GUNNEDAH SECOND ROAD
OVER RAIL BRIDGE
Review of environmental factors
JUNE 2015
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Executive summary

The proposal
Roads and Maritime Services (Roads and Maritime) is proposing to build a second road bridge over the railway line in Gunnedah to provide an unrestricted Higher Mass Limit (HML) truck route through the town and significantly improve local traffic efficiency and road safety.

The proposed bridge would remove a missing link in the HML network in Gunnedah, facilitating an unrestricted link for HML freight vehicles between the New England Highway and the Newell Highway.

The key features of the proposal are to:

- Build a new road bridge over the railway line west of the Gunnedah Maize Mill, connecting the Oxley Highway with Warrabungle Street
- Rebuild the existing roundabout at the intersection of the Oxley Highway and New/View streets
- Build an intersection to provide access to Barber Street where the new route meets Warrabungle Street
- Close the New Street level crossing.

The proposal forms part of the NSW Government's Bridges for the Bush program.

Need for the proposal
The Abbott Street Bridge is the only overpass (or ‘grade separated crossing’) of the railway line in Gunnedah. The bridge is not suitable for use by HML vehicles. Therefore, heavy vehicles travelling on the Oxley Highway and the Kamilaroi Highway through Gunnedah need to use the heavy vehicle route via Bloomfield Street, Boundary Road, Warrabungle Street and New Street, where there is a level crossing (also called an ‘at grade crossing’).

At the New Street level crossing, vehicles need to wait for trains to pass on the track. This is becoming an issue because the increased length and frequency of freight trains due to major coal developments in the Gunnedah Basin (with up to 1200 metre long trains every 23 minutes) has led to frequent extended closures of the level crossing to allow train passage. This is causing significant delays for heavy vehicles, local traffic and pedestrians.

With delays expected to continue to increase, there is a need to improve both local and through traffic efficiency by building a railway overpass that is suitable for HML vehicles.

A second road bridge over the railway line would:

- Improve road safety for vehicles, pedestrians and cyclists
- Improve local and through traffic efficiency and travel times
- Improve access to regional NSW
- Enhance freight efficiency and productivity
- Support growth in regional NSW
- Remove the only remaining HML deficient bridge on the Oxley Highway
- Support the mining industry by providing connecting infrastructure
- Improve rail corridor capacity in the Hunter Valley
• Improve rail safety by removing a level crossing.

Options considered
A multi-stage options development and assessment process was initiated in December 2012. This identified 19 preliminary concept options for a new bridge, using a wide range of alignments across the study area and a combination of inputs from the broader project team, community and other key stakeholders. Nine options were retained from the initial review for assessment at an internal technical workshop held in February 2013. Three options were then shortlisted to be taken forward for further investigation and consultation.

The three shortlisted options were compared using a multi-criteria analysis (MCA) and displayed for community feedback. In August 2014, Option C (Refined) was identified as the recommended option. Following the consideration of community feedback, Option C (Refined) was confirmed by Roads and Maritime as the preferred option in November 2014.

The preferred option takes into consideration the environment, community and other constraints of the study area as it would:

• Minimise environmental effects by reducing the proposal footprint near the Oxley Highway
• Avoid core koala habitat in Wandobah Reserve
• Maximise the connectivity along Blackjack Creek for koala movement through a wide bridge opening
• Minimise potential flooding effects by reducing building within Blackjack Creek and the drainage channels south of the Oxley Highway
• Optimise constructability by improving the curve of the bridge and providing greater railway clearance for the future duplication of the railway line
• Maximise structural efficiency by minimising impacts on existing infrastructure including Oxley Highway roundabout, View Street connection and the culvert across Blackjack Creek.

Construction activities
Building the proposal would involve the following key activities:

• Site establishment
• Utility and services relocation
• Road treatments and intersection upgrades
• Building the new bridge and approaches
• Site disestablishment.

Building is anticipated to take approximately 24 months and would be limited to 7am to 6pm Monday to Friday and 8am to 1pm Saturdays. However, minor night-time work is anticipated for the building of the Oxley Highway roundabout. No work is proposed on Sunday or on public holidays, except if the required rail corridor possession closedown falls on the weekend, when girders would need to be erected.

Statutory and planning framework
A review of relevant legislation determined that the proposal is subject to assessment under Part 5 of the *Environmental Planning and Assessment Act 1979*. The proposal would not require development consent as per the provisions of the *State Environmental Planning Policy (Infrastructure) 2007*. As such, Roads and Maritime is
the proponent and determining authority for this proposal.

The proposal has also been assessed against relevant NSW legislation and other environmental planning instruments and no further statutory approvals are required. The matters of national environmental significance protected under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* were considered and it was found that a referral to the Department of the Environment was not required.

Community and stakeholder consultation
The local Gunnedah community as well as Gunnedah Shire Council (Council), Australian Rail Track Corporation (ARTC) and Transport for NSW were actively engaged throughout the assessment of concept options and the identification of a preferred option for the new bridge. Their feedback has been considered in the concept design for the proposal and is addressed in this Review of Environmental Factors (REF).

The NSW Office of Environment and Heritage, Department of Primary Industries (Fisheries) and Office of Water were also consulted and their recommendations and requirements are addressed in the REF.

Roads and Maritime will continue to liaise with the local community and key stakeholders as the project progresses.

Environmental impacts
Overall, the proposal would not have a significant adverse environmental or social impact. The following describes the key results of the environmental investigations.

Noise
During construction, ‘noise management levels’ (as prescribed under the Interim Construction Noise Guidelines) are likely to be exceeded during the worst-case building scenarios. However, building noise would be temporary and mitigation measures would be implemented to minimise the nuisance to the local community.

Once the bridge is operational, there would be a minor increase in noise level at some sensitive receivers, while other properties are predicted to experience a reduction in noise due to the closure of the New Street rail crossing. While minor exceedances of the Road Noise Policy noise criteria are anticipated at residences during the day, no exceedances are predicted during the night. Furthermore, the predicted daytime and night-time LAeq noise levels show that no receivers would be subject to acute levels of noise.

Biodiversity
The proposal has been aligned and designed, as far as is practicable, to minimise the direct loss of habitat, and in particular, koala feed trees. Biodiversity assessments concluded that no threatened flora species or ecological communities listed under the *Threatened Species Conservation Act 1995, Fisheries Management Act 1994, Environment Protection Biodiversity Conservation Act 1999* or *Fisheries Management Act 1994* are likely to occur within the study area.

Approximately 0.41 hectare of Box Gum Woodland, listed as an endangered ecological community (EEC) under the *Threatened Species Conservation Act 1995* would be permanently impacted by the proposal and approximately 0.43 hectare would be temporarily impacted. The assessment concluded that given the modified condition of the EEC, the small area to be cleared and the rehabilitation measures
proposed, this would not result in a significant impact on the EEC within the local area surrounding Gunnedah.

The proposal could potentially remove approximately 0.63 hectare of structurally modified parkland habitat that is periodically utilised by the koala as an opportunistic food and sheltering resource when moving between more preferential habitats. This would include the removal of 26 secondary koala feed trees. The koala habitat that occurs in the study area was assessed in accordance with the appropriate guidelines and determined to not constitute potential koala habitat or core koala habitat as defined under State or Commonwealth legislation. Therefore, this habitat is not important for the maintenance of a local population of the koala and the proposal is unlikely to result in the decline of this species in the locality.

Landscape and visual
The proposal would change the visual and landscape characteristics of the locality and introduce a new feature into the landscape. To minimise impact on the landscape and views, the proposal includes urban design principles and objectives.

Socio-economic
The proposed bridge has been designed to minimise negative impacts on the local community and contribute to the long-term connectivity and accessibility of the town. However, two residences would need to be acquired to build a safe intersection into Barber Street from the bridge. Roads and Maritime is liaising directly with the affected property owners.

The need for access to Barber Street, following the closure of the New Street level crossing, was a key concern raised by Council and Barber Street businesses during community consultation in 2013 and 2014. Seeking feedback from the community on the new bridge has been an important part of the proposal’s development. Roads and Maritime would continue to liaise with the local community as the project progresses.

Traffic and access
The proposal would be built in a way that minimises the construction footprint and minimises impacts on traffic and transport. A Construction Traffic Management Plan would be prepared during detailed design to manage transport, traffic and access impacts.

Once operational, the bridge would deliver a number of positive benefits that would resolve a number of existing transport, traffic and access issues. These include:

- The provision of a bridge over the railway in Gunnedah that allows use by HML vehicles
- The removal of the existing New Street level crossing, which would eliminate vehicle, pedestrian and cyclist interaction with trains. This would eliminate delays experienced by all road users and increase safety.

Other impacts
The proposal would have a minor impact on the following issues, provided the mitigation measures outlined in this REF were implemented.

- Air quality and climate – There would be potential for dust generation during construction, but the impact would be effectively mitigated through the use of standard dust control procedures.
- Water quality – The project would pose low risk impacts on the health of Blackjack Creek and the Namoi River (the primary source of impact would be
associated with erosion and sedimentation during construction). This would be effectively managed through the implementation of Roads and Maritime’s soil and water management specification.

- Contamination – The risk of exposing contaminated soils is considered low.
- Hydrology and flooding – Afflux values around bridge piers would be less than 10 millimetres, which is insignificant. Afflux values near the southern approach embankment near the Oxley Highway roundabout would be approximately 40 millimetres due to the placement of the embankment within the path of Ashford’s Watercourse drainage line. These levels are manageable and would require the reinstatement of the drainage line.
- Greenhouse gas and climate change – During construction, the proposal would generate a small amount of greenhouse gas emissions through the combustion of fuels in plant and vehicles. Once operational, the bridge may result in a minor reduction in emissions by eliminating the need for vehicles to decelerate, idle and then accelerate at the New Street level crossing.
- Aboriginal heritage – There are no sites of Aboriginal heritage significance near the proposal, and the proposal is unlikely to have an impact on Aboriginal cultural heritage
- Non-Aboriginal heritage – The proposal would minimise direct impact on the Gunnedah Maize Mill, and its historical significance would be respected.

Justification and conclusion
The REF examines and takes into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the proposed activity. A number of potential environmental impacts from the proposal have been avoided or reduced during the concept design development and options assessment process.

The proposal as described in the REF best meets the project objectives but would still result in some impacts on:

- Water quality associated with erosion and sedimentation during construction
- Visual and landscape characteristics of the locality by introducing a new feature into the landscape
- Modified habitat and koala feed trees due to vegetation clearing for site establishment
- Local amenity due to noise, vibration and air quality disturbances during construction
- Traffic and access due to temporary road closures during construction
- Acquisition of private properties.

Mitigation measures detailed in this REF would ameliorate or minimise these expected impacts. The proposal would also facilitate HML access through Gunnedah, significantly improve safety for occupants of vehicles, pedestrians and cyclists, and reduce local traffic disruptions at the existing railway crossing. On balance, the proposal is considered justified.

The environmental impacts of the proposal are not likely to be significant and therefore it is not necessary for an environmental impact statement to be prepared and approval to be sought for the proposal from the Minister for Planning under Part 5.1 of the Environmental Planning and Assessment Act 1979. The proposal is unlikely to affect threatened species, populations or ecological communities or their
habitats, within the meaning of the *Threatened Species Conservation Act 1995* or *Fisheries Management Act 1994* and therefore a Species Impact Statement is also not required. The proposal is also unlikely to affect Commonwealth land or have an impact on any matters of national environmental significance.
Display of the review of environmental factors

This review of environmental factors is on display for comment between 9 June 2015 and 29 June 2015. You can access the documents in the following ways:

Internet


Display

The review documents can be viewed at the following locations:

- **Gunnedah Shire Council**
  63 Eligin Street

- **Gunnedah Shire Library**
  291 Conadilly Street

- **Gunnedah Motor Registry**
  387 Conadilly Street

Purchase

The review documents are available for purchase in hard copy ($25.00) or CD ($10.00) by contacting the project team on 1800 029 585.

How can I make a submission?

To make a submission on the proposal, please send your written comments to:

Gunnedah second road over rail bridge project:
Reply Paid 633
Brisbane QLD 4001

Submissions must be received by Monday, 29 June 2015.

Privacy information

All information included in submissions is collected for the sole purpose of assisting in the assessment of this proposal. The information may be used during the environmental impact assessment process by relevant Roads and Maritime Services staff and its contractors.

Where the respondent indicates at the time of supply of information that their submission should be kept confidential, Roads and Maritime Services will attempt to keep it confidential. However, there may be legislative or legal justification for the release of the information, for example under the Government Information (Public Access) Act 2009 or under subpoena or statutory instrument.

The supply of this information is voluntary. Each respondent has free access at all times to the information provided by that respondent but not to any identifying information provided by other respondents if a respondent has indicated that the representation should be kept confidential.

Any respondent may make a correction to the information that they have provided by
writing to the same address the submission was sent.

The information will be held by the Roads and Maritime, 76 Victoria St, Grafton NSW.

What happens next?
Following the submissions period, Roads and Maritime will collate submissions.

After consideration of community comments Roads and Maritime will determine whether the proposal should proceed as proposed, or whether any alterations to the proposal are necessary. The community will be kept informed regarding this Roads and Maritime Services determination.

If the proposal goes ahead, Roads and Maritime proceeds with final design and tenders are called for construction of the project.
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1 Introduction

1.1 Proposal identification

Roads and Maritime is proposing to build a second bridge over the railway line in Gunnedah to facilitate an unrestricted Higher Mass Limit (HML) truck route through the town and significantly improve local traffic efficiency and road safety.

As shown on Figure 1.1, Gunnedah is situated in northern NSW, 80 kilometres west of Tamworth. The town is bisected by the Hunter Valley Rail Corridor, which separates the town centre and business district in the north from the growing residential areas in the south. The Dr PH Stanley Bridge on Abbott Street (Oxley Highway), known locally and referred to here as the Abbott Street Bridge, is currently the only road overpass of the railway line in Gunnedah.

The Abbott Street Bridge was built in 1941 and cannot be used by HML freight vehicles. Therefore, heavy vehicles travelling on the Oxley Highway and the Kamilaroi Highway through Gunnedah need to use the heavy vehicle route via Boundary Road, Bloomfield Street, Warrabungle Street and New Street. When coal trains pass through town, the local and through traffic is delayed at the New Street level crossing.

The proposed second road over rail bridge would remove a missing link in the HML network at Gunnedah, facilitating an unrestricted link for HML freight vehicles between the New England Highway and the Newell Highway.

The key features of the proposal are to:

- Build a new road bridge over the railway line west of the Gunnedah Maize Mill, connecting the Oxley Highway with Warrabungle Street
- Rebuild the existing roundabout at the intersection of the Oxley Highway and New/View streets
- Build an intersection to provide access to Barber Street where the new route meets Warrabungle Street
- Build a roundabout at the intersection of the Kamilaroi Highway and Warrabungle Street
- Close the New Street level crossing.

Kamilaroi Highway roundabout

The Kamilaroi Highway roundabout is shown on the drawings for the ‘Gunnedah second road over rail bridge’ as part of the design requirements for the proposal. However, it is being assessed separately under a minor work REF.

This is because the roundabout is required to be built and operational approximately 12 months before the start of building of the proposed bridge in order to provide immediate benefits, independent of the proposed bridge.
Figure 1.1
PROPOSAL LOCATION
1.2 Purpose of the report

This REF was prepared by KBR on behalf of Roads and Maritime Northern Region. For the purposes of these works, Roads and Maritime is the proponent and the determining authority under Part 5 of the *Environmental Planning and Assessment Act 1979*.

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

The description of the proposal and associated environmental impacts have been carried out in context of Clause 228 of the Environmental Planning and Assessment Regulation 2000, the *Threatened Species Conservation Act 1995*, the *Fisheries Management Act 1994*, and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. In doing so, the REF helps to fulfil the requirements of Section 111 of the *Environmental Planning and Assessment Act 1979* 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 will be considered when assessing:

- Whether the proposal is likely to have a significant impact on the environment and therefore the necessity for an environmental impact statement to be prepared and approval to be sought from the Minister for Planning and Infrastructure under Part 5.1 of the *Environmental Planning and Assessment Act 1979*.
- The significance of any impact on threatened species as defined by the *Threatened Species Conservation Act 1995* and/or *Fisheries Management Act 1995*, in Section 5A of the *Environmental Planning and Assessment Act 1979* and therefore the requirement for a Species Impact Statement.
- The potential for the proposal to significantly impact a matter of national environmental significance or Commonwealth land and the need to make a referral to the Australian Government Department of Sustainability, Environment, Water, Population and Communities for a decision by the Commonwealth Minister for the Environment on whether assessment and approval is required under the *Environment Protection and Biodiversity Conservation Act 1999*. 
2 Need and options considered

2.1 Strategic need for the proposal

The Abbott Street Bridge is the only grade separated crossing of the railway line in Gunnedah. The bridge is not suitable for use by HML vehicles. Therefore, heavy vehicles travelling on the Oxley Highway and the Kamilaroi Highway through Gunnedah need to use the heavy vehicle route via Bloomfield Street, Boundary Road, Warrabungle Street and New Street, where there is a level crossing.

At the New Street level crossing, vehicles need to wait for trains to pass on the track. This is becoming an issue because the increased length and frequency of freight trains due to major coal developments in the Gunnedah Basin (with up to 1200 metre long trains every 23 minutes), has led to frequent extended closures of the level crossing to allow train passage. This is causing significant delays for heavy vehicles, local traffic and pedestrians.

With delays expected to continue to increase, there is a need to improve both local and through traffic efficiency by building of a railway underpass or overpass that is suitable for HML vehicles.

A number of overarching policies and strategic documents are relevant to the proposal and to the Gunnedah local government area, including:

- NSW 2021: A Plan to Make NSW Number One (NSW Government, 2011)
- NSW Long Term Transport Master Plan (TfNSW, September 2012)
- Bridges for the Bush Initiative (NSW Government, 2012)
- Gunnedah Community Strategic Plan 2012–2022 (Gunnedah Shire Council, 2011)
- Australian Rail Track Corporation (ARTC) 2014–2022 Hunter Valley Corridor Capacity Strategy (ARTC, June 2014).

A second bridge would support the above policies and strategies by:

- Reducing travel times
- Improving local and through traffic efficiency
- Improving road safety
- Providing essential access to regional NSW
- Enhancing freight productivity
- Supporting efficient and productive freight
- Supporting growth in regional NSW
- Removal of the only remaining HML deficient bridge on the Oxley Highway
- Supporting the mining industry by providing connecting infrastructure
- Improving traffic flows and safe access for pedestrians and cyclists using local roads
- Improving rail corridor capacity in the Hunter Valley
- Improving rail safety by removing a level crossing.

Part of the Bridges for the Bush Initiative (NSW Government, 2012) includes replacing or upgrading five key priority HML deficient bridges; the proposed Gunnedah second road over rail bridge is one of the initiative’s priorities. The
replacement or upgrade of the five HML deficient bridges would remove 8000 heavy vehicle trips from the freight task each year as higher mass limits can be achieved on heavy vehicles. This would allow for a reduction in the number of lighter mass loads that need to be transported over the Abbott Street Bridge. It is estimated that the removal or upgrade of the five bridges would return a $200 million saving in economic, social and environmental costs to the State over the next 30 years.

According to seven-day traffic volume data captured in 2010, approximately 5000 vehicles cross the New Street level crossing each day. The Oxley Highway and Kamilaroi Highway (both classified as State highways) traverse the centre of Gunnedah and carry an average of approximately 5000 and 7000 vehicles per day respectively. Given these traffic volumes, building of the proposal is key to easing congestion and improving the efficiency of local and through traffic.

2.2 Existing road and infrastructure

As shown on Figure 2.1, the local road network near the site for the proposal comprises Oxley Highway, South Street, New Street, Barber Street, Warrabungle Street, Kamilaroi Highway and Conadilly Street. All the streets are subject to a posted speed limit of 50 kilometres per hour.

Barber Street is located in the centre of Gunnedah and is aligned in a north-west to south-east direction. Barber Street features a 20 metre wide carriageway within a road reserve approximately 30 metres wide. A mix of both restricted and unrestricted kerbside parking is permitted on both sides of the street.

Warrabungle Street is also located in the centre of Gunnedah, but is aligned in a north-east to south-west direction. Warrabungle Street features a 20 metre wide carriageway within a road reserve approximately 30 metres wide. Unrestricted kerbside parking is permitted on both sides. Warrabungle Street has been used to provide an alternative access through town for heavy vehicles travelling on the Oxley Highway to the west of Gunnedah.

New Street is located west of the centre of Gunnedah and is aligned in a north to south direction. New Street features one of Gunnedah’s two at grade railway crossings. At its southern end, New Street connects to View Street, which is located south-west of the centre of Gunnedah and aligned in a north to south direction.
Figure 2.1
EXISTING ROADS AND INFRASTRUCTURE
2.3 Proposal objectives

The key objectives for the proposal were established by Roads and Maritime in collaboration with key stakeholders. They are to:

- Provide a grade separated HML route through Gunnedah
- Improve local traffic efficiency
- Improve road safety
- Improve road transport productivity, efficiency and reliability of travel
- Minimise the impact on the natural, cultural and built environment
- Provide value for money.

To help achieve these objectives, the following supporting objectives were developed for each:

Provide a grade separated HML route through Gunnedah:

- Provide a compliant engineering design
- Provide a grade separation with minimum complexity in construction, including site access and staging work
- Provide a design which requires minimum ongoing operation/maintenance work and minimises the work health and safety risk for maintenance personnel.

Improve local traffic efficiency/transport productivity and reliability:

- Increase network capacity
- Improve traffic flow
- Reduce traffic durations/delays.

Improve road safety:

- Minimise vehicle conflict points
- Provide suitable and safe pedestrian and cycle routes.

Minimise the impact on the natural, cultural and built environment:

- Minimise visual impact
- Minimise ecological impact
- Minimise impact on heritage
- Minimise noise and air quality impact
- Minimise impact on drainage/water quality/flooding
- Minimise impact on property
- Minimise impact on the social environment.

Provide value for money:

- Provide a design that is affordable and within the capital budget for the proposal
- Provide a justifiable benefit–cost ratio for the life of the structure.
2.4 Alternatives and options considered

This section describes the development and assessment of concept options for the new route that led to the identification of the preferred option.

2.4.1 ‘Do nothing’ option

The ‘do nothing’ option was initially assessed.

It was found that if the proposal was not built, the township would continue to experience lengthy traffic delays at the New Street railway crossing as a result of the coal trains that frequently use the railway line. This situation is expected to worsen, with increased rail movements predicted over the next 10 years as more mining operations are established.

In addition, HML vehicles would continue to use the current heavy vehicle route via Bloomfield Street, Boundary Road, Warrabungle Street and New Street, resulting in continued delays in traffic and reduced road safety for both vehicles and pedestrians.

This was therefore discarded as a viable option to address the current transport and safety issues.

2.4.2 Methodology for selection of preferred option

Study area announcement

In December 2012, Roads and Maritime announced the study area for the project (Figure 1.1). This area was identified because it best met the project objectives. In particular, the provision of a grade separated HML route through Gunnedah because of the area’s ability to connect the Oxley Highway and Kamilaroi Highway for HML use and its potential to improve local road safety and traffic efficiency due to its proximity to the New Street level crossing.

Preliminary technical and environmental investigations were carried out to identify the likely constraints and opportunities within the study area. These were found to be:

- Gunnedah Maize Mill (the Mill) (also historically known as Meggitts Flour Mill), which is located in the middle of the study area
- Blackjack Creek, which is an identified floodplain that becomes inundated during large storms and backwater flooding from the Namoi River
- Vegetation mapped as NSW listed endangered ecological community (White Box Yellow Box Blakely’s Red Gum Woodland), and potential koala migration corridors, which are located within the study area
- Lack of pedestrian and cyclist connectivity between residential areas south of the railway line and the business district north of the railway line
- ARTC vertical and horizontal clearances for single- and double-stacked trains, and provisions to duplicate the line in the future
- Visual and spatial relationship between Pensioner’s Hill, the floodplain and built vertical elements, which are features that characterise the town.

Preliminary concept options

Nineteen preliminary concept options were developed using a wide range of alignments across the study area and a combination of inputs from the broader project team, community suggestions, Roads and Maritime and other key stakeholders.
These preliminary concept options were divided into three general road corridors based on their horizontal alignment:

- **New Street** – These options use the same alignment as the existing level crossing
- **Behind Mill** – These options are to the west of the heritage listed Mill
- **Farrar Road** – These options are via Farrar Road instead of directly connecting to the Oxley Highway.

An initial review of the 19 options identified several that either did not meet the minimum design requirements or the objectives of the proposal. Figure 2.2 shows the initial 19 options.

Nine options were retained from the initial review for assessment at an internal technical workshop held in February 2013 (Figure 2.3). The objective of the workshop was to confirm and agree on a shortlist of up to four options to take forward to the next stage of the project. This workshop was attended by representatives from the project team, Roads and Maritime, Transport for NSW and Council. The assessment of these options considered the project objectives and the key constraints of the study area identified above.

**Shortlisted options**

Following the technical workshop, three options were shortlisted to be taken forward for further investigation and consultation. These options are described below and illustrated in Figure 2.4.

- **Option A** – A new bridge in place of the New Street level crossing. The bridge would span from just south of Barber Street to the Oxley Highway roundabout, which would be raised
- **Option B** – A new bridge west of the Mill to connect the Oxley Highway roundabout with Warrabungle Street, north of the Barber Street intersection. The route alignment would run close to the railway on its southern side, creating a highly skewed crossing of the railway line
- **Option C** – A new bridge west of the Mill to connect the Oxley Highway roundabout with Warrabungle Street. The bridge alignment would start on View Street and make a wide arc west of the Mill. A new roundabout would be built on the Oxley Highway and the existing roundabout removed.
Figure 2.2
INITIAL 19 PRELIMINARY OPTIONS
Figure 2.3
NINE PRELIMINARY OPTIONS ASSESSED AT INTERNAL TECHNICAL WORKSHOP
Figure 2.4
THE THREE SHORTLISTED OPTIONS
2.4.3 Analysis of options

A multi-criteria analysis (MCA) was carried out to compare the three shortlisted options and select the preferred option.

Development of MCA criteria and weightings

The proposal objectives provide context for the development of the design and assessment by confirming the issues that are important to Roads and Maritime, key stakeholders and the community. These objectives formed the basis for the development of the five main MCA categories used in the assessment. Below are the five MCA categories and their links to the proposal objectives:

- Engineering → provide a grade separated HML route through Gunnedah
- Traffic, transport and safety → improve local traffic efficiency and transport productivity and reliability while improving road safety
- Natural environment → Minimise the impact on the natural environment (ecology, flooding and drainage, noise and vibration)
- Built/cultural environment → Minimise the impact on the cultural and built environment (heritage, visual amenity and urban design, community, property and business impacts)
- Value → Provide value for money.

For each of these five MCA categories, the study team established 14 MCA assessment criteria to assess the concept options; they were guided by the proposal's supporting objectives. The 14 criteria are listed in Table 2.1.

<table>
<thead>
<tr>
<th>Assessment category</th>
<th>Criteria</th>
</tr>
</thead>
</table>
| Engineering         | 1. Design performance :
|                     | o Quantitative assessment of how each option would comply with the Roads and Maritime design criteria
|                     | o Qualitative assessment of how each proposed alignment would function as intended through moving a design vehicle through the road network
|                     | 2. Constructability and staging – In relation to:
|                     | o Flooding and drainage
|                     | o Geotechnical
|                     | o Utilities
|                     | o Structure
|                     | o Staging
|                     | o Safety
|                     | o Properties
|                     | o Environmental
|                     | o Traffic
|                     | o Other |
### Assessment category | Criteria
--- | ---
**Traffic, transport and safety** | 3. Vehicles and road safety*  
4. Traffic flow and connectivity  
5. Pedestrian and cyclist access  
6. HML network efficiency  
*As part of the desktop and site investigation, a review of major road safety issues was carried out by GTA Consultant to facilitate the selection of a safe design for all road users, including pedestrians, cyclists and motorists. Road safety issues were identified for each option and were characterised by:  
- Vehicle priority  
- Sight lines  
- Conflicts with local access  
- Pedestrians and cyclist safety considerations  
Two primary indicators were used to compare each of the shortlisted options:  
- How directly would heavy vehicle traffic be linked from one side of Gunnedah to the other  
- How accessible would the HML route be for those freight vehicles travelling to or through Gunnedah**

**Natural environment** | 7. Ecology  
8. Flooding and drainage  
9. Noise and vibration

**Built/cultural environment** | 10. Heritage  
11. Visual amenity and urban design  
12. Community, property and business impacts

**Value** | 13. Capital cost  
14. Lifestyle costs and benefits

The proposed MCA categories and supporting criteria were then distributed to the proposal team, Roads and Maritime and key stakeholders for review.

Following initial agreement on the MCA criteria, the proposal team reviewed the responses received from community consultation to confirm alignment with the values of the local community members and businesses.

The overwhelming focus of community feedback was in relation to the need to improve vehicular and pedestrian traffic connectivity and flow. Proposal cost and environmental concerns also rated as key issues. The proposal team therefore concluded that the MCA criteria provided a close correlation with the issues of most importance to the community and stakeholders; the MCA criteria were therefore adopted with endorsement from Roads and Maritime.

To ensure the assessment process remained objective, weightings were applied to each of the MCA criteria before assessing the three shortlisted options in detail.
Multi-criteria assessment

A detailed assessment was carried out for each of the 14 criteria. Each assessment was completed independently of the overall MCA to ensure results were not influenced by their relative weightings and performance against other criteria.

The results of the combined MCA process and consideration of community feedback on the three shortlisted options (refer to Section 5) determined that:

- Option A would have significant constructability challenges and the requirement for very steep grades to maintain the required clearances over the railway line
- Option B would have design and constructability challenges associated with its skewed alignment over the railway line. It would be within a heritage buffer zone for the Mill and would not provide direct access to Barber Street
- Option C would be the best option in terms of constructability and visual impact but would not provide direct access to Barber Street
- The closure of the New Street level crossing would have an impact on Barber Street businesses, with business from this area needing to relocate within the Gunnedah central business district.

Given these findings, Option C was further developed to utilise the existing Oxley Highway roundabout to achieve the proposal objectives and reduce its footprint. An intersection was also designed to provide direct access to Barber Street to mitigate the impact of the level crossing closure on Barber Street businesses. This improved option was named Option C (Refined).

Option C (Refined) was then assessed using the MCA process. It was found that Option C (Refined) would:

- Generate better results than Option A and B
- Provide many features found in Option A and B. However, with the alignment west of the Mill, visual and heritage impacts would be minimised
- Perform less favourably in relation to cost criteria and would have more impact on criteria related to Blackjack Creek than Option A and B
- Rate well against any other criteria with either a fair or better rating than Option A and B.

In August 2014, Roads and Maritime announced Option C (Refined) as the recommended option and the community was invited to provide feedback.

2.5 Preferred option

In November 2014 following the consideration of community feedback on the recommended option, Option C (Refined) was confirmed by Roads and Maritime as the preferred option.

Option C (Refined) would extend from an upgraded roundabout at the Oxley Highway to a new bridge over the railway line west of the Mill and then join Warrabungle Street with a new roundabout at the intersection of the Kamilaroi Highway.

Option C (Refined) would also provide direct access to Barber Street through an intersection where the new route meets Warrabungle Street. As mentioned above, the inclusion of the connection to Barber Street is the result of feedback from the community and key stakeholders during the 2013 consultation period. It would be
necessary to acquire two residences in Barber Street to build the Barber Street intersection.

The preferred option meets the key proposal objectives as it would:

- Facilitate access for HML vehicles through Gunnedah
- Significantly improve vehicle, pedestrian and cyclist traffic safety
- Provide uninterrupted access to the Barber Street business precinct, thereby minimising impact on businesses
- Reduce delays for local and through traffic.

The preferred option takes into consideration the environment, community and other constraints of the study area as it would:

- Minimise environmental effects by reducing the proposal footprint near the Oxley Highway and avoid core koala habitat in Wandobah reserve
- Enhance the connectivity along Blackjack Creek for koala movement through a wide bridge opening
- Minimise potential flooding effects by reducing building within Blackjack Creek and the drainage channels south of the Oxley Highway
- Optimise constructability by improving the curve of the bridge and providing greater railway clearance for the future duplication of the railway line
- Maximise structural efficiency by minimising impacts on existing infrastructure including the Oxley Highway roundabout, View Street connection and the culvert across Blackjack Creek.

2.6 Design refinements

The preferred option represents a design concept (not a finished design) and, as such, refinements to the design are continuing to take place.

Nevertheless, the proposal described in Chapter 3 is adequately representative of the proposed work to inform this REF.
3 Description of the proposal

3.1 The proposal

The proposal would connect the Oxley Highway roundabout with the Kamilaroi Highway via a road bridge over the railway line to the west of the Gunnedah Maize Mill (the Mill).

As shown on Figure 3.1, the proposal also includes upgrading the Oxley Highway roundabout, a new intersection access to Barber Street and a new roundabout at the Kamilaroi Highway and Warrabungle Street intersection. (As discussed in Chapter 1, the proposed roundabout at the Kamilaroi Highway and Warrabungle Street is not assessed in this REF and will be assessed in a separate REF.)

The key features of the proposal are as follows:

- a seven span, 198 metre long bridge, with a width varying from two lanes and a shared path to three lanes and a shared path (approximately 15 metres to 19 metres)
- bridge construction based on pre-cast concrete girders approximately 25 to 30 metres long and cast in situ concrete piers and deck
- bridge foundation construction based on piles (most likely bored)
- building of a 70 metre long northern road approach embankment and 200 metre long southern road approach embankment
- establishment of temporary building compound, stockpiles and material laydown
- upgrade of existing utilities such as streetlights, 11 kilovolt and 22 kilovolt overhead and underground electricity supply, water mains and communications
- realignment of a 0.5 metre diameter bulk water main
- installation of pedestrian paths
- stormwater drainage works along the new route
- upgrade of the existing Oxley Highway roundabout intersection to a 25 metre radius inscribed circle roundabout, including a 100 metre realignment of South Street
- multi-stage building and traffic management upgrade of the existing Oxley Highway roundabout
- building of a new T-intersection into Barber Street
- acquisition of two residential properties in Barber Street to build the proposed intersection
- partial acquisition of land from the Mill and Marcroft Caravan Park
- New Street level crossing will be closed and removed.
Figure 3.1
PROPOSAL DESIGN
3.2 Design

3.2.1 Design criteria

The proposal design was prepared with reference to the following guidelines:

- Austroads Guide to Road Design (Roads and Maritime, 2009)
- Roads and Maritime Supplements to Austroads Guides (Roads and Maritime, 2009).

Table 3.1 provides a summary of the key design criteria used in developing the concept design and proposal alignment.

<table>
<thead>
<tr>
<th>Design Criteria</th>
<th>Design Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horizontal alignment – design speed</td>
<td>50 km/h</td>
</tr>
<tr>
<td>Vertical alignment – design speed</td>
<td>50 km/h</td>
</tr>
<tr>
<td>Minimum horizontal curve radius</td>
<td>60 m</td>
</tr>
<tr>
<td>Minimum vertical curve</td>
<td>Crest 520 m</td>
</tr>
<tr>
<td></td>
<td>Sag 400 m</td>
</tr>
<tr>
<td>Crest 'K' parameter</td>
<td>5.2</td>
</tr>
<tr>
<td>Sag 'K' parameter</td>
<td>4.0</td>
</tr>
<tr>
<td>Lane width</td>
<td>3.5 m</td>
</tr>
<tr>
<td>Maximum vertical grade</td>
<td>10%</td>
</tr>
<tr>
<td>Minimum sight distance</td>
<td>48 m</td>
</tr>
<tr>
<td>Design vehicle</td>
<td>B-double</td>
</tr>
<tr>
<td>Check vehicle</td>
<td>B-triple</td>
</tr>
</tbody>
</table>

# Except for horizontal curve at Barber Street intersection which is 60 km/hr.

3.2.2 Engineering constraints

The following engineering constraints were identified:

- The presence of low strength soils and uncontrolled fill near the surface, and the expected high bridge loadings
- Significant depth to bedrock
- Shallow groundwater during excavations
- Piling work close to residential properties at the northern end of the alignment, with associated noise and vibration issues
- Building close to Blackjack Creek, which would need to consider:
  - Loading of potentially compressible soils
  - Creek embankment stability
  - Stability and founding levels of retained soil walls
  - Building access when working from the creek bed
Clearances required by ARTC to cross the existing railway with sufficient provision to account for future railway upgrades, namely:

- a horizontal clearance of not less than 17 metres is required to allow duplication of the railway through Gunnedah from the existing one track configuration to two tracks with a parallel vehicle access road for maintenance
- single stacking clearance of 5.15 metres is applicable to the proposal as shown on Figure 3.2.

![Figure 3.2](image)

**Figure 3.2**
**ARTC DESIGN REQUIREMENTS FOR SINGLE AND DOUBLE STACKING CLEARANCES**

### 3.3 Construction activities

#### 3.3.1 Work methodology

Building the proposal would involve the following activities:

- Site establishment
- Utility and services relocation
- Road treatments and intersection upgrades
- Building the new bridge and approaches
- Site disestablishment.

This work would result in temporary disturbances. The area of likely disturbance is shown on Figure 3.3. The above activities are presented in more detail on the following pages.
Figure 3.3
PROPOSAL IMPACTS

Gunnedah second road over rail bridge
Review of Environmental Factors
During site establishment, the main tasks would be to:

- Consult with Council and other agencies to announce the start date on site
- Install perimeter fencing around the site
- Install temporary traffic deviations and warning signs
- Install erosion, sedimentation and drainage controls
- Remove and mulch vegetation
- Import fill and carry out earthwork and surface compaction to establish site compound and prepare for the building of the bridge approach
- Establish site compound (shown on Figure 3.3)
- Establish stockpile sites and access tracks
- Relocate utilities and services including:
  - Bulk water mains
  - One power pole; and remove approximately 15 street lights from the Oxley Highway intersection (there would be potential undergrounding of power lines)
  - Power poles and street lights from the Barber Street intersection
  - Other utilities such as stormwater, water mains, sewer and Telstra cables.

