Liz Mathieson
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Executive summary

The proposal

Queanbeyan-Palerang Regional Council (QPRC) proposes to build a new roundabout on the Kings Highway (B52) at the intersection of Malbon and Molonglo Streets, Bungendore. Key features of the proposal include:

- Construction of a new roundabout at the existing, uncontrolled T-intersection
- Temporary traffic control would provide a single lane in both directions or contraflow during non-peak hours where no other option is available throughout the construction period
- Construction is expected to commence in the first quarter of 2020 and would take from three to five months to complete.

Need for the proposal

The roundabout is required as the existing intersection is an uncontrolled t-intersection that can, at times such as holiday periods, experience significant delays and cause significant congestion as residents of Queanbeyan and Canberra travel to and from the South Coast via Bungendore.

Proposal objectives

The objectives of the proposal are to:

- improve the flow of traffic
- reduce approach speeds
- guide vehicles through the turn movements
- remove unprotected right turns
- reduce vehicle crash rates typically more common at t-intersection treatments
- reduce 'rat-running' by vehicles through the town centre
- improve the safety of pedestrians and cyclists by providing pedestrian refuges in the centre of the road

Options considered

A 'do nothing' option was not considered a feasible outcome.

Four roundabout design options were considered for the proposal. Roundabout Design Option 2 was selected as the preferred concept design for the proposal.

Statutory and planning framework

Clause 94 of the *State Environmental Planning Policy (Infrastructure) 2007* (ISEPP) allows development "for the purpose of a road or road infrastructure facilities" to be carried out by, or on behalf of, a public authority without development consent on any land. Clause 94 of the *State Environmental Planning Policy (Infrastructure)* 2007 would apply for this proposal.

The QPRC is the public authority proponent and would be the nominated determining authority for the proposal.

Community and stakeholder consultation

QPRC uploaded onto its website, web pages dedicated to this project. The web pages provided relevant information about the project and including design drawings, a traffic study and landscape plan. Provision was made on the web page for members of the public to submit comments on the proposal. The submission period ran from 15th October to 12 November 2018. Sixty-one submissions were received. Concerns expressed about the project included the following main issues:

- Cost of the project

- Ability of the proposed roundabout to ease the existing traffic congestion at the intersection
- Road safety at the intersection when proposed roundabout is operational
- Loss of parking spaces adjoining the intersection
- Impact on small businesses near the intersection
- Impact on adjoining/ nearby heritage buildings

Positive comments discussed the following main issues:

- the need for a roundabout at this location
- safety benefits of the proposed roundabout
- the good design of the proposal

A community information session was held at the Bungendore War Memorial Hall from 7-9 pm on 23 October 2018.

- A consultation letter was mailed to the Roads and Maritime Services (RMS), being the main stakeholder for these works.

Environmental impacts

The main environmental impacts of the proposal would be:

Construction Traffic Impacts

During the approximately five month construction period a single lane in both directions would be maintained, or short term contraflow maintained in non-peak times where no other option is available. However, due to the proximity of construction activities, traffic is likely to be slower through the intersection during this time. A construction traffic management plan would be prepared, and acceptable traffic management methods adopted for the project. Access to adjoining properties would be maintained throughout the construction period.

Construction Noise

Some noisy activities would be undertaken at times during the five month construction period. Acceptable noise control methods would be adopted for the project in accordance with EPA guidelines and requirements.

Justification and conclusion

The proposal to construct a roundabout at the corner of Malbon and Molonglo Streets would cause some traffic delays at this intersection for the duration of the construction period that is anticipated to take up to five months. There would also be some construction noise at times from the use of construction equipment. However, construction activities would be restricted to normal EPA daytime construction hours and accepted construction management methods would implemented to minimise any adverse impacts.

Following completion of the works there would be improved traffic flow through the intersection reducing the congestion experienced there at times of peak traffic flow. This would also reduce ‘rat-running’ by vehicles through the town centre improving amenity there. Furthermore, the new intersection would be safer for vehicles, pedestrians and cyclists with newly dedicated pedestrian and cyclist crossing locations including refuges in the centre of the road. As part of the proposal some minor drainage works are proposed to improve the currently impeded drainage along Molonglo Street that results in surface ponding there at times.

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1. Introduction

1.1 Proposal identification

Queanbeyan-Palerang Regional Council (QPRC) proposes to build a new roundabout on the Kings Highway at the intersection of Malbon and Molonglo Streets in Bungendore, NSW. At this location there currently exists an uncontrolled T-intersection.

The location of the proposal is shown in Figure 1-1 and an overview of the proposal is provided in Figure 1-4. Section 3 describes the proposal in more detail.

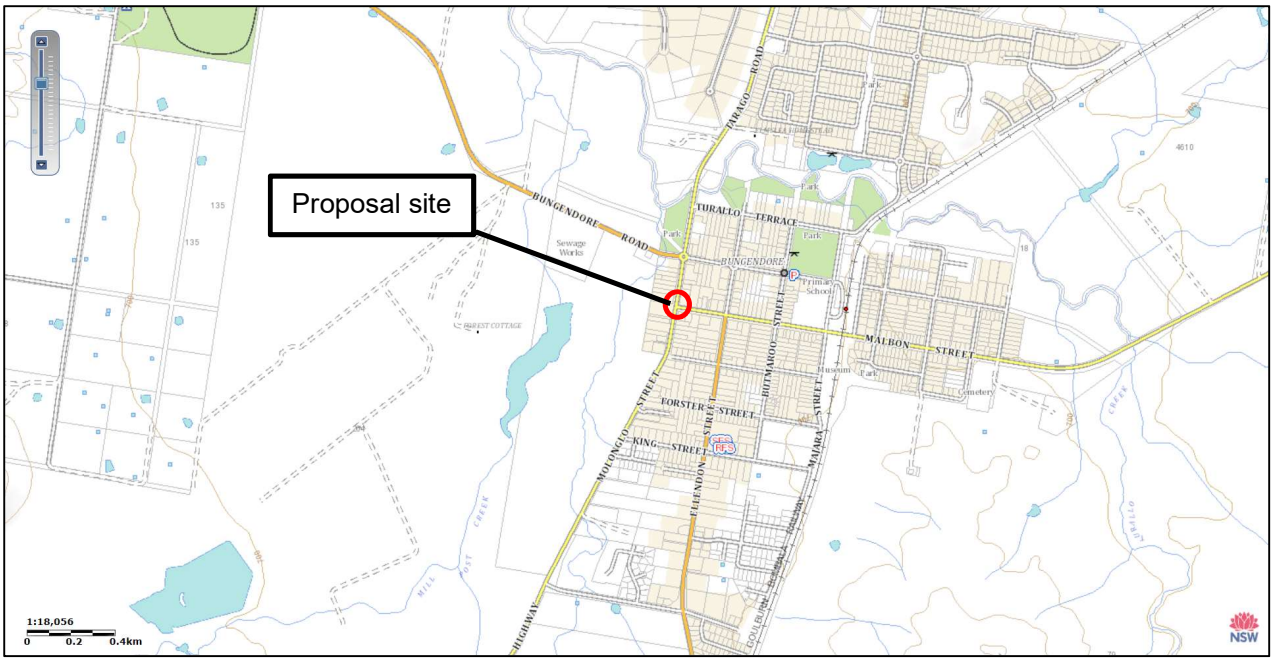

Figure 1-1: General location of the proposal (*Source: SIX Maps, 2019)*

Figure 1-2 Location map of the proposal site (*Source: SIX Maps, 2019)*

Figure 1-3 Aerial view of the proposal site (*Source: SIX Maps, 2019)*

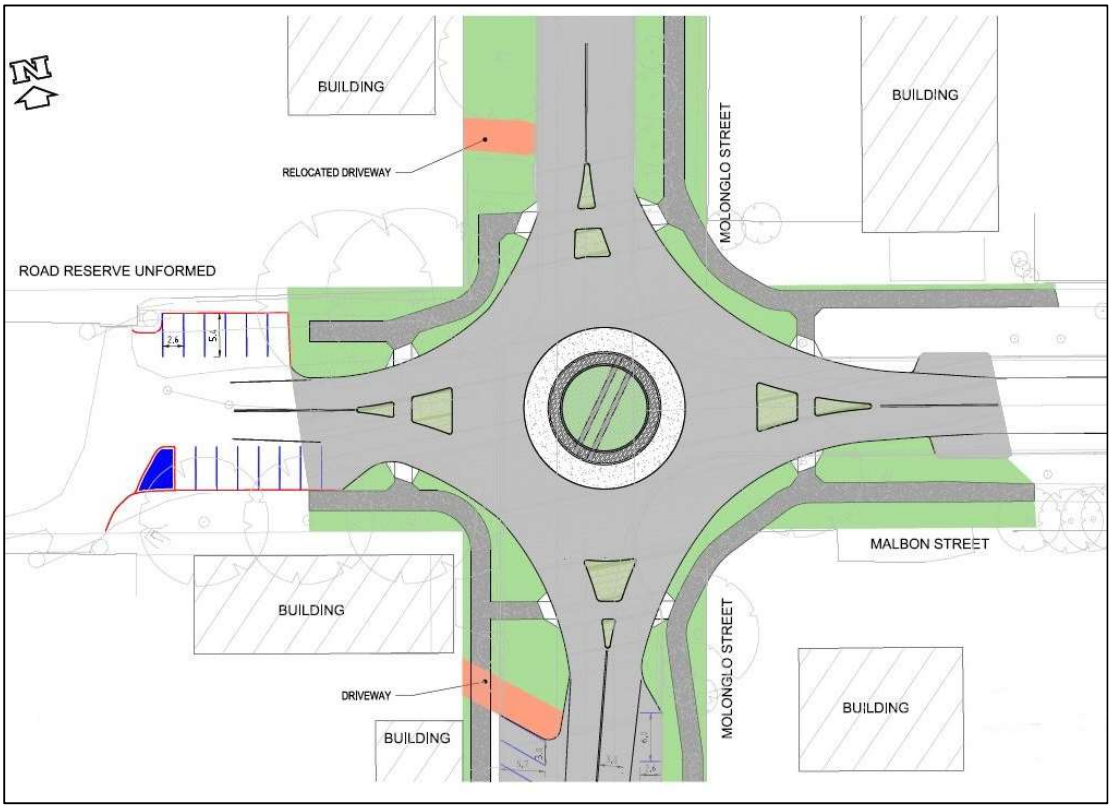

Figure 1-4: The proposal roundabout concept design (*Source: WSP, 2019)*

1.2 Purpose of the report

This review of environmental factors (REF) has been prepared by Public Works Advisory (PWA) on behalf of QPRC. For the purposes of these works, QPRC 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 Kings Highway (B52) is a state highway and main transport link that carries both passenger and heavy vehicles. The existing intersection at Molonglo and Malbon Streets, which forms part of the Kings Highway, is a standard uncontrolled t-intersection which experiences significant delays and congestion during holiday periods, as residents of Queanbeyan and Canberra travel to and from the South Coast.

Roundabouts aim to reduce approach speeds, guide vehicles through the turn movements and remove unprotected right turns. These elements all aim to reduce vehicle crash rates typically more common at t-intersection treatments. Accordingly, it proposed to replace the current intersection of Molonglo and Malbon Streets with a single lane roundabout. The roundabout would improve the flow of traffic and safety of pedestrians and cyclists by providing pedestrian refuges in the centre of the road.

Communication with nearby residents and site observations have indicated that current stormwater drainage along Molonglo Street is inefficient with localised ponding occurring. Therefore, improvement to the drainage network would be incorporated into the proposal works.

The roundabout design would cater for both existing and future development in Bungendore. It would include adequate clearance for large 25m B-double vehicles to traverse all roundabout legs and both cycle and pedestrian movements would to be incorporated into the design.

Overall, the proposed new roundabout at the intersection of Molonglo and Malbon Streets aims to improve traffic efficiency and improve safety for local residents and road users in the Bungendore area.

2.2 Existing infrastructure

The Kings Highway (B52) at the location of the intersection of Molong and Malbon Streets in Bungendore is a two-lane single carriageway road, and is the primary route between Queanbeyan/Canberra and the South Coast.

The existing intersection at Molonglo and Malbon Streets is a standard uncontrolled t-intersection. Molonglo Street runs in a north-south direction, with Malbon Street intersecting from the eastern side of Molonglo Street. The roads comprise two approximately 3.5 m wide sealed bitumen lanes, with one lane of traffic in each direction.

An unnamed, unformed road, used as informal parking for commercial premises along Molonglo Street, is located immediately to the west of the intersection of the two roads.

A sealed hard shoulder area with adequate clearance for on-street parking with formed concrete gutters is present along both Molonglo and Malbon Street. Grassed nature strips comprising scattered trees and overhead services including street lights, telecommunications and powerlines are present adjacent to the roadways. A pavement footpath is provided within the nature strip on both sides of Malbon Street.

The speed limit for traffic through the proposal area along both roads is currently 50 km/h. Giveway signs are located on Malbon Street and the unformed road at the intersection with Molonglo Street.

2.3 Proposal objectives and development criteria

2.3.1 Proposal objectives

The proposal aims to improve road and pedestrian safety by providing a single lane roundabout with pedestrian refuges that meets the QPRC and Roads and Maritime Strategy to cater for both existing and future development in Bungendore and the Southern NSW region. The new roundabout would reduce traffic congestion and delays through Bungendore during holiday periods.

- The objectives of the proposal are to:
  - improve the flow of traffic
  - reduce approach speeds
  - guide vehicles through the turn movements
  - remove unprotected right turns
  - reduce vehicle crash rates typically more common at t-intersection treatments
  - reduce 'rat-running' by vehicles through the town centre
  - improve the safety of pedestrians and cyclists by providing pedestrian refuges in the centre of the road

2.3.2 Development criteria

The development criteria for the proposal include:

- Compliance with relevant standards, environmental requirements and WHS requirements, considering the aspects of constructability, inspection, maintenance and ability to upgrade in the future,
- Provision of a single lane roundabout,
- Provision of a roundabout that accommodates B-double vehicles,
- Provision of pedestrian refuges in the centre of the road
- Provision of bicycle/ pedestrian footpaths along the nature strip on all sides of the roundabout, and
- Stormwater infrastructure and treatment/control to QPRC and RMS standards.

2.3.3 Urban design objectives

Urban design objectives for the proposal include:

- Roundabout design to cater for both existing and future development in Bungendore, the QPRC local government area and the greater Southern NSW region,
- Improve the local flow of traffic and safety of pedestrians and cyclists in Bungendore, and
- Improve stormwater drainage network along Molonglo Street.

2.4 Alternatives and options considered

2.4.1 Identified options

Option 1 – Do Nothing

The 'Do Nothing' option would involve not constructing a roundabout at the intersection of Molonglo and Malbon Streets in Bungendore.

Option 2 - Roundabout Concept Design Option 1
This option included a roundabout with a garden in the centre.

Safety issues were raised during the public consultation period in multiple submissions. These issues related to concerns that Work Health and Safety (WHS) requirements could not be achieved during periods of maintenance of the garden section.

Roundabout Design Option 1also requires land acquisition to the south eastern side of the roundabout and will result in the largest loss of parking to the surrounding area.

Option 3 – Roundabout Concept Design Option 2
This option includes a mountable roundabout with no central garden which allows for heavy vehicles to safely traverse over the roundabout eliminating the need for land acquisition and reducing impacts on surrounding properties. Removal of significant trees will not be required for this option however, in accordance with an arborists report, tree pruning and maintenance will need to be undertaken which will include removal of suckers in the area.

Option 4 – Roundabout Concept Design Option 3
This options includes a non-mountable roundabout which has a smaller radius than Roundabout Design Option 1. The overall size of the roundabout is greater than Roundabout Design Option 2 but less than Roundabout Design Option 1 requiring less land acquisition than Roundabout Design Option 1.

Roundabout Design Option 3 allows for a sculpture to be installed in the middle of the roundabout subject to the design of the sculpture meeting Council and Roads and Maritime Service (RMS) approval. To meet design requirements, the sculpture will need to be smaller than 600 mm high and built of robust low maintenance material and constructed to ensure that sight lines are not blocked.

2.4.2 Analysis of options

Option 1 – Do Nothing
Potential environmental impacts associated with the construction and operation of a roundabout would be avoided by selection of this option. However, this option would not meet the proposal's objectives.

Option 2 – Roundabout Concept Design Option 1
Roundabout Design Option 1 presents unacceptable WHS risks for staff maintaining the garden section of the roundabout as well as impacts on parking and the acquisition of private property. This option is therefore not recommended.

Option 3 – Roundabout Concept Design Option 2
Roundabout Design Option minimises the impact to parking at adjoining properties. Land acquisition will not be required for this option to proceed, This option was therefore recommended.

Option 4 – Roundabout Concept Design Option 3
Roundabout Design Option 3 presents Acquisition of land is also required for this option. This option is therefore not recommended.

2.5 Preferred option

Option 3 – Roundabout Concept Design Option 2
Roundabout Design Option 2 is the preferred option as it minimises the impact to parking at adjoining properties, does not require acquisition of any land and removes the WHS risk to staff during maintenance.

This roundabout design was selected as the preferred option as it met all the proposal's objectives. It was determined as the most suitable design for allowing both heavy and light vehicle drivers to negotiate the roundabout. The design also provides more road side parking spaces on Molonglo Street and incorporates design features to facilitate safe road crossing refuge for adjacent residential properties, pedestrians and cyclists including refuge islands, extend pedestrian footpaths and the relocation of property driveways for two adjacent properties. Furthermore, Roundabout Design Option 2 provides the safest design for the ongoing maintenance of the centre of the roundabout, as well as requiring no land acquisition to enable construction.

3. Description of the proposal

This section describes the proposal and provides descriptions of existing conditions, the design parameters including major design features, the construction method and associated infrastructure and activities.

3.1 The proposal

QPRC proposes to build a new roundabout on the Kings Highway (B52) at the intersection of Malbon and Molonglo Streets, Bungendore. Refer to Figure 1-1 to Figure 1-4 for location details.

Key features of the proposal would include:

- A new single lane roundabout at the existing uncontrolled T-intersection
- All weather Full Depth Asphalt road pavements;
- Centre roundabout island with mountable annulus but not mountable centre island
- Formal on-street parking spaces along Molonglo and Malbon Streets
- New footpath pavement to Malbon and Molonglo Streets nature strip areas surrounding roundabout
- Pedestrian and bicycle refuge splitter islands at Malbon and Molonglo Street
- Relocation of two existing driveways on Molonglo Street

Refer to Figure 3-1 and Appendix G for drawings of the proposal.

