New England Highway bypass at Scone

Review of environmental factors

December 2015
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<th>Author</th>
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Executive summary

The proposal

Roads and Maritime Services (Roads and Maritime) propose to upgrade the New England Highway to bypass Scone (the proposal). The proposal would include building a two lane highway bypass to the west of Scone. The proposal includes about four kilometres of new two lane highway with at-grade connections south and north of Scone, two overbridges, crossing of Figtree Creek, and an at-grade connection at St Aubins Street.

Need for the proposal

The New England Highway is a major freight and commuter route forming part of the Sydney to Brisbane corridor of the National Land Transport Network and the primary route connecting the Upper Hunter with Maitland and Newcastle. The highway currently passes through Scone, forms the main road access through the town and is the main street through the Scone central business district.

Bypassing Scone aligns with the NSW Long Term Transport Master Plan’s focus on providing essential access for regional NSW by providing town bypasses to:

- Improve travel and amenity within towns
- Reduce delays caused to freight traffic
- Increase safety
- Improve urban amenity through reduced noise, lower emissions and less traffic.

Proposal objectives

The objectives of the proposal are to:

- Remove the only remaining rail level crossing on the New England Highway
- Provide unimpeded access for emergency services to the western side of the Great Northern Railway
- Improve travel times for freight and long distance traffic around Scone on the New England Highway
- Improve urban amenity in Scone
- Improve safety for all road users on the New England Highway and in Scone
- Eliminate community division caused by rail infrastructure.

The proposal as described in this review of environmental factors is one part to addressing these proposal objectives. In addition to the highway bypass, Roads and Maritime is planning to construct a town centre rail bridge in Scone. This bridge will be subject to a separate environmental assessment process and could be carried out as a later stage.

Options considered

Options considered for the bypass included the ‘do nothing’ option and a number of variations of highway upgrade and bypass options. Selection of the preferred option took into account social, environmental and economic factors as well as community and stakeholder feedback and is considered the best option to achieve the proposal objectives.

Statutory and planning framework

Clause 94 of State Environmental Planning Policy (Infrastructure) 2007 (ISEPP) permits development on any land for the purpose of a road or road infrastructure facilities to be carried out by or on behalf of a public authority without consent.
As the proposal is for the purpose of a road and is to be carried out by Roads and Maritime, development consent from Upper Hunter Shire Council is not required. The proposal is to be considered under Part 5 of the Environmental Planning and Assessment Act 1979 (EP&A Act). This review of environmental factors (REF) has been prepared as part of the assessment process.

Community and stakeholder consultation

Roads and Maritime has consulted with potentially affected property owners, community members, relevant government agencies and other stakeholders. Roads and Maritime has extensively consulted with Upper Hunter Shire Council in accordance with the requirements of ISEPP.

Consultation for development of the proposal was carried out between August 2011 and April 2014, including public display of the route options and preferred option. Further consultation activities were carried out between November 2014 and September 2015 to refine the preferred option and develop the concept design and REF.

Roads and Maritime will continue to consult with the community and stakeholders as planning progresses. Information about the proposal is also available on the Roads and Maritime website.

Environmental impacts

A number of detailed technical investigations were completed to assess the potential impacts of the proposal and to identify activities to manage and mitigate these impacts.

The beneficial effects of the proposal would include:

- Improved road safety on the New England Highway and Kelly Street
- Removal of the only remaining rail level crossing on the New England Highway
- Provide unimpeded access for emergency services to the western side of the Great Northern Railway
- Improve urban amenity in Scone town centre
- Reduced travel times.

The key potential adverse effects of the proposal would include:

- Traffic impacts during construction, due to changed traffic conditions and increased heavy vehicle movements on the existing road network
- Amenity impacts to properties adjacent to the proposal site during construction
- Temporary disruptions to access during construction
- Minor vegetation removal
- Changed access arrangements for some properties
- Total acquisition of three lots and partial acquisition of 27 lots
- Increased traffic on St Aubins and Aberdeen streets
- Increased traffic noise levels in the vicinity of the proposal
- Changed flooding patterns in the vicinity of the proposal
- Visual impacts associated with proposal.

Adverse environmental effects would be adequately minimised, managed and mitigated through the implementation of safeguards outlined in this REF. These would include a construction environmental management plan and associated sub-plans.
Justification and conclusion

The proposal is located to the west of Scone and includes about four kilometres of new two lane highway. The proposal is required to eliminate the only remaining rail level crossing on the New England Highway, provide unimpeded access for emergency services, improve travel conditions and safety on the New England Highway and in Scone.

The proposal is considered to be consistent with Government strategic planning at Commonwealth, State and regional levels as it would lead to improved efficiency and safety of the road network.

While there would be some environmental impacts as a consequence of the proposal, they have been avoided or minimised wherever possible through design and site-specific safeguards. The beneficial effects are considered to outweigh the adverse impacts and risks associated with the proposal.

The proposal is subject to assessment under Part 5 of the EP&A Act. This REF has examined and considered all matters affecting or likely to affect the environment by reason of the proposed activity.

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 EP&A Act. 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; therefore a referral to the Department of the Environment 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 is not required.

Display of the review of environmental factors

This review of environmental factors is on display for comment until Friday 19 February 2016. You can access the documents in the following ways:

Internet


Display

Stakeholders and the community are invited to attend drop-in information sessions scheduled on Thursday 21 January between 3pm and 7pm, Thursday 4 February between 3pm and 7pm and Friday 5 February between 10am and 2pm at the Scone Motor Inn, 53 New England Highway, Scone. Formal presentations are not scheduled as part of the information sessions.

The documents will also be on display at Upper Hunter Shire Council, 135 Liverpool Street, Scone and can be viewed during office hours, Monday to Friday, between 8.30am and 4.30pm.

Purchase

The documents are available for purchase in hard copy ($25.00) or CD/USB ($10.00) by contacting Roads and Maritime Project Manager Phil Davidson on (02) 4924 0332.

How can I make a submission?

To make a submission on the proposal, please send your written comments to:
Roads and Maritime Services
Phil Davidson
Locked Bag 2030
Newcastle NSW 2300
Submissions must be received by Friday 19 February 2016.

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 staff and contractors.

Where the respondent indicates at the time of supply of information that their submission should be kept confidential, Roads and Maritime 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 Roads and Maritime Services, 59 Darby Street, Newcastle 2300.

What happens next?
Following the submissions period, Roads and Maritime will collate submissions. Acknowledgement letters will be sent to each respondent. The details of submission authors will be retained and authors will be subsequently advised when project information is released.

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 about this Roads and Maritime determination.

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

If you have any queries, please contact the Roads and Maritime Services project manager Phil Davidson on (02) 4924 0332.
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1. **Introduction**

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

1.1 **Proposal identification**

Roads and Maritime Services (Roads and Maritime) propose to upgrade the New England Highway at Scone (the proposal). The proposal would include building a two lane highway bypass to the west of Scone to address rising road and rail volumes and safety issues.

Within the town of Scone, the Great Northern Railway intersects the road network at two points; at the New England Highway (Kelly Street) and at Liverpool Street. Both of these intersections are controlled by an at-grade rail level crossing. The two level crossings are about 500 metres apart. Currently, coal trains running through Scone can divide the town by temporarily closing access at both Kelly Street and Liverpool Street crossings. This impedes east-west traffic access in Scone and in particular emergency service access to the western side of the Great Northern Railway.

The proposal is located to the west of the town of Scone and includes about four kilometres of new two lane highway (refer Figure 1.1). The speed limit along the Scone bypass would be 100 kilometres per hour. The current highway through town has a speed limit of 50 kilometres per hour.

The proposal has been developed to a concept design level and would be further refined during the detailed design phase.

Funding of $90 million has been committed towards the proposal by the Australian and NSW governments. Subject to approval, it is anticipated that construction would start in 2017 and would take about two years to complete, weather permitting.

1.1.1 **Key features**

The key features of the proposal are shown in Figure 3.1 and include:

- At-grade connections south and north of Scone with the existing and realigned New England Highway
- Overbridge at the Great Northern Railway to the south of Scone
- Overbridge about 540 metres long commencing on the southern side of Parsons Gully and extending over Kingdon and Liverpool streets
- Crossing of Figtree Creek
- At-grade connection at St Aubins Street.

For the purposes of this review of environmental factors (REF), the following definitions are employed:

- The ‘proposal site’ refers to the area that could be directly impacted by the proposal. The proposal site is shown in Figure 1.1
- The ‘study area’ encompasses the proposal site and the area that may be indirectly impacted by the proposal.
LEGEND

Proposal site
Railway

Watercourse

Figure 1.1


Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 T 61 2 4979 9999 F 61 2 4979 9988 E tntmail@ghd.com W www.ghd.com.au

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Job Number 22-17554
Revision 0
Date 08 Dec 2015

Roads and Maritime Services
HW9 New England Highway Scone Bypass
Review of Environmental Factors

Regional Context

Proposal site
Railway
Watercourse

GUNDY ROAD
KINGDON STREET
LIVERPOOL STREET
SUSAN STREET
ST AUBINS STREET
PARKER STREET
GOLAN STREET
TOWING DONA STREET
ST AUGUSTINE STREET
WINGEN ROAD

Figure 1.1
1.1.2 Location and context
The proposal is located within the Upper Hunter Shire Council local government area and Roads
and Maritime Hunter region. The study area within which the proposal site is located includes a mix
of rural, residential, industrial, recreational and vegetated areas.

The proposal site is located to the west of the town of Scone, passing through the Scone Golf
Course. Scone is located about 270 kilometres north of Sydney and has a population of about
5500 people.

Access to and from the bypass would be provided to the north and south of town and midway at St
Aubins Street. Adjoining land uses include:

- The town of Scone to the east
- The Great Northern Railway line to the east and passes through the study area in the south
- The existing New England Highway to the east, north and south
- Rural areas, the suburb of Satur and Scone Airport to the west
- Parsons Gully to the west and through the south of the study area.

1.2 Purpose of the report
This REF has been prepared by GHD Pty Ltd (GHD) on behalf of Roads and Maritime. 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 (EP&A Act).

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

The description of the proposed works and associated environmental impacts have been
undertaken carried out in context of clause 228 of the Environmental Planning and Assessment
Regulation 2000, the Threatened Species Conservation Act 1995 (TSC Act), the Fisheries
Management Act 1994 (FM Act), and the Australian Government’s Environment Protection and
Biodiversity Conservation Act 1999 (EPBC Act). In doing so, the REF helps to fulfil the
requirements of section 111 of the EP&A Act that Roads and Maritime examine and take into
account to the fullest extent possible, all matters affecting or likely to affect the environment by
reason of the activity.

The findings of the REF would be considered when assessing:

- Whether the proposal is likely to have a significant impact on the environment and therefore the
  necessity for an environmental impact statement to be prepared and approval to be sought
  from the Minister for Planning under Part 5.1 of the EP&A Act
- The significance of any impact on threatened species as defined by the TSC Act and/or FM
  Act, in section 5A of the EP&A Act 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 the Environment for a decision by the Commonwealth Minister for
  the Environment on whether assessment and approval is required under the EPBC Act.
2. Need and options considered

2.1 Strategic need for the proposal

The New England Highway is a major freight and commuter route forming part of the Sydney to Brisbane corridor of the National Land Transport Network and the primary route connecting the Upper Hunter with Maitland and Newcastle. The highway passes through Scone, forms the main road access through the town and is the main street through the Scone central business district.

Roads and Maritime has carried out an options assessment and feasibility study to consider the impacts of rail operations on the New England Highway (Kelly Street) rail level crossing in Scone and identify a preferred solution. The Kelly Street rail level crossing is the only remaining level crossing on the New England Highway. A second level crossing is located on Liverpool Street about 500 metres south of the Kelly Street level crossing.

Currently, coal trains running through Scone can divide the town by temporarily closing access at both Kelly Street and Liverpool Street. There are currently about 10 coal trains per day and this is projected to increase to 22 trains each way per day by 2021 (GHD, 2015a). The passage of trains impedes east-west traffic access in Scone and in particular emergency service access to the western side of the Great Northern Railway.

Currently the highway south of Scone carries about 8400 vehicles a day, peaking in town at about 14,000. About 8000 vehicles use the Kelly Street level crossing every day, including 1200 heavy vehicles.

The proposal is part of a number of proposed upgrades on the New England Highway that would improve travel times and safety for all road users. The proposal aims to support freight and long distance travel as part of the National Land Transport Network Sydney to Brisbane inland route and would benefit the NSW and national economy.

The inland route has the capacity to accommodate oversized vehicles transporting products from the Port of Newcastle to other parts of Australia, including central Queensland, via the New England Highway. This capacity is particularly important in linking the mining industry in regional areas with mining service providers located in larger regional areas to the south of the corridor.

Bypassing Scone aligns with the NSW Long Term Transport Master Plan (Transport for NSW, 2012) by providing essential access for regional NSW by providing town bypasses to improve travel within towns, reduce delays caused to freight traffic, increase safety and improve urban amenity through reduced noise, lower emissions and less traffic.

2.1.1 Crash profile

In the five year period to the end of June 2014 there were a total of 29 crashes on the New England Highway, in the vicinity of Scone, with no fatalities recorded during this period.

2.1.2 Strategic planning framework

The State Plan (NSW 2021)

NSW 2021: A Plan to Make NSW Number One (NSW 2021) (Department of Premier and Cabinet, 2011) is the NSW Government’s 10 year strategic business plan that sets priorities for action and guides resource allocation to deliver economic growth and critical infrastructure.
NSW 2021 places emphasis on investing in and delivering an efficient and effective transport system including delivering road infrastructure which will relieve congestion, improve travel times, improve road safety and enhance and expand capacity on road corridors. NSW 2021 lists a number of goals to achieve five strategies including ‘return quality services’ and ‘renovate infrastructure’. The relevant goals are discussed below.

**Goal 1: Improve the performance of the NSW economy**

The proposal is aimed at reducing conflicts between heavy vehicles on the New England Highway and freight/passenger trains on the Great Northern Railway. This in turn is aimed at improving travel times and travel time reliability (NSW 2021 Goal 7) and reducing operating costs (NSW 2021 Goal 4) for heavy vehicles on the New England Highway servicing key mining, industry and agricultural centres in the Upper Hunter.

The New England Highway forms part of the National Land Transport Network. This network is recognised for its strategic national importance to national and regional economic growth, development and connectivity. The New England Highway is part of the critical Sydney to Brisbane corridor servicing freight generating areas in Toowoomba and Darling Downs.

Improvements to this corridor will also drive economic growth in regional NSW (NSW 2021 Goal 3), place downward pressure on the cost of living (NSW 2021 Goal 5) and strengthen the NSW skill base (NSW 2021 Goal 6) by:

- Reducing freight vehicle operating costs (related to average speeds and the number of stops)
- Improving connectivity (reduced travel times) to access labour markets (NSW 2021 Goal 7).

**Goal 7: Reduce travel times**

The proposal is aimed at reducing conflicts between motor vehicles on the highway and freight trains on the Great Northern Railway, thereby:

- Reducing delays for heavy vehicles on the highway when the Scone (Kelly Street) rail level crossing is closed
- Reducing delays for Scone residents travelling from east to west (and vice versa) within Scone when the Scone (Kelly Street) rail level crossing is closed
- Reducing delays for private vehicles on the highway when Scone residents travel outside the town centre to access population, employment and education centres at Tamworth, Muswellbrook, Singleton, Maitland or Newcastle
- Reducing delays for through traffic on the highway for people with destinations located to the north and south of Scone.

Delays are a particular issue for emergency vehicles given that all emergency services are located to the east of the Great Northern Railway. The nearest crossing at Aberdeen involves a 30 kilometre round trip if the level crossing is closed or access is not available during an emergency or natural disaster. The proposal would contribute to the goal of the NSW Government to ensure that NSW is ready to deal with major emergencies and natural disasters (NSW 2021 Goal 28).

**Goal 10: Improve road safety**

The proposal is aimed at:

- Reducing ‘stop-start’ traffic conditions which contribute to crashes between motor vehicles on the New England Highway, particularly ‘rear-end’ crashes
- Eliminating the conflict between trains and motor vehicles which contributes to increased risk and severity of crashes.

**Goal 19: Invest in critical infrastructure**

The proposal is aimed at improving travel reliability and travel times on the New England Highway, which is a critical component of the National Land Transport Network servicing the Sydney to Brisbane Corridor to Toowoomba and Darling Downs. The highway also provides a connection to coal mining and agriculture in the Upper Hunter and New England Regions.
The Scone (Kelly Street) rail level crossing is the last rail level crossing on the New England Highway.

**Goal 20: Build liveable centres**

The proposal would align with the NSW Government goal to build liveable centres by:

- Improving east-west connectivity and improving travel reliability and times in the Scone town centre to access residential, business, industrial and special use zones located either side of the Great Northern Railway
- Reducing conflicts and delays at the Scone (Kelly Street) rail level crossing which are contributing to increased crashes, vehicle operating costs and vehicle emissions (*NSW 2021 Goal 22*).

**State Infrastructure Strategy 2012-2032**

The *State Infrastructure Strategy 2012-2032*, (Infrastructure NSW, 2012) details the State’s infrastructure needs for the next 20 years. The strategy recognises that major arterial roads across regional NSW, including the Hunter region will require improvement to meet population and economic growth. The proposal responds to an anticipated increased demand on infrastructure as a result of population increase and coal transportation through the construction of a bypass for the New England Highway at Scone.

**National Road Safety Strategy 2011-2020**

The *National Road Safety Strategy 2011-2020* (Australian Transport Council, 2011) aims to reduce death and serious injury on Australian roads. A target of this strategy is to reduce fatalities and crashes by at least 30 per cent between 2011 and 2020.

The proposal would contribute to achieving this target by constructing a bypass for the New England Highway at Scone and improving traffic flow and safety. The proposal has been designed in accordance with Austroads road design guidelines and Roads and Maritime supplements for safe road operation.

**NSW Bike Plan 2010**

The *NSW Bike Plan 2010* (NSW Government, 2010) is a comprehensive plan to encourage people to ride more often and safely. It includes a number of actions to promote and improve cycling which are relevant to the proposal. Facilities for walking and cycling are expected to remain unchanged as part of the proposal. However, due to the expected reduced traffic volumes on Kelly Street and Liverpool Street, crossing and cycling on the road may be easier and safer. Cyclists would be able to use the roads shoulders on the bypass.

**NSW Long Term Transport Master Plan**

The *NSW Long Term Transport Master Plan* (Transport for NSW, 2012) identifies six key themes and challenges for the NSW transport network over the next 20 years. Two of these themes reference upgrades to the New England Highway and justify the need for the proposal.

The plan also ‘sets the framework to guide transport decision making in NSW for the next 20 years, defining transport priorities and the funding pipeline to inform investment and decisions’. To support the master plan, regional transport plans have been developed to meet each region’s specific needs and priorities.

**Theme 4: Providing Essential Access for Regional NSW**

The proposal would align with the themes of the plan by addressing the bottleneck created by the priority given to trains over highway traffic. The plan identifies the following as part of its long-term strategy to provide essential access to regional NSW:

- ‘Rural highway upgrades, including…pinch points on the New England Highway’, ‘road upgrade works [on the New England Highway] to address [freight] access and safety issues’ and ‘ensuring appropriate capacity to service the [coal] industry’s needs [in the Gunnedah Basin]."
In relation to the Hunter Region, the plan states that in the short term, the NSW Government will consider how best to reduce the impacts of freight movements in Scone including evaluating options to eliminate the rail level crossing between the New England Highway at Kelly Street and the Main Northern Railway line at Werris Creek. In the medium to longer term actions include the New England Highway upgrades to address safety and congestion issues as they emerge; and implementation of improvements on the highway at Scone to improve pedestrian facilities and create safer environments.

The plan also notes that the rail corridor between Newcastle and Scone is close to capacity and the New England Highway passes through several growing towns where local traffic movements are having an impact on longer distance passenger and freight travel.

**Theme 5: Support an efficient and productive freight industry**

The proposal would align with the theme to support an efficient and productive freight industry by improving travel time reliability and reducing operating costs for heavy vehicles on the New England Highway section of the National Land Transport Network which services key mining, industry and agricultural centres in the Upper Hunter, including coal mining, energy generation, thoroughbred horse racing and wine making.

**NSW Freight and Ports Strategy**

The NSW Freight and Ports Strategy (Transport for NSW, 2013) aims to create a transport network where goods move efficiently to their markets. The proposal contributes to the following freight-specific objectives and reflects the importance of the freight transport network in creating a competitive and productive NSW economy.

*Delivery of a freight network that efficiently supports the projected growth of the NSW economy:* The proposal supports heavy vehicle movement along the New England Highway by improving travel time reliability and reducing operating costs on the section of the National Land Transport Network which services key mining, industry and agricultural centres in the Upper Hunter.

*Balancing of freight needs with those of the broader community and the environment:* The proposal is aimed at improving urban amenity and safety of the New England Highway through Scone and eliminating community division caused by rail infrastructure.

**NSW Road Safety Strategy 2012–2021**

The NSW Road Safety Strategy 2012–2021 (Transport for NSW, 2012) sets the direction of road safety in NSW for the next 10 years. NSW is committed to reducing fatalities to less than 4.3 per 100,000 population by 2016 together with at least a 30 per cent reduction in fatalities and serious injuries by 2021.

The strategy is underpinned by the Safe System approach to improving road safety. This takes a holistic view of the road transport system and interactions among the key components of that system – the road user, the roads and roadsides, the vehicle and travel speeds. It recognises that all these components have a role to play in helping to keep road users safe.

This proposal would improve road safety by reducing conflicts between motor vehicles on the highway and freight trains on the Great Northern Railway, which contributes to increased risk and severity of crashes, and by reducing ‘stop-start’ traffic conditions which contribute to crashes between motor vehicles on the New England Highway, particularly ‘rear-end’ crashes.
The Lower Hunter Transport Needs Study (2008) recommended that the Scone level crossing removal should proceed as a grade separation within the short-term, stating that:

During the transit of coal and other freight trains, this level crossing and another in town are concurrently closed to road traffic. Coal trains are becoming both longer and more frequent from the Gunnedah coal basin – predicted coal exports will increase from 3 Mt (2005) to 14 Mt (2022). The level crossing at Scone is the only remaining operational crossing along the major north-south inland route of the AusLink Sydney-Brisbane Strategic Corridor. The township is experiencing an increase in severance and traffic congestion due the prolongation and frequency of the level crossings being in use. Railway related delays and/or incidents cause a gridlock scenario within the town itself and backlogging of traffic along the New England Highway, especially from the north.

The Scone level crossing causes severance and traffic congestion within the township and disruption to the HW9 New England Highway as a strategic corridor for the efficient movement of freight from as far as Queensland. These issues will only be exacerbated with the continuing increase in coal trains in the coming years. The proposed improvement works is recommended to proceed on social (township severance), environmental (green house gas emissions and local air quality) and economic (freight efficiency) grounds and within the short-term period nominated in this study.

Hunter Regional Transport Plan

The Hunter Regional Transport Plan (Transport for NSW, 2014) is designed to support the NSW Long Term Transport Master Plan and outlines specific actions to address the challenges of the region. The plan identifies actions to support growth and road safety within the Hunter region. The proposal is consistent with the strategy as it would improve travel times and road safety.

The plan also identifies actions to manage demand and deliver upgrades to the New England Highway. The proposal is listed in the Hunter Regional Transport Plan as a key action and thus, is consistent with the strategy.

Upper Hunter Strategic Regional Land Use Plan

The Upper Hunter Strategic Regional Land Use Plan 2012 (Department of Planning, 2012) identifies key infrastructure issues for the Upper Hunter region. The specific issues identified include road and rail capacity. The plan specifically mentions the New England Highway as part of the National Land Transport Network and its importance for providing regional freight distribution to the Northern Tablelands. The proposal is consistent with the plan as it would improve economic capacity, travel times and safety.

Upper Hunter Bicycle Plan

The Upper Hunter Bicycle Plan (ROSS Planning, 2014) provides a policy framework to achieve an improved bicycle network and environment over the next ten years. The strategy and associated implementation plan specifically identifies the New England Highway as a priority road for bicycle lane improvements. The proposal is consistent with this plan, as it would divert a large volume of traffic away from the existing Kelly Street section of the New England Highway and improve road safety for bicycle users. Cyclists would be able to use the roads shoulders on the bypass.

2.2 Existing road and infrastructure

2.2.1 Road configurations

The New England Highway functions as an arterial road, providing a connection between Newcastle in the Hunter area and Warwick in south east Queensland. The highway services the large rural agricultural areas of the Hunter and New England regions and forms part of the Sydney to Brisbane transport corridor.
The New England Highway in the vicinity of Scone, named Kelly Street within Scone, from south to north consists of:

- One lane in each direction with a speed limit of 100 kilometres per hour south of Scone
- Two traffic lanes in each direction with no median or parking between Gundy Road and Kingdon Street
- Two traffic lanes in each direction, parallel parking on both sides of the road and a solid median north of Kingdon Street
- Traffic lights at the intersection of Kelly Street and Liverpool Street
- Two traffic lanes in each direction, parallel parking on both sides of the road, a solid median and right turn bays to facilitate turns north of Liverpool Street
- One lane in each direction with no median north of Susan Street, with a level rail crossing which has flashing warning lights and boom gates
- One lane in each direction with a speed limit of 100 kilometres per hour north of Scone.

The speed limit along Kelly Street through Scone is 50 kilometres per hour. Currently the highway south of Scone carries about 8400 vehicles a day, peaking in town at about 14,000. About 8000 vehicles use the Kelly Street level crossing every day, including 1200 heavy vehicles.

Key features of other roads in the vicinity of the proposal site are:

- Gundy Road functions as a collector road to the south east of Scone. It is a rural road with low volumes of traffic that connects Scone with the rural town of Gundy. At its western end, within Scone, Gundy Road forms an intersection with the New England Highway to the south of the town centre
- Kingdon Street is a local road that intersects with Kelly Street to the east of the railway line. To the west of Kelly Street it is split by the railway line. To the west of the railway line, Kingdon Street functions as a local road and is a two-way sealed road with one lane in each direction and no centreline
- Liverpool Street functions as a sub-arterial road through Scone providing an east-west connection and forming part of the road system between Scone and Merriwa. Liverpool Street extends from Stafford Street in the east to Satur Road in the west. The section of Liverpool Street between the New England Highway and Satur Road is a two-way sealed road, with one lane in each direction and a road marked centreline. Liverpool Street intersects with the New England Highway at a traffic light controlled intersection. This is currently the only traffic light controlled intersection in Scone
- St Aubins Street is a local road that is divided by the railway line. To the west of the railway it runs from Aberdeen Street to Guernsey Street. There is no vehicle, pedestrian or cyclist access across the railway on St Aubins Street. St Aubins Street in this location functions as a local road and is a two-way partly sealed road, with one lane in each direction and a grassed median with mature trees in the centre of the road
- Aberdeen Street functions as a collector road providing a north-south link to the local roads on the western side of the New England Highway. Aberdeen Street extends from Forbes Street in the north to Kingdon Street in the south. Aberdeen Street is a two-way sealed road, with unsealed shoulders, one lane in each direction and no road marking. Aberdeen Street is a local traffic area with a speed limit of 50 kilometres per hour.

### 2.2.2 Bus facilities

There is limited public transport operating in the study area. There are two local bus services that operate between Scone and Muswellbrook which use Kelly Street and Liverpool Street. Scone can be accessed by coach from Brisbane, Toowoomba, Armidale, Tenterfield and Sydney.
2.2.3 Pedestrian and bicycle facilities

The existing pedestrian facilities within the study area are summarised below:

- Sealed pedestrian footpaths are generally provided along both sides of the Kelly Street/New England Highway within the Scone town centre. The footpaths extend on the western side between Kingdon Street and Guernsey Street and on the eastern side between Susan Street and Gundy Street.
- There is one traffic light controlled intersection within Scone located at the intersection of Kelly Street / New England Highway and Liverpool Street. Marked pedestrian crossings are provided on all four approaches.
- There are no marked pedestrian crossings on Kelly Street through the town centre, however one pedestrian crossing is provided on Main Street, about 20 metres to the north of Liverpool Street.
- A shared pathway is located on the southern side of Liverpool Street between Scone and Satur Road to the west.
- There is a pedestrian/cyclist level crossing of the Great Northern Railway at Kingdon Street. This crossing is uncontrolled with signage provided to advise pedestrians and cyclists to check for trains prior to crossing.

There are no dedicated cycle lanes currently provided along the New England Highway through Scone. Existing cycling paths extend from the west on Satur Road, east along Liverpool Street, south on Guernsey Street and east on Kingdon Street to Kelly Street.

2.2.4 Parking facilities

On road vehicle parking facilities are available on both sides of the New England Highway through Scone. General parking facilities are also available in surrounding residential streets.

2.3 Proposal objectives

The objectives of the proposal relevant to the concept design described in this REF are to:

- Remove the only remaining rail level crossing on the New England Highway.
- Provide unimpeded access for emergency services to the western side of the Great Northern Railway.
- Improve travel times for freight and long distance traffic around Scone on the New England Highway.
- Improve urban amenity in Scone.
- Improve safety for all road users on the New England Highway and in Scone.
- Eliminate community division caused by rail infrastructure.

The proposal as described in this REF is one part to addressing these proposal objectives. In addition to the highway bypass, Roads and Maritime is planning to construct a town centre rail bridge in Scone. This bridge will be subject to a separate environmental assessment process and could be carried out as a later stage.

2.4 Alternatives and options considered

A number of options have been considered and assessed over a number of stages as described below. The options identification and assessment process is described in the Scone – Kelly Street Level Crossing Options assessment and feasibility report (AECOM, 2014), the Scone Level Crossing Options and Feasibility Study – Issues Report (Roads and Maritime, 2012) and the HW9 New England Highway Rail Level Crossing, Scone Options and Feasibility Study – Issues Report (Roads and Maritime, 2013). Further workshops have also been carried out during the concept design phase. The following sections are summarised from these reports and workshop outcomes.
2.4.1 Methodology for selection of preferred option

At each stage of the options assessment process a range of factors have been considered that generally align with the proposal objectives. These included:

- Improvements to the level of service, travel times and road user safety (including cyclists and pedestrians) for existing and future traffic scenarios
- Minimisation of property impacts including property access and acquisition
- Minimisation of impacts on community facilities
- Operational noise impacts
- Heritage impacts
- Flora and fauna impacts
- Flooding and drainage impacts, including water quality
- Earthworks including minimising need for fill importation
- Constructability, including capacity to be constructed in stages
- Utility impacts.

The options identification and assessment process was carried out over two key stages:

- Route options stage (2011 to 2014) - initial and detailed assessment of feasible route options, including strategic design that resulted in identification of a preferred option that was displayed in a community update in April 2014
- Preferred option refinement stage (2014 to 2015) – refinement of the preferred option, including preliminary design to identify the preferred alignment that would be subject to concept design and assessment in the REF.

2.4.2 Route options stage

Part of the option identification and assessment process was to identify a preferred solution for both the long and short-term.

Short-term solution

Roads and Maritime, Upper Hunter Shire Council and the Australian Rail Track Corporation (ARTC) have developed a short-term solution to address the risk to the response capabilities of the NSW Police and other emergency services to access the western portion of Scone when the existing level crossings are blocked by a stationary train in Scone. ARTC implemented the short term solution in late 2012. Two basic level crossings have been constructed at Kingdon Street and adjacent to the Scone saleyards on the northern side of the town. The crossings are closed and locked to the general public, and only used by emergency services when the existing crossings at Kelly Street and Liverpool Street are closed for prolonged periods.

The intent of the short-term option is to provide temporary emergency access. Once a long-term solution is implemented, the temporary access would no longer be required and would be removed.

Long-term solution – identification of options

Early stages of the assessment included consideration of the ‘do nothing’ option. The do nothing option would not meet the proposal objectives and would not result in any improvement to the road network at Scone, nor would it provide unimpeded access for emergency services vehicles to the western side of Scone. The do nothing option was therefore discounted and not considered further in the assessment process.

Initially 20 routes as long-term options were developed which addressed the proposal objectives and were assessed in two option development workshops against identified constraints in the study area. These workshops were attended by Roads and Maritime, ARTC, Upper Hunter Shire Council, Department of Infrastructure and Regional Development (DoIRD) and Transport for NSW. As a result five options were identified and shortlisted warranting further assessment.
Following the workshops, a value management workshop was held with the addition of five community members and representatives from emergency services, heavy vehicle industry and the Scone Chamber of Commerce. The workshop recommended an additional two options for further consideration. These are variations of the five options that were initially shortlisted.

**Option 1 – New England Highway bypass to the west of Scone**

Option 1 consists of a two-way, two-lane road bypass to the west of Scone adjacent to Kingdon Ponds and within the floodplain. The bypass would bridge over the rail line south of Scone and include full access to the local road network at both ends of town and midway at Liverpool Street. The formation of the intersection at Liverpool Street would be widened to provide two lanes in each direction to allow for an increased volume of traffic to get through the traffic light controlled intersection during a green phase.

**Option 2 – Realign New England Highway to Muffett Street**

Option 2 would involve realignment of the New England Highway. The realignment would commence at the northern end of the Scone town centre with the highway realigned through the Muffett Street industrial area and bridging over the rail line to the north of town.

**Option 3 – Road over rail bridge at the Kelly Street rail level crossing**

Option 3 would involve realignment of the New England Highway and construction of a rail bridge parallel to the existing road alignment north of the existing level crossing, re-joining the existing New England Highway at a T intersection.

**Option 4 – Road over rail bridge at the existing Kelly Street rail level crossing**

Option 4 involves realignment of the New England Highway and construction of a rail bridge adjacent to the existing road alignment north of the existing level crossing with new intersections on the approaches at Guernsey and Muffett streets.

**Option 5 – Rail realignment and new railway station to the west of town**

Option 5 involves construction of a new rail bypass along a similar alignment to Option 1 as well as a passing loop and new railway station. The constraints identified in the floodplain investigations would necessitate a substantial amount of earthworks and rail bridge structures. This option would remove all at-grade conflicts between road and rail traffic.

**Option 6 – A variant of Option 4 road over rail bridge at the Kelly Street rail level crossing**

Development of Option 6 was carried out internally at Upper Hunter Shire Council with some further traffic and economic modelling carried out by Roads and Maritime. Option 6 was strongly based on Option 4 and would include reconfiguration of Kelly Street to a single through lane in each direction through the town centre as well as different intersection treatments at several intersections.

**Option 7 (referred to from here on as Modified Option 1) – A variant of options 1 and 4 – a road bypass and road over rail bridge at the Kelly Street rail level crossing**

This would include construction of a two lane road bypass to the west of Scone on an alignment that is shorter than Option 1, traversing through the Scone Golf Course. The bypass would bridge over the rail line south of town, and at Kingdon and Liverpool streets. This option includes access to the local road network at both ends of town and midway at St Aubins Street. Scone Golf Course would require modification. This option also includes a rail bridge on the existing Kelly Street alignment for local traffic and emergency services, to be constructed after the bypass for staging purposes. Development of Option 7 was carried out by Roads and Maritime (for the bypass component) and Upper Hunter Shire Council (for the Kelly Street bridge component).
**Long-term solution – selection of a preferred option**

Following assessment of each of the seven shortlisted options against the assessment criteria the recommended preferred option was Modified Option 1 and this option was announced in April 2014 and is detailed in a Community Update and the *Scone – Kelly Street Level Crossing Options Assessment and Feasibility Report* (AECOM 2014), both currently on the Roads and Maritime website.