During road treatments and intersection upgrades, the main tasks would be to:

- Inform Council and local residents of the work
- Install signage
- Obtain approval from Council and implement traffic control arrangements
- Build fibre-reinforced concrete road surface for the Oxley Highway roundabout
- Install drainage
- Excavate the surface using graders, excavators, backhoes and ancillary equipment
- Reinstate the Mill road areas where the proposal would join existing roads (this work would be carried out at various stages of the program)
- Recycle suitable excavated material and incorporate suitable material in earthwork
- Truck any unsuitable materials off site
- Compact the surface using vibratory equipment and drum rollers
- Install roadside drainage
- Build the road surface using pavers and rollers
- Progressively landscape and revegetate in consultation with Council
- Install line marking, street lighting, signs and guide posts.

During bridge building, the main tasks would be to:

- Confirm all ARTC requirements for access to rail property
- Build a temporary access road alongside the bridge alignment
- Pre-cast the girders (this would occur off site)
- Build temporary gravel platforms for piling
- Carry out piling operations
- Prepare for pile cap construction; this would include excavation and casting the blinding layer, breaking back the pile reinforcement (if required), and placing reinforcement and formwork
- Carry out dewatering and sheet piling
- Complete concreting, curing and stripping of formwork for pile caps
- Erect formwork, place reinforcement, and carry out concreting, curing and

Gunnedah second road over rail bridge
Review of Environmental Factors
stripping of formwork for piers
- Erect bearings on the headstocks
- Transport pre-cast deck girders directly to erection location or to a temporary site compound
- Build temporary gravel platforms for crane
- Erect pre-cast concrete girders using large cranes (300 to 500 tonnes) on constructed gravel pads in sequence
- Implement all ARTC rail site protection requirements, including the provision of site Protection Officers before accessing rail property
- Construct diaphragms (at the end of each span) using small hand tools, and concreting
- Install reinforcement and pour concrete for decks, span by span
- Carry out finishing operations including bitumen laying and line marking, and install street lighting, stormwater pipes, barriers and screens.

During site disestablishment, the main tasks would be to:
- Remove site compound
- Complete progressive landscaping and revegetation
- Remove traffic controls and signage
- Remove environmental controls.

3.3.2 Construction hours and duration

Building is anticipated to take approximately 24 months. It is proposed that work would only be carried out during daylight hours, as per standard construction hours stipulated in the Interim Noise Construction Guideline (Department of Environment Climate Change and Water 2010). The hours proposed are:

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

The possible exception would be minor night-time work to build the Oxley Highway roundabout.

No work is proposed on Sunday or on public holidays, except if the rail corridor possession closedown falls on the weekend, when girders would be erected.

3.3.3 Plant and equipment

The following plant and equipment may be required to build the proposal:

- Trucks (for equipment and material transportation)
- Excavators
- Compactors, vibratory and drum rollers
- Graders
- Road milling machines
- Mobile cranes
- Compressors
- Generators
- Hand tools such as jackhammers and grinding power tools
- Shoring
- Scaffolding
- Sheet piling
- Traffic control equipment
• Paints
• Pre-cast concrete and cement
• Concrete trucks and concrete pumps
• Piling rigs
• Site compound equipment (portable toilets, crib room, lockup container)
• Environmental controls (sediment fences, sandbags)
• Water cart
• Welding equipment.

3.3.4 Earthwork

Earthwork would be required to form the southern and northern approach ramps to the proposed bridge and at the western end of Barber Street to build the intersection to link this street to Warrabungle Street. Earthwork would also be required to upgrade the Oxley Highway roundabout, to realign South Street and to install drainage along the proposed road alignments.

During the building phase, temporary earthwork and filling would be required to form the access tracks, crane pads and piling pads necessary to facilitate the building of the bridge. These access tracks and pads would likely consist of gravel pavement up to 450 millimetres thick.

3.3.5 Source and quantity of materials

The proposal would require approximately 7700 cubic metres of fill which would be sourced from local quarries. Other building materials would also need to be imported, including materials needed for road construction, gravel, rock, concrete and pre-cast concrete bridge components. The source of materials is yet to be determined but it would most likely be locally sourced. All materials and equipment would be brought to the work site via road.

A local water source would also be required for the proposal.

3.3.6 Traffic management and access

The proposal area is readily accessible via a number of different routes including the Oxley Highway, Kamilaroi Highway and local roads. Access to the Blackjack Creek area for cranes and heavy machinery would be via temporary tracks extending from the southern part of New Street.

The proposed construction methodology has been developed to minimise road closures as far as practicable. Earthwork and roadwork on the Oxley Highway roundabout would be scheduled to start so that the New Street level crossing would remain open to the general public for as long as possible.

The indicative staging strategy presented below is based on the Oxley Highway remaining open in both directions during the reconfiguration of the roundabout. Therefore traffic entering Gunnedah along the Oxley Highway from the west would be able to access the Kamilaroi Highway via Abbott Street. Closure of View Street is proposed for a minimum period.

The indicative staging of Oxley Highway intersection work is summarised below:

• Stage 1 – Build temporary side track on northern side of Oxley Highway/ South Street, to prepare for a T junction
• Stage 2 – Close View Street temporarily, implement a T junction with New Street and Oxley Highway along the prepared side track, to allow maximum
area for building the roundabout concrete road surface

- **Stage 3** – Re open View Street and implement a four-way operation to build the roundabout concrete road surface around it
- **Stage 4** – Close New Street for minimum possible time (six to eight weeks) while remaining concrete road surface is built
- **Stage 5** – When the bridge opens, build roundabout islands and remove any remaining temporary side tracks.

All traffic management would be managed in accordance with a Traffic Management Plan (TMP) in the Construction Environmental Management Plan (CEMP) and the Traffic Control at Construction Sites Manual V4 (RTA, 2010). The Traffic Management Plan would be prepared based on the findings of Section 6.12 of this REF.

### 3.4 Ancillary facilities

A fenced site compound would be provided in the following locations:

- To the west of New Street on the southern side of the railway line. This area would be on the railway property. Approval to use this area is required from the ARTC.
- On the site of the two properties to be acquired being 2 and 4 Barber Street and vacant land directing to the north of 4 Barber Street.

The uses within the site compounds would include crib rooms, site offices, toilets and secure, bunded areas for storage of fuel and chemicals. The compound would also serve as a parking area for site personnel and machinery and act as a laydown and temporary stockpile area for building materials and fill.

Upon completion of the proposed works, the site compounds would be cleared of all materials, including rubbish, and rehabilitated.

Site compound locations are shown on Figure 3.3 above.

### 3.5 Public utility adjustment

Table 3.2 presents a summary of the utilities which would need to be adjusted.

<table>
<thead>
<tr>
<th>Utilities</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major water rising main</td>
<td>500 mm diameter DICL water rising main and a smaller main behind the Mill</td>
</tr>
<tr>
<td></td>
<td>(this includes a 150 mm diameter uPVC golf course supply pipe laid in the</td>
</tr>
<tr>
<td></td>
<td>same trench as the rising main)</td>
</tr>
<tr>
<td>Water main</td>
<td>100 mm and 150 mm diameter water mains under Railway Street,</td>
</tr>
<tr>
<td></td>
<td>Warrabungle Street, Barber Street, Stockman Close, New Street and the</td>
</tr>
<tr>
<td></td>
<td>floodplain.</td>
</tr>
<tr>
<td>Sewer</td>
<td>150 mm and 225 mm diameter sewer mains under Railway Street,</td>
</tr>
<tr>
<td></td>
<td>Warrabungle Street, Barber Street, Stockman Close, New Street and the</td>
</tr>
<tr>
<td></td>
<td>floodplain.</td>
</tr>
<tr>
<td>Stormwater</td>
<td>Stormwater pipes and pits along various local streets</td>
</tr>
<tr>
<td>Telecom</td>
<td>Telstra cables, electrical poles and underground earth wires</td>
</tr>
<tr>
<td>Power supply and street lights</td>
<td>Approximately 18 power poles / street lights are likely to be affected by the</td>
</tr>
<tr>
<td></td>
<td>proposal</td>
</tr>
</tbody>
</table>

Further refinement and confirmation of service agencies requirements will be carried
out during the next phase of design.

3.6 Property acquisition

Building the proposal would require the acquisition of the privately owned properties shown on Figure 3.4 and listed below.

- Lot A: DP323258 (total acquisition)
- Lot B: DP323258 (total acquisition)
- Lot 1: DP864627 (partial acquisition)
- Lot 1: DP1071991 (partial acquisition)
- Lot 1: DP1191803 (partial acquisition).
Figure 3.4
PROPERTIES TO BE COMPLETELY AND PARTIALLY ACQUIRED
4 Statutory and planning framework

This chapter provides the statutory and planning framework for the proposal and determines whether the assessment is subject to an environmental impact assessment under Part 5 of the *Environmental Planning and Assessment Act 1979*.

4.1 State environmental planning policies

4.1.1 State Environmental Planning Policy (Infrastructure) 2007

*State Environmental Planning Policy (Infrastructure) 2007* (ISEPP) aims to facilitate the effective delivery of infrastructure across the State. Clause 94 of ISEPP permits development on any land for the purpose of a road or road infrastructure facilities to be carried out by or on behalf of a public authority without consent.

As the proposal is for road infrastructure and is to be carried out by Roads and Maritime, it can be assessed under Part 5 of the *Environmental Planning and Assessment Act 1979*. Development consent from council is not required.

The proposal would not be located on land reserved under the *National Parks and Wildlife Act 1974* and would not affect land or development regulated by *State Environmental Planning Policy No. 14 – Coastal Wetlands, State Environmental Planning Policy No. 26 – Littoral Rainforests, State Environmental Planning Policy (State and Regional Development) 2011* or *State Environmental Planning Policy (Major Development) 2005*.

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

Clause 85 (Development immediately adjacent to rail corridors) and Clause 86 (Excavation in, above or adjacent to rail corridors) of the ISEPP also apply to the proposal as it would traverse the ARTC managed rail corridor.

Clause 85 and 86 require that before determining a development application, the consent authority must give written notice of the application to the chief executive officer of the rail authority for the rail corridor and take into consideration any response to the notice received within 21 days. Additionally, Clause 86(3) requires concurrence of the chief executive office of the rail authority, unless that rail authority is ARTC. As such, concurrence is not required. ARTC has been consulted throughout the design and options assessment process for the bridge. A summary of this consultation is discussed in Chapter 5.

4.1.2 State Environmental Planning Policy No.44 – Koala Habitat Protection

The aim of *State Environmental Planning Policy No. 44 – Koala Habitat Protection* (SEPP 44) is to encourage the conservation and management of natural vegetation areas that provide habitat for koalas to ensure permanent free-living populations will be maintained over their present range. The policy applies to 107 local government areas. Local councils cannot approve development in an area affected by the policy without an investigation of core koala habitat. The policy provides the State-wide approach needed to enable appropriate development to continue, while ensuring there is ongoing protection of koalas and their habitat. A Draft Koala Plan of Management for Gunnedah Shire Council was prepared in 2013 as per the provisions of SEPP 44.
SEPP 44 does not apply to the proposal as it only applies to development requiring consent by the local government. However, the provisions for conservation of koalas would be considered and acknowledged under Section 111 of the Environmental Planning and Assessment Act 1979 as part of the duty to consider the environmental impact of an activity. This is discussed further in Section 6.5 and Appendix A (Biodiversity Assessment Report).

4.1.3 State Environmental Planning Policy (Rural Lands) 2008

The aim of the Rural Lands SEPP is to facilitate the orderly and economic use and development of rural lands for rural and related purposes. The policy applies to the Gunnedah Shire local government area. The SEPP contains a set of rural planning principles. These are:

(a) the promotion and protection of opportunities for current and potential productive and sustainable economic activities in rural areas
(b) recognition of the importance of rural lands and agriculture and the changing nature of agriculture and of trends, demands and issues in agriculture in the area, region or State
(c) recognition of the significance of rural land uses to the State and rural communities, including the social and economic benefits of rural land use and development
(d) in planning for rural lands, to balance the social, economic and environmental interests of the community
(e) the identification and protection of natural resources, having regard to maintaining biodiversity, the protection of native vegetation, the importance of water resources and avoiding constrained land
(f) the provision of opportunities for rural lifestyle, settlement and housing that contribute to the social and economic welfare of rural communities
(g) the consideration of impacts on services and infrastructure and appropriate location when providing for rural housing
(h) ensuring consistency with any applicable regional strategy of the Department of Planning or any applicable local strategy endorsed by the Director-General.

The proposal is consistent with these principles and acknowledges the requirement for orderly and economic use of the rural lands associated with the proposal area.

4.2 Local environmental plans

4.2.1 Gunnedah Local Environmental Plan 2012

The Gunnedah Local Environmental Plan 2012 (LEP) is the relevant planning scheme for the proposal. The land use zoning and relevant local policies are of interest to development principles. However, the proposal would not to be determined by Council under the LEP.

Even though approval is not being sought under the LEP, an assessment of the consistency of the proposal with the aims of the LEP is provided in Table 4.1. This assessment shows the proposal is broadly consistent with the aims of the LEP and is not in direct conflict with it.
Table 4.1 How Gunnedah Local Environmental Plan 2012 relates to the proposal

<table>
<thead>
<tr>
<th>Aim</th>
<th>Relevance to the proposal</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) to conserve and enhance, for current and future generations,</td>
<td>The proposal is consistent with this aim and the objectives of ecologically sustainable development, including intergenerational equity.</td>
</tr>
<tr>
<td>the ecological integrity, environmental heritage and environmental</td>
<td>The environmental significance of Gunnedah would be conserved and enhanced through the management of potential impacts as discussed in Section 6.5.</td>
</tr>
<tr>
<td>significance of Gunnedah</td>
<td>Environmental heritage has been considered particularly as part of the non-Aboriginal heritage assessment in Section 6.10. The proposal has been designed so that the integrity and heritage significance of the Gunnedah Maize Mill is retained.</td>
</tr>
<tr>
<td>(b) to promote the economic well-being of the community in a</td>
<td>The socio-economic impacts of the proposal are considered in Section 6.13.</td>
</tr>
<tr>
<td>socially and environmentally responsible way, focusing on new</td>
<td>The proposal would support current businesses within Barber Street and the future growth of the associated business development area. The proposal supports the broader diversified economy through facilitating the HML route through Gunnedah.</td>
</tr>
<tr>
<td>employment growth and a diversified economy</td>
<td></td>
</tr>
<tr>
<td>(c) to encourage the proper management of productive agricultural</td>
<td>The proposal would not affect the management of productive agricultural land nor would it result in the fragmentation of agricultural holdings.</td>
</tr>
<tr>
<td>land and prevent the fragmentation of agricultural holdings</td>
<td>The improvement in flows of heavy vehicles through Gunnedah would help primary production in the region more broadly.</td>
</tr>
<tr>
<td>(d) to provide opportunities for a range of new housing and housing</td>
<td>The proposal is not related to the provision of housing and would not facilitate any new opportunities for housing.</td>
</tr>
<tr>
<td>choice</td>
<td></td>
</tr>
<tr>
<td>(e) to facilitate the provision and coordination of community</td>
<td>The proposal would not affect the provision and coordination of community and services and facilities.</td>
</tr>
<tr>
<td>services and facilities</td>
<td>The availability of community services and facilities would remain unchanged as a result of the proposal as discussed in Section 6.13.</td>
</tr>
<tr>
<td>(f) to seek the provision of adequate and appropriate infrastructure</td>
<td>The proposal is directly related to this aim as it would provide new road infrastructure required to ensure there is an HML route through Gunnedah. This is discussed further in Section 2.1 and Section 6.12.</td>
</tr>
<tr>
<td>to meet the needs of future development</td>
<td></td>
</tr>
<tr>
<td>(g) to provide direction and guidance in the management of</td>
<td>The proposal would support growth and development in Gunnedah as discussed in Chapter 2 and Section 6.13.</td>
</tr>
<tr>
<td>growth and development</td>
<td></td>
</tr>
<tr>
<td>(h) to conserve the cultural and environmental heritage of</td>
<td>As discussed in Section 6.10, one item of heritage significance has been identified within the proposal investigation area. The safeguards proposed, and the proposal design, would minimise potential impact on heritage and conserve heritage values.</td>
</tr>
<tr>
<td>Gunnedah</td>
<td></td>
</tr>
<tr>
<td>(i) to allow development in a way that minimises risks due to</td>
<td>Potential environmental risks of the proposal have been identified and minimised as outlined in Chapter 6.</td>
</tr>
<tr>
<td>environmental hazards.</td>
<td></td>
</tr>
</tbody>
</table>

Land use zoning and development

The proposal footprint and surrounding area comprises the following land use zonings:

- B5 – Business Development
- SP2 – Infrastructure
• IN1 – General Industrial
• RE1 – Public Recreation
• RU1 – Primary Production.

Within all these zones, development for the purpose of ‘roads’ is ‘permitted without consent’, except for SP2 – Infrastructure, which requires consent. However, the provisions of the Infrastructure SEPP apply to this proposal, allowing activities by or on behalf of government bodies/authorities to be determined under Part 5 of the Environmental Planning and Assessment Act 1979 and not by Council. Figure 4.1 shows the land use zonings that apply within the proposal footprint and surrounds.
Figure 4.1
LAND USE ZONINGS
The land use zones and their objectives are presented in Table 4.2.

<table>
<thead>
<tr>
<th>Zone</th>
<th>Objectives</th>
<th>Relevance to the proposal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>B5 – Business Development</strong></td>
<td>• To enable a mix of business and warehouse uses, and bulky goods premises that require a large floor area, in locations that are close to, and that support the viability of, centres.</td>
<td>The proposed work would not involve the development of a business. The proposal has been assessed for potential impacts on the availability and mix of business and warehouse developments and details are included in the socio-economic assessment in Section 6.13. The proposal would require the acquisition of two properties situated on Barber Street zoned as B5 for the building of the Barber Street ramps as discussed in Section 6.12. The proposal is considered to be consistent with the objectives of this zone as the ramp would facilitate access to future business development within this zone.</td>
</tr>
</tbody>
</table>
| **SP2 – Infrastructure** | • To provide for infrastructure and related uses.  
• To prevent development that is not compatible with or that may detract from the provision of infrastructure.  
• To provide for a range of significant transport and physical infrastructure to meet the needs of the community.  
• To ensure that the scale and character of infrastructure is compatible with the landscape setting and built form of surrounding development.                                                                                                                                                                                                                                         | The proposal would provide infrastructure to improve traffic management in the locality and better manage heavy vehicle traffic flows through Gunnedah by providing a more appropriate network of heavy vehicle routes throughout the locality. The proposed work would provide for significant transport infrastructure uses within the locality and be consistent with the objectives of the zone. Further impacts on infrastructure would be identified in detailed design of the proposal. |
| **IN1 – General Industrial** | • To provide a wide range of industrial and warehouse land uses.  
• To encourage employment opportunities.  
• To minimise any adverse effect of industry on other land uses.  
• To support and protect industrial land for industrial uses.  
• To enable development that is associated with, ancillary to, or supportive of industry or industrial employees.                                                                                                                                                                                                                                           | The land on which the Gunnedah Maize Mill (the Mill) is located in zone IN1 as shown on Figure 4.1. To accommodate the bridge proposal, a small area of the Mill land would need to be acquired. This is discussed further in Section 6.13.4. |
### Zone Objectives Relevance to the proposal

<table>
<thead>
<tr>
<th>Zone</th>
<th>Objectives</th>
<th>Relevance to the proposal</th>
</tr>
</thead>
</table>
| RE1 – Public Recreation       | • To enable land to be used for public open space or recreational purposes.  
• To provide a range of recreational settings and activities and compatible land uses.  
• To protect and enhance the natural environment for recreational purposes.  
• The effects or potential impacts on any recreational land uses near the proposal would be assessed at a detailed design stage of the proposal. The proposal would acknowledge the objectives of the zone. |
|                               | The majority of land on which the proposal is located is zoned RE1 public recreation. This land is mainly used for drainage and stormwater management.  
It is not anticipated that the proposal would have a negligible effect on public recreation areas available in Gunnedah as discussed in Section 6.13.4. |

The potential impacts on existing and future land uses are considered in Section 6.11. The proposal is considered to be consistent with the zone’s objectives and, by improving the flow of heavy vehicles through Gunnedah, the proposal would be of general benefit to primary production.

**Gunnedah LEP 2012 Schedule 5 – Environmental Heritage**

The Gunnedah Maize Mill (the Mill) is located beside the proposal and is listed on the Gunnedah LEP 2012 Schedule 5 – Environmental Heritage. An inspection of the interior of the Mill determined that it does not meet the State Heritage listing criteria. The Mill’s heritage listing is discussed further in Section 6.10, the Historic Heritage assessment in Appendix B and in the Statement of Heritage Impact for the Mill in Appendix C.

### 4.3 Other relevant legislation

#### 4.3.1 Fisheries Management Act 1994

The objectives of the *Fisheries Management Act 1994* are to conserve the biological diversity of fish and marine vegetation and promote ecologically sustainable development and activities.

Under Section 199 of the *Fisheries Management Act 1994*, a public authority (other than a local government authority) is required to notify the Minister for the Department of Primary Industries (Fisheries) of any dredging or reclamation that it proposes to carry out.

The *Fisheries Management Act 1994* defines dredging as any work that involves excavating water land or removing material from water land; and reclamation as using any material to fill in or reclaimed water land, or depositing any such material on water land for the purposes of its reclamation.

Further, Section 218 of the *Fisheries Management Act 1994* requires that the Minister be notified whenever a weir or barrier to fish movement is to be constructed, altered or modified. The *Fisheries Management Act 1994* also enables the Minister for Fisheries to make Habitat Protection Plans for the protection of any key fish habitat areas. Under Section 205 and Section 219 of the *Fisheries Management Act 1994*, notification and permit to harm any marine vegetation, protected species, or
fish habitats may be required.

As building the bridge is likely to require earthwork, excavation and imported fill within and on the banks of Blackjack Creek, notification is required to DPI (Fisheries) as per Section 199 of the *Fisheries Management Act 1994*. Mitigation measures and safeguards are proposed in Section 6.2.5 to minimise this disturbance.

4.3.2 Water Management Act 2000 and Regulation 2011

The *Water Management Act 2000* addresses the management of surface and ground water in NSW and is administered by the NSW Office of Water. Under the Act, approvals are required for controlled activities. The *Water Management Act 2000* provides for the protection of waterfront land, including on the banks of rivers, creeks and lakeside land. In addition to protecting this land, the *Water Management Act 2000* aims to ensure the integrated and sustainable management of water resources for NSW. For certain activities, known as ‘controlled activities’ and ‘aquifer interferences’ as per Section 91 of the *Water Management Act 2000* an additional approval may be required from the NSW Office of Water.

Exemptions exist under Water Management (General) Regulation 2011 relating to controlled activities for public authorities. Clause 38 states that *inter alia* public authorities are exempt from the requirement for obtaining controlled activity approvals under Section 91E of the *Water Management Act 2000*. This exemption also extends to third parties who are acting under contract on behalf of Roads and Maritime to carry out the building work, where Roads and Maritime retains control over work during and after building work. Nevertheless, Roads and Maritime has a duty of care to ensure that work would not result in unprecedented harm to waterfront land and waterways under the *Water Management Act 2000, Fisheries Management Act 1994* and the *Protection of the Environment Operations Act 1997*.

**Water management work approval**

The *Water Sharing Plan for the Upper Namoi and Lower Namoi Regulated River Water Sources 2003* applies within the Gunnedah Area. Appendix 1 of the plan details the rivers and lakes that form part of the water source. Clause (2) states that this includes the:

…*Namoi River from its junction with the Manilla River to Keepit Dam, including all tributaries (named and unnamed) to Keepit Dam water storage and up to the high water mark of the storage.*

Blackjack Creek, as a tributary of the Namoi River, is included within this definition.

A water management work approval is required under Section 90(2) of the *Water Management Act 2000* for water supply work carried out within the proposal area. Water supply work is defined under the *Water Management Act 2000*. It includes activities such as work constructed or used for the purposes of taking water, work for water capture or storage, work that diverts water flowing to or from a water source or work constructed or used for the purpose of conveying water to the point at which it will be used. Water management work approvals also include drainage work (Section 90(3) and flood work (Section 90(4)), which are work that involves changes to drainage and/or within a floodplain.

An approval is also required under Section 89 of the *Water Management Act 2000* for water use, to authorise its holder to use water for a particular purpose at a location. Roads and Maritime is exempt from the requirement to have an access licence to obtain water as per the exemption listed under Schedule 5 Part 1 (2) of the Water
Management (General) Regulation 2011 for road authorities carrying out road construction.

Advice from the Office of Water provided on 10 December 2014 indicates that a water management work approval would be required to extract water for the construction of the bridge. Currently there is no intention for water to be extracted from any waterways. However, should this change, further consultation would be carried out with Office of Water and an approval would be sought by Roads and Maritime before construction starts.

**Aquifer interference approval**

Section 91, Clause (3) of the *Water Management Act 2000* refers to an aquifer interference approval.

A draft NSW aquifer interference policy has been developed by NSW Office of Water. Under the policy it would be a requirement of the *Water Management Act 2000* to obtain a permit to carry out aquifer interference activities, such as penetrating an aquifer, taking water from an aquifer and disposing of water taken from an aquifer. If extraction is required, an aquifer interference approval under the *Water Management Act 2000* may be required.

The initial geotechnical assessment for the proposal identified groundwater at a shallow depth (one metre) at the borehole at the centre of the proposed bridge alignment. Consultation was carried out with the NSW Office of Water to determine if a groundwater licence would be required before building work. The Office of Water advised that a works approval would be required if it the proposal were to extract water to build the bridge and/or roads but would be exempt from the need to obtain an access licence for the water.

**4.3.3 Noxious Weeds Act 1993**

The administration of noxious weed control is the responsibility of the Minister for Primary Industries. The purpose of the *Noxious Weeds Act 1993* is to identify noxious weeds in respect of which particular control measures need to be taken, to specify those control measures, and to specify the duties of both public and private landholders with respect to the control of noxious weeds. In this regard, the *Noxious Weeds Act 1993* categorises noxious weeds into four divisions according to the requirements for their control.

Section 13 of the *Noxious Weeds Act 1993* states that:

“a public authority that is an occupier of land must control noxious weeds on the land, as required under the control category or categories specified in relation to the weeds concerned, to the extent necessary to prevent the weeds from spreading to adjoining land.”

A number of noxious weeds were identified on site as discussed in Appendix A (Biodiversity Assessment Report). Environmental control measures for the management of weeds are presented in Section 6.5.4.

**4.3.4 Threatened Species Conservation Act 1995**

The *Threatened Species Conservation Act 1995* lists threatened species, populations and ecological communities in NSW. If a threatened species, population or ecological community or its habitat is likely to occur in any area that may be affected by a development proposal, then a ‘seven-part test’ in accordance with Section 5A of the
Environmental Planning and Assessment Act 1979 (as amended by the Threatened Species Conservation Act 1995) must be conducted to determine whether the proposal would have a significant impact.

A biodiversity assessment was carried out for the proposal (refer Appendix A) and is summarised in Section 6.5. The assessment identified no threatened flora species as possibly occurring within the investigation area. The assessment did, however, identify seven threatened fauna species as possibly occurring within the study area with one threatened fauna species and one endangered ecological community confirmed as present. A seven-part test was therefore prepared as part of the assessment for each of the eight fauna species (seven possibly occurring and one present) and one endangered ecological community. The seven-part test determined that there would not be a significant impact on any species listed on the Threatened Species Conservation Act 1995 and no further assessment would be required.

4.3.5 National Parks and Wildlife Act 1974
The National Parks and Wildlife Act 1974 is administered by the Office of Environment and Heritage. The purpose of the National Parks and Wildlife Act 1974 is the conservation of:

- Nature, including habitat, ecosystems, biological diversity, landscapes and landforms
- Objects, places or features of cultural value within the landscape including:
  - Places, objects and features of significance to Aboriginal people
  - Places of social value to the people of NSW
  - Places of historic, architectural or scientific significance.

The National Parks and Wildlife Act 1974 also sets outs the responsibilities for the management of NSW National Parks. As discussed in Section 6.5 and Appendix A (Biodiversity Assessment Report), there are no National Parks near the proposal and as such the provisions of the National Parks and Wildlife Act 1974 relating to National Parks do not apply.

Under Section 86(4) of the National Parks and Wildlife Act 1974, it is an offence to harm or desecrate a declared Aboriginal Place. Many thousands of other Aboriginal heritage sites also receive protection under the Act. Harm includes destroying, defacing or damaging an Aboriginal place. If development will take place near an Aboriginal Place, the potential impacts of the development on an Aboriginal Place must be assessed.

The archaeological heritage assessment carried out for the options analysis (refer to Section 6.9) did not find any previously recorded Aboriginal sites or declared Aboriginal heritage places. The outcome of this assessment considered there to be a low potential of discovery of items not previously identified given the previous disturbance in the survey area.

4.3.6 Soil Conservation Act 1938
The Soil Conservation Act 1938 has the main objective of environmental protection of areas of erosion hazard. As part of the geotechnical, geology, soils and landforms assessment for this REF (refer to Section 6.3), erosion hazard was assessed and safeguards and mitigation measures proposed to address any potential impacts.

4.3.7 Heritage Act 1977
Pursuant to Section 57 of the Heritage Act 1977, a proposed activity in relation to an
item, which is subject to an interim heritage order or is listed on the State Heritage Register, requires approval of a relevant approval body (either the Heritage Branch, Department of Planning and Environment or local council). Under the *Heritage Act 1977*, an excavation permit is required for the disturbance or excavation of any relic. Any deposit, object or material evidence relating to the settlement of NSW, not being Aboriginal settlement, that is over 50 years old is classified as a relic under the *Heritage Act 1977*. An excavation permit is required for any work, excavations or activities associated with an archaeological site.

A non-Aboriginal heritage assessment and Statement of Heritage Impact was prepared for the Mill. It determined that the proposal is unlikely to have any impact on the heritage values of the Mill. The assessment also identified that no other items of non-Aboriginal heritage significance are located in the survey area or building footprint and there is a low potential for the discovery of previously unidentified items. The assessment also noted the areas of the Mill property with archaeological potential due to the presence of previous buildings that have since been demolished. The current design of the proposal would avoid these areas. However, if excavation is required into these areas, further assessment may be required. This is discussed further in Section 6.10.

4.3.8 **Contaminated Land Management Act 1997**

The management of contaminated land is shared by the Environment Protection Authority (EPA), the Department of Planning and Environment, and local government authorities. Under the *Contaminated Land Management Act 1997*, the EPA regulates contaminated sites where the contamination is significant enough to warrant regulation. Contaminated sites that are not regulated by the EPA are managed by local councils through land use planning processes.

As discussed in Section 6.3, the geotechnical investigation carried out for the proposal identified no items listed on the EPA Contaminated Lands Register or on Council records.

As noted in Section 6.3, potential for contamination was identified in land next to the railway corridor at 2 and 12 Railway Avenue due to a previous history of petroleum product storage (including underground storage tanks) and railway use. Number 12 Railway Avenue is still used for petroleum storage by Esso Australia. The rail yards and rail corridor in general also present a source of contamination, as does any fill that has been brought onto site. Should these areas be required for the temporary storage of materials or other building activities, the provisions of the *Contaminated Land Management Act 1997* would be considered, including any previous assessments or notices issued, and a risk assessment carried out to determine any potential impacts on human health. This is discussed further in Section 6.3.

4.3.9 **Protection of the Environment Operations Act 1997**

The *Protection of the Environment Operations Act 1997* is administered by the EPA and administered by the Environment Minister. It is the main law in NSW regulating water, air and noise pollution. Provisions for waste are also included. The Act:

- Empowers regulatory authorities to issue pollution licences for scheduled activities (such as Schedule 1 activities as Environmental Protection Licences)
- Creates a range of penalties for pollution offences
- Allows regulatory authorities to enforce the *Protection of the Environment Operations Act 1997*
• Allows the public to take legal action to enforce the Protection of the Environment Operations Act 1997.

Section 6 of the Act indicates that the EPA is the appropriate regulatory authority for development by public authorities – that is, Roads and Maritime for this proposal. Roads and Maritime would be required to notify the EPA immediately of any ‘pollution incident’ that is likely to have an impact on the environment.

**Offence to pollute waters**

Section 120 of the Protection of the Environment Operations Act 1997 applies a general prohibition to water pollution – that is, all water pollution is prohibited unless it is authorised in some way.

**Air pollution**

Air pollution is defined as the emission into the air of any impurity, including dust, smoke, cinders, solid particles, gases, fumes, odours and radioactive substances. Unlike water pollution, there is no general prohibition on causing air pollution. However, the Protection of the Environment Operations Act 1997 contains a number of specific offences which regulate certain activities that result in air pollution.

**Noise pollution**

There is no general prohibition on causing noise pollution. However, the Protection of the Environment Operations Act 1997 contains a number of specific offences which regulate certain activities that result in noise pollution.

Mitigation measures are proposed in this REF to ensure the proposal does not result in water pollution or air pollution, or generate excessive noise.

4.3.10  **Waste Avoidance and Resource Recovery Act 2001**

The waste hierarchy, established under the Waste Avoidance and Resource Recovery Act 2001, ensures that resource management options are considered against the following priorities:

- **Avoidance** – This includes action to reduce the amount of waste generated by households, industry and all levels of government
- **Resource recovery** – This includes reuse, recycling, reprocessing and energy recovery, consistent with the most efficient use of the recovered resources
- **Disposal** – This includes management of all disposal options in the most environmentally responsible manner.

The proposal would need to consider these principles when preparing any waste management plans for inclusion in any environmental management planning and reporting in the building and operational stages of the proposal. Section 6.8.3 discusses mitigation measures to ensure waste is appropriately managed during the carrying out of the proposal.

4.3.11  **Work Health and Safety Act 2011 and Rail Safety Act 2008 (NSW)**

Legal obligations for working safely within and around rail corridors and building sites in NSW are governed by the Work Health and Safety Act 2011 and Rail Safety Act 2008 (NSW).
An appropriate Safety Management System would need to be developed with ARTC as part of the lease arrangements for carrying out work within, underneath or close to the rail corridor. The document would demonstrate compliance with both acts throughout the proposal lifecycle.

4.4 Commonwealth legislation

4.4.1 Environment Protection and Biodiversity Conservation Act 1999

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

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

4.4.2 Native Title Act 1993

The Native Title Act 1993 acknowledges native title rights and provides principles in relation to the management of native title in Australia.

A search of the federal Native Title Claims Search was carried out as part of the Aboriginal heritage assessment (refer Appendix D) and identified that a native title claim of the Gomeroi people (Tribunal File No. NC2011/006) currently covers a large portion of north-western NSW, including Gunnedah.

Section 228 of the Native Title Act 1993 states that development affects native title:

‘…if it extinguishes the native title rights and interests or if it is otherwise wholly or partly inconsistent with their continued existence enjoyment or exercise.’

Roads and Maritime would address the legal obligations of Native Title claims through its property division before acquisitions occur.

4.5 Confirmation of statutory position

This REF has reviewed the relevant legislation and determined that the proposal would not require development consent as per the provisions of the ISEPP and therefore is subject to assessment under Part 5 of the Environmental Planning and Assessment Act 1979. As such, Roads and Maritime is the proponent and determining authority for this proposal.

The review of legislation also determined that no further approvals or concurrence are required based on the current scope of work.

In determining the proposal and the potential degree of impact, Roads and Maritime has considered Clause 228 of the Environmental Planning and Assessment Regulation 2000 and the objects of the Environmental Planning and Assessment Act 1979 as discussed in Section 8.2.

A notification to DPI (Fisheries) is also required under Section 199 of the Fisheries Management Act 1994.
5 Stakeholder and community consultation

5.1 Consultation strategy

Roads and Maritime is committed to informing and consulting stakeholders about the proposal. Accordingly, a Public Participation Plan was developed for the proposal to inform and consult stakeholders during the development (that is, identification) and assessment of concept options. The plan was consistent with *RTA Community Involvement and Communications: A Resource Manual for Staff* (Roads and Maritime, 2010) and was implemented between December 2012 and December 2014. The objectives of the Public Participation Plan were to:

- Proactively inform stakeholders of the proposal scope and timeframes
- Manage stakeholder expectations in relation to delivery timeframes and their level of influence on the proposal
- Provide stakeholders with appropriate opportunities to provide input throughout the development of the concept options phase.

Stakeholders considered in the Public Participation Plan were:

- Council
- State and Commonwealth Government (Roads and Maritime, NSW Member for Tamworth and Federal Member for New England)
- ARTC
- Local businesses
- Local residents and/or property owners
- Local schools
- Emergency services
- Road users
- Traditional owners
- Environmental groups
- Local media.

The Public Participation Plan outlined consultation tools and activities. These included:

- Face-to-face meetings with key stakeholders (Council, ARTC)
- Face-to-face meetings with directly affected property owners
- Community drop-in sessions at key proposal milestones for local residents and businesses to meet and provide feedback to Roads and Maritime
- Communication collateral to update the community and key stakeholders on proposal progress and opportunities to provide input including:
  - Media releases
  - Radio and newspaper advertisements
  - Community updates (refer to Appendix E)
  - Feedback forms
  - Letters to residents and businesses
- Emails to addresses on the proposal distribution list (comprising people in the study area or those who registered for updates)
- Posters
- Website updates (to proposal page on Roads and Maritime website).
Stakeholders could also provide feedback to the proposal at any time through the following channels:

- Phone: 1800 029 585 (toll free)
- Email: secondroadoverrailbridge@kbr.com
- Web: www.rms.nsw.gov.au
- Post: Gunnedah second road over rail bridge project, Reply Paid Box 633, Brisbane QLD 4101.

The Public Participation Plan included a consultation plan that aligned consultation activities with the proposal milestones. Community involvement carried out for each stage of the assessment process is presented in the following section.