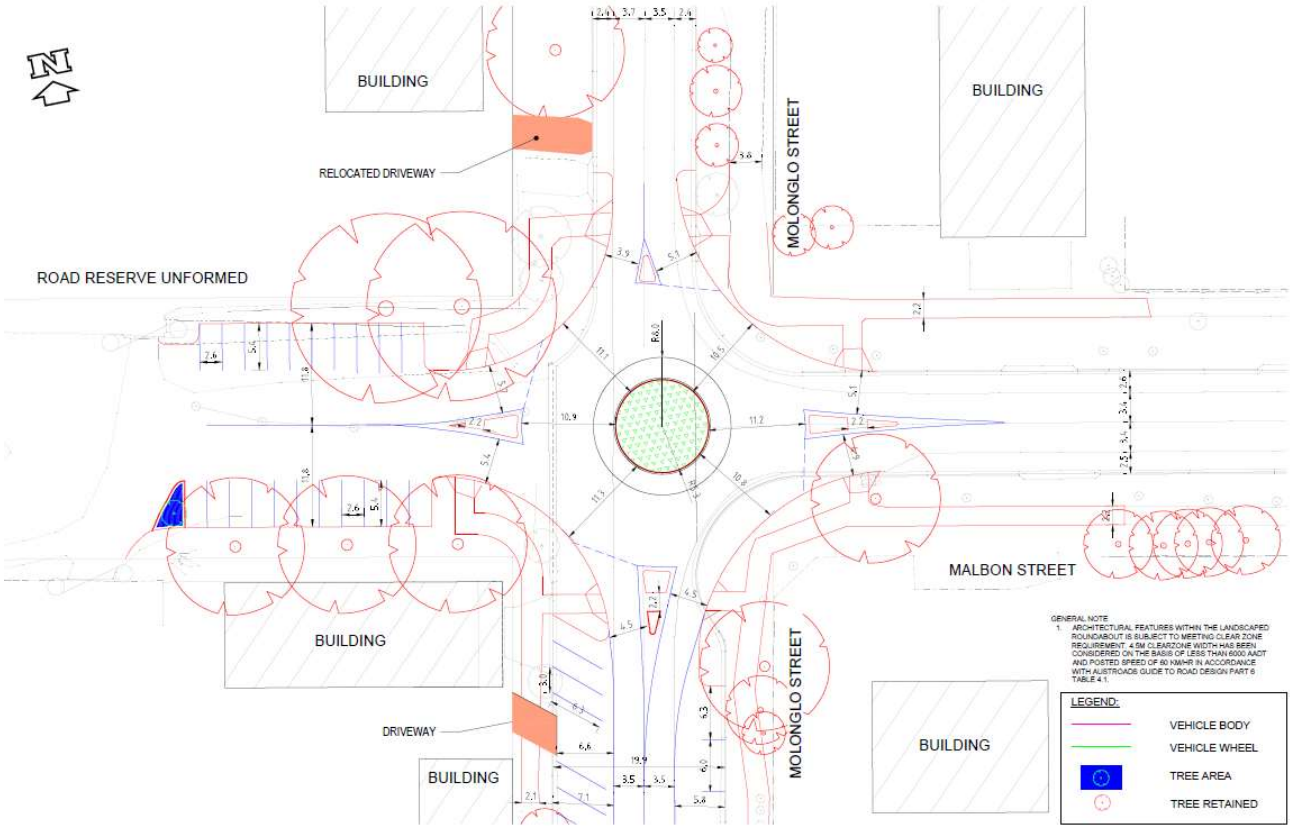

Figure 3-1: Key features of the roundabout proposal
Source: WSP, 2019

3.2 Design

3.2.1 Design criteria

The proposal has been designed in accordance with the following criteria:

- Compliance with relevant standards, environmental requirements and WHS requirements, considering the aspects of constructability, inspection, maintenance and ability to upgrade the roundabout.

3.2.2 Engineering constraints

A number of risks and constraints have been identified including:

- hazards associated with heavy vehicles near light vehicles,
- hazards associated with pedestrians and vehicles,
- hazards associated with existing permanent power, telecommunications, water and sewerage utilities,
- Maintaining through traffic flow and high traffic volumes on the Kings Highway and local roads.;
- Maintaining access to Molonglo and Malbon Streets;
- Maintaining access to private residences and commercials premises adjacent to and near the intersection, and
- Design, staging and construction of the roundabout for compatibility with future upgrades or adjoining projects.

3.2.3 Major design features

Roundabout

A single-lane (average 3.5m wide lanes on approach) concrete roundabout with mountable annulus will be installed designed to be compliant with *AUSTROADS Guide to Road Design Part 4B*. RMS pavement design system Full Depth Asphalt (FDA) will be applied to the roundabout.

The roundabout is designed to accommodate the turning path of B-double vehicles in all directions of traffic flow.

The FDA pavement would entail the following general procedure, based on geotechnical investigation at the site (Opus, 2015):

- Excavation and removal to spoil of the existing thin asphalt wearing course and existing pavement base and sub-base granular materials, to a suitable design depth, equal to the proposed FDA design thickness and any subgrade replacement if required.
- Trim, compact and proof-roll the base of the excavation box (subgrade) in accordance with the current *New South Wales Roads and Maritime Services, QA specification R44-Earthworks. 5T-C0064.00*
- Place, trim, compact and proof-roll the select material (Select Material Zone or SMZ) comprising of DGS20 (min. CBR 45%), in accordance with the current *New South Wales Roads and Maritime Services, QA specification 3051-Granular base and sub-base materials for surfaced road pavements.*

- Place 7mm polymer modified bitumen primer seal, on top of the SMZ in accordance with the *"Update of the Austroads Sprayed Seal Design Method, AP-T68-06" and New South Wales Roads and Maritime Services, QA specification R107-Sprayed Bituminous Surfacing (With Polymer Modified Binder).*
- Place and compact deep asphalt, including base asphalt and top wearing course/surfacing asphalt in accordance with the current *New South Wales Roads and Maritime Services, QA specification R116-Heavy Duty Dense Graded Asphalt.*

Pedestrian/ Cyclist Refuges and Pathways

Pedestrian/cyclist splitter island refuges with 2.2 m wide refuge pathway will be installed at the centre of the road on the eastern, western and southern approaches to the roundabout to tie in with nature strip footpaths.

Concrete footpaths and kerb ramps will be installed at all four intersection corners of the roundabout. Footpaths will be 2.2m in width (minimum) and constructed in accordance with QPRC standards. Proposed new footpaths will tie into the existing footpaths where applicable.

Stormwater Drainage

An underground stormwater drainage system that discharges into an existing drainage channel will be installed at the roundabout intersection. The drainage network will be designed to a 1 in 10 year storm event. The existing drainage channel is to be cleaned and re-graded to suit the outfall at the direction of QPRC.

On-street Parking

Approximately twenty (20) 2.6m wide 90^{o} angle marked parking spaces will be provided in the unformed eastern section of Malbon Street on the northern and southern side of the road.

In the southern approach area of the roundabout:

- 3 m wide, 45 degree angle marked parking spaces (approximately 7) will be installed in the formed road shoulder area on the western side of Molonglo Street.
- 6 m long, parallel marked parking spaces (approximately 6) will be installed in the formed road shoulder area on the western side of Molonglo Street.
- 6 m long, parallel marked parking spaces (approximately 11) will be installed in the formed road shoulder area on the eastern side of Molonglo Street.

3.3 Construction activities

Construction of the project would be undertaken in accordance with a Construction Environmental Management Plan (CEMP) that would be prepared by the construction contractor/s and approved by QPRC prior to commencement of works. The CEMP would incorporate all of the safeguards and management measures identified in this REF, as well as any conditions of approval and any other licence/approval conditions. The CEMP would also incorporate an emergency response plan in case of a pollution incident, a complaints handling procedure and a 24-hour telephone contact number. The complete list of the safeguards and management measures recommended in this REF is provided in Section 7.

QPRC would need to enter into a works authorisation deed (or other suitable agreement) with RMS to deliver the works.

3.3.1 Work methodology

The work methodology would comprise of the following:

- Prepare preliminary documents including; Project Plan, Traffic Management Plan, Construction Environmental Management Plan and sub-plans and Safety Management plan
- Establish a site compound on existing cleared hardstand area within the limit of work
- Develop and implement project induction for all personnel
- Implement approved traffic management plan and traffic control devices
- Establish approved environmental controls, and continuously monitor/review throughout construction;
- Establish and clearly demarcate limit of works, limit of clearing and exclusion zones; Construction of the roundabout and associated elements, including pavements and services in accordance with approved design drawings, specifications and CEMP plans including:
    - Establish stockpile area
    - Earthworks including groundcover clearing and levelling project site area
    - Installation of stormwater, wastewater and pavement drainage and stormwater devices
    - Installation of roundabout infrastructure
    - Construction of road pavements, medians, concrete barriers and pedestrian footpaths
    - Line marking and finishing works
- Progressive stabilisation and rehabilitation of disturbed areas surrounding roundabout. (e.g. landscaping)
- Decommission site compound and stockpile and site clean-up
- Removal of traffic and erosion and sediment controls and stabilisation of disturbed areas
- Opening of new roundabout to road traffic

3.3.2 Construction hours and duration

Construction is expected to commence in February 2020 and take approximately 3 - 5 months to complete.

The *Interim Construction Noise Guidelines* (DECC 2009) outlines recommended standard construction working hours as:

- Monday to Friday 7am to 6pm
- Saturdays 8am to 1pm
- No work on Sundays or public holidays.

The construction would comply with these recommended hours.

It is proposed to construct the roundabout outside of the peak summer holiday season, in order to avoid restricting traffic flow during the peak traffic period. Refer to Section 6.12 for further details and mitigation measures to ameliorate noise impacts.

3.3.3 Plant and equipment

Indicative plant and equipment that may be used in the construction of this proposal would include:

- Excavator/Backhoe (with various attachments)
- Dozers / Graders
- Various hand-held power tools
- Compactor,
- Pad foot and smooth drum rollers
- Loaders
- Various trucks
- Water Cart
- Concrete pumps and trucks
- Mobile crane (if required)
- Material mixer, milling machine and pavement reclaimer
- Light commercial and passenger vehicles

Plant and equipment requirements would be finalised during detailed design and dependent on the successful construction contractor's methodology.

3.3.4 Earthworks

It is not anticipated that significant cut and fill works would be required for the project as the site is generally level. Shallow excavation works would be required for the proposal to remove and regrade the existing road surface and install new stormwater drainage. It is anticipated that a small volume of excess spoil may be generated which would be stockpiled and reused onsite or disposed of in accordance with NSW EPA waste classification requirements.

3.3.5 Materials required

Construction of the proposal would require the following materials:

- Pipe bedding
- Sub-base
- Concrete
- Base course
- Sealing aggregate

- Asphalt
- Landscaping materials
- Road signage and furniture
- Paint for line/road markings

3.3.6 Traffic management and access

The Contractor would prepare a Traffic Management Plan (TMP) prior to construction works commencing. Traffic management during the project would be prepared and carried out in accordance with the *Roads and Maritime Traffic Control at Work Sites Manual* (Roads and Maritime, 2018) and *Australian Standard 1742.3 - 2009 Traffic Control for Works on Roads*. The TMP would be approved by QPRC prior to the works commencing.

The temporary traffic control plan would be managed in such a way that during peak hours periods, a single lane in both directions would be managed at the intersection during the construction period where feasible. Short term contraflow would be managed in non-peak times where no other option is available, as this would allow greater flexibility for works in the roadway construction area. However, in general traffic would be slowed through the construction works area to 40 km/hr.

Access to adjacent private and commercial premises would be managed in a manner to maintain driveway access and minimise traffic disruptions during the construction period. The relevant adjacent landowners would be consulted regarding access where works may impact access to their property.

Construction vehicles would access the project site via Molonglo Street, Malbon Street and/or Bungendore Road. Indicative average numbers during construction would be in the order of 6-10 employees (based on the construction of a similar size). It is estimated that the construction of the project would involve an average of 4 – 6 truck movements per day plus additional traffic associated with construction employees during the construction period.

Large construction vehicles may temporarily be located in close proximity to the project works site in nearby roadside on street parking spaces when not in use.

3.4 Ancillary facilities

A compound area would be established and would include a meal room/office and portable toilets. This area would also be used to store plant, equipment and materials including stockpiles of construction materials. The compound and stockpile areas would be located within the proposed project footprint.

Any excess excavated material would be temporarily stockpiled within the project site. The final location of the stockpile site would be determined during the detailed design phase.

Stockpile and compound areas would be located in a previously cleared, level area at least 40 metres away from the nearest waterway and situated as far away as possible from residential dwellings and other land uses that may be sensitive to noise. Refer to Sections 6.5 and 6.1 respectively, for further details and management measures to ameliorate noise impacts and erosion and sediment controls.

The ancillary facilities would be established in advance of construction works commencing and operated for the duration. Once completed, the area would be rehabilitated to its existing condition.

3.5 Public utility adjustment

Existing Essential Energy electricity infrastructure at the location of the proposed roundabout would need be relocated as part of the early works. Utilities including existing QPRC water and sewerage infrastructure are present in the area adjacent to the roundabout. The precise location of these utilities would need to be identified, protected and avoided during the proposed works.

In addition, new lighting poles would also be installed for the roundabout. The lighting poles would be Council property as they would include provisions for banners.

4. Statutory and planning framework

4.1 Environmental Planning and Assessment Act 1979

The relevant environmental planning instrument for the proposal is *State Environmental Planning Policy* (Infrastructure) 2007 (ISEPP) which removes the requirement to obtain development consent. Therefore, the proposal has been assessed under Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). QPRC is the proponent and the determining authority for the development.

This REF has been prepared in accordance with Section 5.5 of the EP&A Act, which requires that the proponent take into account to the fullest extent possible all matters affecting or likely to affect the environment due to the proposed activity. Consideration of the factors listed under Clause 228 of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation) has been used to assist in assessing the significance of the proposal, and is provided in Appendix A.

4.1.1 State Environmental Planning Policies

State Environmental Planning Policy (Infrastructure) 2007

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

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

As the proposal is for a roundabout and is to be carried out by QPRC it can be assessed under Division 5.1 of the *Environmental Planning and Assessment Act 1979*.

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

Part 2 of SEPP (Infrastructure) 2007 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 SEPP (Infrastructure) 2007 (where applicable), is discussed in Section 5 of this REF.

4.1.2 Local Environmental Plans

Palerang Local Environmental Plan 2014

The proposed roundabout is located within the Queanbeyan-Palerang Local Government Area (LGA). The proposed roundabout site is zoned SP2 Infrastructure (Classified Road) under the *Palerang Local Environmental Plan* 2014 (LEP), as shown in Figure 4-1.

The objectives of the SP2 Infrastructure zone are:

- *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 project is considered consistent with the objectives of the SP2 Infrastructure zone.

Under this zoning, the purpose shown on the Land Zoning Map including any development that is ordinarily incidental or ancillary to development for that purpose is permitted with consent. Accordingly, the roundabout would be permitted with consent as the new roundabout is considered ancillary classified road infrastructure.

However, *State Environmental Planning Policy (Infrastructure) 2007* is the relevant environmental planning instrument for the proposal and is discussed in Section 4.1.1. Clause 5.12 (1) of the Palerang LEP 2014 states that the LEP *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.*

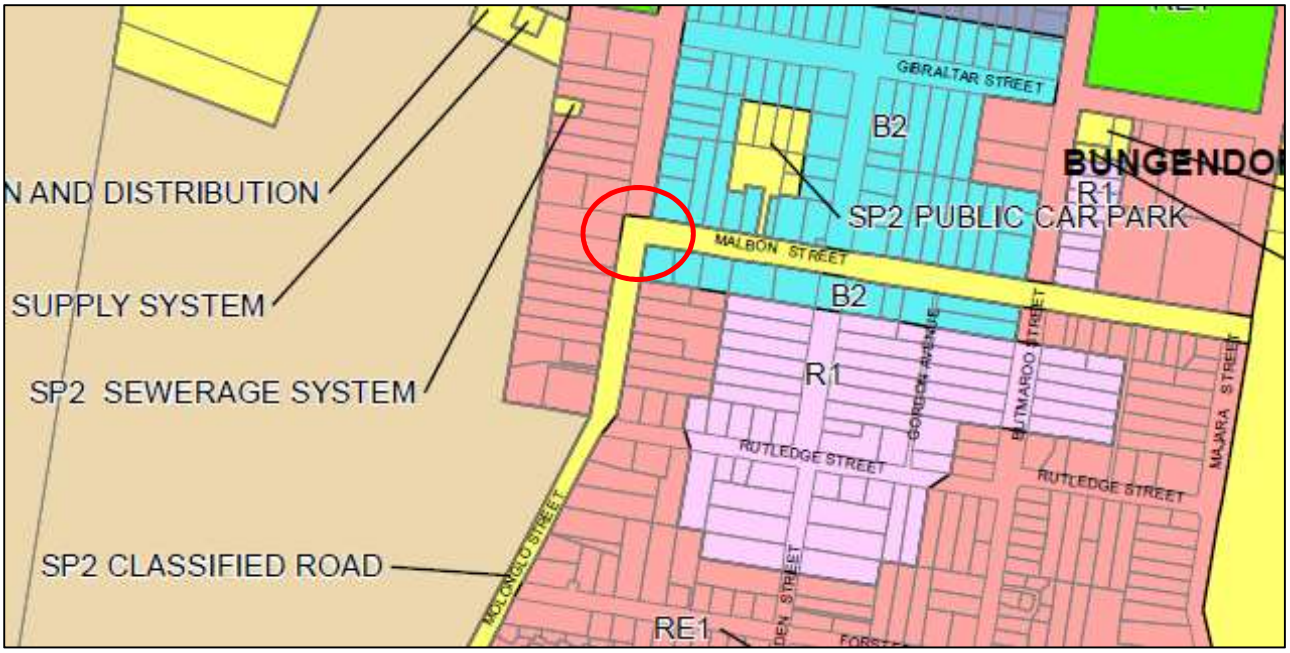

Figure 4-1: LEP Land Use Zoning Map (project location is marked in red).
(Source: Palerang LEP 2014 Land Zoning Map - Sheet LZN_004A)

Heritage

The project site is immediately adjacent to Lot 2, Section 12, DP 758183, which contains the heritage listed Elms VIIIa (Item no I220) and Lots A and B, DP 150816 which contains Brick semi-detached Cottages (Item no. I221) listed under the Palerang LEP 2014. In addition, three other locally listed heritage items are located on Malbon Street in proximity to the project site (See Figure 4-2).