A road bypass of Scone would support freight and long distance travel important to the NSW and National economy being part of the Sydney to Brisbane National Land Transport Network between Gunnedah Basin and Port of Newcastle route.

Bypassing Scone supports the NSW Long Term Transport Master Plan’s theme to provide essential access for regional NSW by providing town bypasses to improve travel within towns, reduce delays caused to freight traffic, increase safety, and improve the urban amenity of towns.

Provision of the local road bridge would reduce division of the town and improve emergency services access and the reliability of travel through Scone via Kelly Street.

A road bypass received strong community support during both the November 2012 and May 2013 public displays.

### 2.4.3 Preferred option refinement stage

Following the announcement of a preferred option in 2014 (as described in section 2.4.2), Roads and Maritime further refined the preferred option to provide the following:

- Minimise impacts on the golf course
- Consider different alignments (east to west) through Parsons Gully in the vicinity of Kingdon and Liverpool streets
- Provide a buffer to the rugby field in Susan Street.

As a result, three options (options A, B and C) were initially developed for further consideration and presented at a value management workshop held on 17 February 2015. Common to all three options are the following:

- At-grade connection south and north of Scone with the existing New England Highway
- At-grade connection at St Aubins Street
- Overbridge at the Great Northern Railway
- Overbridges at Kingdon and Liverpool streets
- Crossing of Figtree Creek within the golf course
- Within and parallel to the floodway for Parsons Gully.

The three options (options A, B and C) were subject to a range of onsite investigations and desktop studies including geotechnical, ecology, noise, flooding analysis and visual assessment.

The workshop participants selected a combined option to investigate further, which is option D. In addition to selecting this option, workshop participants requested the project team to investigate a more western option through the middle portion of the site. This was subsequently carried out and identified as option E.

Options D and E were presented at a technical workshop held on 18 March 2015. The workshop identified option D as the refined preferred option to move forward into concept design and that there are possible improvements relating to:

- Consideration of bridge length options
- Optimisation of the design in relation to flood mitigation
- Consideration to lowering option D to minimise visual impacts
The advantages of having Kingdon and Liverpool streets as underpasses were considered beneficial relative to having to provide a pedestrian underpass at Kingdon Street and a new access to the sporting complex from Liverpool Street.

It was also noted at the technical workshop that there is no dependency between the proposal and the proposed grade separated rail crossing at Kelly Street within Scone.

2.5 Preferred option

Option D was selected as the preferred option. The preferred option involves building a two lane highway bypass to the west of Scone, passing through the Scone Golf Course. The bypass would bridge over the rail line south of town, Kingdon Street and Liverpool Street. Access to and from the bypass would be provided to the north and south of town and midway at St Aubins Street.

The preferred option has been developed to a concept design stage and further details of the proposal are provided in section 3.

2.6 Design refinements

Following selection of option D as the preferred option the following refinements have occurred during the concept design phase:

- Lowering the height of the road wherever possible to minimize visual impacts and reduce the need for imported fill material
- Provide as a minimum 5.15 metres clearance over the Great Northern Railway and 5.4 metres clearance over Liverpool Street
- Refinement of bridge openings and culvert configurations to minimize flooding impacts
- Finalise intersection configurations to ensure safe access to and from the proposal.
3. **Description of the proposal**

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

3.1 **The proposal**

The proposal is located to the west of Scone and connects to the New England Highway to the north and south of Scone. The proposal involves building a two lane highway bypass to the west of Scone. About four kilometres of new highway are proposed and would include at-grade connections south and north of Scone, two overbridges, crossing of Figtree Creek and an at-grade connection at St Aubins Street.

The proposal has been developed to a concept design level and would be further refined during the detailed design phase.

The key features of the proposal are shown in Figure 3.1 and include:

- At-grade connections south and north of Scone with the existing and realigned New England Highway
- Overbridge at the Great Northern Railway to the south of Scone
- Overbridge about 540 metres long commencing on the southern side of Parsons Gully and extending over Kingdon and Liverpool streets
- Crossing of Figtree Creek
- At-grade connection at St Aubins Street.

Subject to approval, it is anticipated that construction of the proposal would start in early 2017 and would take about two years to complete.

The concept design of the proposal is described in *HW9 New England Highway –Scone Bypass, Concept Design Report* (GHD, 2015) and the following sections are summarised from that report.
Figure 3.1

LEGEND
- Proposal site
- Liverpool Street Bike Path
- Cadastre
- Watercourse
- Design features
  - Earthworks
  - Pavement
  - Median
  - Table drain
- Overpass
- Existing utilities
  - Communications
  - Stormwater
  - Electricity
  - Sewer
  - Water

Roads and Maritime Services
HW9 New England Highway Scone Bypass
Review of Environmental Factors

The Proposal - Sheet 3 of 5

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Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 T 61 2 4979 9999 F 61 2 4979 9988 E ntlmail@ghd.com W www.ghd.com.au

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3.2 Design

A description of the concept design is provided below and is illustrated in Figure 3.1. Concept design plans are included in Appendix B. The concept design would be further refined during the detailed design phase.

3.2.1 Design criteria

Standards

The concept design was prepared in accordance with the following standards:

- Guide to Road Design – Austroads (Austroads, 2009)
- RTA Supplement to Austroads Guide to Road Design (2011)
- Road Design Guide (Roads and Traffic Authority of NSW (undated))
- Road Safety Audit Manual and Checklist (Roads and Traffic Authority of NSW, 2005)
- Beyond the Pavement, RTA urban design policy, procedures and design principles (Roads and Traffic Authority of NSW, 2009)
- Roads and Maritime Road Technical Directions
- Roads and Maritime Travel Restrictions Vehicle Routes (Scone) (2015)
- NSW Speed Zone Guidelines (Roads and Traffic Authority of NSW, 2011)

Design criteria

The key design criteria for the proposal are summarised in Table 3-1.

Table 3-1 Design criteria

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roadway</td>
<td>New England Highway – two lane undivided</td>
</tr>
<tr>
<td>Proposed speed</td>
<td>New England Highway – 100 km/h</td>
</tr>
<tr>
<td>Lane widths – through lanes</td>
<td>Through lanes – 3.5 m (minimum)</td>
</tr>
<tr>
<td></td>
<td>Turning lanes – 3.5 m (minimum)</td>
</tr>
<tr>
<td>Horizontal and vertical alignment</td>
<td>Guide to Road Design (Part 3) – Austroads (Austroads, 2009) and RTA Supplement to Austroads Guide to Road Design (2011)</td>
</tr>
<tr>
<td>Design vehicles</td>
<td>New England Highway: B-double truck</td>
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<tr>
<td></td>
<td>For turning movements: up to 19 metre semi-trailer</td>
</tr>
<tr>
<td>Shoulder</td>
<td>2.5 m</td>
</tr>
<tr>
<td>Line marking</td>
<td>Roads and Maritime Delineation Guidelines</td>
</tr>
<tr>
<td>Road furniture</td>
<td>Austroads Road Design Guide section 6</td>
</tr>
<tr>
<td>Temporary delineation and signposting</td>
<td>Traffic Control at Work Sites (RTA, 2003 Edition) and appropriate RTA QA Specification parts</td>
</tr>
</tbody>
</table>
Design life
The design life of key elements of the proposal is:
- Major/inaccessible drainage items – 100 years
- Bridges – 100 years
- Roadside furniture – 40 years
- Lighting – 20 years
- Main bypass pavements – 40 years
- New local road pavements – 20 years.

3.2.2 Engineering constraints
The engineering constraints to the design and construction of the proposal include:
- Existing utilities and associated structures
- Maintaining driveway access to existing residential and commercial properties
- Minimising acquisition requirements
- Maintaining traffic flow during construction
- Minimising flood impacts
- Great Northern Railway
- Equestrian area adjacent on the northern side of the golf course
- Golf clubhouse and surrounds
- Parsons Gully – a meandering creek and flood way, crossing Liverpool and Kingdon Streets and passes through the golf course
- Netball courts associated with the Bill Rose Sports Complex
- Rugby Club and associated field at the western end of Susan Street.

3.2.3 Major design feature, Bridge over Parsons Gully, Kingdon Street and Liverpool Street
The proposed bridge is located south-west of Scone and would span between Parsons Gully near the existing golf course club house at its southern extent, to north of Liverpool Street. The new bridge would have an overall length of about 540 metres and would consist of twenty spans, each of about 27 metres in length. The arrangement of the proposed bridge would include two 3.5 metre travel lanes (one in each direction), a one metre wide central delineated median, and 2.5 metre wide shoulders on each side of the bridge. The bridge deck widens at the northern extent to cater for the right turn lane into St Aubins Street. Bridge safety barriers with a height of 1.3 metres and noise walls would be provided on both sides of the bridge.

The bridge would consist of precast concrete bridge girders supporting a concrete deck slab with an asphaltic concrete wearing surface spanning between piers and abutments. The piers would consist of a reinforced concrete headstock beam, supported by two circular reinforced concrete columns over reinforced concrete pile caps and bored piles. The abutments would be reinforced concrete beams supported on bored concrete piles with walls retaining the road embankment. The road embankment would spill around the abutments. Scour protection would be provided at these locations to protect the road embankment.

Parsons Gully would pass beneath the proposed bridge alignment at two locations, at the southern extent of the bridge and between Kingdon Street and Liverpool Street. Construction of the proposal would include works within Parsons Gully. This includes the construction of bridge piers and emplacement of embankment materials within the extents of Parsons Gully. Minor realignment of the existing ephemeral channel within Parsons Gully may be required due to the positioning of some of the bridge piers.

Parsons Gully is a highly undefined waterway with a number of shallow ephemeral channels, shallow pools, swampy areas and overflow areas. Parsons Gully is a Class 3 waterway (minimal key fish habitat) and contains no known threatened aquatic species or ecological communities. Refer to section 6.2 for further details.
The proposed bridge crosses over Kingdon Street and Liverpool Street and has been designed to provide sufficient vertical and horizontal clearances. At Liverpool Street the bridge also spans existing drainage culverts located beneath and along Liverpool Street at this location. The existing shared path on the south side and parallel to Liverpool Street is retained on its current alignment. In addition, an underpass beneath the most southern span of the bridge will be provided to maintain access between the golf clubhouse and facilities and the golf course.

A typical cross section of the bridge (excluding noise walls) is provided in Figure 3.2.

![Diagram of bridge cross section](image)

**Figure 3.2** Bridge over Parsons Gully, Kingdon Street and Liverpool Street - typical cross section

### 3.2.4 Major design feature, Bridge over the Great Northern Railway

The proposed bridge would span the Great Northern Railway at a location about 1.5 kilometres south of the existing Scone train station. The new bridge would have an overall length of about 100 metres and would consist of three spans, each of about 33 metres in length, with the central span crossing the existing rail line. The piers supporting the bridge would be constructed within the rail corridor and positioned parallel to the existing rail line, and on a 40 degree skew angle relative to the road alignment. The bridge has been designed to provide both the vertical and horizontal clearances required by ARTC, including 5.15 metre vertical clearance with allowance to lift the bridge in the future if additional clearance is required.

The arrangement of the proposed bridge would include two 3.5 metre travel lanes (one in each direction), a one metre wide central delineated median, and 2.5 metre wide shoulders on each side of the bridge. Bridge safety barriers with a height of 1.3 metres would be provided on both sides of the bridge, which may be increased in height on the northern side to act as a noise wall.
The bridge would consist of precast concrete bridge girders supporting a concrete deck slab with an asphaltic concrete wearing surface spanning between piers and abutments. The piers would be reinforced concrete blade piers supported on bored concrete piles designed to cater for train collision loads. The abutments would be reinforced concrete beams supported on bored concrete piles with walls retaining the road embankment.

A preliminary cross section of the bridge (excluding noise walls) over the Great Northern Railway is provided in Figure 3.3.

![Figure 3.3 Bridge over Great Northern Railway - typical cross section](image)

### 3.2.5 Design features

**Typical cross section**

The proposal would be constructed on a raised embankment of variable height in areas outside the major bridge structures described above. Typical cross sections are summarised in Table 3-2 and shown in Figure 3.4.
Table 3-2  Typical cross section

<table>
<thead>
<tr>
<th>Element</th>
<th>New England Highway</th>
<th>Kelly Street</th>
<th>St Aubins Street</th>
</tr>
</thead>
<tbody>
<tr>
<td>Through lane widths</td>
<td>3.5 m</td>
<td>3.5 m</td>
<td>3.5 m</td>
</tr>
<tr>
<td>Turning lane widths</td>
<td>3.5 m (minimum)</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Shoulder</td>
<td>2.5 m</td>
<td>2.0 m</td>
<td>2.0 m</td>
</tr>
<tr>
<td>Fill batter slope</td>
<td>2:1 m</td>
<td>4:1</td>
<td>4:1</td>
</tr>
</tbody>
</table>

**Lane configurations**

Two through travel lanes about 3.5 metres wide would be provided for the entire four kilometre length. The proposal would provide new or modified connections to local roads as generally described below.

At the southern end the existing New England Highway would connect to the proposal via:
- A southbound slip lane utilising the existing highway pavement
- A new T-intersection providing for left turn in and right turn in.

At St Aubins Street a new intersection would be provided.

At the northern end the existing New England Highway would connect to the proposal via:
- A southbound slip lane utilising the existing highway pavement
- A new T-intersection providing for right turn out and left turn out movements only.

A new roundabout would be constructed at the northern end generally on the existing highway pavement to provide for two-way access to properties in the vicinity. The southbound slip lane would tie in to the roundabout.

**Horizontal and vertical alignment and speed limit**

The horizontal and vertical alignment of the proposal varies but has been designed to tie in with the existing roads, achieve the required clearances over local roads and the Great Northern Railway, achieve the required flood immunity and to comply with the relevant guidelines. The speed limit on the bypass section of the New England Highway would be 100 kilometres per hour and on Kelly Street and other intersecting roads in the immediate vicinity of the proposal, 50 kilometres per hour.

**Tie-ins**

At the start and end points of the proposal site, the bypass would be tied in to the existing alignment of all roads. Activities to tie the proposal into the existing alignment would include pavement work to create consistent levels between existing and new surfaces. The extent of tie-in work would be determined during detailed design.

**Intersections and accesses**

The proposal would provide new and modified intersections at the southern and northern ends with the existing highway, and at St Aubins Street. Private property access at both the northern and southern ends, and St Aubins Street would be retained with modifications as required.

**Parking facilities**

No parking facilities would be removed or provided by the proposal.
Drainage
The proposal would involve as required upgrading the existing stormwater drainage system and provision of new infrastructure. The drainage design is still under development and would be further refined during the detailed design stage. Drainage design would consider cross drainage, transverse drainage, longitudinal drainage, water quality, subsurface drainage, pipe cover, temporary drainage and scour protection as relevant. Drainage structures (culverts) would be provided along the proposal at strategic locations to manage flood waters.

Pedestrian and bicycle facilities
The proposal would not provide any new pedestrian or dedicated bicycle facilities. Existing facilities in the vicinity of the proposal would be altered as required, particularly the shared path along Liverpool Street. Cyclists would be able to use the road shoulders on the bypass.

Bus facilities
No bus facilities would be removed or provided by the proposal.

Public utilities
There are a number of public utilities within the proposal site that would require adjustment or relocation as part of the proposal. Refer to section 3.5 for further details.

Lighting
The proposal would include the provision of lighting at the intersections at the southern and northern connections and at the St Aubins Street intersection. Lighting would be designed in accordance with relevant guidelines and standards to minimise light spillage into residential properties, minimise glare that could impact on driver visibility and with a design life of 20 years. Lighting design would be further refined during the detailed design phase.

Urban and landscape design
An urban design report and landscape character and visual impact assessment was prepared by Clouston Associates to inform the concept design (refer Appendix H).

In recognition of the potential visual impacts of the proposal four urban design and landscape objectives were developed as follows:

- Develop an integrated concept design that fits sensitively with the existing qualities and characteristics of the Scone area
- Ensure that impacts on visual amenity and landscape character are reduced as far as possible
- Develop a suite of bridge elements that work cohesively together
- Improve safety and connectivity for vehicles, pedestrians and cyclists.

These objectives were developed with reference to principles contained in the Beyond the Pavement, RTA urban design policy, procedures and design principles (NSW Roads and Traffic Authority, 2009).

These objectives and associated principles were developed into a set of more specific recommendations for design strategies and initiatives relating to landscaping opportunities and design of prominent features such as bridges and embankments.

These principles and design features have been integrated into the concept design and would be considered further in the detailed design phase of the proposal.

A landscape concept plan was also prepared for the proposal and is provided in Appendix H.
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Signage and line marking
Appropriate signage and line marking would be provided to suit the proposal.

Safety barriers
The proposal would include the modification of existing safety barriers as required and provision of new safety barriers would also be required in accordance with relevant standards and guidelines.

Cost estimate
Funding of $90 million has been committed towards the proposal by the Australian and NSW governments.

3.3 Construction activities

3.3.1 Work methodology
It is anticipated that construction would start in early 2017 and would take about two years to complete, weather permitting. Construction activities would be guided by a construction environmental management plan to ensure work is carried out to Roads and Maritime specifications within the specified work area. Detailed work methodologies would be determined during detailed design and construction planning. The proposed possible work methodology is described below noting that the order of activities would vary to suit the final construction staging plans, which would be determined by the construction contractor and may change.

- Identify sensitive areas as defined by the REF and the construction environmental management plan
- Surveys, investigations and setting out work in accordance with design plans
- Install traffic management measures including temporary traffic signs and barricades
- Install temporary erosion, sediment and water quality controls, including silt fences, and stormwater diversion drains
- Mark trees that would need to be removed or trimmed, and mark any ‘no-go’ areas
- Clear and grub vegetation
- Relocate, adjust or protect existing utility services
- Strip topsoil from work areas and stockpile for future use
- Import and fill to the road formation levels
- Property adjustment works
- Dispose of unsuitable and/or surplus material from the proposal site
- Construct the bridge from south of Parsons Gully (near golf club house) over Kingdon Street to north of Liverpool Street
- Construct a new bridge over the Great Northern railway
- Erect new noise walls
- Install new culverts and subsoil drains
- Install new kerb and gutter
- Construct the pavements, including placing and compacting select fill, base course, and asphalt wearing surface
- Construct tie-ins to existing roads
- Install new street lights
- Rehabilitate disturbed areas and landscape in accordance with the landscaping plan
- Line marking and sign posting
- Final site clean-up.
3.3.2 Staging

A possible strategy for construction staging has been developed which splits the proposal into three sections. Tie-ins to existing roads would be completed following construction of the main bypass. Upgrades to local roads would be carried out during the work and would be staged to minimise impacts.

The majority of work can be constructed away from local roads. Traffic controls would be established for the tie-ins to local roads and to manage additional traffic due to construction.

Construction of the proposal is anticipated to be staged in the following sections:

- Section 1: Southern end to rail line
- Section 2: Rail line to the bridge over Parsons Gully, Kingdon Street and Liverpool Street
- Section 3: Bridge over Parsons Gully, Kingdon Street and Liverpool Street to northern end.

Staging of the proposal would be further refined during the detailed design stage.

3.3.3 Early works

The following works are possible as early works that could be completed in advance of the main construction contract to minimise the overall impacts to adjacent residents and increase construction efficiency. During this stage traffic would remain in its existing arrangement.

- Site establishment, including the preparation of management plans and the installation of controls as required for the early works
- Utility relocations including electrical, water, sewer and telecommunications
- Clearing of properties
- Modification to the existing travelling stock route at the northern end of the proposal.

3.3.4 Construction hours and duration

It is anticipated that construction would be largely carried out during standard construction working hours in accordance with the Interim Construction Noise Guideline (DECC, 2009):

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

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

- Placement of asphalt
- Intersection and tie-in activities
- Line marking
- Installation and adjustment of barriers and signage for construction zones during each construction stages
- Work within the rail corridor.

Any work carried out outside of standard working hours would be in accordance with the Interim Construction Noise Guideline (DECC, 2009) and the Environmental Noise Management Manual: Practice Note vii – Road works outside normal working hours (RTA, 2001).

Prior advice would be given to the community if any work is planned to be carried out outside standard construction hours.
### 3.3.5 Plant and equipment

A range of plant and equipment would be used during construction. The final equipment and plant requirements would be determined by the construction contractor. An indicative list of plant and equipment is provided below:

- Bulldozers
- Backhoes
- Dump trucks
- Road trucks
- Excavators
- Piling rigs
- Cranes
- Concrete pumps
- Road sweepers
- Water trucks
- Water pumps
- Concrete saws
- Asphalt pavers
- Roller/compacters
- Graders
- Scrapers
- Concrete trucks
- Generators
- Trenching Machine
- Under boring rig
- Milling machine
- Kerb extrusion machine.

### 3.3.6 Earthworks

The majority of the earthworks would be associated with filling for the new road. The filling would be up to about 9.5 metres in depth, with an average depth of around three metres.

The estimated quantities of materials associated with earthworks are provided in Table 3-3. Earthwork requirements would be confirmed during detailed design.

Table 3-3 Indicative earthwork quantities

<table>
<thead>
<tr>
<th>Material</th>
<th>Volume (cubic metres ($m^3$))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top soil (removal for reuse in the proposal)</td>
<td>5200</td>
</tr>
<tr>
<td>Imported general fill for embankments</td>
<td>226,600</td>
</tr>
<tr>
<td>Imported select fill</td>
<td>17,700</td>
</tr>
<tr>
<td>Imported heavily bound base</td>
<td>23,700</td>
</tr>
</tbody>
</table>

### 3.3.7 Source and quantity of materials

The road pavement materials would be sourced from appropriately licensed facilities (quarries). About 41,400 cubic metres of pavement, gravel and select materials would be required to be imported.

Imported materials would be sourced from commercial suppliers in nearby areas, wherever possible. As part of the concept design a preliminary assessment of potential sources of material has been completed that has identified suitable material is available at local quarries.

Surplus or unsuitable material that cannot be used on-site would be classified in accordance with the *Waste Classification Guidelines* (DECCW, 2009) and disposed of at an approved materials recycling or waste disposal facility.

The amount of water that would be required during construction is unknown at this stage. The amount would depend on material sources and methodologies applied by the contractor. It is proposed that water would be obtained from the local water supply network.
3.3.8 Traffic management and access

Construction of the proposal would generate heavy vehicle movements. These heavy vehicle movements would mainly be associated with:

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

The estimated number of these heavy vehicle movements (in and out) is shown in Table 3-4. An indicative duration of the movements for the specific material is also provided.

Table 3-4 Heavy vehicle movements

<table>
<thead>
<tr>
<th>Material</th>
<th>Number of movements</th>
<th>Time period</th>
</tr>
</thead>
<tbody>
<tr>
<td>General fill</td>
<td>27,000</td>
<td>12 months</td>
</tr>
<tr>
<td>Imported select fill</td>
<td>2700</td>
<td>3 months</td>
</tr>
<tr>
<td>Imported heavily bound base</td>
<td>1800</td>
<td>2 months</td>
</tr>
<tr>
<td>Culverts</td>
<td>90</td>
<td>2 months</td>
</tr>
<tr>
<td>Bridge materials</td>
<td>2250</td>
<td>12 months</td>
</tr>
</tbody>
</table>

Construction vehicles would access the site via arterial roads wherever possible. About 50 heavy vehicles would be required on-site per day, resulting in about 100 heavy vehicles movements in and out of the site per day. Based on the identified likely sources of construction materials the primary access to the site would be via Liverpool Street. Materials sourced from the south would use the New England Highway and then enter the site via Liverpool Street. For materials sourced from the west access would be via Liverpool Street. Light vehicle movements would be required for the movement of construction personnel, including contractors, site labour force and specialist supervisory personnel. This would be about 25 to 30 small vehicle movements in and out of the site per day and would fluctuate during construction of the proposal.

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

Property accesses would be maintained as far as practicable throughout construction and there would be no disruption to bus services. Heavy vehicle movements on local roads would be minimised as far as possible and restricted to designated transport routes.

3.4 Ancillary facilities

Site compound facilities would include portable buildings with amenities (such as lunch facilities and toilets), secure and bunded storage areas for site materials, including fuel and chemicals, office space for on-site personnel, and associated parking.

Two potential compound sites are being investigated for use during construction of the proposal as shown on Figure 3.5. One is located in the south of the proposal site and one in the north. The potential impacts associated with these locations have been assessed in this REF. The two potential sites have been selected with consideration to the following criteria:

- Proximity to the proposal site
- Not prone to excessive flooding
- Relatively flat ground that does not require substantial reshaping
In previously disturbed areas that do not require additional clearing of native vegetation and are unlikely to contain Aboriginal heritage.

In plain view of the public to deter theft and illegal dumping.

Should the construction contractor select alternative compound sites the above criteria would be used.

Stockpile locations would be refined during the detailed design phase using the criteria set out in the *Stockpile Management Guideline* (RTA, 2011).

Sites would be securely fenced with temporary fencing. Signage would be erected advising the general public of access restrictions. Upon completion of construction, the temporary site compound, work areas and stockpiles would be removed, the site cleared of all rubbish and materials and rehabilitated.

### 3.5 Public utility adjustment

Consultation with public utility authorities has been carried out as part of the development of the concept design to identify and locate existing utilities and incorporate utility authority requirements for relocations and/or adjustments. Preliminary investigations have indicated that the following existing utilities and corresponding authorities were found to be within the extents of the proposal:

- Overhead and underground electricity – Ausgrid
- Water reticulation – Upper Hunter Shire Council
- Sewer reticulation – Upper Hunter Shire Council
- Telecommunications – Telstra / AAPT PowerTel.

Consultation with utility owners is ongoing and would continue throughout the detailed design phase. The final location of any relocated utilities is still subject to this consultation and has not been defined to date. The construction area for the proposal has been defined to allow for the anticipated location of all relocated or adjusted utilities.

### 3.6 Property acquisition

The need for property acquisitions is still being investigated and would be further refined during the detailed design phase. Based on the concept design and subject to negotiations in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991*, the following property adjustments may be required:

- 41 individual lots would be directly impacted, of these 21 privately and 15 publically owned lots would be subject to acquisition, with five having already been acquired by Roads and Maritime
- The 21 privately owned lots subject to acquisition are owned by 10 separate owners
- The 15 publically owned lots subject to acquisition are owned by three separate owners (Upper Hunter Shire Council, Local Land Services (NSW Government) and the State of NSW)
- Of the 36 individual lots subject to acquisition, two privately owned lots (one owner) and one publically owned lot (Upper Hunter Shire Council) would be subject to total acquisition, with the remaining 33 lots subject to partial acquisition
- Of the 36 individual lots subject to acquisition, nine are zoned RE1 (public recreation) and comprise the Scone Golf Course, a public park on Kingdon Street and the Bill Rose Sports Complex. All would be subject to partial acquisition only
- Excluding properties already acquired by Roads and Maritime no houses would be subject to acquisition.

Details of all lots that could be subject to acquisition are provided in section 6.11.

Roads and Maritime will carry out ongoing consultation with all affected landholders.
Figure 3.5

Potential Compound Locations

LEGEND
- Proposal site
- Railway
- Watercourse
- Potential compound locations

GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 T 61 2 4979 0899 F 61 2 4979 9888 E ndmail@ghd.com W www.ghd.com.au

Roads and Maritime Services
HW9 New England Highway Scone Bypass
Review of Environmental Factors


Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 T 61 2 4979 0899 F 61 2 4979 9888 E ndmail@ghd.com W www.ghd.com.au

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Paper Size A4

0 55 110 220 330 440

Margins
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

08 Dec 2015

Job Number 22-17554
Revision 0

Proposal site
Railway
Watercourse
Potential compound locations

Potential Compound Locations
4. **Statutory and planning framework**

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 facilities 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 is not located on land reserved under the National Parks and Wildlife Act 1974 and does not affect land or development regulated by State Environmental Planning Policy No. 14 - Coastal Wetlands, State Environmental Planning Policy No. 26 - Littoral Rainforests, State Environmental Planning Policy (State and Regional Development) 2011 or State Environmental Planning Policy (Major Development) 2005.

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

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

State Environmental Planning Policy 44 Koala Habitat Protection (SEPP 44) aims to encourage the ‘proper conservation and management of areas of natural vegetation that provide habitat for Koalas to ensure a permanent free-living population over their present range and reverse the current trend of Koala population decline’.

Schedule 1 of SEPP 44 lists the local government areas to which SEPP 44 applies. Scone is listed under Schedule 1 which now forms part of the Upper Hunter local government area.

SEPP 44 requires that before granting consent for development on land over one hectare in area, a consent authority must be satisfied as to whether or not the land is ‘potential’ and ‘core’ Koala habitat. Potential Koala habitat is defined as ‘an area of native vegetation where the trees of the types listed in Schedule 2 constitute at least 15 per cent of the total number of trees in the upper or lower strata of the tree component’. Core Koala habitat, is defined as ‘an area of land with a resident breeding population of Koalas, evidenced by attributes such as breeding females and recent sightings and historical records of a population’. Where core Koala habitat is found to occur, SEPP 44 requires that a site-specific Koala Plan of Management be prepared, unless a local government area-based Koala Plan of Management exists.

A biodiversity assessment was carried out by GHD as an input to the REF. This is included in section 6.2. The proposal site is predominantly cleared of native vegetation and does not constitute core koala habitat.
4.2 Local environmental plans

4.2.1 Upper Hunter Local Environmental Plan 2013

The proposal is located wholly within the Upper Hunter Shire local government area. The proposal site is within or adjacent to the following zones under the *Upper Hunter Local Environmental Plan 2013* (the LEP) (as shown on Figure 6.23):

- SP2 (infrastructure)
- R1 (general residential)
- RE1 (public recreation)
- RE2 (private recreation)
- RU4 (rural small holdings)
- B4 (mixed use)
- B2 (local centre)
- IN2 (light industrial).

The zone provisions provide that the proposal would be permitted with or without consent under all of the above zones. Clause 5.12 of the LEP states that ‘...this Plan does not restrict or prohibit, or enable the restriction or prohibition of, the carrying out of any development, by or on behalf of a public authority, that is permitted to be carried out with or without development consent, or that is exempt development, under State Environmental Planning Policy (Infrastructure) 2007’.

As the proposal is permitted without consent under *State Environmental Planning Policy (Infrastructure) 2007* (refer section 4.1), the consent requirements of the LEP do not apply.

4.3 Other relevant legislation

4.3.1 Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (POEO Act) establishes the procedures for issuing licences for environmental protection in relation to aspects such as waste, air, water and noise pollution control. The owner or occupier of premises engaged in scheduled activities is required to hold an environment protection licence and comply with the conditions of that licence.

Under Part 3.2 of the POEO Act, the carrying out of scheduled development work as defined in Schedule 1 requires an environmental protection licence. Schedule 1, Clause 35 (road construction) is potentially relevant to the proposal. Road construction is defined by Clause 35(1) as ‘...the construction, widening or re-routing of roads, but does not apply to the maintenance or operation of any such road’.

Clause 35(2) specifies that road construction is declared to be a scheduled activity if it results in four or more traffic lanes (not including bicycle lanes or lanes used for entry or exit), where the road is classified or proposed to be classified as a main road (but not a freeway or tollway) under the *Roads Act 1993*, for at least three kilometres of its length in the metropolitan area, or five kilometres of its length in any other area.

The proposal involves the upgrade of about four kilometres of the New England Highway however it would be a two lane road (one in each direction). It is not expected that any other scheduled activities would be triggered and therefore an environmental protection licence is not anticipated to be required.
4.3.2 Threatened Species Conservation Act 1995

The NSW Threatened Species Conservation Act 1995 (TSC Act) lists a number of threatened species, populations or ecological communities to be considered in deciding whether there is likely to be a significant impact on threatened biota, or their habitats. If any of these could be impacted by the proposal, an assessment of significance that addresses the requirements of section 5A of the EP&A Act must be completed to determine the significance of the impact.

A biodiversity assessment was carried out by GHD and is included in section 6.2. The proposal site was assessed for the potential presence of threatened species; populations and ecological communities listed under the TSC Act and concluded that there would be no significant impacts as a result of the proposal.

4.3.3 Water Act 1912

The Water Act 1912 facilitates development and use of water, by controlling the extraction of water, the use of water, the construction of works, such as dams and weirs, and the carrying out of activities in or near sources in NSW. Part 5 of the Water Act 1912 applies to water supply work or aquifer interference approvals within the meaning of that Act.

As discussed in section 6.4.2, groundwater dewatering is likely to be required. A licence is required from DPI Water for groundwater dewatering during construction if the water extraction is greater than three mega litres per year (ML/yr).

4.3.4 National Parks and Wildlife Act 1974

The National Parks and Wildlife Act 1974 (NP&W Act) aims to conserve nature, objects, places or features (including biological diversity) of cultural value within the landscape. The NP&W Act also aims to foster public appreciation, understanding and enjoyment of nature and cultural heritage, and provides for the preservation and management of national parks, historic sites and certain other areas identified under the Act. The NP&W Act is administered by the NSW Office of Environment and Heritage (OEH).

A search of the Aboriginal Heritage Information Management System database on 6 January 2015 and 24 April 2015 revealed no Aboriginal heritage items or places which have previously been recorded within the proposal site. One registered Aboriginal site was identified within the search area, a single open campsite. This site is located about two kilometres from the proposal.

A preliminary Aboriginal cultural heritage assessment for the proposal was carried out in accordance with Stage 1 of the Roads and Maritime Procedure for Aboriginal Cultural Heritage Consultation and Investigation. The preliminary assessment included a desktop search for known objects in the study area, followed by a site inspection by the Roads and Maritime Aboriginal Cultural Heritage Officer in April and November 2015.

This preliminary assessment concluded that there is a low likelihood for Aboriginal cultural heritage potential to be present within the proposal site and that further assessment is not required.

Refer to section 6.7 for further information.

4.3.5 Noxious Weeds Act 1993

The Noxious Weeds Act 1993 (NW Act) defines the roles of government, councils, private landholders and public authorities in the management of noxious weeds. Three noxious weeds, within the Upper Hunter local government area occur within the study area. These include:

- Class 3 African Box-thorn (*Lycium ferocissimum*)
- Class 4 Fireweed (*Senecio madagascariensis*)
- Class 4 Weeping Willow (*Salix babylonica*).
Within the study a small number of African Box-thorn (*Lycium ferocissimum*) which is a class 3 noxious weed were recorded on one property located immediately north of Susan Street. Fireweed (*Senecio madagascariensis*) occurs in low densities throughout the study area and Weeping Willows (*Salix babylonica*) species are present along Parsons Gully creek line in the vicinity of Bill Rose Sports Complex and immediately north of Kingdon Street.

All noxious weeds within the site would be managed in accordance with the NW Act. Mitigation measures to control the spread of noxious weeds are discussed in section 6.2.4.

### 4.3.6 Fisheries Management Act 1994

The *Fisheries Management Act 1994* (FM Act) aims to conserve, develop and share the fishery resources of the State for the benefit of present and future generations. There is no instream work proposed. The proposal site does not contain any protected marine vegetation, such as seagrass, mangroves or saltmarsh. The proposal site was assessed for the potential presence of threatened aquatic species and concluded there is no potential for impacts to threatened aquatic species.

Construction of the proposal would include work within Parsons Gully. This includes the construction of bridge piers and emplacement of embankment materials within the extents of Parsons Gully. Minor realignment of the existing ephemeral channel within Parsons Gully may be required due to the positioning of some of the bridge piers.