5.2 Community involvement

5.2.1 Stage 1: proposal and study area announcement

In December 2012, the proposal was announced, the study area was displayed and the community was asked to provide early feedback. Opportunities to provide input were communicated through:

- Community update (#1) distributed to every address in Gunnedah (refer to Appendix E)
- Newspaper advertisements of community drop-in sessions held on Monday 10 December 2012 (11am–2pm and 5–8pm)
- Content on the Roads and Maritime website
- Media releases
- Two community drop-in sessions at Gunnedah Town Hall (mentioned above) where posters were displayed and feedback forms were available.

About 50 members of the community attended the drop-in sessions including residents and businesses from both within and outside the study area. Feedback forms were returned at the drop-in sessions as well as posted to the proposal mailbox. Table 5.1 lists the top four topics raised in community feedback and the sections of the REF that address these topics.

<table>
<thead>
<tr>
<th>Topics raised by the community</th>
<th>Relevant section of the REF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic congestion</td>
<td>Section 6.12</td>
</tr>
<tr>
<td>Pedestrian safety</td>
<td>Section 3.2</td>
</tr>
<tr>
<td>Impact on the community</td>
<td>Section 6.13</td>
</tr>
<tr>
<td>Impact on property</td>
<td>Section 6.13</td>
</tr>
</tbody>
</table>

A number of suggestions from the community about the location of the proposed bridge were also received. Subsequent stages of the development and assessment of concept options addressed these suggestions.

Table 5.2 summarises the community suggestions, with the responses from Roads and Maritime, during the development and assessment of concept options as well as the sections of the REF that provide further detail. The feedback received on this stage of the development of concept options is further detailed in the Early Feedback Summary (Roads and Maritime, 2012).
<table>
<thead>
<tr>
<th>Community suggestions for location of the new bridge</th>
<th>Roads and Maritime responses as identified through the development of concept options and reference to relevant section of the REF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Put roundabout at the intersection of Kamilaroi Highway and Warrabungle Street.</td>
<td>The preferred option includes a new roundabout at the intersection of the Kamilaroi Highway and Warrabungle Street. Section 3.2 provides further details of the design of the proposal.</td>
</tr>
<tr>
<td>Direct traffic down Rosemary Street to a bridge that crosses the railway line at the southern end of the street.</td>
<td>An option similar to this, closer to Tempest Street was considered during the development of concept options. However, it was not progressed due to the excessive grades required to cross the railway line. Section 2.4 provides further details on the options considered. This topic is also further responded to in the Preliminary Concept Options Report (Roads and Maritime, 2013).</td>
</tr>
</tbody>
</table>
| Direct trucks along the back of Pensioners Hill (outside the study area) to link in with existing agricultural facilities (e.g. sale yards and silos on Kamilaroi Highway). | The option to have the new route start from Farrar Road, go over the railway and connect to Warrabungle Street was considered during the development of concept options. This option was not progressed for the following reasons:  
- It is outside the proposal study area  
- It would not satisfy the key objective to improve traffic efficiency within the study area  
- It would not be suitable for recategorisation as a State Road due to direct access from industrial/commercial premises and unacceptable traffic conflicts  
- Farrar Road is narrow and steep in its approach to the Oxley Highway, which is problematic for B-double vehicles. Section 2.4 provides further details on the options considered. This topic is also further responded to in the Preliminary Concept Options Report (Roads and Maritime, 2013). |
| Direct traffic behind the Mill and down Warrabungle Street. | The preferred option extends from an upgraded roundabout on the Oxley Highway to a new bridge over the railway line west (behind) of the Mill and down Warrabungle Street. Section 3.2 provides further details of the design for the proposal. |
| Build a bridge that spans from the northern side of the New Street level crossing to the southern side of the Oxley Highway. | This option was considered but was not progressed as it would have significant constructability challenges and the requirement for very steep grades to maintain the required clearances over the railway line. Section 2.4 provides further details on the options considered. This topic is also further responded to in the Preliminary Concept Options Report (Roads and Maritime, 2013). |
| Build a second railway line that bypasses the town. | This option is not part of the proposal scope because it would involve significant cost and has a number of design constraints. This topic is also further responded to in the Preliminary Concept Options Report (Roads and Maritime, 2013). |
5.2.2 Stage 2: preliminary concept options announcement

Public participation during Stage 2 focused on gathering stakeholder and community feedback on three preliminary concept options – A, B and C. Opportunities to provide feedback were communicated through:

- Community update (#2) distributed to every address in Gunnedah (refer to Appendix E)
- Newspaper advertisements of community drop-in sessions held on Wednesday 22 May 2013 (11am–2pm and 4–7pm)
- Content on the proposal page of Roads and Maritime website including the community update and Preliminary Concept Options Report (Roads and Maritime, 2013)
- Emails to addresses on the proposal distribution list (stakeholders who registered during Stage 1)
- Media releases
- Two community drop-in sessions at Gunnedah Town Hall (mentioned above) where posters were displayed and feedback forms were available
- Display of the Preliminary Concept Options Report (Roads and Maritime, 2013) along with posters and the community update including feedback form at Gunnedah Shire Council Office, Gunnedah Shire Library and Gunnedah Motor Registry Office
- Meetings with eight potentially affected property owners.

Seventy-three feedback forms were received during the consultation period. Table 5.3 lists the top five topics raised in community feedback and the responses from Roads and Maritime identified during the development and assessment of concept options as well as the sections of the REF that provide further detail. The feedback received during this stage of the development of concept options is further detailed in the Community Submissions Report (Roads and Maritime, 2013).

Table 5.3 Top five topics from stage two consultation

<table>
<thead>
<tr>
<th>Topics raised by the community</th>
<th>Roads and Maritime responses as identified through the development of concept options and reference to relevant section of the REF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business/services patronage</td>
<td>Business impacts potentially caused by closing the New Street level crossing were a key feature of community feedback received during May 2013. The preferred proposal – Option C (Refined) – was developed to accommodate access to Barber Street to mitigate this impact. Section 6.12 discusses socio-economic impacts of the proposal. This topic is also further responded to in the Recommended Option Report (Roads and Maritime, 2014).</td>
</tr>
<tr>
<td>Traffic flow and travel times</td>
<td>One of the primary objectives of the proposal is to improve local traffic efficiency and improve road safety in Gunnedah. Section 6.12 addresses the issue of traffic and access.</td>
</tr>
<tr>
<td>Future of existing New Street level crossing</td>
<td>The preferred option is to replace the level crossing. Requests for the New Street level crossing to remain open were thoroughly investigated by the proposal team. However, to meet the objectives of this proposal to improve safety and traffic efficiency, the level crossing would be permanently closed.</td>
</tr>
<tr>
<td>Topics raised by the community</td>
<td>Roads and Maritime responses as identified through the development of concept options and reference to relevant section of the REF</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Topics raised by the community</td>
<td>Roads and Maritime responses as identified through the development of concept options and reference to relevant section of the REF</td>
</tr>
<tr>
<td>Property access</td>
<td>Property access was considered in the proposal’s design with residential properties and businesses on Warrabungle Street and Barber Street being accommodated. Section 3.2 provides further details of the proposal’s design. This topic is also further responded to in the Recommended Option Report (Roads and Maritime, 2014).</td>
</tr>
<tr>
<td>Proposal funding and cost</td>
<td>The cost of the proposal is included in the NSW Government’s ‘Bridges to Bush’ program which funds projects in regional NSW to improve transport access and road safety. This topic is further responded to in the Recommended Option Report (Roads and Maritime, 2014).</td>
</tr>
</tbody>
</table>

5.2.3 Stage 3: recommended option announcement

In August 2014, the Recommended Option Report (Roads and Maritime, 2014) was released and the community was invited to comment on the recommended option – Option C (Refined). Opportunities to provide input were communicated through:

- Community update (#3) distributed to every address in Gunnedah (Appendix E)
- Newspaper advertisements of community drop-in sessions held on Wednesday 27 August (4–7pm) and Thursday 28 August 2014 (9am–12pm)
- Content on the proposal page of Roads and Maritime website including the community update and Recommended Option Report (Roads and Maritime, 2014)
- Emails to addresses on the proposal distribution list (stakeholders who registered during Stage 1 and 2)
- Media releases
- A staffed display in the Roads and Maritime stall at AgQuip Field Days from 19–21 August 2014
- Two community drop-in sessions at Gunnedah Town Hall (mentioned above) where posters were displayed and the feedback forms were available
- Display of the Recommended Option Report (Roads and Maritime, 2014) along with posters and the community update including feedback form at Gunnedah Shire Council Office, Gunnedah Shire Library and Gunnedah Motor Registry Office
- Meetings with four potentially affected property owners.

During the consultation period for the recommended option, 51 submissions were received. Table 5.4 lists the top five topics raised in community feedback and the responses from Roads and Maritime identified during the development and assessment of concept options as well as the sections of the REF that provide further detail. The feedback received on this stage of the proposal is further detailed in the Community Submissions Report (Roads and Maritime, 2014).
### Table 5.4  Top five topics from stage three consultation

<table>
<thead>
<tr>
<th>Topics raised by the community</th>
<th>Roads and Maritime responses as identified through the development of concept options and reference to relevant section of the REF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land acquisition</td>
<td>Land acquisition in Barber Street is required to build an intersection that provides safe access to and from the new route to Barber Street. This intersection location is to ensure a safe grade is maintained for heavy vehicles to turn right into Barber Street. Section 3.6 provides further detail on land acquisition. This topic is also further responded to in the Recommended Option Report (Roads and Maritime, 2014) and the Preferred Option Report (Roads and Maritime, 2014).</td>
</tr>
<tr>
<td>Alternative route options</td>
<td>Alternative options to Option C (Refined) were suggested for the new route in 16 submissions; all of these alternatives had been previously considered and not progressed by the proposal team for the reasons outlined in the Preliminary Concept Option Report (Roads and Maritime, 2013) and the Recommended Option Report (Roads and Maritime, 2014). Section 2.4 provides a summary of the options considered.</td>
</tr>
<tr>
<td>Intersection design: Barber Street</td>
<td>The proposal would provide direct access to and from Barber Street via an intersection where the new route alignment meets Warrabungle Street. The intersection would allow for northward and southward vehicle movements in and out of Barber Street. It has also been designed to safely accommodate B-double heavy vehicles. The design and location of the intersection has been dictated by a number of design constraints including: road gradients, safe turning requirements, lines of vision, and property accesses. Section 3.2 provides further details on the design of the proposal. This topic is also further responded to in the Recommended Option Report (Roads and Maritime, 2014) and the Preferred Option Report (Roads and Maritime, 2014).</td>
</tr>
<tr>
<td>Business/service patronage</td>
<td>Business impacts potentially caused by closing the New Street level crossing were a key feature of community feedback received during May 2013. As such, Option C (Refined) was developed to accommodate access into Barber Street to mitigate this impact. This topic is further responded to in the Recommended Option Report (Roads and Maritime, 2014) and the Preferred Option Report (Roads and Maritime, 2014). Section 6.13 also provides more detail on the socio-economic impact of the proposal.</td>
</tr>
<tr>
<td>Consultation process</td>
<td>The topic of the consultation process was raised in eight submissions; in particular opinions were expressed about the affected property owners in Barber Street not being appropriately consulted about the recommended option. As discussed above in the land acquisition topic response, property acquisitions are required to build a safe intersection into Barber Street. The inclusion of this intersection is the result of feedback from the community and key stakeholders during the community feedback period during 2013. To provide the community with the opportunity to comment on its inclusion, Roads and Maritime introduced an additional consultation step. Option C (Refined) was presented as a recommended option for community comment. This topic is further responded to in the Preferred Option Report (Roads and Maritime, 2014) and the Community Submissions Report (Roads and Maritime, 2014).</td>
</tr>
</tbody>
</table>
5.2.4 Stage 4: announcement of the preferred option

In November 2014, the preferred option was announced and communicated via:

- Distribution of a community update (#4) (direct mail and letter box drop) (Appendix E)
- Emails to the addresses on the proposal distribution list (stakeholders who registered during Stage 1, 2 and 3)
- Content on the Roads and Maritime website
- Display of the Preferred Option Report (Roads and Maritime, 2014) along with posters and the community update including feedback form at Gunnedah Shire Council Office, Gunnedah Shire Library and Gunnedah Motor Registry Office
- Media release
- Meetings with four potentially affected property owners.

This stage did not involve seeking further feedback from the community. Its aim was to announce the preferred option and explain the next steps for the proposal.

5.3 Aboriginal community involvement

An Aboriginal heritage impact assessment was prepared by OzArk Environmental & Heritage Management Pty Ltd as part of the development of concept options (refer to Appendix D). No Aboriginal community consultation was carried out as part of the assessment as it was concluded that no objects or sites of Aboriginal heritage significance were present in the area of investigation.

A Stage 1 Assessment was conducted by Roads and Maritime’s Aboriginal Cultural Heritage Advisor Northern Region, and Regional environmental staff, in accordance with the NSW Roads and Maritime Services Procedure for Aboriginal Cultural Heritage Consultation and Investigation (PACHCI). The assessment concluded that the proposal is unlikely to have an impact on Aboriginal cultural heritage.

Subsequently, a letter of clearance (dated 17 April 2013) was prepared by Roads and Maritime’s Aboriginal Cultural Heritage Advisor during the options assessment.

5.4 ISEPP consultation

Gunnedah Shire Council, under Part 2, Division 1 of Infrastructure SEPP, was invited to provide comment in relation to Clause 13, 14, and 15. On the 27 October 2014, a formal letter was posted and emailed to Council’s Heritage Officer and the Director of Infrastructure Services outlining the proposal, the relevant ISEPP clauses and that feedback would be required by 18 November 2014. Table 5.5 describes an assessment against the relevant ISEPP clauses and provides the relevant section of the REF that addresses these issues.
### Table 5.5 Assessment of relevant ISEPP clauses

<table>
<thead>
<tr>
<th>Infrastructure SEPP clause</th>
<th>Assessment</th>
<th>REF Section</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>13 Consultation with councils – development with impacts on council-related infrastructure or services</strong>&lt;br&gt;(1) This clause applies to development carried out by or on behalf of a public authority that this Policy provides may be carried out without consent if, in the opinion of the public authority, the development: a) will have a substantial impact on stormwater management services provided by a council, or</td>
<td>The proposal has the potential to impact on stormwater.&lt;br&gt;Correspondence with Council was issued.&lt;br&gt;Council responded that there were no specific requirements for impacts on stormwater.</td>
<td>Section 6.2</td>
</tr>
<tr>
<td>(b) is likely to generate traffic to an extent that will strain the capacity of the road system in a local government area, or</td>
<td>The proposal has the potential to impact on traffic in the local government area.&lt;br&gt;Correspondence with Council was issued.&lt;br&gt;Council responded that there were no specific requirements for the proposal, but measures needed to be qualified to mitigate likely increased truck/traffic noise and street light spillage associated design in accordance with current Australian Standards throughout the length of the project.</td>
<td>Section 6.12</td>
</tr>
<tr>
<td>c) involves connection to, and a substantial impact on the capacity of, any part of a sewerage system owned by a council, or</td>
<td>The proposal has the potential to impact on the local sewerage system.&lt;br&gt;Correspondence with Council was issued.&lt;br&gt;Council responded that there were no specific requirements for impacts on the local sewerage system.</td>
<td>Section 3.5</td>
</tr>
<tr>
<td>d) involves connection to, and use of a substantial volume of water from, any part of a water supply system owned by a council, or</td>
<td>The proposal has the potential to impact on stormwater.&lt;br&gt;Correspondence with Council was issued.&lt;br&gt;Council responded that there were no specific requirements for impacts on stormwater.</td>
<td>Section 6.2</td>
</tr>
<tr>
<td>e) involves the installation of a temporary structure on, or the enclosing of, a public place that is under a council’s management or control that is likely to cause a disruption to pedestrian or vehicular traffic that is not minor or inconsequential, or</td>
<td>The proposal has the potential to involve the installation of temporary structures and potentially cause temporary disruptions to pedestrians and vehicular traffic that are minor or inconsequential.&lt;br&gt;Correspondence with Council was issued.&lt;br&gt;Council responded that there were no specific requirements for the proposal, but measures needed to be qualified to mitigate likely increased truck/traffic noise and street light spillage associated design in accordance with current Australian Standards throughout the length of the project.</td>
<td>Section 6.12</td>
</tr>
<tr>
<td>Infrastructure SEPP clause</td>
<td>Assessment</td>
<td>REF Section</td>
</tr>
<tr>
<td>---------------------------</td>
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<td>-------------</td>
</tr>
<tr>
<td>f) involves excavation that is not minor or inconsequential of the surface of, or a footpath next to, a road for which a council is the roads authority under the <em>Roads Act 1993</em> (if the public authority that is carrying out the development, or on whose behalf it is being carried out, is not responsible for the maintenance of the road or footpath).</td>
<td>The proposal would involve work on local roads. Correspondence with Council was issued. Council responded that there were no specific requirements for this proposal.</td>
<td>Section 6.12</td>
</tr>
</tbody>
</table>

**14 Consultation with councils – development with impacts on local heritage**

(1) This clause applies to development carried out by or on behalf of a public authority if the development:

(a) is likely to have an impact that is not minor or inconsequential on a local heritage item (other than a local heritage item that is also a State heritage item) or a heritage conservation area, and

(b) is development that this Policy provides may be carried out without consent.

(2) A public authority, or a person acting on behalf of a public authority, must not carry out development to which this clause applies unless the authority or the person has:

(a) had an assessment of the impact prepared, and

(b) given written notice of the intention to carry out the development, with a copy of the assessment, to the council for the area in which the heritage item or heritage conservation area (or the relevant part of such an area) is located, and taken into consideration any response to the notice that is received from the council within 21 days after the notice is given.

The historic heritage investigations described in Section 6.10 determined that the proposal is likely to have a minor effect on the Mill. Correspondence was issued to Council about Clause 14 and the Former Brunton’s Flour Mill, Gunnedah- Heritage Assessment was provided. Council acknowledged the impacts in the heritage assessment and stated that the proposal would have less impact on the Mill than other previously considered options. | Section 6.10 |

**15 Consultation with councils – development with impacts on flood liable land**

(1) In this clause, "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 and as in force from time to time.

The proposal study area is located within Flood liable land in accordance with Council flood mapping documents. Correspondence with Council was issued. The Council responded that there were no specific requirements for the proposal in relation to flood liable land. | Section 6.6 |
5.5 Government agency and stakeholder involvement

5.5.1 Gunnedah Shire Council

Council is an important stakeholder and has been actively involved throughout the public participation process. Council representatives have been integrated within the proposal team, attending internal workshops and face-to-face meetings to ensure key concerns and requirements were considered. Council representatives have also attended community consultation events throughout the process.

In response to community feedback and representations, Council supported the New Street level crossing remaining open unless vehicular access was provided to Barber Street as part of the proposal to ensure ongoing access into the Barber Street business precinct. At its meeting on 19 June 2013, Council resolved the following:

“That Council indicate to Roads and Maritime and the NSW Member for Tamworth

1. That any second overpass in the vicinity of the heritage Mill site must either:
   a. provide vehicular access/egress to and from Barber Street (Option C Refined) or
   b. ensure that the New Street level crossing remains operational.”

This feedback from Council, along with the community's feedback and the findings of a number of technical investigations, was actively integrated into the development of the proposal.

In August 2014, Roads and Maritime announced the recommended option for the new bridge, which included the intersection into Barber Street to maintain vehicular access. Council expressed its support for the recommended option as resolved at the Council meeting on 27 August 2014. The resolution was:

“That Council write to Roads and Maritime indicating our support of refined Option C proposal for the second road over rail bridge”.

As outlined in Section 5.4, Roads and Maritime invited Council to comment on the REF and the proposal as required under ISEPP. No further feedback has been
provided at this stage.

Roads and Maritime will continue to engage Council as the proposal progresses into the detailed design and construction phases.

5.5.2 Other government departments

Other government departments with interests in the proposal were invited to provide comment as part of the REF. Letters were emailed and posted to:

- Department of Primary Industries
- Office of Environment and Heritage
- Office of Water.

Each was advised they needed to provide feedback by 18 November 2014.

**Department of Primary Industries (DPI)**

Roads and Maritime has notified and consulted with DPI (Fisheries Aquaculture and Aquatic Environment Branch) to obtain advice on any REF requirements. Table 5.6 summarises the aspects required by DPI to be considered in the REF, and the response to these requirements.

<table>
<thead>
<tr>
<th>Key requirements</th>
<th>Response and section of REF</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Permits</strong></td>
<td></td>
</tr>
<tr>
<td>In relation to required approvals/permits, the Minister for Fisheries must be notified of any proposed dredging and reclamation work associated with the proposed work by Roads and Maritime in accordance with Section 199 of the Fisheries Management Act 1994 (the Act). Such work may include, but is not limited to, construction of temporary crossings/side tracks, bridges, creek diversions, geotechnical investigations, excavating or reclaiming the bed or banks of any waterways. The REF should describe the type and extent of such proposed work within Blackjack Creek. A permit is required to temporarily or permanently block fish passage under Section 219 of the Act. Such work may include the bunding of waterways during bridge or side track construction, use of silt fences across waterways and other similar work. The REF should describe the type, extent and duration of such work in Blackjack Creek.</td>
<td>Section 4.3.1</td>
</tr>
<tr>
<td><strong>Blockages to fish passage</strong></td>
<td></td>
</tr>
<tr>
<td>Fisheries NSW requests that the REF needs to consider whether any side tracks, temporary culvert structures, etc., are likely to be used that may result in the blockage of fish passage within Blackjack Creek. If so, details on proposed design and construction methods, likely duration of installation or removal methods should be outlined in the REF.</td>
<td>The proposal design has been developed to minimise any permanent structures within Blackjack Creek. All work proposed would be temporary, with the creek returned to its current topography.</td>
</tr>
</tbody>
</table>
Key requirements | Response and section of REF
--- | ---
**Maintenance of, or improvement to, cross-sectional area of a waterway**
The REF should describe the proposed work in relation to the cross-sectional area of the waterway, a description of the need for the proposed work, and the likely construction methods should be provided. Fisheries NSW requests that constriction of waterways or the use of scour protection within the bed of waterways be avoided where possible, as such work is likely to have a detrimental impact on floodwater velocities which can have significant impacts on fish and fish habitat.

Temporary work is proposed within the bed and banks of Blackjack Creek.

**Damage to riparian vegetation**
Fisheries NSW seeks information on any damage to riparian vegetation that may occur, noting that degradation of riparian vegetation along watercourses is listed as a Key Threatening Process under the Act.

Appendix A (Biodiversity Assessment Report)

**Bank stabilisation and rehabilitation**
Fisheries NSW seeks information on any destabilisation of the banks with heavy machinery or damage to the bed or banks. Fisheries NSW requests that any bed and bank rehabilitation work be completed immediately after the completion of work. Proposals to ensure replacement of aquatic and riparian vegetation with native/endemic species are encouraged.

The proposal design has been developed to minimise any permanent structures within Blackjack Creek. All work proposed are of a temporary nature with the creek to be returned to its current topography

**Removal, realignment of snags**
Fisheries NSW requests information on any proposal to remove, realign or relocate snags (large woody debris) during side track construction, or bridge replacement. Proposed work should be outlined within the REF. Snags should not be removed, realigned or relocated without first contacting I&I NSW. Note that the removal of large woody debris is listed as a Key Threatening Process under the Act.

Based on the field assessments, no snags are present within the area to be temporarily impacted as a result of the proposal.

**Threatened species, populations and ecological communities**
Threatened species provisions are listed in the *Fisheries Management Act 1994*. The REF must address the threatened species provisions of the Act for species, populations or communities listed under schedules 4 and 5 whose historical geographical distribution extends to within the area of work. The proposal should address whether there are likely to be any significant impacts on the listed species, populations or ecological communities.

Appendix A (Biodiversity Assessment Report)

**Office of Environment and Heritage (OEH)**
Roads and Maritime has consulted OEH in regard to the proposal and received a response on 4 November 2014. Table 5.7 shows the sections in which OEH’s key requirements are addressed.

**Table 5.7** Key requirements of OEH

<table>
<thead>
<tr>
<th>Key requirements</th>
<th>Section of REF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impacts on Aboriginal cultural heritage objects</td>
<td>Section 6.9</td>
</tr>
<tr>
<td>Impacts on flora, fauna, threatened species, populations, communities and their habitats</td>
<td>Section 6.5</td>
</tr>
</tbody>
</table>

**Office of Water**
Roads and Maritime has consulted the Office of Water in regard to the proposal and received a response on 10 December 2014. The Office of Water advised that Roads and Maritime would require a works approval if it were to extract water to build the bridge and/or roads but would be exempt from the need to obtain an access licence for the water. (Refer to Section 4.3.2 for more information on this subject.)
The Office of Water also advised that, pursuant to Clause 38 of the Water Management (General) Regulation 2011, Roads and Maritime Services as a public authority is exempt from Section 91E(1) of the Water Management Act 2000 and therefore not required to obtain a controlled activity before commencing work. However, Clause 37 provides that this exemption is subject to a condition requiring the person by whom the relevant controlled activity is carried out to comply with any direction that the Minister may give to the person for the protection of:

a) the waterfront land on which the activity is carried out, or
b) any river, lake or estuary to which that land has frontage.

5.5.3 Australian Rail Track Corporation (ARTC)

Australian Rail Track Corporation is a key stakeholder for this proposal and has been actively consulted throughout the concept development stage. Representatives have attended internal workshops, and face-to-face meetings have been held to ensure ARTC requirements are integrated into the proposal. The primary feedback from ARTC is that:

- The proposal adhere to the clearances required for the bridge to cross the railway line
- It has a strong preference to close the New Street level crossing.

The proposal (as described in Section 3.2) accommodates both these aspects.

Roads and Maritime invited ARTC to provide comment as part of the REF process. It sent a letter dated 27 October 2014 and received ARTC’s response on 30 October 2014. In its response, ARTC advised it would like to review the draft REF and associated management plan once available. This will occur when the draft REF is completed and made publicly available in 2015.

In addition, ARTC provided Environment Protection Licence 3142 (which is a key compliance document under the Protection of the Environment Operations Act 1997) and additional information relating to Blackjack Creek (refer to Section 3.2.2).

5.6 Ongoing or future consultation

The REF will be displayed for community comment. All the submissions received on the REF will be collated in a community submissions report, which will also be made available to the public. Roads and Maritime will continue to engage the community as the proposal progresses to detailed design and construction.
6 Environmental assessment

6.1 Air quality and climate

6.1.1 Existing environment

Air quality

Air quality near the proposal area is generally representative of a rural setting and as such is of sound quality. The nearest Office of Environment and Heritage (OEH) air quality monitoring station is in Tamworth approximately 65 kilometres to the east. Although this monitoring station is not close enough to the proposal area to provide an accurate representation of local air quality, it provides a general indication of air quality for the north-west slopes region.

Daily air quality index data from 2009 to the present is shown in Figure 6.1. As shown, the air quality index typically falls within the ‘very good’ to ‘good’ range.

![Daily Regional Air Quality Index - RAQI Time Range: 31/12/2009 to 24/11/2014](image)

Note: Very good 0 – 33, Good = 34 – 66, Fair 67 – 99, Poor – 100 – 149

**Figure 6.1**

**DAILY AIR QUALITY – TAMWORTH WEATHER STATION**

Common actions that can affect local air quality include dust generated from coal trains and from cleared land (in particular from cropping activities such as ploughing or harvesting during dry conditions), bushfires and controlled burns. Vehicle movements are also a source of local air quality contamination; however, when compared with the above sources, the proportion emitted is likely to be minor.
Potentially sensitive receivers are located close to the proposal area and include residences and businesses on Railway Avenue, Barber Street, Warrabungle Street, Stockman Close and Farrar Road, as shown on Figure 6.2.

**Climate**

Long-term local climate data are available from the Bureau of Meteorology weather station at Gunnedah Pool (station number 055023) which is approximately 1 kilometre south-east of the proposal area. The data show that the area experiences cool, dry winters and hot summers. Mean minimum temperatures range between 3 and 18 degrees Celsius, and mean maximum temperatures range between 17 and 34 degrees Celsius. The long-term mean rainfall record, which is presented in Figure 6.3, shows that the majority of annual rainfall occurs between October and February.

Wind rose graphs of local wind direction versus wind speed at 9am and 3pm are presented in Figure 6.4 and Figure 6.5. These show that at 9am the prevailing wind direction is from the south-east and east. At this time of day Gunnedah generally experiences low wind conditions with calm conditions observed 39 per cent of the time. Wind speeds generally increase later in the day and records for 3pm show that wind direction is more variable with prevailing winds from the north-west, south-east and south-west.

6.1.2 **Policy setting**

Air quality in NSW is regulated by the *Protection of the Environment Operations Act 1997* and the *Protection of the Environment Operations (Clean Air Regulation) 2010*. Both are administered by the EPA and regulated by the EPA and local councils.

6.1.3 **Criteria**

The criteria adopted for assessing the impact of the proposal would be to minimise emissions to air and minimise dust nuisance complaints.

6.1.4 **Potential impacts**

**Construction**

Dust nuisance during the building phase represents the greatest potential air quality impact of the proposal. Impacts may be generated from the following activities:

- Earthwork and general building activities on unsealed surfaces, most notably during the formation of the southern and northern approaches to the bridge
- Grading and surface levelling work for road surface preparation
- Transportation of fill
- Clearing of vegetation and access tracks.

Nuisance impacts are more likely to occur during dry and windy conditions. The wind roses presented in Figure 6.4 and Figure 6.5 provide an indication of areas with a higher potential to be affected. However, it is not possible to predict with any certainty where nuisance may occur.

Given the relatively small areas of exposed surfaces, potential dust emissions would be minor and able to be controlled using routine dust management measures.
Figure 6.2
PROPERTIES POTENTIALLY AFFECTED BY AIR QUALITY IMPACTS FROM THE PROPOSAL
Figure 6.3
MEAN RAINFALL FOR GUNNEDAH
Figure 6.4
WIND ROSE FOR GUNNEDAH AT 9AM
Figure 6.5
WIND ROSE FOR GUNNEDAH AT 3PM
Vehicles, plant and equipment used during the building work would generate exhaust emissions, but these would be insignificant, intermittent and temporary and are therefore not expected to impact on local air quality.

The demolition of the buildings at 2 and 4 Barber Street has the potential to generate dust and also to expose potentially hazardous building fibres. A building inspection would be required before demolition to ascertain the presence of any hazardous materials and inform any necessary mitigation measures.

**Operation**

Once it is operational, the proposal is not expected to have an impact on air quality in the study area.

### 6.1.5 Safeguards and management measures

The proposed safeguards and management measures to minimise the project’s potential impact on air quality and climate are presented in Table 6.1.

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air quality</td>
<td>• Air quality mitigation strategies would be included in a Construction Environmental Management Plan (CEMP).</td>
<td>Contractor</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>Exposure of hazardous building materials</td>
<td>• A full building inspection would be conducted of the houses and structures to be demolished to determine if any hazardous materials are present. The inspection would be carried out by a suitably qualified person.</td>
<td>Roads and Maritime</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>Dust nuisance</td>
<td>• Transport loads of erodible material would be covered to minimise the generation of airborne material.</td>
<td>Roads and Maritime</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>• Stockpiles would be located far away from sensitive receivers. Stockpiles or areas that may generate dust would be managed in accordance with Roads and Maritime's Stockpile Site Management Guideline (RTA 2011).</td>
<td>Roads and Maritime</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>• Measures (including watering or covering exposed area) would be used to minimise or prevent air pollution and dust.</td>
<td>Roads and Maritime</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>• Visual monitoring of air quality would be carried out on a daily basis to verify the effectiveness of controls.</td>
<td>Roads and Maritime</td>
<td>Construction</td>
</tr>
<tr>
<td>Emissions to air</td>
<td>• Burning of waste or vegetation would not be permitted.</td>
<td>Roads and Maritime</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>• Plant and vehicles would not be left idling when not in use for extended periods.</td>
<td>Roads and Maritime</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>• Vehicles, plant and equipment would be regularly maintained and machinery would be fitted with emission control devices in accordance with Australian Design Standards.</td>
<td>Roads and Maritime</td>
<td>Construction</td>
</tr>
</tbody>
</table>
6.2 Water quality

Information regarding ground and surface water quality was obtained from site visits and geotechnical/environmental desktop and field studies by Golder Associates (Golder) in 2013 (refer to Appendix F). Field investigations involved the installation and in-situ testing of two slotted standpipe groundwater monitoring wells.

6.2.1 Existing environment

Surface water

Blackjack Creek consists of a highly modified and actively maintained watercourse that flows from south to north through the survey area. The fall of the bed is very gradual and the bed and banks of the creek are thickly vegetated by weeds, grass, sedges and reed species. Areas of this vegetation appear to be regularly slashed. The morphology and vegetation along the watercourse remain similar from the survey area to the point where it enters the Namoi River approximately 1.5 kilometres downstream of the proposal area.

An open, grassed drain enters the creek immediately south of the railway bridge (refer to Figure 6.6). This drain lies within a natural drainage channel, previously known as Ashford’s Watercourse, which drains a significant portion of southern Gunnedah. The drain is concrete-lined in sections.

During site visits in August and September 2014, water was observed to pool beneath and next to the culverts under the Oxley Highway and immediately up and downstream of the railway bridge (refer to Figure 6.7). Small areas of standing water were also observed within the drainage channel (refer to Figure 6.6).
Groundwater

The inferred direction of groundwater flow is to the north through the alluvium, charged by flow from land at higher elevations south and west of the proposal area.

The locations of a number of Council’s groundwater monitoring wells are shown on Figure 3 in Appendix F (Geotechnical Environmental Desktop Study). Water levels observed at these locations were recorded as part of the Blackjack Creek Riparian Corridor/Channel Reconstruction (Constructive Solutions, 2013). The results of bore water level monitoring showed that the standing water table elevation to the south of the study area is approximately 1.8 to 2.4 metres below ground level. It is assumed that the elevation of the water table varies seasonally and with changing climatic conditions. The water table elevations at the two groundwater monitoring bores located within the survey area were recorded as 1.8 metres and 2.2 metres below ground level respectively (refer to Figure 2 of Appendix F).

Several published reports associated with the Blackjack Creek remediation and reconstruction work upstream of the study area identified dryland salinity and high water tables as issues within Wandobah Reserve and Blackjack Creek. These are expected to impact on the proposal area. The reports highlighted that:

- Soil salinity is high near the surface and decreasing with soil depth
- Soil salinity is high enough to affect plant growth
- The water tables are impacted by seasons but can range from 0 to 5.5 metres below ground level
- Saline water discharges are likely to occur during wet periods
- Poor drainage exacerbates salinity levels.
6.2.2 Policy setting

Building work activities would need to comply with best practice water quality management practices specified within the Roads and Maritime QA Specification G36 to minimise impacts on aquatic life, riparian vegetation, recreational use, food supply and the environmental values of Blackjack Creek.

6.2.3 Criteria

There are no baseline water quality data to derive criteria against the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC Water Quality Guidelines, 2000) or other more local water quality guidelines. Accordingly, the criterion adopted for assessing the impact of the proposal would be minimisation of impacts on water quality downstream of the proposal area. This would be achieved by implementing the safeguards and management measures in Section 6.2.5.

6.2.4 Potential impacts

**Construction**

The primary potential source of water quality impacts is expected to be associated with erosion and sedimentation resulting from building work activities such as vegetation clearing. Other potential sources of building work that could have water quality impacts include:

- Spills of fuels or lubricants from building machinery operating within and next to Blackjack Creek
- Accidental releases of contaminants such as concrete
- Contaminated stormwater runoff from the site compound
- Spills of fuels, chemicals or other contaminants from storage areas within the site compound, particularly during floods
- Dewatering of high salinity groundwater.

As described in Section 6.2.1, the bed and banks of Blackjack Creek are densely covered in grasses and sedges which would provide a degree of natural mitigation against any sediment mobilised by the proposed work. The low gradient of the creek bed and ephemeral nature of flows would also reduce the risk of sedimentation downstream from the site. With the implementation of safeguards and management measures, the potential for impacts on water quality within Blackjack Creek and the Namoi River is considered low.

**Operation**

The proposal has been designed to avoid permanent impacts on Blackjack Creek. Once operational, it is not likely to result in any impacts on water quality within Blackjack Creek or surrounding waterways.

6.2.5 Safeguards and management measures

The proposed safeguards and management measures to minimise the project’s potential impact on water quality are presented in Table 6.2.