It is noted that the project site is not listed as a local heritage item. Section 6.8 of this REF addresses the potential impacts of the proposed works on non-Aboriginal heritage, with mitigation measures for the protection of heritage values provided in Section 6.8.4.

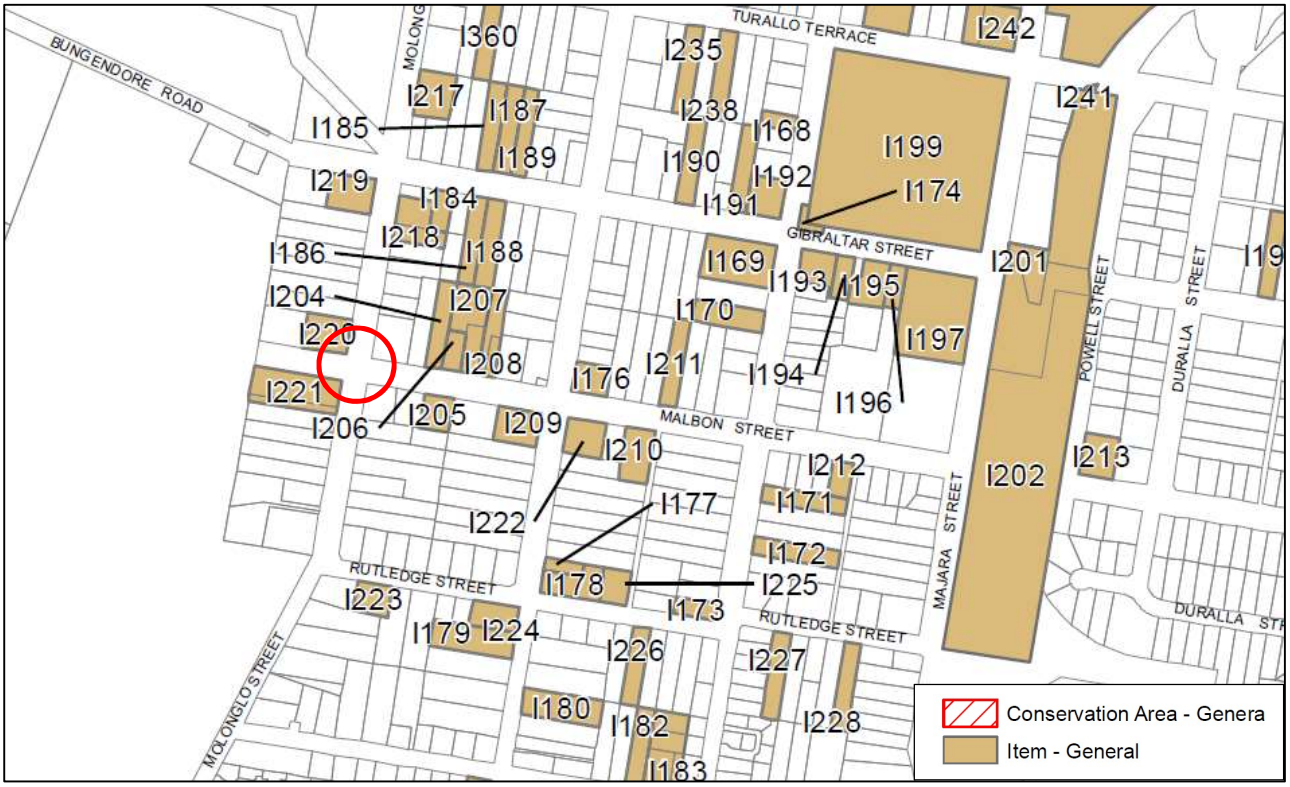

Figure 4-2 LEP Heritage Map (project location is marked in red).
(Source: Palerang LEP 2014 Heritage Map - Sheet HER_004A)

Flood Planning

Based on the Palerang LEP 2014, the project site is located within a flood planning area (See Figure 4-3). The proposal does not require development consent and therefore LEP provisions do not apply. Nevertheless, the issue of flood planning as relevant to the proposal is discussed in Section 6.

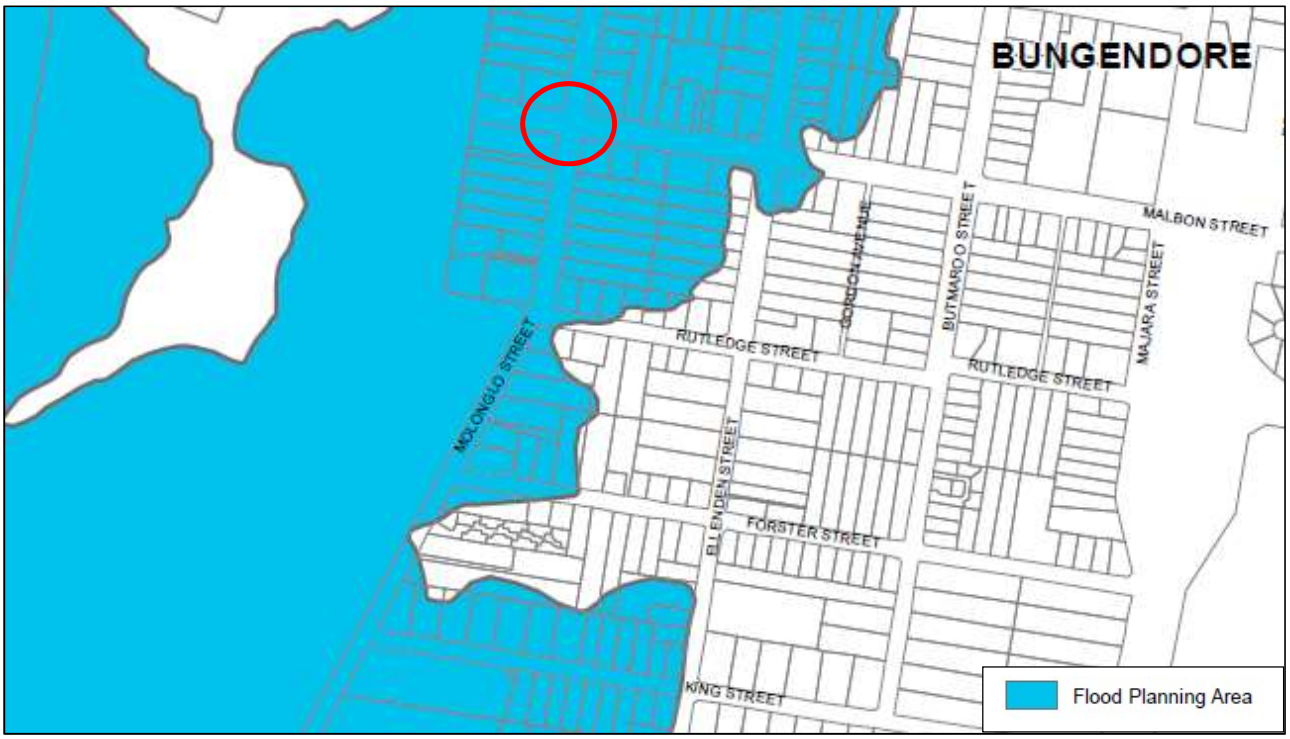

Figure 4-3 LEP Flood Planning Map (project location is marked in red).
(Source: Palerang LEP 2014 Flood Planning Map - Sheet FLD_004A)

4.2 Other relevant NSW legislation

4.2.1 Roads Act 1993

The *Roads Act 1993* sets out rights of members of the public to pass along public roads, establishes procedures for opening and closing a public road, and provides for the classification of roads. It also provides for declaration of Roads and Maritime and other public authorities such as Council as roads authorities for both classified and unclassified roads, and confers certain functions (in particular, the function of carrying out roadwork) on Roads and Maritime and other roads authorities.

Under Section 138 of the *Roads Act 1993* a person must not erect a structure or carry out a work in, on or over a public road, otherwise than with the consent of the appropriate roads authority. Roads and Maritime is the roads authority for Molonglo Street and Malbon Street where the new roundabout would be constructed, as this section of road forms part of the Kings Highway (B52) which is a classified road. Accordingly, approval from RMS under Section 138 of the *Roads Act 1993* would need to be obtained prior to the commencement of the proposal works within the Kings Highway (B52).

4.2.2 Heritage Act 1977

The *Heritage Act 1977* protects and aims to conserve the environmental heritage of New South Wales. Environmental heritage is broadly defined under Section 4 of the *Heritage Act 1977* as consisting of "those places, buildings, works, relics, moveable objects, and precincts, of State or local heritage significance" (Heritage Branch, DoP 2009:4). Aboriginal places or objects that are recognised as having high cultural value (potentially of local and State significance) can be listed on the State Heritage Register and protected under the provisions of the *Heritage Act 1977.*

The project site is immediately adjacent to Lot 2, Section 12, DP 758183, which contains the heritage listed Elms VIlla (Item no. I220) and Lots A and B, DP 150816 which contains Brick semi-detached Cottages (Item no. I221) listed under the Palerang LEP 2014. In addition, three other locally listed heritage items are located on Malbon Street in proximity to the project site. The heritage items are not listed on the State Heritage Register under the *Heritage Act 1977*. A heritage impact assessment has been prepared for the proposal which concluded that the project would not impact negatively the heritage significance of the adjoining heritage items, as discussed in Section 6.8

4.2.3 Biodiversity Conservation Act 2016

The Biodiversity Conservation Act 2016 (BC Act) protects species of threatened flora and fauna, endangered populations and endangered ecological communities and their habitats in NSW. It also lists Key Threatening Process that adversely affects threatened species, populations or ecological communities or that may cause species, populations or ecological communities that are not threatened to become threatened.

Amongst other matters, offences are established for damage to habitats of threatened species or threatened ecological communities. Defences to those offences include that the act was necessary for the carrying out of a development consent within the meaning of the EP&A Act. Part 4 of the *Biodiversity Conservation Act 2016* sets out provisions for threatened species and threatened ecological communities and introduces a new biodiversity assessment method (BAM), a new biodiversity offset scheme (BOS) and an expanded biodiversity certification program.

The location where the new roundabout would be installed comprises a previously cleared and developed road and the removal of mature trees in the nature strip areas adjacent to the new roundabout would not be required for the proposal. As such, it is not anticipated that any threatened flora and fauna species, populations or communities, or their habitats as listed under the BC Act would be impacted by the proposal (see Section 6.6).

4.2.4 National Parks and Wildlife Act 1974

The National Parks and Wildlife Act 1974 (NPW Act) provides for the statutory protection of Aboriginal cultural heritage places, objects and features. One of the objects of the NPW Act is the conservation of places, objects and features of significance to Aboriginal people (Section 2A). The NPW Act provides for the management of both Aboriginal Objects and Aboriginal Places and is administrated by NSW Environment, Energy and Science (formerly the Office of Environment and Heritage).

Aboriginal Objects and Aboriginal Places are protected under Part 6 of the NPW Act and there are legislative penalties if a person harms or desecrates an Aboriginal Place or Object (s. 86). Harm to an Aboriginal Place or Object includes any act or omission that destroys, defaces or damages the object or place, or, in relation to an Aboriginal object, moves the object from the land on which it had been situated.

However, harm to an Aboriginal Object that is 'trivial or negligible' does not constitute an offence. Also, it is a defence against prosecution for unintentionally harming Aboriginal Objects if due diligence had been exercised to determine that no Aboriginal object would be harmed, or the harm or desecration was authorised by an Aboriginal heritage impact permit (AHIP).

The Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW (DECCW, 2010) has been used in assessing the likelihood of encountering items of Aboriginal cultural heritage during the construction works. The site has been extensively disturbed as a result of the construction of the roadways and surrounding residential and commercial development and it is considered that further archaeological investigations and/or an Aboriginal Heritage Impact Permit are not required and that the proposed development can proceed with caution. In the event that any Aboriginal heritage items are found during the proposed development, the proposed development should cease and safeguards listed in Section 6.7.4 should be implemented.

4.2.5 Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (POEO Act) regulates air, noise, land and water pollution. The Environment Protection Authority (EPA) is generally responsible for implementing the POEO Act, and would be the appropriate regulatory authority for the proposal.

The proposal does not constitute a scheduled activity listed under Schedule 1 of the POEO Act and therefore an environment protection licence is not anticipated to be required. Furthermore, as management measures would be implemented to prevent water pollution, it is considered unlikely that a licence would be required under Section 120 of the POEO Act for the pollution of waters.

Other relevant provisions of the POEO Act include:

- Section 115 – It is an offence to dispose of waste in a manner that harms or is likely to harm the environment; and
- Section 116 – It is an offence to cause any substance to leak, spill or otherwise escape (whether or not from a container) in a manner that harms or is likely to harm the environment.

QPRC and its contractors would comply with POEO Act, including the requirement to notify EPA under Section 148 if a pollution event occurs that causes or threatens material harm to the environment.

4.2.6 Protection of the Environment Operations (Waste) Regulation 2014

The *Protection of the Environment Operations (Waste) Regulation 2014* sets out the provisions with regards to non-licensed waste activities and non-licensed waste transporting, in relation to the way in which waste must be stored, transported, and the reporting and record-keeping requirements. The proposed works would be undertaken to be consistent with the requirements of this regulation.

The disposal of waste including spoil would be required to comply with the *Protection of the Environment Operations (Waste) Regulation 2014*.

4.3 Commonwealth legislation

4.3.1 Environment Protection and Biodiversity Conservation Act 1999

The *Commonwealth Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act) provides for Commonwealth involvement in development assessment and approval in circumstances where there exist 'matters of national environmental significance'.

The proposal would not impact on any of the following matters, including Matters of National Environmental Significance, which are protected under this Act:

- World heritage properties;
- National heritage places;
- Wetlands of international importance;
- Nationally threatened species and ecological communities;
- Migratory species;
- Commonwealth marine areas;
- The Great Barrier Reef Marine Park;
- Nuclear actions (including uranium mining); and
- A water resource, in relation to coal seam gas development and large coal mining development.

Under the 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 Section 6 and Appendix A of the REF.

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

Findings – matters of national environmental significance

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

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

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

4.4 Confirmation of statutory position

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

QPRC is the determining authority for the proposal. This REF fulfils QPRC'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.

As the section of road at the intersection on Molonglo and Malbon Streets where the new roundabout would be constructed forms part of the Kings Highway (B52) which is a classified road, approval from RMS in accordance with Section 138 of the *Roads Act 1993* is required prior to the commencement of works located within the Kings Highway (B52) road reserve.

5. Consultation

This section discusses the consultation undertaken to date for the proposal and the consultation proposed for the future.

5.1 Consultation strategy

QPRC has consulted with stakeholders including RMS, the Bungendore community and the Bungendore Town Centre and Environs s355 Committee throughout the development of the proposal.

5.2 Community involvement

A community information session was held at the Bungendore War Memorial Hall from 7-9 pm on 23 October 2018. A Bungendore Roundabout design project information webpage was posted on the QPRC website which provided the opportunity for community consultation submissions to be provided to QPRC between 15 October to 12 November 2018. A general summary of the issues raised during the community consultation period is provided in the table below. The complete list of community consultation responses is provided in Appendix E.

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

Group	Issue raised	Response / where addressed in REF
Residents	**Functionality** • The roundabout won't allow the high truck volume for the road to go around or through the roundabout (i.e. large B double vehicles) • Roundabout won't fix the traffic congestion problem in the long term, is a short-term solution • Installation of a set of traffic lights is preferred to a roundabout • Installation of a town bypass is preferred to a roundabout • Reduction/loss of on-street parking associated with the roundabout • There is no need for a roundabout • Size – space is too narrow for roundabout • Existing Giveway sign functions suitably - roundabout not required • Will there be new footpaths included in the design? • Traffic from Tarago will be impeded as the traffic heading to the coast will have right of way. This will cause more issues only this time for traffic heading from Tarago to Queanbeyan.	Roundabout design allows for B- Double vehicle turning paths in all directions. Sections 3.2 and 6.4 All community comments were noted by QPRC and incorporated into design where feasible.

Group	Issue raised	Response / where addressed in REF
	• Inclusion of safety features for pedestrians crossing Molonglo Street • Install "traffic control devices" to significantly reduce approach speeds into the roundabout. • The roundabout design is too big – excessive footprint • Negative impact on local traffic entering the main road from side streets.	Roundabout design includes provision of on-street parking and pedestrian pathways and central island refuges
	Impact to local businesses • Reduced access/ revenue – during construction period and operation of the roundabout as parking will be lost in front of adjacent businesses and public facilities (e.g. Old Stone House, Food Lovers Market, Cleanseeds, Mojo, War Memorial Hall) • Unsafe access- Lack of safe pedestrian crossing areas and parking to access nearby local businesses	Noted and Sections 3.2,6.9, and 6.11
	Construction Cost/ Time • Cost estimated for construction works is excessive/ too high • Estimated construction timeframe of 5 to 6 months is too long • Roundabout is not a good value for money resolution to manage traffic	Noted
	Safety • Roundabout will not improve road safety/ slow down traffic • Lack of safe crossing areas and footpaths near the roundabout for pedestrians/ cyclists	Roundabout design includes provision of pedestrian/cyclist pathways and central island refuges Noted and Sections 3.2,6.9, and 6.11
	Visual Amenity/ Heritage • Roundabout is an unattractive visual feature, design should include community art installation or landscaping such as centre garden, native vegetation. • Existing mature trees adjacent to roundabout should be retained • Negative impact to adjacent local heritage items and heritage item	Noted and Sections 3.2, 6.8, 6.6, and 6.9

Group	Issue raised	Response / where addressed in REF
	streetscape	
Local Businesses	Advice required regarding: • Construction schedule • Expected road closures, durations and likely days / times • Parking constraints (during and after construction) • Opportunities for compensation for local businesses	Section 3.3.2 Section 3.3.6 Section 3 /TBC in detailed design phase Noted - QPRC to address
Bungendore Town Centre and Environs s355 Committee	• The roundabout should be made as attractive as possible. i.e. through inclusion of a large garden bed in the central island in keeping with the village character • Consideration of safety for garden maintenance through the provision of a 2.5m central path to provide a safe parking position for staff. • The heritage streetscape of the Stone House should be preserved/ retained • As many of existing mature trees as possible which surround the intersection should be retained.	Noted. Section 3.2, 6.6,6.8,6.9 and 6.11

5.3 ISEPP consultation

ISEPP consultation was not carried out with the State Emergency Service in relation to flood liable land as the proposed works represent alterations and additions to an existing roadway. Furthermore, new stormwater infrastructure would be installed as part of the proposed works to improve stormwater drainage along the roadway.

The RMS have been consulted in relation to the project. Issues that have been raised as a result of this consultation are outlined below in Table 5-2.