Parsons Gully is a highly undefined waterway with a number of shallow ephemeral channels and overflow areas. North of Liverpool Street, the creek is not defined and becomes a series of degraded, shallow pools with some swampy areas. Parsons Gully is a Class 3 waterway (minimal key fish habitat) and contains no known threatened aquatic species or ecological communities. Refer to section 6.2 for further details.

Under Part 7 of the FM Act, a permit is required for dredging and reclamation, obstruction of fish passage, harm to marine vegetation and use of electrical or explosive devices in a waterway. The proposal would involve construction of bridge piers and emplacement of embankment material within the waterway of Parsons Gully and this would meet the definition of dredging and reclamation under the FM Act.

However under section 199 of the FM Act public authorities, such as Roads and Maritime, do not need to acquire a permit for dredging and reclamation but must:

1. (a) give the Minister written notice of the proposed work, and
   (b) consider any matters concerning the proposed work that are raised by the Minister within 28 days after the giving of the notice (or such other period as is agreed between the Minister and the public authority).

2. Any such public authority is to notify the Minister of any dredging or reclamation work that it proposes to carry out or authorise despite any matter raised by the Minister. The Minister may, within 14 days after being so notified, refer any dispute to the Minister responsible for the public authority. If the dispute cannot be resolved by those Ministers, it is to be referred to the Premier for resolution.

Written notice of the proposal would be provided as required under section 199 of the FM Act.

Section 219 of the FM Act relates to blocking fish passage. Given the ephemeral and degraded nature of Parsons Gully and lack of suitable fish habitat, the proposal is not anticipated to block fish passage and therefore a permit under 219 of FM Act is not expected to be required. However, consultation with DPI (Fisheries) would be carried out during detailed design to confirm any specific requirements for approval under section 219 of the FM Act.
4.3.7 Land acquisition (Just Terms Compensation) Act 1991

The Land Acquisition (Just Terms Compensation) Act 1991 applies to the acquisition of land (by agreement or compulsory process) by a public authority authorised to acquire the land by compulsory process. It provides a guarantee that, when a public authority requires the acquisition of land, the amount of compensation will not be less than the market value of the land. The Land Acquisition (Just Terms Compensation) Act 1991 would apply to the acquisition of any land required for the proposal. Property acquisition is further discussed in section 6.11.2.

4.4 Commonwealth legislation

4.4.1 Environment Protection and Biodiversity Conservation Act 1999

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

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

4.5 Confirmation of statutory position

The proponent and determining authority for the proposal is Roads and Maritime. Clause 94 of the ISEPP provides that the proposal may be carried out without the need for development consent. The proposal is therefore subject to assessment and determination under Part 5 of the EP&A Act.
5. **Stakeholder and community consultation**

This section discusses the consultation carried out to date for the proposal and the consultation proposed for the future. The description contains the consultation strategy or approach used and the outcomes of consulting with the community and relevant government agencies and stakeholders.

### 5.1 Consultation strategy

Consultation with potentially affected property owners, relevant government agencies and other stakeholders has been carried out during the proposal development phase. The purpose of consultation has been to:

- Inform the community of the proposal
- Canvas comments and issues about the proposal and concept design from those who may be affected
- Advise potentially directly affected stakeholders of the proposed upgrade and its possible property impacts
- Advise stakeholders on how they may obtain further information or communicate concerns, complaints or suggestions.

A number of stakeholders were identified to be engaged as part of the consultation process. These stakeholders included:

- Directly affected stakeholders including adjacent property owners, residents, businesses and those directly affected by the proposal
- Upper Hunter Shire Council
- Emergency service providers
- Agricultural industry group
- Equine industry groups
- Tourism industry groups
- Sporting and recreational facility providers
- Utility providers.

A summary of consultation carried out to date is provided in sections 5.2 to 5.5. Roads and Maritime would continue to consult with the community and relevant stakeholders during the detailed design and construction of the proposal as described in section 5.6.

### 5.2 Community involvement

Roads and Maritime has implemented a community consultation program for the proposal.

The purpose of the program is to provide balanced and objective information to assist the community in building an understanding of the proposal and provide an opportunity for the community and stakeholders to provide feedback. The objectives of the consultation program are to:

- Provide clear, consistent and timely information about the proposal and its perceived benefits
- Raise awareness of the proposal to ensure that the local community, road users and commuters are kept informed
- Explain key features of the proposal
- Provide a point of contact for stakeholders and community members
- Monitor and evaluate community feedback for inclusion in the REF.
5.2.1 Consultation activities

Roads and Maritime completed a number of consultation activities between August 2011 and April 2014, including public display of the route options and preferred options. Key consultation activities during this period included:

- A community forum to introduce the proposal on 25 August 2011
- Public displays and information sessions to present the five route options in November 2012
- A value management workshop to consider the five route options on 11 December 2012
- A public display and information session on 30 May 2013 to present the two preferred route options
- Meetings with land owners and local business on 30 May 2013
- Briefings with Upper Hunter Shire Council

Further consultation activities have been carried out between November 2014 and November 2015 to inform refinement of the April 2014 preferred option and development of the concept design and REF. Key consultation activities during this period included:

- Meetings with land owners and local businesses
- Value management/technical workshops to consider the refined options in February and March 2015
- Meetings with various stakeholders as part of a socio-economic impact assessment completed for the proposal (Appendix K)
- Briefings with Upper Hunter Shire Council
- Community update in July 2015.

5.2.2 Consultation outcomes

The consultation activities outlined above have identified a range of issues for consideration in the concept design and REF including:

- Property acquisition process, timing and the potential for full or partial acquisitions
- Potential impacts during construction and operation, including noise, dust, and access constraints for some residents
- Increased flooding risks
- Impacts on residential and agricultural properties
- Impacts on public recreation areas
- Impacts on emergency services.

Key issues are discussed in Table 5-1.

The outcome of the consultation process found that the proposal offers opportunities to restore community values and lifestyle by removing passing heavy vehicles from the centre of town, making it a safer place for pedestrians and offering business expansion opportunities for local businesses along Kelly Street.
<table>
<thead>
<tr>
<th>Key issue</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Property acquisition</td>
<td>The proposal would involve full and partial property acquisition. The concept design has sought to minimise the need for property acquisition while achieving the proposal objectives. Roads and Maritime is working directly with potentially affected property owners in relation to property acquisition. Roads and Maritime expects that the proposal would have minimal impact on property values. During construction, mitigation measures would be implemented in consultation with property owners to provide entry and exit options where property access would be affected.</td>
</tr>
<tr>
<td>Separation of local and through traffic</td>
<td>The proposal would provide for separation of local and through traffic including removing long distance heavy vehicles from the centre of Scone.</td>
</tr>
<tr>
<td>Increased flood risk</td>
<td>A flooding assessment (Appendix F) has been completed for the proposal and is summarised in section 6.4. The proposal would be located within the floodplain of Parsons Gully / Figtree Creek. The design of the proposal was developed to minimise potential increase in flood risk.</td>
</tr>
<tr>
<td>Construction and operational impacts – noise</td>
<td>A noise and vibration assessment (Appendix G) has been carried out for the proposal and is summarised in section 6.5. The operational noise modelling indicates that road traffic noise levels are anticipated to increase in the vicinity of the proposal and decrease along Kelly Street. Noise mitigation in the form of noise barriers and possible architectural treatments would be required. Roads and Maritime would complete a noise monitoring program within 12 months of bypass opening and once traffic flows have stabilised to verify the predicted noise levels. The construction noise and vibration assessment indicates that during periods of construction, noise and vibration levels would exceed the criteria. Safeguards and mitigation measures have been recommended to minimise potential impacts.</td>
</tr>
<tr>
<td>Construction impact – air quality</td>
<td>An air quality assessment has been completed for the proposal (section 6.9). Construction of the proposal has the potential to create minor impacts to air quality through the generation of dust. Safeguards and mitigation measures have been recommended to minimise the potential impacts.</td>
</tr>
<tr>
<td>General inquiries related to timeframes for completion of the proposal, improvement of facilities and connection to local roads</td>
<td>Work is scheduled to start in early 2017 and is expected to take about two years to complete, weather permitting. Traffic and access is discussed in section 6.1.</td>
</tr>
</tbody>
</table>
**Key issue** | **Response**
---|---
Impacts on sporting and recreational areas | The proposal would traverse the golf course requiring reconfiguration of the affected holes on the course. Reconfiguration could result in a long term positive outcome for the club and its members. The new course may provide opportunities to maintain and attract more members in the future. The proposal would pass over the western edge of the Bill Rose Sports Complex. During construction safe access to the sports complex would be retained however some of the netball courts would be closed for safety reasons. A playing field, public park and dog park would also be closed during construction. During construction there is potential for short term amenity impacts. Operation of the proposal is not expected to significantly impact on users of the sports complex, however due to the location of the overbridge an alternate site for the playing field and public park would be required in consultation with council. These impacts are discussed further in section 6.12. Functionality and access to sporting and recreational areas would be maintained as much as is reasonably practical. Traffic and access is discussed in section 6.1.

Access for emergency services | When completed the proposal would provide unimpeded access for emergency services to the western side of the Great Northern Railway. During construction existing emergency vehicle access would be maintained. Traffic and access is discussed in section 6.1.

Visual impacts | The proposal would be constructed on a raised embankment and includes bridge structures to provide for the required clearances over Kingdon and Liverpool streets, the Great Northern Railway and to minimise impacts on flooding. The operational noise assessment (section 6.5 and Appendix G) has also identified the need for noise walls in some sections. A visual impact assessment (Appendix H) has been carried out for the proposal as summarised in section 6.6. This assessment has provided recommendations for the mitigation of potential impacts.

### 5.3 Aboriginal community involvement

A preliminary Aboriginal cultural heritage assessment for the proposal was carried out in accordance with Stage 1 of the Roads and Maritime Procedure for Aboriginal Cultural Heritage Consultation and Investigation. The preliminary assessment included a desktop search for known objects in the study area, followed by a site inspection by the Roads and Maritime Aboriginal Cultural Heritage Officer in April and November 2015. A search of the Aboriginal Heritage Information Management System database on 6 January 2015 and 24 April 2015 revealed no Aboriginal heritage items or places which have previously been recorded within the proposal site. One registered Aboriginal site was identified within the search area, a single open campsite. This site is located about two kilometres from the proposal.

This preliminary assessment concluded that there is a low likelihood for Aboriginal cultural heritage potential to be present within the proposal site and therefore consultation with the Aboriginal community was not deemed necessary.

Refer to section 6.7 for further information.
5.4 ISEPP consultation

Consultation with councils and other public authorities is provided for by Clauses 13 to 16 of the ISEPP, which apply to development carried out by or on behalf of a public authority that the ISEPP provides may be carried out without consent. Consultation is required in relation to specified development (Clause 16) or development that impacts on:

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

Roads and Maritime has regularly consulted with Upper Hunter Shire Council since 2011 as the proposal has the potential to impact on council infrastructure and services, local heritage and is located on flood liable land. Consultation has included regular presentations, meetings and briefings.

Formal written consultation between Roads and Maritime and Upper Hunter Shire Council also occurred on 26 June 2015 in accordance with clauses 13, 14 and 15 of ISEPP. A summary of the response from council is provided in Table 5-2 and a copy of the Roads and Maritime letter and council response is provided in Appendix L.

Roads and Maritime would continue to consult with Upper Hunter Shire Council throughout the detailed design and construction phases of the proposal.

The proposal would not impact on any other relevant matters listed in clause 16 of ISEPP, and therefore no further ISEPP consultation has been carried out.

5.5 Government agency and stakeholder involvement

The proposal is adjacent to Kingdon Ponds floodplain, Parsons Gully, St Aubin’s Arms heritage property and would cross the golf course and a travelling stock route (R90720). Roads and Maritime has therefore consulted with the following agencies:

- NSW Trade and Investment (Crown Lands, Hunter Area)
- NSW Department of Primary Industries
- NSW Environment Protection Authority (Hunter Region)
- NSW Office of Environment and Heritage (Hunter and Central Coast)
- Hunter Local Land Services (Invasion Species and Emergency Management).

A letter was sent to each agency on 26 June 2015. A summary of the responses from these agencies is provided in Table 5-2 and a copy of the response is provided in Appendix L. At the time of publication of the REF no written response has been received from NSW Trade and Investment (Crown Lands).

Roads and Maritime has also consulted with other relevant stakeholders including utility providers, community groups and business groups.

Table 5-2 Summary of ISEPP and other agency consultation

<table>
<thead>
<tr>
<th>Agency</th>
<th>Response received</th>
<th>Summary of response</th>
<th>Where addressed in this REF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper Hunter Shire Council</td>
<td>17 July 2015</td>
<td>Concern about the connectivity at Liverpool Street</td>
<td>6.1 – Traffic and access</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Concern about noise and visual impacts. Particularly near Aberdeen Street residences</td>
<td>6.5 – Noise and vibration 6.6 – Landscape and visual amenity</td>
</tr>
<tr>
<td>Agency</td>
<td>Response received</td>
<td>Summary of response</td>
<td>Where addressed in this REF</td>
</tr>
<tr>
<td>-------------------------------------------------</td>
<td>-------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>NSW Trade and Investment (Crown Lands)</td>
<td>No response received</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>NSW Department of Primary Industries</td>
<td>17 July 2015</td>
<td>Figure provided cannot be used to definitively identify all Crown land impacted by the proposal. Recommend that additional search be carried out to identify all Crown Land within the corridor</td>
<td>Noted.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Roads and Maritime should acquire all Crown land identified within the approved corridor of the proposal</td>
<td>6.11 – Land use and property</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lot 200 DP 579923 is a travelling stock route managed by Local Land services</td>
<td>Local Land Services have been invited to comment (refer below).</td>
</tr>
<tr>
<td>NSW Environment Protection Authority</td>
<td>24 July 2015</td>
<td>An Environment Protection Licence for the activity of ‘Road Construction’ in accordance with the POEO Act may be required</td>
<td>4.3.1 – POEO Act</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No further comment on the proposal</td>
<td>Noted.</td>
</tr>
<tr>
<td>NSW Office of Environment and Heritage</td>
<td>20 July 2015</td>
<td>Requirements for threatened species, populations and ecological communities</td>
<td>6.2 – Biodiversity</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Aboriginal cultural heritage</td>
<td>6.7 – Aboriginal cultural heritage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Floodplain management</td>
<td>6.4 – Hydrology, water quality and flooding</td>
</tr>
</tbody>
</table>
## Ongoing or future consultation

Future planned consultation to be carried out by Roads and Maritime and the construction contractor would include:

- Meetings with Upper Hunter Shire Council and other relevant stakeholders, including government agencies, utility providers, bus operators, adjacent landowners, business owners and community stakeholders
- Providing project updates to the local community during the construction planning phase and construction period
- Updating the Roads and Maritime website
- Display of the REF and preparation of a submissions report.

### Table: Agency Response received

<table>
<thead>
<tr>
<th>Agency</th>
<th>Response received</th>
<th>Summary of response</th>
<th>Where addressed in this REF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hunter Local Land Services</td>
<td>4 August 2015</td>
<td>Further detail of the proposal</td>
<td>3 – Description of the proposal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Movement of stock</td>
<td>6.11 – Land use and property</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Formal response will be provided from Hunter Local Land Services once proposal details are confirmed</td>
<td>Roads and Maritime would meet with Local Land Services to discuss design details associated with the travelling stock route.</td>
</tr>
</tbody>
</table>
6. **Environmental assessment**

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

- The factors specified in the guidelines *Is an EIS required?* (DUAP 1999) and *Roads and Related Facilities* (DUAP 1996) as required under clause 228(1)(b) of the Environmental Planning and Assessment Regulation 2000. The factors specified in clause 228(2) of the Environmental Planning and Assessment Regulation 2000 are also considered in Appendix A.

- Potential impacts on matters of national environmental significance under the EPBC Act 1999. Site-specific safeguards are provided to manage and minimise the identified potential impacts.

6.1 **Traffic and access**

6.1.1 **Existing environment**

**Road network**

**New England Highway (Kelly Street through Scone)**

The New England Highway functions as an arterial road, providing a connection between Newcastle in the Hunter area and Warwick in south east Queensland. The highway services the large rural agricultural areas of the Hunter and New England regions and forms part of the Sydney to Brisbane transport corridor.

The New England Highway in the vicinity of Scone, named Kelly Street within Scone, from south to north consists of:

- One lane in each direction with a speed limit of 100 kilometres per hour south of Scone
- Two traffic lanes in each direction with no median or parking between Gundy Road and Kingdon Street
- Two traffic lanes in each direction, parallel parking on both sides of the road and a solid median north of Kingdon Street
- Traffic lights at the intersection of Kelly Street and Liverpool Street
- Two traffic lanes in each direction, parallel parking on both sides of the road, a solid median and right turn bays to facilitate turns north of Liverpool Street
- One lane in each direction with no median north of Susan Street, with a level rail crossing which has flashing warning lights and boom gates
- One lane in each direction with a speed limit of 100 kilometres per hour north of Scone.

The speed limit along Kelly Street through Scone is 50 kilometres per hour. Currently the highway south of Scone carries about 8400 vehicles a day, peaking in town at about 14,000. About 8000 vehicles use the Kelly Street level crossing every day, including 1200 heavy vehicles.

**Gundy Road**

Gundy Road functions as a collector road to the south east of Scone. It is a rural road with low volumes of traffic that connects Scone with the rural town of Gundy. At its western end, within Scone, Gundy Road forms a priority intersection with the New England Highway to the south of the town centre.
Gundy Road is a two-way sealed road, with one lane in each direction and a marked centreline. A footpath is located on the northern side of Gundy Road between the New England Highway and Barton Street. Scone High School is located on Gundy Road about 100 metres east of the New England Highway. Gundy Road has a speed limited of 50 kilometres per hour with a 40 kilometre per hour school zone on week days.

**Kingdon Street**

Kingdon Street is a local road that intersects with Kelly Street to the east of the railway line. To the west of Kelly Street it is split by the railway line.

There is no vehicular access across the railway line with Kingdon Street west of the New England Highway having a cul-de-sac and connection to the rear of the shopping strip along the New England Highway. There is pedestrian and cyclist access across the railway, with a footpath on the southern side of Kingdon Street between the New England Highway and the railway.

To the west of the railway line, Kingdon Street functions as a local road and is a two-way sealed road with one lane in each direction and no centreline. Angled unmarked rear to kerb parking occurs on both sides of the road for the majority of its length. There are no formalised footpaths provided.

A narrow ford crossing (low water crossing) is located on Kingdon Street between Guernsey Street and Hill Street. This ford also marks the start of a 40 kilometre per hour school zone, with Scone Grammar School located between Hill Street and Aberdeen Street.

The speed limit along all sections of Kingdon Street is 50 kilometres per hour.

**Liverpool Street**

Liverpool Street functions as a sub-arterial road through Scone providing an east-west connection and forming part of the road system between Scone and Merriwa. Liverpool Street extends from Stafford Street in the east to Satur Road in the west. The section of Liverpool Street between the New England Highway and Satur Road is a two-way sealed road, with one lane in each direction and a road marked centreline.

Liverpool Street intersects with the New England Highway at a traffic light controlled intersection. This is currently the only traffic light controlled intersection in Scone.

Angled, unmarked rear to kerb parking occurs on the southern side of the Liverpool Street with parallel parking on the northern side of the road for the majority of the street's length. Footpaths are provided on both sides of the road between the New England Highway and Hill Street. The footpath continues on the southern side to Morse Street where it crosses under the road to the north side to continue along Liverpool Street and north on Satur Road.

There is a railway level crossing about 100 metres west of the New England Highway. The level crossing has warning lights and boom gates.

Scone Public School is located on Liverpool Street between Guernsey Street and Hill Street. A 40 kilometre per hour school zone operates in this location. Outside of the school zone hours the speed limit is 50 kilometres per hour.

**St Aubins Street**

St Aubins Street is segregated into two separate sections as follows:

- Park Street to the Great Northern Railway Line, north adjacent to the railway to Susan Street
- Great Northern Railway Line to Aberdeen Street.
There is no vehicle, pedestrian or cyclist access across the railway on St Aubins Street. To the west of the railway line, St Aubins Street in this location functions as a local road and is a two-way partly sealed road, with one lane in each direction and a grassed median with mature trees in the centre of the road. The median is not raised and there is currently no protection from the mature trees. Parallel parking occurs on both sides of the road for the majority of the length. There are no formalised footpaths provided.

The speed limit is 50 kilometres per hour.

**Aberdeen Street**

Aberdeen Street functions as a collector road providing a north-south link to the local roads on the western side of the New England Highway. Aberdeen Street extends from Forbes Street in the north to Kingdon Street in the south. Aberdeen Street is a two-way sealed road, with unsealed shoulders, one lane in each direction and no road marking. Aberdeen Street is a local traffic area with a speed limit of 50 kilometres per hour. There are no footpaths provided.

**Intersections and access**

There are a number of existing intersections and accesses along Kelly Street through Scone and surrounding residential streets and regional connector roads. The following are located in immediate proximity to the proposal (from south to north):

- New England Highway – private access to St Aubins property (west side)
- New England Highway – private access to Energy Australia substation (east side)
- New England Highway – private access to service station (east side)
- Kingdon Street – numerous accesses to various properties including Scone Golf Club, Scone Grammar School, Bill Rose Sports Complex and residential and rural properties. Kingdon Street intersects with Aberdeen Street and Wingen Street in the vicinity of the proposal
- Liverpool Street – numerous accesses to various residential and rural properties. Liverpool Street intersects with Aberdeen Street in the vicinity of the proposal
- Aberdeen Street (between Liverpool and Susan streets) – numerous accesses to various properties including Scone Rugby Union Club, Scone Park and residential and rural properties. Aberdeen Street intersects with Kingdon Street, Liverpool Street, St Aubins Street, Susan Street and Parker Street in the vicinity of the proposal
- St Aubins Street – this street is a no through road to the west of Aberdeen Street (east of the proposal) and provides access to four private properties
- Susan Street – this street provides access to private properties to the east of the proposal and one private property to the west of the proposal
- Parker, Mount and Forbes streets – these streets all terminate to the east of the proposal (at Aberdeen Street) and provide access to a number of private properties
- New England Highway – private access to service station, fast food restaurant and numerous private properties (west and east sides) on the eastern side of the proposal. There is one access to a private property to the west of the proposal.

**Level crossings**

There are currently two level crossings with vehicle and pedestrian/cyclist access, and one pedestrian/cyclist level crossing in the study area:

- Kelly Street (New England Highway) between Belmore Street and Muffett Street - Kelly Street reduces to one lane in each direction at the level crossing. The level crossing has advanced warning signs and road markings along with flashing warning lights and barriers. Kelly Street has a speed limit of 50 kilometres per hour at the location of the level crossing. The general frequency of trains at this level crossing is currently two trains per peak hour.
• Liverpool Street between Guernsey Street and Kelly Street (New England Highway) - This level railway crossing is about 100 metres west of the New England Highway. At the crossing there are two lanes on the west bound approach and one lane on the east bound approach. The level crossing has advanced warning signs and road markings along with flashing warning lights and barriers. The general frequency of trains at this level crossing is currently two trains per peak hour.

• Kingdon Street pedestrian/cyclist crossing - There is no vehicular access across the railway where it crosses Kingdon Street. Access for pedestrians and cyclists is provided. Signage is provided (look for trains and cyclists dismount).

Public transport

Bus services

There is limited public transport operating in the study area. Scone can be accessed by coach from Brisbane, Toowoomba, Armidale, Tenterfield and Sydney. There are two local bus services that operate between Scone and Muswellbrook which use Kelly Street and Liverpool Street. These are:

• 414 – Muswellbrook to Scone via Aberdeen. This service is operated by Osborn’s. There are five services per day, including two services from Scone High School.

• 415 – Muswellbrook to Scone via Denman. This service consists of one Denman-Scone mid-morning loop servicing Muswellbrook, Aberdeen, Scone and Denman.

Rail services

Scone can be accessed by rail from Moree, Armidale and Newcastle/Sydney. A summary of the rail services operating to/from Scone are provided in Table 6-1.

Table 6-1 Scone rail services and frequencies

<table>
<thead>
<tr>
<th>Rail service operator</th>
<th>Route</th>
<th>Service frequency (each direction)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSW TrainLink</td>
<td>To/from Newcastle</td>
<td>3 per day</td>
</tr>
<tr>
<td>NSW TrainLink</td>
<td>To/from Moree</td>
<td>1 per day</td>
</tr>
<tr>
<td>NSW TrainLink</td>
<td>To/from Armidale</td>
<td>1 per day</td>
</tr>
<tr>
<td>NSW TrainLink</td>
<td>To/from Sydney</td>
<td>2 per day</td>
</tr>
</tbody>
</table>

School bus services

Various bus operators service the local schools in and around Scone. There are five operators in total that facilitate 13 different routes. A summary of the local school services is provided in Table 6-2. These services generally only operate before and after school.

Table 6-2 Scone school bus routes

<table>
<thead>
<tr>
<th>Bus service operator</th>
<th>Route</th>
</tr>
</thead>
<tbody>
<tr>
<td>Howards Bus &amp; Charter</td>
<td>Murrurundi - Scone No 1</td>
</tr>
<tr>
<td>Howards Bus &amp; Charter</td>
<td>Murrurundi - Scone No 2</td>
</tr>
<tr>
<td>Howards Bus &amp; Charter</td>
<td>Scone - Parkville - Wingen</td>
</tr>
<tr>
<td>Kean’s Travel</td>
<td>Glenbawn - Aberdeen - Scone</td>
</tr>
<tr>
<td>Kean’s Travel</td>
<td>Kars Springs - Bunnan</td>
</tr>
<tr>
<td>Kean’s Travel</td>
<td>Satur - Scone</td>
</tr>
<tr>
<td>Bus service operator</td>
<td>Route</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>------------------------------</td>
</tr>
<tr>
<td>Kean’s Travel</td>
<td>Scone - Brawboy</td>
</tr>
<tr>
<td>Kean’s Travel</td>
<td>Scone - Middle Brook</td>
</tr>
<tr>
<td>Kylie Carter</td>
<td>Belltrees - Woolooma - Brumlo</td>
</tr>
<tr>
<td>OJ &amp; KE Cumberland</td>
<td>Puen Buen - Cliftlands - Scone</td>
</tr>
<tr>
<td>Royce &amp; Patrina Albury</td>
<td>Gundy - Isis River</td>
</tr>
<tr>
<td>Royce &amp; Patrina Albury</td>
<td>Scone - Ellerston</td>
</tr>
<tr>
<td>Royce &amp; Patrina Albury</td>
<td>Scone - Gundy</td>
</tr>
</tbody>
</table>

### Pedestrian and bicycle facilities

Sealed pedestrian footpaths are generally provided along both sides of Kelly Street (New England Highway) within the Scone Town Centre. The footpaths extend on the western side between Kingdon Street and Guernsey Street and on the eastern side between Susan Street and Gundy Street.

There is one traffic light controlled intersection within Scone located at the intersection of Kelly Street (New England Highway) and Liverpool Street. Marked pedestrian crossings are provided on all four approaches. There are several refuge islands for pedestrians to cross the New England Highway (Kelly Street):

- Between Kingdon Street and Liverpool Street
- Between Liverpool Street and St Aubins Street
- Between St Aubins Street and Susan Street
- About 20 metres north of Everleigh Court.

There are existing cycling facilities provided in Scone. Cycling paths extend from the west on Satur Road, east along Liverpool Street, south on Guernsey Street and east on Kingdon Street to Kelly Street.

There is a pedestrian / cyclist level crossing of the Great Northern Railway at Kingdon Street. This crossing is uncontrolled with signage provided to advise pedestrians and cyclists to check for trains prior to crossing.

No dedicated cycle lanes are currently provided along the New England Highway.

### Car parking

On road vehicle parking facilities are available on New England Highway (Kelly Street) north of Kingdon Street and north of Liverpool Street (parallel parking on both sides of the road). Angled, unmarked rear to kerb parking occurs on the southern side of Liverpool Street with parallel parking on the northern side of the road through to Aberdeen Street.

### Traffic volumes

Traffic counts were carried out for the proposal in March 2015. This survey identified that the New England Highway (south of Gundy Road) carries about 9560 vehicles per day (on week days) and the New England Highway (north of Everleigh Court) carries about 6261 vehicles per day (on week days). Existing traffic volumes are shown in Table 6-3. Based on historical traffic growth data 2015 modelled traffic data is also provided in Table 6-3. Note that data provided is for overall peak hours 8am to 9am and 4pm to 5pm. Traffic volumes may be different on individual roads at other times of day.
Table 6-3 Existing traffic volumes (2015)

<table>
<thead>
<tr>
<th>Location</th>
<th>Morning peak (8am – 9am)</th>
<th>Evenning peak (4pm – 5pm)</th>
<th>Weekday average (vehicles per day)</th>
<th>2015 modelled (vehicles per day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aberdeen Street – south of Liverpool Street</td>
<td>156</td>
<td>66</td>
<td>873</td>
<td>548</td>
</tr>
<tr>
<td>Liverpool Street – at Parsons Gully</td>
<td>606</td>
<td>596</td>
<td>6569</td>
<td>7213</td>
</tr>
<tr>
<td>Aberdeen Street – north of Liverpool Street</td>
<td>104</td>
<td>98</td>
<td>1002</td>
<td>584</td>
</tr>
<tr>
<td>St Aubins Street – east of Aberdeen Street</td>
<td>40</td>
<td>29</td>
<td>266</td>
<td>210</td>
</tr>
<tr>
<td>Liverpool Street – east of Aberdeen Street</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td>6109</td>
</tr>
<tr>
<td>Kelly Street – between Liverpool Street and St Aubins Street</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td>8732</td>
</tr>
</tbody>
</table>

ND = no data (traffic counts not carried out at these locations)

Level of service

Level of service is the standard measure used to assess the operational performance of the network and intersections. There are six levels of service, ranging from level of service A to level of service F. Level of service A represents the best performance, and level of service F the worst. A level of service D or better is considered to be an acceptable level of service.

The traffic assessment carried out for the proposal (GHD, 2015) revealed that intersections in both the morning and evening peaks experience small delays that are average and acceptable and that there is spare capacity in the network (Table 6-4).

Table 6-4 Existing level of service

<table>
<thead>
<tr>
<th>Intersection</th>
<th>Type</th>
<th>Morning peak - delay per vehicle (seconds)</th>
<th>Morning Peak - level of service</th>
<th>Evening peak - delay per vehicle (seconds)</th>
<th>Evening peak - level of service</th>
</tr>
</thead>
<tbody>
<tr>
<td>New England Highway / Liverpool Street</td>
<td>Signals</td>
<td>26</td>
<td>B</td>
<td>26</td>
<td>B</td>
</tr>
<tr>
<td>New England Highway / Susan Street</td>
<td>Priority</td>
<td>10</td>
<td>A</td>
<td>11</td>
<td>A</td>
</tr>
<tr>
<td>New England Highway / Gundy Street</td>
<td>Priority</td>
<td>15</td>
<td>B</td>
<td>15</td>
<td>B</td>
</tr>
<tr>
<td>Liverpool Street / Aberdeen Street</td>
<td>Priority</td>
<td>14</td>
<td>A</td>
<td>15</td>
<td>B</td>
</tr>
<tr>
<td>Intersection</td>
<td>Type</td>
<td>Morning peak - delay per vehicle (seconds)</td>
<td>Morning Peak - level of service</td>
<td>Evening peak - delay per vehicle (seconds)</td>
<td>Evening peak - level of service</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>-------</td>
<td>------------------------------------------</td>
<td>---------------------------------</td>
<td>------------------------------------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>St Aubins Street / Aberdeen Street</td>
<td>Priority</td>
<td>1</td>
<td>A</td>
<td>1</td>
<td>A</td>
</tr>
</tbody>
</table>

**Crash history**

The existing intersections on the New England Highway (Kelly Street) between Common Road and 300 metres south of Gundy Road and Liverpool Street between Satur Road and Stafford Street have a history of intersection related crashes. Roads and Maritime data indicates that there have been a total of 29 crashes in the five year period to the end of June 2014. There were no fatalities recorded during this period.

Table 6-5 provided a detailed summary of crash history and contributing factors for New England Highway (Kelly Street) and Liverpool Street.

**Table 6-5 Crash history**

<table>
<thead>
<tr>
<th>Crash history</th>
<th>New England Highway</th>
<th>Liverpool Street</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of highway segment (kilometres)</td>
<td>4</td>
<td>1.8</td>
</tr>
<tr>
<td>Total crashes</td>
<td>29</td>
<td>17</td>
</tr>
<tr>
<td>Fatal crashes/fatalities</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Crashes that occurred at intersections</td>
<td>22</td>
<td>8</td>
</tr>
<tr>
<td>Crashes resulting in injuries/number of injuries</td>
<td>17/20</td>
<td>9/11</td>
</tr>
<tr>
<td>Rear-end crashes</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>Crashes where opposing vehicles were turning</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Crashes resulting in vehicles leaving the road</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Crashes where speed was a contributing factor</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Crashes where fatigue was a contributing factor</td>
<td>1</td>
<td>5</td>
</tr>
</tbody>
</table>

**6.1.2 Potential impacts**

**Construction**

*Partial road closures and construction speed limits*

The proposal would require modified arrangements for portions of the existing New England Highway (at the southern and northern ties ins), Kingdon Street, Liverpool Street and St Aubins Street during various stages of construction. Construction speed limits (typically 40 kilometres per hour) would also apply to road segments within and directly adjacent to the construction site. These could lead to short term travel delays for motorists, but it is anticipated that these impacts would be localised and of a short duration.
Construction is expected to take about two years and impacts would be variable throughout this period depending on the construction stage. Construction staging would be developed to minimise impacts on the road network. Where possible, construction activities that could substantially affect traffic congestion would be carried out outside peak periods, as far as is practicable.

**Construction traffic generation**

Construction of the proposal would generate heavy vehicle movements. These heavy vehicle movements would mainly be associated with:

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

Light vehicle movements would be required for the movement of construction personnel, including contractors, site labour force and specialist supervisory personnel.

Construction vehicles would access the site via arterial roads wherever possible. About 50 heavy vehicles would be required on-site per day, resulting in about 100 heavy vehicles movements in and out of the site per day. In addition, small vehicles would be required to transport staff, resulting in about 60 small vehicle movements in and out of the site per day. Small vehicles used to transport staff to and from the site would park at one of the site compound facilities to either the north or south of the Scone town centre.

Construction vehicles would access the site via the New England Highway and Liverpool Street wherever possible. It is not anticipated that the proposal would have a high degree of impact on the Scone town centre as construction vehicles should access the construction area either to the north, south and west of the Scone town centre.

The estimated construction traffic movements are small when compared to the existing traffic volumes in the area (Table 6-3) and are not expected to result in any impacts to the traffic and transport environment of the study area.

Short-term manual traffic control may be used to manage heavy vehicle entry and exit from the construction site and compound. This may result in minor traffic delays for motorists, however, these delays would be localised and of a short duration.

**Intersections and access**

Potential impacts associated with construction of the proposal may include access disruptions at existing intersections and accesses for property owners within proximity to the proposal site. Vehicular access to some properties may be restricted for short periods during the construction works. Where access to property would be disrupted for an extended period, alternative access would be provided. As the proposal would be constructed progressively, this would minimise the duration of time that access would be impacted. Pedestrian access to properties would be maintained at all times.

Heavy vehicle traffic would be restricted, as much as possible, to the regional road network to minimise impacts on local roads.

Potential impacts would be managed through the development of a construction traffic management plan and appropriate consultation with affected parties.