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pollution of receiving waters</td>
<td>• A Soil and Water Management Plan (SWMP) would be prepared as part of the CEMP before construction begins in accordance with the Roads and Maritime</td>
<td>Contractor</td>
<td>Pre-construction</td>
</tr>
</tbody>
</table>

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Gunnedah second road over rail bridge

Review of Environmental Factors
Impact | Environmental safeguards | Responsibility | Timing
--- | --- | --- | ---
| Specification G38. The SWMP would address: | | | 
| o Roads and Maritime Code of Practice for Water Management, the Roads and Maritime Erosion and Sedimentation Procedure | | | 
| o Roads and Maritime Technical Guideline: Temporary Stormwater Drainage for Road Construction, (Roads and Maritime 2011b) | | | 
| • The plan would include (but not be limited to): | | | 
| o Details of erosion and sediment controls to be implemented, including erosion and sediment control plans developed for the proposal | | | 
| o Details of inspection frequency for control measures | | | 
| o Monitoring and maintenance of environmental control measures | | | 
| o Procedures to manage stockpiles generated during construction | | | 
| o Acid sulfate management measures | | | 
| o Detailed consideration of measures to prevent (where possible) or minimise any water quality impacts | | | 
| o Measures to manage known and unexpected contamination during the construction stage | | | 
| o Appropriate controls to minimise risk of release of dirty water into drainage lines and/or waterways | | | 
| o Visual monitoring of local water quality (that is, turbidity, hydrocarbon spills/slicks) to be carried out on a regular basis to identify any potential spills or deficient erosion and sediment controls | | | 
| o Water quality control measures to prevent any materials (such as concrete, grout and sediment) entering waterways. | | | 

• Pre-cast concrete elements would be used where practicable, in preference to pouring concrete near the creek and drainage lines. | Roads and Maritime | Pre-construction |

• Equipment and vehicle washdown would be carried out off site or in a bunded area with an impervious surface. | Roads and Maritime | Construction |
<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Concrete truck washouts would be carried out in a bunded area with an impervious surface.</td>
<td>Road and Maritime</td>
<td>Construction</td>
<td></td>
</tr>
<tr>
<td>• All fuels, chemicals and other liquids would be stored as far as practicable from Blackjack Creek and drainage lines in a bunded area (110% capacity) within the site compound. A Safety Data Sheet is required for each item stored.</td>
<td>Road and Maritime</td>
<td>Construction</td>
<td></td>
</tr>
<tr>
<td>• Refuelling would be carried out within a bunded area at least 50 metres from watercourses.</td>
<td>Road and Maritime</td>
<td>Construction</td>
<td></td>
</tr>
<tr>
<td>• Vehicles and equipment would be checked daily for leaks.</td>
<td>Road and Maritime</td>
<td>Construction</td>
<td></td>
</tr>
<tr>
<td>• All staff would be trained in incident and emergency response procedures.</td>
<td>Road and Maritime</td>
<td>Construction</td>
<td></td>
</tr>
<tr>
<td>• Emergency spill kits would be kept on site at all times, along with the contact numbers of key agencies which would be notified in the event of an incident.</td>
<td>Road and Maritime</td>
<td>Construction</td>
<td></td>
</tr>
<tr>
<td>• The Roads and Maritime Environmental Incident Classification and Management Procedure would be followed in the event of an incident.</td>
<td>Road and Maritime</td>
<td>Construction</td>
<td></td>
</tr>
<tr>
<td>• The EPA would be notified in the event of a significant spill in accordance with Part 5.7 of the Protection of the Environment Operations Act 1997.</td>
<td>Road and Maritime</td>
<td>Construction</td>
<td></td>
</tr>
<tr>
<td>• Work would be carried out in the dry season where feasible and reasonable.</td>
<td>Road and Maritime</td>
<td>Construction</td>
<td></td>
</tr>
<tr>
<td>• Visual monitoring of water quality (turbidity and hydrocarbon slicks) would be carried out on a daily basis.</td>
<td>Road and Maritime</td>
<td>Construction</td>
<td></td>
</tr>
</tbody>
</table>

6.3 Soils and contamination

6.3.1 Existing environment

Golder was appointed to carry out a geotechnical and environmental study to support design work. This predominantly desktop assessment was carried out in February 2013 and was supplemented by a walkover of the site on 18 February 2013. The assessment covered a survey area of approximately 25 hectare.

Golder then carried out a geotechnical investigation in September 2013. This comprised fieldwork, laboratory analysis and preparation of an interpretive report (refer to Appendix G). The fieldwork was carried out in July 2013 and included the installation of five boreholes. The survey area of this investigation and the locations of boreholes are shown on Figures 1 and 2 of Appendix G. The report contained in Appendix G informs this section of the REF. The full report should be referred to for detailed descriptions of survey methodologies, laboratory testing results and subsurface conditions.
**Topography**

The topography of the survey area is generally flat (approximately 260 metres Australian Height Datum) with the exception of where it is intersected by the ephemeral Blackjack Creek, a minor drainage line that intersects the creek, a railway embankment and flood protection levies. The bed of Blackjack Creek is approximately three metres below the surrounding surface level. The western portion of the survey area also includes the toe of Pensioners Hill which rises to approximately 310 metres Australian Height Datum to the west of the survey area.

**Geology and soils**

Geological mapping indicates that the western side of the study area is underlain by volcanic rock and the eastern side by conglomerate, sandstone and siltstone. More recent alluvial deposits, including sandy to silty clays and minor gravels, are shown to be present in Blackjack Creek and also over much of Gunnedah.

Boreholes drilled within the study area show that subsurface conditions are mainly localised fill and topsoil over a thick layer of undifferentiated alluvial and residual soils. Fill and topsoil were encountered to shallow depths (less than two metres) over most of the survey area with deeper areas (up to two metres) north of the railway line. Underlying the fill/topsoil was a layer of inferred alluvial and residual soils comprising clay, silty clay, sandy silt and clayey sand.

**Acid sulfate soils**

The location and elevation of Gunnedah, being some 270 kilometres from the coast at an elevation of around 260 Australian Height Datum, effectively precludes any potential risk of acid sulfate soils within the study area. This assumption is supported by acid sulfate soils risk mapping for the study area, which shows that the study area is not within an acid sulfate soils risk area.

**Contamination**

An assessment of the potential presence of contaminated soils, including agricultural chemical residues, was carried out by Golder. This involved a review of publicly available information including Environmental Protection Agency (EPA) databases relating to the *Contaminated Land Management Act 2008*, Office of Water groundwater records, soil and geological sheets and historical aerial photographs. A site visit was also carried out to visually identify potential sources of existing and historic contamination.

The study identified numerous potential sources of contamination within the survey area. The majority of these sources are located outside of the work footprint area of the proposal and would therefore not be affected by the proposal. The potential sources of contamination which may be intercepted include asbestos (if present) in the buildings proposed to be removed and Total Petroleum Hydrocarbons, Polycyclic Aromatic Hydrocarbons, metals/metalloids, Organo Chlorine Pesticides and Organo Phosphate Pesticides within the rail corridor.

6.3.2 Potential impacts

**Construction**

*Erosion and sedimentation*

Building activities which have the potential to result in erosion and sedimentation if not appropriately managed include:

- Clearing of, or disturbance to, vegetation associated with site establishment
• Light and heavy vehicle movements within the bed and banks of Blackjack Creek and associated drainage lines
• Importation of fill for building of temporary crane support and piling pads
• Importation of fill for building of permanent road embankments
• Other earthwork along the proposed alignment
• Stockpiling of fill and road building materials
• Piling and building of bridge piers
• Clearing and surfacing of land within the site compound.

Erosion resulting from the above activities may result in sedimentation and water quality impacts within Blackjack Creek and the Namoi River – specifically, increases in turbidity may negatively affect aquatic ecosystems. As described above, the bed and banks of Blackjack Creek are thickly covered in grasses and sedges which would provide a degree of natural mitigation against any sediment which might be mobilised within the creek bed by the proposed work. The low gradient of the creek bed and ephemeral nature of flows also contribute to a reduced risk of sedimentation downstream from the site. As such, if managed appropriately, the proposed work would represent a low risk to soils and water quality downstream of the proposal.

Contamination

Investigations carried out by Golder identified a number of potential sources of contamination within the survey area. However, with the exception of the rail embankment, none of these sources falls within the footprint area of the proposal. The risk of exposing contaminated soils is therefore considered low and could be managed with the implementation of measures described in Section 6.3.3. In regard to the railway embankments, the proposed road would be elevated at this point and therefore potentially contaminated soil in this area would not be disturbed.

Operation

Erosion and sedimentation

Disturbed areas and road embankments have the potential to erode if not sufficiently stabilised and/or vegetated.

Contamination

Once operational, the proposal is not anticipated to result in any impacts as a result of interactions with contaminated materials.

6.3.3 Safeguards and management measures

The following procedures would be adhered to when developing and implementing the environmental safeguards listed in Table 6.3:

• Roads and Maritime Specification G38 – Soil and Water Management (Soil and Water Management Plan)
• Roads and Maritime Specification G39 Soil and Water Management (Erosion and Sediment Control Plan)
• The NSW Soils and Construction – Managing Urban Stormwater Volume 1 (‘The Blue Book’) (Landcom, 2004) and Volume 2 (DECC, 2008)
• Roads and Maritime Code of Practice for Water Management, the Roads and Maritime Erosion and Sedimentation Procedure.

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Erosion and sedimentation during</td>
<td>• Preparation of a Soil and Water Management Plan (SWMP) as part of a Roads and Maritime</td>
<td>Pre-</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>construction</td>
<td></td>
</tr>
</tbody>
</table>

Table 6.3 Proposed safeguards and management measures for soils and contamination

Gunnedah second road over rail bridge
Review of Environmental Factors
<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>construction</td>
<td>A detailed erosion and sedimentation control plan would be prepared within the SWMP and approved by the Roads and Maritime Environmental Officer before start of work in accordance with the requirements of the ‘Blue Book’.</td>
<td>Roads and Maritime</td>
<td>Pre-construction</td>
</tr>
<tr>
<td></td>
<td>The Erosion and Sediment Control Plan would include specific details of controls required for work within Blackjack Creek and drainage lines.</td>
<td>Roads and Maritime</td>
<td>Pre-construction</td>
</tr>
<tr>
<td></td>
<td>The Erosion and Sediment Control Plan would include a procedure for regular inspection, maintenance and cleaning of erosion and sediment controls.</td>
<td>Roads and Maritime</td>
<td>Pre-construction</td>
</tr>
<tr>
<td></td>
<td>Erosion and sedimentation controls would remain in place until the work area has been stabilised and the risk of erosion and sedimentation is minimal.</td>
<td>Roads and Maritime</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>Work would be scheduled to occur within the dry season where feasible and practical.</td>
<td>Roads and Maritime</td>
<td>Pre-construction</td>
</tr>
<tr>
<td></td>
<td>Work would be suspended in periods of heavy rain.</td>
<td>Roads and Maritime</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>Disturbance to vegetation and soil outside of the work area would be minimised.</td>
<td>Roads and Maritime</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>Vehicle and equipment movements would be confined to established access tracks.</td>
<td>Roads and Maritime</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>Vehicle and equipment use within Blackjack Creek would be minimised.</td>
<td>Roads and Maritime</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>The siting of soil stockpiles would be as far from Blackjack Creek and associated drainage lines as feasible and practical.</td>
<td>Roads and Maritime</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>All stockpiles would be stabilised at the end of each work day during wet weather and managed in accordance with the Roads and Maritime procedure, Stockpile Site Management Guidelines (Roads and Maritime, 2011).</td>
<td>Roads and Maritime</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>All surfaces disturbed would be stabilised and restored as soon as practicable and in a progressive manner as work is completed.</td>
<td>Roads and Maritime</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>No work would start before installation of appropriate erosion and sediment control structures.</td>
<td>Roads and Maritime</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>Stockpiling of soil, earth or other material would be bunded or fenced and located within sites approved by</td>
<td>Roads and Maritime</td>
<td>Construction</td>
</tr>
<tr>
<td>Impact</td>
<td>Environmental safeguards</td>
<td>Responsibility</td>
<td>Timing</td>
</tr>
<tr>
<td>--------</td>
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</tr>
</tbody>
</table>
| Exposure of contaminated soils | • A contingency plan for the management of contaminated soils would be developed.  
  • Visual assessment of excavated materials would be carried out immediately following exposure.  
  • If any areas where excavation is required are identified as Potential Acid Sulfate Soil, an Acid Sulfate Soil Management Plan would be prepared in accordance with the Roads and Maritime Guidance for the Management of Acid Sulfate Materials: Acid Sulfate Soils, Acid Sulfate Rock and Monosulfidic Black Ooze (RTA 2005). The ASS management plan would be approved by Roads and Maritime before the start of any earthwork and, at a minimum, the plan would include:  
  o Management measures for the safe excavation, isolation and disposal of neutralised soils  
  o Requirements for additional testing to determine predicted liming rates of excavated spoil once quantities are determined.  
  • Specific controls to be implemented would include:  
    o Capping exposed surfaces with clean fill to prevent oxidation  
    o Placing excavated ASS separately in a lined, bunded and covered area  
    o Neutralising ASS for reuse (where appropriate) by using additives such as lime. | Roads and Maritime | Construction |

6.4 Noise

This section draws on the main findings of a Noise and Vibration Impact Assessment Report (refer to Appendix H) prepared by SLR Consulting for the in November 2014.

6.4.1 Existing environment

Land use to the west of the proposal area, near Farrar Road, is typically industrial and commercial. To the east of the proposal, land uses are a mix of residential and commercial.

To characterise the noise environment across these areas and establish existing ambient noise levels, unattended noise monitoring was performed with noise loggers at representative locations during April 2013. The noise monitoring locations were selected to be representative of receivers potentially affected by the building and
The noise loggers continuously measured noise levels in 15-minute sampling periods to determine the existing equivalent continuous sound level (LAeq), the background level (LA90) and other relevant statistical noise levels during the daytime, evening and night-time periods. Noise levels were found to display a diurnal trend with noise levels during the night-time lower than the levels during the daytime and evening periods. This is typical of areas where the daytime and evening ambient noise levels are primarily influenced by road/rail traffic movements.

Measurements of ambient noise were used to determine the various sources that influence the existing noise environment. At each location the measurements were performed using sound level meters for a minimum period of 15 minutes.

The noise sources were found to be typical of an urban environment with examples of noise sources including residents (48–67 decibels), general industry (53–55 decibels) and dogs (48–59 decibels). The noise environment at the monitoring locations is described in detail in Table 2 in Appendix H (Noise and Vibration Impact Assessment Report).

6.4.2 Policy setting

Environmental Protection Agency guidelines

For traffic operating on public roads, the NSW Government’s Road Noise Policy is appropriate for assessing potential road traffic noise impacts. The document identifies strategies that address the issue of road traffic noise from:

- Existing roads
- New road projects
- Road redevelopment projects
- New traffic-generating developments.

The noise criteria in the Road Noise Policy aim to protect amenity inside and immediately around permanent residences, schools, hospitals and other sensitive land uses, rather than at all points in a given locality, which would not be practical or possible. Although it is not mandatory to achieve the noise assessment criteria in the Road Noise Policy, proponents need to provide justification if it is not considered feasible or reasonable to achieve them.

The Road Noise Policy recognises that there are generally more opportunities to minimise noise impacts from new roads and road corridors, especially those in greenfield locations, through judicious road design and land use planning. The scope to reduce noise impacts from existing roads and corridors is more limited.

The Interim Construction Noise Guideline (EPA, 2009) sets out ways to deal with the impacts of building noise on residences and other sensitive land uses. The main objectives of these guidelines that are relevant to the proposal are to:

- Promote a clear understanding of ways to identify and minimise noise from construction
- Focus on applying all ‘feasible’ and ‘reasonable’ work practices to minimise building noise impacts
- Encourage building work to be carried out only during the recommended standard hours unless approval is given for work that cannot be carried out...
during these hours

- Streamline the assessment and approval stages and reduce time spent dealing with complaints at the project implementation stage
- Provide flexibility in selecting site-specific feasible and reasonable work practices in order to minimise noise impacts.

Although the guideline is non-mandatory, it is considered to be applicable to the proposal and has been adopted for the purposes of assessing the potential for impacts during the building work.

The EPA also manages the Construction Vibration (Human Comfort) – Assessing Vibration – A Technical Guideline, (Department of Environment and Climate Change, 2006), which presents preferred and maximum vibration values for use in assessing human responses to vibration and provides recommendations for measurement and evaluation techniques.

**Roads and Maritime guidelines**

Roads and Maritime has also prepared a number of guidelines which set the policy framework and assessment for the noise and vibration associated with Roads and Maritime developments. These include:


### 6.4.3 Criteria

**Operation**

Table 6.4 summarises the Road Noise Policy assessment criteria for ‘redevelopment’ and ‘new road’ for residences, which are applicable for the proposal. The proposal is considered to be a new road while the proposed work at the Barber Street connection is considered to be redevelopment of existing roads.

These criteria are presented for assessment against facade noise levels as measured at the most affected point in front of a building.

<table>
<thead>
<tr>
<th>Road category</th>
<th>Type of project/land use</th>
<th>Assessment criteria (dBA)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Daytime (7am 10pm)</td>
</tr>
<tr>
<td>Freeway/arterial/sub-arterial roads</td>
<td>Existing residences affected by noise from new freeway/arterial/sub-arterial road corridors</td>
<td>$L_{A_{eq}}$ (15 hour) 55 (external)</td>
</tr>
<tr>
<td></td>
<td>Existing residences affected by noise from redevelopment of existing freeway/arterial/sub-arterial roads</td>
<td>$L_{A_{eq}}$ (15 hour) 60 (external)</td>
</tr>
<tr>
<td></td>
<td>Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments</td>
<td>$L_{A_{eq}}$ (15 hour) 60 (external)</td>
</tr>
</tbody>
</table>

In addition to the noise criteria in Table 6.4, the Road Noise Policy describes a ‘relative increase criterion’ of 12 decibels above existing traffic noise. This criterion is...
primarily intended to protect existing quiet areas from excessive changes in amenity.

**Construction**

**Noise**

The Interim Construction Noise Guideline provides guidance levels for airborne noise at sensitive land uses, including passive recreation, commercial and industrial premises. Guidance levels are also given for ground-borne noise and sleep disturbance.

Noise management levels (NMLs) from the guideline are presented in Table 6.5 and Table 6.6.

**Table 6.5**  
ICNG project-specific NML for residential assessment (dBA re 20 µPA)

<table>
<thead>
<tr>
<th>Project</th>
<th>Daytime (7am 6pm Monday to Friday, 8am 1pm Saturdays)</th>
<th>Evening (6 10pm Monday to Friday)</th>
<th>Night (10pm 7am Monday to Friday)</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Street, Barber Street</td>
<td>62</td>
<td>49</td>
<td>42</td>
</tr>
<tr>
<td>Warrabungle Street</td>
<td>49</td>
<td>44</td>
<td>38</td>
</tr>
<tr>
<td>Stockman Close</td>
<td>55</td>
<td>47</td>
<td>43</td>
</tr>
</tbody>
</table>

**Table 6.6**  
NMLs at sensitive land uses and commercial and industrial premises (other than residences)

<table>
<thead>
<tr>
<th>Receiver</th>
<th>LA_{eq15minute)</th>
<th>Construction NML</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial (offices)</td>
<td>External noise level 70 dBA</td>
<td></td>
</tr>
<tr>
<td>Industrial</td>
<td>External noise level 75 dBA</td>
<td></td>
</tr>
</tbody>
</table>

**Vibration**


The acceptable vibration dose values (VDVs) for human comfort from vibration of an intermittent nature are set between 0.10 metres per second (m/s)$^{1.75}$ and 0.80 m/s$^{1.75}$ during both daytime and night-time.

**6.4.4 Potential impacts**

**Construction**

**Noise**

The building work noise impact assessment was based on a concept level design and scope of work for the major work scenarios and worst-case sound power levels for plant and equipment. In practice, noise levels would depend on a number of variables including wind direction, number of plant and equipment operating simultaneously and the precise location of noise sources in relation to sensitive
Daytime LAeq (15 minute) noise level predictions for the various building activities, along with noise management levels are presented in Table 6.7.

<table>
<thead>
<tr>
<th>Building stage</th>
<th>Receiver</th>
<th>Project specific NML</th>
<th>Predicted noise level</th>
<th>LAeq</th>
<th>Exceedance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Driven piling</td>
<td>New Street</td>
<td>62</td>
<td>73</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Railway Avenue North</td>
<td>62</td>
<td>76</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Barber Street</td>
<td>62</td>
<td>79</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Warrabungle Street east</td>
<td>49</td>
<td>83</td>
<td>34</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Warrabungle Street west</td>
<td>49</td>
<td>85</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stockman Close</td>
<td>55</td>
<td>85</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mill buildings</td>
<td>70</td>
<td>92</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Railway Avenue south</td>
<td>75</td>
<td>81</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Farrar Road</td>
<td>75</td>
<td>90</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Placement of pre-cast beams</td>
<td>New Street</td>
<td>62</td>
<td>53</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Railway Avenue north</td>
<td>62</td>
<td>47</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Barber Street</td>
<td>62</td>
<td>59</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Warrabungle Street east</td>
<td>49</td>
<td>62</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Warrabungle Street west</td>
<td>49</td>
<td>62</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stockman Close</td>
<td>55</td>
<td>56</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mill buildings</td>
<td>70</td>
<td>65</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Railway Avenue south</td>
<td>75</td>
<td>50</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Farrar Road</td>
<td>75</td>
<td>60</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Concreting</td>
<td>New Street</td>
<td>62</td>
<td>57</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Railway Avenue north</td>
<td>62</td>
<td>51</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Barber Street</td>
<td>62</td>
<td>63</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Warrabungle Street east</td>
<td>49</td>
<td>66</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Warrabungle Street west</td>
<td>49</td>
<td>66</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stockman Close</td>
<td>55</td>
<td>60</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mill buildings</td>
<td>70</td>
<td>69</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>
As indicated in Table 6.7, the noise management levels are likely to be exceeded during the worst-case scenarios. The highest impacts are predicted during driven piling, with exceedances of up to 36 decibels at Warrabungle Street. In the event that auger or bored piling techniques are used (rather than driven piling), exceedances would be reduced by up to 20 decibels.

For the remaining building stages, the primary noise impacts would be confined to the Warrabungle Street residences, with exceedances of up to 13 decibels for precast placement, up to 17 decibels for concreting and up to 28 decibels during finishing.

Residential receivers are considered to be highly noise affected if noise levels exceed 75 decibels during standard construction hours. The worst-case predicted
levels indicate that there is potential for this to occur during driven piling, building of new kerbs and associated infrastructure, and finishing in the streets immediately surrounding the proposal.

**Vibration**

The major potential sources of vibration from the proposed building activities are pile driving (if chosen as the pile installation methodology) and vibratory rolling. Other proposed building activities would either utilise plant items that are not significantly vibration intensive or would be conducted with sufficient separation distance from the nearest receivers to not cause impacts. In regard to pile driving and vibratory rolling, the following findings were made:

- The proposed piling activities would be generally more than 20 metres from any existing buildings. Therefore, the proposed piling activity is not likely to cause cosmetic damage
- Some existing residential buildings are likely to be less than 12 metres from the proposed alignment work areas. Therefore, the allowable ratings should be less than or equal to 200 kilo newton for vibratory rollers, and less than or equal to 900 kilograms for hydraulic hammers.

**Safe working distances**

As a guide, safe working distances for typical items of vibration intensive plant are listed in Table 6.8. The safe working distances are quoted for both ‘cosmetic’ damage to buildings and for human comfort.

**Table 6.8**  Recommended safe working distances for vibration intensive plant

<table>
<thead>
<tr>
<th>Plant item</th>
<th>Rating/Description</th>
<th>Safe working distance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Cosmetic damage</td>
</tr>
<tr>
<td>Vibratory roller</td>
<td>&lt; 50 kN (typically 1–2 tonnes)</td>
<td>5 m</td>
</tr>
<tr>
<td></td>
<td>&lt; 100 kN (typically 2–4 tonnes)</td>
<td>6 m</td>
</tr>
<tr>
<td></td>
<td>&lt; 200 kN (typically 4–6 tonnes)</td>
<td>12 m</td>
</tr>
<tr>
<td></td>
<td>&lt; 300 kN (typically 7–13 tonnes)</td>
<td>15 m</td>
</tr>
<tr>
<td></td>
<td>&gt; 300 kN (typically 13–18 tonnes)</td>
<td>20 m</td>
</tr>
<tr>
<td></td>
<td>&gt; 300 kN (&gt; 18 tonnes)</td>
<td>25 m</td>
</tr>
<tr>
<td>Small hydraulic hammer</td>
<td>(300 kg: 5–12 tonne excavator)</td>
<td>2 m</td>
</tr>
<tr>
<td>Medium hydraulic hammer</td>
<td>(900 kg: 12–18 tonne excavator)</td>
<td>7 m</td>
</tr>
<tr>
<td>Large hydraulic hammer</td>
<td>(1600 kg: 18–34 tonne excavator)</td>
<td>22 m</td>
</tr>
<tr>
<td>Vibratory pile driver</td>
<td>Sheet piles</td>
<td>2 m to 20 m</td>
</tr>
<tr>
<td>Pile boring</td>
<td>≤ 800 mm</td>
<td>2 m (nominal)</td>
</tr>
<tr>
<td>Jackhammer</td>
<td>Hand held</td>
<td>1 m (nominal)</td>
</tr>
<tr>
<td>Impact piling*</td>
<td>&lt; 10,000 kg/m</td>
<td>15 m</td>
</tr>
</tbody>
</table>

Note: More stringent conditions may apply to heritage or other sensitive structures.
Note*: Data sourced from published measurement results.
The safe working distances presented in Table 6.8 are indicative only and would vary depending on the particular item of plant and local geotechnical conditions. They apply to typical buildings under typical geotechnical conditions.

**Ground-borne construction noise**

The nature of the work (surface work with minimal screening effects) means that ground-borne noise impacts are expected to be negligible. This is because the airborne noise emissions in most circumstances are much higher than ground-borne noise levels. Ground-borne noise is therefore not expected to be an issue for the proposal.

**Operation**

**Noise**

A three-dimensional computer noise model was developed as part of the Detailed Design Noise Assessment for the proposal. Noise modelling of the proposal area was carried out using the UK Department of Transport, Calculation of Road Traffic Noise (CORTN 1988) algorithms incorporated in SoundPLAN noise software.

The predicted operational noise levels for the at-opening year (2016) are compared to the Road Noise Policy criteria (provided in Table 6.4) and the acute noise levels (Lₐeq 65 decibels for day and Lₐeq 60 decibels for night) in Table 6.9.

**Table 6.9 Predicted operational noise levels for the at-opening year (2016)**

<table>
<thead>
<tr>
<th>Receiver address</th>
<th>RNP criteria (dBA)</th>
<th>Predicted noise levels (dBA)</th>
<th>Are the RNP criteria exceeded?</th>
<th>Change in noise levels</th>
<th>Is there an acute level of noise?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Day</td>
<td>Night</td>
<td>Day</td>
<td>Night</td>
<td>Day</td>
</tr>
<tr>
<td>2 Railway Avenue</td>
<td>55</td>
<td>50</td>
<td>59</td>
<td>49</td>
<td>49</td>
</tr>
<tr>
<td>5 Barber Street</td>
<td>55</td>
<td>50</td>
<td>59</td>
<td>50</td>
<td>54</td>
</tr>
<tr>
<td>1/2–6 Warrabungle Street</td>
<td>55</td>
<td>50</td>
<td>52</td>
<td>42</td>
<td>57</td>
</tr>
<tr>
<td>2/2-6 Warrabungle Street</td>
<td>55</td>
<td>50</td>
<td>53</td>
<td>43</td>
<td>55</td>
</tr>
<tr>
<td>3 Warrabungle Street</td>
<td>55</td>
<td>50</td>
<td>54</td>
<td>44</td>
<td>57</td>
</tr>
<tr>
<td>14/2-6 Warrabungle Street</td>
<td>55</td>
<td>50</td>
<td>53</td>
<td>44</td>
<td>53</td>
</tr>
<tr>
<td>1 Little Barber Street</td>
<td>55</td>
<td>50</td>
<td>52</td>
<td>42</td>
<td>53</td>
</tr>
<tr>
<td>7 Stockman Close</td>
<td>55</td>
<td>50</td>
<td>46</td>
<td>37</td>
<td>52</td>
</tr>
<tr>
<td>9 Stockman Close</td>
<td>55</td>
<td>50</td>
<td>46</td>
<td>36</td>
<td>52</td>
</tr>
<tr>
<td>33 Conadilly Street</td>
<td>60</td>
<td>55</td>
<td>58</td>
<td>51</td>
<td>59</td>
</tr>
<tr>
<td>35 Conadilly Street</td>
<td>60</td>
<td>55</td>
<td>56</td>
<td>49</td>
<td>57</td>
</tr>
<tr>
<td>36 Conadilly Street</td>
<td>60</td>
<td>55</td>
<td>59</td>
<td>52</td>
<td>60</td>
</tr>
</tbody>
</table>

Note 1: Day = 7am –10pm (15 hours); Night = 10pm–7am (9 hours).
The predicted operational noise levels for the design year (2026) are compared to the Road Noise Policy criteria (provided in Table 6.4) and the acute noise levels (LAeq 65 decibels for day and LAeq 60 decibels for night) in Table 6.10.

<table>
<thead>
<tr>
<th>Receiver address</th>
<th>RNP criteria (decibels)</th>
<th>Predicted noise levels (decibels)</th>
<th>Are the RNP criteria exceeded?</th>
<th>Change in noise levels</th>
<th>Is there an acute level of noise?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Day¹</td>
<td>Night¹</td>
<td>Day</td>
<td>Night</td>
<td>Day</td>
</tr>
<tr>
<td>2 Railway Avenue</td>
<td>55</td>
<td>50</td>
<td>59</td>
<td>49</td>
<td>49</td>
</tr>
<tr>
<td>5 Barber Street</td>
<td>55</td>
<td>50</td>
<td>60</td>
<td>50</td>
<td>55</td>
</tr>
<tr>
<td>1/2–6 Warrabungle Street</td>
<td>55</td>
<td>50</td>
<td>53</td>
<td>43</td>
<td>57</td>
</tr>
<tr>
<td>2/2-6 Warrabungle Street</td>
<td>55</td>
<td>50</td>
<td>53</td>
<td>44</td>
<td>55</td>
</tr>
<tr>
<td>3 Warrabungle Street</td>
<td>55</td>
<td>50</td>
<td>54</td>
<td>44</td>
<td>57</td>
</tr>
<tr>
<td>14/2–6 Warrabungle Street</td>
<td>55</td>
<td>50</td>
<td>53</td>
<td>44</td>
<td>54</td>
</tr>
<tr>
<td>1 Little Barber Street</td>
<td>55</td>
<td>50</td>
<td>52</td>
<td>43</td>
<td>53</td>
</tr>
<tr>
<td>7 Stockman Close</td>
<td>55</td>
<td>50</td>
<td>47</td>
<td>37</td>
<td>52</td>
</tr>
<tr>
<td>9 Stockman Close</td>
<td>55</td>
<td>50</td>
<td>46</td>
<td>36</td>
<td>52</td>
</tr>
<tr>
<td>33 Conadilly Street</td>
<td>60</td>
<td>55</td>
<td>58</td>
<td>51</td>
<td>60</td>
</tr>
<tr>
<td>35 Conadilly Street</td>
<td>60</td>
<td>55</td>
<td>56</td>
<td>49</td>
<td>58</td>
</tr>
<tr>
<td>36 Conadilly Street</td>
<td>60</td>
<td>55</td>
<td>59</td>
<td>53</td>
<td>60</td>
</tr>
</tbody>
</table>

Note 1: Day = 7am–10pm (15 hours); Night = 10pm–7am (9 hours).

Based on the predicted results presented in Table 6.9 and Table 6.10, the following findings were made:

- While an increase in noise level is predicted at some sensitive receivers as a result of the proposal, other properties are predicted to experience a reduction in noise due to the closure of the New Street rail crossing.
- Potential noise levels two decibels above the Road Noise Policy criteria are predicted to occur at two locations on Warrabungle Street during the daytime.
- No levels are predicted to occur above the Road Noise Policy criteria during the night.
- All predicted relative increases in noise levels are less than the prescribed Road Noise Policy relative increase criterion of 12 decibels.
- The predicted daytime and night-time LAeq noise levels show that no receivers are predicted to be subject to acute levels of noise.

6.4.5 Safeguards and management measures

The mitigation measures to manage potential noise and vibration impacts would be in accordance with Section 4.6 of the Roads and Maritime QA Specification G36, with the additions and amendments to this document listed in Table 6.11.

Gunnedah second road over rail bridge 77
Review of Environmental Factors
<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
</table>
| Noise and vibration disturbance during building work                  | • A site-specific Construction Noise and Vibration Management Plan (CNVMP) would be prepared. This plan would address each major stage of the building work and identify the appropriate mitigation and management measures. The objectives of the CNVMP are to:  
  o Minimise exceedances of the noise management levels and goals nominated in Section 6.4.4  
  o Provide detail of noise and vibration monitoring, reporting and response procedures  
  o Describe specific mitigation treatments, management methods and procedures to be implemented to control noise and vibration during construction  
  o Describe construction timetabling to minimise noise impacts including time and duration restrictions, respite periods and frequency  
  o Describe procedures for notifying residents of building activities likely to affect their amenity through noise and vibration  
  o Define contingency plans to be implemented in the event of non-compliances and/or noise complaints  
  o Define the construction hours. | Contractor | Pre-construction |
| Vibration disturbance during building work                              | • Potential vibration impacts would be addressed in the CNVMP.  
  • Building condition surveys would be completed both before and after the work for all potentially affected properties. | Contractor | Pre-construction |
| Noise impacts on residential receivers during operation                | • Architectural noise treatments may be developed at affected properties on Railway Avenue, Barber Street, Warrabungle Street, Stockman Close and Farrar Road in consultation with property owners. | Roads and Maritime | Detailed design |
| Additional noise impacts due to change in building methodology         | • If a driven pilling technique is selected, the Roads and Maritime Environmental Officer must be contacted with regard to any additional requirements. Further mitigation measures or specialist input may be required to supplement the CNVMP. | Roads and Maritime | Detailed design |
| Noise disturbance during construction                                   | • As a minimum, the following mitigation measures would be included in the CNVMP and all feasible and practical mitigation considered:  
  o Using localised acoustic hoarding around significantly noise generating stationary items of plant, where practicable.  
  o Scheduling highly noisy activities | Contractor | Pre-construction |

Gunnedah second road over rail bridge  
Review of Environmental Factors 78
<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>during less noise-sensitive periods where feasible and practical.</td>
<td>Contractor</td>
<td></td>
</tr>
<tr>
<td></td>
<td>o Inducing and training workers and contractors to create awareness of the locality of sensitive receivers and the importance of minimising noise emissions.</td>
<td>Construction</td>
<td></td>
</tr>
<tr>
<td></td>
<td>o Ensuring any spoil is placed and not dropped into awaiting trucks.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o Locating noisy plant away from receivers where possible.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o Turning noisy plant off when not in use.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o Ensuring plant is appropriately maintained.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o Using silenced or less noise-intensive equipment, where feasible and practical.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o Limiting heavy vehicle movements to daytime hours where feasible and practical.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o Considering the use of non-tonal reversing alarms to minimise nuisance caused by reversing alarms.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vibration during construction</td>
<td>Attended vibration monitoring would be carried out if vibration intensive work is required within ‘cosmetic damage’ safe working distances – for example, if rock breaking is required within 7 m of a receiver (medium rock breaker), or if impact piling is required within 15 m of a receiver.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>The aim of the attended vibration monitoring would be to ensure levels remain below the criteria for cosmetic damage at all receivers.</td>
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<tr>
<td></td>
<td>The following measures for vibration management would be included in the CNVMP:</td>
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<td></td>
<td>o Bored pilling – not impact pilling – would be used where feasible and practical.</td>
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<td></td>
<td>o If rock breaking is required, the following additional measures would be considered in the CNVMP:</td>
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<tr>
<td></td>
<td>o Dampered rock breakers and/or ‘city’ rock breakers would be used to minimise the impacts associated with rock breaking work (if required) and a smaller capacity rock breaker would be used where feasible and practical</td>
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<td></td>
<td>o Rock breaking operations would be sequenced so vibration-intensive operations do not occur concurrently</td>
<td></td>
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<td></td>
<td>o Rock breaking would be scheduled during the less sensitive times of the day</td>
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<td></td>
<td>o Hydraulic rock splitters would be used rather than rock breakers (if applicable).</td>
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</tr>
</tbody>
</table>
6.5 Biodiversity

A biodiversity assessment report was prepared by KBR in January 2015 (refer to Appendix A). This section draws on the main findings of the assessment.

6.5.1 Existing environment

For the purposes of assessing the biodiversity impacts of the proposal the following spatial definitions apply:

- Locality – Land that is within a 10 kilometre radius of the site that supports biodiversity and provides habitat values
- Study area – The area containing the site and additional areas immediately surrounding the site that may be indirectly affected by the proposal (Figure 6.8)
- Site – The area where land disturbance is necessary as a result of the proposal. The site also includes estimated areas where incidental disturbances may occur to allow for building work activities.

Desktop survey

A comprehensive literature review of information pertaining to the study area was carried out. Key sources of information reviewed include the following reports, together with the databases and websites included in Table 6.12.

- Ecology Assessment: Gunnedah Second Road Over Rail Bridge Options (OzArk, 2013)
- Gunnedah Second Road Over Rail Bridge Koala Tree and Habitat Assessment (KBR, 2014).

The desktop review informed a likelihood of occurrence assessment, which is presented in the Biodiversity Assessment Report (Appendix A).
Figure 6.8
STUDY AREA FOR THE BIODIVERSITY ASSESSMENT
### Table 6.12 Ecological desktop database and website searches

<table>
<thead>
<tr>
<th>Databases or websites searched</th>
<th>Date searched</th>
<th>Type of search</th>
</tr>
</thead>
<tbody>
<tr>
<td>Department of the Environment EPBC Act Protected Matters Search Tool</td>
<td>25 September 2014</td>
<td>Polygon search of site with a 10 km buffer (coordinates: -30.977, 150.24248)</td>
</tr>
<tr>
<td>Department of Primary Industries Noxious Weeds Database</td>
<td>1 October 2014</td>
<td>Area search of Gunnedah LGA</td>
</tr>
<tr>
<td>Department of Primary Industries (Fishing and Aquaculture) Threatened and Protected Species Record Viewer</td>
<td>1 October 2014</td>
<td>Area search of Gunnedah LGA</td>
</tr>
<tr>
<td>Department of the Environment Register of Critical Habitat</td>
<td>3 October 2014</td>
<td>National search</td>
</tr>
<tr>
<td>Office of Environment and Heritage Critical Habitat Register</td>
<td>3 October 2014</td>
<td>State search</td>
</tr>
<tr>
<td>Office of Environment and Heritage Key Threatening Processes</td>
<td>3 October 2014</td>
<td>Threatened Species Conservation Act 1995 Key Threatening Processes website search</td>
</tr>
<tr>
<td>Department of the Environment Key Threatening Processes</td>
<td>3 October 2014</td>
<td>Environment Protection and Biodiversity Conservation Act 1999 Key Threatening Processes website search</td>
</tr>
<tr>
<td>Department of Primary Industries (Fishing and Aquaculture) Threatened Species Conservation</td>
<td>3 October 2014</td>
<td>Fisheries Management Act 1994 Key Threatening Processes and Endangered Ecological Communities website search</td>
</tr>
</tbody>
</table>

The Atlas of NSW Wildlife and Department of the Environment's Environment Protection and Biodiversity Conservation Act 1999 Protected Matters Search Tool results are provided in Appendix A and B of the biodiversity assessment report.