Table 5-2: Issues raised through ISEPP consultation

Agency	Issue raised	Response / where addressed in REF
RMS	RMS advised its role would fall into two district phases: - Phase 1: Assessment and in-principle acceptance - Phase 2: Overseeing delivery (detailed design and construction) 'In-principle acceptance' would represent acceptance to the concept design/s. Should Council receive 'in-principle	Section 6.10

Agency	Issue raised	Response / where addressed in REF
	acceptance' and wish to proceed with the project, the project would then move into Phase 2. Council would need to enter into a works authorisation deed (or other suitable agreement) with RMS to deliver the works.	
RMS	RMS needs to be satisfied with the design of the roundabout and Council are responsible for considering and addressing any environmental impacts of the roundabout via a Part 5 assessment under the *Environmental Planning and Assessment Act, 1979.* This includes consideration and mitigation of issues such as impacts to surrounding land owners, noise, biodiversity, heritage, parking, accessibility etc., both during construction and post construction.	Noted. QPRC to determine REF and RMS to approve roundabout designs prior to commencement of construction works. Sections 7.3 and 6 Sections 6.10,6.9,6.5,6.6,6.7,6.8,6.4 and 6.11
RMS	Detailed comments were provided by RMS on the issues to be addressed as part of Phase 1 assessment (i.e. Design assessment and in-principle acceptance **)**	Noted and provided to QPRC to address as part of detailed design process.

5.4 Ongoing or future consultation

Ongoing consultation with RMS is to be carried out by QPRC through scheduled monthly meetings throughout the design process and construction period. Concurrence from RMS for the works within the classified road reserve would be obtained prior to the commencement of works.

6. Environmental assessment

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

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

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

6.1 Landform, Geology and Soils

6.1.1 Existing environment

The project site is situated on a shallow hilltop with an elevation of approximately 710 m. The site is level, comprising a developed and asphalted road reserve including formed gutters with surrounding nature strip areas comprising grassed groundcover, pedestrian pathways and scattered planted trees.

The Canberra 1:100,000 Geological Map (Map Sheet 8727, First Edition, 1992) indicates the site is located within thick deposits of Quaternary alluvium, comprising gravel, sand, silty clay and black organic clay.

The project site is located within the Lake George Complex Mitchell Landscape of the South East Highlands Bioregion. The "Descriptions for NSW (Mitchell) Landscapes Version 2" (DECC, 2002) describes the Lake George Complex Mitchell Landscape as follows:

> *"Closed drainage basins of Quaternary lakes and swamps set within block faulted ranges. Extensive Tertiary quartz gravel, sand, and mud overlying Silurian-Devonian gneissic granite and Silurian quartz sandstone and mudstone. General elevation 700m, local relief of lake beds < 50m, rounded hills stand above the plain to 900m. Eastern margins with well developed sandy lunettes. Maximum lake depths about 7m, may be dry for periods of years or vary in water level over decades. Evidence of much greater extent and depth during the Pleistocene ice ages. Self-mulching grey clays on the lakebeds, yellow earths on the lunettes. Wet tussock grasslands of spear grass (Austrostipa sp.) and Poa sp. with kangaroo grass (Themeda triandra) on lake margins, now extensively altered by exotics. Clumps of sparse stunted snow gums (Eucalyptus pauciflora) on low hills and sandy lunettes. Common reed (Phragmites australis) around freshwater seepage areas on lake margins."*

6.1.2 Potential impacts

Construction

As the site is level, only minimal earthworks in the form of shallow ground excavation and minor shallow trenching would be required for the proposal construction works. The proposed works may also result in the generation of a small volume of spoil. Where suitable, excess materials would be stockpiled and used as backfill. During construction works, there is the potential for erosion and the movement of sediment from disturbed ground or stockpiled excess spoil to be transported offsite during rain events. However, appropriate erosion and sediment control measures would be implemented and maintained throughout all

stages of construction to manage this risk. Management measures are also proposed to prevent and manage spills of fuels or other chemicals at the construction site with the potential to pollute the ground at the site. Provided the management measures listed in Section 6.1.3 below are implemented, no significant impacts to local topography and soils are anticipated associated with the construction works.

Operation

As the project site is generally flat no retaining walls or batters would be required for the new roundabout. The new roundabout and associated roadway stormwater drainage has been designed to capture and dispose of rainfall runoff from impervious surfaces to prevent erosion in surrounding areas. As such, there would be no impacts to landform, geology or soil during the operation of the proposal.

6.1.3 Safeguards and management measures

The following safeguards and management measures would be implemented for the project.

Impact	Environmental safeguards	Responsibility	Timing	Reference
Soil erosion and sedimentation	A site-specific Erosion and Sediment Control Plan will be prepared and implemented as part of the CEMP. Measures which must be implemented include: ○ at the start of works, and progressively during construction, install the required erosion and sediment control measures, controls must be regularly inspected and maintained during construction, particularly following rainfall. ○ maintain a register of inspection and maintenance of erosion control and sediment capture measures. ○ Exposed Areas must be minimised and stabilised progressively throughout construction, with sediment controls maintained until stabilisation is achieved.	Contractor	Detailed design / Pre-construction	Soil erosion and sedimentation
Spill or fuels or other chemicals	Any fuels or lubricants for machinery or other chemicals stored on site shall be stored within appropriate containers and within a bunded enclosure capable of storing 120% of the volume of material stored there.	Contractor	Construction	Pollution of nearby watercourses
Spill or fuels or other chemicals	A site-specific emergency spill plan will be developed, and include spill management measures in accordance with the	Contractor	Detailed design / Pre-construction	Section 4.3 of QA G36 Environment Protection

Impact	Environmental safeguards	Responsibility	Timing	Reference
	Roads and Maritime Code of Practice for Water Management (RTA, 1999) and relevant EPA guidelines. The plan will address measures to be implemented in the event of a spill, including initial response and containment, notification of emergency services and relevant authorities (including Roads and Maritime and EPA officers).			(RMS)
Soil erosion and sedimentation	All areas where ground disturbance has occurred would be stabilised following completion of works to ensure there is no erosion hazard and restored to their pre-construction condition. This would involve, where required, reshaping the ground surface, covering it with topsoil excavated from the site and re-establishing an appropriate vegetation cover.	Contractor	Post Construction	Soil erosion and sedimentation

6.2 Surface Waters

6.2.1 Existing environment

The nearest watercourse is Halfway Creek which is located approximately 250 m to the west of the project site. At this location Halfway Creek is an ephemeral watercourse comprising a generally dry eroded channel passing through a cleared paddock. The creek line may include a series of intermittent pools after rainfall events. Halfway Creek is a tributary of Lake George which drains into the southern shoreline of the lake located approximately 7 km to the north of the site.

6.2.2 Potential impacts

Construction

As the project site is generally level, it is anticipated that only shallow ground-levelling excavation works and minimal shallow trenching may potentially be required during the constructing works. The excavation and ground disturbing activities proposed to be undertaken during construction have the potential to cause erosion and sedimentation if excavated materials are transported off-site. Therefore, construction erosion and sediment controls and stabilisation following the works would be required for activities in these areas to prevent any off-site impacts, including sedimentation of nearby drainage lines and waterbodies.

As discussed above (in Section 6.1) a number of management measures are proposed to mitigate soil erosion and sedimentation risks and prevent and manage spills of fuels or other chemicals at the construction site. These management measures would prevent potential pollutants leaving the project site and polluting nearby watercourses. With implementation of these measures and the measures listed below

in Section 6.2.3, it is considered that no significant impacts associated with surface waters would occur during construction works.

Operation

The design of the proposal includes appropriate stormwater management devices to effectively collect and dispose of surface water runoff at the roundabout. No significant impacts would occur.

6.2.3 Safeguards and management measures

The following safeguards and management measures would be implemented for the project.

Impact	Environmental safeguards	Responsibility	Timing	Reference
Soil and water management	Appropriate stormwater management devices shall be incorporated into the design of the proposal.	Design team/ Contractor	Detailed design/ Construction	Pollution of nearby drainage lines and watercourses
Water Pollution	▪ Any concrete washout required for the works must be carried out in designated concrete washout areas identified on the CEMP, or trucks return to their depot for washout. ▪ Refuelling of essential onsite plant (e.g. excavators, pumps, etc) is to be undertaken in an impervious bunded area within the limit of works; the location will maximise distance between drains/waterways and will have spill kits immediately available. ▪ All non-essential plant and vehicles (light vehicles, trucks, etc) must be refuelled offsite at a service station or depot. ▪ At the start of each shift, plant and equipment must be checked for fuel/oil leaks. No leaking equipment will be permitted to operate on site.	Contractor	Construction	Pollution of nearby drainage lines and watercourses
Soil and water management	The CEMP would incorporate a pollution incident response management plan that defines appropriate procedures for notification of pollution	Contractor	Construction	Pollution of nearby drainage lines and watercourses

Impact	Environmental safeguards	Responsibility	Timing	Reference
	incidents to the required authorities in accordance with s. 147 to 153 of the POEO Act and requires response actions to be implemented in order to address any risks such as incidents posed to the environment, property or surrounding communities.			

6.3 Groundwater

6.3.1 Existing environment

The project site is situated on a shallow hilltop. Groundwater is not anticipated to be close to the ground surface and therefore would not be encountered during the construction works. As such it is considered that significant dewatering during excavation works would not be required. It is however noted that fluctuations in groundwater levels may occur as a result of seasonal variations, temperature, rainfall, tidal influences, and other similar factors.

6.3.2 Potential impacts

Construction

As the project site is generally level, and as roadworks only are proposed involving minimal ground excavation, there would be no direct impacts to groundwater. Soil and water management measures are proposed (refer to Sections 6.1.3 and 6.2.3) to prevent and manage spills of fuels or other chemicals and sedimentation that could potentially pollute the groundwater. With implementation of these measures no significant impact to groundwater are likely.

Operation

The operation of the project would not impact on groundwaters.

6.4 Traffic and Transport

6.4.1 Existing environment

The project site is a T-intersection that forms part of the Kings Highway. Traffic travelling north along Molonglo Street (from Queanbeyan) turns right into Malbon Street and continues east through the township of Bungendore (towards Braidwood).

The intersection experiences high traffic volumes, particularly on Friday and Sunday evenings and during public holidays when residents of Canberra travel to and from the NSW South Coast (Cardno, 2013). The intersection also experiences large truck movements including semi-trailers and B-doubles.

Buildings adjoining the intersection comprise commercial businesses and residential dwellings. The businesses on Malbon Street provide off-street parking via un-sealed driveways off Malbon St. Parking on Molonglo Street to the south of the intersection and opposite Malbon St is provided by 45° angle, on-street parking on the sealed road verge. Space is provided along Molonglo St to the north of the intersection for kerbside, parallel parking only.

The Malbon Street road reserve that extends past the intersection to the west is unsealed and currently used for parking by customers of the adjoining commercial businesses.

At present, no paved footpaths are present on any of the roadsides at the intersection.

6.4.2 Potential impacts

Construction

The works would be undertaken in such a way that a single lane of traffic in both directions is maintained during the construction period, where feasible. Short term contraflow would be managed in non-peak hours where no other option is available, as this would allow greater flexibility for works in the narrow roadway construction area. However, the traffic would be slowed to 40km/hr through the construction area during the construction period. At times of heavy traffic flow this may result in increased traffic congestion at the intersection, leading to delays and increasing vehicle trip travelling times.

Vehicle access would be maintained to all properties adjoining the construction area throughout the duration of the construction period.

The construction site may, at times, occupy some of the roadside parking spaces near the intersection potentially leading to a temporary reduction in available parking in the area and large construction vehicles would temporarily be located in close proximity to the project works site in nearby roadside on street parking spaces when not in use. However, overall the anticipated increased traffic movements associated with the construction works would be minor and short term.

Operation

Operation of the new roundabout would improve traffic flow through the intersection, reducing congestion and travel times, particularly during times of heavy traffic. The design would incorporate adequate maneuvering space for large 25 m long B-Double trucks travelling in all directions through the roundabout to assist with traffic flow.

Pedestrian and bicycle access would also improve during operation, as the new roundabout would include paved footpaths and pedestrian refuges in the centre of the road that would improve safety for pedestrians and cyclists crossing the road.

The installation of two formalised driveways for the adjacent properties on the western side of Molonglo Street and new marked on-street parking spaces along both sides of Molonglo Street to the south of the roundabout (including 45° angle parking spaces and parallel parking spaces on the western side and parallel parking spaces on the eastern side) and twenty one 90° angle parking spaces on the eastern side of the roundabout along the sealed road shoulder has been incorporated in the new roundabout design. It is considered that the inclusion of relocated formal driveways and on-street parking in the new roundabout design would provide equivalent or better access and parking arrangements for adjoining residential properties, community facilities and commercial premises once operational.

6.4.3 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Traffic and transport	A Traffic Management Plan (TMP) will be prepared and implemented as	Contractor	Detailed design / Pre-	Section 4.8 of

Impact	Environmental safeguards	Responsibility	Timing	Reference
	part of the CEMP. The TMP will be prepared in accordance with the Roads and Maritime *Traffic Control at Work Sites Manual* (RMS, 2018) and *QA Specification G10 Control of Traffic* (Roads and Maritime, 2008). The TMP will include: ▪ confirmation of haulage routes ▪ measures to maintain access to local roads and properties ▪ site specific traffic control measures (including signage) to manage and regulate traffic movement ▪ measures to maintain pedestrian and cyclist access ▪ requirements and methods to consult and inform the local community of impacts on the local road network ▪ access to construction sites including entry and exit locations and measures to prevent construction vehicles queuing on public roads. ▪ a response plan for any construction traffic incident ▪ consideration of other developments that may be under construction to minimise traffic conflict and congestion that may occur due to the cumulative increase in construction vehicle traffic ▪ monitoring, review and amendment mechanisms.		construction	QA *G36 Environment Protection (RMS)*
Traffic and transport	Any disturbance to landowners as a result of vehicle movements and noise would be minimised by adhering to the working hours outlined in Section 6.5.5. The contractor would avoid any inconvenience to residences/landowners, and all access points would be in their original condition following completion of the works.	Contractor	Construction	Traffic impact to local residents and road users
Traffic and	Existing roads would be restored to	Contractor	Construction	Traffic impact

Impact	Environmental safeguards	Responsibility	Timing	Reference
transport	their condition prior to works.			to local residents and road users
Traffic and transport	All construction traffic would comply with all applicable traffic laws and regulations including speed limits. All construction vehicles would comply with the speed limits set for the roads when accessing the works sites.	Contractor	Construction	Traffic impact to local residents and road users

6.5 Noise and Vibration

6.5.1 Methodology

Construction noise

The NSW *Interim Construction Noise Guideline* (DECC 2009) deals with managing construction noise impacts. According to the guideline, a quantitative assessment of noise impacts is warranted when works are likely to impact an individual or sensitive land use for more than three weeks in total. The guideline specifies noise targets, or 'noise management levels', for residences and other noise sensitive receivers.

Operational noise

The *NSW Road Noise Policy* (DECCW 2011) and the *Noise Mitigation Guideline* (RMS 2015) addresses noise related to road traffic. The proposal is to provide a roundabout would not affect the level of traffic at Molonglo and Malbon Streets. Therefore, assessment against targets in the *NSW Road Noise Policy* is not considered necessary for this proposal

6.5.2 Existing environment

The area immediately surrounding the project site comprises a low density rural township containing residences as well as commercial properties and associated road and services infrastructure. The project site generally comprises a developed and asphalted road reserve including formed gutters with surrounding nature strip areas consisting of grassed groundcover, pedestrian pathways and scattered planted trees.

The nearest sensitive receivers are private residences and business premises located in close proximity to the intersection of Molonglo and Malbon Streets. The closest residential properties are located approximately 30 m to the north and south of the proposed roundabout, on the western side of Molonglo Street. Two commercial premises are located approximately 15 m from the roundabout on properties located at the southern corners of the intersection of Molonglo and Malbon Streets. One further commercial property is located on the north eastern corner of the intersection, approximately 25 m from the works area. Sensitive noise receivers in the vicinity of the proposed roundabout are already subject to noise and vibration associated with the existing road traffic along these roadways.

Noise monitoring was not undertaken as part of the REF, however background noise levels in the proposal areas are likely to be between 45 to 55 dB(A) in the works area (using Figure 2.2 of the *Noise Guide for Local Government* (EPA, 2013) as a guide), with the greatest source of noise being vehicle traffic.

6.5.3 Criteria

Construction

The typical A-weighted sound power levels for equipment which may be required to undertake the construction works are listed in Table 6-1 below (it is noted that this list is not definitive and these levels are taken from the *Australian Standard AS2436-2010 Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites*).

Table 6-1 Construction Equipment Sound Power Level

Equipment	Typical Sound Power Levels (dB)	Sound Pressure Level at 15 m distance (dB(A))	Sound Pressure Level at 30m distance (dB(A))
Excavator	107	83	77
Trucks (>20t)	107	83	77
Light vehicles	106	82	76
Compressor (silenced)	101	77	71
Power Hand Tools	102	78	72
Crane (mobile)	104	80	74
Roller	108	84	78
Grader	110	86	80
Compactor	113	89	83
Asphalt Paver	108	84	78
Water Cart Truck	107	83	77
Concrete Pump Truck	108	84	78

Notes:

1. The method specified in AS2436 suggests that errors are introduced for distances greater than 100m from the sound source.

6.5.4 Potential impacts

Construction

The total duration of construction works is anticipated to be up to 5 months. During the construction stage a range of equipment (detailed in Section 3.3) would be used, generating additional noise emissions above the normal road activities. Noise impacts resulting from construction of the new roundabout are likely to vary in type and intensity to that of the existing roadway.

Under the *Interim Construction Noise Guideline* (DECCW, 2009) construction noise criteria for residences where the construction duration is greater than three weeks is the rating background noise plus 10 dB(A). The noise management level for the residential areas would therefore be between 55 and 65 dB(A). The majority of residential properties in the vicinity of the project site are located further than 30 m from the works which, based on the typical sound power levels in Table 6-1 and using the methodology in the *Australian Standard Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites* and the *Interim Noise Construction Guideline*, the maximum predicted noise levels at the closest residences during construction may exceed the recommended noise affected level as well as the highly affected noise level (75 dB(A)), above which there may be strong community reaction to noise (DECCW, 2009).

Noise and vibration levels would vary depending on the nature of the activities being undertaken. The use of several items of construction equipment simultaneously is only expected to occur intermittently, if at all. In addition, working hours would be restricted to the standard construction hours as specified by EPA and the nature of the works would be temporary. Construction noise impacts associated with the proposal are therefore assessed to be low.

The use of the construction equipment listed in Table 6-1 also has the potential to cause some vibration impacts.