**Public transport**

There is no expected impact on public transport. All existing bus services would be maintained during construction. Bus detours would not be required.
Pedestrians and cyclists

There are no expected substantial impacts on pedestrian footpaths or cyclist access. During some stages of construction temporary restrictions or alternative arrangements may be required.

Operation

Speed limits

The proposal would result in a bypass of Scone with a speed limit of 100 kilometres per hour. The speed limit along Kelly Street would remain unchanged at 50 kilometres per hour. Speed limits on all other local roads would also not be altered as a result of the proposal.

Impacts on local roads

The traffic assessment carried out for the proposal (GHD, 2015) included projected traffic volumes for 2017 and 2027 on the proposal and other local roads. Table 6-6 summarises the projected traffic volumes using the proposal in 2017 and 2027.

Table 6-6 Projected traffic volumes on the proposal – weekday averages

<table>
<thead>
<tr>
<th>Location</th>
<th>2017 (vehicles per day)</th>
<th>2027 (vehicles per day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proposal – north of St Aubins Street</td>
<td>4075</td>
<td>4797</td>
</tr>
<tr>
<td>Proposal – south of St Aubins Street</td>
<td>5776</td>
<td>7335</td>
</tr>
</tbody>
</table>

Table 6-7 provides a comparison of the average weekday traffic on local roads for 2015 (modelled existing traffic) with the 2027 ‘do minimum’ and 2027 'with proposal' scenarios. In this case the ‘do minimum’ scenario involves no changes to the existing highway through Scone.

These results indicate the following:

- Without construction of the proposal traffic along Kelly Street (between Liverpool and St Aubins streets) would increase from 8732 to 10,481 vehicles per day
- With construction of the proposal the projected future traffic (2027) along Kelly Street (between Liverpool and St Aubins streets) and on Liverpool Street (east of Aberdeen Street) reduce substantially when compared to the ‘do minimum’ case and are below the existing 2015 modelled traffic volumes
- With construction of the proposal the projected future traffic (2027) on Aberdeen and St Aubins streets would increase substantially due to vehicles using the at grade intersection at St Aubins Street.

Overall these results show that there would be a benefit within the Scone town centre with construction of the proposal due to through traffic bypassing the town and the shift in local traffic using the at grade intersection at St Aubins Street to enter and exit the proposal. However these altered traffic patterns would result in a substantial increase in traffic using Aberdeen Street and an increase in traffic using St Aubins Street and potentially resulting in amenity impacts and safety concerns for local residents.

Table 6-7 Existing and projected traffic volumes on local roads – weekday averages

<table>
<thead>
<tr>
<th>Location</th>
<th>2015 (vehicles per day)</th>
<th>2027 do minimum (vehicles per day)</th>
<th>2027 with proposal (vehicles per day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aberdeen Street – south of Liverpool Street</td>
<td>548</td>
<td>642</td>
<td>840</td>
</tr>
<tr>
<td>Location</td>
<td>2015 (vehicles per day)</td>
<td>2027 do minimum (vehicles per day)</td>
<td>2027 with proposal (vehicles per day)</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>-------------------------</td>
<td>-------------------------------------</td>
<td>---------------------------------------</td>
</tr>
<tr>
<td>Liverpool Street – at Parsons Gully</td>
<td>7213</td>
<td>8947</td>
<td>8921</td>
</tr>
<tr>
<td>Aberdeen Street – north of Liverpool Street</td>
<td>584</td>
<td>696</td>
<td>2761</td>
</tr>
<tr>
<td>St Aubins Street – east of Aberdeen Street</td>
<td>210</td>
<td>256</td>
<td>483</td>
</tr>
<tr>
<td>Liverpool Street – east of Aberdeen Street</td>
<td>6109</td>
<td>7619</td>
<td>5421</td>
</tr>
<tr>
<td>Kelly Street – between Liverpool Street and St Aubins Street</td>
<td>8732</td>
<td>10,481</td>
<td>6199</td>
</tr>
</tbody>
</table>

**Future intersection performance**

The traffic assessment carried out for the proposal (GHD, 2015) included intersection performance for 2027 based on project traffic growth and included comparison of the ‘with proposal’ and a ‘do minimum’ scenarios (Table 6-8 and Table 6-9). In this case the ‘do minimum’ scenario involves no changes to the existing highway through Scone.

The results indicate that by building the proposal there are improvements in intersection performance at the New England Highway (Kelly Street) intersections with Liverpool Street and Gundy Road for both the morning and evening peak periods. There is also an improvement in the performance of the New England Highway (Kelly Street) level crossing for the morning peak period.

The level of performance of the proposed intersection with St Aubins Street and the New England Highway (north and south of Scone) all operate at a level of service A.
### Table 6-8  Modelled intersection level of service (2027) – do minimum case

<table>
<thead>
<tr>
<th>Intersection</th>
<th>Type</th>
<th>Morning peak - delay per vehicle (seconds)</th>
<th>Morning peak - level of service</th>
<th>Evening peak - delay per vehicle (seconds)</th>
<th>Evening peak - level of service</th>
</tr>
</thead>
<tbody>
<tr>
<td>New England Highway / Liverpool Street</td>
<td>Traffic lights</td>
<td>30</td>
<td>C</td>
<td>29</td>
<td>C</td>
</tr>
<tr>
<td>Liverpool Street level crossing</td>
<td>Traffic lights</td>
<td>21</td>
<td>B</td>
<td>19</td>
<td>B</td>
</tr>
<tr>
<td>New England Highway level Crossing</td>
<td>Traffic lights</td>
<td>15</td>
<td>B</td>
<td>16</td>
<td>B</td>
</tr>
<tr>
<td>New England Highway / Susan Street</td>
<td>Priority</td>
<td>11</td>
<td>A</td>
<td>13</td>
<td>A</td>
</tr>
<tr>
<td>New England Highway / Gundy Street</td>
<td>Priority</td>
<td>22</td>
<td>B</td>
<td>18</td>
<td>B</td>
</tr>
<tr>
<td>Liverpool Street / Aberdeen Street</td>
<td>Priority</td>
<td>15</td>
<td>B</td>
<td>12</td>
<td>A</td>
</tr>
<tr>
<td>St Aubins Street / Aberdeen Street</td>
<td>Priority</td>
<td>2</td>
<td>A</td>
<td>1</td>
<td>A</td>
</tr>
</tbody>
</table>

### Table 6-9  Modelled intersection level of service (2027) – with the proposal

<table>
<thead>
<tr>
<th>Intersection</th>
<th>Type</th>
<th>Morning peak - delay per vehicle (seconds)</th>
<th>Morning peak - level of service</th>
<th>Evening peak - delay per vehicle (seconds)</th>
<th>Evening peak - level of service</th>
</tr>
</thead>
<tbody>
<tr>
<td>New England Highway / Liverpool Street</td>
<td>Traffic lights</td>
<td>27</td>
<td>B</td>
<td>26</td>
<td>B</td>
</tr>
<tr>
<td>Liverpool Street level crossing</td>
<td>Traffic lights</td>
<td>17</td>
<td>B</td>
<td>20</td>
<td>B</td>
</tr>
<tr>
<td>New England Highway level Crossing</td>
<td>Traffic lights</td>
<td>13</td>
<td>A</td>
<td>16</td>
<td>B</td>
</tr>
<tr>
<td>New England Highway / Susan Street</td>
<td>Priority</td>
<td>9</td>
<td>A</td>
<td>9</td>
<td>A</td>
</tr>
<tr>
<td>New England Highway / Gundy Street</td>
<td>Priority</td>
<td>7</td>
<td>A</td>
<td>6</td>
<td>A</td>
</tr>
<tr>
<td>Intersection</td>
<td>Type</td>
<td>Morning peak - delay per vehicle (seconds)</td>
<td>Morning peak - level of service</td>
<td>Evening peak - delay per vehicle (seconds)</td>
<td>Evening peak - level of service</td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>--------</td>
<td>------------------------------------------</td>
<td>---------------------------------</td>
<td>-------------------------------------------</td>
<td>--------------------------------</td>
</tr>
<tr>
<td>Liverpool Street / Aberdeen Street</td>
<td>Priority 16</td>
<td>B</td>
<td>12</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>St Aubins Street / Aberdeen Street</td>
<td>Priority 3</td>
<td>A</td>
<td>3</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>St Aubins Street / proposal</td>
<td>Priority 10</td>
<td>A</td>
<td>10</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Proposal / New England Highway (north)</td>
<td>Priority 13</td>
<td>A</td>
<td>12</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Proposal / New England Highway (south)</td>
<td>Priority 11</td>
<td>A</td>
<td>11</td>
<td>A</td>
<td></td>
</tr>
</tbody>
</table>

**Access**

Existing intersections and access arrangements to the majority of properties including the Scone Grammar School, Bill Rose Sports Complex, Scone Rugby Union Club and Scone Park would not be affected by the proposal. The following access arrangements would be modified as required (from south to north):

- **St Aubins property (New England Highway, west side)** – the existing access to the New England Highway would be modified to suit the proposal and provide for all turning movements. Access into Scone would be available either via the at grade intersection on the southern side of Scone or at St Aubins Street
- **AusGrid substation (New England Highway, east side)** – the existing access to the New England Highway would be modified to suit the proposal and provide for left in, left out and right out turning movements. Vehicles travelling from the south would access the site by using the at grade intersection south of Scone and then head north towards Scone and turn around in a side street, for example Gundy Road, before travelling back south to the site
- **Service station (New England Highway, east side)** – the existing access to the New England Highway would be modified to suit the proposal and provide for all turning movements. Vehicles using the bypass would access the service station via the at grade intersection south of Scone
- **Scone Golf Club** – the proposal would separate the golf clubhouse from the golf course. Suitable access would be provided beneath the bridge that commences adjacent to the golf clubhouse
- **Kingdon Street** – all existing access would continue to be available beneath the bridge structure
- **Liverpool Street** – all existing access would continue to be available beneath the bridge structure
- **Aberdeen Street (between Liverpool and Susan streets)** – all existing access would be unaffected
- **St Aubins Street** – this street would be connected to the proposal by an at grade intersection. Existing private property access in St Aubins Street would be retained and modified as required to suit the proposal
- **Susan Street** – the single private property to the west of the proposal would be provided with alternative access off the western edge of the proposal to connect with the existing access
- **Private property (New England Highway, west side)** – all existing access would be retained and modified as required to suit the proposal
• Private property (New England Highway, east side) – all existing private property access would be retained and modified as required to suit the proposal. Access to the north along the existing highway for these properties would be provided by the at grade intersection on the north side of Scone. This would require vehicles to travel south towards Scone and turn around in a side street before heading back north to the at grade intersection.

• Private property (New England Highway, west side) – the existing access would be severed by the proposal and alternative access would be provided off the western edge of the proposal to connect with the existing access.

**On-road parking**

There are no anticipated impacts of the proposal on parking.

**Public transport**

There are no anticipated impacts on local public transport as a result of the proposal. Some bus services could experience minor improvements due to the decongestion benefits on Kelly Street in Scone.

**Pedestrian and bicycle facilities**

There are no anticipated impacts on existing pedestrian and cyclist facilities as a result of the proposal. The existing shared path along the southern side of Liverpool Street would be modified to suit the proposal. Cyclists would be able to use the road shoulders on the proposal. Due to the expected reduction in traffic volumes on Kelly Street and Liverpool Street, crossing and cycling on the road is likely to be safer.

**Road user safety**

The safety of all road users including pedestrians, cyclists and motorists would be improved during operation of the proposal. Diversion of traffic to the bypass would reduce the volume of traffic on Kelly Street and Liverpool Street and is expected to reduce the incidence of intersection-related crashes.

**Summary of operational impacts**

In summary, during operation the proposal would result in the following positive traffic and transport impacts:

- Removal of the last level crossing on the New England Highway and elimination of the potential access constraint for emergency services and the public to the western side of the Great Northern Railway in Scone
- Reduced traffic congestion along Kelly Street within Scone
- Reduced travel times and vehicle operating costs
- Improved operational efficiency and safety on local roads within the Scone town centre.
- Improved intersection performance.

In summary, during operation the proposal would result in the following negative traffic and transport impacts:

- An increase in traffic using Aberdeen Street and St Aubins Street potentially resulting in amenity impacts and safety concerns for local residents
- Altered access arrangements for a number of properties.
### 6.1.3 Safeguards and management measures

Mitigation measures provided in Table 6-10 will be implemented to minimise potential impacts on traffic and access.

**Table 6-10  Summary of potential impacts and environmental safeguards – traffic and access**

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access to properties</td>
<td>Residents and businesses will be notified of any specific impacts to property access and arrangements required during construction.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td></td>
<td>Roads and Maritime will continue to consult with all properties that will have altered access following construction of the proposal.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td>Altered traffic patterns</td>
<td>Roads and Maritime will continue to consult with residents likely to be affected by increased traffic on St Aubins and Aberdeen streets to minimise amenity impacts and address safety concerns.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td>Construction traffic management</td>
<td>A detailed construction traffic management plan will be prepared in accordance with <em>Traffic Control at Work Sites Manual Version 4</em> (RTA, 2010) and <em>Specification G10 - Control of Traffic</em>. The plan will be approved by Roads and Maritime before implementation to provide a comprehensive and objective approach to minimise any potential impacts on road network operations during construction.</td>
<td>Construction contractor</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>Traffic</td>
<td>The plan will focus on maintaining general traffic flow and providing appropriate site accesses and construction traffic routes and will include measures such as: Hours of operation, including prohibitions on queuing outside sites prior to commencement of working hours Restrictions on delivery times and access (arterial roads would be used wherever possible) Special control arrangements (such as warning signs or lights) at site accesses Road safety audit requirements. Any localised improvements/adjustments to existing traffic management arrangements. Arrangements for pedestrians and cyclists. The plan will be reviewed if complaints are received.</td>
<td>Construction contractor</td>
<td>Pre-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>Congestion and safety</td>
<td>Traffic control will be provided in accordance with the approved construction traffic management plan to manage and regulate traffic movements during construction.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>Access to properties</td>
<td>Property access will be maintained at all times where practicable.</td>
<td>Construction contractor and Roads and Maritime</td>
<td>Construction</td>
</tr>
<tr>
<td>Access to properties</td>
<td>Where changes to access arrangements are necessary, Roads and Maritime will advise owners and tenants and consult with them in advance regarding alternate access arrangements.</td>
<td>Construction contractor and Roads and Maritime</td>
<td>Construction</td>
</tr>
<tr>
<td>Pedestrian and cyclist access</td>
<td>Pedestrian and cyclists connectivity across the site will be maintained during construction.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
</tbody>
</table>

6.2 **Biodiversity**

This section addresses the potential terrestrial and aquatic biodiversity impacts associated with the proposal and details the management measures proposed to mitigate these impacts.

6.2.1 **Methodology**

The methodology for the terrestrial and aquatic flora and fauna assessment is described below.

**Database searches and literature review**

A desktop review was carried out to help determine the conservation significance of the proposal site and to identify threatened species, populations and ecological communities listed under the TSC Act and FM Act and matters of national environmental significance (MNES) listed under the EPBC Act that may occur in the locality, based on previous records, known distribution ranges, and habitats present. Biodiversity databases and literature pertaining to the subject site and locality (within a 10 kilometre radius of the site) that were reviewed prior to conducting field investigations included:

- The Commonwealth Department of the Environment (DoTE) Protected Matters Search Tool (PMST) for relevant MNES listed under the EPBC Act (DoTE 2015a)
- The OEH Wildlife Atlas database (licensed) for records of threatened species, populations and endangered ecological communities listed under the TSC Act that have been recorded within a 10 kilometre radius of the site (OEH 2015a)
- OEH threatened biota profiles for descriptions of the distribution and habitat requirements of threatened biota (OEH, 2015b). This resource was used to identify the suite of threatened biota that could potentially be affected by the proposal and to inform habitat assessments
- Department of Primary Industries (DPI) Threatened and Protected Species Records Viewer for threatened species listed on the FM Act previously recorded within the Upper Hunter Shire Council area (DPI 2015)
- OEH (2014b) online threatened biodiversity profiles for endangered ecological communities (EECs) known to occur within the locality (Hunter Central Rivers Catchment Management Area)
- The NSW Vegetation Information System for information regarding vegetation types (OEH, 2015c)
- DPI Noxious Weeds Database for information regarding noxious weeds (DPI 2015a).
Likelihood of occurrence of threatened species

Following collation of database records and species and community profiles a ‘likelihood of occurrence’ assessment was prepared with reference to the broad habitats contained within the study area. The likelihood of threatened and migratory biota occurring in the study area was assessed based on presence of records from the locality, species distribution and habitat preferences, and quality of potential habitat present. The results of this assessment are provided in Appendix C.

Field survey

Field surveys of the proposal site were conducted by two ecologists on 28 – 30 January 2015. A supplementary survey was also completed on the 27 November 2015 to survey the southern end of the proposal site.

A combination of random meander and targeted searches for threatened species was used to survey the proposal site and to map vegetation communities.

All vascular plants (not mosses, lichens or fungi) identified during the survey were recorded on field data sheets. Plant specimens that could not be identified rapidly in the field were collected and subsequently identified using the Flora of NSW (Harden 1993-2007). Plant specimens that were problematic to identify (either insufficient sample collected or no reproductive material available at the time of the survey) were identified to genus level.

Information regarding vegetation structure and disturbance history was also recorded throughout the study area.

Searches for potential habitat for threatened fauna species included but were not limited to:

- Koala feed trees
- Hollow-bearing trees
- Potential roosts for microchiropteran bats
- Vegetated ponds, riparian vegetation and drainage lines for frogs and waterbirds.

The fauna survey comprised:

- Two days of diurnal bird and reptile surveys
- Two nights of spotlighting for threatened microbats, arboreal mammals and owls
- Two nights of stag watching
- Deployment of a bat call recording device (Anabat) to record microchiropteran bats.

Ground debris searches were also carried out during the survey while traversing the site. These included active searches for small fauna and opportunistic observation of fauna activity such as scats, tracks, burrows or other traces. Opportunistic and incidental observations of fauna species were recorded during field surveys.

Field survey methods and effort are summarised in Table 6-11 and shown on Figure 6.1.
<table>
<thead>
<tr>
<th>Survey</th>
<th>Survey method</th>
<th>Description</th>
<th>Survey effort</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flora survey</td>
<td>Vegetation mapping</td>
<td>Broad-scale vegetation survey including vegetation mapping according to the NSW Vegetation Information System. The floristic and structural information recorded within each vegetation type was used to identify and describe the nominated vegetation types, identify threatened ecological communities and determine the conservation status of vegetation types under the TSC Act and EPBC Act. An inventory of noxious weeds present in the study area was also compiled and significant infestations mapped.</td>
<td>Four quadrats and about 16 hours of random meander over four days (28 - 30 January 2015 and 27 November 2015).</td>
</tr>
<tr>
<td></td>
<td>Biobanking 20 x 50 m quadrat /plots</td>
<td>Quantitative data was collected describing the condition of vegetation in terms of floristics, structure and habitat using the site value metrics defined in the methodology presented in the BioBanking Assessment Methodology (OEH 2014).</td>
<td>Four quadrats over three days (28 - 30 January 2015)</td>
</tr>
<tr>
<td></td>
<td>Random meander</td>
<td>Random meander transects were carried out through the study area in accordance with the methods outlined in Cropper (1993)</td>
<td>16 hours over three days (28 - 30 January 2015)</td>
</tr>
<tr>
<td></td>
<td>Rapid flora assessments</td>
<td>Rapid flora surveys were completed in areas of predominantly exotic vegetation. These surveys included recording dominant species within the ground, mid and canopy layer.</td>
<td>8 hours over three days (28 - 30 January 2015)</td>
</tr>
<tr>
<td>Fauna survey</td>
<td>Habitat assessment</td>
<td>Surveys involved targeted searches for resources of relevance to native fauna and in particular threatened species, including, tree-hollows and stags, water bodies and drainage lines. Indirect evidence of fauna (ie scats, feathers, fur, tracks, dens, nests, scratches, chew marks and owl wash) was also recorded.</td>
<td>The entire proposal site was surveyed over three days (28 - 30 January 2015)</td>
</tr>
<tr>
<td></td>
<td>Hollow-bearing tree assessment</td>
<td>The proposal site was traversed and hollow-bearing trees recorded using a differential GPS. Features recorded comprised tree species, number of hollows, estimated diameter of hollows, and presence of scratch marks and other signs of faunal activity.</td>
<td>The entire proposal site was surveyed over three days (28 - 30 January 2015)</td>
</tr>
<tr>
<td></td>
<td>Amphibian and reptile searches</td>
<td>Active reptile and amphibian searches involved searching potential basking sites during daylight hours, lifting up debris that may provide habitat for and identifying those observed or captured.</td>
<td>2 hours over three days (28 - 30 January 2015)</td>
</tr>
<tr>
<td>Survey</td>
<td>Survey method</td>
<td>Description</td>
<td>Survey effort</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>------------------------------------------------------</td>
</tr>
<tr>
<td>Nocturnal amphibian searches</td>
<td></td>
<td>Active searches for frogs were performed within the study area focussing on areas of suitable habitat, including small ponds and/or pools of standing water and drainage lines. Frogs were identified by sight and call. Call playback for threatened species was not used, given the lack of specific habitat for any threatened frog species within the study area.</td>
<td>2 hours over three days (28-30 January 2015)</td>
</tr>
<tr>
<td>Diurnal bird survey</td>
<td></td>
<td>Bird surveys were conducted at dusk and dawn for a period of 30 minutes using the point count method. All birds heard and seen during these times were recorded. Any incidental recordings of bird species during other survey activities were also noted.</td>
<td>4 person hours over three days (28-30 January 2015)</td>
</tr>
<tr>
<td>Stag watching</td>
<td></td>
<td>Hollow bearing trees within the study area were observed for signs of wildlife emerging from hollows. Stag watching began about 15 minutes prior to sunset and continued for 15 minutes after sunset.</td>
<td>2 person hours over two nights (28 and 29 January 2015)</td>
</tr>
<tr>
<td>Microchiropteran bat surveys</td>
<td></td>
<td>Stationary Anabat recordings were taken at two locations along Parsons Gully. Recording commenced about half an hour before dusk and continued until the following morning.</td>
<td>32 hours over three nights (28-30 January 2015)</td>
</tr>
<tr>
<td>Spotlighting</td>
<td></td>
<td>Spotlighting for arboreal fauna and nocturnal avifauna was carried out over two nights. Two ecologists traversed the study area over two nights and all species heard or seen were noted.</td>
<td>4 person hours over two nights (28 and 29 January 2015)</td>
</tr>
</tbody>
</table>

### 6.2.2 Existing environment

**Flora species**

A total of 153 species of flora were recorded within the study area, comprising 70 native, 74 exotic and nine planted native species. The majority of these species comprised grasses and herbs with there being very few remnant shrubs or trees throughout the study area.

No threatened flora species were recorded within the study area. The full list of plant species recorded is presented in Appendix D. Species recorded are discussed below in relation to the vegetation communities occurring within the study area.

**Noxious and environmental weeds**

Three species declared as noxious weeds in the Upper Hunter local government area were identified within the study area, these include:

- African Box-thorn (*Lycium ferocissimum*)
- Fireweed (*Senecio madagascariensis*)
- Weeping Willow (*Salix babylonica*).
Within the study a small number of African Box-thorn (*Lycium ferocissimum*) which is a class 3 noxious weed were recorded on one property located immediately north of Susan Street. Fireweed (*Senecio madagascariensis*) occurs in low densities throughout the study area and Weeping Willows (*Salix babylonica*) species are present along Parsons Gully in the vicinity of Bill Rose Sports Complex and immediately north of Kingdon Street. Fireweed and Weeping Willows are both listed as Class 4 noxious weeds within the Upper Hunter local government area.

In addition to this noxious weed there are a number of environmental weeds present within and in the surrounding areas of native vegetation. These include Paspalum (*Paspalum dilatatum*), Rumex (*Rumex crispus*) and Paddy's Lucerne (*Sida rhombifolia*).

The distribution of noxious and environmental weeds in the study area is closely tied to disturbance, with cleared paddocks dominated by exotic plant species. Surface water and nutrient flows would also be contributing to the observed weed infestation within vegetation adjacent to drainage lines featuring heavier infestation with exotic species than drier woodland upslope.

Water bodies in the study area appeared to be free of aquatic noxious weeds such as Alligator weed (*Alternanthera philoxeroides*) and Water Hyacinth (*Eichhornia crassipes*).

**Vegetation types**

Overall the study area is highly modified with very little remnant native vegetation. The majority of the study area occurs in cleared paddocks dominated by exotic grasses and weeds, including Paspalum (*Paspalum dilatatum*), Buffalo Grass (*Stenotaphrum secundatum*), Couch (*Cynodon dactylon*), Kikuyu (*Pennisetum clandestinum*) and Purpletop (*Verbena bonariensis*).

Throughout the study area there are occasional, isolated trees and shrubs. These are predominantly exotic or planted native species, including River Red Gum (*Eucalyptus camaldulensis*), Silky Oak (*Grevillia robusta*), Crepe Myrtle (*Lagerstroemia* sp.), Cadagi Tree (*Corymbia torelliana*), Norfolk Island Hibiscus (*Lagunaria patersonia*), River Oak (*Casuarina cunninghamiana* subsp. *cunninghamiana*), Desert Ash (*Fraxinus angustifolia* subsp. *angustifolia*) and Golden Wreath Wattle (*Acacia saligna*).

Vegetation within the study area has been divided into four broad vegetation types, two of which comprise exotic vegetation one of which comprises exotic vegetation with scattered remnant trees and one which consists of a highly modified native vegetation community. These vegetation types are listed in Table 6-12 and described below.

<table>
<thead>
<tr>
<th>Vegetation type</th>
<th>TSC Act status</th>
<th>EPBC Act status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Derived native grassland</td>
<td>Not listed</td>
<td>Not listed</td>
</tr>
<tr>
<td>Potential derived native grassland</td>
<td>Not listed</td>
<td>Not listed</td>
</tr>
<tr>
<td>Exotic grassland with planted trees and scattered remnant trees</td>
<td>Not listed</td>
<td>Not listed</td>
</tr>
<tr>
<td>Exotic grassland</td>
<td>Not listed</td>
<td>Not listed</td>
</tr>
<tr>
<td>Planted trees</td>
<td>Not listed</td>
<td>Not listed</td>
</tr>
</tbody>
</table>
**Derived native grassland**

Derived native grasslands are native grasslands that remain after the clearing or dieback of previous woody canopy vegetation. This vegetation type represents a highly modified form of the original community that would have once occurred on the site. Within the study area derived native grasslands occur at the northern and southern ends of the alignment (refer to Figure 6.1). These properties have been grazed and although dominated by native grasses they also contain a high abundance of exotic pastoral grasses and exotic forbs. A small patch of potential derived grassland also occurs on the western side of the New England Highway at the southern end of the proposal. This area was not assessed in detail as land access was not available. This area was therefore assessed from the adjacent road reserve.

Common species within these derived grasslands include Windmill Grass (Chloris truncata), Spring Grass (Eriochloa procera), Queensland Blue Grass (Dichanthium sericeum), Paspalidium distans, Plains Grass (Austrostipa aristiglumis), Common Rush (Juncus usitatus), Wallaby Grasses (Austrodonanthis spp.), Pigweed (Portulaca oleracea), Climbing Saltbush (Einadia nutans), Black Rolypoly (Sclerolaena muricata), Brigalow Burr (Sclerolaena tetracuspis), Black Cotton Bush (Maireana decalvans) as well as the exotic species Urochloa Grass (Urochloa panicoides), Paspalum (Paspalum dilatatum), White Clover (Trifolium repens), Dock (Rumex crispus), Spear thistle (Cirsium vulgare), Wireweed (Polygonum aviculare) and Pattie’s Lucerne (Sida rhombifolia).

Plate 6-1 provides an example of the derived native grasslands that are present within the study area.

In accordance with the definitions for vegetation condition in the biobanking assessment methodology this vegetation would be considered to be in low condition.

**Exotic grassland with planted trees and scattered remnant trees**

Exotic grassland with planted trees and scattered remnant trees occurs within the Scone golf course and Bill Rose Sports Complex. This vegetation consists of cleared land with a small number of scattered remnant Forest Red Gum (Eucalyptus tereticornis) and Yellow Box (Eucalyptus melliodora), along Parsons Gully Creek, many of which contain large hollows. Native vegetation within the shrub layer in these areas has been largely cleared to accommodate the golf course and sporting fields and the ground layer consists primarily of turf grass species such as Couch (Cynodon dactylon) and Kikuyu (Pennisetum clandestinum) which have been planted on fairways and greens.

Within the golf course and sporting fields there are also patches of planted native trees along the ephemeral drainage channel of Parsons Gully and surrounding fairways and sporting fields. Common planted species in these areas include River Red Gum (Eucalyptus camaldulensis), Silky Oak (Grevillia robusta), Norfolk Island Hibiscus (Lagunaria patersonia), River Oak (Casuarina cunninghamiana subsp. cunninghamiana), Desert Ash (Fraxinus angustifolia subsp. angustifolia) and Golden Wreath Wattle (Acacia saligna).

The canopy cover of this community is about 5 per cent and there is less than 10 per cent native ground cover.

In accordance with the definitions for vegetation condition in the biobanking assessment methodology this vegetation would be considered to be in low condition.

Plate 6-1, Plate 6-3 and Plate 6-4 illustrates examples of this vegetation type.
**Exotic grassland**

Exotic grassland is the dominant vegetation type within the study area. This vegetation occurs in paddocks, sporting fields and private property and is dominated by exotic grasses and herbs, including Paspalum (*Paspalum dilatatum*), Buffalo Grass (*Stenotaphrum secundatum*), Couch (*Cynodon dactylon*), Kikuyu (*Pennisetum clandestinum*), Spear thistle (*Cirsium vulgare*) and Purpletop (*Verbena bonariensis*). Refer to Plate 6-5 for an example of this vegetation type.

**Planted trees**

Throughout the study area there are numerous planted trees, these include plantings within Bill Rose Sports Complex and Scone Golf Course, revegetation along Parsons Gully and landscape plantings in private property and along property fence lines. Common species planted throughout the study area include River Red Gum (*Eucalyptus camaldulensis*), Silky Oak (*Grevillia robusta*), Crepe Myrtle (*Lagerstroemia* sp.), Cadagi Tree (*Corymbia torelliana*), Norfolk Island Hibiscus (*Lagunaria patersonia*), River Oak (*Casuarina cunninghamiana subsp. cunninghamiana*) and Desert Ash (*Fraxinus angustifolia* subsp. *angustifolia*). Planted trees within the study area occur over an exotic understorey comprised primarily of introduced grasses and herbs.

Planted vegetation within the study area is not considered to be a native vegetation community.

Plate 6-6 shows planted River Red Gums (*Eucalyptus camaldulensis*) north of Liverpool Street. These trees are located immediately adjacent to the proposal site.
Threatened ecological communities

The desktop literature review identified 21 endangered ecological communities listed under the TSC Act and nine threatened ecological community listed on the EPBC Act have been previously recorded in the study area or are predicted to occur in the locality.

No threatened ecological communities listed under the TSC Act or EPBC Act were recorded during the field assessment.

Threatened flora

The desktop review identified that seven threatened flora species listed under the EPBC Act and five threatened flora species listed under the TSC Act have been previously recorded or are predicted to occur in the locality. No threatened flora species were recorded during the field assessment and based on known habitat associations and the nature and condition of habitat available it is unlikely that any threatened flora species would occur within the proposal site. An assessment of the likelihood of threatened flora species to occur within the proposal site is provided in Appendix C.

Fauna species

A total of 43 fauna species were recorded within the study area, including four mammals, two frogs, two reptiles and 35 birds. The full list of fauna species recorded is presented in Appendix D.

Habitats types

The habitat assessment identified the following main habitat types across the proposal site and surrounding area.

Grasslands

Grasslands are the dominant habitat type within the study area. Grassland areas include areas dominated by exotic grasses and weeds as well as areas dominated by native grasses in the north and south of the area.

Grasslands at the site would support open country bird species and a limited suite of native reptiles and mammals. This vegetation type would provide minimal shelter opportunities and foraging resources due to the lack of structural diversity (absence of a canopy or shrub layer), lack of fallen timber and low levels of litter. The presence of cattle grazing in many of these areas would further limit the value of this habitat for native mammals, reptiles and granivorous birds.
Figure 6.1

Legend:
- Proposal site
- Cadastre
- Railway
- Watercourse
- Vegetation:
  - Cleared
  - Derived native grassland
  - Exotic grassland
  - Exotic grassland with planted trees and scattered remnant trees
  - Planted trees
  - Potential derived native grassland
  - Hollow bearing tree
  - Eucalyptus camadulensis (remnant)
  - Biobanking plot

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56


Roads and Maritime Services
HW9 New England Highway Scone Bypass
Review of Environmental Factors
Vegetation Types and Survey Effort
Sheet 1 of 5

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Figure 6.1

LEGEND

Proposal site

Vegetation

Exotic grassland with planted trees and scattered remnant trees

Planted trees

Waterbody

Hollow bearing tree

Eucalyptus camaldulensis (planted)

Biobanking plot

SHEET INDEX


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Job Number
Rev. 22-17554
Date 09 Dec 2015

Roads and Maritime Services

HW9 New England Highway Scone Bypass

Review of Environmental Factors

Vegetation Types and Survey Effort

Sheet 2 of 5
**Scattered trees with hollows**

Throughout the Scone Golf Course there are a number of scattered mature trees many of which contain hollows. Tree hollows are important for native fauna as diurnal or nocturnal shelter sites, for rearing young, for feeding, for thermoregulation, and to facilitate ranging behaviour and dispersal. An estimated 15 per cent of all terrestrial vertebrate fauna in Australia are dependent upon tree hollows and for many of these species the relationship is essential (ie no other habitat resource represents an adequate substitute (Gibbons and Lindenmayer, 2002)).

The study area contains 19 habitat trees, including hollow-bearing trees and stags (refer Figure 6.1). Overall the study area is likely to contain sufficient quantities of these resources to support local populations of hollow-dependant fauna.

It is unlikely that hollow bearing trees within the study area would provide habitat for threatened mammals as they are not connected to any adjacent areas of vegetation. These hollows may provide suitable diurnal roost sites for tree-roosting microbats, and are also likely to provide roost and nest sites for native parrots, including the Red-rumped Parrot and Galah, observed nesting during the field surveys.

**Planted vegetation**

Within the study area there are small patches of planted native vegetation and exotic plants within the Bill Rose Sports Complex as well as along Parsons Gully and within residential yards These trees and shrubs may provide some foraging resources for fauna, however as there is virtually no natural shelter such as rock fragments or woody debris and very patchy vegetation cover, these small patches of planted trees are only likely to support opportunistic species tolerant of fragmented landscapes. These may include native bird species such as the Australian Magpie and Australian Magpie-lark and exotic fauna such as the European Rabbit and Red Fox.

**Aquatic Habitat**

Two narrow ephemeral drainage lines occur within the study area. Despite heavy rain during and immediately preceding field surveys, water within creeks was confined to isolated pools. Stream flow within these creeks would likely be active only during and immediately following high rainfall periods. Flows would quickly recede and standing pools may persist providing some limited aquatic habitat. These may be utilised by aquatic macroinvertebrates, colonised through aerial pathways, although the period of habitability would likely be insufficient for stable communities to occur.