### Field survey

Field surveys were carried out in March 2013 and April 2014 to identify listed species, populations and ecological communities under the Threatened Species Conservation Act 1995, Fisheries Management Act 1994 and/or Environment Protection and Biodiversity Conservation Act 1999 that had been previously recorded or were predicted to occur in the locality.

The study area was initially surveyed over two days in March 2013. The survey focused on three proposed alignment options, including the one that is now proposed. Field investigation focused on the identification of ecological constraints and potential impacts associated with each of the alignment options.

In April 2014, KBR ecologists conducted a field survey across the site and part of the study area immediately surrounding the site. This survey focused on tree identification and koala habitat values associated with the site and study area.

Further details regarding the flora and fauna field survey methodologies and levels of effort are included in Appendix A.
Overview of the existing environment

The study area has been extensively modified since European settlement and is currently a mix of commercial and residential areas, including an urban parkland, railway property, drainage areas and roads and streets. The urban parkland takes the form of a regularly maintained open grassy woodland.

Field evidence suggests that the urban parkland has been planted with native and exotic tree species, the majority of which are approximately 20 to 30 years of age, with a few that may be approximately 40 to 50 years old. The understorey is dominated by exotic grass species, the majority of which is regularly maintained by means of mowing and slashing. No distinct patches of remnant vegetation remain in the study area.

Although the urban parkland resembles an open grassy woodland, it possesses limited and marginal habitat values for native flora and fauna species. Blackjack Creek runs through the western extent of the study area and is an ephemeral waterway that has been extensively modified and acts as a stormwater/flood mitigation drainage line, parts of which are regularly slashed and maintained as grassland. The northern extent of the study area is located west of the Gunnedah town centre. This part of the study area contains urban development and cleared parkland resulting in low biodiversity values due to a lack of diversity in the species present and the predominately urban footprint.

Vegetation communities

There are six vegetation types that have been mapped across the study area (Figure 6.9) that are within or close to areas of potential disturbance:

- Parkland/woodland
- Riparian woodland
- Flood channel maintained grassland
- Maintained lawn/grassland
- Rail corridor grassland
- Urban landscaping.

The parkland vegetation canopy near the site consists of small trees approximately five metres high comprising Yellow Box (*Eucalyptus melliodora*), Blakely’s Red Gum (*Eucalyptus blakelyi*) and River Oak (*Causarina cunninghamiana*). The understorey also consists of small trees approximately two metres high comprising Cooba (*Acacia stenophylla*), Silver-leaf ironbark (*Eucalyptus melanophloia*) and Kurrajong (*Brachychiton populneus*). The groundcover consists of grasses comprising the exotic species Soft Brome (*Bromus molliformis*) and African Lovegrass (*Eragrostis curvula*), as well as the native Red Grass (*Bothriochloa marca*).

One large Bimble Box (*Eucalyptus populnea*) tree is located immediately south-east of the roundabout between the Oxley Highway and View Street.

Threatened flora species

The database searches identified seven Commonwealth and four State threatened flora species as potentially occurring within a 10 kilometre radius of the site. An assessment on the likelihood of these threatened flora species occurring within the study area was carried out and is provided in Appendix C of the Biodiversity Assessment Report (Appendix A). As the study area is highly modified, it does not provide preferred habitat for any of the identified threatened flora species. Field surveys did not identify any threatened flora species present within the study area.
Figure 6.9
MAPPED VEGETATION TYPES
Threatened ecological communities

The Commonwealth and State database searches identified five ecological communities of conservation significance as potentially occurring within a 10 kilometre radius of the site. An assessment on the likelihood of these ecological communities occurring within the study area was carried out and is provided in Appendix C of the Biodiversity Assessment Report (Appendix A). This assessment determined that no threatened ecological communities were present within the study area.

Endangered ecological communities

Based on the NSW National Parks and Wildlife Service identification guidelines for Box Gum Woodland, approximately 0.61 hectare of vegetation within the footprint of the site meets the description of White Box Yellow Box Blakely’s Red Gum Woodland EEC (Box Gum Woodland) (see Figure 6.10).

Threatened fauna

The Commonwealth and/or State database searches identified 30 threatened fauna species as potentially occurring within a 10 kilometre radius of the site.

The proposal would be located primarily within a highly modified parkland environment, which does not provide suitable habitat for the majority of the species identified by Commonwealth and State database searches. The complete likelihood of occurrence assessment is presented in Appendix C of the Biodiversity Assessment Report (Appendix A). This assessment determined that eight threatened fauna species (including the koala) may possibly occur periodically within the study area. These species are:

- Little Lorikeet (*Glossopsitta pusilla*) – Vulnerable under the *Threatened Species Conservation Act 1995*
- Swift Parrot (*Lathamus discolor*) – Endangered under the *Environment Protection and Biodiversity Conservation Act 1999* and *Threatened Species Conservation Act 1995*
- Superb Parrot (*Polytelis swainsonii*) – Vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999* and *Threatened Species Conservation Act 1995*
- Large-eared Pied Bat (*Chalinolobus dwyeri*) – Vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999* and *Threatened Species Conservation Act 1995*
- Corben’s Long-eared Bat (*Nyctophilus corbeni*) – Vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999* and *Threatened Species Conservation Act 1995*
- Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*) – Vulnerable under the *Threatened Species Conservation Act 1995*
Figure 6.10
EXTENT OF BOX GUM WOODLAND
The 2013 field survey identified one threatened fauna species, the koala (Phascolarctos cinereus), which is listed as vulnerable under both the Threatened Species Conservation Act 1995 and Environment Protection and Biodiversity Conservation Act 1999, as occurring within the study area.

**Migratory species**

The database searches identified nine migratory species that may possibly occur periodically within the study area. Based on the likelihood of occurrence assessment provided in Appendix C of the Biodiversity Assessment Report (Appendix A), three migratory species were identified as having potential to be recorded in the study area based on habitat features – the Great Egret, Cattle Egret and Rainbow Bee-eater.

**Koala habitat assessment**

In the Approved Recovery Plan: Recovery Plan for the Koala (Phascolarctos cinereus) (DECC, 2008), the Gunnedah local government area is recognised as having an important koala population and Gunnedah is located in Koala Management Area (KMA) 6: Western Slopes and Plains.

The recovery plan categorises feed tree species according to different KMAs across NSW. According to the recovery plan, the Yellow Box (Eucalyptus melliodora), Blakely’s Red Gum (Eucalyptus blakelyi) and Bimble Box (Eucalyptus populnea) are recognised as secondary koala feed tree species in the western slopes and plains KMA. No primary koala feed tree species occur within or directly next to the site, but are found more abundantly throughout the locality.

The presence of secondary koala feed trees in the study area infers that habitat is present within the study area. However, given the fragmented nature of the habitats within the study area and the limited habitat values in comparison to larger and more favourable habitats in the surrounding landscape that are further removed from the built up urban areas of Gunnedah, this area is only likely to be used periodically by transient koalas moving and dispersing throughout the locality.

The koala habitat assessment tool in the Environment Protection and Biodiversity Conservation Act 1999 referral guidelines for the vulnerable koala (combined populations of Queensland, New South Wales and the Australian Capital Territory)(DoE, 2014) was used to determine the sensitivity, value and quality of the proposal area. Based on the assessment described, the potentially impacted area does not constitute habitat critical to the survival of the koala.

6.5.2 Policy setting

The proposal would not be built on land reserved under the National Parks and Wildlife Act 1974 and would not affect land or development regulated by State Environmental Planning Policy No. 14 – Coastal Wetlands, State Environmental Planning Policy No. 26 – Littoral Rainforests, State Environmental Planning Policy (State and Regional Development) 2011 or State Environmental Planning Policy (Major Development) 2005.

Under Part 5 of the NSW Environmental Planning and Assessment Act 1979, the State Environmental Planning Policy No.44 (Koala Habitat Protection) does not apply to the proposal as it only applies to development requiring consent by local government. However, the provisions for conservation of koalas are considered and acknowledged under Section 111 of the Environmental Planning and Assessment Act 1979 as part of the duty to consider the environmental impact of an activity.
The impact assessment for this proposal has been carried out in accordance with Section 5A of the *Environmental Planning and Assessment Act 1979*, as amended by the *Threatened Species Conservation Act 1995*, which in turn has been amended by the *Threatened Species Conservation Legislation Amendments Act 2002* (Assessment of Significance ‘7-Part Test’); and the *Environment Protection and Biodiversity Conservation Act 1999* – Matters of National Environmental Significance Significant Impact Guidelines 1.1.

As building the proposal would require earthwork, excavation and fill to be imported within and on the banks of Blackjack Creek, notification is required to the Department of Primary Industries (Fisheries) as per Section 199 of the *Fisheries Management Act 1994*.

6.5.3 Potential impacts

**Construction**

As far as is practicable, the alignment and design of the proposal has been gradually amended to minimise the direct loss of trees and the number of trees to be indirectly impacted by the proposal. This has been achieved, for example, by refining the horizontal alignment and increasing the length of the bridge section. These design refinements would substantially reduce the proposal’s overall area of disturbance.

**Threatened flora**

The likelihood of occurrence assessment determined that no threatened flora species or ecological communities listed under the *Threatened Species Conservation Act 1995, Fisheries Management Act 1994 and/or Environment Protection Biodiversity Conservation Act 1999* are likely to occur within the study area. This assessment also determined that no threatened fauna species listed under the *Fisheries Management Act 1994* are likely to occur within the study area.

**Endangered ecological communities**

The majority of vegetation clearing required for the proposal would be within the urban parkland. It is estimated that the proposal may result in the clearing and loss of approximately 0.61 hectare, of *White Box – Yellow Box – Blakely’s Red Gum Woodland* ‘Box Gum Woodland’. An assessment of significance (‘7-Part Test’) was carried out for this EEC (Section 5 of Appendix A (Biodiversity Assessment Report)). It determined that, given the modified condition of the EEC, the small area to be cleared and the rehabilitation measures proposed, the proposed work would not result in a significant impact on the EEC within the local area surrounding Gunnedah. Based on this assessment, a Species Impact Statement is not considered necessary for this EEC.

**Threatened fauna**

An assessment of significance (‘7-Part Test’) was undertaken for seven threatened fauna species listed under the *Threatened Species Conservation Act 1995*. The assessment determined that the proposal is unlikely to result in a significant affect to the threatened species habitats and therefore no Species Impact Statements are considered necessary for these species. As an assessment against the significant impact assessment guidelines in accordance with the *Environment Protection and Biodiversity and Conservation Act 1999* for the listed threatened fauna also revealed no significant impact to listed species. This suggests that based on the assessments undertaken for the listed species identified it would not be necessary to refer to the proposal.
**Koala habitat**

One threatened fauna species, the koala (Phascolarctos cinereus), listed as vulnerable under the *Threatened Species Conservation Act 1995* and *Environment Protection Biodiversity Conservation Act 1999*, was confirmed as present within the study area. The amount of koala habitat to be permanently impacted by the proposal is approximately 0.39 hectare. The amount of koala habitat to be temporarily disturbed to facilitate construction activities and access within estimated areas of incidental disturbance is approximately 0.22 hectare. No primary koala feed trees will be removed within the area of incidental disturbance however this area would be subject to incidental disturbances such as ground disturbance including the removal of ground cover and the establishment of tree protection measures.

The proposal would result in the removal of 26 secondary koala feed trees within the site area, as shown on Figure 6.11. As shown on Figure 6.11, 23 secondary koala feed trees located along permanent/incidental boundary would be retained and protected from building activities and access requirements. Measures to mitigate potential impacts on koala feed trees are discussed further in Section 6.5.4.

In accordance with the *Threatened Species Conservation Act 1995*, as the proposal would not result in a significant residual impact on the Koala a Species Impact Statement for this species is not considered necessary. Further based on the assessment of the Koala in accordance with the significant impact assessment guidelines under the *Environment Protection and Biodiversity Conservation Act 1999* it is not consider necessary to refer the proposal based on its impacts to the Koala.

Given the modified urban setting in which the proposal would be located, the small area of anticipated clearing and the avoidance and mitigation measures proposed, the proposal is not expected to significantly impact on any of the known/potentially occurring threatened or endangered species or their habitats within the site or in the study area.
Figure 6.11
POTENTIAL IMPACTS ON KOALA HABITAT
6.5.4 Safeguards and management measures

The proposed safeguards and management measures to minimise impact on biodiversity are presented in Table 6.13.

Table 6.13 Proposed safeguards and management measures for biodiversity

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
</table>
| Vegetation clearing     | • A Tree Protection Plan (TPP) would be prepared to protect native tree species, in particular Yellow Box and Blakely's Red Gum species.  
                          | • The location of exclusion zones would be identified, with temporary fencing or flagging tape to indicate the limits of clearing in accordance with Guide 2 – Exclusion Zones of the Biodiversity Guidelines – Protecting and managing biodiversity on RTA projects (RTA, 2011).  
                          | • Tree Protection Zones (TPZ) would be implemented around trees to be retained near the proposed work in accordance with the Australian Standard AS 4970-2009 Protection of Trees on Development Sites to prevent machinery impacts on trees.  
                          | • Koala feed trees would be identified and clearly marked.  
                          | • It is not anticipated that any hollow-bearing trees would be impacted by the proposal. However, should a hollow-bearing tree be identified, it would be clearly marked. | Contractor      | Pre-construction |
| Weeds                   | • Site assessments would be carried out by an ecologist or person trained in weed management to identify, describe and map weed-infested areas, including WoNS, National Environmental Alert Weeds and/or noxious weeds within the site and adjacent areas.  
                          | • Areas infested with weeds would be marked with exclusion zone fencing and signage to limit access by personnel and vehicles.  
                          | • A weed management plan would be developed and implemented. | Contractor      | Pre-construction |
| Vegetation clearing     | • All relevant staff would be inducted and informed of the limits of vegetation clearing and the areas of vegetation to be retained.  
                          | • To minimise flora and fauna impacts from construction activities, vegetation clearing and riparian zone management would be carried out in accordance with the Biodiversity Guidelines – Protecting and Managing Biodiversity on RTA Projects (NSW RTA, 2011) | Contractor      | Construction     |
**Impact** | **Environmental safeguards** | **Responsibility** | **Timing**
--- | --- | --- | ---
• Clearing of vegetation would be carried out in accordance with Guide 1 – Pre-clearing Process of Biodiversity Guidelines – Protecting and Managing Biodiversity on RTA Projects (RTA, 2011). These guidelines cover the felling of both non-habitat and habitat trees and the rescue and relocation of fauna.
• Pre-clearance surveys would be carried out by suitably qualified ecologists 24 hours before clearing to identify any specific habitat features, such as active bird nests and tree hollows that may be harbouring native fauna (such as micro-bats).
• Native vegetation would be re-established that is representative of the vegetation and habitats that may be temporarily removed by the proposal. This would specifically involve revegetation plantings of Yellow Box and Blakely’s Red Gum, as well other native species that occur in the study area.
• A planting program would be developed that achieves a density of trees representative of an open woodland and a patch size similar in extent to what may be potentially cleared.
• Vegetation would be reinstated so that it may in future provide the same level of wildlife corridor functionality as that which is to be potentially cleared.
• If unexpected threatened fauna or flora species are discovered, work would stop immediately and follow the RTA ‘Unexpected Threatened Species Find Procedure’ in Guide 1 – Pre-clearing Process of Biodiversity Guidelines – Protecting and Managing Biodiversity on RTA Projects (RTA, 2011).
• Pre-clearance surveys would be performed to ensure threatened flora species that have been assessed as likely occurrences are not present within the site.
• Exclusion zone fencing would be established before the start of clearing activities to protect retained vegetation from inadvertent clearing activities.
• Vegetation clearing would be limited to the extent required to build the proposal.
• Vegetation clearing within the areas of incidental disturbance would be limited to the extent required to establish machinery/vehicle access and the site compound.
<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
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</thead>
<tbody>
<tr>
<td>• Trees would be felled directionally away from vegetation and habitat that is to be retained.</td>
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<tr>
<td>• Where possible, any tree stumps would be retained within the riparian zone of Blackjack Creek (10 m from top of bank)</td>
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<td>• Any trees requiring pruning would be pruned in accordance with the Australian Standard AS 4373 Pruning of Amenity Trees.</td>
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<tr>
<td>• Vegetation clearing would be carried out in a manner that prevents the mixing of topsoil with woody vegetation debris.</td>
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<tr>
<td>• Non-woody vegetation (groundcovers) would be incorporated into the topsoils as organic nutrients for use in site rehabilitation.</td>
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<tr>
<td>• The outcomes of vegetation clearing would be documented.</td>
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</tr>
<tr>
<td>Weeds</td>
<td>• Site inductions would include making all staff aware of weed management measures on site.</td>
<td>Contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>• Marked weed infestations would be managed during building with a combination of mechanical control methods (slashing or mowing) as well as a range of herbicides.</td>
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<tr>
<td>• Vehicle loads would be securely covered to prevent weed plant material falling or blowing off vehicles.</td>
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<tr>
<td>• All weed plant material and topsoil containing weed plant material would be disposed of at an appropriate waste management facility.</td>
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<tr>
<td>• Weeds would be separated from native vegetation if native vegetation is to be used for mulch during revegetation and rehabilitation.</td>
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<tr>
<td>• Any topsoil imported onto the site for revegetation and rehabilitation would be tested to ensure it contains no weed seeds or seedlings.</td>
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</table>

6.6 Hydrology and flooding

A hydrologic/hydraulic study and report was prepared by KBR for the proposal area in December 2013 (refer to Appendix I). This section draws on the main findings of the report.

The purpose of the study was to:

• Estimate changes in water levels (afflux) upstream and downstream of the proposed alignment options for a 100 year average recurrence interval flood event
- Calculate velocities around the proposed bridge piers for a 100 year average recurrence interval flood event in Blackjack Creek and estimate the potential effects in terms of scour and erosion.

6.6.1 Existing environment

Hydrology and drainage

As shown on Figure 6.12, the proposal site is located immediately next to Blackjack Creek, a highly modified watercourse, which flows from south to north through the study area.

The catchment area of Blackjack Creek upstream of the proposal is approximately 24 square kilometres and extends over a length of eight kilometres to the south of the Oxley Highway. Downstream of the proposal area, the watercourse enters the Namoi River floodplain and intersects the Namoi River approximately 1.5 kilometres to the north.

Ashford’s Watercourse joins the eastern side of Blackjack Creek between the Oxley Highway and the railway viaduct. Within the study area, this watercourse is an open, grassed drain, but further upstream, to the south-west of New Street, it is a rectangular, concrete channel draining a large area of southern Gunnedah.

Flooding

The proposal area would be subject to flooding from both Blackjack Creek and the Namoi River. Furthermore, the culverts on Blackjack Creek on the Oxley Highway (immediately south of the proposal area) have capacity only up to the 20 year average recurrence interval flood event.

6.6.1 Potential impacts

Construction

Given the proximity of the proposal to Blackjack Creek, the building work is likely to be impacted by flooding in the event of a significant rain event. This could impact both the building work and the downstream environment should building materials be transported downstream. Building planning would therefore need to avoid the wettest months, where feasible and practical, and include a contingency plan in the event of a flood. Modelling suggests that the proposal would not result in changes sufficient to cause scour of the embankments or the existing environment.

Operation

The bridge piers have been designed to minimise the footprint of the bridge and reduce afflux. It is predicted that the afflux values around the bridge piers would be less than 10 millimetres, which is insignificant. Afflux values near the southern approach embankment near the Oxley Highway roundabout would be slightly higher at approximately 40 millimetres due the placement of the embankment within the path of Ashford’s Watercourse drainage line. These levels are manageable and would require the reinstatement of the drainage line.

A revised hydrologic/hydraulic assessment would be done once the bridge is operational to update the results based on the latest bridge position and pier/foundation configurations.
Figure 6.12
PROPOSAL DESIGN
6.6.2 Safeguards and management measures
The proposed safeguards and management measures to minimise impact on hydrology and flooding are presented in Table 6.14.

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrology and flooding</td>
<td>• A flood management procedure would be developed. This would detail how potential flood events would be monitored and how the site would be secured in the event of a flood.</td>
<td>Roads and Maritime</td>
<td>Pre-construction</td>
</tr>
<tr>
<td></td>
<td>• If feasible and practical, building work would be carried out during the dry season (i.e. outside of the months of December to April).</td>
<td>Roads and Maritime</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>• Crane pads would be completely removed and the pad areas returned to pre-construction levels.</td>
<td>Roads and Maritime</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>• Consideration of scour protection to embankments next to the drainage line.</td>
<td>Roads and Maritime</td>
<td>Construction</td>
</tr>
</tbody>
</table>

6.7 Greenhouse gas and climate change
6.7.1 Existing environment
Existing sources of greenhouse gas emissions near the proposal include vehicle movements within the town and agricultural machinery operating on the surrounding agricultural land.

6.7.2 Policy setting
The key policy document in NSW is the State Government’s NSW 2021: A Plan to Make NSW Number One. It includes goals and targets supplemented by practical action to minimise impacts on local communities.

The NSW Climate Impact Profile prepared by the Office of Environment and Heritage assesses the potential impacts projected for NSW as a result of climate change. It outlines the risks NSW faces in terms of climate change and helps decision makers develop planning and response strategies under the NSW policy.

6.7.3 Criteria
The criteria for assessing the impact of the proposal relate to minimising greenhouse gas emissions during construction and ensuring the proposal has considered increases in temperature and extreme weather events in design.

6.7.4 Potential impacts
Construction
The proposal may generate greenhouse gas emissions through:

- The combustion of fuels in plant, equipment and vehicles
- The production and transport of building materials.

However, the overall amounts of emissions generated would be minor.
During detailed design, the necessary measures to ensure the proposal is resilient to future changes in climate and extreme weather events would be considered.

**Operation**

Once it is operational, the proposal would not result in an increase in traffic movements. If anything, it may result in a minor reduction in greenhouse gas emissions in the area as it would eliminate the need for vehicles to decelerate, idle and then accelerate at the existing New Street level crossing.

6.7.5 Safeguards and management measures

The proposed safeguards and management measures to minimise impact on hydrology and flooding are presented in Table 6.15.

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vulnerability to effects of climate change</td>
<td>• The effect of climate change would be factored into future designs, including the effects of flooding of Blackjack Creek.</td>
<td>Roads and Maritime</td>
<td>Detailed Design</td>
</tr>
<tr>
<td>Greenhouse gas emissions</td>
<td>• Building materials, particularly fill, would be sourced from as close to the site as is feasible and practical.</td>
<td>Roads and Maritime</td>
<td>Construction</td>
</tr>
</tbody>
</table>

6.8 Waste management and demand on resources

6.8.1 Policy setting

Roads and Maritime is committed to the management of waste through the hierarchy principles outlined in the *Waste Avoidance and Resources Recovery Act 2001*.

6.8.2 Potential impacts

**Construction**

Building the proposal and demolishing structures such as the residential building at 2 and 4 Barber Street would generate the following forms of waste:

- Surplus materials such as concrete, steel and timber
- General refuse from workers
- Packaging associated with the building materials
- Vegetative matter, including weeds
- Demolished materials, which may include contaminants such as lead paint.

If not appropriately managed, these wastes have the potential to impact visual amenity and soil and water quality.

In addition, the proposal would require the use of the following resources:

- Fill to build the bridge approaches
- Building materials such as concrete, bitumen and road base
- Water for the site compound, dust suppression and concreting
- Energy (primarily diesel) to operate equipment, plant and machinery.
The above resources are readily available and are expected to be sourced locally from within Gunnedah and surrounding region.

Operation

Once it is operational, the proposal is not expected to have any impact on waste and resource use.

6.8.3 Safeguards and management measures

The proposed safeguards and management measures for waste management and demand on resources are presented in Table 6.16.

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste management</td>
<td>• Weed-free vegetation would be re-used on site.</td>
<td>Roads and Maritime</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>• All surplus soil and imported fill would be used on site where feasible and practical. Where not, this material would be transferred to a Council site or disposed of in accordance with the EPA’s Waste Classification Guidelines.</td>
<td>Roads and Maritime</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>• Appropriate receptacles for the collection of waste, including separate receptacles for recycling, would be provided on site.</td>
<td>Roads and Maritime</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>• Waste materials would be removed from the site by an appropriately licensed or approved contractor and disposed at a facility authorised to take such waste.</td>
<td>Roads and Maritime</td>
<td>Construction</td>
</tr>
<tr>
<td>Noxious weed disposal</td>
<td>All noxious weeds would be disposed of in accordance with the requirements of the Biodiversity Guidelines – Protecting and Managing Biodiversity on RTA Projects Guide 6 – Weed Management (Roads and Maritime, 2011).</td>
<td>Roads and Maritime</td>
<td>Construction</td>
</tr>
<tr>
<td>Material use</td>
<td>• Where feasible and practical, the procurement policy would be to purchase materials manufactured with a recycled content.</td>
<td>Roads and Maritime</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>• Fill and materials would be sourced from as close to the building site as is feasible and practical.</td>
<td>Roads and Maritime</td>
<td>Construction</td>
</tr>
</tbody>
</table>

6.9 Aboriginal heritage

6.9.1 Existing environment

An Aboriginal heritage assessment was carried out for the proposal (refer to Appendix D). This section draws on the main findings of the report.

Gunnedah and its surrounding areas were originally inhabited by Aboriginal tribes of the Kamilaroi (Gamilaraay) language group.
As part of this assessment an initial desktop search of the OEH Aboriginal Heritage Information Management System was carried out and revealed 21 sites within 10 square kilometres of the proposal area. Of the 21 sites identified, none are within three kilometres of the proposal.

A desktop search of the National Native Title Claims database identified that a native title claim by the Gomeroi People exists over the Gunnedah local government area. This will be investigated further by Roads and Maritime once a concept design has been developed further.

A detailed ground-truthing exercise in accordance with the DECCW (2010a) ‘Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales’ guidelines was carried out within the study area as shown on Figure 6.13. The results of the field survey identified a low potential for any intact Aboriginal sites to remain due to the high degree of disturbance over the survey area. The survey also identified that no area within the study area is likely to contain undetected sites of Aboriginal heritage significance and objects.

6.9.2 Policy setting

The proposed work would be required to be consistent with the Roads and Maritime Service Procedure for Aboriginal Cultural Heritage Consultation and Investigation (PACHCI) and the NSW Due Diligence Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales.

An Aboriginal heritage clearance letter from the Roads and Maritime Aboriginal Heritage Advisor has been prepared for Stage 1 of the PACHCI and advises that the proposal is unlikely to have an impact on Aboriginal cultural heritage. As such, Stage 2 of the PACHCI consultation with the Aboriginal community is not required.

Under Clause 228(2)(e) of the Environmental Planning and Assessment Regulation 2000, public authorities are required to consider the impact of their activities 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.

6.9.3 Criteria

The criteria for the archaeological survey and assessment are guided by the Code of Practice for Archaeological Investigation of Aboriginal Objectives in New South Wales (DECCW, 2010).

More broadly, the criteria adopted for assessing the impact on Aboriginal heritage in the locality would be to ensure the proposal avoids impact on known or unidentified items of indigenous heritage significance.

6.9.4 Potential impacts

Construction

As the field investigations determined that there were no sites of Aboriginal heritage significance near the proposal, the assessment determined that no known, or predicted, Aboriginal site or objects would be impacted by the proposal. Further archaeologist assessment was determined as not required and as such Aboriginal heritage presents no constraint to the construction or operation of the proposal.
Figure 6.13
STUDY AREA

Gunnedah second road over rail bridge
Review of Environmental Factors
Nevertheless, as the proposed work would result in disturbance to subsurfaces through the excavations and earthwork required, as such, there is the potential for the discovery of previously unidentified items of Aboriginal heritage significance. During on-site work, all staff, contractors and others involved in construction activities would be made aware of the statutory legislation protecting sites and places of significance. Safeguards and management measures for the protection of unidentified objects during construction have been provided in Section 6.9.5.

**Operation**

Once it is operational, the proposal is not expected to have any impact on Aboriginal cultural heritage within the site or in the study area.

6.9.5 Safeguards and management measures

The safeguards and mitigation measures to manage potential impacts on Aboriginal heritage would be in accordance with Section 4.9 of the Roads and Maritime QA Specification G36 and the Roads and Maritime standard safeguards, with the additions and amendments as presented in Table 6.17.

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
</table>
| Potential disturbance to previously unidentified item of Aboriginal heritage significance | • All staff, contractors and others involved in construction and maintenance related activities should be made aware of legislation protecting sites and places of significance. Of particular importance is the National Parks and Wildlife Amendment (Aboriginal Objects and Aboriginal Places) Regulation 2010, under the National Parks and Wildlife Act 1974.  
• Work would be limited to the study area shown in Figure 6.13 so as to limit the possibility of encountering Aboriginal heritage features in unassessed areas. Should impacts be required beyond the areas assessed in Appendix D (Aboriginal Heritage Assessment Report), then additional archaeological assessment may be necessary.  
• Should any Aboriginal heritage features be identified during the course of construction, work in that area would cease and subsequent actions would be guided by the Roads and Maritime Standard Management Procedure: Unexpected Archaeological Finds (Roads and Maritime, July 2012). Work would not restart unless authorised by the Roads and Maritime Environmental Officer and OEH. | Contractor | Pre-construction and construction |

6.10 Non-Aboriginal heritage

A number of assessments were carried out to assess the impacts of the proposal on matters of non-Aboriginal heritage. These assessments are provided as appendices...
to this REF and are listed below:

- A historic heritage assessment of the Gunnedah local government area (Appendix B)
- A desktop-based Statement of Heritage Impact to assess the potential impact of the proposal on the Gunnedah Maize Mill (the Mill) (Appendix C)
- An assessment into the heritage significance of the Mill Brunton’s Flour Mill by the NSW Department of Public Works (DPWS) (Appendix J).

6.10.1 Existing environment

European settlement of the Gunnedah area began with the explorations of Surveyor-General John Oxley in 1818, closely followed by Alan Cunningham in 1825 and Thomas Mitchell in 1831 (Atchison, 1977).

Wheat and maize cultivation, alongside grazing, developed into major industries in the area by 1860. However, it was the discovery of large coal deposits on Gunnedah’s Black Jack Hill in 1877 that contributed to the initial development and expansion of the town. A railway line was constructed into Gunnedah in 1879 and the town became the commercial centre of the north-west, and a municipality in 1885.

In order to describe the existing non-Aboriginal heritage values associated with the study area and to determine the presence of any Non-Aboriginal heritage items, an initial desktop assessment of public databases was carried out. The results of the search are shown in Table 6.18.

<table>
<thead>
<tr>
<th>Name of Database Searched</th>
<th>Date of Search</th>
<th>Type of Search</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSW Heritage Office State Heritage Register and State Heritage Inventory <a href="http://www.heritage.nsw.gov.au/">http://www.heritage.nsw.gov.au/</a></td>
<td>01.12.2014</td>
<td>Gunnedah LGA</td>
<td>One place (the Mill) was identified on the State Inventory as having local heritage significance. It is not identified as being of State significance.</td>
</tr>
<tr>
<td>Local Environment Plan</td>
<td>05.04.2013</td>
<td>Gunnedah LEP 2012</td>
<td>One place (the Mill) listed in Schedule 5 of the LEP is within the search area.</td>
</tr>
</tbody>
</table>

The desktop assessment identified the Mill as being listed on the Gunnedah LEP 2012 and on the State register as a place of local heritage significance. The Mill was the first flour mill to operate in Gunnedah, opening in January 1904 on land next to...
the railway line in the south-west corner of town. Over the past 100 years the Mill has operated as a flour mill and grain holding facility and is now the Gunnedah Maize Mill. Throughout this time, it has gone through many physical changes as a result of ownership changes, fires and redevelopment.

In addition to the existing structures within the Mill property (Figure 6.14) there are a number of locations within the property that are thought to be the sites of former buildings which have been removed over the years. These are shown on Figure 6.15.

Figure 6.14
GUNNEDAH MAIZE MILL COMPLEX AS VIEWED FROM NEW STREET
The areas shown on Figure 6.15, including the former manager’s cottage, former wheat sheds and site of an earlier building (possibly for wheat storage), represent areas of historical archaeological potential.

The Mill Heritage Assessment (Appendix J) says the following in relation to the heritage significance of the Mill:

- The Mill is a key landmark within the current townscape and is of historical importance to the wheat growing industry and milling economy of the district
- The Mill is the only remaining evidence of the Brunton’s Milling business, with all other mills demolished
- The historic character and setting of the former Mill has been retained
- There are very few mill complexes remaining from the early 20th century that have retained an associated engine room
- The integrity of the Mill’s setting contributes to its rarity
- The Mill has local and potentially State heritage significance.

However, the assessment only included a visual inspection from public street frontages and did not assess inside the mill or the engine room. As such, the final significance assessment was a provisional conclusion only. Further investigations were carried out as part of the historic heritage assessment (refer to Appendix B) to determine the heritage significance for the Mill. This investigation is discussed below.

**Field investigation**

Further field investigation was carried out to investigate the heritage significance of the Mill which was not previously assessed (Appendix B (Historic Heritage Assessment Report)). This investigation primarily related to an internal investigation and to items in the curtilage of the Mill. The survey area was examined by pedestrian
survey and close examination was given to all land surfaces and built features.

The survey identified that within the Mill precinct there was two features of additional heritage significance:

- The interior of the Mill building
- A brick spoon drain within the Mill grounds.

These features are discussed below.

**Mill interior**

The interior of the Mill was surveyed with the current mill owner to identify recent modifications and inspect historical photographic records. The survey identified that the main building has been renovated in a manner sympathetic to the heritage values of the site, although none of the original machinery remains and some concrete footings have been demolished. The machinery has been replaced with older equipment sourced from demolished mills locally.

Following the inspection of the interior of the Mill, the assessment determined that the Mill (including both the interior and external features inspected by DPWS) does not meet the State Heritage listing criteria.

**Brick spoon drain**

A review of the significance of the brick drain against the Heritage Council criteria shows that it does not fulfil any criteria and is not considered a heritage item due to its more recent construction. It is also not considered related to the heritage significance of the Mill.

6.10.2 Policy setting

Public authorities are required to consider the impact of their activities 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 under Clause 228(2)(e) of the Environmental Planning and Assessment Regulation 2000.

Heritage items in NSW are protected under the *Heritage Act 1977* and the relevant LEP as discussed in Section 4.3.7.

6.10.3 Criteria

The significance of the Mill and brick drain was assessed in accordance with the Heritage Council of NSW heritage assessment criteria. These criteria are listed broadly in Appendix J (Former Brunton’s Flour Mill Heritage Assessment Report).

The criteria for the Statement of Heritage Impact were adopted from the Statements of Heritage Impact guidelines for new developments next to a heritage item (NSW Heritage Office 2002). These criteria incorporate eight questions which are required to be addressed and are as follows:

1. How is the impact of the new development on the heritage significance of the item or area to be minimised?
2. Why is the new development required to be adjacent to a heritage item?
3. How does the curtilage allowed around the heritage item contribute to the retention of its heritage significance?
4. How does the new development affect views to, and from, the heritage item? What has been done to minimise negative effects?

5. More broadly, the criteria adopted for assessing the impact on non-Aboriginal heritage in the locality, would be to ensure the proposal avoids impact on known or unidentified items of indigenous heritage significance.

6. Is the development sited on any known, or potentially significant archaeological deposits? If so, have alternative sites been considered? Why were they rejected?

7. Is the new development sympathetic to the heritage item? In what way (e.g. form, siting, proportions, design)? Will the additions visually dominate the heritage item? How has this been minimised?

8. Will the public and users of the item still be able to view and appreciate its significance?

6.10.4 Potential impacts

Construction and operation

The proposal has been designed to minimise direct impact on the Mill, and heritage assessments have determined that the proposal would result in minimal impacts on the heritage significance of the Mill. This REF provides mitigation measures to ensure the historical significance of the Mill is respected as much as feasible and practical.

The assessment considered the heritage significance of the Mill in terms of three key types of impact:

1. Visual amenity
2. Physical impact (direct)
3. Physical impact (indirect).

Table 6.19 addresses the potential impacts in response to the criteria set by the NSW Heritage Office as described in Section 6.10.3. A full response addressing each of the NSW Heritage Office criteria is provided in Appendix B (Historic Heritage Assessment Report).