The vibration generated from construction works would vary depending on the level and type of activity carried out during each activity. Potential vibration generated to receivers for the works would be dependent on separation distances, dominant frequencies of vibration and the receiver structure.

Dominant vibration generating plant include:

- Excavator
- Compactor
- Truck movements along roads

There is a minor potential for the nearest affected receivers to be affected by the above listed construction plant.

Control measures to minimise noise and vibration impacts would be implemented during construction for all components of the proposal as part of the contractor's Construction Environmental Management Plan (CEMP).

Control measures to minimise noise and vibration impacts would be implemented during construction as part of the contractor's Construction Environmental Management Plan (CEMP).

Operation

The operation of the project is not anticipated to result in increased noise and vibration levels from that of existing traffic noise levels.

6.5.5 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Noise and vibration	A Noise and Vibration Management Plan (NVMP) will be prepared and implemented as part of the CEMP. The NVMP will generally follow the approach in the Interim *Construction Noise Guideline* (ICNG) (DECC, 2009) and identify: ▪ all potential significant noise and vibration generating activities associated with the activity ▪ feasible and reasonable mitigation measures to be implemented ▪ a monitoring program to assess performance against relevant noise and vibration criteria ▪ arrangements for consultation with affected neighbours and sensitive receivers, including notification and complaint handling procedures ▪ contingency measures to be implemented in the event of non-compliance with noise and vibration criteria.	Contractor	Detailed design / Pre-construction	Section 4.6 of QA *G36 Environment Protection* (RMS)
Noise and vibration	All sensitive receivers (eg schools, local residents) likely to be affected will be notified at least 2 weeks prior to commencement of any works associated with the activity that may have an adverse noise or vibration impact. The notification will provide details of: ▪ the project ▪ the construction period and construction hours ▪ contact information for project management staff ▪ complaint and incident reporting ▪ how to obtain further information.	Contractor/QPRC	Pre-construction	Noise impacts to local residents
Noise and vibration	Works would be undertaken during normal work hours i.e. 7am to 6pm Monday to Friday; 8am to 1pm Saturdays; and no work would be undertaken on Sundays, Public Holidays or outside these work hours without notification to the affected	Contractor	Pre-construction / Construction	Noise impacts to local residents

Impact	Environmental safeguards	Responsibility	Timing	Reference
	community and EPA. Such notification would include the following details: ▪ The locations and types of surrounding receivers likely to be affected; ▪ The nature of the proposed works; ▪ The noise characteristics of any powered equipment likely to be used; ▪ Measures to be taken to reduce noise emissions; and ▪ Any other information EPA may request.			
Noise and vibration	No swearing or unnecessary shouting or loud stereos/radios on site.	Contractor	Construction	Noise impacts to local residents
Noise and vibration	All construction machinery is to be turned off when not in use.	Contractor	Construction	Noise impacts to local residents
Noise and vibration	Work generating high noise levels should be scheduled during less sensitive time periods if practicable.	Contractor	Construction	Noise impacts to local residents
Noise and vibration	Use quieter and less noise emitting construction methods where feasible and reasonable.	Contractor	Construction	Noise impacts to local residents
Noise and vibration	All plant and equipment to be appropriately maintained to ensure optimum running conditions, with periodic monitoring.	Contractor	Construction	Noise impacts to local residents
Noise and vibration	Simultaneous operation of noisy plant within discernible range of a sensitive receiver is to be limited/ avoided where possible.	Contractor	Construction	Noise impacts to local residents
Noise and vibration	Plant used intermittently to be throttled down or shut down when not in use where practicable.	Contractor	Construction	Noise impacts to local residents
Noise and vibration	All reasonable practical steps shall be undertaken to reduce noise and vibration from the site.	Contractor	Construction	Vibration impacts to local residents

6.6 Biodiversity

6.6.1 Methodology

A Visual Tree Assessment Report was prepared by Treeworks (2019) for the project to assess the mature trees surrounding the proposed roundabout site located on Molonglo and Malbon Streets. A copy of the assessment is provided in Appendix D.

6.6.2 Existing environment

Vegetation within the road reserve of Malbon and Molonglo Streets comprises a scattered native and introduced species of planted, ornamental trees and mown grass. No remnant native vegetation occurs at the project site.

A search of the Bionet Atlas of NSW Wildlife database indicates 19 threatened species protected under the *Biodiversity Conservation Act 2016* have previously been recorded within a 10km x 10km radius of the site, including 6 threatened flora species, one reptile species, ten threatened bird species and two mammal species. An EPBC Act Protected Matters Report for a 10km by 10km area surrounding the site identified two listed threatened ecological communities, 39 listed threatened species and 14 listed migratory species that may or are likely to occur, or have habitat, in the area. These search results are provided in Appendix F.

Overall the site to be affected by the project works has very limited habitat potential due to its highly disturbed nature, and none of the threatened flora species or communities listed as occurring within a 10km radius of the site are anticipated to be utilising the site for primary habitat. The site provides only limited fauna habitat mainly for invertebrates (i.e. insects, spiders, millipedes, snails, etc.) and the small lizards, birds and microbats one typically finds within the residential areas of Bungendore.

6.6.3 Potential impacts

Construction

Overall, the proposed works would require very minor vegetation removal, comprising the removal of 4 trees located in the nature strip area near the roundabout site. The majority of trees along Malbon Street and Molonglo Street would not require removal for the construction of the new roundabout, as shown in Figure 6-1 and would be protected from harm during construction works. All trees which are located in close proximity to the proposal works, and their root zone would be suitably protected through the implementation of tree protection measures which would be included in the CEMP in accordance with AS 4970-2009 *Protection of trees on development sites* (Australian Standards 2009).

The Visual Tree Assessment Report prepared by Treeworks (2019) for the project recommended that all 10 trees inspected as part of the assessment be retained; and provided recommendations for their protection during the construction works, which are included in Section 6.6.4.

Overall, any impacts on flora and fauna as a result of the proposal during construction are considered to be negligible provided the mitigation measures identified are implemented.

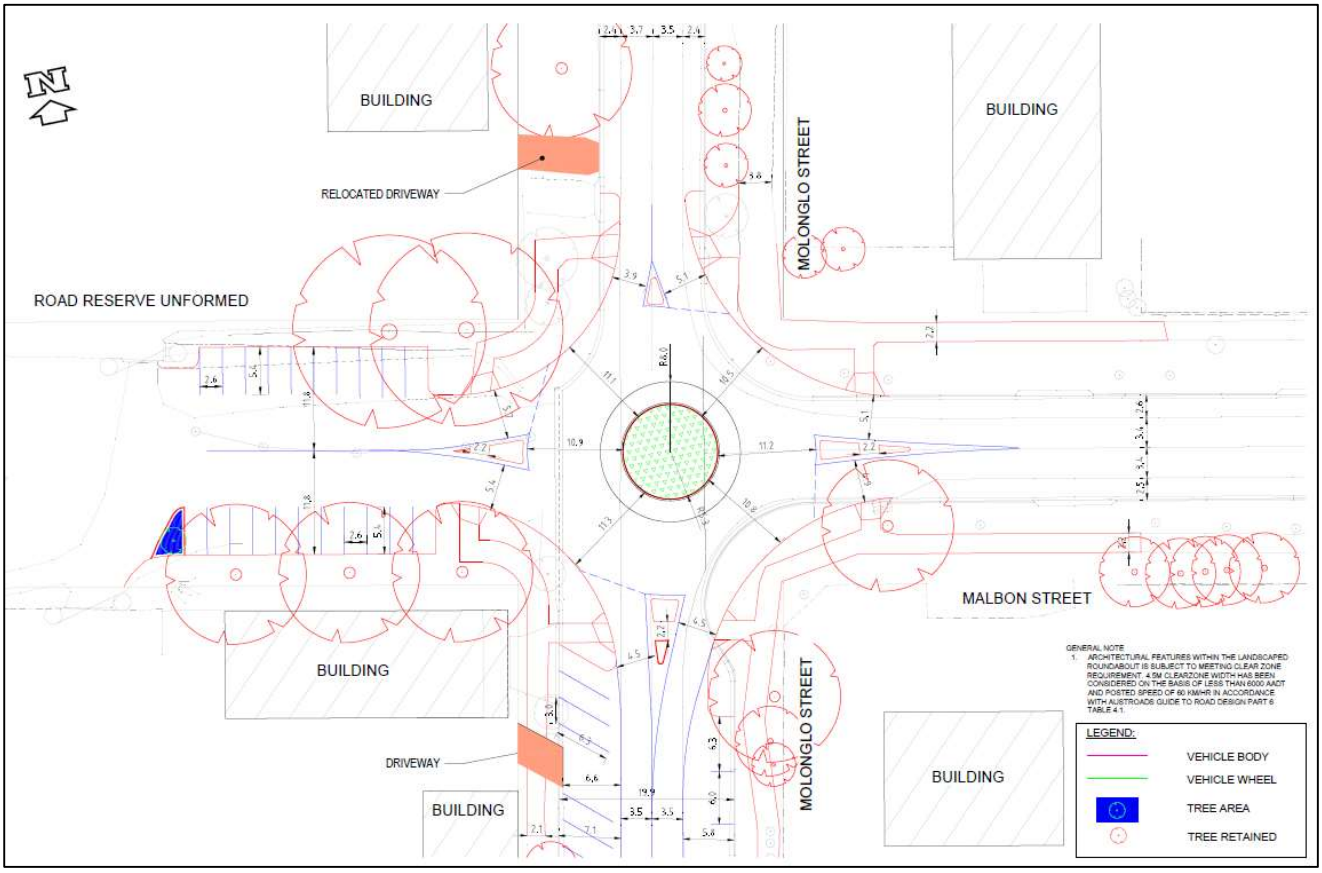

Figure 6-1 Roundabout plan showing the trees to be retained in red (trees to be removed are shown in grey).

Source: WSP, 2019

Operation

The operation of the project is not expected to result in any impact to biodiversity values. During operation of the roundabout, landscaped areas such as the nature strips surrounding the roundabout would be maintained by QPRC staff.

Conclusion on significance of impacts

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

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

6.6.4 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Biodiversity	Trimming of trees branches and any tree removal should be limited to the minimum required to successfully complete the	Contractor	Construction	Vegetation removal

Impact	Environmental safeguards	Responsibility	Timing	Reference
	proposal, with consideration to the Arboricultural assessment procedures and recommendations.			
Biodiversity	Vehicles and machinery should be stored and parked in designated parking areas only.	Contractor	Construction	Tree Protection
Biodiversity	The works are to be undertaken in accordance with AS 4970-2009 Protection of trees on development sites (Australian Standards 2009).	Contractor	Construction	Tree Protection
Biodiversity	Preserving as much of the TPZ as possible during all phases of this develop is important for all trees. Tree Protection Fencing (TPF) is to be put in place and not to move until the post-construction phase. TPF is needed for trees T4, T5, T6 and T7 as identified in the Treeworks assessment (2019) as shown in *Recommended Tree Protection Fencing* illustration (page 13)	Contractor	Construction	Tree Protection
Biodiversity	There must be no change to the water flow of the nearby creek and exposed drain, as this is a vital water source for the adjacent Elm trees namely trees T1, T2, T3, T8, T9 and T10. Open kerbs are recommended for trees to receive water on rain events.	Contractor	Construction	Tree Protection
Biodiversity	All Arboricultural work is to be completed prior to any construction work. This includes the removal of large patches of deadwood in the veteran trees marked T1, T2 and T3. These trees are naturally senescing (aging), which is normal. Stem injecting is also required to de-stress these old Elm trees to rid them of Elm Leaf Beetle. Some of these trees require protective trunk padding to be installed by an Arborist	Contractor	Construction	Tree Protection
Biodiversity	A watering program is to be implemented at determined rates as prescribed by the Site Arborist (approximately 200 litres per tree per week), using a soaker or drip hose, or by water truck. This is to	Contractor	Construction	Tree Protection

Impact	Environmental safeguards	Responsibility	Timing	Reference
	be in use during all phases of development.			
Biodiversity	Any animals injured during the works should be collected and taken to a local veterinarian or wildlife carer such as WIRES.	Contractor	Construction	Fauna Protection
Biodiversity	On completion of works, it is advised to retain all mulches as this will benefit the soil with good water infiltration and many other benefits. Watering all trees in hot summer months is recommended.	Contractor	Post- construction / Operation	Tree Protection
Biodiversity	Following completion of construction works, disturbed surfaces would be stabilised and landscaped, as required	Contractor	Post- construction / peration	Landscape Protection

6.7 Aboriginal Cultural Heritage

6.7.1 Methodology

Diligence Code of Practice for the Protection of Aboriginal Objects in NSW (DECCW, 2010) has been used in assessing the likelihood of encountering items of Aboriginal cultural heritage during the construction works.

6.7.2Existing environment

A search of the Aboriginal Heritage Information Management System (AHIMS) carried out on 1 November 2019 with a search area from Lat -35.2573, 149.4361 , Long -35.2547, 149.4402 revealed that no previously identified Aboriginal sites or places are recorded with the entire proposal works area.

The project site is considered to be disturbed land, having been subject to historic clearing and disturbance for the purpose of rural township development activities and the installation of existing public utilities infrastructure (such as roads, power supply, water and wastewater).

6.7.3 Potential impacts

Construction

The project site has previously been subject to high levels of disturbance and modifications due to residential and infrastructure development, including the installation of the existing roadways. It is therefore unlikely that the proposed works would disturb any undisturbed Aboriginal objects or sites. The works would not take place on land identified as Crown land, with works being carried out on either road reserve or adjacent nature strip areas.

Assessment of the project site based on The *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* (DECCW, 2010) indicates that overall, it is considered reasonable to conclude that there are no known Aboriginal objects or a low probability of objects occurring in the area of the proposed activity, for the following reasons:

- No Aboriginal objects or places have been recorded in adjacent to or in close proximity any of the site, in accordance with a search of the AHIMS database (see Appendix F).
- The closest waterway is Halfway Creek, which is located over 150 m away from the site to the west at its closest location. The creek line did not contain any water during the site inspection for the REF. Based on this information the waterway is assumed to be ephemeral in nature and therefore unlikely to support past Aboriginal occupation. Furthermore, the work site would be located within the road reserve and nature strip area and no waterways would be disturbed during the construction works. No other landscape features likely to indicate presence of Aboriginal objects are present within the proposal works area.
- The works site comprises sealed road reserves and nature strip area and have been subject to previous disturbance for the construction of the existing roadways and surrounding residential and commercial development within the town. Therefore, the roundabout site is considered to be located on land that has been highly disturbed.

Therefore, it is considered that further archaeological investigations and/or an AHIP are not required and that the proposed development can proceed with caution. In the event that any Aboriginal heritage items are found during construction, work should cease and safeguards listed below in 6.7.4 would be applied.

Operation

There would be no impacts to Aboriginal cultural heritage during operation of the roundabout.

6.7.4 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Aboriginal heritage	As part of an induction, in the unlikely event that any unknown Aboriginal objects are uncovered during proposed works, all workers and sub-contractors should be aware of their responsibilities under the provisions of the NPW Act (including the penalties under the ancillary provisions) and *Heritage Act 1977*. In this event all works must cease and the area where Aboriginal objects are uncovered is protected until a qualified archaeologist and representatives of registered Aboriginal parties are contacted and can inspect and assess the area to determine its significance.	Contractor	Construction	Heritage impacts
Aboriginal heritage	Where the find(s) are determined to be Aboriginal Objects, any re-commencement of construction	Contractor	Construction	Heritage impacts

Impact	Environmental safeguards	Responsibility	Timing	Reference
	related ground surface disturbance may only resume in the area of the find(s) following compliance with any consequential legal requirements and gaining written approval from NSW Environment, Energy and Science (EES) (as required).			
Aboriginal heritage	*The Standard Management Procedure - Unexpected Heritage Items* (Roads and Maritime, 2015) will be followed in the event that an unknown or potential Aboriginal object/s, including skeletal remains, is found during construction. This applies where Roads and Maritime does not have approval to disturb the object/s or where a specific safeguard for managing the disturbance (apart from the Procedure) is not in place. Work will only re-commence once the requirements of that Procedure have been satisfied.	Contractor	Construction	Section 4.9 of QA *G36 Environment Protection* (RMS)

6.8 Non-Aboriginal Heritage

6.8.1 Methodology

A Heritage Impact Assessment (HIA) was prepared by PWA (2019) for the project. A copy of the report is provided in Appendix C. The HIA considered the potential impacts on listed heritage items and on precinct character, as defined in the *Palerang Development Control Plan 2015*. The assessment was based on a desk analysis of relevant heritage listings for the Study Area (defined as a 150m x 150m section of primarily low density (R2) residential zoned and local centre (B2) zoned land centred on the intersection of Molonglo Street and Mabon Street, Bungendore) and site inspection undertaken on 14 March 2019. The following information is taken from the report.

6.8.2 Existing environment

Five heritage items listed under the Palerang LEP 2014 are located in the immediate vicinity of the proposed development. The heritage items are listed in Table 6-2 and shown in Figure 6-2 below. Item I220 Elms Villa is also listed by the National Trust of Australia NSW.

There are no heritage items listed on the State Heritage Register within the Study Area.