Given the limited aquatic habitat and highly ephemeral nature of the creeks they are ranked as Class 3 minimal fish habitat. These streams are considered Type 3 minimally sensitive key fish habitat (DPI 2013). The lack of connectivity to larger water bodies suggests that these creeks would be insufficient for colonisation or prolonged presence of any fish populations.

Frogs were heard calling from scattered water filled depressions. These included the Common Eastern Froglet (*Crinia signifera*) and the Stripped Marsh Frog (*Limnodynastes peronii*). No threatened frogs are likely to occur.

Waterways within the study area are likely to provide habitat for a range of wetland birds and may also provide foraging habitat for migratory species such as Cattle Egret (*Ardea ibis*) and Great Egret (*Ardea alba*) though the surrounding disturbed areas, traffic, grazing and other agricultural activities would limit their value for such species.

**Figtree Creek**

Figtree Creek intersects with Parsons Gully within the golf course and is in the southern portion of the study area. The creek is very narrow with the widest point being about three metres. The creek is of low habitat quality, as the riparian zone is dominated by exotic grasslands with a small number of remnant trees scattered along the channel. This creek is classified as a second order creek and is therefore not considered key fish habitat (DPI 2013).
Parsons Gully runs through most of the study area and is a narrow ephemeral creek with some larger pools of water (Plate 6-7).

Vegetation surrounding and on the creek bank is dominated by exotic grasses although there are small areas of aquatic vegetation including *Eleocharis plana* (Spike Rush) and the exotic sedge *Cyperus eragrostis* around the edges of some of the pools. The creek reaches its widest point near the golf course car park area, where it is about 20 metres wide. Riparian vegetation consists of planted trees and willows, with the understorey dominated by exotic grasses. No snags were visible in the water.

Parsons Gully flattens out into a very shallow grassed area south of Liverpool Street, most likely due to the watercourse being previously modified during the construction of Liverpool Street. The area is dominated by exotic grasses and regularly mown by council.

North of Liverpool Street, Parsons Gully channel is not defined and becomes a series of degraded, shallow pools with some swampy areas. Exotic grasses are the dominant riparian vegetation. An unnamed drainage line branches off to the east. The drainage line is not clearly defined due to the thick covering of exotic grasses. Some small, shallow pools of water occur along the drainage line.

Parsons Gully Creek is classified as a third order creek and would be considered as a Class 3 (minimal key fish habitat) waterway as it is an intermittent creek which would provide only sporadic refuge, breeding or feeding areas for aquatic fauna (DPI 2013).

Plate 6-7 Parsons Gully

**Key habitats and wildlife corridors**

The proposal does not intersect any key habitats or corridors mapped by OEH. The nearest areas of OEH mapped key fauna habitat and key corridors is about three kilometres northeast of the study area, associated with Scone Mountain National Park.

The majority of vegetation at the study area is highly modified, consisting of predominantly exotic grasses and weeds. These areas are unlikely to form important wildlife connectivity corridors.
Threatened fauna
The desktop review identified 17 threatened fauna species listed under the TSC Act, and 13 threatened fauna species listed under the EPBC Act, previously recorded or predicted to occur in the locality.

No threatened fauna species were detected during the field survey.

Migratory species
The desktop review identified 11 migratory species listed under the EPBC Act as potentially occurring in the locality. No migratory species listed under the EPBC Act were observed during field surveys.

Based on the nature and condition of habitat within the proposal site, there is a moderate likelihood that following three migratory fauna species could occur:

- Cattle Egret (*Ardea ibis*)
- Great Egret (*Ardea alba*)
- Rainbow Bee-eater (*Merops ornatus*).

Endangered populations
The desktop review identified two threatened populations listed under the TSC Act have been previously recorded in the locality. One of these populations was identified within the study area. *Eucalyptus camaldulensis* (River Red Gum) is listed under the TSC Act as an endangered population within the Hunter Catchment. This listing excludes planted trees of non-local provenance. Five *Eucalyptus camaldulensis* (River Red Gum) individuals were recorded within the proposal site, four of these have been planted and one appears to be remnant.

This proposition is supported by historic aerial photos that show that areas containing planted River Red Gums did not contain any trees in 1972. Furthermore these planted *Eucalyptus camaldulensis* (River Red Gum) occur along the fairway of the Scone Golf course over an exotic groundcover comprised of turf grasses that are regularly mown means there are no opportunities for recruitment of these species.

There are also two rows of planted River Red Gums immediately adjacent to the proposal site, north of Liverpool Street, these would not be impacted by the proposal.

An assessment of significance has been prepared to assess the significance of impacts of the proposal on the Hunter Catchment Endangered Population of *Eucalyptus camaldulensis* (River Red Gum). This assessment determined that the proposal is unlikely to have a significant impact on the *Eucalyptus camaldulensis* (River Red Gum) population in the Hunter Catchment. This assessment is provided in Appendix E.

6.2.3 Potential impacts

Construction

Vegetation clearing
This proposal site includes about 33.36 hectares of vegetation, which is comprised of 7.54 hectares of derived native grassland, 1.11 hectares of potential derived grasslands, 4.63 hectares of exotic grassland with planted trees and scattered remnant trees, 14.71 hectares of exotic grassland and 1.95 hectares of planted trees.

Vegetation clearing in these communities would involve removal of a low diversity of non-threatened native plants, including planted trees and remnant trees, as well as potential foraging habitat for one threatened fauna species.

The extent of proposed clearing of each vegetation community is summarised in Table 6-13.
Table 6-13  Vegetation types within the proposal site

<table>
<thead>
<tr>
<th>Vegetation type</th>
<th>TSC Act status</th>
<th>EPBC Act status</th>
<th>Area impacted (hectares)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Derived native grassland</td>
<td>Not listed</td>
<td>Not listed</td>
<td>7.54</td>
</tr>
<tr>
<td>Potential derived native grassland</td>
<td>Not listed</td>
<td>Not listed</td>
<td>1.11</td>
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<tr>
<td>Exotic grassland with planted trees and scattered remnant trees</td>
<td>Not listed</td>
<td>Not listed</td>
<td>4.63</td>
</tr>
<tr>
<td>Exotic grassland</td>
<td>Not listed</td>
<td>Not listed</td>
<td>14.71</td>
</tr>
<tr>
<td>Planted trees</td>
<td>Not listed</td>
<td>Not listed</td>
<td>1.95</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td><strong>33.36</strong></td>
</tr>
</tbody>
</table>

**Threatened flora species**

No threatened flora species were recorded during the field assessment and based on known habitat associations and the nature and condition of habitat available it is unlikely that any threatened flora species would occur within the proposal site.

**Threatened fauna species**

Based on the nature and condition of habitat and recent local records, there is a moderate likelihood that one threatened fauna species (Grey-headed Flying-fox (*Pteropus poliocephalus*) listed as vulnerable under the EPBC Act and TSC Act could occur within the proposal area.

Habitat for Grey-headed Flying-fox within the study area is limited to foraging habitat. There are no Grey-headed Flying-fox camps or breeding habitat present within the study area. The closest recorded Grey-headed Flying-fox camp is located in Singleton, about 60 kilometres south of the proposal site.

The proposal would remove 6.5 hectares of potential foraging habitat for the Grey-headed Flying-fox comprising 4.6 hectares of exotic grassland with planted trees and scattered remnant trees and 1.9 hectares of planted trees.

In accordance with section 5A of the EP&A Act an assessment of significance has been completed to assess the significance of impacts on the Grey-headed Flying-fox (*Pteropus poliocephalus*) (Appendix E). This assessment found that the proposal is unlikely to have a significant impact on this species given that:

- Vegetation to be removed is likely to be outside the species home range (as it is about 60 kilometres from the nearest roost camp) and comprises a negligible proportion of potential foraging habitat present in surrounding areas and the broader locality
- The proposal would not result in the isolation of potential foraging habitat that could affect the foraging or dispersive movements of this species.

In accordance with the EPBC Act an assessment of significance has also been completed to assess the significance of impacts on the Grey-headed Flying-fox (*Pteropus poliocephalus*) (Appendix E). This assessment found that the proposal is unlikely to have a significant impact on this species given that:

- It is unlikely that this would lead to a long-term decrease in the size of an important population given the large home range and migratory habits of this species
- No roosting (camp) sites would be impacted by the proposal
- Large old trees would be avoided where possible
• Breeding habitat would not be impacted by the proposal
• The proposal is highly unlikely to fragment an existing population as this is a highly mobile species that travel large distances every year
• There are large areas of alternative native vegetation present within adjoining areas to the proposal site likely to comprise habitat for this species.

There are no threatened fauna species listed under the FM Act that have previously recorded or are predicted to occur in the locality.

**Threatened ecological communities**

No threatened ecological communities listed under the TSC or EPBC Acts were recorded during the field assessment.

**Endangered populations**

About six planted *Eucalyptus camaldulensis* (River Red Gum) individuals would be removed as a result of the proposal. Although these individuals are not considered to be part of the local endangered population of this species as the provenance is unknown, an assessment of significance has been completed as a precautionary measure.

This assessment determined that the proposal is unlikely to have a significant impact on the endangered population of *Eucalyptus camaldulensis* (River Red Gum) in the Hunter Valley as:

• The genetic provenance of these individuals is unknown
• There is currently little opportunity for any of these individuals to contribute to maintenance of the population through recruitment as they are located on a fairway of a golf course that is regularly mown
• The proposal would not impact on the ability of pollinators to move between other planted individuals at the golf course or in adjacent areas that would not be impacted by the proposal.

**Habitat removal and fragmentation**

The proposed works would have a direct negative effect on habitat for native flora and fauna through vegetation clearing as described above. The removal of vegetation would remove a small amount of habitat resources such as potential foraging substrate, foraging resources (for example, fruits, nectar and seed) and woody debris. As the habitat within and surrounding the proposal site is of low value, clearing is unlikely to have significant negative effects through edge effects, fragmentation of habitat or the disruption of fauna movement corridors.

The proposed works would result in the removal of up to seven hollow-bearing trees. This would remove potential nesting or denning habitat for arboreal mammals, birds or bats. Two Brush-tailed Possums (*Trichosurus vulpecula*) and a number of common bird species were observed utilising these hollow bearing trees. Where possible the removal of hollow bearing trees would be avoided during construction.

Aerial habitat would not be affected and mobile species are likely to traverse obstacles and gaps in habitat created by the proposal. The proposed works are unlikely to pose an obstruction or hazard to the flight of birds or bats in the context of existing land uses in the locality.

The construction of the proposal has the potential to create a barrier for ground dwelling species such as reptiles and small mammals, however there would be opportunities for fauna to move underneath bridges included in the proposal.

The proposal would remove about 6.5 hectares of potential foraging habitat for the Grey-headed Flying-fox comprising 4.6 hectares of exotic grassland with planted trees and scattered remnant trees and 1.9 hectares of planted trees. An assessment of significance has been completed to assess the significance of impacts on this species (Appendix E), which concluded that the proposal is unlikely to have a significant impact on this species.
The proposal would not impact on or fragment any key habitats or wildlife corridors. Mitigation measures to minimise impacts of habitat removal and fragmentation on native flora and fauna are provided in section 6.2.4.

**Fauna mortality**
The proposed works present an inherent risk of injury and mortality to native fauna. Specific risks include:

- During construction when vegetation is being cleared and general construction equipment movements
- Presence of new watering or feed sources or other artificial habitat, such as proposed landscaping that could attract fauna to the vicinity of the bypass
- Mitigation measures to minimise risk of injury and mortality to native fauna are provided in section 6.2.4.

**Introduction/spread of weeds**
The proposal is already dominated by exotic species. There is potential that the proposal may increase the degree of weed infestation through dispersal of weed propagules (seeds, stems and flowers) via erosion (wind and water) and via workers shoes and clothing and through construction vehicles.

Mitigation measures to minimise the introduction and spread of weeds are provided in section 6.2.4.

**Introduction of pests and pathogens**
Construction activities within the site have the potential to introduce or spread pathogens such as Phytophthora (*Phytophthora cinnamomi*), Myrtle Rust (*Uredo rangelii*) and Chytrid fungus (*Batrachochytrium dendrobatidis*) throughout the proposal site. There is little available information about the distribution of these pathogens within the locality, and no evidence of these pathogens was observed during surveys. Phytophthora and Myrtle Rust may result in the dieback or modification of native vegetation and damage to fauna habitats while Chytrid fungus has potential to impact amphibian populations in the area.

A 'clean on entry, clean on exit' policy would be implemented as outlined in section 6.2.4 to prevent the introduction or spread of these pathogens within the proposal site.

**Impacts on migratory species**
An assessment of the likelihood of occurrence of migratory species was carried out for the proposal (Appendix C). This assessment found that based on the nature and condition of habitat and recent local records (including the results of the field survey for the proposal) there are three migratory species listed under the EPBC Act that may utilise the proposal site on an opportunistic or seasonal basis. These are:

- Cattle Egret (*Ardea ibis*)
- Great Egret (*Ardea alba*)
- Rainbow Bee-eater (*Merops ornatus*).

An assessment of significance using the *Significant Impact Guidelines 1.1: Matters of National Environmental Significance* (DSEWPaC 2013) have been prepared for migratory species listed under the EPBC Act with a moderate likelihood of occurrence in the study area.

This assessment concluded that the proposal would be unlikely to result in a significant impact on any of these migratory species. The full assessment of significance is provided in Appendix E.
Impacts on hydrology and aquatic habitats

Construction of the proposal would include works within Parsons Gully. This includes the construction of bridge piers and emplacement of embankment materials within the extents of Parsons Gully. Minor realignment of the existing ephemeral channel within Parsons Gully may be required due to the positioning of some of the bridge piers.

Parsons Gully is a highly undefined waterway with a number of shallow ephemeral channels and overflow areas. North of Liverpool Street, the creek is not defined and becomes a series of degraded, shallow pools with some swampy areas. Parsons Gully is a Class 3 waterway (minimal key fish habitat) and contains no known threatened aquatic species or ecological communities. Given the ephemeral and degraded nature of Parsons Gully and lack of suitable fish habitat, the proposal is not anticipated to block fish passage.

Further consultation with DPI (Fisheries) would be carried out during detailed design to confirm any specific requirements for approvals under the FM Act. Notification and permitting requirements under the FM Act are further discussed in section 4.3.6.

Indirect impacts on aquatic habitat may potentially include temporary impacts on water quality during construction. Potential sources of impacts to surface water within the proposal site may include:

- Runoff from areas stripped of vegetation
- Runoff from soil stockpiles
- Runoff from hardstand areas, including roads, hardstands and site facilities
- Leakage or spillage of hydrocarbon products from vehicles, wash down areas and maintenance areas
- Refuelling activities and fuel, oil and grease storage.

Potential water quality impacts may be associated with runoff from disturbed areas, including vegetation clearing areas, construction lay down areas and access roads if risks are not effectively managed and appropriate mitigation measures implemented. Concentrated and/or altered water movement within the proposal site could increase the potential for sediment mobilisation and transport.

Mitigation measures to minimise impacts to aquatic habitats are provided in section 6.2.4.

Noise and vibration

The proposal could introduce noise impacts into fauna habitat. Species inhabiting the proposal site and surrounds are likely to be accustomed to some level of disturbance as the proposal is in close proximity to residential properties, farms and parklands.

This would be a minor impact and is likely to have a minor effect on native fauna in habitat adjoining the proposal site.

Construction lighting

The proposal site would experience some artificial lighting impacts including security lighting. Night-time security or operational lighting can potentially discourage habitat use where diffuse light penetrates into adjoining areas. The foraging regimes of some nocturnal native mammals and birds can be disrupted by lighting and make them vulnerable to predation by cats, dogs and foxes. The eyesight of nocturnal species (such as owls, gliders and possums) is hindered by bright lights, and where they are affected by this, they may become more susceptible to predation.

Mitigation measures outlined in section 6.2.4 would minimise the potential impacts of construction lighting on native fauna.
**Key threatening processes**

A key threatening process is defined under the TSC Act as an action, activity or proposal that:

- Adversely affects two or more threatened species, populations or ecological communities
- Could cause species, populations or ecological communities that are not currently threatened to become threatened (OEH 2015d).

There are currently 36 key threatening processes listed under the TSC Act, seven listed under the FM Act and 19 under the EPBC Act. A number of key threatening processes are listed under more than one of these acts. Key threatening processes relevant to the proposal are summarised in Table 6-14.

**Table 6-14  Key threatening processes**

<table>
<thead>
<tr>
<th>Key threatening process</th>
<th>Status</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clearing of native vegetation</td>
<td>TSC Act; EPBC Act</td>
<td>Clearing of native vegetation has occurred historically within and around the proposal site. This has resulted in a variety of impacts on the remaining native vegetation including increased weed invasion due to soil disturbance and edge effects. This key threatening process would be slightly exacerbated by the removal of up to 8.66 hectares of highly modified native vegetation (derived grassland) within the proposal site. Mitigation measures to minimise impacts are provided in section 6.2.4.</td>
</tr>
<tr>
<td>Loss of hollow-bearing trees</td>
<td>TSC Act</td>
<td>Past clearing at the site is likely to have resulted in a loss of hollow-bearing trees. At present there is a mixture of mature and immature vegetation within the proposal site. The proposal would involve the removal of up to 10 hollow-bearing trees. Mitigation measures to minimise impacts are provided in section 6.2.4.</td>
</tr>
<tr>
<td>The degradation of native riparian vegetation along NSW water courses</td>
<td>FM Act</td>
<td>Clearing of riparian vegetation has occurred historically within and around the proposal site. This has resulted in a variety of impacts on the remaining native vegetation including increased weed invasion due to soil disturbance and edge effects. No native riparian vegetation would be cleared for the proposal.</td>
</tr>
</tbody>
</table>

**Operation**

The existing environment of the study area is of limited habitat value for most native species and no additional adverse impacts on native species are anticipated as a result of the operation of the proposal.

Potential impacts associated with lighting and habitat degradation would be minimised through implementation of the management measures outlined in 6.2.4. The proposal is not located in an important movement corridor for native species and potential impacts from interaction with road traffic are not expected to be significant.

**6.2.4 Safeguards and management measures**

Mitigation measures provided in Table 6 15 will be implemented to minimise potential impacts on flora and fauna.
<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potential for impacts to Parsons Gully</td>
<td>Roads and Maritime will carry out further consultation with DPI (Fisheries) during detailed design to confirm any specific requirements for approvals under the FM Act.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td>Direct impacts to native vegetation</td>
<td>Where possible, minimise the clearing of mature trees, in particular hollow-bearing and habitat trees.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td>Potential for artificial lighting impacts on native fauna</td>
<td>Design of all permanent lighting to minimise light spill and the associated secondary impact on nocturnal fauna species potentially utilising the area.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td>Potential impacts on native flora and fauna</td>
<td>A Construction Environmental Management Plan (CEMP) will be developed for the construction phase of the proposal. The CEMP will be prepared and implemented in accordance with the Roads and Maritime Biodiversity Guidelines (RTA 2011) and include the procedures outlined below.</td>
<td>Construction contractor</td>
<td>Pre-construction</td>
</tr>
<tr>
<td></td>
<td>Protocols for clearing of vegetation will be developed and implemented in accordance with the Roads and Maritime Biodiversity Guidelines (Guide 4: Clearing of vegetation and removal of bushrock) (RTA 2011).</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>Potential for spread of exotic or invasive species, or spread of pathogens that may be harmful to native biota</td>
<td>Protocols for preventing or minimising the spread of noxious and environmental weeds will be developed and implemented in accordance with the Roads and Maritime Biodiversity Guidelines (Guide 6: Weed Management) (RTA 2011).</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>Protocols for preventing the introduction and/or spread of disease causing agents such as bacteria and fungi will be developed and implemented in accordance with the Roads and Maritime Biodiversity Guidelines (Guide 7: Pathogen Management) (RTA 2011).</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
</tbody>
</table>

New England Highway bypass at Scone
Review of environmental factors
81
<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potential for erosion and sediment removal into wetlands and creeks</td>
<td>Protocols for minimising impacts on aquatic habitat will be developed and implemented in accordance with Roads and Maritime Biodiversity Guidelines (Guide 10: Aquatic habitats and riparian zones) (RTA 2011). This will also include relevant measures from the Office of Water Guidelines for Riparian Corridors on Waterfront Lands and Guidelines for Vegetation Management Plans.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>Temporary stockpiles to be restricted to the construction area and identified construction compounds, in areas of cleared land and exotic grassland and managed to ensure no offsite impacts of dust generation or sedimentation.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>Remove from site any excavated material not required for backfilling as soon as practical.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>Potential for direct impacts on native fauna species</td>
<td>A pre-clearance procedure will be developed and implemented in accordance with the Roads and Maritime Biodiversity Guidelines (Guide 1: Pre-clearing process) (RTA 2011) and include (but not limited to) inspection of hollow trees prior to removal.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>Fauna handling will be conducted in accordance with the Roads and Maritime Biodiversity Guidelines (Guide 9: Fauna handling) (RTA 2011).</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>Any unexpected threatened species finds will be dealt with in accordance with the Roads and Maritime Biodiversity Guidelines (RTA, 2011).</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>Exclusion zones are to be identified and demarcated in accordance with the Roads and Maritime Biodiversity Guidelines (Guide 2: Exclusion zones) (RTA 2011).</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>Direct impacts to native vegetation</td>
<td>Protocols for the re-establishment of native vegetation is to be developed in accordance with the Roads and Maritime Biodiversity Guidelines (Guide 3: Re-establishment of native vegetation) (RTA 2011).</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
</tbody>
</table>
Potential for artificial lighting impacts on native fauna | Using down-lights and motion sensor lighting during construction in order to reduce light spill and the associated secondary impact on nocturnal fauna species potentially utilising the area. | Construction contractor | Construction

6.3 Geology and soils

6.3.1 Existing environment

Regional geology
Reference to the 1:100 000 scale Hunter Coalfield Regional Geology Sheet 9033 (Glen and Beckett 1993), indicates the site is underlain by Quaternary aged alluvium consisting of gravel, sand, silt and clay. The alluvial soils are underlain by the Permian aged Wittingham Coal Measures and Jerrys Plains Subgroup of the Singleton Supergroup which consists of coal seams, claystone, tuff, siltstone, sandstone and conglomerate. The current investigation has found the alluvial soils to be 13 metres to 18 metres thick.

The 1985 Department of Mineral Resources (1985) report: Scone Town Planning Drilling Programme. Ref. GS1987/023 provides additional information on the geology around Scone with particular reference to coal resources. The report presents the findings of two deep boreholes to supplement other deep coal exploration boreholes around Scone. The exploration boreholes encountered sandstone and conglomerate to at least 150 metres depth without any coal seams of economic value.

Soil landscapes
Reference to the 1:250 000 scale Singleton Soil Landscape Map (DLWC 1991) indicates the site is within the ‘Hunter soil landscape’, which is characterised by alluvial plains and terraces of the Hunter River and its tributaries. Soils are mainly formed in alluvium and include clay, silty and sandy clays and sands. Reported limitations include moderate flood hazard, moderate to low soil erodibility, moderate to high erosion hazard, and a high shrink-swell potential in some areas.

Acid sulfate soils
The site is at an elevation of about 200 metres above sea level. Acid sulfate soils are typically restricted to coastal elevations below 20 metres above sea level. Acid sulfate soils are not a consideration in the Scone area and therefore not considered further.

Contamination
A phase 1 contamination assessment (GHD, 2015) was carried out for the proposal has identified potential contamination from:

- The presence of uncontrolled fill of unknown origin in built up areas on properties or from illegal dumping
- The use of pesticides related to the golf course
- The presence of a suspected nightsoil disposal area located at Parsons Gully.

To supplement the Phase 1 Contamination Assessment, contaminated soil sampling was carried out in accordance with the Guidelines for Consultants Reporting on Contaminated Sites (OEH 2011) to provide a preliminary indication of contamination, which targeted potential areas and contaminants of concern as described above. Soil samples were taken at five borehole and four test pit locations within the suspected nightsoil area, golf course and other fill areas.
Contamination test results reported concentrations of analytes below the adopted assessment criteria for the applicable land and worker activity uses. Samples from the suspected nightsoil disposal area reported results below the laboratory limit of reporting for faecal coliforms and *Escherichia coli*. These results confirmed that this area was not nightsoil.

### 6.3.2 Potential impacts

#### Construction

**Topography, geology and soils**

The proposal would involve earthworks along the proposal site, predominantly filling for the new road embankment.

As discussed in section 3.3.6 about 226,600 cubic metres of material would be imported for embankment construction. Fill material imported from off-site would be sourced from certified suppliers to avoid the potential for contaminated fill to be imported. Surplus or unsuitable material that cannot be used on-site (for example as part of landscaping) would be disposed of appropriately.

A preliminary indication of the classification of soils for offsite disposal show that soils may potentially be classified as restricted solid waste (based on benzo(a)pyrene, Total Chromium, Lead and Nickel results) in accordance with NSW Environmental Protection Authority (EPA) Waste Classification Guidelines (2014). However additional assessment such as toxicity characteristic leaching procedure testing or obtaining more samples to provide a greater representative data set may result in a reduced classification.

The proposed earthworks would result in a change to the topography of the proposal site. However this change is not expected to be significant. Potential implications for hydrology and flooding are considered in section 6.4.

**Erosion and sedimentation**

The proposal would involve removal of top soil, earthworks associated with filling for the new road and stockpiling of spoil for construction. If not adequately managed, earthworks, stockpiling and transportation of spoil could potentially have the following impacts:

- Erosion of exposed soil and stockpiled materials, as soils are known to have moderate to high soil erosion potential
- An increase in sediment loads entering the receiving stormwater system.

With the implementation of erosion and sedimentation controls outlined in section 6.3.3, potential construction related erosion and sedimentation impacts would be appropriately managed and are not expected to be significant.

**Contamination**

Any existing contamination present within the soils or groundwater in the proposal area and associated ancillary facilities has the potential to be exposed or disturbed during construction activities. This would include excavation and earthworks. As outlined in section 6.3.1, the preliminary investigation results of potential contamination sources indicate that contamination levels are below the adopted assessment criteria. Therefore potential contamination issues associated with the proposal are expected to be minor.

Although there is considered to be minimal potential for widespread contamination to occur in the proposal site, there is the potential to encounter previously unknown contamination during construction. An approach to managing any unexpected contaminated material that may be uncovered would be specified in the construction environmental management plan.
Soil contamination could occur as a result of any accidental spills or leaks of fuels, oils and other chemicals from equipment and vehicles during construction. To avoid this potential impact, fuels and chemicals would be managed in accordance with the management measures provided in section 6.3.3.

**Operation**

Operation of the proposal is not likely to result in any significant impacts on soils, landscape, topography or geology. The risk of soil erosion during operation would be minimal as all areas impacted during construction would be sealed or rehabilitated and landscaped to prevent soil erosion from occurring.

### 6.3.3 Safeguards and management measures

Mitigation measures provided in Table 6-16 will be implemented to minimise potential impacts on geology and soils.

**Table 6-16 Summary of potential impacts and environmental safeguards – geology and soils**

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
</table>
| Erosion and sedimentation   | A soil and water management plan (SWMP) will be prepared as part of the CEMP in accordance with the requirements of Roads and Maritime contract specification G38 prior to the commencement of construction. The SWMP will address the following:  
  - Roads and Maritime Code of Practice for Water Management, the Roads and Maritime *Erosion and Sedimentation Procedure*  
  - Roads and Maritime Technical Guideline: *Temporary Stormwater Drainage for Road Construction, 2011*  
| Contamination of soil       | The CEMP will include a contaminated land management plan prepared in accordance with the *Contaminated Land Management Act 1997*, Roads and Maritime *Contaminated Land Management Guideline*, Roads and Maritime *Environmental Incident Classification and Reporting Procedure*, and EPA guidelines on contaminated land management.  
  The contaminated land management plan would provide for dealing with:  
  - Areas of potential contamination  
  - Unexpected contamination finds  
  - Any land contamination caused during construction. | Construction contractor | Pre-construction |
### Environmental safeguards

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Erosion and sedimentation</td>
<td>Erosion and sediment controls will be implemented before any construction starts and inspected regularly, particularly after a rainfall event. Maintenance work will be carried out as needed.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>Site stabilisation of disturbed areas will be carried out progressively as stages are completed.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>All stockpiles will be designed, established, operated and decommissioned in accordance with Roads and Maritime <em>Stockpile Management Guideline</em> (RTA, 2011).</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>Controls will be implemented at exit points to minimise the tracking of soil and particulates onto pavement surfaces.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>Any material transported onto pavement surfaces will be swept and removed at the end of each working day.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>Excess spoil</td>
<td>Excess spoil not required or able to be used for backfilling will be stockpiled in a suitable location before being reused or removed from the site, and disposed of appropriately in accordance with the NSW EPA <em>Waste Classification Guidelines</em> (2014).</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>Contamination of soils</td>
<td>In the event that indicators of contamination are encountered during construction (such as odours or visually contaminated materials), work in the area will cease until advice on the need for remediation or other action is obtained from an environmental consultant.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>A fully equipped emergency spill kit will be kept on-site at all times.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
</tbody>
</table>

### 6.4 Hydrology, water quality and flooding

#### 6.4.1 Existing environment

This section summarises the results of the hydrological and hydraulic assessment that was completed for the proposal. The detailed assessment is provided in Appendix F.

**Catchment overview**

Scone is situated on the eastern side of Parsons Gully, south-west of Scone Mountain. The Great Northern Railway and New England Highway run in a north-south direction through the centre of town. A local creek system named Figtree Creek also runs through the centre of town in a south-westerly direction towards the main floodplain.
In addition to Figtree Creek, a number of other gullies immediately north and south of Scone drain in a westerly direction towards the floodplain and interact with both the railway corridor and New England Highway and a number of developments in and around Scone (refer to Figure 1.1 for a regional context and Figure 6.2 for the local context).

The floodplain west of Scone comprises of three watercourses. From east to west, these watercourses are named, Parsons Gully, Kingdon Ponds and Middle Brook respectively. Land throughout the catchment is typically natural however the majority of the floodplain in the lower reaches of the catchment has been converted to pasture for agricultural land uses. In the lower reaches of these watercourses, closer to Scone, the floodplains begin to merge to form a single complex floodplain between Scone and Satur Road.

The Middlebrook catchment is about 20 to 22 kilometres in length, and comprises a catchment area of about 7123 hectares upstream of Scone. In the upper catchment, it is characterised by very steep slopes following a long, narrow meandering watercourse. Adjacent to Scone, this watercourse is characterised by a heavily meandering and well defined incised channel with a floodplain encompassing the area between the main channel and the natural levee banks of the Kingdon Ponds watercourse. There is little to no development within the floodplain of this watercourse adjacent to Scone.

The Kingdon Ponds watercourse is much larger, with a catchment area of about 21,369 hectares. This catchment extends about 20 to 22 kilometres upstream of Scone. The upper catchment is generally characterised by very steep slopes with a number of watercourses joining the main watercourse upstream of Scone. Adjacent to Scone this tributary is characterised by a meandering well-defined, incised channel with natural levee banks on both banks. This watercourse generally runs through a ridgeline or high point separating the major floodplains of the Parsons Gully and Middle Brook watercourses adjacent to Scone. There is no defined floodplain for this watercourse adjacent to Scone as excess flow from the main channel is distributed into Parsons Gully and Middle Brook floodplains. There is no development in the vicinity of this watercourse adjacent to Scone.

Parsons Gully is relatively minor in size with a catchment area of about 2462 hectares, extending about three to four kilometres upstream of Scone. Adjacent to Scone, Parsons Gully is characterised by a wide, flat floodplain with a poorly defined ephemeral watercourse. However, in terms of elevation this floodplain is generally lower than the Middle Brook and Kingdon Ponds watercourses, resulting in the Parsons Gully floodplain receiving much of the overbank flows from the neighbouring watercourses once their capacity has been exceeded.

These over-bank flows tend to cross the floodplain upstream of Liverpool Street between the watercourses as the terrain undulates, resulting in much of the over-bank flow volume from the larger Middle Brook and Kingdon Ponds watercourses being received by the lower floodplain of Parson Gully as the flow approaches town. This flow behaviour is generally more prevalent in the larger, less frequent flood events due to the limited capacity of the channels and floodplains of the western watercourses.

**Hydrology and drainage**

The proposal passes over the alluvial flood plain associated with Kingdon Ponds and Parsons Gully. Watercourses from higher ground to the east cross the proposal in ten locations. These watercourses meet with the south flowing Parsons Gully at various points.

Geotechnical investigations were completed by GHD in 2015 for the proposal. Site drainage was observed to be poor in areas around Parsons Gully and selected watercourses and low lying areas. During and following particularly prolonged wet weather and flooding, much of the site is expected to be inundated. The above areas are likely to be the last areas to dry out, particularly the area immediately adjacent to the existing railway and between Liverpool Street and Susan Street.
Flooding

Previous assessments
The Scone Floodplain has a history of flooding with most significant events being reported in 1955, 1976, 1977 and 1992.

Scone Flood Study (1996)
A flood study completed by the Department of Land and Water Conservation (DLWC) in 1996 contains a hydrologic and hydraulic analysis of flow conditions within the Scone floodplain. This study considered flood levels for the probable maximum flood (PMF) event and the one in 20, one in 50 and one in 100 year ARI flood events.

The 1955 flood event is generally considered to be the equivalent of the one in 100 year average recurrence interval (ARI) flood event. Observations of the event by residents note that as much as 70 per cent of the flow generated in this event had been transferred to the Parsons Gully floodplain by the time it reached Scone.

The report notes that considerable cross flow may occur between the three streams, with the majority of the flow coming from the larger Kingdon Ponds catchment in larger flood events and it was estimated that even in a one in 10 year ARI flood event considerable flows would spill over from Kingdon Ponds eastward towards Parsons Gully. Based on the flood levels presented in this study Liverpool Street is expected to be overtopped in a one in 10 year ARI flood event.

Scone Floodplain Management Study and Plan (1999)
A flood study has also been completed by Bewsher Consulting Pty Ltd in 1999 as part of the Scone Floodplain Risk Management Plan. Building on the earlier work by DLWC, the report contains more detailed hydrologic and hydraulic analysis of the urban area surrounding Figtree Creek, which runs through the centre of Scone. This study considered flood levels for the PMF and the one in 100 year ARI flood events.

Flood levels are difficult to discern from this study however it is noted that the Figtree Creek drainage channel between St. Aubins Street and Kingdon Street has a very limited capacity overtopping in about a one in five year ARI flood event. It is also noted that similar to the DLWC study a complex overland flow pattern occurs as the drainage channel capacity is exceeded.

Flood modelling
An XP-RAFTS hydrological model was developed as part of the hydrological and hydraulic assessment for the proposal (Appendix F). The results of this model were then input to the MIKE11 model to get flow spread and distribution over the floodplain. The output from MIKE11 became an input to the detailed TUFLOW model for Scone and its immediate surrounds.

The hydrologic study encompassed the entire Parsons Gully, Kingdon Ponds, Middle Brook and Figtree Creek catchments upstream of Scone and considered flood levels for the PMF, 10, 20, 50, 100, 200, 500 and 2000 year ARI flood events. Detailed information on the methodology used is provided in Appendix F.

The results of modelling of existing flood conditions for the 20 and 100 year ARI flood events are provided in Figure 6.2 and Figure 6.3 respectively. The results indicate that there is little difference in the extent of inundation between the two events and for both flood events:

- The majority of the floodplain area is inundated including part of Scone to the west of the Great Northern Railway
- A number of roads including the New England Highway, Liverpool Street, Kelly Street, Mount Street, Parker Street and Kingdon Street and the Great Northern Railway are partially inundated for the 100 year ARI event
- Figtree Creek flows exceed local pipe capacity resulting in extensive flooding within Scone
- The existing Great Northern Railway and New England Highway act as a temporary barrier to floodwaters in Figtree Creek.
Water quality

There is no currently available data on water quality in the vicinity of the proposal however observations made during investigations for the proposal indicate that water quality is likely to be generally poor to moderate due to intermittent flow conditions and runoff from urban and rural areas and the golf course.