Table 6.19 Statement of heritage impact

<table>
<thead>
<tr>
<th>Heritage criteria</th>
<th>Potential impact</th>
<th>Assessment summary</th>
</tr>
</thead>
</table>
| 1 How is the impact of the new development on the heritage significance of the item or area to be minimised? | Visual amenity | • There would be some alteration to the views of the Mill.  
• To minimise the visual impact of the proposal on the views to and from the Mill, key built form and landscape design elements have been incorporated in the proposal. This includes a simple configuration which is sympathetic to the urban setting, the use of materials which visually relate to the Mill, buffers, spaces and strategic landscaping and visual screening. |
| 2 Why is the new development required to be next to a heritage item? | None | • The need for the proposal is to facilitate an HML truck route through Gunnedah and address traffic safety issues at the New Street rail crossing.  
• Impacts on heritage from the three shortlisted options were assessed during the options assessment process. The proposal was identified as having the least impact on the physical and visual historical significance of the Mill. |
| 3 How does the curtilage allowed around the heritage item contribute to the retention of its heritage significance? | None | • Heritage significance would be retained due to the distance between the proposal and the Mill buildings.  
• While the proposal would result in some minor land acquisition in the western-most corner of the property, no... |
<table>
<thead>
<tr>
<th>Heritage criteria</th>
<th>Potential impact</th>
<th>Assessment summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>heritage significance?</td>
<td></td>
<td>features of historical significance have been identified within this area (refer to item 5 below).</td>
</tr>
<tr>
<td>4 How does the new development affect views to, and from, the heritage item? What has been done to minimise negative effects?</td>
<td>Visual amenity</td>
<td>During construction, the work site and the site compound would result in some short-term impacts on views from the site. However, the potential visual impacts of the building work would be temporary and are therefore considered to be minimal.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• As described in item 1 above, the visual impact of the proposal on views to and from the Mill would be minimised through: a simple bridge configuration which is sympathetic to the urban setting, the use of materials which visually relate to the Mill, buffers, spaces, strategic landscaping and visual screening.</td>
</tr>
<tr>
<td>5 More broadly, the criteria adopted for assessing the impact on non-Aboriginal heritage in the locality, would be to ensure the proposal avoids impact on known or unidentified items of indigenous heritage significance.</td>
<td>Physical (direct)</td>
<td>As described in item 3, the proposal would result in some minor land acquisition in the western-most corner of the property.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• The minor property acquisition would impact the brick spoon drain in this area. However, this drain has been assessed and was determined to have no heritage significance.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Removal of a small portion of the drain would not impact on the historical values of the Mill site.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Mitigation measures are proposed in Section 6.10.5 in the event that removal of the drain is required.</td>
</tr>
<tr>
<td>6 Is the development sited on any known, or potentially significant archaeological deposits? If so, have alternative sites been considered? Why were they rejected?</td>
<td>Physical (indirect)</td>
<td>The subsurface archaeological potential for former historical buildings within the curtilage of the Mill has been acknowledged in relation to the proposed temporary use of 821 square metres within the grounds of the Mill during the building work phase of the proposal.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Mitigation measures in Section 6.10.5 would be implemented to ensure no ground surface disturbances are caused within these areas during building work.</td>
</tr>
<tr>
<td>7 Is the new development sympathetic to the heritage item? In what way (e.g. form, siting, proportions, design)? Will the additions visually dominate the heritage item? How has this been minimised?</td>
<td>Visual amenity</td>
<td>The concept design proposed has been developed to minimise impact on the Mill and its land.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• As outlined in item 1, a number of key built form and landscape design elements would be used so the proposal is sympathetic to the Mill and minimises its impact on the heritage significance of the area.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Encroachment onto lands included within the curtilage of the Mill would be limited and activities contained within this area would not impact the historical values of the Mill site.</td>
</tr>
<tr>
<td>8 Will the public, and users of the item, still be able to view and appreciate its significance?</td>
<td>None</td>
<td>The public would be able to view and appreciate the significance of the Mill from the proposal.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• The most significant view of the Mill from Gunnedah township would be retained.</td>
</tr>
</tbody>
</table>

### 6.10.5 Safeguards and management measures

As building work is required within a small portion of the Mill property, mitigation measures are proposed to ensure disturbance to the ground would be minimised.
Should the proposed work change such as to require subsurface disturbance, then an archaeological assessment would be required to determine whether a Section 140 permit under the *Heritage Act 1977* would be required to excavate land within which relics may be present. If excavation impacts were considered to be minor or to have an inconsequential effect, a Section 139(4) excavation permit under the *Heritage Act 1977* may be applicable. The unplanned discovery of items of potential non-Aboriginal heritage significance would be managed in accordance with the safeguards and mitigation measures listed in Section 6.10.5.

The proposal has the potential to impact on the visual amenity of the Mill and its setting. Potential impacts on visual amenity of the Mill from within the township and surroundings would be avoided through the mitigation measures and safeguards proposed in Table 6.20.

The safeguards and mitigation measures to manage potential impacts on non-Aboriginal heritage would be in accordance with Section 4.10 of the Roads and Maritime QA Specification G36 and the Roads and Maritime standard safeguards, with the additions and amendments as presented in Table 6.20.

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Views of the Gunnedah Maize Mill</td>
<td>Landscaping would seek to retain screening trees and open space to the south-west of the Mill as far as practicable, avoid hard edges and provide sympathetic landscaping (as recommended in Appendix B (Historic Heritage Assessment Report) and Appendix J (Former Brunton’s Flour Mill Heritage Assessment Report).</td>
<td>Roads and Maritime</td>
<td>Detailed design and post-construction</td>
</tr>
<tr>
<td></td>
<td>The mitigation measures outlined in Section 6.11.5 to reduce the impact on visual amenity would be employed to ensure the aesthetics of the area and the heritage significance of the Mill are not adversely impacted by the proposal.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Damage to the curtilage and archaeological potential of the Gunnedah Maize Mill</td>
<td>The historic curtilage of the Mill (as shown in Figure 3.4) would be retained as far as practicable, considering the bulk and footprint of the proposed structure.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td></td>
<td>The following mitigation measures would be applied to so that the establishment and use of the curtilage area during the building phase of work does not involve any ground surface disturbance:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o Geotextile would be laid over areas to be used for the temporary site compound and access routes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o Crushed gravel would also be laid over areas to be used for the temporary site compound and access routes, to the following specifications:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>▪ 450 mm across piling and crane pad areas</td>
<td></td>
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<tr>
<td></td>
<td>▪ 300 mm over heavy vehicle and machinery access and delivery routes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>▪ 50 mm over access tracks and</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impact</td>
<td>Environmental safeguards</td>
<td>Responsibility</td>
<td>Timing</td>
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<tr>
<td></td>
<td>side tracks designated for light vehicle use only.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o Geotextile and crushed gravel would be removed at the completion of work and/or temporary use of the area</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o Land to be temporarily used during the building phase of work would be appropriately delineated to ensure that activities are contained and no unnecessary impacts occur within the grounds of the Mill.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• The boundary of land to be temporarily used during the building phase of work (as shown in Figure 3.4) would be appropriately delineated with high visibility flagging tape/bunting (or similar) to ensure that activities are contained and no unnecessary impacts occur beyond this within the grounds of the Mill.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Should the proposal result in subsurface disturbance in this area, an archaeological assessment would be required. This would help determine if a permit under Section 140 of the Heritage Act 1977 is required to excavate land within which relics may be present. If impacts are considered to be minor or to have an inconsequential effect, then a Section 139(4) excavation permit may be applicable.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• All staff, contractors and others involved in building and maintenance related activities would be made aware of legislation protecting sites and places of significance. Of particular importance are the Heritage Act 1977 and the Gunnedah LEP 2012.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Heritage induction would be provided to all workers before building begins. Induction would inform them of the location of heritage items near the proposal site and a brief them on the Standard Management Procedure: Unexpected Archaeological Finds (Roads and Maritime, 2012), which would need to be followed if unanticipated heritage items or deposits are located during building.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Removal of the brick drain at the Mill</td>
<td>• While the brick drain has been determined to have no heritage significance, in the event that it is removed the work area would be cleared, designated and minimised surrounding the drain to avoid any intrusion into the curtilage of the Mill and surrounds.</td>
<td>Contractor</td>
<td>Pre-construction and construction</td>
</tr>
<tr>
<td>Damage to items of non-Aboriginal heritage significance</td>
<td>• In the event that non-Aboriginal heritage items are found during building or should listed heritage items come under threat, work in the immediate area would be stopped and the Roads and Maritime’s Environmental Officer and the NSW</td>
<td>Contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>Impact</td>
<td>Environmental safeguards</td>
<td>Responsibility</td>
<td>Timing</td>
</tr>
<tr>
<td>--------</td>
<td>---------------------------</td>
<td>---------------</td>
<td>--------</td>
</tr>
<tr>
<td></td>
<td>Heritage Office would be contacted to determine the significance of the finding and/or actions to be taken.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• In accordance with the Standard Management Procedure: Unexpected Archaeological Finds (Roads and Maritime, 2012), the protocol to be followed in the event that a site, artefact or relic (as defined by the Heritage Act 1977) is identified during building work:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o All ground surface disturbance in the area of the finds would cease immediately the finds are uncovered</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o The discoverer of the find(s) would notify machinery operators in the immediate vicinity so work can be halted</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o The site supervisor would be informed of the find(s)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o A qualified opinion would be gained from an archaeologist as soon as possible</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o No work would start near the find until any required approvals are given by the regulator.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6.11 Landscape and visual impacts

6.11.1 Existing environment

A landscape character and visual impact assessment was completed by KI Studio in November 2014 (refer to Appendix K). This section draws on the main findings of the report.

The landscape setting of the locality surrounding the site for the proposal can be defined by seven landscape character zones which relate to the land use, landform and scenic values of the Gunnedah locality. These landscape character zones are discussed below and shown in Figure 6.16.

**Industrial fringe**

This zone occupies the foot of Pensioners Hill and comprises predominantly commercial properties with warehouse type buildings in a slightly elevated position compared to the town. This zone is considered low in sensitivity due to its utilitarian character and commercial land use.

**Gunnedah township**

The township is characterised by low built forms from which a few vertical buildings protrude. This is further emphasised by the fairly flat, low-lying topography of the town. Three significant built elements have a dominant presence due to their vertical character: the town hall, the Gunnedah Maize Mill and the silos.

The disparity of built elements and mixed land use creates an incohesive character that limits its visual appeal. Taking into consideration the future development of this zone, the sensitivity to visual impacts is considered moderate.
Recreation
Gunnedah Showground occupies a large parcel of land south of South Street / the Oxley Highway. It is an important tourist attraction for Gunnedah and offers a wide range of recreational activities. It is characterised by large shed/stable type buildings scattered around the property. Considering its significance to the township and its intrinsic connection with rural Australia, a high sensitivity is considered appropriate for this zone.

Railway corridor and South Street
This area is identified by its strong linear infrastructure and contains two significant built elements: the Gunnedah Railway Station and the silos. These two elements underpin the character and sense of place of Gunnedah. This situation is further reinforced by the railway line. A high sensitivity rating is applied for this zone.

Open space and floodway
The Blackjack Creek floodway is situated along the interface of two different geological areas and marks the entry point into the township for vehicles travelling from the west on the Oxley Highway and the Kamilaroi Highway. The floodway is visually of high significance as it defines the western edge of the central part of town. This zone is considered high in sensitivity due to its strategic position within Gunnedah and aesthetic appeal.

The floodplain, combined with Wandobah Reserve and the Gunnedah Showground create an extensive buffer zone that articulates the northern from the southern side of town. This buffer zone accentuates the entry point into town.

Pensioners Hill
Pensioners Hill rises sharply above the town and defines the western edge of the township. Panoramic views are attained from the hilltop lookout over the town and beyond. This zone is considered high in sensitivity as it strongly contributes to the identity of Gunnedah.

Pensioners Hill Reserve has panoramic views of the town and is a popular destination for picnics. This zone is considered high in sensitivity as it strongly contributes to the identity of Gunnedah.

The Gunnedah Maize Mill
The ensemble of the main brick building and silos create a strong landmark within the township. Its setting, directly next to the floodplain and Pensioners Hill, reinforces the connection between the natural and cultural elements – a characteristic that contributes to visually defining Gunnedah. Due to this spatial and visual relationship and the heritage significance (as discussed in Section 6.10), this zone is considered high in sensitivity.

6.11.2 Policy setting
Public authorities are required to consider the impact of their activities 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, transformation of a locality and any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality under Clause 228(2)(b, d & e) of the Environmental Planning and Assessment Regulation 2000.
Figure 6.16
LANDSCAPE CHARACTER ZONES
The visual assessment was prepared in accordance with the following Roads and Maritime guidelines:

- Guidelines for Landscape Character and Visual Impact Assessment EIA-N04, Version 2.0 (Roads and Maritime, 2013), including the latest revision to this document
- Beyond the Pavement – Urban Design Policy Procedures and Design Principles (Roads and Maritime, 2014)
- Bridge Aesthetics – Design Guidelines to Improve the Appearance of Bridges in NSW (Roads and Maritime, 2012)

6.11.3 Criteria

The criteria used to assess the magnitude and sensitivity of impacts are derived from the landscape visual impacts rating table in the Guidelines for Landscape Character and Visual Impact Assessment EIA-N04, Version 2.0 (Roads and Maritime, 2013), as shown in Table 6.21.

<table>
<thead>
<tr>
<th>Sensitivity</th>
<th>Magnitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>High impact</td>
</tr>
<tr>
<td></td>
<td>High-moderate</td>
</tr>
<tr>
<td>Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td>Moderate-low</td>
</tr>
<tr>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Negligible</td>
</tr>
<tr>
<td>Negligible</td>
<td>Negligible</td>
</tr>
</tbody>
</table>

The following key urban design objectives were also set for the proposal to provide a benchmark to achieve for the design elements:

- Develop a concept that responds to, and respects the unique setting of the town of Gunnedah. It is like a stage theatre with many parts – the town, the floodplain, Pensioners Hill, and the Mill. There is space between these parts that needs to be respected – the interface between all of these elements is sensitive
- Locate the structures so they minimise impacts on key views/vistas that give the township and the landscape character its special quality
- Mitigate impacts on sensitive environs such as the floodplain, heritage elements, koala habitats, and local residences
- Create an infrastructure proposal which provides effective linkages to Oxley Highway traffic and the residential areas to the south of the railway corridor while also providing user-friendly facilities for pedestrians and cyclists
- Develop a scheme that is compatible with the desired future character and land use of the town centre.

6.11.4 Potential impacts

Construction

The proposal is anticipated to have a temporary visual impact on the local setting through the presence of building vehicles, cranes and equipment. To build the proposal, vehicles would need to access the area frequently and a site compound
would be established. Access roads and the compound would change the appearance of the floodplain in the surrounding landscape. There would be temporary disturbance to key views within the area, particularly as the building site, equipment and vehicles would be highly visible from the Oxley Highway, Barber Street, New Street and Pensioners Hill.

As discussed in Section 6.5 the proposal would require the removal of vegetation. This would affect the local landscape during the building work period. As discussed below, once the works are complete, a rehabilitation plan would be implemented which would minimise the permanent impact on the landscape and visual characteristics of the area.

Provided the safeguards and management measures in Section 6.11.5 are implemented, it anticipated that these impacts would have a low to moderate impact.

**Operation**

The proposal would modify the visual and landscape characteristics of the locality and introduce a new feature into the landscape. The rigorous options assessment process has included urban design principles and objectives to ensure the impact of the proposal on the landscape and views would be considered and mitigated.

A number of elements have been included in the concept design to minimise potential impacts on the landscape. These include:

- There would be minimal use of abutment retaining walls. This would reduce the built form elements in the floodplain, thereby reducing impact on visual and landscape character

- The pier design would minimise the footprint within the waterway. A headstock would be introduced to cater for the various widths of the structure and reflect the form language of the pier to create an integral composition. The ends of the headstocks would be tapered to provide a more dynamic appearance

- A pedestrian railing would be used along the outside of the shared path on the bridge to visually minimise the bulk of the structure and provide a more open character. This would be achieved by introducing a double-rail barrier between the shared path and roadway to protect pedestrians and cyclists from vehicular traffic

- The kerb height along the roadway would be minimised by the introduction of a traffic rail barrier system, thereby reducing the apparent bulk of the structure. This would also reinforce the horizontality of the structure and retain an elegant proportion between superstructure and kerb depth. To further minimise kerb depth, drainage pipes would be concealed between the girders.

A series of photomontages of the bridge are shown in Figure 6.17 and Figure 6.18 below which show the structure from various key viewpoints.

To assess the residual visual and landscape impacts of the concept design of the proposal, the assessment is divided into two assessments as per the Roads and Maritime guidelines: the landscape character assessment and the visual impact assessment.
Figure 6.17
PHOTOMONTAGE OF THE BRIDGE LOOKING SOUTH TOWARDS THE GUNNEDAH MAIZE MILL FROM BLACKJACK CREEK
Figure 6.18
PHOTOMONTAGE OF THE BRIDGE FROM PENSIONERS HILL
**Landscape character impact assessment**

Table 6.22 presents an overview of:

- The sensitivity of each landscape character zone (refer also Section 6.11.1)
- The magnitude of the impact of the proposal on each landscape character zone (refer also Appendix K (Landscape Character and Visual Impact Assessment Report))
- The impact on the landscape character. This is based on the aggregate of the area’s built, natural and cultural character and sense of place. It is measured by a combination of the area’s sensitivity and the magnitude in accordance with the criteria specified in Section 6.11.3. A full description of the impact on each zone is discussed in Appendix K.

<table>
<thead>
<tr>
<th>Character zones</th>
<th>Sensitivity</th>
<th>Magnitude</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial Fringe</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Gunnedah Township</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td>Recreation</td>
<td>High</td>
<td>Low</td>
<td>Moderate</td>
</tr>
<tr>
<td>Railway Corridor &amp; South Street</td>
<td>High</td>
<td>Negligible</td>
<td>Moderate-high</td>
</tr>
<tr>
<td>Open Space &amp; Floodway</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Pensioners Hill</td>
<td>High</td>
<td>Moderate</td>
<td>Moderate-high</td>
</tr>
<tr>
<td>The Mill</td>
<td>High</td>
<td>Moderate</td>
<td>Moderate-high</td>
</tr>
</tbody>
</table>

As shown in Table 6.22, the overall proposal is likely to have a moderate to moderate-high impact on landscape character. In a number of situations, the impacts would be positive, as the proposal would enhance safety and connectivity and improve traffic flow.

The zone with the highest impact would be the floodplain, as the proposed bridge would become a dominant element within this setting and detract from the natural quality of the floodplain.

In the case of the other zones with a high to moderate impact, their sense of place and attributes would not greatly change. The relatively high magnitude of impact assessed would be driven by sensitive viewsheds that contribute to the overall character of Gunnedah. This, combined with the high sensitivity of these zones would result in the moderate to high rating.

**Visual impact assessment**

The visual impact assessment involved selecting representative viewpoints from various locations near the proposal area. To determine the visual impact, sensitivity values were assigned to the various viewpoints. Table 6.23 describes the chosen viewpoints (shown on Figure 6.19) and the sensitivity of each.
<table>
<thead>
<tr>
<th>Viewpoint</th>
<th>Viewpoint Sensitivity</th>
<th>Magnitude</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>View looking south along the floodplain from the Kamilaroi Highway</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>2</td>
<td>View looking south from one of the commercial properties along Farrar Road</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>3</td>
<td>View looking south from the cul-de-sac of Stockman Close towards the Mill.</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>4</td>
<td>View looking east along Barber Street towards the intersection with Warrabungle Street in the mid-ground</td>
<td>Low</td>
<td>Moderate</td>
</tr>
<tr>
<td>5</td>
<td>View looking east along Railway Avenue with the Mill in the background</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td>6</td>
<td>View looking north from New Street towards the Mill complex</td>
<td>High</td>
<td>Moderate</td>
</tr>
<tr>
<td>7</td>
<td>View looking north from Wandobah Road / View Street towards the intersection with South Street / Oxley Highway</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>8</td>
<td>View looking east along the Oxley Highway with the floodplain in the foreground (left)</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td>9</td>
<td>View looking from Pensioners Hill towards the Mill and town below.</td>
<td>High</td>
<td>Low</td>
</tr>
</tbody>
</table>

Based on this assessment, it can be concluded that the proposal would have a limited visual impact. Although the proposal is substantial in scale, its location within the floodplain would allow for a better integration of the structure in its setting, complemented by landscape design strategies. This situation would limit the visual exposure of the structure, taking a rather ‘background’ role within its urban setting.

From Pensioners Hill, the views would be minimally impacted due to the existing and proposed vegetation which would visually obscure the structure.

In most cases the impact on sensitive viewers would be moderate to low. However, as described above, Viewpoint 3 (from the cul-de-sac of Stockman Close towards the Mill) is likely to experience high impact as a result of the relatively high visual exposure of the proposal combined with the sensitive nature of the viewer (namely, residents) from Stockman Close.

The proposal is considered to have an overall moderate visual impact.
Figure 6.19
VISUAL IMPACT VIEWPOINTS
**Light spill – vehicles**

The proposal has the potential to impact on the residents of Stockman Close with the introduction of a new source of disturbance from the headlights of northbound vehicles using the bridge, and towards the west as vehicles enter from Barber Street.

The visual and landscape assessment (Appendix K) assessed the impact of light spill as part of the concept design. It found that the proposed design and consideration of permanent screening in the railings would reduce potential night-time glare from vehicles crossing the bridge. The assessment also recommended a review of the use of a double rail barrier during detailed design to ensure lighting glare from vehicles does not impact residences further afield. Should this be the case, a full height barrier would be adopted which would adequately minimise the impact of light spill.

**Light spill – street lighting**

Street lighting on the bridge has the potential to result in light spill impacts on neighbouring properties. This would be considered further in detailed design to ensure the placement of street lights minimises impact on surrounding properties.

### 6.11.5 Safeguards and management measures

The mitigation measures to manage landscape character and visual impacts would be in accordance with the Roads and Maritime QA Specification G36, with the additions and amendments as listed in Table 6.24.

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
</table>
| Short-term impacts on landscape character and visual amenity | • The site compound and general site layout – including stockpiles, materials, buildings, plant and equipment – would be placed to minimise the visual impact on surrounding residences.  
  • Work would be carried out in accordance with EIA-N04 Guidelines for Visual Impact Assessment and Landscape Character Assessment (Roads and Maritime, 2013). | Contractor | Pre-constructionанс Construction |
| Long-term impacts on landscape character | • Bridge work would be managed in accordance with Bridge Aesthetics Guidelines (Roads and Maritime, 2012d).  
  • Landscaping would be managed in accordance with Roads and Maritime’s Landscape Guideline (RTA, 2008).  
  • Opportunities to minimise impacts on landscape character would be considered during detailed design in consultation with Council. This would include consideration of the recommendations in the Landscape Character and Visual Assessment (Appendix K) for rehabilitation, planting and landscaping in consultation with Council and any affected landholders. This would include:  
  o Complementary planting and reinstatement of vegetation within the floodplain | Roads and Maritime | Detailed design |
<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
</table>
| Light spill from headlights on the bridge | - The detailed design would consider any potential for light spill impacts from vehicle headlights and street lights on residences.  
- The detailed design would also consider the use of a double rail barrier or other form of permanent screening within the railings to minimise the effects of lighting glare from vehicles. Should lighting glare affect residences, an assessment would be carried out to determine if a full height barrier should be adopted to help minimise the impact of any light spill. | Roads and Maritime | Detailed design |

### 6.12 Traffic and access

#### 6.12.1 Existing environment

A traffic and transport impact assessment was carried out by GTA Consultants in November 2014 (refer to Appendix L). The assessment included a desktop review of existing data and traffic volume counts from Gunnedah Shire Council (taken in September and October 2010) and by GTA Consultants (in March 2013). Figure 6.20 shows the location of the roads discussed in this section.
Figure 6.20
EXISTING ROADS AND INFRASTRUCTURE
Roads within the proposal area

**Oxley Highway (Conadilly Street, Abbott Street, South Street, Mullaley Road)**

The Oxley Highway is one of the key east–west rural highways in northern NSW. It connects the central NSW towns of Gilgandra, Coonabarabran, Gunnedah and Tamworth with coastal centres. It is classified as a State Highway (Route H11) and travels through Gunnedah via Conadilly Street, Abbott Street, South Street and Mullaley Road, carrying approximately 6500 vehicles per day. Roundabouts are located at intersections with New Street and Marquis Street; all other intersections have a ‘Give Way’ in favour of highway traffic (except Conadilly Street and Anzac Parade).

**Kamilaroi Highway (Conadilly Street, Boggabri Road)**

The Kamilaroi Highway is a key rural highway in northern and western NSW. It connects the New England Highway at Willow Tree (south-east of Gunnedah) with the rural towns of Gunnedah, Boggabri, Narrabri, Wee Waa, Walgett and Bourke. It is classified as a State Highway and travels through the centre of Gunnedah via Conadilly Street and Boggabri Road, carrying approximately 7000 vehicles per day. Conadilly Street is the ‘main street’ of Gunnedah and between the two roundabouts at Chandos Street and Elgin Street there is a 40 kilometre per hour High Pedestrian Activity Area. All other intersections have a ‘Give Way’ in favour of Kamilaroi Highway traffic.

**Barber Street**

Barber Street is a local street within the centre of Gunnedah. The street is a 20 metre wide carriageway within a 30 metre wide road reserve, with unrestricted parking permitted on both sides.

**Warrabungle Street**

Warrabungle Street is a local road within the centre of Gunnedah. The street is a 20 metre wide carriageway within a 30 metre wide road reserve, with unrestricted parking permitted on both sides. Warrabungle Street forms part of the heavy vehicle by-pass route through Gunnedah.

**New Street**

New Street is a local road west of the centre of Gunnedah. New Street forms part of the heavy vehicle by-pass route through Gunnedah and has a railway level crossing.

**View Street**

View Street is a local road located south-west of the centre of Gunnedah.

**Rail crossings**

There are four rail crossings in Gunnedah:

- Abbott Street Bridge is the only grade separated rail crossing in Gunnedah and the only HML deficient bridge on the Oxley Highway. There is a footpath on both sides of the bridge, connecting to a footpath on the western side of Anzac Parade (to the south) and to both sides of Abbott Street (to the north)
- New Street level crossing is located immediately next to the proposal area as shown in Figure 6.20. The crossing provides for pedestrians to cross the railway line on the eastern side of New Street.
• Marquis Street level crossing is located south of Gunnedah town centre and has footpaths on both sides
• Carroll Street level crossing is located east of Gunnedah town centre and does not have footpaths.

Traffic volumes
A review of this traffic volume data revealed that approximately 18,500 vehicles per day cross the railway at the four crossing locations. This can be broken down as follows:

• New Street
  o 5000 vehicles per day
  o Busiest at grade crossing for vehicles, with 807 vehicles in the peak two hours (95 more vehicles than Marquis Street)
  o The majority of pedestrians use the western side of View Street/New Street rather than the eastern side
• Marquis Street
  o 5000 vehicles per day
  o Caters for a high volume of local traffic and pedestrian trips
• Abbott Street
  o 6500 vehicles per day
  o Busiest vehicle crossing of the railway line, with 732 in the morning peak hour or 224 more than Marquis Street
• Carroll Street
  o 2000 vehicles per day.

The general characteristics of traffic volumes along the east–west routes through Gunnedah town centre are shown in Table 6.25. As shown:

• Barber Street is the busiest east–west route
• South Street (Oxley Highway) is the second busiest
• Conadilly Street (Kamilaroi Highway) is the third busiest overall, but the afternoon peak is larger than the South Street peak
• Bloomfield Street carries very low volumes of traffic – this is the heavy vehicle by-pass route.

Table 6.25 Traffic volumes of east–west routes through Gunnedah

<table>
<thead>
<tr>
<th>Street</th>
<th>Morning peak two hours (no. of vehicles)</th>
<th>Afternoon peak two hours (no. of vehicles)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barber Street</td>
<td>675</td>
<td>985</td>
</tr>
<tr>
<td>South Street (Oxley Highway)</td>
<td>508</td>
<td>538</td>
</tr>
<tr>
<td>Conadilly Street (Kamilaroi Highway)</td>
<td>405</td>
<td>559</td>
</tr>
<tr>
<td>Bloomfield Street</td>
<td>182</td>
<td>215</td>
</tr>
</tbody>
</table>

Traffic conditions
In general the traffic conditions in Gunnedah are free-flowing. However, significant delays are experienced at the level crossings due to increasing train movements. As the New Street and Marquis Street level crossings are located approximately 800 metres apart, a single coal train of up to 1200 metres can block both crossings.
The current heavy vehicle bypass route, via Bloomfield Street, caters for heavy vehicles passing through the town and Council is committed to the ongoing upgrading and maintenance of this route. The route is a local road and is the responsibility of Council.

As shown on Figure 6.21, the New Street level crossing forms part of the existing permitted B-double routes.

**Higher mass limit (HML) routes**

Currently there is no HML continuity through Gunnedah due to restricted access over the Abbott Street Bridge (Oxley Highway) and through Conadilly Street (Kamilaroi Highway), Gunnedah’s main street.

The designated HML routes through Gunnedah can be found on the Roads and Maritime Intelligent Access Program (IAP). The current routes include Abbott Street and South Street (Oxley Highway). However, the Abbott Street Bridge is load limited and unsuitable for HML vehicles. There are also HML restrictions on the Kamilaroi Highway on Conadilly Street, east of Tempest Street and west of Henry Street and the length of Bloomfield Street. Signposts within Gunnedah provide a different route directing HML vehicles to use Bloomfield and New streets, including the New Street level crossing.

The alternative heavy vehicle route for the Kamilaroi Highway through Gunnedah involves using Bloomfield Street, which is also unsuitable for HML vehicles.

It should be noted that to meet the project objectives to provide HML connectivity through Gunnedah, Roads and Maritime and Council are progressing a road reclassification agreement as part of the project. This is shown in the red text on Figure 6.21.

**Crash data**

Crash data from Council for the urban area for the five-year period to June 2012 was reviewed. A total of 110 crashes were reported during the period, with 56 resulting in injuries to 69 people. The majority of crashes (34 per cent) occurred at intersections, followed by 27 per cent at Conadilly Street (Kamilaroi Highway and Oxley Highway). There were no fatal crashes within the urban area.

6.12.1 Policy setting

The proposal forms part of the NSW Long Term Transport Master Plan (TfNSW 2012), the Strategic Land Use Plan – New England North West (NSW Government 2012) and the Bridges for the Bush Initiative (NSW Government 2012) as discussed in Section 2.1. The proposal is also part of a commitment from the NSW Government to improve HML freight productivity.

Roads and Maritime is required to assess the impact on traffic when assessing the impact of their activities as per Clause 228 of the Environmental Planning and Assessment Regulation 2000.

6.12.2 Criteria

The criteria adopted for assessing the impact on traffic and access in the locality would be to ensure the proposal addresses the key traffic issues of road safety, traffic capacity, integration with user and community needs.
Figure 6.21
PERMITTED ROUTES FOR B-DOUBLE TRUCKS (UP TO 26 M LONG)
The Austroads Level of Service (LoS) criteria (as defined in the SIDRA Intersection program) is applied to assessing the intersection performance within the locality as shown in Table 6.26. In congested urban conditions, Level of Service D is often accepted as being the lowest desirable level of service during daily peak traffic periods.

Table 6.26 SIDRA intersection level of service criteria

<table>
<thead>
<tr>
<th>Level of Service (LoS)</th>
<th>Average Delay per vehicle (secs/veh)</th>
<th>Traffic signals, roundabout</th>
<th>Give Way &amp; Stop sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0 to 14</td>
<td>Good operation</td>
<td>Good operation</td>
</tr>
<tr>
<td>B</td>
<td>15 to 28</td>
<td>Good with acceptable delays and spare capacity</td>
<td>Acceptable delays and spare capacity</td>
</tr>
<tr>
<td>C</td>
<td>29 to 42</td>
<td>Satisfactory</td>
<td>Satisfactory, but accident study may be required</td>
</tr>
<tr>
<td>D</td>
<td>43 to 56</td>
<td>Near capacity</td>
<td>Near capacity, accident study may be required</td>
</tr>
<tr>
<td>E</td>
<td>57 to 70</td>
<td>At capacity, at signals incidents will cause excessive delays</td>
<td>At capacity, requires other control mode</td>
</tr>
<tr>
<td>F</td>
<td>Greater than 70</td>
<td>Extra capacity required</td>
<td>Intersection LoS and major road approach LoS values are not applicable for two-way sign control since the average delay is not a good LoS measure due to zero delays associated with major road lanes</td>
</tr>
</tbody>
</table>

6.12.3 Potential impacts

Construction

Building work is proposed to be carried out in a manner that minimises the construction footprint and impacts on traffic and transport. A Traffic Management Plan (TMP) would be prepared during detailed design to manage transport, traffic and access impacts during building work.

The potential impacts during the building stage, potential routes required and access routes to the work site are likely to include:

- Heavy vehicle movements (for hauling building materials) on New Street, the Oxley Highway, Warrabungle Street, Barber Street and the Kamilaroi Highway
- Heavy vehicle movements associated with building equipment within the reserve areas next to Blackjack Creek
- A small increase in vehicle movements from building staff and service vehicles
- Temporary full closure of Barber Street access to Warrabungle Street (approximately 10 weeks) during building of the off-ramp
- Temporary disruption to the driveway access of Marcroft Park during its relocation
- Temporary complete closure of the Gunnedah Maize Mill driveway at Barber Street. Access to the New Street driveway would be maintained
- Temporary staged complete closures of View Street (12 weeks) and New...
Street (10 weeks) approaches to the Oxley Highway

- Temporary staged complete closure of Warrabungle Street (one way) to ensure that access is maintained at Kamilaroi Highway during reconstruction of the roundabout
- Increased traffic movements on the surrounding road network resulting from diversion of vehicles during temporary road closures
- Temporary and future permanent disruptions to bus route 451, including re-routing
- Potential disruptions to the railway line during building of the proposed bridge from each side.

These impacts have the potential to result in minor increases in travel times due to reduced speed limits relating to roadwork and temporary road closures. Potential safety issues may arise as a result of increased heavy vehicle movements. Figures 5.1 to 5.5 of Appendix L (Traffic and Transport Impact Assessment Report) show potential detours which would minimise potential impacts associated with temporary road closures in particular, and continue to provide connectivity into the town centre.

During building, bus route 451 would also need to be re-routed. Consultation would be required with Hopes Coaches before the start of building to facilitate this.

A discussion regarding access requirements for construction vehicles to the work site is provided in Section 3.3.6. Access would be via either the Oxley Highway or Warrabungle Street. The route to and from the work site would need to consider weight, width and height constraints of the sections of road approaching the building site. In some cases, transport by rail may be considered.

Residents, property owners and business owners (including the Mill and residents of Marcroft Park) would need to be consulted about altered access arrangements before carrying out such changes. The work required within the Council public reserve and on ARTC land would also require consultation with Council and ARTC to determine appropriate access arrangements.

Provided an appropriate construction TMP is prepared which includes the safeguards proposed in Section 6.12.4, building the proposal is not expected to have significant impacts on traffic or access.

**Operation**

Building the proposal would deliver a number of positive benefits that would resolve a number of transport, traffic and access issues. These include:

- A road over rail bridge that allows use by HML vehicles
- Removal of the existing New Street level crossing, which would eliminate vehicle, pedestrian and cyclist interaction with trains.
- Elimination of delay experienced by all road users at the New Street level crossing.

**Traffic volumes**

The forecast traffic volumes for the peak hour, daily, daytime (15 hours) and night-time (9 hour) were determined for the opening year (2016) and 10 years after opening (2026) assuming traffic growth of one per cent per annum (cumulative). It was assumed that the daytime traffic volumes would account for 90 per cent of the daily traffic flow.

The traffic volumes for the peak hour, daily, daytime (15 hour) and night-time are compared in Appendix L (Traffic and Transport Impact Assessment Report),
Table 4.4, Table 4.5 and Table 4.6). Table 6.27 shows the current traffic volumes during the evening (PM) peak hour, and the forecasts for the opening year of the proposal, and 10 years after opening.

<table>
<thead>
<tr>
<th>Location</th>
<th>2013 Light</th>
<th>2013 Heavy</th>
<th>2016 Light</th>
<th>2016 Heavy</th>
<th>2026 Light</th>
<th>2026 Heavy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kamilaroi Hwy (West of Warrabungle St)</td>
<td>212</td>
<td>35</td>
<td>217</td>
<td>36</td>
<td>236</td>
<td>39</td>
</tr>
<tr>
<td>Warrabungle St (North of Kamilaroi Hwy)</td>
<td>43</td>
<td>13</td>
<td>44</td>
<td>13</td>
<td>46</td>
<td>14</td>
</tr>
<tr>
<td>Kamilaroi Hwy (East of Warrabungle St)</td>
<td>122</td>
<td>2</td>
<td>126</td>
<td>2</td>
<td>139</td>
<td>2</td>
</tr>
<tr>
<td>Warrabungle St (South of Kamilaroi Hwy)</td>
<td>65</td>
<td>2</td>
<td>66</td>
<td>2</td>
<td>70</td>
<td>2</td>
</tr>
<tr>
<td>Oxley Hwy (West of New St)</td>
<td>276</td>
<td>19</td>
<td>282</td>
<td>19</td>
<td>301</td>
<td>21</td>
</tr>
<tr>
<td>New St (North of Oxley Hwy)</td>
<td>365</td>
<td>12</td>
<td>371</td>
<td>12</td>
<td>394</td>
<td>13</td>
</tr>
<tr>
<td>Oxley Hwy (East of New St)</td>
<td>90</td>
<td>7</td>
<td>91</td>
<td>7</td>
<td>96</td>
<td>7</td>
</tr>
<tr>
<td>View St (South of Oxley Hwy)</td>
<td>205</td>
<td>7</td>
<td>208</td>
<td>7</td>
<td>219</td>
<td>7</td>
</tr>
<tr>
<td>Barber St (East of View St)</td>
<td>473</td>
<td>13</td>
<td>482</td>
<td>13</td>
<td>513</td>
<td>15</td>
</tr>
</tbody>
</table>

The traffic modelling for the proposal shows the following:

- Negligible increase in traffic growth during the PM peak hour traffic volumes:
  - Heavy vehicle movements remain similar at all locations, with the largest increase in 2026 at the Kamilaroi Highway (west of Warrabungle Street), from 35 to 39 movements
  - Light vehicle movements increase marginally at all locations, with the largest increase at Barber Street (east of View Street) in 2026, from 473 to 513 movements

- Increased daily heavy vehicle traffic at the Kamilaroi Highway (west of Warrabungle Street) from 419 existing to 462 movements in 2026; Barber Street (east of View Street) from 144 to 165 movements in 2026; Oxley Highway (west of New Street) from 200 to 219 movements in 2026; and New Street (north of Oxley highway) from 127 to 140 movements

- The majority of increases in traffic at all locations occur during the daytime (15 hour) period. The largest increase between the existing scenario to 2026 is in light vehicle movements at Barber Street (east of View Street), from 5009 to 5438, followed by New Street (north of Oxley Highway), from 3658 to 3722 movements

- Negligible increase in traffic growth during the night-time (9 hour traffic volumes), approximately 20 additional light vehicle movements at each location.

In general these increases in traffic volumes are not anticipated to have a noticeable effect on the traffic in Gunnedah.

**Intersections**

To assess the potential impact on traffic, the SIDRA intersection analysis program was used to model the base case and future year operations of the following intersections:
• Oxley Highway, View Street and the proposed bridge approach (south)
• Warrabungle Street and Barber Street
• Warrabungle Street and Kamilaroi Highway.

Traffic in the PM peak was modelled at these intersections for the following years:

• 2013 – base case (existing)
• 2016 – opening year
• 2026 – 10 years after opening.