Table 6-2: Listed heritage Items in the vicinity of the project site

Item Name Address Lot No.	Item Name Address Lot No.	Item Name Address Lot No.	Item Name Address Lot No.
I204	Karingal, including decorative verandah trim and weatherboard cladding	6 Malbon Street	Lot 4, DP 1062845
I205	Dwelling, including verandah	9 Malbon Street	Lot 11, DP 840692
I206	House	10 Malbon Street	Lot 1, DP 1062845
I220	Elms Villa (also referred to as 'Old stone Barn' or 'Stone House')	41 Molonglo Street	Lot 2, Section 12, DP 758183
I221	Brick semi-detached cottages	45 Molonglo Street	Lots A and B, DP 150816

Note: Listed under the Palerang Local Environmental Plan (LEP 2014) Schedule 5 (Environmental Heritage)

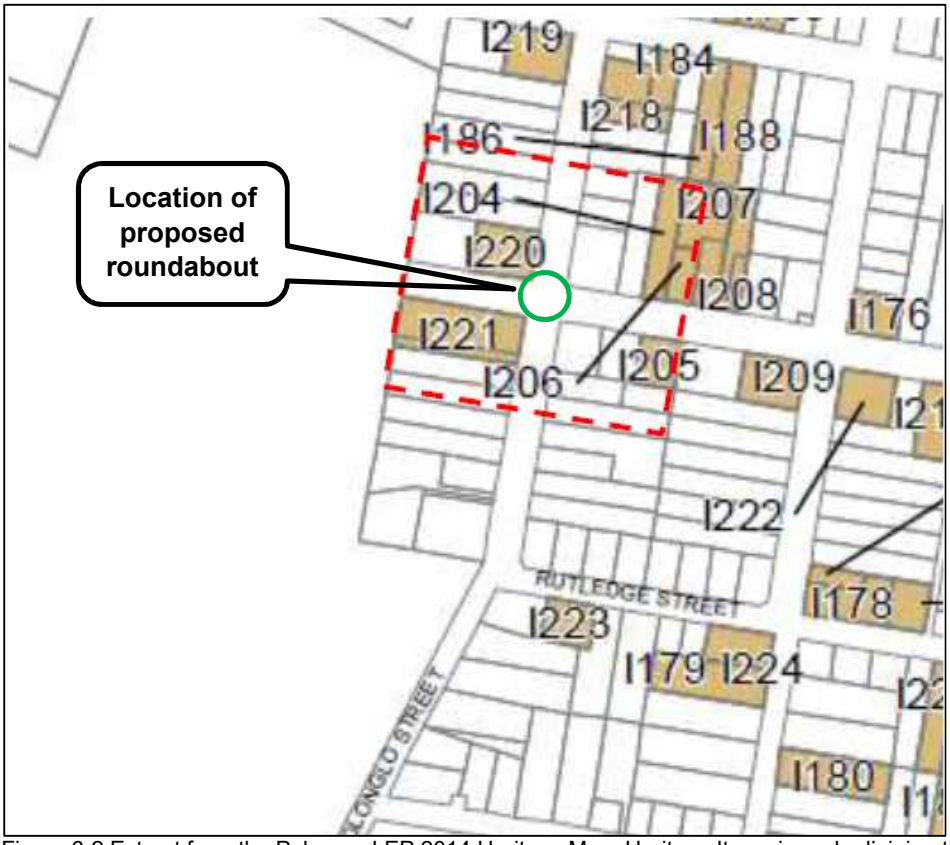

Figure 6-2 Extract from the Palerang LEP 2014 Heritage Map. Heritage Items in and adjoining the Study Area

Source: Palerang LEP 2014.

6.8.3Potential impacts

Construction

The HIA found that the proposed works do not involve any activity incompatible with the objectives of heritage management as defined in the Palerang LEP 2014, Clause 5.10 or incompatible with the Development Control Plan provisions for protection of the special character of defined Bungendore Heritage Precincts (2 and 3).

The proposed works would have no heritage impact to the nearby listed heritage items in Malbon Street including, Karingal, the dwelling and house (items I204, I205, and I206, respectively) and negligible visual impact to the setting of heritage items within the Study Area.

The proposal would have a minor visual impact at street level only to the setting of Elms Villa (Item No. I220) located on Molonglo Street including its boundary wall; as a result of modifications to road kerbs, paving and soft and hard landscaping in the road reserve outside the building frontage and in the splitter islands. However, these impacts would not detract substantially from the item's aesthetic, historic and streetscape values.

There would be negligible visual impact to the setting of the Brick semi-detached Cottages (Item No. I221) on Molonglo Street as a result of civil/stormwater works at road level, and the surrounding trees will be retained.

The removal of the mature *quercus palustris* (Oak*)* in the reserve outside Elms Villa (I220), the stand of *ulmus procera* (Elm) adjoining Malbon St West, and other mature and semi mature trees within the study area as identified in the arborist's report prepared for the project (Treeworks, 2019) would not be required for the construction of the new roundabout. Accordingly, the proposal includes requirements for the

protection of these trees to maintain and improve tree health during construction and operation of the roundabout. This would have benefits for local heritage and precinct values.

Overall, the HIA (PWA, 2019) concluded that the heritage impact of the proposed Bungendore roundabout at the intersection of Molonglo and Malbon Streets would be minor.

Operation

During operation the roundabout would require associated new road infrastructure including signage, landscaping, new kerbs and gutters and new electrical services including street lighting. Cumulatively, these new elements would have some visual impact on the project area due to the densification of the proposed additional road traffic infrastructure. However, the existing historic urban setting is not considered exceptional as existing road infrastructure is already dominant in the project area. During operation, the area of the roundabout would retain some heritage character due to the association of Elms Villa and the Cottages and their respective positions in relation to a historic intersection. The wide street layout and particularly the presence of mature trees of considerable size on the corners of the intersection are key elements of the landscape. The Elms Villa facade is largely obscured from the street by the large Elm trees in front of the building. As such the heritage impact of the proposed Bungendore roundabout at the intersection of Molonglo and Malbon Streets during operation is considered to be minor.

6.8.4 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Non-Aboriginal heritage	As part of the CEMP construction site induction, in the unlikely event that any historical relics or sites are identified workers should be aware of their responsibilities under the provisions of the *Heritage Act 1977*. In this event all works must cease and the area be protected until a qualified archaeologist inspects the site and provides management advice in consultation with the Heritage Division, EES	Contractor	Construction	Archaeological heritage
Non-Aboriginal heritage	Construction works must prevent direct or indirect impacts to the adjacent local heritage items identified in the Heritage Impact Assessment (PWA, 2019) and to the mature trees identified for retention and protection in the Arboricultural report (Treeworks, 2019). The location of the items and trees are to be detailed on construction plans as an exclusion/ protection zone.	Contractor	Construction	Built and landscape heritage

6.9 Landscape Character and Visual Amenity

6.9.1 Existing environment

The project site is located within a rural village setting. Due to the location of the proposed works within the village, and within close proximity to surrounding residential and commercial properties along Molonglo and Malbon Streets, the proposal is considered to have the potential to impact landscape character and visual amenity in the locality during both construction and operation.

Overall, the proposed roundabout works area comprises a disturbed landscape as a result of previous residential and infrastructure development, and has been highly modified and cleared of native vegetation. Previous ground disturbance in the proposal area is likely to be variable, ranging from deep to shallow disturbance, with this area having experienced high levels of previous impact primarily in the form of roadway and road verge clearance, deep earthworks and trenching events for existing services infrastructure, residential and commercial premises development within the Bungendore village area.

6.9.2 Potential impacts

Construction

During construction there is potential for visual amenity to be impacted by views of construction materials, equipment, vegetation clearing, and bare earth from vegetation removal and earthworks. Visual impacts resulting from construction would be short term, and would lesson over time as the roundabout is constructed and as landscaping of the surrounding nature strips occurs.

Vegetation removal would be limited to grass cover and several smaller trees within the nature strip area adjacent to the intersection. The existing mature trees located along Molonglo Street and the unformed section of Malbon Street in the nature strip areas adjacent to the road reserve including the large Elm, Oak, Ash and Plane tree species which are of local landscape value and visual amenity which have been assessed in the Arborist report (Treeworks, 2019) would be retained and protected for the duration of construction works. As such, impacts to landscape character visual amenity associated with vegetation removal during construction is anticipated to be negligible.

Operation

The project would result in new landscape features at the intersection of Molonglo and Malbon Streets in Bungendore; including a roundabout and associated road signage, road infrastructure (such as central roundabout island, splitter islands, and concrete pavements), new underground services and street lighting, new kerbs, and minor modification of the road layout such as marked lines and parking spaces in a hard shoulder.

The new roundabout is a low rise feature, and existing road infrastructure and signage is present at the project site. In addition, the retention of the existing large mature trees surrounding the intersection would serve to maintain the visual amenity and landscape character during operation of the roundabout.

Cumulatively, it is considered that the new roundabout and the associated road signage and infrastructure would have a minor impact on the landscape character and visual amenity of the area during operation of the roundabout.

6.9.3 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Landscape character and	The worksite will be maintained in a clean and tidy manner throughout	Contractor	Construction	Visual amenity

Impact	Environmental safeguards	Responsibility	Timing	Reference
visual impact	construction works			
Landscape character and visual impact	The nature strip areas disturbed during construction works must be landscaped following construction of the roundabout using native species endemic to the local area, and managed and maintained by QPRC post-construction.	Contractor / QPRC	Construction / operation	Visual amenity

Other safeguards and management measures that would address landscape character and visual impacts are identified in sections 6.6.4 and 6.8.4.

6.10 Property and Land Use

6.10.1 Existing environment

The proposed roundabout would be located within classified RMS road reserve on land under the care and control of QPRC. The roundabout project site is located within rural village landscape with private residences and commercial premises located in close proximity to the intersection of Molonglo and Malbon Streets. The closest residential properties are located the north and south of the proposed roundabout, on the western side of Molonglo Street. Two commercial premises are located on lots located at the southern corners of the intersection of Molonglo and Malbon Streets. One further commercial property is located on the north eastern corner of the intersection. A community War Memorial Hall is also located on the western side of Molongo Street approximately 60 m to the south of the intersection of the two streets.

The project site is generally disturbed and cleared of vegetation due to previous residential, roadway and services infrastructure development impacts in Bungendore village, and has been modified and cleared of native vegetation.

6.10.2 Potential impacts

Construction

As the road where the roundabout would be located forms part of Kings Highway which is a classified road, RMS would be consulted by QPRC throughout the design and construction process and concurrence received from RMS for works within the classified road.

RMS' advisory role for the proposed roundabout would fall into two district phases during design and construction of the proposal:

- Phase 1: Assessment and in-principle acceptance
- Phase 2: Overseeing delivery (detailed design and construction)

'In-principle acceptance' would represent acceptance to the concept design/s by RMS. When QPRC receive 'in-principle acceptance' and proceed with the proposal, the project would then move into Phase 2. QPRC would need to enter into a works authorisation deed (or other suitable agreement) with RMS to deliver the proposed roundabout works.

Two driveways which are used for access to private properties would be relocated for the proposal. Access to private properties would be maintained during construction works and consent for the driveway relocation works on private land would be sought from the landowner by QPRC prior to the commencement of construction works.

Construction works associated with the proposed roundabout installation may cause some temporary disruption to private landowners and public uses at the intersection of Molonglo and Malbon Streets and on surrounding roads in the village area. Works within road reserve area where works are taking place and nearby high public use areas such as the War Memorial Hall and the commercial premises would need to be managed in consultation with the community in the proprietors of the businesses, in order to limit impact on their operational activities. The construction site would be fenced appropriately during works to ensure public safety.

Due to the temporary nature of the works, these impacts are not anticipated to be significant, assuming implementation of the management measures listed below.

Operation

The operation of the roundabout designed and operated in accordance to all relevant QPRC, RMS and best practice guidelines is considered to result in a positive impact to local land use.

6.10.3 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Property and access	Obtain all necessary licenses and/or approvals/authorisation from RMS for works proposed in classified RMS road reserves	QPRC	Pre-construction / Construction	Access/ Property approvals
Property and access	Approval for driveway relocation works on private land should be sought from the landowner by QPRC prior to the commencement of construction works.	QPRC	Pre-construction / construction	Access to property
Property and access	Two weeks prior to construction, the contractor must notify residents, schools, community centres and businesses in close proximity to the works site regarding scope of work and duration.	QPRC/ Contractor	Pre-construction / Construction	Access to property
Property and access	Consultation would be undertaken affected landowners regarding potential impact on access and land uses during construction and any safeguards or mitigation measures that need to be implemented during the works.	QPRC/ Contractor	Pre-construction/ construction	Access to property
Property and access	No construction activities (e.g. tree clearing, stockpiling etc.) would be undertaken on property adjoining the project site without prior approval of landowners.	Contractor	Construction	Access to property
Property	The contractor would be required to ensure the necessary care and maintenance of property facilities and operations. However, if any damage did occur to property it	Contractor	Construction	Property management

Impact	Environmental safeguards	Responsibility	Timing	Reference
	would be restored to a condition equivalent to the original condition.			
Property and access	Temporary fencing would be installed where necessary to exclude the general public from the work sites. Any temporary fencing or gates no longer required would be removed at the completion of the construction works.	Contractor	Construction	Access to property and safety
Property and access	QPRC and the contractor should provide a 24-hour telephone number so that any issues relating to the construction and operation of the new infrastructure can be clarified and complaints dealt with by those able to respond.	QPRC/ Contractor	Construction	Property and access management
Property and access	Appropriate security, supervision and access controls would be put in place and properly monitored to ensure no access by unauthorised personnel, either to the work area or via the work area to adjoining areas.	QPRC/ Contractor	Construction	Property and access management
Property	Post-construction, classified roads would be restored in accordance with RMS requirements and work as executed plans provided to RMS.	QPRC/ Contractor	Post-Construction	Property management

6.11 Socio-economic

6.11.1 Existing environment

The intersection of Molonglo and Malbon Streets forms part of the Kings Highway, which is a major heavy and light vehicle route between Queanbeyan and Canberra and the South Coast. Currently, the road carries generally moderate traffic flows. However, the road experiences significant increases in recreational and tourist traffic during holiday periods, resulting in delays and traffic congestion at the intersection and travel delays during times of high traffic flow.

6.11.2 Potential impacts

Construction

The proposal is unlikely to cause significant adverse socio-economic impacts during construction, although some temporary and minor disruption and disturbance to local businesses, residents and their daily routine may occur due to traffic management measures. The works may also result in a minor increase in temporary employment in the area due to construction works.

Other potential socio-economic impacts have been assessed in the following sections of the REF:

- Traffic and transport (section 6.4);
- Construction noise and vibration (section 6.5);
- Landscape Character and visual amenity (section 6.9), and
- Air quality (section 6.12).

Operation

Long term socio-economic benefits to the community would result from the proposed roundabout, through the provision of improved traffic flow management infrastructure and the installation of formal parking provisions along Molonglo Street. Overall, a beneficial impact is anticipated during operation of the proposed new roundabout at the intersection of Molonglo and Malbon Streets, as it would improve traffic efficiency, and improve safety for local residents and road users in the Bungendore area.

6.11.3 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Socio-economic	A Communication Plan (CP) will be prepared and implemented as part of the CEMP to help provide timely and accurate information to the community during construction. The CP will include (as a minimum): mechanisms to provide details and timing of proposed activities to affected residents, including changed traffic and access conditions, contact	QPRC/Contractor	Pre-construction / Construction	Community feedback

Impact	Environmental safeguards	Responsibility	Timing	Reference
	name and number for complaints.			
Socio-economic	QPRC and the contractor should provide a 24-hour telephone number so that any issues relating to the construction and operation of the new infrastructure can be clarified and complaints dealt with by those able to respond.	QPRC/Contractor	Pre-construction / Construction	Community feedback

Other safeguards and management measures that would address socio-economic impacts are identified in Sections 6.4, 6.5, 6.9 and 6.12.

6.12 Other impacts

6.12.1 Existing environment and potential impacts

Environmental factor	Existing environment	Potential impacts
Air Quality.	Air quality is expected to be good in the area, with the main influence on air quality in the area being vehicle emissions associated with moderate to hjgh traffic volumes along Molonglo and Malbon Streets and surrounding local roads in Bungendore. There is one point source (Bungendore Sand) of air pollution in the vicinity of the proposed roundabout works area. However, in high wind events, dust can be a major source of air particulates.	The main impact to air quality during construction would be expected to arise from the generation of airborne localised dust associated with earthworks and from trucks transporting materials to and from the construction site on sealed roads. This is not anticipated to cause notable adverse environmental impacts unless the weather is particularly windy. Dust suppression methods, including the use of water carts, would be applied on windy days if required to prevent dust from being transported off site. Local air quality may be affected by emissions from construction traffic. These emissions would, however, occur only intermittently, and are expected to be minor and temporary. It would be unlikely that they would contribute to a permanent detectable reduction in local air quality. With the implementation of the recommended mitigation measures below, potential air quality impacts during construction are considered to be minor and are unlikely to be significant.
Waste	-	Potential waste generated during construction of the roundabout is likely to include: ▪ Excavated material; ▪ Asphalt waste; ▪ Green waste associated with the vegetation clearing works; ▪ Construction materials including materials such as concrete,

Environmental factor	Existing environment	Potential impacts
		paper, plastics, glass, metal and timber; and ▪ General domestic waste. It is anticipated that the construction works would generate a small amount of excess spoil. Excess fill would be reused onsite (if suitable) or transported offsite for reuse or disposal. Where practicable, asphalt would be crushed and made available for reuse. Vegetation would be transported offsite for reuse or disposal. All weeds would be removed from the construction site. Waste generated on site can be readily managed through the implementation of the safeguards and management measures listed below in 6.12.2 to avoid any offsite impacts. The potential impact associated with construction waste is therefore predicted to be minimal.
Utilities	The intersection where the roundabout will be constructed forms part of the Kings Highway, which is an RMS classified road. Existing utilities infrastructure including underground and overhead electricity and underground water supply, stormwater and sewer services are present within the road reserve and nature strip area at the project site.	Relevant utilities and infrastructure providers including RMS, QPRC and Essential Energy have and would be consulted further regarding the design requirements for the infrastructure at the location of the proposed roundabout, where it is located in close proximity to, or has the potential to impact on existing services and infrastructure during construction and operation of the roundabout. Those requirements would be incorporated into the design of the proposal.