Groundwater

A large number of groundwater bores are located in the Kingdon Ponds, Parsons Gully and Middlebrook areas as well as a lesser quantity in Scone. They appear to be for irrigation and stock, including irrigation for the golf course. Department of Primary Industries (DPI) Water records include 11 registered bores in the vicinity of the proposal. In addition to these registered bores, the survey carried out as part of preliminary investigations identified additional groundwater bores in the vicinity of the proposal.

Drilling records for these registered bores indicate groundwater was encountered at between two metres to nine metres depth with bores targeting ‘gravel’ / ‘sand’ layers between three and 19 metres below ground surface. Geotechnical investigations carried out for the proposal encountered groundwater at about five metres below the ground surface.

There is limited information publically available regarding groundwater quality in the area. Groundwater monitoring data accessible through the DPI Water was limited to a single existing bore located to the west of Parsons Gully in the northern part of the study area. Groundwater electrical conductivity has been monitored since 2010 with records indicating conductivity ranging from 2150 to 2200 micro-siemens per centimetre (μS/cm) during 2012, 2013 and 2014.

6.4.1 Potential impacts

Long term impacts on flooding would occur from the commencement of construction. These impacts would mostly be related to the final constructed proposal. Long term impacts to property have been discussed below as operational impacts.

Construction

Hydrology and drainage

Construction activities have the potential to result in local changes to overland flow regimes and the obstruction of drainage paths resulting in temporary localised flooding. Due to the low lying nature of the proposal site, this could result in minor increases in surface flows along existing overland flow paths to the nearest drainage line. To minimise the potential for localised flooding and erosion during construction, it would be necessary to carefully plan, implement and maintain measures aimed at intercepting any concentrated flow and diverting it toward the existing stormwater drainage system.

The implementation of the mitigation measures provided in section 6.4.3 would minimise the potential for impacts.

Flooding

Construction activities are not expected to impact on flooding behaviour in the area. The potential impacts associated with the proposal being located in the floodplain are discussed under operational impacts below.

In the event that a flood occurs during construction there is potential for large scale loss of any un-stabilised earthworks and unsecured construction materials within the floodplain.

The implementation of the mitigation measures provided in section 6.4.3 would minimise the potential for impacts.
Figure 6.2

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

Proposal site
1 in 20 yr Flood Extents - Existing
Railway
Watercourse

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Figure 6.3

LEGEND

Proposal site
Railway
Watercourse

1 in 100 yr Flood Extents - Existing

Roads and Maritime Services
HW9 New England Highway Scone Bypass
Review of Environmental Factors
100 yr ARI Flooding
Inundation Extent - Existing

6.4.2 Water quality

Construction activities have the potential to impact on water quality within local receiving waters (Parsons Gully, Kingdon Ponds, Figtree Creek and Middle Brook). The main potential impacts relate to soil disturbance, which represents a risk to surface water quality, and run-off during construction. Pollutants such as sediment, soil nutrients and construction waste have the potential to mobilise and enter drainage lines, particularly during high rainfall events.

Water quality impacts could also potentially occur during construction as a result of contamination by fuel or chemical spills from construction vehicles.

The implementation of the mitigation measures provided in section 6.4.3 would minimise the potential for impacts.

Groundwater

The depth of excavation for the bridge piles is anticipated to be below the groundwater level and dewatering is likely to be required. A licence is required from DPI Water for groundwater dewatering during construction if the water extraction is greater than three mega litres per year (ML/yr). Dewatering would be carried out in accordance with the Roads and Maritime Technical Guideline for Dewatering.

Construction of the proposal would require removal of five groundwater bores. The locations of these bores are shown in Figure 6.4.

There are no expected impacts on groundwater quality as a result of construction of the proposal.

Operation

Hydrology and drainage

The proposal would involve upgrading the existing and installation of new road drainage and stormwater management elements. Stormwater run-off from the widened sections of road pavement would be managed by new or upgraded pavement drainage systems, which would discharge to the existing or upgraded stormwater drainage system.

The proposal site is predominantly open pasture areas. The proposal would result in an increase in hardstand areas within the catchment resulting in a corresponding increase in stormwater from the road surface. This could result in an increase in localised flooding where existing drainage infrastructure is inadequate.

The drainage design is still under development and would be further refined during the detailed design stage. Drainage design would consider cross drainage, transverse drainage, longitudinal drainage, water quality, subsurface drainage, pipe cover, temporary drainage and scour protection as relevant. This will need to ensure that the existing drainage systems have the capacity to receive the increased flows from the proposal.
LEGEND

- Proposal site
- Railway
- Groundwater bore
- Watercourse

Figure 6.4

Impacted Groundwater Bores

Roads and Maritime Services

HW9 New England Highway Scone Bypass

Review of Environmental Factors

Flooding

Flooding has been carried out to predict the change in flood levels as a result of the proposal.

Roads and Maritime have completed numerous design refinements during development of the proposal in order to minimise the changes in flood levels. The concept design of the proposal as presented in this REF contains a number of flood relief structures including culverts and an extended bridge structure to provide for the flow of flood waters.

The results of modelling of changed flood conditions for the one in 20 and one in 100 year ARI flood events are provided in Figure 6.5 and Figure 6.6 respectively (refer to the hydrological and hydraulic assessment in Appendix F for modelling of other flood events). The results indicate that for both events there would be an increase in the depth of flooding in areas generally to the west of the proposal and in the vicinity of the showground, while there would be a decrease to the east of the proposal generally in the vicinity of Aberdeen Street.

Results of the analysis have shown:

- For both the 20 and 100 year ARI events there is a reduced impact (flood extent), depth and velocity within Scone upstream of Liverpool Street as a result of the proposal embankment forming a flood barrier
- The above flood barrier formation has led to an increased flood level west of the proposal and generally upstream of Liverpool Street on the western side of the proposal. In this area there are a limited number of dwellings
- For events up to the 100 year ARI, impacts are not predicted to extend westward to Kingdon Ponds upstream of Liverpool Street.

It is important to note that within areas identified as being subject to increased flood levels there would be variable changes in depth, in some cases these changes would be minimal and may not be noticeable. Further any potential increase in depths of flooding may not actually result in any damage to residences as they could have floor levels above the predicted flood level.

In recognition of this during the design refinement process Roads and Maritime completed floor level surveys of all residences and other key buildings within the area where flood levels could change to assess the potential impacts associated with the increase or decrease in flood levels. A total of 51 buildings were subject to floor level survey.

Based on the flood modelling and floor level surveys it is predicted that:

- In a one in 20 year ARI event:
  - 25 buildings could be subject to increased inundation of variable depth. Of these 21 buildings were already subject to a variable level of inundation in this flood event under existing conditions
  - Existing flood levels for some buildings would decrease including one building that would no longer be inundated
- In a one in 100 year ARI event:
  - 20 buildings could be subject to increased inundation of variable depth. Of these 15 buildings were already subject to a variable level of inundation in this flood event under existing conditions
  - Existing flood levels for some buildings would decrease including nine buildings that would no longer be inundated.

Roads and Maritime would continue to refine the design throughout the detailed design phase to try and further reduce potential flooding impacts. Roads and Maritime would also carry out consultation with all affected property owners including providing details of the predicted actual changes in flood levels in relation to each individual property.
Other key findings of the hydrological and hydraulic assessment (Appendix F) include:

- **Flood affected area** – the flood affected area within the extent of the model would increase from about 559.9 hectares to about 561.2 hectares in a 100 year ARI event
- **Lots affected** – the number flood impacted lots not subject to acquisition would decrease from 739 to 728 in a 100 year ARI event
- **Flood storage** – the proposal would result in a loss of about 77,480 cubic metres from the existing floodplain storage in a 100 year ARI event
- **Flood velocities** – velocities are expected to increase by up to about 0.5 metres per second in some areas to the west of the proposal and to the east in the vicinity of the existing railway, and would decrease in residential areas to the east of the proposal
- **Flood planning levels** – the *Upper Hunter Local Environment Plan 2013* nominates a flood planning level of the 100 year ARI flood level plus 0.5 metres freeboard. The predicted flood levels as a result of the proposal would reduce the available freeboard in rural areas to the west while the freeboard would be increased in residential areas to the east. Potential changes to the relevant development control plans may be required
- **Flood management planning** – the proposal would result in changed flood conditions within the existing floodplain areas. Roads and Maritime would consult with relevant authorities throughout the detailed design phase regarding potential changes to the relevant plans including development control plans and floodplain risk management plans
- **Flood evacuation** – the proposal would not significantly impact on any existing flood evacuation and emergency egress routes or centres. An assessment of the road closure conditions for Liverpool Street has shown the proposal would increase the closure duration by around two hours. However Liverpool Street was predicted to be closed for existing conditions for all events considered in the assessment. The potential warning time for the closure was predicted to be approximately one hour shorter than for the existing conditions
- **Critical infrastructure** – the proposal would not result in any impacts to the substation located east of the existing highway.

**Water quality**

Operation of the proposal is not likely to result in any significant impacts on water quality. The risk of soil erosion during operation would be minimal as all areas impacted during construction would be sealed or rehabilitated and landscaped to prevent soil erosion from occurring.

**Groundwater**

There are no expected impacts on groundwater from operation of the proposal.
Figure 6.5

Roads and Maritime Services
HW9 New England Highway Scone Bypass
Review of Environmental Factors
20 yr ARI Flooding

Change in Inundation Level

LEGEND
- Proposal site
- Decrease in flood level (<-50mm)
- No change in flood level (=50mm)
- Increase in flood level (>+50mm)

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LEGENDE

- Proposal site
- Decrease in flood level (<-50mm)
- No change in flood level (=50mm)
- Increase in flood level (>+50mm)

Figure 6.6

Roads and Maritime Services
HW9 New England Highway Scone Bypass
Review of Environmental Factors
100 yr ARI Flooding
Change in Inundation Level


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Paper Size A4

0 55 110 220 330 440

Metres

0 110 220 330 440

0 1 2 3 4

Figure 6.6

Proposal site
Decrease in flood level (<-50mm)
No change in flood level (=50mm)
Increase in flood level (>+50mm)
### 6.4.3 Safeguards and management measures

Mitigation measures provided in Table 6-17 would be implemented to minimise potential impacts on hydrology, water quality and drainage.

**Table 6-17  Summary of potential impacts and environmental safeguards – hydrology, water quality and drainage**

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drainage design</td>
<td>Roads and Maritime will consult with Upper Hunter Shire Council during detailed design to ensure appropriate integration with council’s stormwater network.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td>Flooding</td>
<td>Roads and Maritime will continue to refine the design throughout the detailed design phase to try and further reduce potential flooding impacts.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td></td>
<td>Roads and Maritime will consult with relevant authorities throughout the detailed design phase regarding potential changes to the relevant plans including development control plans and floodplain risk management plans.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td></td>
<td>Roads and Maritime will consult with all affected property owners likely to be affected by a change in flood levels including providing details of the predicted actual changes in flood levels in relation to each individual property.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td>Groundwater bores</td>
<td>Roads and Maritime will consult with the owners of the five known groundwater bores to be removed to determine requirements for replacement of these bores if required.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td>Sedimentation and contamination of surface water</td>
<td>Erosion, sedimentation and contamination safeguard measures identified in section 6.3.3 will be implemented.</td>
<td>Roads and Maritime and Construction contractor</td>
<td>Pre-construction and Construction</td>
</tr>
<tr>
<td>Flood hazards</td>
<td>As part of the CEMP a flood risk management plan will be prepared that details the processes for monitoring of flood alerts. The plan will specify the steps to be taken in the event a flood warning is issued including removal or securing of loose material in the floodplain and removal or securing of all fuels and chemicals.</td>
<td>Construction contractor</td>
<td>Pre-construction and 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>A system for daily monitoring of flood alerts will be implemented so that in the event of a flood warning being issued all unsecured material in the floodplain can be removed and other appropriate precautionary measures taken.</td>
<td>Construction contractor</td>
<td>Pre-construction and Construction</td>
</tr>
<tr>
<td>Contamination of surface water</td>
<td>Storage of excess materials within the floodplain, including within compound areas will be minimised. As far as is practical materials are to be ordered on, or as close as possible to, an as needs basis.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>All fuels, chemicals, and liquids will be stored at least 50 metres away from any waterway or drainage line as far as is practicable and will be stored in an impervious bunded area within the compound site.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>Vehicle wash downs and/or concrete truck washouts will be carried out within a designated bunded area on an impervious surface or carried out off-site.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>Visual monitoring of local water quality (ie turbidity, hydrocarbon spills/slicks) will be carried out on a regular basis to identify potential spills or the effects of sediment-laden runoff.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>Vehicles and plant will be properly maintained and regularly inspected for fluid leaks.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>An emergency spill kit will be kept on site at all times. All staff will be made aware of the location of the spill kit and trained in its use.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>Dewatering</td>
<td>Dewatering (groundwater and surface runoff collected within the works area) will be carried out in accordance with the Roads and Maritime Technical Guideline for Dewatering.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>Groundwater dewatering</td>
<td>In consultation with DPI water, a licence will be obtained if groundwater extraction of more than three mega litres per year (ML/yr) is required. Any requirement of this licence including monitoring will be completed.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
</tbody>
</table>
6.5 **Noise and vibration**

This section summarises the results of the noise and vibration assessment carried out by GHD as an input to the REF. The full report is provided in Appendix G.

6.5.1 **Methodology**

The assessment involved a quantitative assessment of construction noise and vibration, and operational noise, prepared with consideration of the following key guidelines:

- *Noise Criteria Guideline* (Roads and Maritime Services, 2014)
- *Noise Mitigation Guideline* (Roads and Maritime Services, 2014)
- *Road Noise Policy* (DECCW, 2011)

The assessment involved:

- Identifying sensitive receivers and monitoring background noise levels
- Traffic counts completed during the background noise monitoring
- Establishing the noise and vibration assessment criteria
- Predicting the potential construction and operational noise and vibration
- Assessing the potential noise and vibration impacts by comparing the predictions with the criteria
- Providing mitigation measures, where required.

The identified sensitive receivers and monitoring locations are shown on Figure 6.7.

6.5.2 **Existing environment**

**Study area**

The study area for the noise and vibration assessment has been established to include:

- For construction noise and vibration: noise sensitive receivers located in proximity to construction activities and ancillary facilities
- For operational noise: an area that extends about 600 metres from the centreline of the outermost traffic lane for all components of the proposal. This distance is reduced where noise levels are dominated by existing roads or other transport corridors. The extent of the study area was initially determined based on experience with the likely extent of noise and vibration impacts from similar proposals. The extent of the study area has been reviewed and confirmed following noise and vibration modelling to ensure that it is sufficient to include relevant potentially affected receiver locations.

**Sensitive receivers**

The nearest sensitive receivers and land uses to the proposal site (within the study area) have been identified. Sensitive receivers within the study area have been grouped into noise catchment areas (Table 6-18). Receivers within each noise catchment area are expected to experience similar existing background noise levels based on the results of site observations and the background noise monitoring. Non-residential receivers in the study area include schools, places of worship (churches), medical facilities and outdoor recreation areas.

Sensitive receivers and noise catchment areas within the noise assessment study area are shown on Figure 6.7.
<table>
<thead>
<tr>
<th>Noise catchment area</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rural residential receivers adjacent to the New England Highway to the north and south of Scone. The background noise environment is dominated by traffic on the existing highway.</td>
</tr>
<tr>
<td>2</td>
<td>Residential receivers adjacent to the New England Highway within Scone. The background noise environment is dominated by traffic on the existing highway and other sources typical of an urban/suburban environment.</td>
</tr>
<tr>
<td>3</td>
<td>Residential receivers adjacent to Liverpool Street. The background noise environment is dominated by traffic on Liverpool Street and other noise sources typical of a suburban environment.</td>
</tr>
<tr>
<td>4</td>
<td>All remaining receivers within Scone. The background noise environment is dominated by distant noise from the main road and rail corridors, domestic noise sources and intermittent traffic. This noise catchment area includes receivers both north and south of Liverpool Street.</td>
</tr>
<tr>
<td>5</td>
<td>Scattered rural receivers beyond Scone. The noise environment is dominated by rural noise sources such as farm activities, birds, insects and cattle. This noise catchment area includes receivers both north and south of Liverpool Street.</td>
</tr>
</tbody>
</table>
Figure 6.7

Proposal site
Railway
Sensitive receiver
Noise catchment area
The proposal

LEGEND

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Figure 6.7

LEGEND
- Proposal site
- Railway
- Watercourse
- The proposal
- Logger location
- Sensitive receiver
- Noise catchment area
  - NCA1 (South)
  - NCA2
  - NCA5 (South)

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Proposal site
Railway
Watercourse
The proposal
Logger location
Sensitive receiver
Noise catchment area
NCA1 (South)
NCA2
NCA5 (South)

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Review of Environmental Factors
Noise Sensitive Receivers and Logger Locations - Sheet 2 of 9


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Proposal site
Railway
Watercourse
The proposal
Logger location
Sensitive receiver
Noise catchment area
NCA1 (South)
NCA2
NCA5 (South)
LEGEND

Proposal site
Watercourse
Logger location
Sensitive receiver
Noise catchment area
NCA3
NCA4 (South)
NCA5 (South)

Roads and Maritime Services
HW9 New England Highway Scone Bypass
Review of Environmental Factors
Noise Sensitive Receivers
and Logger Locations - Sheet 3 of 9


Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

Proposal site
Watercourse
Logger location
Sensitive receiver
Noise catchment area
NCA3
NCA4 (South)
NCA5 (South)
RL_197


Created by: fmackay, tmorton

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Review of Environmental Factors
HW9 New England Highway Scone Bypass

Roads and Maritime Services

Figure 6.7

Noise Sensitive Receivers
and Logger Locations - Sheet 6 of 9
Figure 6.7

Proposal site
Watercourse
The proposal
Logger location
Sensitive receiver
Noise catchment area
NCA1 (North)
NCA4 (North)
NCA5 (North)

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Roads and Maritime Services
HW9 New England Highway Scone Bypass
Review of Environmental Factors
Noise Sensitive Receivers and Logger Locations - Sheet 7 of 9

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LEGEND

Proposal site
Railway
Sensitive receiver
Logger location
Watercourse
The proposal

Noise catchment area
NCA1 (North)
NCA2
NCA5 (North)

Figure 6.7

Roads and Maritime Services
HW9 New England Highway Scone Bypass
Review of Environmental Factors
Noise Sensitive Receivers
and Logger Locations - Sheet 8 of 9


Proposal site
Railway
Sensitive receiver
Logger location
Watercourse
The proposal

Noise catchment area
NCA1 (North)
NCA2
NCA5 (North)
LEGEND
Railway
Watercourse
Logger location
Sensitive receiver
Noise catchment area
NCA1 (North)

Figure 6.7
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0 30 60 90 120
Metres

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Background noise levels

Noise monitoring was carried out at selected locations within the study area to measure the existing road traffic noise and the background and ambient noise environment in the vicinity of the proposal site. The results provided a basis for validation of the noise model and the development of proposal specific noise criteria.

Long-term unattended noise monitoring was conducted between 19 March 2015 and 1 April 2015 at 11 locations considered to be representative of the local noise environment. About 20 hours of unattended monitoring was also carried out at a twelfth location as a suitable location for a long term logger was not available.

Attended noise measurements were also taken at the three monitoring locations for a period of 15 minutes during the daytime to supplement the unattended monitoring. The monitoring locations are shown on Figure 6.7. A summary of the monitoring results (with all invalid weather affected data removed) from the unattended monitoring are provided in Table 6-19 and Table 6-20.

Table 6-19  Noise monitoring results - background noise levels – $L_{90}$ dB(A)

<table>
<thead>
<tr>
<th>Monitoring location</th>
<th>Day (7am – 6pm)</th>
<th>Evening (6pm – 10pm)</th>
<th>Night (10pm – 7am)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1 - 343 New England Highway</td>
<td>39</td>
<td>42</td>
<td>33</td>
</tr>
<tr>
<td>L2 - 2A Kelly St</td>
<td>42</td>
<td>38</td>
<td>30</td>
</tr>
<tr>
<td>L3 - 1/5 Parker Street</td>
<td>34</td>
<td>38</td>
<td>36</td>
</tr>
<tr>
<td>L4 - 79 Aberdeen St</td>
<td>42</td>
<td>36</td>
<td>32</td>
</tr>
<tr>
<td>L5 - 99 Aberdeen St</td>
<td>35</td>
<td>35</td>
<td>28</td>
</tr>
<tr>
<td>L6 - 245 Kelly St</td>
<td>47</td>
<td>40</td>
<td>29</td>
</tr>
<tr>
<td>L7 - 343 New England Highway</td>
<td>33</td>
<td>43</td>
<td>39</td>
</tr>
<tr>
<td>L8 - 2742 New England Highway</td>
<td>32</td>
<td>37</td>
<td>34</td>
</tr>
<tr>
<td>L9 - 73 St Aubins Street</td>
<td>34</td>
<td>35</td>
<td>30</td>
</tr>
<tr>
<td>L10 - 41 Kingdon Street</td>
<td>34</td>
<td>35</td>
<td>32</td>
</tr>
<tr>
<td>L11 - 12 Liverpool Street</td>
<td>40</td>
<td>37</td>
<td>36</td>
</tr>
<tr>
<td>L12 - Adjacent to highway south of Scone</td>
<td>51</td>
<td>37</td>
<td>34</td>
</tr>
</tbody>
</table>
### Table 6-20  Noise monitoring results - road traffic noise levels (weekday) – \( L_{Aeq} \) dB(A)

<table>
<thead>
<tr>
<th>Monitoring location</th>
<th>( L_{Aeq(15hr)} ) (7am to 10pm weekdays)</th>
<th>( L_{Aeq(9hr)} ) (10pm to 7am weekdays)</th>
<th>( L_{Aeq(1hr)} ) (Highest)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1 - 343 New England Highway</td>
<td>66</td>
<td>62</td>
<td>67</td>
</tr>
<tr>
<td>L2 - 2A Kelly St</td>
<td>65</td>
<td>62</td>
<td>66</td>
</tr>
<tr>
<td>L3 - 1/5 Parker Street</td>
<td>54</td>
<td>47</td>
<td>54</td>
</tr>
<tr>
<td>L4 - 79 Aberdeen St</td>
<td>60</td>
<td>53</td>
<td>61</td>
</tr>
<tr>
<td>L5 - 99 Aberdeen St</td>
<td>53</td>
<td>45</td>
<td>55</td>
</tr>
<tr>
<td>L6 - 245 Kelly St</td>
<td>69</td>
<td>66</td>
<td>70</td>
</tr>
<tr>
<td>L7 - 343 New England Highway</td>
<td>52</td>
<td>53</td>
<td>54</td>
</tr>
<tr>
<td>L8 - 2742 New England Highway</td>
<td>50</td>
<td>44</td>
<td>52</td>
</tr>
<tr>
<td>L9 - 73 St Aubins Street</td>
<td>52</td>
<td>44</td>
<td>54</td>
</tr>
<tr>
<td>L10 - 41 Kingdon Street</td>
<td>49</td>
<td>43</td>
<td>52</td>
</tr>
<tr>
<td>L11 - 12 Liverpool Street</td>
<td>62</td>
<td>54</td>
<td>63</td>
</tr>
<tr>
<td>L12 - Adjacent to highway south of Scone</td>
<td>71</td>
<td>69</td>
<td>72</td>
</tr>
</tbody>
</table>

#### 6.5.3 Criteria

**Construction noise and vibration criteria**

**Construction noise**

Construction noise criteria were developed in accordance with the *Interim Construction Noise Guideline* (DECC, 2009) for each noise catchment area. Standard hours defined in the guideline are:

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

The proposed construction activities are expected to generally occur during the standard construction hours. However, the *Interim Construction Noise Guideline* acknowledges that the following activities have justification to be carried out outside the recommended construction hours:

- The delivery of oversized plant or structure
- Emergency work
- Works for which it can be demonstrated that there is a need to operate outside the recommended standard hours
- Works which maintain noise levels at receivers below the night time noise affected construction noise management levels.

Construction activities within the rail corridor may also need to be carried out outside standard working hours.
The following descriptors are used for construction hours outside the standard hours above:

- Outside standard working hours (period 1) – Monday to Friday (6pm - 10pm), Saturday (7am - 8am) and (1pm - 10pm), Sunday / public holidays (8am - 6pm)
- Outside standard working hours (period 2) - Monday to Friday (10pm - 7am), Saturday (10pm - 8am), Sunday / public holidays (6pm - 7am).

For recommended standard hours the following terms are used in relation to establishment of construction noise criteria:

- The ‘noise affected level’ represents the point above which there may be some community reaction to noise. For standard construction hours this level is established with reference to the measured background noise levels (Table 6-19) plus 10 dB(A). Outside standard construction hours this level is the background plus 5 dB(A)
- The ‘highly noise affected level’ represents the point above which there may be strong community reaction to noise. This level is set at $L_{Aeq(15min)}$ 75 dB(A).

The noise management levels that apply to residential receivers within each noise catchment area during construction of the proposal are presented in Table 6-21.

**Table 6-21  Proposal specific construction noise management levels – residential receivers**

<table>
<thead>
<tr>
<th>Noise catchment area</th>
<th>Standard hours noise management levels ($L_{Aeq}$ dB(A))</th>
<th>Outside standard hours noise management levels ($L_{Aeq}$ dB(A)) (see Notes 1, 2 and 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Noise affected – 49&lt;br&gt;Highly noise affected - 75</td>
<td>Day: 44&lt;br&gt;Evening: 44&lt;br&gt;Night: 38</td>
</tr>
<tr>
<td>2</td>
<td>Noise affected – 52&lt;br&gt;Highly noise affected - 75</td>
<td>Day: 47&lt;br&gt;Evening: 43&lt;br&gt;Night: 35</td>
</tr>
<tr>
<td>3</td>
<td>Noise affected – 50&lt;br&gt;Highly noise affected - 75</td>
<td>Day: 45&lt;br&gt;Evening: 41&lt;br&gt;Night: 37</td>
</tr>
<tr>
<td>4</td>
<td>Noise affected – 44&lt;br&gt;Highly noise affected - 75</td>
<td>Day: 39&lt;br&gt;Evening: 39&lt;br&gt;Night: 35</td>
</tr>
<tr>
<td>5</td>
<td>Noise affected – 42&lt;br&gt;Highly noise affected - 75</td>
<td>Day: 37&lt;br&gt;Evening: 37&lt;br&gt;Night: 37</td>
</tr>
</tbody>
</table>

Note 1: Out of hours work (day): 7am to 8am and 1pm to 6pm Saturday, 8am to 6pm Sunday & public holidays

Note 2: Out of hours work (evening): 6pm to 10pm Monday to Sunday & public holidays

Note 3: Out of hours work (night): 10pm to 7am, Monday to Saturday; 10pm to 8am Sunday & public holidays

The construction noise management levels that apply to other sensitive receivers (when in use) in the study area are:

- Schools, hospitals and places of worship – 45 dB(A) internal noise level
- Active recreation – 65 dB(A) external noise level
- Passive recreation – 60 dB(A) external noise level
- Industrial properties – 75 dB(A) external noise level
- Commercial properties – 70 dB(A) external noise level.

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The highly affected noise level of $L_{Aeq(15\text{min})}$ 75 dB(A) also applies to other sensitive receivers.

**Construction traffic noise**

The *Road Noise Policy* (DECCW, 2011) provides traffic noise target levels for receivers in the vicinity of existing roads. These levels are applied to construction works to identify potential construction traffic impacts and the subsequent need for reasonable and feasible mitigation measures.

It is anticipated that the majority of the proposal would be constructed with traffic and access maintained along New England Highway and the surrounding local road network. Table 6-22 presents the applicable criteria relating to noise due to additional traffic generated during construction of the proposal.

<table>
<thead>
<tr>
<th>Types of receiver</th>
<th>Assessment criteria Day (7am – 10pm)</th>
<th>Assessment criteria Night (10pm – 7am)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing residences affected by additional traffic on existing arterial roads generated by land use developments.</td>
<td>$60 ; L_{Aeq(15\text{hr})} ; \text{dB(A)}$ (external)</td>
<td>$55 ; L_{Aeq(9\text{hr})} ; \text{dB(A)}$ (external)</td>
</tr>
<tr>
<td>Existing residences affected by additional traffic on existing local roads generated by land use developments.</td>
<td>$55 ; L_{Aeq(1\text{hr})} ; \text{dB(A)}$ (external)</td>
<td>$50 ; L_{Aeq(1\text{hr})} ; \text{dB(A)}$ (external)</td>
</tr>
<tr>
<td>School classrooms (when in use)</td>
<td>$40 ; L_{Aeq(1\text{hr})} ; \text{dB(A)}$ (internal)</td>
<td>-</td>
</tr>
<tr>
<td>Places of worship (when in use)</td>
<td>$40 ; L_{Aeq(1\text{hr})} ; \text{dB(A)}$ (internal)</td>
<td>$40 ; L_{Aeq(1\text{hr})} ; \text{dB(A)}$ (internal)</td>
</tr>
<tr>
<td>Open space (active use) (when in use)</td>
<td>$60 ; L_{Aeq(15\text{hr})} ; \text{dB(A)}$ (external)</td>
<td>-</td>
</tr>
<tr>
<td>Open space (passive use) (when in use)</td>
<td>$55 ; L_{Aeq(15\text{hr})} ; \text{dB(A)}$ (external)</td>
<td>-</td>
</tr>
</tbody>
</table>

Based on the *Road Noise Policy* (DECCW, 2011) it is considered that where road traffic noise levels already exceed the assessment criteria, an increase of less than 2 dB(A) represents a minor impact that is barely perceptible to the average person.

**Construction vibration**

Table 6-23 summarises the *German Standard Structural Vibration Part 3: Effects of vibration on structures, DIN 4150-3 -1999* minimum safe levels of vibration at different frequencies for commercial, residential and heritage listed buildings.

Humans are capable of detecting vibration at levels well below those causing risk of damage to a building. The degrees of perception for humans are suggested by the vibration level categories given in *BS 5228.2 – 2009, Code of Practice for noise and vibration on construction and open sites – Part 2: Vibration*. This indicates that a vibration level of as little as 0.14 millimetres per second (mm/s) may be perceptible while a vibration level of 10 millimetres per second is likely to be intolerable.
Detailed discussion regarding construction vibration criteria for human comfort and structural damage and cosmetic damage to buildings is provided in Appendix G.

Table 6-23  Vibration criteria for structural damage

<table>
<thead>
<tr>
<th>Type of structure</th>
<th>Vibration velocity mm/s 1 Hz to 10 Hz</th>
<th>Vibration velocity mm/s 10 Hz to 50 Hz</th>
<th>Vibration velocity mm/s 50 Hz to 100 Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buildings used for commercial purposes, industrial buildings and buildings of similar design.</td>
<td>20</td>
<td>20 to 40</td>
<td>40 to 50</td>
</tr>
<tr>
<td>Dwellings and buildings of similar design and/or use.</td>
<td>5</td>
<td>5 to 15</td>
<td>15 to 20</td>
</tr>
<tr>
<td>Structures that because of their particular sensitivity to vibration, do not correspond to those listed above and have intrinsic value (e.g., buildings under a preservation order).</td>
<td>3</td>
<td>3 to 8</td>
<td>8 to 10</td>
</tr>
</tbody>
</table>

Operational noise criteria


The Noise Criteria Guideline approach is to assess noise levels at each façade of receivers (as relevant) within the study area. The criterion at a receiver depends on the following factors:

- If noise levels at the receiver will be influenced by a new road or a redeveloped road
- If the receiver is in a transition zone
- Whether residences are likely to receive a significant relative increase in noise due to the proposal.

The most stringent applicable criteria at a receiver façade become the proposal criteria that will be used in the assessment.

For the proposal transition zones have been identified at the northern and southern end where the proposal deviates from the existing New England Highway, Aberdeen Street north of St Aubins Street and St Aubins Street east of Aberdeen Street.

Proposal specific operational noise criteria for residential and non-residential land uses have been established with reference to the Noise Criteria Guideline (Roads and Maritime, 2014) and are shown in Table 6-24 and Table 6-25 respectively.

Most buildings provide a noise reduction of at least 10 dB(A) when windows are left 20 per cent open, without providing additional treatment. Therefore where the noise goals are internal, a 10 dB(A) reduction from external noise levels to internal noise levels has been adopted to allow for an external assessment.

Refer to the noise and vibration assessment in Appendix G for a detailed description of derivation of the proposal specific criteria.
### Table 6-24 Proposal specific operational noise criteria - residential, dB(A)

<table>
<thead>
<tr>
<th>Road category</th>
<th>Type of project / land use</th>
<th>Day (7am - 10pm)</th>
<th>Night (10pm - 7am)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freeway / arterial / sub-arterial roads</td>
<td>Existing residences affected by noise from new freeway/arterial/sub-arterial road corridors</td>
<td>55 L_{Aeq(15hour)} (external)</td>
<td>50 L_{Aeq(9hour)} (external)</td>
</tr>
<tr>
<td></td>
<td>Existing residences affected by noise from redevelopment of existing freeway/arterial/sub-arterial roads</td>
<td>60 L_{Aeq(15hour)} (external)</td>
<td>55 L_{Aeq(9hour)} (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></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Existing residences affected by both new roads and the redevelopment of existing freeway/arterial/sub-arterial roads in a transition zone</td>
<td>55-60 L_{Aeq(15hour)} (external)</td>
<td>50-55 L_{Aeq(9hour)} (external)</td>
</tr>
<tr>
<td></td>
<td>Existing residences affected by increases in traffic noise of 12 dBA or more from new freeway/arterial/sub-arterial roads</td>
<td>42-55 L_{Aeq(15hour)} (external)</td>
<td>42-50 L_{Aeq(9hour)} (external)</td>
</tr>
<tr>
<td></td>
<td>Existing residences affected by increases in traffic noise of 12 dBA or more from redevelopment of existing freeway/arterial/sub-arterial roads</td>
<td>42-60 L_{Aeq(15hour)} (external)</td>
<td>42-55 L_{Aeq(9hour)} (external)</td>
</tr>
<tr>
<td>Local Roads</td>
<td>Existing residences affected by additional traffic on existing local roads generated by land use developments</td>
<td>55 L_{Aeq(1hour)} (external)</td>
<td>50 L_{Aeq(1hour)} (external)</td>
</tr>
</tbody>
</table>

### Table 6-25 Proposal specific operational noise criteria – non-residential, dB(A)

<table>
<thead>
<tr>
<th>Land use</th>
<th>Day (7am - 10pm)</th>
<th>Night (10pm - 7am)</th>
<th>Additional considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>School classrooms (when in use)</td>
<td>40 L_{Aeq,1hour} (internal)</td>
<td>–</td>
<td>In the case of buildings used for education or health care, noise level criteria for spaces other than classrooms and wards may be obtained by interpolation from the ‘maximum’ levels shown in Australian/New Zealand Standard 2107:2000 Acoustics – Recommended design sound levels and reverberation times for building interiors.</td>
</tr>
<tr>
<td>Hospital wards (when in use)</td>
<td>35 L_{Aeq,1hour} (internal)</td>
<td>35 L_{Aeq,1hour} (internal)</td>
<td>The criteria are internal. Areas outside the place of worship, such as a churchyard or cemetery may also be a place of worship. Compliance with internal criteria inside the church may be sufficient; however for external areas open space (passive use) criteria may also be applied.</td>
</tr>
<tr>
<td>Places of worship (when in use)</td>
<td>40 L_{Aeq,1hour} (internal)</td>
<td>40 L_{Aeq,1hour} (internal)</td>
<td></td>
</tr>
<tr>
<td>Land use</td>
<td>Day (7am - 10pm)</td>
<td>Night (10pm - 7am)</td>
<td>Additional considerations</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>------------------</td>
<td>--------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>Open space (active use) (when in use)</td>
<td>40 $L_{Aeq,1hour}$ (internal)</td>
<td>-</td>
<td>Active recreation is characterised by sporting activities and activities which generate their own noise or focus for participants making them less sensitive to external noise intrusion.</td>
</tr>
<tr>
<td>Open space (passive use) (when in use)</td>
<td>40 $L_{Aeq,1hour}$ (internal)</td>
<td>-</td>
<td>Passive recreation is characterised by contemplative activities that generate little noise and where benefits are compromised by external noise intrusion eg playing chess, reading.</td>
</tr>
<tr>
<td>Aged care facilities</td>
<td>40 $L_{Aeq,1hour}$ (internal)</td>
<td>-</td>
<td>Assessed as residential receivers</td>
</tr>
</tbody>
</table>


Sleep disturbance

Sleep disturbance impacts are likely to be dependent on the following:

- Maximum noise level of an event
- Number of occurrences
- Duration of the event
- Level above background or ambient noise levels.