Table 6.28 shows the modelling results. The results were assessed against the Level of Service (LoS) criteria discussed in Section 6.10.4.

Table 6.28 Modelling results for the PM peak at key intersections

<table>
<thead>
<tr>
<th>Intersection</th>
<th>2013 (Existing)</th>
<th>2016</th>
<th>2026</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average delay</td>
<td>Level of</td>
<td>Average</td>
</tr>
<tr>
<td></td>
<td>(sec)</td>
<td>Service</td>
<td>delay</td>
</tr>
<tr>
<td>Oxley Highway/View St</td>
<td>11</td>
<td>A</td>
<td>13</td>
</tr>
<tr>
<td>Warrabungle Street/Barber St</td>
<td>-</td>
<td>-</td>
<td>9</td>
</tr>
<tr>
<td>Warrabungle Street/Kamilaroi Hwy</td>
<td>14</td>
<td>A</td>
<td>11</td>
</tr>
</tbody>
</table>

The results indicate that the intersections would operate satisfactorily following the building of the proposed bridge, each performing at LoS A. This is the best level, and indicates free-flowing traffic.

**Barber Street intersection**

As part of the options investigations, it was identified that there would be a need for a direct connection between the proposal and Barber Street. It was determined that the intersection point for the proposed bridge at Warrabungle Street should be shifted marginally north to make an at grade connection. Accordingly, under the proposal, the Barber Street approach to Warrabungle Street would be realigned north of the existing location to safely provide B-double access to and from Barber Street as well as access to the Mill.

The proposal provides the direct access into Barber Street via an intersection where the bridge alignment meets Warrabungle Street. The intersection would allow for the northward and southward vehicle movements in and out of Barber Street. It would also safely accommodate B-double heavy vehicles. The design and location of the intersection has been dictated by a number of design constraints including road gradients, safe turning requirements, lines of vision and property accesses. To provide the appropriate safety outcomes for this intersection, the acquisition of two properties is required. This is discussed further in Section 6.13.

**Public transport**

Bus route 451 would need to re-route via the proposed bridge following the closure of the New Street level crossing. Roads and Maritime would consult with Hopes Coaches before the permanent closure of the level crossing.

**Walking and cycling**

Pedestrians and cyclists who currently cross at the New Street level crossing would cross the railway line via the 2.5-metre wide shared path on the eastern side of the
proposed bridge. The path is proposed to extend into Barber Street to New Street. A pedestrian refuge facility is proposed on the Barber Street approach. Experienced cyclists would be able to use the road shoulders (1.5 metres wide). The proposed bridge would provide a crossing for pedestrians and cyclists who currently need to cross the railway line at grade which is a safety issue.

Pedestrians and cyclists travelling from the southern part of Gunnedah town centre would need to travel a longer route to cross the railway line. This could be partially mitigated by another level crossing for them (at the railway line) and a new shared path along South Street between View Street and Marquis Street (this is not included in the current proposal). Roads and Maritime would consult with Council and ARTC regarding the connection to any future cycle paths and the possibility of a new shared path along South Street.

**Property access**

**Marcroft Park**

As a result of the proposed Barber Street off-ramp, the proposal would result in the relocation of the driveway to Marcroft Park, as the intersection's chevron median strip would impact on southbound access. An additional driveway is proposed approximately 40 metres north of the existing driveway as shown on Figure 6.22. The landholder would be consulted approximately these proposed changes during detailed design.

**Gunnedah Maize Mill**

The proposal would affect access to the Mill. Under the current arrangement, vehicles can make both right and left turns onto Barber Street when exiting the Mill. This is a frequent manoeuvre made by vehicles accessing the Mill as they often turn right onto Barber Street and re-loop back into the Mill via New Street for unloading and reloading. The right turn would no longer be possible when the proposed bridge and intersection on Barber Street are built as a safety review determined that there would be an unacceptable road safety risk allowing right turns onto Barber Street from the Mill when the proposal is in operation.

A further major safety issue identified was the limited sight lines from the Mill to other vehicles turning onto Barber Street due to the proposed road geometry and bridge structure. This is a particular risk to road safety as the right turn is a frequent occurrence from the Mill which increases the likelihood of a crash at this location.

The impact of preventing a right turn from the Mill would require an alternative access route to re-enter the Mill, as shown on Figure 6.23. The alternative access route would require vehicles to travel along Warrabungle Street and make a U-turn at the proposed Kamilaroi Highway roundabout. They could then re-enter Barber Street and New Street to access the Mill. The alternative route is approximately 650 metres long. The proposed no right turn would result in an increased travel distance of approximately 150 metres for mill vehicles, which is considered minimal.
Figure 6.22
PROPERTIES TO BE COMPLETELY AND PARTIALLY ACQUIRED
Figure 6.23
MODIFIED TRAFFIC ARRANGEMENT FOR THE MILL
6.12.4 Safeguards and management measures

Safeguards to minimise adverse impacts on traffic, transport and access are provided in Section 3.7 of the Roads and Maritime QA Specification G36. Table 6.29 provides additional safeguards for the proposal.

Table 6.29 Proposed safeguards and management measures for traffic, transport and access

<table>
<thead>
<tr>
<th>Impact on traffic and access</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impact</td>
<td>A Traffic Management Plan (TMP) would be prepared in accordance with the RTA (2010) Traffic Control and Work Sites Manual and RTA Specification G10- Control of Traffic. The plan must be approved by Roads and Maritime and reviewed by CVC before implementation.</td>
<td>Contractor</td>
<td>Pre-construction</td>
</tr>
<tr>
<td></td>
<td>Where possible, current traffic movements and property accesses would be maintained during the building work. Any disturbance would be minimised to prevent unnecessary traffic delays.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>The TMP would include measures to provide safe access to work areas from the road network, safety barriers where necessary, temporary speed restrictions when necessary, adequate sight distances and prominent warning signs.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>The route(s) identified in the TMP to and from the work area would consider the weight, width and height constraints of roads approaching the site. Transport by rail would be considered if required.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Consultation would be carried out with local residents at Marcroft Park and the owners of the Gunnedah Maize Mill, and businesses, landholders and residents on Warrabungle Street, View Street, Conadilly Street and Barber Street to discuss temporary access requirements to properties and changes to intersections to ensure access is maintained at all times.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Residents, businesses and Council would be notified of the proposed work and any changes in traffic arrangements in the vicinity in accordance with Roads and Maritime procedures before work starts.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Work areas would be bounded by fencing or barriers to prevent pedestrian access. Safe alternative access would be provided for pedestrians where required.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impact on driveway access at Marcroft Park</td>
<td>Variable message signs (VMS) and/or state signs would be erected to notify drivers of the temporary detours in place before and during building of the proposed bridge or upgraded intersections.</td>
<td>Contractor</td>
<td>Pre-construction</td>
</tr>
<tr>
<td></td>
<td>The property owner at Marcroft Park would continue to be consulted in regard to the permanent relocation of the driveway access.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td>Impact</td>
<td>Environmental safeguards</td>
<td>Responsibility</td>
<td>Timing</td>
</tr>
<tr>
<td>------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------</td>
<td>---------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Impact on driveway access at Gunnedah Maize Mill</td>
<td>• The owner of the Mill would be consulted in regard to the detailed design of the driveway access onto Barber Street.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td>Impact on traffic and access</td>
<td>• Construction traffic would access the site via designated access points as defined in the Traffic Management Plan.</td>
<td>Contractor</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>• Access arrangements onto ARTC land and the public reserve would be determined in consultation with ARTC and Council before establishing the work site.</td>
<td>Contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>Impact on traffic and access</td>
<td>• Building vehicles would be parked off-road as far as practicable or in a manner that minimises disruption to other road users, businesses and the public.</td>
<td>Contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>Impact on public transport routes</td>
<td>• Roads and Maritime would consult with Hopes Coaches regarding the need to route bus route 451 during construction and before the closure of New Street level crossing.</td>
<td>Roads and Maritime</td>
<td>Operation</td>
</tr>
</tbody>
</table>

6.13 Socio-economic assessment

This section provides a summary of the area’s socio-economic profile and presents the potential socio-economic impacts and mitigation measures associated with the proposal. The area of investigation adopted for the socio-economic assessment is adopted from the initial options assessment and is shown on Figure 6.13. However, the information presented and issues discussed in this section apply to Gunnedah local government area (LGA) more broadly.

6.13.1 Existing environment

Regional context

Gunnedah Shire is located in the New England region of New South Wales, in the Upper Namoi Valley. The LGA covers an area of approximately 4994 square kilometres and is bordered by the shires of Liverpool Plains, Tamworth, Warrumbungle and Narrabri.

The area of investigation is located to the west of the main town centre, near Pensioners Hill. Land within the study area is zoned under the Gunnedah Local Environmental Plan 2012 (LEP) as Business Development, Infrastructure, General Industrial, Public Recreation or Primary Production (Figure 6.24).

The existing land use within the study area differs slightly to its LEP zoning, namely the area zoned as Business Development, near Warrabungle Street, Barber Street, Little Barber Street and Railway Avenue, is mainly residential houses and accommodation (including the Overlander Motor Lodge, Marcroft Park caravan park and Gunnedah Apartments – The Vines), as well as, a small number of businesses.
Figure 6.24
LAND USE ZONINGS
Socio-economic profile

Population characteristics

A demographic profile of the Shire of Gunnedah’s social characteristics is derived from the last ABS Census in 2011 and is shown in Appendix M. Statistics for both the Gunnedah Urban Centre and Locality (UCL) and the LGA are compared, as the UCL more closely reflects the demographic profile of the area of investigation. For regional context, the percentage breakdown of the data for the New England and North West Statistical Level Area 4 and NSW is also provided.

Key characteristics of Gunnedah’s demographic profile and the area of investigation are as follows:

- In 2011, the LGA had a total population of approximately 12,066 with the following age breakdown:
  - 28 per cent aged less than 20 years
  - 16 per cent aged between 20–34 years
  - 26 per cent aged between 35–54 years
  - 30 per cent aged over 55 years
- The median age of the population is 40 years
- The LGA has an indigenous population of 11.3 per cent, which is significantly higher than the NSW average of 2.5 per cent. Only 11.8 per cent of the population were born overseas, which is significantly lower than the NSW average of 31.4 per cent
- The majority of the population within the UCL (35.1 per cent) and LGA (35.2 per cent) who attended school, finished high school in Year 10. This figure contrast with the rest of NSW, where the majority (49.2 per cent) finished high school in Year 12 and only 23.9 per cent in Year 10. The balance in the New England North West Region is similar for both finishing years, with 32.3 per cent finishing in Year 10 and 34.4 per cent finishing in Year 12
- Average household income is significantly lower within the New England North West Region and in Gunnedah than the rest of the State. However, average rents are about 5 per cent lower within the region. Rents in the UCL are slightly higher than the region as a whole, but still remain lower than the State average. Weekly household incomes, however, are lower than the LGA and region
- Between 2005 and 2009 the number of registered vehicles rose by a rate of 2.8 per cent per year, more than double the rate of northern NSW. The most significant increase during this period was amongst motorbike ownership, followed by articulated trucks (Public Practice, 2011)
- The majority of the population in the LGA and UCL travel to work as a driver or passenger in a car to work (69.5 per cent and 76 per cent respectively) with around 5.3 per cent and 4.9 per cent walking (only) to work.

Population growth

The population in Gunnedah rose by approximately five per cent between Census measurements in 2006 and 2011. Between 2005 and 2010, the population rose by 303 persons to an estimated 12,265, representing a rate of 0.3 per cent per annum (Public Practice, 2011) and appeared to have dropped at the last census from to 12,066.

Employment and labour force

Employment rates within the LGA are consistent with averages across NSW. At the 2011 ABS Census, approximately 59.8 per cent of people were engaged in full-time
employment, 28.8 per cent were engaged in part-time employment. The unemployment rate within LGA was 6.0 per cent and the potential labour force increased from 2009 to 2011 by 303 persons (Public Practice, 2011). The unemployment rate in the Gunnedah UCL was 6.9 per cent.

There is a shortage of local jobs within Gunnedah Shire, as there are 5226 working residents compared to only 4635 local jobs. This means approximately 11 per cent of the population do not work within the LGA and are dependent on vehicles to travel outside of the LGA for employment.

Public transport

As discussed in Section 6.12.1, public transport usage rates are very low in the LGA. This is also reflected in the low number of services provided each day. This is typical of rural townships. At the 2011 ABS Census, approximately 0.4 per cent of the population took public transport to or from work, which is significantly below the NSW average of 13.8 per cent.

In contrast, 5.2 per cent of the population walked to work, which is above the NSW average of 4.1 per cent.

Key community facilities, services and events

Gunnedah township provides a number of community and social services for the community living within the LGA, including schools, recreational facilities, health services and a TAFE campus. The services provided by the Shire of Gunnedah are centrally located within the urban centre and most are within five to 10 kilometres of the centre of the township.

For the majority of the population of the Shire who live within Gunnedah (70 per cent), the services in the township readily serve their needs (Gunnedah Shire Council, 2011). The populations in other villages and rural areas, however, have reported dissatisfaction with access to facilities, attributed in part to the aging population located within these areas (Gunnedah Shire Council, 2011). Services which are not provided within the Gunnedah township are available in neighbouring Tamworth, about one hour’s drive away.

Key facilities near the proposal include:

- Gunnedah Showground area
- Longmuir Playing fields
- Wandobah Reserve
- Pensioners Hill Lookout.

Business and industry

Local and regional economy

The Gunnedah area has a production base for metal manufacturing and farm machinery and export industries in cotton processing, grain producing, brick and terracotta production, tannery and leather processing, timber milling, cotton processing and skilled mining. Amongst the largest industries are the Gunnedah Leather Processors, Gunnedah Timbers, Prydes (stockfeeds), Wholegrain Milling, Paradise Farms, Manildra Flour Mills, Namoi Valley Bricks and the Gunnedah Maize Mill, which is located within the area of investigation.
Agriculture is the largest contributor to Gunnedah's economy (income as well as employment). It provides approximately $125 million of income annually from family and corporate farms that produce wheat, barley, cotton, sunflowers, soybeans, sorghum and vegetables (Economic Development, 2012). Also within the region is a large livestock industry, including pigs, cattle and sheep. The Gunnedah Saleyards, in the north-west of the area of investigation, are the second largest within NSW and in 2010–2011 reported a turnover of $98 million, with approximately 132,800 beef cattle.

Mines currently operating within Gunnedah Shire are located to the north and west outside of the township (Economic Development, 2012). Economic Development (2012) notes that the current capacity of the rail network (which passes through the study area) is at 10 million tonnes per annum, so the planned upgrade of the region's rail network by ARTC to 50 million tonnes per annum by 2020 is vital to support the region's economic growth.

**Business activity**

The township of Gunnedah is where the majority of retail, commercial and manufacturing businesses are located within the Shire. The majority of businesses are within a few blocks of Conadilly Street, which joins the area of investigation.

An established light industrial area is also located next to the area of investigation on Farrar Road, and includes a range of businesses such as self-storage and mining services.

As part of the design options development for the proposal, an investigation was carried out by Essential Economics (2014) which reviewed the businesses and potential future availability of commercial retail business in the Gunnedah town centre. According to Essential Economics (2014), the Gunnedah town centre contains a total of approximately 101,000 square metres of commercial floor space. The central business district (CBD) accounts for approximately 41,000 square metres. The town centre accommodates approximately 280 retail, commercial, industrial and community-based business tenancies, with 136 of these in the CBD. Figure 6.25 shows the current retail businesses and areas within the Gunnedah town centre.

**Tourism**

Tourism is a growing part of the local economy, with the township promoting its status as the 'Koala Capital of the World'. Other tourist attractions include the Gunnedah Showground, which is home to the Gunnedah Show and is considered among the best show rings in NSW, a number of rural shows hosted by the Gunnedah Show Society throughout the year, museums and a wildlife park.

**Community values**

Stakeholder consultation carried out as part of this proposal and also by Council in preparing its Community Strategic Plan 2012–2022, highlighted a number of key values and issues for the Gunnedah Shire. Community values are places and features that are important to the local and regional communities. Key community values that have been discussed for this proposal and the region include:

- A strong sense of belonging within local neighbourhoods
- Concern regarding the adequacy of existing infrastructure to support development
- Desire for progress and development and the management and maintenance
of infrastructure

- Improved traffic flows and safe access for pedestrians and cyclists using local roads
- Access to community facilities, including childcare, preschool, aged care and health services
- A high level of satisfaction with trees in neighbourhoods in the Gunnedah township, and a desire for more trees and more methods to improve waterway quality
- The use of sporting facilities, neighbourhood parks and recreational areas for those located within Gunnedah township.

Community consultation

As discussed in Chapter 5, the Gunnedah community and relevant stakeholder groups were engaged during the options assessment process for the proposal. Issues raised by the community relating to the proposal are presented in Chapter 5. These include: land acquisition, alternative route options, design of Barber Street intersection, and business/service patronage.

Roads and Maritime has provided responses to the community to address each of these concerns (refer to Section 5.2.3 and Table 5.4. Potential socio-economic impacts (including those raised by the community) that may arise during building and operation of the proposal are discussed further in Section 6.13.4.
Figure 6.25
RETAIL BUSINESSES WITHIN THE GUNNEDAH TOWN CENTRE

6.13.2 Policy setting

Roads and Maritime is required to assess the social, economic and environmental impacts of its activities as per Clause 228 of the Environmental Planning and Assessment Regulation 2000.

Roads and Maritime is also required to consider the principles of Ecologically Sustainable Development under the objects of the Environmental Planning and Assessment Act 1979, which require an assessment of inter- and intra-generational equity and social impacts.
6.13.3 Criteria

The criteria for assessing the impact of the proposal are to minimise impacts on the local socio-economic environment, to address community concerns, and to ensure potential impacts on the locality are effectively managed.

The Roads and Maritime (2014) Environmental Impact Assessment Practice Note: Socio-economic Assessment has also been used in the preparation of this section of the REF. It provides guidance on the applicable criteria for identifying relevant social indicators, the level of impacts and appropriate mitigation measures to address the impacts of the proposal.

6.13.4 Potential impacts

Construction

Building the proposal would result in a number of temporary socio-economic impacts within the area of investigation and the LGA. These would include:

- Traffic and accessibility impacts on businesses, visitors, events, community activities and residents due to the proximity to the key intersections of the Oxley Highway and View Street, Kamilaroi Highway and Warrabungle Street along the main routes into Gunnedah and the need for staging the intersection upgrades
- Temporary access impacts for the Mill and residents/businesses on Warrabungle Street and Barber Street
- Connectivity for pedestrians and cyclists between recreational and residential areas and the main township as well as changes in public transport
- Minor amenity-based impacts on the local air quality, noise and vibration and visual aspects
- Vegetation removal within potential koala habitat, recreation space, and private property.

These impacts are likely to create temporary disturbance. However, provided sufficient planning and consultation with affected stakeholders is carried out, significant potential impacts would be avoided and residual impacts would be minimised. For example, all efforts would be made to ensure businesses retain access at all times to avoid any impacts on their operations. Mitigation measures proposed in Section 6.13.5 would ensure that socio-economic impacts minimised.

Operation

The proposal has sought to minimise the long-term and permanent impacts on the community. Nevertheless, residual impacts may occur. These would include:

- Property acquisition
- Influences on property values, due to changes in local amenity and visual impacts
- Health impacts on residents and business in the immediate vicinity of exhaust fumes
- Noise disturbances from the new road influencing the local amenity of neighbouring properties, including Marcroft Park
- Loss of potential recreation space and vegetation within an area containing potential koala habitat, affecting tourism and community wellbeing
• Longer journey times for pedestrians and cyclists due to the permanent closure of the New Street level crossing
• Potential flooding from changes in the hydrology of Blackjack Creek affecting neighbouring property
• Changes in local traffic movements and access to businesses due to the new bridge and the permanent closure of the level New Street crossing.

*Landscape character and visual amenity*

Section 6.11 of this REF discusses the proposal's potential impacts on the landscape. The assessment concluded it would have minor impacts on the landscape from key viewpoints. These impacts are considered acceptable.

Potential for light spill on residences in Stockman Close would be addressed during detailed design.

The loss of vegetation, including potential koala habitat, is addressed in Section 6.5.3. The assessment determined that the loss of vegetation would not be of significance to the koala. Mitigation measures are proposed which would reinstate vegetation as part of the rehabilitation plan and facilitate screening of the proposal from key viewpoints.

The loss of recreation space and vegetation is therefore adequately mitigated and would have a negligible impact on tourism or social beneficial use. The rehabilitation plan proposed would also seek to improve the visual amenity of the area for residents and create new opportunities for recreation, with connection to the proposed cycleway through the presently under-utilised area.

*Traffic and access*

The traffic assessment in Section 6.12 assesses the potential effects of traffic increases on key intersections within the proposal area. It concludes that the proposal would result in the same or better Level of Service in Gunnedah. In addition, the proposal is anticipated to have a positive social benefit, in providing a safer crossing of the railway line, which the community has identified as a key value.

Once operational, the proposal is not anticipated to affect access to, or the operation of, community services and recreational infrastructure. The proposal is also not anticipated to alter the social cohesion of the community as connectivity would be retained between the Gunnedah CBD and the residential area south of the railway.

As noted in Section 6.12.4, the proposal would change access to Marcroft Park as the current driveway is within the proposal footprint. A new driveway access would be provided as part of the final design for the proposal.

Access to the Mill would also be permanently altered as a result of the proposal (refer to 6.11.4). The current arrangements for vehicles exiting the Mill would change, with right turns no longer permitted onto Barber Street. Roads and Maritime has consulted with the Mill owner and carried out investigations with traffic consultants to develop a modified traffic arrangement for the Mill, as shown on Figure 6.23, to ensure that business operations overall are not adversely impacted.

*Local economy, businesses and property values*

The proposal has been designed to minimise impacts on the local community through the design of the alignment, the provision of landscaping and visual design. This combined with the management and mitigation measures proposed to minimise impacts on the amenity of the local environment, would minimise any potential effects
on property values.

Potential impacts on businesses and passing trade as a result of the closure of the New Street level crossing have also been addressed through the provision of the right turn onto Barber Street. It is not anticipated that the proposal would adversely affect businesses within the Barber Street precinct area once the turn is operational and may provide a benefit in terms of improvements to accessibility and connectivity to this area of Gunnedah.

As noted above (Traffic and access), the proposal would have an impact on the current traffic movements associated with the Mill.

Overall, it is considered that the proposal would have a positive benefit on the regional economy and the State transport network, by providing superior access for HML vehicles through Gunnedah.

6.13.5 Safeguards and management measures

The mitigation measures to manage socio-economic impacts would be in accordance with those proposed throughout this REF and the Roads and Maritime QA Specification G36, plus the additions and amendments presented in Table 6.30.

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<th>Environmental safeguards</th>
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</table>
| Local amenity disturbances | • A Community and Stakeholder Management Plan would be prepared for the building phase of the proposal. The plan would be prepared in accordance with the Community Engagement and Communications Manual (Roads and Maritime, 2012b). As a minimum, the plan would include the following measures:  
  o Residents and businesses within the locality would be contacted at least five days before the start of work  
  o Community consultation would be carried out in accordance with the Community Engagement and Communications Manual (Roads and Maritime, 2012b)  
  o A complaints management procedure would be initiated which requires that complaints received are to be recorded and attended to promptly.  
  • Existing access for nearby and adjoining properties would be maintained at all times during construction unless otherwise agreed to by the affected property owner.  
  • The Gunnedah Showground and Gunnedah Tourist Information Centre would be consulted in regard to the staging of work near the Oxley Highway to avoid any conflicts with events. | Roads and Maritime/Contractor | Pre-construction |
6.14 Cumulative effects

6.14.1 Existing environment

A search of development applications within Gunnedah LGA was carried out in February 2015. These applications were for the subdivision of lots located approximately three kilometres south-west of Gunnedah town centre and the development of an oil seed/stock feed mill located approximately 18 kilometres west of Gunnedah town centre.

A search of the NSW Department of Planning and Environment major projects register was carried out in February 2015. A number of major projects are proposed within the LGA, mostly related to the development of coal mines and associated mining infrastructure. The majority of these projects are located 20 kilometres or more outside of Gunnedah town centre, with no projects located near to the site of the proposal.

Based on the results of these two searches, there are no additional significant proposals to be completed close to the proposal.

6.14.2 Policy setting

Public authorities are required to consider the cumulative effect of their activities under Clause 228(2)(o) of the Environmental Planning and Assessment Regulation 2000.

6.14.3 Potential impacts

The environmental impacts resulting from the proposal and other development proposals and activities within the local area would not generate any major cumulative impacts.

During building, the proposal is anticipated to generate minor cumulative impacts in combination with other activities within the local area. These impacts may affect the local amenity (including noise and air quality), visual amenity, traffic and access. Continued consultation with the community, businesses and Council, combined with the safeguards proposed in Chapter 7 of this REF would ensure the proposal minimises any potential cumulative impacts.
6.14.4 Safeguards and management measures

The potential for adverse cumulative impacts would be most effectively addressed by the application of the individual safeguards recommended throughout the REF and summarised in Chapter 7.

6.15 Summary of beneficial effects

The potential beneficial effects of the proposal are presented in Table 6.31.

Table 6.31 Summary of beneficial effects of the proposal

<table>
<thead>
<tr>
<th>Effect</th>
<th>Significance Rating</th>
</tr>
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<tbody>
<tr>
<td>• Significantly improved access for HML vehicles through Gunnedah</td>
<td>High</td>
</tr>
<tr>
<td>• Significantly improved vehicle, pedestrian and cyclist traffic safety</td>
<td>High</td>
</tr>
<tr>
<td>• Uninterrupted access to the Barber Street business precinct, minimising impacts on businesses</td>
<td>High</td>
</tr>
<tr>
<td>• Reduced local traffic disruption by replacing the New Street level crossing, where traffic needs to wait while trains pass through town</td>
<td>High</td>
</tr>
<tr>
<td>• Minimised environmental impacts near the Oxley Highway and avoids core koala habitat in the Wandobah Reserve</td>
<td>Moderate</td>
</tr>
<tr>
<td>• Increased connectivity, structural diversity and biodiversity value of vegetation – including improved koala habitat values within the proposal area – due to revegetation and rehabilitation post-construction</td>
<td>Moderate</td>
</tr>
<tr>
<td>• Improved efficiency by minimising impact on existing infrastructure, including the Oxley Highway roundabout, View Street connection and culvert across Blackjack Creek</td>
<td>Moderate</td>
</tr>
</tbody>
</table>

6.16 Summary of adverse effects

The potential adverse effects of the proposal are presented in Table 6.32.

Table 6.32 Summary of adverse effects

<table>
<thead>
<tr>
<th>Effect</th>
<th>Significance Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Temporary noise and air quality disturbances during building work.</td>
<td>Low</td>
</tr>
<tr>
<td>• Water quality impacts associated with erosion and sedimentation resulting from building activities</td>
<td>Moderate</td>
</tr>
<tr>
<td>• Permanent loss of 0.63 hectare of structurally modified parkland habitat</td>
<td>Moderate</td>
</tr>
<tr>
<td>• Permanent removal of 26 mature koala feed trees</td>
<td>Moderate</td>
</tr>
<tr>
<td>• Modification to visual and landscape characteristic of the locality, by introducing a new feature into the landscape</td>
<td>Low</td>
</tr>
<tr>
<td>• Potential to direct headlights into homes on Stockman Close as vehicles depart from Barber Street</td>
<td>Low</td>
</tr>
<tr>
<td>• Minor encroachment onto land included within the curtilage of the Gunnedah Maize Mill</td>
<td>Low</td>
</tr>
<tr>
<td>• Temporary road access restrictions during building, and increased traffic movements in surrounding road network as a result of diversion during temporary road closures</td>
<td>Low</td>
</tr>
<tr>
<td>• Temporary and permanent disruptions to bus route 451</td>
<td>Low</td>
</tr>
<tr>
<td>• Potential disruptions to railway line during building</td>
<td>Low</td>
</tr>
</tbody>
</table>

As shown in Table 6.32, there are not expected to be any significant long-term adverse impacts as a result of the proposal. Safeguards and management measures discussed in this REF would manage and minimise the severity and/or duration of these impacts.
7 Environmental management

7.1 Environmental management plans (or system)

This REF identifies a number of safeguards and management measures to minimise the potential adverse environmental and social impacts of the proposal. The safeguards and management measures presented in Chapter 6 are listed together in Table 7.1.

Should the proposal proceed, these measures would be incorporated into the detailed design and applied during construction and operation of the proposal.

A Project Environmental Management Plan (PEMP) and a Construction Environmental Management Plan (CEMP) would be prepared to describe safeguards and management measures. These plans would provide a framework for establishing how these measures would be implemented and who would be responsible for their implementation.

The plans would be prepared before construction of the proposal and must be reviewed and certified by the Roads and Maritime Services Environmental Officer, Northern Region, before the start of any on-site work.

The CEMP would be a working document, subject to ongoing change and updated as necessary to respond to specific requirements. The CEMP and PEMP would be developed in accordance with the specifications set out in the Roads and Maritime documents:

- QA Specification G36 – Environmental Protection (Management System)
- QA Specification G38 – Soil and Water Management (Soil and Water Plan)
- QA Specification G40 – Clearing and Grubbing.

7.2 Summary of safeguards and management measures

Environmental safeguards outlined in this document would be incorporated into the detailed design phase of the proposal and during construction and operation of the proposal, should it proceed. These safeguards would minimise any potential adverse impacts arising from the proposed work on the surrounding environment. The safeguards and management measures are summarised in Table 7.1.
Table 7.1 Summary of site specific environmental safeguards

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
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</table>
| General | • All environmental safeguards must be incorporated within the following:  
  o Project Environmental Management Plan.  
  o Detailed design stage.  
  o Contract specifications for the proposal.  
  o Construction Environmental Management Plan. | Project manager | Pre-construction |
| General | • A risk assessment must be carried out on the Proposal in accordance with the Roads and Maritime Services Project Pack and PMS risk assessment procedures to determine an audit and inspection program for the work. The recommendations of the risk assessment are to be implemented.  
  • A review of the risk assessment must be carried out after the initial audit or inspection to evaluate is the level of risk chosen for the project is appropriate.  
  • Any work resulting from the proposal and as covered by the REF may be subject to environmental audit(s) and/or inspection(s) at any time during their duration. | Project manager and regional environmental staff | Pre-construction  
After first audit |
| General | • An environmental contract specification must be forwarded to the Roads and Maritime Services Senior Environment Officer for review at least 10 working days before the tender stage.  
  • A contractual hold point must be maintained until the CEMP is reviewed by the Roads and Maritime Services Senior Environmental Officer. | Project manager | Pre-construction |
<p>| General | • The Roads and Maritime Services Project Manager must notify the Roads and Maritime Services Environmental Officer Northern Region at least 5 days before work commencing. | Project manager | Pre-construction |
| General | • All businesses and residences likely to be affected by the proposed work must be notified at least 5 working days before the start of the proposed activities. | Project manager | Pre-construction |
| General | • Environmental awareness training must be provided, by the contractor, to all field personnel and subcontractors. | Contractor | Pre-construction and during construction as required. |
| Air quality | • Air quality mitigation strategies would be included in a CEMP. | Contractor | Pre-construction |</p>
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<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
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<tbody>
<tr>
<td>Exposure of hazardous building materials</td>
<td>• A full building inspection would be conducted of the houses and structures to be demolished to determine if any hazardous materials are present. The inspection would be carried out by a suitably qualified person.</td>
<td>Roads and Maritime</td>
<td>Pre-construction</td>
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</table>
| Dust nuisance                | • Transport loads of erodible material would be covered to minimise the generation of airborne material.  
• Stockpiles would be located far away from sensitive receivers. Stockpiles or areas that may generate dust would be managed in accordance with Roads and Maritime’s Stockpile Site Management Guideline (RTA 2011).  
• Measures (including watering or covering exposed area) would be used to minimise or prevent air pollution and dust.  
• Visual monitoring of air quality would be carried out on a daily basis to verify the effectiveness of controls.                                                                                                                 | Roads and Maritime | Construction   |
| Emissions to air             | • Burning of waste or vegetation would not be permitted.  
• Plant and vehicles would not be left idling when not in use for extended periods.  
• Vehicles, plant and equipment would be regularly maintained and machinery would be fitted with emission control devices in accordance with Australian Design Standards.                                                                                                        | Roads and Maritime | Construction   |
| Pollution of receiving waters | • A Soil and Water Management Plan (SWMP) would be prepared as part of the CEMP before construction begins in accordance with the Roads and Maritime Specification G38. The SWMP would address:  
  o Roads and Maritime Code of Practice for Water Management, the Roads and Maritime Erosion and Sedimentation Procedure  
  o Roads and Maritime Technical Guideline: Temporary Stormwater Drainage for Road Construction, (Roads and Maritime 2011b)  
• The plan would include (but not be limited to):  
  o Details of erosion and sediment controls to be implemented, including erosion and sediment control plans developed for the proposal                                                                 | Roads and Maritime | Pre-construction |
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<tr>
<td></td>
<td>o Details of inspection frequency for control measures</td>
<td>Roads and Maritime</td>
<td>Construction</td>
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<td></td>
<td>o Monitoring and maintenance of environmental control measures</td>
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<td></td>
<td>o Procedures to manage stockpiles generated during construction</td>
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<td>o Acid sulfate management measures</td>
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<td></td>
<td>o Detailed consideration of measures to prevent (where possible) or minimise any water quality impacts</td>
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<td>o Measures to manage known and unexpected contamination during the construction stage</td>
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<td></td>
<td>o Appropriate controls to minimise risk of release of dirty water into drainage lines and/or waterways</td>
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<td></td>
<td>o Visual monitoring of local water quality (that is, turbidity, hydrocarbon spills/slicks) to be carried out on a regular basis to identify any potential spills or deficient erosion and sediment controls</td>
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<tr>
<td></td>
<td>o Water quality control measures to prevent any materials (such as concrete, grout and sediment) entering waterways.</td>
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<tr>
<td>Pollution of receiving waters</td>
<td>• Pre-cast concrete elements would be used where practicable, in preference to pouring concrete near the creek and drainage lines.</td>
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<td></td>
<td>• Equipment and vehicle washdown would be carried out off site or in a bunded area with an impervious surface.</td>
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<td></td>
<td>• Concrete truck washouts would be carried out in a bunded area with an impervious surface.</td>
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<td></td>
<td>• All fuels, chemicals and other liquids would be stored as far as practicable from Blackjack Creek and drainage lines in a bunded area (110% capacity) within the site compound. A Safety Data Sheet is required for each item stored.</td>
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<td>• Refuelling would be carried out within a bunded area at least 50 metres from watercourses.</td>
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<td>• Vehicles and equipment would be checked daily for leaks.</td>
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<td>• All staff would be trained in incident and emergency response procedures.</td>
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<tr>
<td>Emergency spill kits would be kept on site at all times, along with the contact numbers of key agencies which would be notified in the event of an incident.</td>
<td>The Roads and Maritime Environmental Incident Classification and Management Procedure would be followed in the event of an incident. The EPA would be notified in the event of a significant spill in accordance with Part 5.7 of the Protection of the Environment Operations Act 1997. Work would be carried out in the dry season where feasible and reasonable. Visual monitoring of water quality (turbidity and hydrocarbon slicks) would be carried out on a daily basis.</td>
<td>Roads and Maritime</td>
<td></td>
</tr>
<tr>
<td>Erosion and sedimentation</td>
<td>Preparation of a Soil and Water Management Plan (SWMP) as part of a CEMP. A detailed erosion and sedimentation control plan would be prepared within the SWMP and approved by the Roads and Maritime Environmental Officer before start of work in accordance with the requirements of the ‘Blue Book’. The Erosion and Sediment Control Plan would include specific details of controls required for work within Blackjack Creek and drainage lines. The Erosion and Sediment Control Plan would include a procedure for regular inspection, maintenance and cleaning of erosion and sediment controls.</td>
<td>Roads and Maritime</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>Erosion and sedimentation</td>
<td>Erosion and sedimentation controls would remain in place until the work area has been stabilised and the risk of erosion and sedimentation is minimal. Work would be scheduled to occur within the dry season where feasible and practical. Work would be suspended in periods of heavy rain. Disturbance to vegetation and soil outside of the work area would be minimised. Vehicle and equipment movements would be confined to established access tracks. Vehicle and equipment use within Blackjack Creek would be minimised. The siting of soil stockpiles would be as far from Blackjack Creek and associated drainage lines as feasible and practical.</td>
<td>Roads and Maritime</td>
<td>Construction</td>
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### Impact

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</table>
| • All stockpiles would be stabilised at the end of each work day during wet weather and managed in accordance with the Roads and Maritime procedure, Stockpile Site Management Guidelines (Roads and Maritime, 2011).  
• All surfaces disturbed would be stabilised and restored as soon as practicable and in a progressive manner as work is completed.  
• No work would start before installation of appropriate erosion and sediment control structures.  
• Stockpiling of soil, earth or other material would be bunded or fenced and located within sites approved by the proposal’s Environmental Officer. | Roads and Maritime                    | Construction    |