6.12.2 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Air Quality	▪ Construction vehicles and equipment would be suitably serviced within the six-month period prior to commencement of construction activities and all necessary maintenance undertaken during the construction period to meet EPA air quality requirements. ▪ The excessive use of vehicles and powered construction equipment would be avoided. ▪ All construction machinery would be turned off when not in use to minimise emissions. ▪ Construction contractors would monitor dust generation potential. ▪ Dust suppression methods including the use of water carts would be applied where required (i.e. on windy days when earthworks and vehicle movements are generating dust). ▪ Any stockpiled spoil/fill would be protected to minimise dust generation to avoid sediment moving offsite. ▪ Vehicles transporting spoil from the sites would be covered.	Contractor	Construction	Air pollution

Impact	Environmental safeguards	Responsibility	Timing	Reference
Waste	A Waste Management Plan (WMP) will be prepared and implemented as part of the CEMP. The WMP will include but not be limited to: ▪ measures to avoid and minimise waste associated with the project ▪ classification of wastes and management options (re-use, recycle, stockpile, disposal) ▪ statutory approvals required for managing both on and off-site waste, or application of any relevant resource recovery exemptions ▪ procedures for storage, transport and disposal ▪ monitoring, record keeping and reporting. The WMP will be prepared taking into account the *Environmental Procedure - Management of Wastes on Roads and Maritime Services Land* (Roads and Maritime, 2014) and relevant Roads and Maritime Waste Fact Sheets. ▪ No batched concrete mixing plants would be established in the works areas. Any required concrete would be mixed off-site and transported to the construction area. ▪ Following completion of the works, excess concrete would be removed off-site for recycling. ▪ All waste removed from the site, would be classified and disposed of appropriately, and all non-recyclable waste would be disposed of at an appropriate licensed waste disposal facility. ▪ Notification to the EPA in accordance with Part 5.7 of the POEO Act is to be undertaken where a pollution incident occurs in the course of an activity so that material harm to the environment is caused or threatened. ▪ If any contaminated material is encountered during earthworks, work shall cease, the site secured and a safe work method statement(s) and	Contractor	Pre-construction / Construction	Section 4.2 of QA *G36 Environment Protection* (RMS) Waste management

Impact	Environmental safeguards	Responsibility	Timing	Reference
	appropriate practices shall be implemented. Any contaminated material would be classified first and then stored, transported and disposed of in accordance with EPA requirements at an EPA licensed waste facility. ▪ Cleared vegetation (devoid of weeds) would be removed off site and disposed of in accordance with EPA requirements. ▪ If practicable, surplus excavated materials/fill would be reused onsite as part of rehabilitation and restoration works. Any surplus spoil disposed of in this manner would be seeded to minimise the likelihood of it being transported offsite through wind or water action.			
Utilities	▪ Prior to the commencement of works the location of existing utilities and relocation details will be accurately located using 'dial before you dig' and following consultation with the affected utility owners prior to the commencement of works. ▪ Utility and service providers would be consulted during construction works in the event that impacts on any utilities and services by the proposal are likely. ▪ If the scope or location of proposed utility relocation works falls outside of the assessed proposal scope and footprint, further assessment will be undertaken.	Contractor	Pre-construction / Construction	Existing Services

6.13 Cumulative impacts

6.13.1 Study area

The cumulative environmental effects of the proposal include the combined effect of individual impacts associated with the proposal in addition to the impacts of other activities in the area. These may include future road works including maintenance, and other non-road development that could result in traffic, biodiversity, air quality, noise, visual and waste generation impacts.

It is anticipated that any future road works in Bungendore would be coordinated by QPRC, as required.

In terms of non-road development in Bungendore, a search of NSW Major Project register on the 5th November 2019 was conducted for major project DAs lodged with QPRC in the last 4 years. No projects were identified in Bungendore.

6.13.2 Potential impacts

Construction

No other major construction projects are known to be planned at the same time in the nearby area of the proposed works, and therefore no cumulative impacts are anticipated. However, the proposed works would be co-ordinated by Council and RMS to minimise any cumulative effects.

Operation

No cumulative impacts are anticipated during operation of the roundabout.

6.13.3 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Cumulative roadworks construction impacts	Ongoing coordination within QPRC and RMS to ensure any road closures or construction works will be managed by QPRC to minimise cumulative impacts	QPRC	Construction	Cumulative road impacts

7. Environmental management

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

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

The CEMP would be prepared prior to construction of the proposal and must be reviewed and certified by QPRC and RMS 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.

7.2 Summary of safeguards and management measures

Environmental safeguards and management measures outlined in this REF will be incorporated into the detailed design phase of the proposal and during construction and operation of the proposal, should it proceed. These safeguards and management measures will minimise any potential adverse impacts arising from the proposed works on the surrounding environment. The safeguards and management measures are summarised in Table 7-1.

Table 7-1: Summary of safeguards and management measures

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

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		five days prior to commencement of the activity.	Maritime project manager		
3	General – environmental awareness	All personnel working on site will receive training to ensure awareness of environment protection requirements to be implemented during the project. This will include up-front site induction and regular "toolbox" style briefings. Site-specific training will be provided to personnel engaged in activities or areas of higher risk.	Contractor / Roads and Maritime project manager	Pre-construction/detailed design	
4	Soil erosion and sedimentation	A site-specific Erosion and Sediment Control Plan will be prepared and implemented as part of the CEMP. Measures which must be implemented include: o at the start of works, and progressively during construction, install the required erosion and sediment control measures, controls must be regularly inspected and maintained during construction, particularly following rainfall. o maintain a register of inspection and maintenance of erosion control and sediment capture measures. Exposed Areas must be minimised and stabilised progressively throughout construction, with sediment controls maintained until stabilisation is achieved.	Contractor	Detailed design/Pre-construction	Soil erosion and sedimentation
5	Spill or fuels or other chemicals	Any fuels or lubricants for machinery or other chemicals stored on site shall be stored within appropriate containers and within a bunded enclosure capable of storing 120% of the volume of material stored there.	Contractor	Construction	Pollution of nearby watercourses
6	Spill or fuels or other chemicals	A site-specific emergency spill plan will be developed, and include spill management measures in accordance with the Roads and Maritime Code of Practice for Water Management (RTA, 1999) and relevant EPA guidelines. The plan will address measures to be implemented in the event of a spill, including initial response and containment, notification of emergency services and relevant authorities (including Roads and Maritime and EPA officers).	Contractor	Detailed design/Pre-construction	Section 4.3 of QA G36 Environment Protection (RMS)

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
7	Soil erosion and sedimentation	All areas where ground disturbance has occurred would be stabilised following completion of works to ensure there is no erosion hazard and restored to their pre-construction condition. This would involve, where required, reshaping the ground surface, covering it with topsoil excavated from the site and re-establishing an appropriate vegetation cover.	Contractor	Post Construction	Soil erosion and sedimentation
8	Soil and water management	Appropriate stormwater management devices shall be incorporated into the design of the proposal.	Design team/ Contractor	Detailed design/ Construction	Pollution of nearby drainage lines and watercourses
9	Water Pollution	▪ Any concrete washout required for the works must be carried out in designated concrete washout areas identified on the CEMP, or trucks return to their depot for washout. ▪ Refuelling of essential onsite plant (e.g. excavators, pumps, etc) is to be undertaken in an impervious bunded area within the limit of works; the location will maximise distance between drains/waterways and will have spill kits immediately available. ▪ All non-essential plant and vehicles (light vehicles, trucks, etc) must be refuelled offsite at a service station or depot. At the start of each shift, plant and equipment must be checked for fuel/oil leaks. No leaking equipment will be permitted to operate on site.	Contractor	Construction	Pollution of nearby drainage lines and watercourses
10	Soil and water management	The CEMP would incorporate a pollution incident response management plan that defines appropriate procedures for notification of pollution incidents to the required authorities in accordance with s. 147 to 153 of the POEO Act and requires response actions to be implemented in order to address any risks such as incidents posed to the environment, property or surrounding communities.	Contractor	Construction	Pollution of nearby drainage lines and watercourses
11	Traffic and transport	A Traffic Management Plan (TMP) will be prepared and implemented as part of the CEMP. The TMP will be prepared in accordance with the	Contractor	Detailed design/Pre-construction	Section 4.8 of

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		Roads and Maritime *Traffic Control at Work Sites Manual* (RMS, 2018) and *QA Specification G10 Control of Traffic* (Roads and Maritime, 2008). The TMP will include: ▪ confirmation of haulage routes ▪ measures to maintain access to local roads and properties ▪ site specific traffic control measures (including signage) to manage and regulate traffic movement ▪ measures to maintain pedestrian and cyclist access ▪ requirements and methods to consult and inform the local community of impacts on the local road network ▪ access to construction sites including entry and exit locations and measures to prevent construction vehicles queuing on public roads. ▪ a response plan for any construction traffic incident ▪ consideration of other developments that may be under construction to minimise traffic conflict and congestion that may occur due to the cumulative increase in construction vehicle traffic monitoring, review and amendment mechanisms.			QA *G36 Environment Protection* (RMS)
12	Traffic and transport	Any disturbance to landowners as a result of vehicle movements and noise would be minimised by adhering to the working hours outlined in Section 6.5.5. The contractor would avoid any inconvenience to residences/landowners, and all access points would be in their original condition following completion of the works.	Contractor	Construction	Traffic impact to local residents and road users
13	Traffic and transport	Existing roads would be restored to their condition prior to works.	Contractor	Construction	Traffic impact to local residents and road users
14	Traffic and transport	All construction traffic would comply with all applicable traffic laws and regulations including speed limits. All construction vehicles would comply with the speed limits set for the roads when accessing the	Contractor	Construction	Traffic impact to local residents and

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		works sites.			road users
15	Noise and vibration	A Noise and Vibration Management Plan (NVMP) will be prepared and implemented as part of the CEMP. The NVMP will generally follow the approach in the Interim *Construction Noise Guideline* (ICNG) (DECC, 2009) and identify: ▪ all potential significant noise and vibration generating activities associated with the activity ▪ feasible and reasonable mitigation measures to be implemented ▪ a monitoring program to assess performance against relevant noise and vibration criteria ▪ arrangements for consultation with affected neighbours and sensitive receivers, including notification and complaint handling procedures contingency measures to be implemented in the event of non-compliance with noise and vibration criteria.	Contractor	Detailed design/Pre-construction	Section 4.6 of QA *G36 Environment Protection* (RMS)
16	Noise and vibration	All sensitive receivers (eg schools, local residents) likely to be affected will be notified at least 2 weeks prior to commencement of any works associated with the activity that may have an adverse noise or vibration impact. The notification will provide details of: ▪ the project ▪ the construction period and construction hours ▪ contact information for project management staff ▪ complaint and incident reporting how to obtain further information.	Contractor/QPRC	Pre-construction	Noise impacts to local residents
17	Noise and vibration	Works would be undertaken during normal work hours i.e. 7am to 6pm Monday to Friday; 8am to 1pm Saturdays; and no work would be undertaken on Sundays, Public Holidays or outside these work hours without notification to the affected community and EPA. Such notification would include the following details: ▪ The locations and types of surrounding receivers likely to be	Contractor	Pre-construction/ Construction.	Noise impacts to local residents

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		affected; ▪ The nature of the proposed works; ▪ The noise characteristics of any powered equipment likely to be used; ▪ Measures to be taken to reduce noise emissions; and Any other information EPA may request.			
18	Noise and vibration	No swearing or unnecessary shouting or loud stereos/radios on site.	Contractor	Construction	Noise impacts to local residents
19	Noise and vibration	All construction machinery is to be turned off when not in use.	Contractor	Construction	Noise impacts to local residents
20	Noise and vibration	Work generating high noise levels should be scheduled during less sensitive time periods if practicable.	Contractor	Construction	Noise impacts to local residents
21	Noise and vibration	Use quieter and less noise emitting construction methods where feasible and reasonable.	Contractor	Construction	Noise impacts to local residents
22	Noise and vibration	All plant and equipment to be appropriately maintained to ensure optimum running conditions, with periodic monitoring.	Contractor	Construction	Noise impacts to local residents
23	Noise and vibration	Simultaneous operation of noisy plant within discernible range of a sensitive receiver is to be limited/ avoided where possible.	Contractor	Construction	Noise impacts to local residents
24	Noise and vibration	Plant used intermittently to be throttled down or shut down when not in use where practicable.	Contractor	Construction	Noise impacts to local residents

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
25	Noise and vibration	All reasonable practical steps shall be undertaken to reduce noise and vibration from the site.	Contractor	Construction	Vibration impacts to local residents
26	Biodiversity	Trimming of trees branches and any tree removal should be limited to the minimum required to successfully complete the proposal, with consideration to the Arboricultural assessment procedures and recommendations.	Contractor	Construction	Vegetation removal
27	Biodiversity	Vehicles and machinery should be stored and parked in designated parking areas only.	Contractor	Construction	Tree Protection
28	Biodiversity	The works are to be undertaken in accordance with AS 4970-2009 Protection of trees on development sites (Australian Standards 2009).	Contractor	Construction	Tree Protection
29	Biodiversity	Preserving as much of the TPZ as possible during all phases of this develop is important for all trees. Tree Protection Fencing (TPF) is to be put in place and not to move until the post-construction phase. TPF is needed for trees T4, T5, T6 and T7 as identified in the Treeworks assessment (2019) as shown in *Recommended Tree Protection Fencing* illustration (page 13)	Contractor	Construction	Tree Protection
30	Biodiversity	There must be no change to the water flow of the nearby creek and exposed drain, as this is a vital water source for the adjacent Elm trees namely trees T1, T2, T3, T8, T9 and T10. Open kerbs are recommended for trees to receive water on rain events.	Contractor	Construction	Tree Protection
31	Biodiversity	All Arboricultural work is to be completed prior to any construction work. This includes the removal of large patches of deadwood in the veteran trees marked T1, T2 and T3. These trees are naturally senescing (aging), which is normal. Stem injecting is also required to de-stress these old Elm trees to rid them of Elm Leaf Beetle. Some of these trees require protective trunk padding to be installed by an Arborist	Contractor	Construction	Tree Protection
32	Biodiversity	A watering program is to be implemented at determined rates as prescribed by the Site Arborist (approximately 200 litres per tree per	Contractor	Construction	Tree Protection

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		week), using a soaker or drip hose, or by water truck. This is to be in use during all phases of development.			
33	Biodiversity	Any animals injured during the works should be collected and taken to a local veterinarian or wildlife carer such as WIRES.	Contractor	Construction	Fauna Protection
34	Biodiversity	On completion of works, it is advised to retain all mulches as this will benefit the soil with good water infiltration and many other benefits. Watering all trees in hot summer months is recommended.	Contractor	Post-construction/Operation	Tree Protection
35	Biodiversity	Following completion of construction works, disturbed surfaces would be stabilised and landscaped, as required	Contractor	Post-construction/Operation	Landscape Protection
36	Aboriginal heritage	As part of an induction, in the unlikely event that any unknown Aboriginal objects are uncovered during proposed works, all workers and sub-contractors should be aware of their responsibilities under the provisions of the NPW Act (including the penalties under the ancillary provisions) and *Heritage Act 1977*. In this event all works must cease and the area where Aboriginal objects are uncovered is protected until a qualified archaeologist and representatives of registered Aboriginal parties are contacted and can inspect and assess the area to determine its significance.	Contractor	Construction	Heritage impacts
37	Aboriginal heritage	Where the find(s) are determined to be Aboriginal Objects, any re-commencement of construction related ground surface disturbance may only resume in the area of the find(s) following compliance with any consequential legal requirements and gaining written approval from NSW Environment, Energy and Science (EES) (as required).	Contractor	Construction	Heritage impacts
38	Aboriginal heritage	*The Standard Management Procedure - Unexpected Heritage Items* (Roads and Maritime, 2015) will be followed in the event that an unknown or potential Aboriginal object/s, including skeletal remains, is found during construction. This applies where Roads and Maritime does not have approval to disturb the object/s or where a specific	Contractor	Construction	Section 4.9 of QA *G36 Environment Protection* (RMS)

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		safeguard for managing the disturbance (apart from the Procedure) is not in place. Work will only re-commence once the requirements of that Procedure have been satisfied.			
39	Non-Aboriginal heritage	As part of the CEMP construction site induction, in the unlikely event that any historical relics or sites are identified workers should be aware of their responsibilities under the provisions of the *Heritage Act 1977*. In this event all works must cease and the area be protected until a qualified archaeologist inspects the site and provides management advice in consultation with the Heritage Division, EES	Contractor	Construction	Archaeological heritage
40	Non-Aboriginal heritage	Construction works must prevent direct or indirect impacts to the adjacent local heritage items identified in the Heritage Impact Assessment (PWA, 2019) and to the mature trees identified for retention and protection in the Arboricultural report (Treeworks, 2019). The location of the items and trees are to be detailed on construction plans as an exclusion/ protection zone.	Contractor	Construction	Built and landscape heritage
41	Landscape character and visual impact	The worksite will be maintained in a clean and tidy manner throughout construction works	Contractor	Construction	Visual amenity
42	Landscape character and visual impact	The nature strip areas disturbed during construction works must be landscaped following construction of the roundabout using native species endemic to the local area, and managed and maintained by QPRC post-construction	/QPRC	Construction/Operation	Visual amenity
43	Property and access	Obtain all necessary licenses and/or approvals/authorisation from RMS for works proposed in classified RMS road reserves	QPRC	Pre-construction/ Construction	Access/ Property approvals
44	Property and access	Approval for driveway relocation works on private land should be sought from the landowner by QPRC prior to the commencement of construction works.	QPRC	Pre-construction/ Construction	Access to property

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
45	Property and access	Two weeks prior to construction, the contractor must notify residents, schools, community centres and businesses in close proximity to the works site regarding scope of work and duration.	QPRC/ Contractor	Pre-construction/ Construction	Access to property
46	Property and access	Consultation would be undertaken affected landowners regarding potential impact on access and land uses during construction and any safeguards or mitigation measures that need to be implemented during the works.	QPRC/ Contractor	Pre-construction/ Construction	Access to property
47	Property and access	No construction activities (e.g. tree clearing, stockpiling etc.) would be undertaken on property adjoining the project site without prior approval of landowners.	Contractor	Construction	Access to property
48	Property	The contractor would be required to ensure the necessary care and maintenance of property facilities and operations. However, if any damage did occur to property it would be restored to a condition equivalent to the original condition.	Contractor	Construction	Property management
49	Property and access	Temporary fencing would be installed where necessary to exclude the general public from the work sites. Any temporary fencing or gates no longer required would be removed at the completion of the construction works.	Contractor	Construction	Access to property and safety
50	Property and access	QPRC and the contractor should provide a 24-hour telephone number so that any issues relating to the construction and operation of the new infrastructure can be clarified and complaints dealt with by those able to respond.	QPRC/ Contractor	Construction	Property and access management
51	Property and access	Appropriate security, supervision and access controls would be put in place and properly monitored to ensure no access by unauthorised personnel, either to the work area or via the work area to adjoining areas.	QPRC/ Contractor	Construction	Property and access management
52	Property and access	Post-construction, classified roads would be restored in accordance with RMS requirements and work as executed plans provided to RMS.	QPRC/ Contractor	Post-Construction	Property management
53	Socio-	A Communication Plan (CP) will be prepared and implemented as part	QPRC/Contractor	Pre-construction/	Community

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
	economic	of the CEMP to help provide timely and accurate information to the community during construction. The CP will include (as a minimum): mechanisms to provide details and timing of proposed activities to affected residents, including changed traffic and access conditions, contact name and number for complaints.		Construction	feedback
54	Socio-economic	QPRC and the contractor should provide a 24-hour telephone number so that any issues relating to the construction and operation of the new infrastructure can be clarified and complaints dealt with by those able to respond.	QPRC/Contractor	Pre-construction/ Construction	Community feedback
55	Cumulative impacts	Ongoing coordination within QPRC and RMS to ensure any road closures or construction works will be managed by QPRC to minimise cumulative impacts	QPRC	Construction	Cumulative road network impacts
56	Air Quality	▪ Construction vehicles and equipment would be suitably serviced within the six-month period prior to commencement of construction activities and all necessary maintenance undertaken during the construction period to meet EPA air quality requirements. ▪ The excessive use of vehicles and powered construction equipment would be avoided. ▪ All construction machinery would be turned off when not in use to minimise emissions. ▪ Construction contractors would monitor dust generation potential. ▪ Dust suppression methods including the use of water carts would be applied where required (i.e. on windy days when earthworks and vehicle movements are generating dust). ▪ Any stockpiled spoil/fill would be protected to minimise dust generation to avoid sediment moving offsite. Vehicles transporting spoil from the sites would be covered.	Contractor	Construction	Air pollution
57	Waste	A Waste Management Plan (WMP) will be prepared and implemented as part of the CEMP. The WMP will include but not be limited to: ▪ measures to avoid and minimise waste associated with the project	Contractor	Pre-construction/Construction	Section 4.2 of QA *G36 Environment*