For continuous rather than intermittent traffic flow, the *Environmental Noise Management Manual* (RTA, 2001) recommends $L_{Amax}$ noise pass-by events should not exceed $L_{Aeq(1hr)}$ noise levels by more than 15 dB(A). The *Environmental Noise Management Manual* (RTA, 2001) advises that maximum noise levels can be used as a tool to prioritise and rank mitigation strategies, but should not be applied as a decisive criterion in itself.

6.5.4 Potential impacts

Construction

Construction noise

Construction activities would result in a short-term increase in localised noise levels, particularly for residences and other sensitive receivers located close to the proposal site. The proposal is also likely to involve some construction activities outside the standard construction hours for safety reasons or to minimise disruptions to traffic as discussed in section 6.5.3.

Noise emissions from construction have been assessed at identified sensitive receivers in the proposal area during standard construction hours and outside the standard construction hours. A quantitative assessment has been completed with consideration to the *Interim Construction Noise Guideline* (DECC, 2009).

The proposal construction may be divided into three sections, including:

- Southern end to the railway line
- Rail line to the bridge over Parsons Gully, Kingdon Street and Liverpool Street
- Bridge over Parsons Gully, Kingdon Street and Liverpool Street to northern end.

The proposal is anticipated to involve the following general work methodology and sequencing:

- Establishment of temporary fencing
- Installation of erosion and sediment controls
• Establishment of construction compound sites
• Vegetation clearing and grubbing
• Utility relocations
• Stripping, stockpiling and management of topsoil and unsuitable material
• Earthworks preparation/bulk earthworks
• Structural work – bridge work and viaduct construction
• Piling – vibratory and bored or CFA
• Drainage work – including culverts, subsoil drains, kerbs and guttering
• Structural work – bridge work and viaduct construction
• Pavement and median construction – including compaction and asphalt laying
• Construct tie-ins to existing roads
• Installation of street lights
• Landscaping
• Finishing work including installation of pavement marking and signposting
• Removal of construction compounds and site tidy up.

The final staging and construction methodology for the proposal would be determined by the construction contractor and may change.

The magnitude of the off-site noise impact associated with construction activities would be dependent upon a number of factors:

• The intensity and location of construction activities
• The type of equipment used
• Existing local noise sources
• Intervening terrain
• The prevailing weather conditions.

Plant and equipment needed for the proposal would be determined during the construction planning phase. Table 6-27 provides a summary of the expected construction noise levels at certain distances based on noise emission sound power levels for individual plant and equipment likely to be used for the proposal. Other equipment may be used however it is anticipated that they would produce similar noise emissions.

Construction equipment will likely move about the site altering noise impacts with respect to the identified noise sensitive receivers. During any given period, the construction items to be used in the proposal area will operate at maximum sound power levels for only brief stages. At other times, the machinery may produce lower sound levels while carrying out activities not requiring full power. It is highly unlikely that all construction equipment would be operating at their maximum sound power levels at any one time and certain types of construction machinery will be present in the proposal area near to the receiver for only brief periods during construction and/or maintenance activities. Furthermore, since the noise modelling provides the predicted maximum noise level at any residential receiver in any noise catchment area, the results are considered worst case.

Potential noise impacts from construction activities include:

• Construction activities carried out during standard hours have the potential to exceed the noise affected construction noise management levels at residential receivers in all noise catchment areas. Activities that encompass the entire project area, such as earthworks and pavement compaction and installation are likely to affect the greatest number of residential receivers. Receivers closest to the project have the highest potential for impact

• Residential receivers in noise catchment area 2 and noise catchment area 4 have the greatest potential for impact. Up to 18 receivers in noise catchment area 2 are predicted to exceed the highly noise affected criterion. Up to 11 receivers in noise catchment area 4 are predicted to exceed the highly noise affected criterion
Construction activities outside standard hours have the potential to exceed the noise affected construction noise management levels at residential receivers in all noise catchment areas.

Construction activities during standard hours have the potential to exceed the noise management level at educational facilities, including Scone Grammar School, Scone High School and Scone Public School and at Scone Anglican Church, particularly during clearing, earthworks and pavement activities. Construction noise management levels are applicable as an internal level only when the facilities are in use. As a guide, an external trigger of 55 dB(A) has been adopted, assuming a 10 dB reduction from external to internal noise levels and a 45 dB(A) internal noise management level for these receivers.

Construction activities during standard hours have the potential to exceed the noise management level at recreational areas, including Scone Golf Course, Bill Rose Sports Complex, Liverpool Street Park (dog walking park), White Park and Scone Rugby Club when these areas are in use, particularly during clearing, earthworks and pavement activities. Noise management levels in these areas are applied as external noise criteria.

Construction compound activities are predicted to comply with the 75 dB(A) Leq ‘highly affected’ noise level at all assessed receivers. The operation of the northern compound is predicted exceed the standard hours noise management level by up to 10 dB(A) at nearby receivers within noise catchment area 2. Also operation of the northern compound has the potential to exceed the out of hours (night time) noise management level by up to 27 dB(A) at nearby noise catchment area 2 receivers. Operation of the southern compound is predicted to comply with all noise management levels, however moderate exceedances of up to 4 dB(A) are predicted at 15 receivers within noise catchment area 4 during out of hours (night time) work.

Refer to Appendix G for figures showing construction noise levels and exceedances.

It is recommended that the noise and vibration mitigation measures detailed in section 6.5.5 be implemented where feasible and reasonable to minimise the identified potential impacts.

Sleep disturbance

The Interim Construction Noise Guideline (DECC, 2009) states that ‘where construction works are planned to extend over more than two consecutive nights, the impact assessment should cover the maximum noise level from the proposed works’.

Typically, L_{A1(1minute)} or L_{Amax} noise levels are around 5 dB to 10 dB greater than the L_{Aeq (15 minute)} noise levels. Typically a standard window will provide a 10 dB reduction when partially open and a 20 dB reduction when closed. To be conservative, it is assumed that windows would be kept open during night-time construction activities.

The Environmental Criteria for Road Traffic Noise (OEH, 1999) acknowledges that based on the current level of understanding no absolute noise level criteria have been established that correlate to an acceptable level of sleep disturbance. However, the Road Noise Policy (DECCW, 2011) provides guidance suggesting that maximum internal noise levels below 50 dB(A) to 55 dB(A) are unlikely to cause awakening reactions and one or two events per night, with maximum internal noise levels of 65 dB(A) to 70 dB(A) (inside dwellings) are not likely to significantly affect health and wellbeing.

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1 The ICNG (DECCW 2009) states that a “conservative estimate of the difference between internal and external noise levels is 10 dB for buildings other than residences”.

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There is the potential for sleep disturbance impacts, with consideration to the *Road Noise Policy* (DECCW, 2011) sleep disturbance levels, if construction activities occur during the night-time period. Therefore it is recommended that construction activities likely to generate the highest levels of noise be avoided as far as possible and be scheduled to occur at the beginning of the shift (before 11 pm) to minimise the potential for sleep disturbance. All workers should be briefed on the need to minimise noise as a result of their activities.

Where construction works are carried out outside of recommended standard hours, it is recommended that the noise and vibration mitigation measures detailed in section 6.5.5 be implemented where feasible and reasonable to minimise the identified potential impacts.

**Construction traffic impacts**

The *Road Noise Policy* (DECCW, 2011) state that ‘for existing residences and other sensitive land uses affected by additional traffic on existing roads generated by land use developments, any increase in the total traffic noise level as a result of the development should be limited to 2 dB above that of the noise level without the development. This limit applies wherever the noise level without the development is within 2 dB of, or exceeds, the relevant day or night noise assessment criterion.’

This is also considered to be applicable for construction noise therefore if road traffic noise increases from construction is within 2 dBA of current levels then the objectives of the *Road Noise Policy* are achieved.

The predicted increase in noise level due to construction traffic on the haulage routes has been calculated based on the total construction vehicle movements relative to the existing traffic volumes. Since the calculations are based on the expected maximum traffic volumes generated due to construction of the proposal, the results are considered worst case. The predicted results are shown below in Table 6-26.

<table>
<thead>
<tr>
<th>Road</th>
<th>Existing volumes (daytime)</th>
<th>Construction generated traffic (per day)</th>
<th>Predicted relative increase in total traffic noise (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>New England Highway – North of Bypass</td>
<td>7184</td>
<td>80</td>
<td>0.1</td>
</tr>
<tr>
<td>New England Highway – South of Bypass</td>
<td>8943</td>
<td>80</td>
<td>0.2</td>
</tr>
<tr>
<td>Kelly Street - North of Liverpool Street</td>
<td>7736</td>
<td>80</td>
<td>0.2</td>
</tr>
<tr>
<td>Kelly Street - South of Liverpool Street</td>
<td>11451</td>
<td>80</td>
<td>0.1</td>
</tr>
<tr>
<td>Liverpool Street - East of Aberdeen Street</td>
<td>5643</td>
<td>160</td>
<td>0.6</td>
</tr>
<tr>
<td>Liverpool Street - West of Aberdeen Street</td>
<td>6655</td>
<td>160</td>
<td>0.4</td>
</tr>
<tr>
<td>St Aubins Street West of Aberdeen Street</td>
<td>183</td>
<td>40</td>
<td>4.1</td>
</tr>
<tr>
<td>St Aubins Street East of Aberdeen Street</td>
<td>203</td>
<td>40</td>
<td>3.8</td>
</tr>
</tbody>
</table>
The results in Table 6-26 indicate that Aberdeen and St Aubins streets are predicted to increase by more than 2 dB (A) due to construction traffic. Existing local traffic noise levels on these roads are in the order of 50 to 55 dB(A) \( L_{\text{Aeq}} \) based on noise logger results. Construction traffic may therefore exceed the Noise Criteria Guideline local road noise criteria of 55 dB(A). All other assessed haulage routes are expected to remain below the 2 dB(A) increase in construction generated traffic noise level.

It is noted that given the speed limits on the local roads such as Aberdeen and St Aubins streets it is unlikely that engine compression braking would be utilised by construction traffic.

Spoil would be moved during the day where practical, and feasible and reasonable management strategies would be investigated, in consultation with the NSW Environment Protection Authority, to minimise the volume of heavy vehicle movements at night. These would be detailed in the construction noise and vibration management plan and implemented in accordance with the *Interim Construction Noise Guideline*.

It is recommended that the noise and vibration mitigation measures detailed in section 6.5.5 be implemented to manage potential construction traffic impacts.

**Construction vibration**

Construction activities would result in a short-term increase in localised vibration levels, particularly for residences and other sensitive receivers located close to the proposal site. The construction vibration assessment is based on an assumed construction methodology. The final staging and construction methodology for the proposal would be determined by the construction contractor and may change.

Energy from equipment is transmitted into the ground and transformed into vibration, which attenuates with distance. The magnitude and attenuation of ground vibration is dependent on a range of factors including the method of energy transfer, the vibration frequency and type and the characteristics of the ground and surrounding topography.

Vibration impacts focus on potential structural damage in close proximity to construction activities. Furthermore, it is possible that local sensitive receivers may perceive construction vibration at times. The level of annoyance, however, will depend on individuals.

Due to complicated ground conditions and other variables associated with construction vibration, an exact vibration assessment result is generally not expected from available prediction methods. Rather, regular monitoring of vibration levels at adjacent sensitive receptors is often required to help understand the vibration effect. This is particularly the case with activities such as pile driving and operation of heavy vibratory compaction plant, where avoidance of damage or other disruption is critical.
Plant and equipment needed for the proposal would be determined during the construction planning phase. Table 6-27 provides safe working buffer distances required to comply with the human comfort, cosmetic damage, standard dwelling and heritage building structural damage criteria based on equipment likely to be used for the proposal. Other equipment may be used however it is anticipated that they would produce similar vibration levels.

Vibration may be amplified in multi-level buildings through the structure to the upper floors. A doubling of the buffer distances provided for multi-level structures would provide a conservative allowance for this possible effect.

Table 6-27 Construction vibration safe working buffer distances (metres)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Human comfort</th>
<th>Structural damage heritage building / structure</th>
<th>Structural damage standard dwellings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roller</td>
<td>90</td>
<td>24</td>
<td>13</td>
</tr>
<tr>
<td>15 tonne vibratory roller</td>
<td>140</td>
<td>35</td>
<td>18</td>
</tr>
<tr>
<td>Loader breaking kerbs</td>
<td>120</td>
<td>30</td>
<td>16</td>
</tr>
<tr>
<td>7 tonne compactor</td>
<td>90</td>
<td>24</td>
<td>13</td>
</tr>
<tr>
<td>Pavement Breaker</td>
<td>90</td>
<td>24</td>
<td>13</td>
</tr>
<tr>
<td>Dozer</td>
<td>60</td>
<td>15</td>
<td>8</td>
</tr>
<tr>
<td>Backhoe</td>
<td>10</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Jackhammer</td>
<td>4</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Excavator</td>
<td>25</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Piling (impact)</td>
<td>700</td>
<td>180</td>
<td>100</td>
</tr>
<tr>
<td>Piling (vibratory)</td>
<td>110</td>
<td>50</td>
<td>30</td>
</tr>
<tr>
<td>Piling (bored)</td>
<td>120</td>
<td>35</td>
<td>17</td>
</tr>
</tbody>
</table>

Sources:

British Standard 5228.2 – 2009, Code of Practice for noise and vibration on construction and open sites – Part 2: Vibration: criteria (1 millimetre per second)

German Standard DIN 4150-3: 1999-02 Structural Vibration – Part 3: Effects of vibration on structures: criteria (3 millimetres per second)

With consideration to structural damage vibration impacts for general construction activities, the expected magnitude of ground vibrations should not be sufficient to cause damage if the equipment operates at distances greater than 18 metres from standard residential buildings or structures of similar construction. Heritage buildings and structures may be impacted up to 35 metres from the works.

Vibration impacts due to piling activities have the potential to exceed structural vibration values for standard dwellings at distances from the activity of 100 metres for impact piling, 30 metres for vibratory piling and 17 metres for bored piling. Heritage buildings and structures may be impacted up to 180 metres, 50 metres and 35 metres for impact, vibratory and bored piling respectively. In the event that these buffer distances are not practical, other methods may be investigated such as press-in hydraulic piling or jacked-in piling. These methods generally exhibit much lower vibration levels compared to impact, vibratory and bored piling.
With consideration to human comfort vibration impacts, where rolling and compacting activities occur within 140 metres of adjacent receivers including residences, schools and places of worship, there is the potential that vibration levels could be intrusive for some activities. It is recommended that where reasonable and feasible, buffer distances are implemented as per values shown in Table 6-27 for the corresponding activities.

Piling activities may cause adverse reaction from receivers up to 700 metres from the activity where impact piling is used. Vibratory or bored piling are therefore preferred methods over impact piling, however press-in hydraulic piles or jacked-in piles may also provide alternatives with negligible vibration levels by comparison.

It is recommended that the noise and vibration mitigation measures detailed in section 6.5.5 be implemented to manage potential construction vibration impacts.

**Operation**

**Operational noise**

Operational noise modelling for the proposal was carried out for the following scenarios:

- **Existing 2015** - the current year existing noise model was used to verify the operational noise model. It considered data obtained from the road traffic noise monitoring and simultaneous traffic counts
- **‘Build’ 2017 and ‘no build’ 2017**
- **‘Build’ 2027 and ‘no build’ 2027**.

The ‘no build’ (or ‘do nothing’) scenarios are required to assess the increase in total traffic noise associated with the proposal (ie the ‘build’ scenario).

Day and night-time noise maps (façade corrected) for the ‘no build’ and ‘build’ for 2027 (day and night) are shown in Figure 6.8 to Figure 6.11. Refer to the noise and vibration assessment in Appendix G for mapping of the 2017 scenario.

All road traffic noise levels include a +2.5 dB(A) façade correction and show the maximum overall road traffic noise level at the façade for each building. The noise contours are presented as the $L_{Aeq(15\text{ hour})}$, whereas the criteria for school classrooms, places of worship, hospital wards (including medical facilities) are $L_{Aeq(1\text{ hour})}$. For comparison, the criteria at these locations may be adjusted with a correction of 2.6 dB(A) added to the $L_{Aeq(15\text{ hour})}$ to derive the $L_{Aeq(1\text{ hour})}$.

The *Noise Mitigation Guideline* (Roads and Maritime Services, 2014) provides guidance where exceedance of the proposal specific noise criteria is predicted at sensitive receivers. The *Noise Mitigation Guideline* mitigation guidance can be summarised as:

- The controlling criterion represents the noise criteria at each residential façade, in accordance with the *Noise Criteria Guideline* (Roads and Maritime Services, 2014)
- The cumulative criterion represents the total noise level that is 5 dB(A) or more above the *Noise Criteria Guideline* (Roads and Maritime Services, 2014) criteria in the build year. The cumulative limit only applies when the contribution from the proposal at the affected façade is more than 2 dB(A)
- The acute noise level is defined as a level of road traffic noise of 65 dB(A) $L_{Aeq(15\text{hr})}$ (day) or 60 dB(A) $L_{Aeq(9\text{hr})}$ (night), one metre from the building façade
- Mitigation should be assessed at each façade of the residence, as the worst affected façade may not be the façade with an increase of 2 dB(A).
Figure 6.8

Predicted road traffic noise levels,
No Build 2027 Day (facade corrected)

LEGEND

- Proposal site
- Railway
- Watercourse
- The proposal

- 45 dBA predicted traffic noise level, LAeq 15hr
- 50 dBA predicted traffic noise level, LAeq 15hr
- 55 dBA predicted traffic noise level, LAeq 15hr
- 60 dBA predicted traffic noise level, LAeq 15hr
- 65 dBA predicted traffic noise level, LAeq 15hr

Figure 6.9

Predicted road traffic noise levels,
No Build 2027 Night (facade corrected)

<table>
<thead>
<tr>
<th>Noise Level</th>
<th>LAeq 9hr</th>
</tr>
</thead>
<tbody>
<tr>
<td>40 dB</td>
<td>40 dBA</td>
</tr>
<tr>
<td>45 dB</td>
<td>45 dBA</td>
</tr>
<tr>
<td>50 dB</td>
<td>50 dBA</td>
</tr>
<tr>
<td>55 dB</td>
<td>55 dBA</td>
</tr>
<tr>
<td>60 dB</td>
<td>60 dBA</td>
</tr>
</tbody>
</table>

LEGEND

Proposal site
Railway
Watercourse
The proposal
LEGEND
Proposal site
Railway
Watercourse
The proposal

Predicted road traffic noise levels,
Build 2027 Day (facade corrected)

Roads and Maritime Services
HW9 New England Highway Scone Bypass
Review of Environmental Factors


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Proposed site
Railway
Watercourse

45 dBA predicted traffic noise level, LAeq 15hr
50 dBA predicted traffic noise level, LAeq 15hr
55 dBA predicted traffic noise level, LAeq 15hr
60 dBA predicted traffic noise level, LAeq 15hr
65 dBA predicted traffic noise level, LAeq 15hr

Figure 6.40

to Tamworth

to Muswellbrook

NEW ENGLAND HIGHWAY
GREAT NORTHERN RAILWAY
PARSONSGULLY
FIG TREE CREEK
SMITH STREET
MOUNT STREET
ABERDEEN STREET
ARKER STREET
DUNKLEY STREET
KELLY STREET
SKINNER STREET
GUNDY ROAD
GUERNSEY STREET
KINGDON STREET
LIVERPOOL STREET
KELLY STREET
ST AUBINS STREET
PARKER STREET
FORBES STREET
SUSAN STREET
ST AUGUSTINE STREET
NEW ENGLAND HIGHWAY Scone Bypass
Build 2027 Day (facade corrected)
The operational noise assessment results indicate the following:

- The controlling criterion from the Noise Criteria Guideline is predicted to be exceeded at 166 sensitive receivers during the day time period and 121 sensitive receivers during the night time period. It should be however that many of these are due to noise from existing roads not part of the proposal and therefore not all would qualify for mitigation treatment.

- The cumulative criterion from the Noise Criteria Guideline is exceeded at 16 sensitive receivers, however noise levels may also decrease at some receivers near to the existing highway as a result of the proposal.

- The relative increase criterion is exceeded at 51 sensitive receivers.

The proposal is predicted to exceed the criteria at the following non-residential receivers:

- Scone Anglican Church
- Scone High School
- Scone Grammar School
- Scone Public School
- Scone Rugby Club
- Equestrian Showgrounds
- Scone Golf Course
- Liverpool Street park

Additional detailed noise assessment (including internal and external noise monitoring) will be required at the schools and church to identify which structures are sensitive locations with regards to the traffic noise criteria and to determine the transmission loss through the relevant building facades for comparison with the internal noise criteria.

Sensitive receivers that qualify for consideration of additional noise mitigation are discussed in more detail in section 6.5.5. It is predicted that some sensitive receivers will benefit from the proposed alignment, where it diverts traffic from Liverpool Street and the existing New England Highway.

The identified exceedances of the noise criteria are primarily due to the following factors:

- With construction of the proposal residential receivers located away from the existing highway traffic and receiver facades which were previously facing away from road traffic noise are now exposed to noise from the proposal.

- Changes in traffic volumes on existing roads.

- Changes in road design elevations.

**Maximum noise level / sleep disturbance**

The Road Noise Policy (DECCW, 2011) provides a literature review for the assessment of sleep arousal due to traffic noise however does not set a sleep disturbance assessment criterion. Sleep disturbance impacts are likely to be dependent on the following:

- Maximum noise level of an event
- Number of occurrences
- Duration of the event
- Level above background or ambient noise levels.

For continuous rather than intermittent traffic flow, the Environmental Noise Management Manual (RTA, 2001) recommends $L_{A\text{max}}$ noise pass-by events may lead to sleep disturbance if the $L_{A\text{max}}$ noise levels exceeds the $L_{A\text{eq}(1hr)}$ noise level by more than 15 dB(A) when the $L_{A\text{max}}$ noise levels is greater than 65 dB(A).

The Environmental Noise Management Manual advises that the maximum noise level can be used as a tool to prioritise and rank mitigation strategies, but should not be applied as a decisive noise criterion for selection of mitigation treatments.
The $L_{\text{Amax}}$ and $L_{\text{Aeq(1hr)}}$ noise levels during the night-time period (10pm to 7am) at the five road traffic noise monitoring locations are summarised in Table 6-28.

### Table 6-28 Summary of maximum noise levels - dB(A)

<table>
<thead>
<tr>
<th>Noise monitoring location</th>
<th>$L_{\text{Amax}}$ range</th>
<th>$L_{\text{Aeq(1hr)}}$ range</th>
<th>Highest $L_{\text{Amax}} - L_{\text{Aeq(1hr)}}$ average</th>
<th>Average nightly number of $L_{\text{Amax}}$ events &gt; 65 dB(A) and 15 dB(A) above $L_{\text{Aeq(1hr)}}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>78-90</td>
<td>53-66</td>
<td>31.5</td>
<td>23.5</td>
</tr>
<tr>
<td>L2</td>
<td>77-95</td>
<td>51-66</td>
<td>30.9</td>
<td>23.9</td>
</tr>
<tr>
<td>L4</td>
<td>66-85</td>
<td>40-59</td>
<td>33.3</td>
<td>23.1</td>
</tr>
<tr>
<td>L5</td>
<td>38-81</td>
<td>52-55</td>
<td>24.3</td>
<td>15.7</td>
</tr>
<tr>
<td>L6</td>
<td>79-96</td>
<td>54-70</td>
<td>32.6</td>
<td>23.7</td>
</tr>
<tr>
<td>L11</td>
<td>67-80</td>
<td>42-61</td>
<td>29.0</td>
<td>23.0</td>
</tr>
</tbody>
</table>

The current maximum noise levels exceed the $L_{\text{Aeq(1hr)}}$ noise levels by more than 15 dB(A) and are above 65 dB(A) for almost all measured 15-minute samples during the night time period.

The proposal, incorporating the new and redeveloped sections, is likely to reduce the maximum noise levels for some residential receivers, particularly along Kelly Street through town. Given the proposal is expected to reduce heavy vehicle volumes through the township, the number of maximum noise level events due to heavy vehicles is expected to reduce significantly.

Conversely, there are expected to be receivers in the vicinity of the proposal that will be exposed to higher and more frequent maximum noise events due to the location of the proposal. However, given the proposal is expected to involve heavy vehicles travelling at relatively constant speeds and free flowing, typical maximum noise events due to sources such as engine braking are less likely to occur.

Based on existing maximum noise levels, location L1 is considered most representative of traffic travelling at 100 kilometres per hour, as expected on the proposal. However, it should be noted that location L1 was located in the vicinity of the speed zone change from 100 kilometres per hour to 50 kilometres per hour, therefore heavy vehicles would have a greater propensity to use engine braking at location L1 than would be the situation on the proposal where the speed is expected to be more constant.

Location L5 is considered to be representative of receivers that are potentially affected by the proposal. On this basis, the upper range of the maximum noise levels have the potential to increase by up to 9 dB and the number of $L_{\text{Amax}}$ events greater than 65 dB(A) and 15 dB(A) above $L_{\text{Aeq(1hr)}}$ have the potential to increase by approximately 29 events per night.

Although the comparison of the L1 and L5 results suggest a significant increase in the number of $L_{\text{Amax}}$ events, it should be noted that the prediction of maximum noise levels for new roads possess a reasonable level of uncertainty. If a higher degree of certainty is required, it is recommended that a detailed noise assessment is undertaken once the project opens and maximum noise level events can be measured. Roads and Maritime do not provide any requirements to provide noise mitigation options on the basis of the maximum noise level assessment. Rather, maximum noise levels assessment can be used to prioritise the application of noise mitigation measures.
**Traffic noise increase on existing local roads**

Local road noise criteria are applicable in addition to the proposal noise criteria at residential receiver facades within a transition zone where the existing local road noise contribution is identified as being greater than the proposal noise contribution and the proposal is expected to increase noise from the existing local road more than 2 dB.

Modelling results indicate that local road traffic noise is not expected to exceed the applicable criteria and therefore mitigation measures are not required in relation to local traffic noise.

**Operational vibration**

There are no expected operational vibration impacts associated with the proposal.

### 6.5.5 Safeguards and management measures

**Construction noise and vibration mitigation measures**

Mitigation measures provided in Table 6-29 will be implemented to minimise potential construction noise and vibration impacts.

#### Table 6-29 Summary of potential impacts and environmental safeguards – construction noise and vibration

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction noise and vibration - General</td>
<td>A construction noise and vibration management plan (CNVMP) will be prepared as part of the construction environmental management plan (CEMP). The plan will include, but not be limited to: Community consultation measures Environmental site inductions. Behavioural practices Noise monitoring program Attended vibration measurement requirements.</td>
<td>Construction contractor</td>
<td>Pre-construction and construction</td>
</tr>
<tr>
<td>Source controls – Construction hours and scheduling</td>
<td>Where reasonable and feasible, construction should be carried out during the standard daytime working hours. Work generating high noise and/or vibration levels should be scheduled during less sensitive time periods The use of mulchers, jack hammers, concrete saws, rock breakers, compaction or other equipment used in very close proximity to the receivers should be limited where feasible and reasonable to the standard construction hours.</td>
<td>Construction 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>Source controls – Construction respite period</td>
<td>If highly noise affected impacts are predicted high noise and vibration generating activities may only be carried out in continuous blocks, not exceeding three hours each, with a minimum respite period of one hour between each block. If highly noise affected impacts are predicted no more than four consecutive nights of high noise and/or vibration generating work may be carried out over any seven day period, unless otherwise approved by the relevant authority.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>Source controls – Equipment selection</td>
<td>Where reasonable and feasible, use quieter and less vibration emitting construction methods.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>Source controls – Maximum noise levels</td>
<td>The noise levels of plant and equipment must have operating sound power or sound pressure levels compliant with the criteria listed in Table 2 of the <em>Construction Noise Strategy</em>.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>Source controls – Rental plant and equipment</td>
<td>The noise levels of plant and equipment items are to be considered in rental decisions and in any case cannot be used on site unless compliant with the criteria in Table 2 of the <em>Construction Noise Strategy</em>.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>Source controls – Use and siting of plant</td>
<td>Simultaneous operation of noisy plant within discernible range of a sensitive receiver is to be avoided. The offset distance between noisy plant and adjacent sensitive receivers is to be maximised. Plant used intermittently to be throttled down or shut down. Noise-emitting plant to be directed away from sensitive receivers.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>Source controls – Plan worksites and activities to minimise noise and vibration</td>
<td>Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site.</td>
<td>Construction 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>Source controls – Non-tonal reversing alarms</td>
<td>Non-tonal reversing beepers (or an equivalent mechanism) must be fitted and used on all construction vehicles and mobile plant regularly used on site and for any out of hours work.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>Source controls – Minimise disturbance arising from delivery of goods to construction sites</td>
<td>Loading and unloading of materials/deliveries is to occur as far as possible from sensitive receivers. Select site access points and roads as far as possible away from sensitive receivers. Dedicated loading/unloading areas to be shielded if close to sensitive receivers. Delivery vehicles to be fitted with straps rather than chains for unloading, wherever possible.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>Path controls - Shield stationary noise sources such as pumps, compressors and fans</td>
<td>Stationary noise sources should be enclosed or shielded whilst ensuring that the occupational health and safety of workers is maintained.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>Path controls - Shield sensitive receivers from noisy activities</td>
<td>Use structures to shield residential receivers from noise such as site shed placement; earth bunds; fencing; erection of operational stage noise barriers (where practicable) and consideration of site topography when situating plant.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>Project specific noise mitigation</td>
<td>In circumstances where the noise levels are predicted to exceed construction noise management levels after implementation of the general work practices, additional mitigation measures are required. These include monitoring, individual briefings, letter box drops, phone calls, specific notifications and alternative accommodation.</td>
<td>Construction 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>Where reasonable and feasible, it is recommended high noise generating activities (75 dB(A) Leq at receiver) be used during standard construction hours and in continuance blocks of no more than 3 hours with at least a one hour respite between each block of work generating high noise impact, where the location of the work is likely to impact the same receivers.</td>
<td>Construction contractor</td>
<td>Construction</td>
<td>Construction</td>
</tr>
</tbody>
</table>
| Where high noise generating activities (75 dB(A) Leq at receiver) are required out of hours the following will be implemented:  
  - The equipment will be used prior to 10pm where reasonable and feasible  
  - Where the above cannot be achieved the equipment will be used prior to midnight where reasonable and feasible  
  - It is not proposed to apply a 3 hour on and a 1 hour off respite approach in an effort to ensure that the use of such equipment is completed as early in the night as possible. | Construction contractor                                                                                      | Construction              | Construction  |
<p>| Project specific noise mitigation - Construction compound              | Temporary barriers or hoarding will be constructed around the eastern and southern boundaries of the northern compound. The noise barriers should aim to break line of sight from between the sources and receiver locations. It is recommended any temporary noise barriers extend all the way down to the ground and all gaps are eliminated to prevent noise flanking. | Construction contractor  | Construction  |
| Project specific noise mitigation - Construction related traffic       | Roads and Maritime will undertake further construction noise modelling during detailed design to confirm potential increases in construction traffic noise levels on St Aubins and Aberdeen streets.                                                                                                                  | Roads and Maritime        | Detailed design|</p>
<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management of construction related traffic or traffic re-routes should as a minimum include the following controls:</td>
<td>Construction contractor</td>
<td>Construction</td>
<td></td>
</tr>
</tbody>
</table>
| • Scheduling and routing of vehicle movements  
• Speed of vehicles  
• Driver behaviour and avoidance of the use of engine compression brakes  
• Ensuring vehicles are adequately silenced before allowing them to access the site. |                                                                                |                                  |          |
| Where noise impacts are greater than one year then consideration should be given to the following measures where feasible and reasonable:                                                                                         | Construction contractor        | Construction |
| Temporary noise barriers  
At-receiver noise mitigation.                                                                                                                                             |                                |                                  |          |
| Feasible and reasonable considerations should also include:                                                                                                                                                                     | Construction contractor        | Construction |
| • Time of day of the noise increase and exceedance of criteria  
• Time of use of affected receivers  
• How many decibels the noise levels are to increase  
• How long the mitigation will provide benefit to the receiver during the proposal  
• Maintaining the road surface to minimise the potential increase in noise due to pot-holes and road surface irregularities. |                                |                                  |          |
| Project specific noise mitigation – compliance noise and vibration monitoring                                                                                                                                                  | Construction contractor and Roads and Maritime | Construction |
| Attended compliance noise or vibration monitoring will be carried out to confirm the predicted noise or vibration levels upon receipt of a complaint.  
This would be carried out at the complainant’s location and the monitoring will cover the time of day when the impacts were reported to occur, will be completed by a suitably qualified professional and in accordance with the ICNG. |                                |                                  |          |
<table>
<thead>
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<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project specific noise mitigation – building condition inspections and vibration trials</td>
<td>Where construction activities generating vibration are to be carried out at a distance of less than 20 metres from a building and 35 metres from a heritage building, initial vibration monitoring trials will be carried out at the commencement of breaking, rolling and compacting activities.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
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</table>
| Project specific noise mitigation – human comfort impacts            | Where non-vibration inducing construction methods are impractical, the following principles in accordance with the ICNG will be applied:  
  - Confining vibration-generating operations to the least vibration-sensitive part of the shift – which could be when the background disturbance is highest  
  - Determining an upper level for vibration impact also considering what is achievable using feasible and reasonable mitigation  
  - Consulting with the community regarding the proposed events. | Construction contractor | Construction |
| Project specific noise mitigation – community relations              | Where construction work will be outside of standard construction hours, measures outlined in section 6.12.3 and the procedures outlined in Environmental Noise Management Manual (RTA, 2001) Practice Note (vii) will be applied in relation to consultation with the community. | Roads and Maritime | Construction |

**Operational noise and vibration mitigation measures**

**Noise mitigation principles**

The key *Noise Mitigation Guideline* (Roads and Maritime Services, 2014) principles to consider at this stage of the proposal design are:

- Noise mitigation should be designed to reduce noise levels to the criteria for qualifying receivers
- Following concept design, residual exceedances of noise criteria may be addressed at qualifying receivers using, in order of preference (*Road Noise Policy* section 3.4.1 (DECCW, 2011)), quieter road surfaces, barriers and at-property treatments
- Noise barrier evaluation processes must:
  - Give preference to reducing outdoor noise levels and the number of at-property treatments
  - Provide efficient barrier heights and extents without disregarding lengths of effective noise barrier in front of eligible groups of receivers
- Noise mitigation shall be evaluated and installed where feasible and reasonable.
Receivers requiring mitigation

Properties that qualify for consideration of operational noise mitigation are presented in Table 6-31 and shown in Figure 6.12. These should be read in conjunction with the detailed results for all property facades provided in the noise and vibration assessment in Appendix G.