**Exposure of contaminated soils**

- A contingency plan for the management of contaminated soils would be developed.  
- Visual assessment of excavated materials would be carried out immediately following exposure.  
- If any areas where excavation is required are identified as Potential Acid Sulfate Soil, an Acid Sulfate Soil Management Plan would be prepared in accordance with the Roads and Maritime Guidance for the Management of Acid Sulfate Materials: Acid Sulfate Soils, Acid Sulfate Rock and Monosulfidic Black Ooze (RTA 2005). The ASS management plan would be approved by Roads and Maritime before the start of any earthwork and, at a minimum, the plan would include:
  - Management measures for the safe excavation, isolation and disposal of neutralised soils  
  - Requirements for additional testing to determine predicted liming rates of excavated spoil once quantities are determined.
- Specific controls to be implemented would include:
  - Capping exposed surfaces with clean fill to prevent oxidation  
  - Placing excavated ASS separately in a lined, bunded and covered area  
  - Neutralising ASS for reuse (where appropriate) by using additives such as lime.
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<tbody>
<tr>
<td>Noise impacts on residential receivers during operation</td>
<td>• Architectural noise treatments may be developed at affected properties on Railway Avenue, Barber Street, Warrabungle Street, Stockman Close and Farrar Road in consultation with property owners.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td>Additional noise impacts due to change in construction methodology</td>
<td>• If a driven pilling technique is selected, the Roads and Maritime Environmental Officer must be contacted with regard to any additional requirements. Further mitigation measures or specialist input may be required to supplement the Construction Noise and Vibration Management Plan (CNVMP).</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
</tbody>
</table>
| Noise and vibration disturbance during construction                    | • A site-CNVP would be prepared. This plan would address each major stage of the building work and identify the appropriate mitigation and management measures. The objectives of the CNVMP are to:  
  o Minimise exceedances of the noise management levels and goals nominated in Section 6.4.4  
  o Provide detail of noise and vibration monitoring, reporting and response procedures  
  o Describe specific mitigation treatments, management methods and procedures to be implemented to control noise and vibration during construction  
  o Describe construction timetabling to minimise noise impacts including time and duration restrictions, respite periods and frequency  
  o Describe procedures for notifying residents of building activities likely to affect their amenity through noise and vibration  
  o Define contingency plans to be implemented in the event of non-compliances and/or noise complaints  
  o Define the construction hours.                                                                 | Contractor             | Pre-construction  |
| Vibration disturbance during construction                               | • Potential vibration impacts would be addressed in the CNVMP.  
• Building condition surveys would be completed both before and after the work for all potentially affected properties. | Contractor             | Pre-Construction   |
<p>| Noise disturbance during                                               | • As a minimum, the following mitigation measures would be included in the CNVMP and all feasible and practical mitigation considered:                                                                                       | Contractor             | Pre-construction  |</p>
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<tr>
<td>construction</td>
<td>o Using localised acoustic hoarding around significantly noise generating stationary items of plant, where practicable.</td>
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<td>Construction</td>
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<td></td>
<td>o Scheduling highly noisy activities during less noise-sensitive periods where feasible and practical.</td>
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<td></td>
<td>o Inducting and training workers and contractors to create awareness of the locality of sensitive receivers and the importance of minimising noise emissions.</td>
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<td>o Ensuring any spoil is placed and not dropped into awaiting trucks.</td>
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<td></td>
<td>o Locating noisy plant away from receivers where possible.</td>
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<td></td>
<td>o Turning noisy plant off when not in use.</td>
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<td></td>
<td>o Ensuring plant is appropriately maintained.</td>
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<td></td>
<td>o Using silenced or less noise-intensive equipment, where feasible and practical.</td>
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<td></td>
<td>o Limiting heavy vehicle movements to daytime hours where feasible and practical.</td>
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<tr>
<td></td>
<td>o Considering the use of non-tonal reversing alarms to minimise nuisance caused by reversing alarms.</td>
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<tr>
<td>Vibration disturbance during</td>
<td>• Attended vibration monitoring would be carried out if vibration intensive work is required within 'cosmetic damage' safe working distances – for example, if rockbreaking is required within 7 m of a receiver (medium rockbreaker), or if impact piling is required within 15 m of a receiver.</td>
<td>Contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>construction</td>
<td>• The aim of the attended vibration monitoring would be to ensure levels remain below the criteria for cosmetic damage at all receivers.</td>
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<tr>
<td></td>
<td>• The following measures for vibration management would be included in the CNVMP:</td>
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<td></td>
<td>o Bored pilling – not impact pilling – would be used where feasible and practical.</td>
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<td></td>
<td>• If rockbreaking is required, the following additional measures would be</td>
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### Impact

<table>
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<tr>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
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</table>
| **Considered in the CNVMP:**  
  o Dampered rockbreakers and/or ‘city’ rockbreakers would be used to minimise the impacts associated with rockbreaking work (if required) and a smaller capacity rockbreaker would be used where feasible and practical  
  o Rockbreaking operations would be sequenced so vibration-intensive operations do not occur concurrently  
  o Rockbreaking would be scheduled during the less sensitive times of the day  
  o Hydraulic rock splitters would be used rather than rockbreakers (if applicable). | Contractor | Pre-construction |
| **Vegetation clearing**  
  • A Tree Protection Plan (TPP) would be prepared to protect native tree species, in particular Yellow Box and Blakely’s Red Gum species.  
  • The location of exclusion zones would be identified, with temporary fencing or flagging tape to indicate the limits of clearing in accordance with Guide 2 – Exclusion Zones of the Biodiversity Guidelines – Protecting and managing biodiversity on RTA projects (RTA, 2011).  
  • Tree Protection Zones (TPZ) would be implemented around trees to be retained near the proposed work in accordance with the Australian Standard AS 4970-2009 Protection of Trees on Development Sites to prevent machinery impacts on trees.  
  • Koala feed trees would be identified and clearly marked.  
  • It is not anticipated that any hollow-bearing trees would be impacted by the proposal. However, should a hollow-bearing tree be identified, it would be clearly marked. | Contractor | Pre-construction |
| **Weeds**  
  • Site assessments would be carried out by an ecologist or person trained in weed management to identify, describe and map weed-infested areas, including WoNS, National Environmental Alert Weeds and/or noxious weeds within the site and adjacent areas.  
  • Areas infested with weeds would be marked with exclusion zone fencing and signage to limit access by personnel and vehicles.  
  • A weed management plan would be developed and implemented. | Contractor | Pre-construction |
### Vegetation clearing

- All relevant staff would be inducted and informed of the limits of vegetation clearing and the areas of vegetation to be retained.
- To minimise flora and fauna impacts from construction activities, vegetation clearing and riparian zone management would be carried out in accordance with the Biodiversity Guidelines – Protecting and Managing Biodiversity on RTA Projects (NSW RTA, 2011).
- Clearing of vegetation would be carried out in accordance with Guide 1 – Pre-clearing Process of Biodiversity Guidelines – Protecting and Managing Biodiversity on RTA Projects (RTA, 2011). These guidelines cover the felling of both non-habitat and habitat trees and the rescue and relocation of fauna.
- Pre-clearance surveys would be carried out by suitably qualified ecologists 24 hours before clearing to identify any specific habitat features, such as active bird nests and tree hollows that may be harbouring native fauna (such as microbats).
- Native vegetation would be re-established that is representative of the vegetation and habitats that may be temporarily removed by the proposal. This would specifically involve revegetation plantings of Yellow Box and Blakely’s Red Gum, as well other native species that occur in the study area.
- A planting program would be developed that achieves a density of trees representative of an open woodland and a patch size similar in extent to what may be potentially cleared.
- Vegetation would be reinstated so that it may in future provide the same level of wildlife corridor functionality as that which is to be potentially cleared.
- If unexpected threatened fauna or flora species are discovered, work would stop immediately and follow the RTA ‘Unexpected Threatened Species Find Procedure’ in Guide 1 – Pre-clearing Process of Biodiversity Guidelines – Protecting and Managing Biodiversity on RTA Projects (RTA, 2011).
- Pre-clearance surveys would be performed to ensure threatened flora species that have been assessed as likely occurrences are not present within the site.
- Exclusion zone fencing would be established before the start of clearing activities to protect retained vegetation from inadvertent clearing activities.
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<th>Responsibility</th>
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<tbody>
<tr>
<td>Vegetation clearing would be limited to the extent required to build the proposal.</td>
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<tr>
<td>Vegetation clearing within the areas of incidental disturbance would be limited to the extent required to establish machinery/vehicle access and the site compound.</td>
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<tr>
<td>Trees would be felled directionally away from vegetation and habitat that is to be retained.</td>
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<tr>
<td>Where possible, any tree stumps would be retained within the riparian zone of Blackjack Creek (10 m from top of bank)</td>
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<tr>
<td>Any trees requiring pruning would be pruned in accordance with the Australian Standard AS 4373 Pruning of Amenity Trees.</td>
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<tr>
<td>Vegetation clearing would be carried out in a manner that prevents the mixing of topsoil with woody vegetation debris.</td>
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<tr>
<td>Non-woody vegetation (groundcovers) would be incorporated into the topsoils as organic nutrients for use in site rehabilitation.</td>
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<tr>
<td>The outcomes of vegetation clearing would be documented.</td>
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<tr>
<td>Site inductions would include making all staff aware of weed management measures on site.</td>
<td>Contractor</td>
<td>Construction</td>
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<tr>
<td>Marked weed infestations would be managed during building with a combination of mechanical control methods (slashing or mowing) as well as a range of herbicides.</td>
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<tr>
<td>Vehicle loads would be securely covered to prevent weed plant material falling or blowing off vehicles.</td>
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<tr>
<td>All weed plant material and topsoil containing weed plant material would be disposed of at an appropriate waste management facility.</td>
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<tr>
<td>Weeds would be separated from native vegetation if native vegetation is to be used for mulch during revegetation and rehabilitation.</td>
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<tr>
<td>Any topsoil imported onto the site for revegetation and rehabilitation would be tested to ensure it contains no weed seeds or seedlings.</td>
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<td>Impact</td>
<td>Environmental safeguards</td>
<td>Responsibility</td>
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<tr>
<td>Hydrology and flooding</td>
<td>• A flood management procedure would be developed. This would detail how potential flood events would be monitored and how the site would be secured in the event of a flood.</td>
<td>Roads and Maritime</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>Hydrology and flooding</td>
<td>• If feasible and practical, building work would be carried out during the dry season (i.e. outside of the months of December to April).</td>
<td>Roads and Maritime</td>
<td>Construction</td>
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<td></td>
<td>• Crane pads would be completely removed and the pad areas returned to pre-construction levels.</td>
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<td></td>
<td>• Consideration of scour protection to embankments next to the drainage line.</td>
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<tr>
<td>Vulnerability to effects of climate change</td>
<td>• The effect of climate change would be factored into future designs, including the effects of flooding of Blackjack Creek.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td>Greenhouse gas emissions</td>
<td>• Building materials, particularly fill, would be sourced from as close to the site as is feasible and practical.</td>
<td>Roads and Maritime</td>
<td>Construction</td>
</tr>
<tr>
<td>Waste management</td>
<td>• Weed-free vegetation would be re-used on site.</td>
<td>Roads and Maritime</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>• All surplus soil and imported fill would be used on site where feasible and practical. Where not, this material would be transferred to a Council site or disposed of in accordance with the EPA’s Waste Classification Guidelines.</td>
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<td></td>
<td>• Appropriate receptacles for the collection of waste, including separate receptacles for recycling, would be provided on site.</td>
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<td></td>
<td>• Waste materials would be removed from the site by an appropriately licensed or approved contractor and disposed at a facility authorised to take such waste.</td>
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<tr>
<td>Noxious weed disposal</td>
<td>• All noxious weeds would be disposed of in accordance with the requirements of the Biodiversity Guidelines – Protecting and Managing Biodiversity on RTA Projects Guide 6 – Weed Management (Roads and Maritime, 2011).</td>
<td>Rods and Maritime</td>
<td>Construction</td>
</tr>
<tr>
<td>Material use</td>
<td>• Where feasible and practical, the procurement policy would be to purchase materials manufactured with a recycled content.</td>
<td>Roads and Maritime</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>• Fill and materials would be sourced from as close to the building site as is feasible and practical.</td>
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<td>Impact</td>
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</tbody>
</table>
| Potential disturbance to previously unidentified item of Aboriginal heritage significance | • All staff, contractors and others involved in construction and maintenance related activities should be made aware of legislation protecting sites and places of significance. Of particular importance is the National Parks and Wildlife Amendment (Aboriginal Objects and Aboriginal Places) Regulation 2010, under the National Parks and Wildlife Act 1974.  
• Work would be limited to the study area shown in Figure 6.13 so as to limit the possibility of encountering Aboriginal heritage features in unassessed areas. Should impacts be required beyond the areas assessed in Appendix D (Aboriginal Heritage Assessment Report), then additional archaeological assessment may be necessary.  
• Should any Aboriginal heritage features be identified during the course of construction, work in that area would cease and subsequent actions would be guided by the Roads and Maritime Standard Management Procedure: Unexpected Archaeological Finds (Roads and Maritime, July 2012). Work would not restart unless authorised by the Roads and Maritime Environmental Officer and OEH. | Contractor                   | Pre-construction and during construction |
| Views of the Gunnedah Maize Mill                                     | • Landscaping would seek to retain screening trees and open space to the south-west of the Mill as far as practicable, avoid hard edges and provide sympathetic landscaping (as recommended in Appendix B (Historic Heritage Assessment Report) and Appendix J (Former Brunton’s Flour Mill Heritage Assessment Report).  
• The mitigation measures outlined in Section 6.11.5 to reduce the impact on visual amenity would be employed to ensure the aesthetics of the area and the heritage significance of the Mill are not adversely impacted by the proposal. | Roads and Maritime           | Detailed design and post-construction |
| Damage to the curtilage and archaeological potential of the Gunnedah Maize Mill | • The historic curtilage of the Mill (as shown in Figure 3.4) would be retained as far as practicable, considering the bulk and footprint of the proposed structure.  
• The following mitigation measures would be applied to so that the establishment and use of the curtilage area during the building phase of work does not involve any ground surface disturbance:  
  o Geotextile would be laid over areas to be used for the temporary site compound and access routes | Roads and Maritime           | Detailed design               |
Crushed gravel would also be laid over areas to be used for the temporary site compound and access routes, to the following specifications:

- 450 mm across piling and crane pad areas
- 300 mm over heavy vehicle and machinery access and delivery routes
- 50 mm over access tracks and side tracks designated for light vehicle use only.

Geotextile and crushed gravel would be removed at the completion of work and/or temporary use of the area.

Land to be temporarily used during the building phase of work would be appropriately delineated to ensure that activities are contained and no unnecessary impacts occur within the grounds of the Mill.

- The boundary of land to be temporarily used during the building phase of work (as shown in Figure 3.4) would be appropriately delineated with high visibility flagging tape/bunting (or similar) to ensure that activities are contained and no unnecessary impacts occur beyond this within the grounds of the Mill.
- Should the proposal result in subsurface disturbance in this area, an archaeological assessment would be required. This would help determine if a permit under Section 140 of the Heritage Act 1977 is required to excavate land within which relics may be present. If impacts are considered to be minor or to have an inconsequential effect, then a Section 139(4) excavation permit may be applicable.
- All staff, contractors and others involved in building and maintenance related activities would be made aware of legislation protecting sites and places of significance. Of particular importance are the Heritage Act 1977 and the Gunnedah LEP 2012.
- Heritage induction would be provided to all workers before building begins. Induction would inform them of the location of heritage items near the proposal site and a brief them on the Standard Management Procedure: Unexpected Archaeological Finds (Roads and Maritime, 2012), which would need to be followed if unanticipated heritage items or deposits are located during building.
<table>
<thead>
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<th>Impact</th>
<th>Environmental safeguards</th>
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<th>Timing</th>
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<tbody>
<tr>
<td>Removal of the brick drain at the Gunnedah Maize Mill</td>
<td>• While the brick drain has been determined to have no heritage significance, in the event that it is removed the work area would be cleared, designated and minimised surrounding the drain to avoid any intrusion into the curtilage of the Mill and surrounds.</td>
<td>Contractor</td>
<td>Pre-construction and construction</td>
</tr>
</tbody>
</table>
| Damage to items of non-Aboriginal heritage significance | • In the event that non-Aboriginal heritage items are found during building or should listed heritage items come under threat, work in the immediate area would be stopped and the Roads and Maritime’s Environmental Officer and the NSW Heritage Office would be contacted to determine the significance of the finding and/or actions to be taken.  
• In accordance with the Standard Management Procedure: Unexpected Archaeological Finds (Roads and Maritime, 2012), the protocol to be followed in the event that a site, artefact or relic (as defined by the Heritage Act 1977) is identified during building work:  
  o All ground surface disturbance in the area of the finds would cease immediately the finds are uncovered  
  o The discoverer of the find(s) would notify machinery operators in the immediate vicinity so work can be halted  
  o The site supervisor would be informed of the find(s)  
  o A qualified opinion would be gained from an archaeologist as soon as possible  
  o No work would start near the find until any required approvals are given by the regulator. | Contractor | Construction |
| Long-term impacts on landscape character | • Bridge work would be managed in accordance with Bridge Aesthetics Guidelines (Roads and Maritime, 2012d).  
• Landscaping would be managed in accordance with Roads and Maritime’s Landscape Guideline (RTA, 2008).  
• Opportunities to minimise impacts on landscape character would be considered during detailed design in consultation with Council. This would include consideration of the recommendations in the Landscape Character and Visual Assessment (Appendix K) for rehabilitation, planting and landscaping in consultation with Council and any affected landholders. This would include:  
  o Complementary planting and reinstatement of vegetation within the floodplain | Roads and Maritime | Detailed design |
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<th>Impact</th>
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<td></td>
<td>o Screen planting where required on key views</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
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<td></td>
<td>o Plantings to the north and east of the Mill, on the northern/western side of the new bridge structure</td>
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<td></td>
<td>• The recommendations in the Landscape Character and Visual Assessment (Appendix K) to minimise the impact of new development on the Mill would be considered during detailed design in consultation with Council. This would include:</td>
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<td>o Suitably scaled buffers and spaces, and strategic tree placement around the mill to ensure retention of key contextual views</td>
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<td></td>
<td>o Provision of effective visual screening for residents and adjoining land uses to the west of the floodplain, to mitigate views of the new bridge.</td>
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<tr>
<td>Light spill from headlights on the bridge</td>
<td>• The detailed design would consider any potential for light spill impacts from vehicle headlights and street lights on residences.</td>
<td>Contractor</td>
<td>Pre-construction Construction</td>
</tr>
<tr>
<td></td>
<td>• The detailed design would also consider the use of a double rail barrier or other form of permanent screening within the railings to minimise the effects of lighting glare from vehicles. Should lighting glare affect residences, an assessment would be carried out to determine if a full height barrier should be adopted to help minimise the impact of any light spill.</td>
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<tr>
<td>Short-term impacts on landscape character and visual amenity</td>
<td>• The site compound and general site layout – including stockpiles, materials, buildings, plant and equipment – would be placed to minimise the visual impact on surrounding residences.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td></td>
<td>• Work would be carried out in accordance with EIA-N04 Guidelines for Visual Impact Assessment and Landscape Character Assessment (Roads and Maritime, 2013).</td>
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<tr>
<td>Impact on driveway access – Marcroft Park</td>
<td>• The property owner at Marcroft Park would continue to be consulted in regard to the permanent relocation of the driveway access.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td>Impact on driveway access – the Gunnedah Maize Mill</td>
<td>• The owner of the Mill would be consulted in regard to the detailed design of the driveway access onto Barber Street.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
</tbody>
</table>
### Impact on Traffic and Access

- **A Traffic Management Plan (TMP) would be prepared in accordance with the RTA (2010) Traffic Control and Work Sites Manual and RTA Specification G10-Control of Traffic. The plan must be approved by Roads and Maritime and reviewed by CVC before implementation.**

- Where possible, current traffic movements and property accesses would be maintained during the building work. Any disturbance would be minimised to prevent unnecessary traffic delays.

- The TMP would include measures to provide safe access to work areas from the road network, safety barriers where necessary, temporary speed restrictions when necessary, adequate sight distances and prominent warning signs.

- The route(s) identified in the TMP to and from the work area would consider the weight, width and height constraints of roads approaching the site. Transport by rail would be considered if required.

- Consultation would be carried out with local residents at Marcroft Park and the owners of the Gunnedah Maize Mill, and businesses, landholders and residents on Warrabungle Street, View Street, Conadilly Street and Barber Street to discuss temporary access requirements to properties and changes to intersections to ensure access is maintained at all times.

- Residents, businesses and Council would be notified of the proposed work and any changes in traffic arrangements in the vicinity in accordance with Roads and Maritime procedures before work starts.

- Work areas would be bounded by fencing or barriers to prevent pedestrian access. Safe alternative access would be provided for pedestrians where required.

### Impact on Traffic and Access

- **Variable message signs (VMS) and/or state signs would be erected to notify drivers of the temporary detours in place before and during building of the proposed bridge or upgraded intersections.**

<table>
<thead>
<tr>
<th>Impact on traffic and access</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
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</thead>
</table>
| Impact on traffic and access | - A Traffic Management Plan (TMP) would be prepared in accordance with the RTA (2010) Traffic Control and Work Sites Manual and RTA Specification G10-Control of Traffic. The plan must be approved by Roads and Maritime and reviewed by CVC before implementation.  
- Where possible, current traffic movements and property accesses would be maintained during the building work. Any disturbance would be minimised to prevent unnecessary traffic delays.  
- The TMP would include measures to provide safe access to work areas from the road network, safety barriers where necessary, temporary speed restrictions when necessary, adequate sight distances and prominent warning signs.  
- The route(s) identified in the TMP to and from the work area would consider the weight, width and height constraints of roads approaching the site. Transport by rail would be considered if required.  
- Consultation would be carried out with local residents at Marcroft Park and the owners of the Gunnedah Maize Mill, and businesses, landholders and residents on Warrabungle Street, View Street, Conadilly Street and Barber Street to discuss temporary access requirements to properties and changes to intersections to ensure access is maintained at all times.  
- Residents, businesses and Council would be notified of the proposed work and any changes in traffic arrangements in the vicinity in accordance with Roads and Maritime procedures before work starts.  
- Work areas would be bounded by fencing or barriers to prevent pedestrian access. Safe alternative access would be provided for pedestrians where required.  
- Variable message signs (VMS) and/or state signs would be erected to notify drivers of the temporary detours in place before and during building of the proposed bridge or upgraded intersections. | Contractor | Pre-construction |
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<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
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</table>
| Impact on traffic and access | • Construction traffic would access the site via designated access points as defined in the Traffic Management Plan.  
• Access arrangements onto ARTC land and the public reserve would be determined in consultation with ARTC and Council before establishing the work site.  
• Building vehicles would be parked off-road as far as practicable or in a manner that minimises disruption to other road users, businesses and the public.  

> | Contractor                             | Construction |
| Impact on Public Transport Routes  | • Roads and Maritime would consult with Hopes Coaches regarding the need to re-route bus route 451 during construction and before the closure of New Street level crossing.  

> | Roads and Maritime                     | Operation |
| Local amenity disturbances         | • A Community and Stakeholder Management Plan would be prepared for the building phase of the proposal. The plan would be prepared in accordance with the Community Engagement and Communications Manual (Roads and Maritime, 2012b). As a minimum, the plan would include the following measures:  
  o Residents and businesses within the locality would be contacted at least five days before the start of work  
  o Community consultation would be carried out in accordance with the Community Engagement and Communications Manual (Roads and Maritime, 2012b)  
  o A complaints management procedure would be initiated which requires that complaints received are to be recorded and attended to promptly.  
• Existing access for nearby and adjoining properties would be maintained at all times during construction unless otherwise agreed to by the affected property owner.  
• The Gunnedah Showground and Gunnedah Tourist Information Centre would be consulted in regard to the staging of work near the Oxley Highway to avoid any conflicts with events.  

> | Roads and Maritime/Contractor          | Pre-construction |
<table>
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<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
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</table>
| Impact to property | • A land acquisition between the Gunnedah Maize Mill and Crown land reserve would be required to mitigate the effects of land lost within the Mill property boundary.  
• Acquisition of the two properties in Barber Street would be carried out in accordance with the Land Acquisition Information Guide (Roads and Maritime, 2014) and the Land Acquisition (Just Terms Compensation) Act 1991.  
• The community and affected landholders would be kept informed on the acquisition process and the proposal timing.  
• The owner of Marcroft Park would be consulted in regard to the removal of the passive use area in the southern corner of the property. | Roads and Maritime/Contractor | Pre-construction |
### 7.3 Licensing and approvals

As discussed in Chapter 4, various approvals and permits are likely to be required for the proposal. These are summarised in Table 7.2.

#### Table 7.2 Summary of licensing and approvals required for the proposal

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Timing</th>
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<tbody>
<tr>
<td>A late draft copy of the REF is required to be issued to DPI for review and consideration.</td>
<td>Following a review of a late draft of the REF and a minimum of 28 days before the start of dredging or reclamation work. Outcomes of this consultation must be addressed in the CEMP.</td>
</tr>
<tr>
<td>A <strong>commence work notification</strong> form is required as per the notification requirements under Section 199 of the <em>Fisheries Management Act 1994</em>.</td>
<td>A minimum of three days before the start of construction.</td>
</tr>
<tr>
<td>A <strong>permit to block fish passages</strong> is required under Section 219 of the <em>Fisheries Management Act 1994</em>. This applies to any temporary or permanent blockages that occur as a result of bridge or side track construction.</td>
<td>Before the start of construction.</td>
</tr>
<tr>
<td>Council must be notified of proposed road closures.</td>
<td>A Traffic Management Plan and notification must be issued to Council about the proposed road closures before they occur.</td>
</tr>
<tr>
<td>Documented approval regarding <strong>access from the landholders</strong> of properties that would be obstructed or impacted by the construction of the proposal.</td>
<td>Landholders must be consulted before construction and notified at least five days before the obstruction.</td>
</tr>
<tr>
<td>An <strong>aquifer interference approval</strong> is required under Section 91(3) of the <em>Water Management Act 2000</em> if groundwater extraction is proposed.</td>
<td>Before the start of construction.</td>
</tr>
<tr>
<td>A <strong>water management work approval</strong> under the <em>Water Management Act 2000</em> is required if surface water extraction or diversion is proposed. Roads and Maritime is exempt from the need to obtain an access licence for the water.</td>
<td>Before the start of construction.</td>
</tr>
</tbody>
</table>
8 Conclusion

8.1 Justification

This REF has been prepared to assess the proposal to build a road bridge over the railway line in Gunnedah.

At present, there is only one bridge in Gunnedah that crosses the railway line – the Abbott Street bridge. However, this bridge is not suitable for use by HML freight vehicles. As a result, heavy vehicles travelling on the Oxley Highway and Kamilaroi Highway through Gunnedah need to use alternative routes to cross the railway. The main route is via the level crossing on New Street in Gunnedah.

The increased length and frequency of freight trains due to major coal developments in the Gunnedah Basin has led to frequent extended closures of the New Street level crossing to allow trains to pass. This is causing significant delays for HML vehicles, local traffic and pedestrians using the New Street level crossing.

The need for the proposed bridge is identified in the State Government's Bridges for the Bush Initiative, which also highlights the need to replace or upgrade five other HML deficient bridges.

The proposed bridge would be suitable for use by HML vehicles. It would:

- Improve the flow of local and through traffic in Gunnedah
- Improve road safety for vehicles, cyclists and pedestrians
- End the need for large vehicles to move through the centre of Gunnedah and thereby promote a better environment within the town centre
- Support the regional and wider economy by improving transport for HML vehicles.

8.2 Objects of the Environmental Planning and Assessment Act

Table 8.1 Application of the objects of the Environmental Planning and Assessment Act to the proposal

<table>
<thead>
<tr>
<th>Object</th>
<th>Comment</th>
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<tbody>
<tr>
<td>5(a)(i) To encourage the proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment.</td>
<td>The proposal is needed to provide a HML-compliant route for the movement of trucks through the Gunnedah Basin. The development of land for the purposes of the proposal would remove the requirement for large vehicles to move through the centre of Gunnedah and promote a better environment within the town centre. The constructed proposal would provide a benefit to the community through improved local traffic efficiency and safety for pedestrians and cyclists and would support the regional economy through the provision of an improved transport route for larger vehicles.</td>
</tr>
<tr>
<td>5(a)(ii) To encourage the promotion and coordination of the orderly economic use and development of land.</td>
<td>The proposal would promote the appropriate economic use and development of land by providing access through Gunnedah for HML vehicles to the growing mining industries to the west of the township.</td>
</tr>
<tr>
<td>5(a)(iii) To encourage the protection, provision and coordination of communication and utility services.</td>
<td>The proposal would require the relocation or adjustment of water mains, power poles, sewerage infrastructure and Telstra cables. This relocation would ensure these utilities are protected and remain operational following the construction of the proposal.</td>
</tr>
<tr>
<td>5(a)(iv) To encourage the provision of land for public purposes.</td>
<td>Construction of the proposal would result in temporary disruptions to traffic and access in streets surrounding the proposal site. Once operational, the proposal would provide improved traffic efficiency for vehicles and pedestrians, and there would be no long-term access restrictions to public land.</td>
</tr>
<tr>
<td>5(a)(v) To encourage the provision and coordination of community services and facilities.</td>
<td>Not relevant to the proposal.</td>
</tr>
<tr>
<td>5(a)(vi) To encourage the protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats.</td>
<td>A biodiversity assessment has been carried out for the proposal and is provided in Appendix A. The protection and conservation of the environment would be assured through the implementation of the safeguards presented in this REF and in a Construction Environmental Management Plan to be prepared for construction.</td>
</tr>
<tr>
<td>5(a)(vii) To encourage ecologically sustainable development.</td>
<td>Ecologically sustainable development is considered in Sections 8.2.1 to 8.2.4 (below).</td>
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<tr>
<td>5(a)(viii) To encourage the provision and maintenance of affordable housing.</td>
<td>Not relevant to the proposal.</td>
</tr>
<tr>
<td>5(b) To promote the sharing of the responsibility for environmental planning between different levels of Government in the State.</td>
<td>Not relevant to the proposal.</td>
</tr>
<tr>
<td>5(c) To provide increased opportunity for public involvement and participation in environmental planning and assessment.</td>
<td>As discussed in Section 5.2, the community has been engaged throughout the options development phase of the proposal and would be consulted through to operation.</td>
</tr>
</tbody>
</table>

| 8.2.1 The precautionary principle |

The precautionary principle dictates that a lack of scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation, where there is a risk of serious or irreversible damage.

The proposal is located in an area of previously disturbed land and would only require a minor amount of vegetation clearing and disturbance to open space. Preliminary environmental investigations were carried out to evaluate the environmental values of the proposal area and to assess the key impacts the proposal may have on these values.

A number of safeguards and management measures are proposed to minimise the potential environmental impacts of the proposal. These would be implemented during the construction and operation of the proposal.
The proposal is therefore consistent with the precautionary principle.

8.2.2  Inter and Intra-generational equity

The inter and intra-generational equity principle dictates that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations. This principle includes both intra-generational equity (within generations) and intergenerational equity (between generations).

The environmental impacts identified for the construction of the proposal are unlikely to give rise to long-term adverse impacts that would disadvantage current or future generations. The benefits of the proposal, as outlined in Section 6.14 of this REF, would be available to current and future generations. Potential impacts would be minimised by the implementation of appropriate safeguards and management measures.

The proposal is therefore consistent with the principle of inter and intra-generational equity.

8.2.3  Conservation of biological diversity and ecological integrity

Biological diversity (biodiversity) is defined as the variety of life forms, and is usually considered at three levels: genetic diversity, species diversity and ecosystem diversity. Ecosystem diversity describes the condition of an ecosystem that is relatively unaltered from its natural state. The principle of conservation of biological diversity and ecological integrity dictates that the diversity of genes, species, population and communities, as well as the ecosystems and habitats to which they belong, must be maintained and improved to ensure their survival.

The proposal would avoid, where possible, disturbance to the local environment. Where this is not possible, safeguards and mitigation measures are provided to ensure the proposal would not compromise the biological diversity of the local environment or the ecological integrity of the surrounding area. An ecological assessment and site-specific safeguards are provided in Section 6.5 and Appendix A of this REF.

Confidence in this conclusion is increased by the use of a rigorous concept design process, the application of the precautionary principle, and the mitigation of impacts.

The proposal is therefore consistent with the principle of conservation of biological diversity and ecological integrity.

8.2.4  Improved valuation, pricing and incentive mechanisms

This principle dictates that costs to the environment should be factored into the economic costs of a project.

Environmental and social issues were identified for consideration during the planning and establishment of the need for the proposal and in consideration of the various proposal options. The REF has examined the environmental and social consequences of the proposal and identifies safeguards and management measures for the values that have the potential to be impacted. The implementation of these safeguards and management measures would result in an economic cost to Roads and Maritime, which would increase the capital and operating costs of the proposal. This indicates that environmental resources have been given appropriate valuation.
The design for the proposal has been developed with an objective of minimising potential impacts on the surrounding environment. This indicates that the concept design for the proposal has been developed with an environmental objective in mind.

8.3 Conclusion

The proposal is subject to assessment under Part 5 of the *Environmental Planning and Assessment Act 1979*. This 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 of conservation agreements and plans of management under the *National Parks and Wildlife Act 1974*, joint management and biobanking agreements under the *Threatened Species Conservation Act 1995*, wilderness areas, critical habitat, impacts on threatened species, populations and ecological communities and their habitats and other protected fauna and native plants.

A number of potential environmental impacts from the proposal would be avoided or reduced due to design work carried out during concept design.

The proposal as described in the REF best meets the project objectives but would still result in some impacts on:

- Water quality associated with erosion and sedimentation resulting from building activities
- Visual and landscape characteristics due to the introduction of a new feature (the bridge) into the landscape
- Habitat and feed trees for koalas due to clearing for site establishment
- Local amenity due to temporary noise, vibration and air quality disturbances during construction
- Traffic and access due to temporary road closures during construction.

Mitigation measures detailed in this REF would minimise these expected impacts.

The proposal would also facilitate HML vehicle access through Gunnedah, significantly improve vehicle, pedestrian and cyclist traffic safety and reduce local traffic disruptions at the existing railway crossing. On balance, the proposal is therefore considered justified.

The environmental impacts of the proposal are not likely to be significant and therefore it is not necessary for an environmental impact statement to be prepared and approval to be sought for the proposal from the Minister for Planning under Part 5.1 of the *Environmental Planning and Assessment Act 1979*. The proposal is unlikely to affect threatened species, populations or ecological communities or their habitats, within the meaning of the *Threatened Species Conservation Act 1995* or *Fisheries Management Act 1994* and therefore a Species Impact Statement is not required. The proposal is also unlikely to affect Commonwealth land or have an impact on any matters of national environmental significance.
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.

Lauren Crickmore
Senior Environmental Scientist
Kellog Brown & Root Pty Ltd
Date: 15/04/15

I have examined this review of environmental factors and the certification by insert name from above and company name and accept the review of environmental factors on behalf of Roads and Maritime Services.

David Andrews 15/4/15
Project Development Manager
Infrastructure Development Division (Northern Region)
Date:

Greg Collins
Environment Manager
Environment Branch (Northern Region)
Date: 15/4/15
10 References

Aboriginal Land Rights Act 1983 (NSW)


Contaminated Land Management Act 1997 (NSW)

Crown Lands Act 1989 (NSW)


Department of Environment, Climate Change and Water (DECCW) 2010a, Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales: Part 6 National Parks and Wildlife Act 1974, NSW.

Department of Environment, Climate Change and Water (DECCW) 2010b, Interim Construction Noise Guidelines, NSW.


Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)

Environmental Planning & Assessment Act 1979 (NSW)

Environmental Planning & Assessment Regulation 2000 (NSW)

Fisheries Management Act 1994 (NSW)

Gunnedah Local Environmental Plan 2012


Heritage Act 1977

Land Acquisition (Just Terms Compensation) Act 1991 (NSW)


National Parks and Wildlife Act 1974 (NSW)

Native Vegetation Act 2003 (NSW)

Native Title Act 1993 (Commonwealth)

National Parks and Wildlife Amendment (Aboriginal Objects and Aboriginal Places) Regulation 2010

National Parks and Wildlife Act 1974 (NSW)

Noxious Weeds Act 1993 (NSW)
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*Protection of the Environment Operations Act* 1997 (NSW)

*Protection of the Environment Operations (Clean Air Regulation)* 2010 (NSW)

*Protection of the Environment Operations (Waste)* Regulation 2005


*Roads Act 1993 (NSW)*

*Soil Conservation Act 1938 (NSW)*

*State Environmental Planning Policy No. 14 – Coastal Wetlands,*

*State Environmental Planning Policy No. 26 – Littoral Rainforests*

*State Environmental Planning Policy No. 44 – Koala Habitat Protection*

*State Environmental Planning Policy (State and Regional Development) 2011*
State Environmental Planning Policy (Major Development) 2005.

State Environmental Planning Policy (Infrastructure) 2007

State Environmental Planning Policy (Rural Lands) 2008

State Environmental Planning Policy 71 – Coastal Protection

Threatened Species Conservation Act 1995

Threatened Species Conservation Legislation Amendments Act 2002


Water Management (General) Regulation 2011 (NSW)

Waste Avoidance and Resource Recovery Act 2001 (NSW)

Water Management Act 2000 (NSW)

Water Act 1912 (NSW)
### Terms and acronyms used in this REF

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
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<tbody>
<tr>
<td>ABS</td>
<td>Australian Bureau of Statistics</td>
</tr>
<tr>
<td>ARTC</td>
<td>Australian Rail Track Corporation</td>
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<td>ASS</td>
<td>Acid sulfate soils</td>
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<td>CEMP</td>
<td>Construction environmental management plan</td>
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<tr>
<td>CNVMP</td>
<td>Construction noise and vibration management plan</td>
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<td>dBA</td>
<td>A-weighted Decibel</td>
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<td>EEC</td>
<td>Endangered ecological community</td>
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<td>EIA</td>
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<td>Environment Protection Authority (NSW)</td>
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<tr>
<td>Kg</td>
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<td>KMA</td>
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<td>Km/h</td>
<td>Kilometre per hour</td>
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<td>Kilo-newton</td>
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<td>Kilovolt</td>
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<td>LAeq</td>
<td>Equivalent continuous level. A term used to define the period of measurement of continuous noise or energy average noise level</td>
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<tr>
<td>LoS</td>
<td>Level of service</td>
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<td>MCA</td>
<td>Multi-criteria analysis</td>
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<td>m/s&lt;sup&gt;1.75&lt;/sup&gt;</td>
<td>Unit of measurement for a vibration dose value</td>
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<td>Roads and Traffic Authority (now Roads and Maritime Service)</td>
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<td>State environmental planning policy. A type of planning instrument made</td>
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under Part 3 of the *Environmental Planning and Assessment Act 1979*.

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<td>WoNS</td>
<td>Weed of National Significance</td>
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