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		▪ classification of wastes and management options (re-use, recycle, stockpile, disposal) ▪ statutory approvals required for managing both on and off-site waste, or application of any relevant resource recovery exemptions ▪ procedures for storage, transport and disposal ▪ monitoring, record keeping and reporting. The WMP will be prepared taking into account the *Environmental Procedure - Management of Wastes on Roads and Maritime Services Land* (Roads and Maritime, 2014) and relevant Roads and Maritime Waste Fact Sheets. ▪ No batched concrete mixing plants would be established in the works areas. Any required concrete would be mixed off-site and transported to the construction area. ▪ Following completion of the works, excess concrete would be removed off-site for recycling. ▪ All waste removed from the site, would be classified and disposed of appropriately, and all non-recyclable waste would be disposed of at an appropriate licensed waste disposal facility. ▪ Notification to the EPA in accordance with Part 5.7 of the POEO Act is to be undertaken where a pollution incident occurs in the course of an activity so that material harm to the environment is caused or threatened. ▪ If any contaminated material is encountered during earthworks, work shall cease, the site secured and a safe work method statement(s) and appropriate practices shall be implemented. Any contaminated material would be classified first and then stored, transported and disposed of in accordance with EPA requirements at an EPA licensed waste facility. ▪ Cleared vegetation (devoid of weeds) would be removed off site			*Protection* (RMS)

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		and disposed of in accordance with EPA requirements. If practicable, surplus excavated materials/fill would be reused onsite as part of rehabilitation and restoration works. Any surplus spoil disposed of in this manner would be seeded to minimise the likelihood of it being transported offsite through wind or water action.			
58	Utilities	▪ Prior to the commencement of works the location of existing utilities and relocation details will be accurately located using 'dial before you dig' and following consultation with the affected utility owners prior to the commencement of works. ▪ Utility and service providers would be consulted during construction works in the event that impacts on any utilities and services by the proposal are likely. If the scope or location of proposed utility relocation works falls outside of the assessed proposal scope and footprint, further assessment will be undertaken.	Contractor	Pre-construction/ Construction	Existing Services

7.3 Licensing and approvals

Table 7-2: Summary of licensing and approvals required

Instrument	Requirement	Timing
Part 5 of EP&A Act	Determination of the proposal by QPRC	Prior to start of the activity
Section 138 of Roads Act 1993	Consent to erect a structure or carry out a work in, on or over a classified (public) road	Prior to start of the activity
N/A	Landowner consent (where works are located on private land)	Prior to start of the activity

8. Conclusion

8.1 Justification

The proposal has been assessed against the objectives of the EP&A Act in Table 8-1 . The Kings Highway (B52) is a main transport link that carries both light passenger and heavy freight vehicles. The existing intersection at Molonglo and Malbon Streets, which forms part of the Kings Highway, is a standard uncontrolled t-intersection which experiences significant delays and congestion during holiday periods, as residents of Queanbeyan and Canberra travel via Bungendore to and from the South Coast.

Roundabouts aim to reduce approach speeds and guide vehicles through the turn movements. These elements all aim to reduce vehicle crash rates typically more common at t-intersection treatments. The roundabout would improve the flow of traffic and safety of pedestrians and cyclists by providing pedestrian refuges in the centre of the road.

The proposal would assist in improving road safety by providing safer, or comparable, access and egress arrangements at the intersection of Molonglo and Malbon Street in Bungendore than those in place for the existing intersection. In addition, the roundabout aims to reduce traffic delays and congestion through the village for both large and light vehicles, particularly during high traffic flow holiday periods.

The proposal meets the objectives of the EP&A Act and as such, is considered justified. Though environmental impacts would occur, they can be effectively mitigated with the application of safeguards.

8.1.1 Social factors

The proposal would potentially cause short term impacts such as increased noise and traffic and a reduction in community amenity for the users of adjoining land and local streets during the construction phase. However, the works are temporary and can be managed to minimise impacts.

8.1.2 Biophysical factors

No significant impacts to Aboriginal cultural or historic heritage are anticipated to occur due to the proposed works.

The proposal would be unlikely to significantly affect any listed threatened species, fauna populations or ecological communities, provided appropriate management measures, as provided in Section 7 are implemented.

Overall, biophysical impacts associated with the proposal are considered to be minor and manageable through the identified management measures.

8.1.3 Economic factors

The existing uncontrolled t-intersection experiences significant delays and congestion during holiday periods. The roundabout would reduce traffic delays and congestion through the village for both large commercial and light private vehicles, therefore providing a positive economic outcome for businesses which rely on road freight to transports goods and for private road users by reducing travel time and by association, fuel consumption. In addition, the provision of formal roadside parking spaces along Molonglo Street as part of proposal, will facilitate access for locals and visitors to local businesses in Bungendore once the roundabout is operational.

8.1.4 Public interest

The proposal would improve road safety by providing safer access and egress arrangements at the intersection of Molonglo and Malbon Street than the existing arrangements. Furthermore, the roundabout would reduce traffic delays and congestion through the village.

It is considered that adverse environmental impacts potentially associated with the operational phase of the proposal are considered to be minimal. The operational impacts would be positive for the general public, due to the provision of improved road infrastructure in Bungendore.

8.2 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 provision of a roundabout would improve road safety for motorists along the Kings Highway at Bungendore. A number of mitigation measures would be implemented to minimise the environmental impacts associated with the proposal.
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 in Sections 8.2.1 - 8.2.4 below.
1.3(c) To promote the orderly and economic use and development of land.	Transporting freight by road and leisure travel by private light vehicles are key elements of the NSW economy. The Kings Highway is a major freight and leisure travel route. The roundabout would improve road safety and reduce travel time and traffic congestion at peak traffic periods.
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 not result in long term degradation of the quality of the environment, provided that the mitigation measures detailed in Section 7 of this REF are properly implemented
1.3(f) To promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage).	Heritage Impact assessment has been carried out for the proposal (see Sections 6.7 and 6.8). The proposal would not result in unsustainable management of built and cultural heritage (including Aboriginal cultural heritage), provided that the mitigation measures detailed in Section 7 of this REF are properly implemented
1.3(g) To promote good design and amenity of the built environment.	Consultation with relevant stakeholders including RMS and the local community has been undertaken during the development of the proposal. Details of this consultation can be found in section 5.
1.3(h) To promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants.	Not relevant to the project.
1.3(i) To promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State.	Not relevant to the project.
1.3(j) To provide increased opportunity for community participation in environmental planning and assessment.	Consultation with relevant stakeholders has been undertaken during the development of the proposal. Details of this consultation can be found in section 5.

8.2.1 The precautionary principle

The 'precautionary principle' has been applied to the proposal. A heritage study, tree assessment and community consultation have been undertaken as part of the assessment of the proposal, including a consideration of options as well as identification, design and assessment of the proposal. The evaluation of options and the design of the preferred option have concentrated on minimising impacts on the environment, namely biodiversity, noise and soil and water quality, wherever possible. No threat or serious irreversible damage to the environment would be caused by the proposal.

8.2.2 Intergenerational equity

The roundabout at Bungendore would assist in providing safer road infrastructure to manage traffic flows and vehicular, bicycle and pedestrian safety. The proposal considers and minimises impacts to the local environment through the introduction of site specific safeguards to ensure the integrity of natural and social values of the environment are maintained for future generations.

8.2.3 Conservation of biological diversity and ecological integrity

Thorough assessment of the local environment has been undertaken to identify and manage any potential environmental impacts associated with the proposed roundabout. Site specific safeguards as outlined in Section 7 of this REF would ensure that the proposal does not compromise biological diversity or ecological integrity.

8.2.4 Improved valuation, pricing and incentive mechanisms

It is often difficult to place a monetary value on environmental resources. An indirect indication of the value of such resources is the cost of the proposed site specific safeguards. The costs of the proposed site specific safeguards would be incorporated into the detailed design and construction cost estimate of the proposal.

8.3 Conclusion

The proposed roundabout at the intersection of Molonglo and Malbon Streets in Bungendore 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 and noise during construction. Safeguards and management measures as detailed in this REF would ameliorate or minimise these expected impacts. The proposal would also improve safety and reduce travel times and traffic congestion during holiday periods. 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.

There would be no significant impact on any other aspect of 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. The proposal is subject to assessment under Division 5.1 of the EP&A Act.

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.

Kristen Parmeter

Environment Scientist

Public Works Advisory

Date:

I have examined this review of environmental factors and accept it on behalf of Queanbeyan-Palerang Regional Council.

Name:

Position:

Queanbeyan-Palerang Regional Council

Date:

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

Name:

Position:

Roads and Maritime Services

Date:

10. References

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Department of Energy and Climate Change (DECC), 2009. *NSW Government Interim Construction Noise Guidelines.*

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OPUS, 2015, *Roundabouts on Kings Highway Bungendore & Braidwood, Palerang Design Report*

Public Works Advisory (PWA),2019, *Bungendore Roundabout Heritage Impact Assessment*, Report no. HAA19-003.

Treeworks, 2019, *Visual Tree Assessment Report For Various Trees on the corner of Molonglo and Malbon Streets Bungendore NSW.*

Terms and acronyms used in this REF

Term / Acronym	Description
BC Act	*Biodiversity Conservation Act 2016* (NSW).
CEMP	Construction environmental management plan
EES	NSW Environment, Energy and Science (formerly Office of Environment and Heritage (OEH))
EIA	Environmental impact assessment
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW). Provides the legislative framework for land use planning and development assessment in NSW
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth). Provides for the protection of the environment, especially matters of national environmental significance, and provides a national assessment and approvals process.
ESD	Ecologically sustainable development. Development which uses, conserves and enhances the resources of the community so that ecological processes on which life depends, are maintained and the total quality of life, now and in the future, can be increased
FM Act	*Fisheries Management Act 1994* (NSW)
Heritage Act	*Heritage Act 1977* (NSW)
ISEPP	*State Environmental Planning Policy (Infrastructure) 2007*
LALC	Local Aboriginal Land Council
LEP	Local Environmental Plan. A type of planning instrument made under Part 3 of the EP&A Act.
LoS	Level of Service. A qualitative measure describing operational conditions within a traffic stream and their perception by motorists and/or passengers.
MNES	Matters of national environmental significance under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999.*
NPW Act	*National Parks and Wildlife Act 1974* (NSW)
PWA	Public Works Advisory
Roads and Maritime	NSW Roads and Maritime Services
SEPP	State Environmental Planning Policy. A type of planning instrument made under Part 3 of the EP&A Act.
QA Specifications	Specifications developed by Roads and Maritime Services for use with road work and bridge work contracts let by Roads and Maritime Services.
QPRC	Queanbeyan-Palerang Regional Council

Appendix A

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

Clause 228(2) Checklist

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

Factor	Impact
a) Any environmental impact on a community? Briefly summarise any likely environmental impacts of the proposal on a community. There is the potential for some minor and temporary noise, dust and traffic and access impacts during construction works. Safeguards are provided in Section 7 of the REF.	Negative, short term during construction phase Positive, long term
b) Any transformation of a locality? The proposal would result in the additional of low rise road infrastructure. However, the additional infrastructure is sympathetic to the current road reserve land use.	Minor negative, short term during construction phase Negligible, long term
c) Any environmental impact on the ecosystems of the locality? Some vegetation, mainly comprising grass cover and several trees will need to be cleared. No significant impact to threatened species is anticipated. No adverse impact on the ecosystems in the locality is predicted. Safeguards have been provided to reduce risks in Section 6.6	Minor negative, short term during construction phase No impact, long term
d) Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality? Minimal impact to the aesthetic quality of the area would occur due to minor vegetation clearing and the construction of new road infrastructure in a currently disturbed rural township setting.	Minor negative, short term during construction phase No impact, long term
e) Any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations? The proposal would avoid impact to the surrounding heritage items in the area. Refer to Section 6.8 for details. No impacts to Aboriginal heritage anticipated.	No impact
f) Any impact on the habitat of protected animals (within the meaning of the Biodiversity Conservation *Act 2016)?* It is not anticipated that the proposal would impact on the habitat of protected animals a only minor vegetation removal is required. Refer to Section 6.6.	No impact

Factor	Impact
g) Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air? It is not anticipated that the proposal would endanger any species of animal, plant or other form of life, whether living on land, in water or in the air.	Nil
h) Any long-term effects on the environment? The proposal would have a beneficial long term socio-economic effect on the environment by improving road safety for road users in Bungendore	Positive, long term
i) Any degradation of the quality of the environment? The proposal would not result in degradation of the quality of the environment, provided that the mitigation measures detailed in Section 7 of this REF are properly implemented.	No impact
j) Any risk to the safety of the environment? During construction, the proposal presents a minor potential short term risk to the safety of the environment through spillage of construction materials, or waste contaminating the surrounding environment. Mitigation measures outlined in Section 7 of this REF would minimise potential risks to the safety of the environment. In the long term, the addition of the roundabout and pedestrian refuges at the intersection of Malbon and Molonglo Streets would increase safety for road users.	Minor Negative, short term during construction phase Positive, long term
k) Any reduction in the range of beneficial uses of the environment? There would be improved traffic flow through the intersection reducing the congestion experienced at times of peak traffic flow. This would also reduce 'rat-running' by vehicles through the town centre improving amenity. Furthermore, the new intersection would be safer for vehicles, pedestrians and cyclists with newly dedicated pedestrian and cyclist crossing locations including refuges in the centre of the road	Positive, long term
l) Any pollution of the environment? Pollution of the environment has the minor potential to occur during construction of the proposal. Potential pollution sources include construction waste, sediment and spillage of chemicals. Specific safeguards, outlined in Section 7 of this REF, would be implemented to minimise the likelihood of this occurring.	Minor Negative, short term during construction phase
m) Any environmental problems associated with the disposal of waste? Minimal waste is predicted, Waste produced during construction would be recycled where possible and disposed off-site.	Minor Negative, short term during construction phase
n) Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply? Not applicable	No impact

Factor	Impact
o) Any cumulative environmental effect with other existing or likely future activities? The proposed works would be co-ordinated by Council and RMS to minimise any cumulative effects.	No impact
p) Any impact on coastal processes and coastal hazards, including those under projected climate change conditions? Proposal site is not located in the coastal zone.	Not applicable

Matters of National Environmental Significance and Commonwealth land

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

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

Factor	Impact
a) Any impact on a World Heritage property?	Nil
b) Any impact on a National Heritage place?	Nil
c) Any impact on a wetland of international importance?	Nil
d) Any impact on a listed threatened species or communities?	Nil
e) Any impacts on listed migratory species?	Nil
f) Any impact on a Commonwealth marine area?	Nil
g) Does the proposal involve a nuclear action (including uranium mining)?	Nil
h) Additionally, any impact (direct or indirect) on the environment of Commonwealth land?	Nil

Appendix B - Statutory consultation checklists

Infrastructure SEPP 2007

Certain development types

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

Development within the Coastal Zone

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

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

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

Local heritage items

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

Flood liable land

Issue	Potential impact	Yes / No	If 'yes' consult with	ISEPP clause

Issue	Potential impact	Yes / No	If 'yes' consult with	ISEPP clause
Flood liable land	Are the works located on flood liable land? If so, will the works change flood patterns to more than a *minor* extent?	Yes – N/A QPRC proponent	QPRC	ISEPP cl.15
Flood liable land	Are the works located on flood liable land? (to any extent). If so, do the works comprise more than minor alterations or additions to, or the demolition of, a building, emergency works or routine maintenance	Yes – Only Minor alterations addition to existing road	State Emergency Services Email: erm@ses.nsw.gov.au	ISEPP cl.15AA

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

Public authorities other than councils

Issue	Potential impact	Yes / No	If 'yes' consult with	ISEPP clause
National parks and reserves	Are the works adjacent to a national park or nature reserve, or other area reserved under the *National Parks and Wildlife Act 1974*, or on land acquired under that Act?	No	Office of Environment and Heritage	ISEPP cl.16(2)(a)
National parks and reserves	Are the works on land in Zone E1 National Parks and Nature Reserves or in a land use zone equivalent to that zone?	No	Office of Environment and Heritage	ISEPP cl. 16(2)(b)
Aquatic reserves	Are the works adjacent to an aquatic reserve or a marine park declared under the *Marine Estate Management Act 2014*?	No	Department of Industry	ISEPP cl.16(2)(c)
Sydney Harbour foreshore	Are the works in the Sydney Harbour Foreshore Area as defined by the *Sydney Harbour Foreshore Authority Act 1998?*	No	Sydney Harbour Foreshore Authority	ISEPP cl.16(2)(d)
Bush fire prone land	Are the works for the purpose of residential development, an educational establishment, a health services facility, a correctional centre or group home in bush fire prone land?	No	Rural Fire Service *[Refer to the NSW Rural Fire Service publication Planning for Bush Fire Protection (2006)]*	ISEPP cl.16(2)(f)
Artificial light	Would the works increase the amount of artificial light in the night sky and that is on land within the dark sky region as identified on the dark sky region map? (Note: the dark sky region is within 200 kilometres of the Siding Spring Observatory)	No	Director of the Siding Spring Observatory	ISEPP cl.16(2)(g)

Issue	Potential impact	Yes / No	If 'yes' consult with	ISEPP clause
Defence communications buffer land	Are the works on buffer land around the defence communications facility near Morundah? (Note: refer to Defence Communications Facility Buffer Map referred to in clause 5.15 of Lockhardt LEP 2012, Narrandera LEP 2013 and Urana LEP 2011.	No	Secretary of the Commonwealth Department of Defence	ISEPP cl. 16(2)(h)
Mine subsidence land	Are the works on land in a mine subsidence district within the meaning of the *Mine Subsidence Compensation Act 1961*?	No	Mine Subsidence Board	ISEPP cl. 16(2)(i)

Appendix C - Heritage Impact Assessment

Appendix D – Tree Assessment

Appendix E – Consultation Responses

Appendix F – Database Searches

Appendix G – Concept Design