Residential receivers

The proposal is predicted to exceed the criteria at a number of residential receivers that would then qualify for mitigation. These residences can be grouped into the areas identified in Table 6-30.

Table 6-30 Locations where receivers qualify for mitigation

<table>
<thead>
<tr>
<th>Location</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rail overbridge</td>
<td>Receivers qualifying for noise mitigation located on Joan Street and Smith Street with southern or western facades facing the bypass. Qualifying receivers are generally closely spaced in this area. Quiet pavements or noise barriers are likely to be viable in this location.</td>
</tr>
<tr>
<td>Bridge over Parsons Gully, Kingdon Street and Liverpool Street (eastern receivers)</td>
<td>Receivers south of Liverpool Street that qualify for mitigation and are exposed to noise from this section of the proposal. These receivers are located on Kingdon and Aberdeen streets. Qualifying receivers are generally closely spaced in this area. Quiet pavements or noise barriers are likely to be viable in this location.</td>
</tr>
<tr>
<td>Bridge over Parsons Gully, Kingdon Street and Liverpool Street (western receivers)</td>
<td>Residential receivers located to the west of the proposal, just south of Liverpool Street. Qualifying receivers are generally closely spaced in this area. Quiet pavements or noise barriers are likely to be viable in this location.</td>
</tr>
<tr>
<td>St Aubins / Aberdeen streets</td>
<td>Residential receivers along Aberdeen and St Aubins streets that qualify for mitigation. These receivers are exposed to the additional traffic on these existing local roads which are proposed to form a connection to the proposal. Noise barriers are not anticipated to be viable as street access would need to be maintained at these receivers. At property treatments are therefore likely to be viable in this location.</td>
</tr>
<tr>
<td>Northern bypass intersection and scattered / isolated receivers</td>
<td>Two residences adjacent to the northern intersection with Kelly Street and two receivers off Aberdeen Street and just north of Susan Street qualify for mitigation. As these residences are isolated, noise barriers are not expected to be viable and at property treatments are anticipated.</td>
</tr>
</tbody>
</table>
Non-residential receivers

The proposal is predicted to exceed the criteria at the following non-residential receivers that would then qualify for mitigation:

- Scone Anglican Church
- Scone High School
- Scone Grammar School
- Scone Public School
- Scone Rugby Club
- Equestrian Showgrounds
- Scone Golf Course
- Liverpool Street Park.

Additional detailed noise assessment (including internal and external noise monitoring) will be required at the schools and church to identify which structures are sensitive locations with regards to the traffic noise criteria and to determine the transmission loss through the relevant building facades. This would then determine if any specific mitigation is required.

Noise mitigation options

The Noise Mitigation Guideline (Roads and Maritime Services, 2014) recommends noise mitigation in the following order of preference:

- Quieter pavement surfaces
- Noise mounds
- Noise barriers (noise walls)
- At-property treatments.

A review of the predicted noise levels and exceedances shows that the application of more than one noise mitigation treatment type would be required. The Noise Mitigation Guideline (Roads and Maritime Services, 2014) states that noise barriers should be considered where there are four or more closely spaced receivers. As most of the receivers are relatively closely spaced, noise barriers should be considered as a potential mitigation option.

Noise barriers are not likely to be an option for receivers exposed to noise from St Aubins and Aberdeen streets due to residential access and space constraints along these roads. Additionally, other receivers north of Liverpool Street are more spread out or subject to noise from Kelly Street so that a noise barrier adjacent to the proposal would not be a viable option.

Low noise pavements may be more suitable and would potentially reduce the number of receivers that trigger further mitigation.

The following mitigation options have been investigated and are presented in the following sections:

- Noise barriers
- Low noise pavement
- Low noise pavement with noise barriers.
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<tr>
<th>Receiver ID</th>
<th>Floor level</th>
<th>Façade direction</th>
<th>Build 2027 (day)</th>
<th>Build 2027 (night)</th>
<th>Controlling criteria (day)</th>
<th>Controlling criteria (night)</th>
<th>Controlling criteria exceeded? (day)</th>
<th>Controlling criteria exceeded? (night)</th>
<th>Cumulative limit exceeded? (day)</th>
<th>Cumulative limit exceeded? (night)</th>
<th>Relative increase (2027) (day)</th>
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Noise barrier assessment

Barriers locations, heights and lengths were evaluated to provide reductions in noise from the proposal at receivers where mitigation requirements were identified. The evaluation of barriers presented in this section is based on information available at concept design stage and therefore only provides a possible mitigation scenario.

All noise mitigation options including but not limited to the use of barriers and/or quieter pavements would be re-evaluated at the detailed design stage.

Three locations were identified to be viable for noise barriers. Barrier locations are presented in Figure 6.12 and discussed below:

- **Barrier 1 (B1):** located on the northern/eastern side of the rail overbridge and about 305 metres in length. A design height of one metre was obtained using the *Noise Mitigation Guideline* process.
- **Barrier 2 (B2):** located on the eastern side of the bridge over Parsons Gully, Kingdon Street and Liverpool Street, extending about 745 metres to the south along the proposal. A design height of 2.5 metres was obtained using the *Noise Mitigation Guideline* process.
- **Barrier 3 (B3):** located on the western side of the bridge over Parsons Gully, Kingdon Street and Liverpool Street and about 360 metres in length. A design height of 1.5 metres was obtained using the *Noise Mitigation Guideline* process.

A noise contours map showing the predicted noise benefit due to the barriers is presented in Figure 6.12 (sheet 1). Receiver façade locations have been identified showing where criteria are predicted to be exceeded before and following the implementation of the barriers at the design heights identified above.

Low noise pavement

The evaluation of low noise pavement in this section is based on information available at concept design stage and therefore only provides a possible mitigation scenario.

All noise mitigation options including but not limited to the use of barriers and/or quieter pavements would be re-evaluated at the detailed design stage.

Low noise pavement consisting of stone mastic asphalt has been identified as a possibility for the proposal by Roads and Maritime. The *Environmental Noise Management Manual* (RTA, 2001) lists stone mastic asphalt as providing -2.0 to -3.5 dB reduction of tyre noise at the source. The *Environmental Noise Management Manual* (RTA, 2001) also states:

‘The road surface correction applied depends on the road surface’s porosity, macrotexture, depth and wavelength, the percentage of heavy vehicles and vehicle speeds.’

The *Environmental Noise Management Manual* (RTA, 2001) also acknowledges that the noise reduction performance of low noise pavement may deteriorate over time due to clogging of air voids and wear, therefore a conservative -2dB road surface correction (compared to dense graded asphalt) was applied to the noise model for the main bypass road segments to represent the low noise pavement.

The results indicate with stone mastic asphalt the number of receivers that qualify for noise mitigation is reduced from 83 receivers (no quiet pavement or barriers) to 53 receivers.

Low noise pavement with barrier

With low noise pavement, noise barriers B1 and B3 are no longer considered viable mitigation options as a sufficient number of related receivers no longer require mitigation. Scattered receivers in the vicinity of B1 and B3 that do still trigger mitigation under the low noise pavement scenario would be investigated for other mitigation options such as façade treatment. Barrier B2, however is still considered to be viable, and has been evaluated for height using the *Noise Mitigation Guideline* (Roads and Maritime Services, 2014) process.
The results indicate with stone mastic asphalt and noise barriers the number of receivers that qualify for noise mitigation is reduced from 83 receivers (no quiet pavement or barriers) to 32 receivers.

The noise barrier location, residual impacts and barrier noise benefit for the ‘low noise pavement with barrier’ scenario is presented in Figure 6.12 (sheet 2). Barrier 2 (B2): located on the eastern side of the bridge over Parsons Gully, Kingdon Street and Liverpool Street, extending about 745 metres to the south along the proposal. A design height of 2.0 metres was obtained using the *Noise Mitigation Guideline* (Roads and Maritime Services, 2014) process.

**Post construction noise monitoring program**

To confirm that the noise level targets are achieved, the Noise Mitigation Guideline (Roads and Maritime Services, 2014) refers to the Environmental Noise Management Manual (Practice note (viii)) (RTA, 2001) which recommends that a post-construction noise monitoring program be carried out.

The noise monitoring program (including simultaneous traffic counts) should be carried out within 12 months of proposal opening once traffic flows have stabilised. Monitoring locations should be selected along the proposal at the monitoring locations completed in this assessment and at locations where any valid noise complaints are received.

The measured noise levels should be compared to the noise level assessment targets. If the noise level targets are exceeded the Environmental Noise Management Manual recommends the following action:

- If the exceedance is less than 2 dB(A), *‘the prediction methodology and suitability of noise mitigation measures should be reassessed and the reasons for the marginal exceedance should be identified in the report’*
- If the exceedance is greater than two dB(A), *‘the adequacy of the noise mitigation measures needs to be reviewed, and if problems are identified steps need to be taken to rectify the situation. Additional noise treatments may be required to achieve the design noise level, where this is feasible and reasonable.’*

The *Noise Mitigation Guideline* (Roads and Maritime Services, 2014) states, *‘Note that where the outcome of the compliance report is that further noise mitigation should be considered the processes in this guideline should be followed.’*

**Operational vibration mitigation**

There are no expected operational vibration impacts associated with the proposal and no mitigation measures have been recommended.
Figure 6.12

LEGEND

Proposal site
Railway
Watercourse
The proposal

Logger location
Sensitive receiver
Noise barrier location
Facade locations that exceed with barriers (residual impacts)
Facade locations that exceed without barriers (residual impacts)

1 dB to 2 dB
2 dB to 3 dB
3 dB to 4 dB
4 dB to 5 dB

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6.6 Landscape and visual amenity

A concept urban design and landscape plan was prepared by Clouston Associates as an input to the REF. The results of the report are summarised in the following sections. A full copy of the concept urban design and landscape plan is provided in Appendix H.

The assessment was prepared in accordance with the policy and guidelines set down in Beyond the Pavement: Roads and Maritime Urban Design Policy, Procedures and Design Principles (2014) and has been prepared with consideration of the following Roads and Maritime urban design documents:

- EIA Guidance Note (Guidelines for Landscape character and visual impact assessment (Roads and Maritime, 2013)
- Noise Wall Design Guidelines (RTA, 2006)
- Bridge Aesthetics (RTA 2003)
- Shotcrete design guidelines (RTA, 2005)
- Landscape Guidelines (RTA, 2008).

The report defines several landscape character zones and assesses the potential landscape character and visual impacts of the proposal. The assessment is based on the sensitivity of a view and the magnitude of the proposal in that view. Sensitivity and magnitude are combined to give a visual impact rating of high, moderate, low or negligible.

Refer to concept urban design and landscape plan in Appendix H for a detailed description of the methodology.

6.6.1 Existing environment

The landscape and visual environment surrounding the proposal site is typical of the Upper Hunter Valley district with areas of flat farmland, large swathes of pasture, pockets of native vegetation and creek lines. The town of Scone includes medium density commercial and residential development in a rectilinear street pattern. The major transport corridors extend through the town centre from north to south, leaving the west and east of the town fringed by open farmland with very little transport infrastructure.

Landscape character zones

The proposal site transitions through a number of landscape character zones. An assessment of the sensitivity of each of these landscape zones and the magnitude of impacts has been completed and an overall landscape character impact rating assigned (refer to Appendix H). The landscape character zones and their sensitivity rating are described in Table 6-32 and shown on Figure 6.13.

<table>
<thead>
<tr>
<th>Landscape character zone</th>
<th>Description</th>
<th>Sensitivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 – Transport Corridors (New England Highway and Great Northern Railway)</td>
<td>The two main transport corridors that cross the study area are the arterial New England Highway and the Great Northern Railway. These corridors cut through the centre of Scone from south to north and separate the eastern and western sides of town. The landscape zone transverses through a modified landscape of undulating landform. Swathes of native grasses and modified pastoral land as well as some disturbed native bushland occur along the perimeter of the road corridor.</td>
<td>Low</td>
</tr>
<tr>
<td>Landscape character zone</td>
<td>Description</td>
<td>Sensitivity</td>
</tr>
<tr>
<td>------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-------------</td>
</tr>
</tbody>
</table>
| 2 – Open Farmland                  | This landscape zone is mostly flat and open with sweeping views to surrounding hills. Built form in the landscape is limited to a low density of residential properties and farm buildings.  
The land is generally flat and there are a number of small natural drainage lines and local creeks.  
Vegetation within this zone is predominantly exotic grasslands with some areas of native vegetation that have been retained along creek lines. There are also patches of native and exotic vegetation surrounding built forms within the landscape. | Moderate    |
| 3 – Residential Development        | This landscape character zone covers the town of Scone and consists predominantly of medium density residential development. Development spreads along wide streets either side of the New England Highway and is mostly single storey bungalows on large blocks of land.  
Vegetation within this zone consists of a mix of native and exotic trees, shrubs and groundcovers planted within residential lots and as formal street trees. | Moderate    |
| 4 – Commercial Development         | This zone includes the Scone commercial precinct which is traversed by the New England Highway. The commercial strip runs for about 700 metres with wide footpaths and protective awnings on many of the commercial properties.  
Vegetation within this zone includes a mix of native and exotic trees, shrubs and groundcovers planted within the road median, at round-a-bouts and as formal street trees. | Moderate    |
| 5 – Public/Private Open Space      | This landscape character zone consists of areas of open space within and surrounding Scone, including the Scone Golf Course, Bill Rose Sports Complex and Scone Rugby Club.  
Landforms are mostly flat with rainfall running into man made channels and creeks.  
Vegetation includes mostly exotic grassland and planted trees along boundary lines with small pockets of undisturbed native bushland. | Moderate    |
LEGEND

- Residential Development
- Commercial Development
- Open Farmland
- Transport Corridors
- Public/Private Open Space
- Landscape Character photo location

Figure 6.13

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Roads and Maritime Services
HW9 New England Highway Scone Bypass
Review of Environmental Factors

Landscape Characters Zones

Figure 6.13
6.6.2 Potential impacts

Construction
During construction, positioning of plant and equipment within the view of neighbouring properties and existing road users would result in minor, temporary visual impacts. Earthworks would also expose subsoil. The use of lighting towers during any night work may result in light spill impacting adjoining properties and residents.

The proposal would require removal of some vegetation within the boundaries of the proposal site. This would include trimming and/or clearing of some planted and remnant native trees. Some of this vegetation contributes to the amenity and character of the local area, and/or screens views from properties adjoining the road. The removal of this vegetation would have the potential to reduce some screening between residential dwellings and the road. This would lead to temporary visual impacts during construction until the works are complete and disturbed areas rehabilitated.

Potential visual impacts during construction would be minimised through implementation of the safeguards and management measures outlined in section 6.6.2.

Operation
The proposal is likely be visually prominent from several key viewpoints around Scone. The proposal design features a number of elements that would be obvious elements within the predominantly open farmland landscape. These include embankments/batters and the overbridge crossing Parsons Gully and Kingdon and Liverpool streets.

Change resulting from the proposal would mainly affect owners, residents, and tenants of properties adjoining the proposal site, and future road users.

Landscape character impact
A summary of the landscape character impact is provided in Table 6-33 and described in further detail below. Overall the impacts of the proposal on landscape character is rated as negligible for zone 4 (commercial development), low for zone 1 (transport corridor), moderate for zone 5 (public/private open spaces) and moderate/high impact for zones 2 and 3 (open farmland/residential development).

Table 6-33 Summary of impacts on landscape character

<table>
<thead>
<tr>
<th>Landscape character zone</th>
<th>Sensitivity</th>
<th>Magnitude</th>
<th>Significance of impact rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>2</td>
<td>Moderate</td>
<td>High</td>
<td>Moderate to high</td>
</tr>
<tr>
<td>3</td>
<td>Moderate</td>
<td>High</td>
<td>Moderate to high</td>
</tr>
<tr>
<td>4</td>
<td>Moderate</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td>5</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
</tbody>
</table>

New England Highway bypass at Scone
Review of environmental factors
**Landscape character zone 1 – transport corridors (New England Highway and Great Northern Railway)**

Although presence of existing road and rail infrastructure within this landscape character zone reduces the zone’s sensitivity the proposal would be larger in scale compared to existing transport infrastructure. The New England Highway through Scone town centre would experience a reduction in traffic, potentially improving the character of the existing road in this location. The combination of the above sensitivity and the magnitude results in a low impact on the landscape character of this zone.

**Landscape character zone 2 – open farmland**

This landscape zone consists of open farmland. The proposal would result in changes to the built form within this landscape character zone which would stand out within the predominantly flat landscape. The elevated nature of the bridge and large embankments would spatially divide the open farmland, breaking the continuity of this landscape zone.

The combination of medium sensitivity and a high magnitude of impact results in a moderate to high impact on the landscape character of this zone.

**Landscape character zone 3 – Residential development**

The landscape character of zone 3 includes medium density residential development within the town of Scone. The town of Scone is considered to be scenic with wide streets on a rectilinear grid. The sensitivity of this zone has been assigned as moderate as it has the capability to absorb moderate change of a similar scale.

The proposal would be located about 800 metres from the centre of Scone but would pass in close proximity (60 to 120 metres) to residential properties to the west of the town. In this location the proposal may alter the character of the residential landscape zone, increasing the sense of enclosure and bulk of infrastructure elements within the landscape.

The combination of the above sensitivity and the magnitude results in a moderate to high impact on the landscape character of this zone.

**Landscape character zone 4 – commercial development**

The landscape character of zone 3 includes the Scone commercial precinct. The Scone town centre is scenic with many heritage brick buildings. The zone is capable of absorbing moderate change without detrimental impacts on its character and as such has had a sensitivity rating of moderate applied. The proposal is located about 800 metres from the centre of Scone and would not adversely impact the character of the commercial area. Once operational, the proposal would reduce the number of vehicles travelling through the town which could result in improvements to the character of the commercial area for pedestrians.

The combination of the above sensitivity and the magnitude results in a negligible impact on the landscape character of this zone.

**Landscape character zone 5 – public / private open space**

This landscape zone comprises open spaces surrounding Scone including the Scone Golf Course, Bill Rose Sports Complex and Scone Rugby Club. The proposal would directly impact the golf course, bisecting it in two. The course would be re-designed to respond to the proposal with holes moved to the western side of the proposal. The proposal has been assessed as having a moderate magnitude of impact on public/private open spaces.

The combination of the above sensitivity and the magnitude results in a moderate impact on the landscape character of this zone.
**Visual impacts**

The magnitude of visual change is strongly influenced by the level of visibility of the proposal resulting from the combination of scale, extent, distance and duration of the views. Visual sensitivity depends on the nature of the existing environment and on the likely response from people viewing the scene. People driving on a busy road and/or at high speeds are likely to be less sensitive to a change in the environment since they are focused on changes in traffic conditions and driving, compared to someone who is enjoying a recreational experience or someone who is viewing the scene from their living room.

A visual impact assessment was completed for ten viewpoints within the study area. Details of this assessment are provided in Appendix H and a summary of the results are provided in Table 6-34. The viewpoints used in the analysis are shown on Figure 6.14.

To assist with the visual impact assessment three photomontages of the proposal were prepared as part of the concept urban design and landscape plan (Appendix H) and are shown on Figure 6.15. These locations were:

- Kingdon Street looking west
- Liverpool Street looking west
- Wingen Street looking west.

The greatest visual impacts would be on the western edge of Scone. The viewpoints that received a moderate/high and high impact rating are residential receptors and include properties located along Joan, Aberdeen and Wingen streets which may have clear and unobstructed views of the proposal.

Elements of the proposal that are likely to be the most visually intrusive include the earth embankments, bridges and vehicle movements. Vehicle headlights may also cause visual impacts at night.

The proposed bridge over Kingdon and Liverpool streets would visually bisect these road corridors, visually separating the eastern and western sides of the streets. This would result in visual impacts for pedestrians and motorists travelling along these streets.

Construction of the proposal would result in reduced traffic volumes through Scone town centre which is likely to have positive impacts on visual amenity along the exiting New England Highway.

The assessment concludes that residential receptors in close proximity to the proposal and the Scone Golf Course would experience moderate to high impacts. Impacts on the remainder of the viewpoints would be moderate and moderate to low.

**Table 6-34** Summary of visual impacts across the study area

<table>
<thead>
<tr>
<th>Viewpoint</th>
<th>Description, receptors and impacts</th>
<th>Impact rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Description: New England Highway, looking north and south. Receptors: users of the New England Highway, travelling in a northbound and southbound direction. Impacts: the proposal intersections with the existing New England Highway would be highly visible from these viewpoints. The new road corridor, embankments and associated road infrastructure (such as signage) would be visible within the view frame. Although noticeable, a major visual impact is not expected due to the short duration of the view by passing motorists. The presence of existing road infrastructure within the view frame lowers the sensitivity of the receptors to change of this nature.</td>
<td>Low to Moderate</td>
</tr>
<tr>
<td>Viewpoint</td>
<td>Description, receptors and impacts</td>
<td>Impact rating</td>
</tr>
<tr>
<td>-----------</td>
<td>-----------------------------------</td>
<td>---------------</td>
</tr>
</tbody>
</table>
| 2         | Description: Residential properties off Joan Street, looking west  
Receptors: local residents  
Impacts: the proposal would be elevated over the railway line on a bridge at this location that may be clearly visible from several of these properties, partly screened by foreground vegetation. The bridge would be of a greater scale and bulk than existing infrastructure elements within the view. The existing elevated rail track would obscure views of the proposal further to the west. Although potentially visually intrusive, the presence of current transport infrastructure within the view would reduce the magnitude of the changes associated with the proposal. | Moderate to High |
| 3         | Description: Scone Golf Course, looking south  
Receptors: users of the golf course  
Impacts: the proposal would be clearly visible from this viewpoint, bisecting the golf course in close proximity to the clubhouse. The road corridor is likely to be visually intrusive and dominate the view, blocking some views to the middle distance. A bridge over the creek would also be highly visible to the west of this viewpoint. Vehicles would be visible moving along the new proposal. The functionality of the golf course is likely to be impacted, although as a private commercial facility, the sensitivity of the receptors is rated as moderate. The golf course is expected to be redesigned as part of the proposal with all holes to be on the western side of the proposal. | Moderate to High |
| 4         | Description: Kingdon Street, looking west  
Receptors: users of Kingdon Street  
Impacts: the proposal would be visible in the middle distance of the view frame, crossing over Kingdon Street on an elevated bridge (refer to Figure 6.15). The road, vehicles and bridge piers may be clearly visible from this viewpoint, obscuring some of the middle distance view. Vegetation would screen views of the proposal to the north and south. | Moderate |
| 5         | Description: Residential properties on Aberdeen Street, looking west  
Receptors: local residents  
Impacts: the proposal would be clearly visible from the rear of properties to the west of Aberdeen Street. The proposal would be elevated above the flood plain with the bridge and embankments visible. Receptors to the east of Aberdeen Street would have glimpses of the proposal between buildings and vegetation. The greatest visual impact would be on properties with a second story, offering elevated views over the proposal and vehicular traffic from these floors. | High |
<table>
<thead>
<tr>
<th>Viewpoint</th>
<th>Description, receptors and impacts</th>
<th>Impact rating</th>
</tr>
</thead>
</table>
| 6         | Description: Residential properties in proximity to Wingen Street, looking east  
Receptors: local residents  
Impacts: the proposal would be clearly visible from the majority of these properties, especially those that are orientated east. The proposal would be elevated above the flood plain on large embankments and a bridge which would be visible crossing Liverpool and Kingdon streets (refer to Figure 6.15). Vehicles would be clearly visible travelling in both directions. Foreground vegetation may screen some views of the proposal although it is still likely to be visually dominant and intrusive. | High          |
| 7         | Description: Aberdeen Street, looking west  
Receptors: users of Aberdeen Street  
Impacts: the proposal would be visible from Aberdeen Street, elevated above the floodplain on a small embankment. Vehicles would be clearly visible travelling in both directions. Although visually dominant within the view frame, a major impact on visual amenity is not expected due to the low sensitivity of receptors and short duration of view. | Low to Moderate |
| 8         | Description: Liverpool Street, looking west  
Receptors: users of Liverpool Street  
Impacts: the proposal would be visible in the middle distance of the view frame, crossing over Liverpool Street on an elevated bridge. The road, vehicles and piers may visible from this viewpoint, obscuring some of the middle distance view. A moderate/low impact on visual amenity is expected in this location due to the distance between the viewer and proposal. | Low to Moderate |
| 9         | Description: Liverpool Street, looking east  
Receptors: users of Liverpool Street  
Impacts: the proposal would be visible in the middle distance of the view frame, crossing over Liverpool Street on an elevated bridge. The road, vehicles, bridge and piers may be clearly visible from this viewpoint, obscuring some of the middle distance view. Vegetation would screen views of the proposal to the north and south. | Moderate       |
| 10        | Description: Residential properties along Towarri Street, Satur, looking east  
Receptors: local residents  
Impacts: elements of the proposal (embankments and bridge) would be visible from these properties, partially screened by vegetation in the foreground. Although visible, they are unlikely to be visually dominant within the view frame due to the distance from the proposal and the panoramic nature of the view. | Moderate       |
Summary of Visual Impacts

Roads and Maritime Services
HW9 New England Highway Scone Bypass
Review of Environmental Factors

NOTE: All images are indicative only and subject to refinement during detailed design.
### 6.6.3 Safeguards and management measures

Mitigation measures provided in Table 6-35 and would be implemented to minimise potential impacts on landscape character and visual amenity.

Table 6-35 Summary of potential impacts and environmental safeguards – landscape character and visual impacts

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light spill</td>
<td>Permanent lighting will be designed to minimise light spill into residential properties and sensitive receptors.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
</tbody>
</table>
| Visual impacts       | Bridges will be designed and constructed in accordance with the Roads and Maritime *Bridge Aesthetics Guidelines* (RTA, 2003) including the following considerations:  
  - Bridges should be as simple and elegant as possible to complement the semi-rural setting  
  - All bridge elements including lighting columns, barrier supports, crash barriers and piers to be considered as a whole to simplify the structure and reduce visual clutter  
  - Bridges to connect seamlessly with abutments and embankments.  
  Develop a limited range of materials, colours and textures for all built elements to achieve a simple uncluttered design. | Roads and Maritime  | Detailed design     |
| Landscape and visual impacts | A detailed landscape plan will be prepared and implemented in accordance with the Roads and Maritime *Landscape Guideline* (RTA 2008). The plan will consider the following:  
  - Planting either side of the proposal to screen built form and reduce the scale of the infrastructure  
  - Fill embankments to be planted with low groundcovers/native grasses and groups of trees  
  - Reinforce the local semi-rural landscape character through the use of appropriate vegetation  
  - Low planting of native species, mostly grasses and low shrubs to less than one metre high, combined with appropriately spaced tall Eucalyptus species to retain sightlines  
  - Areas disturbed by construction to be restored to match existing condition as far as possible  
  - Protect and retain riparian vegetation as far as possible | Roads and Maritime  | Detailed design     |
### Environmental safeguards

- **Slope stabilisation matting such as a Jute mat to be used to assist plant establishment and prevent erosion**
- **Tree planting outside the proposal site may assist in visually screening the proposal and should be considered further during the detailed design.**

<table>
<thead>
<tr>
<th>Vegetation</th>
<th>Existing vegetation will be maintained and protected wherever possible, particularly in riparian areas. Trimming of trees rather than clearing will be carried out where possible.</th>
<th>Construction contractor</th>
<th>Construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual impacts</td>
<td>Compounds, storage areas, stockpiles and associated works areas will be located in cleared or disturbed areas as far as possible.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>The construction site will be kept tidy and rubbish free.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>Work areas will be restored progressively and maintained until established.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>The site will be rehabilitated and landscaped in accordance with an approved landscape plan.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>Light spill</td>
<td>Temporary lighting for construction will be sited and designed to minimise light spill into residential properties and identified sensitive receptors.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
</tbody>
</table>

### 6.7 Aboriginal cultural heritage

#### 6.7.1 Existing environment

A search of the OEH Aboriginal Heritage Information Management System was carried out on 6 January 2015 and 24 April 2015. One registered Aboriginal site was identified within the search area, a single open campsite. This site is located about two kilometres from the proposal.

The natural landscape of the proposal site has been heavily modified as a result of agriculture and surrounding development and is prone to flooding thereby reducing the potential for Aboriginal objects to be present.

A preliminary Aboriginal cultural heritage assessment for the proposal was carried out in accordance with Stage 1 of the Roads and Maritime Procedure for Aboriginal Cultural Heritage Consultation and Investigation. The assessment included a desktop search for known objects in the study area, followed by a site inspection by the Roads and Maritime Aboriginal Cultural Heritage Officer in April and November 2015.

This preliminary assessment concluded that there is a low likelihood for Aboriginal cultural heritage potential to be present within the proposal site and that further assessment is not required.

#### 6.7.2 Potential impacts

**Construction**

There are no listed or registered Aboriginal sites located within the proposal site. Furthermore, due to the disturbed nature of the proposal site, it is unlikely that previously unrecorded Aboriginal
objects or sites would be uncovered during construction. The proposal is not anticipated to have any impact on Aboriginal cultural heritage.

Operation

There are no expected impacts during operation.

6.7.3 Safeguards and management measures

Mitigation measures have been provided in Table 6-36 in the unlikely event that items of potential Aboriginal significance are uncovered during construction of the proposal.

Table 6-36 Summary of potential impacts and environmental safeguards – Aboriginal cultural heritage

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguard</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inadvertent impacts on heritage items</td>
<td>As part of the site induction, all workers will be advised of their obligations in relation to heritage under the National Parks and Wildlife Act 1974 before construction begins and the guidelines to follow if unanticipated heritage items or deposits are located during construction.</td>
<td>Construction Contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>Aboriginal heritage item encountered during work</td>
<td>In the event of an unexpected find of an Aboriginal heritage item (or suspected item), work will cease in the affected area and the Roads and Maritime Environment Manager, Hunter Region and the Roads and Maritime Aboriginal Cultural Heritage Officer, will be contacted for advice on how to proceed. The Roads and Maritime Unexpected Archaeological Finds Procedure 2012 will be followed in the event a potential artefact is uncovered.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
</tbody>
</table>

6.8 Non-Aboriginal heritage

This section addresses the non-Aboriginal heritage impacts associated with the proposal and details the management measures proposed to mitigate these impacts. The information presented in this section is summarised from the Historical Heritage Assessment prepared by Virtus Heritage (Appendix I).

6.8.1 Methodology

Desktop assessment

The historic heritage assessment includes a review of various historical records including database records, historical aerial photographs, parish maps and previous studies. Heritage database searches were conducted on 1 June 2015 to identify any heritage items located within the proposal site. The following database searches were carried out:

- Department of the Environment Australian Heritage Database
- NSW State Heritage Register
- NSW State Heritage Inventory
- Heritage Schedule (5) of Upper Hunter Local Environmental Plan 2013
Section 170 Heritage and Conservation Registers of the Roads and Maritime, RailCorp and Australian Rail Track Corporation.

**Predictive model**

Based on the desktop assessment a predictive model was developed which identified that in addition to the known listed heritage items in the area the heritage items associated with the following could potentially occur:

- Railway camps and related rail infrastructure and structures
- Post and rail fencing
- Pastoral evidence (sheds, shearing sheds, sheep dips, cattle yards and runs)
- Bottle dumps and refuse pits
- Remains of old farms or homesteads
- Road construction (Great North Road).

**Field Survey**

A field survey of the proposal was carried out by Virtus Heritage between 1 and 2 June 2015. The survey team conducted a pedestrian survey of the proposal area with the exception of properties where there was no access permission. These restricted access properties were not surveyed and no photographs were taken of the properties. During the survey a small number of properties also had access issues due to waterlogged ground surfaces and dense ground cover. However, these properties were still observed for any visible historic heritage such as building structures, farming infrastructure or rail infrastructure.

6.8.2 Existing environment

**History**

The Hunter Valley was one of the first large areas of suitable pastoral land to be explored and was opened up to free settlement in the 1820s. Pastoral and agricultural activities were important in the Upper Hunter region during the early period of European colonisation and a thriving wool industry lead to early prosperity. The township of Scone was officially established in 1838 nearly a decade after the first settler pastoralists occupied the area. The township was built east of Kingdon Ponds adjacent to St Aubins estate around the store and inn known as St Aubins Arms.

The opening of the Great Northern Railway in 1871 encourage economic and demographic growth of the Upper Hunter Valley region by connecting rural townships with the coast and Sydney town, dramatically increasing the ease with which people and goods could be distributed throughout the growing colony.

**Results of desktop assessment**

The results of database searches found that one registered historic heritage item occurs within the study area that being St Aubins Arms Hotel, 245 Kelly St, Scone. St Aubins Arms is listed on the Register of the National Estate (Non-statutory archive) as an Indicative Place. This listing means that this place has not been assessed for national listing and is not legally registered as a national heritage place with the Commonwealth Department of the Environment.

The search of the State Heritage Register listed a total of eight items listed as State significant and protected under the NSW *Heritage Act 1977*. Of the eight items, three are located in the study area, these being the Old Court Theatre, Scone Civic Theatre and Scone Railway Station. None of these items are located within the proposal site or immediate proximity.

The search of the State Heritage Inventory listed a total of 96 items listed by local government and State agencies; however a number of these are repeated in the list. Of the 96 items, one item, the St Aubins Arms, is listed within the study area.
A total of 211 items, five conservation areas and one archaeological site are listed within Schedule 5 of the Upper Hunter LEP. The results of the search identified one registered historical heritage item, St Aubins Arms within the study area.

The section 170 searches identified one listed item on the NSW Transport (RailCorp) section 170 heritage and conservation register in the area of Scone, being the Scone Railway Precinct, Susan Street, Scone. No items on these registers were located within or immediately adjacent to the study area.

Heritage items recorded during the database searches that are located in proximity to the proposal are listed in Table 6-37. All heritage items recorded from the database searches and the field survey are shown on Figure 6.16.

### Table 6-37 Summary of heritage listings within the study area

<table>
<thead>
<tr>
<th>Type of heritage listing/register</th>
<th>Name of heritage listing/register</th>
<th>Heritage significance registered on listing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australian Heritage Database</td>
<td>St Aubins Arms</td>
<td>Potential National</td>
</tr>
<tr>
<td>State Heritage Inventory</td>
<td>St Aubins Arms</td>
<td>Local</td>
</tr>
<tr>
<td></td>
<td>Scone Conservation Area*</td>
<td>Local</td>
</tr>
<tr>
<td></td>
<td>Grammar School (Former St Luke’s Anglican Schoolhouse)</td>
<td>Local</td>
</tr>
<tr>
<td>Upper Hunter LEP</td>
<td>St Aubins Arms</td>
<td>Local</td>
</tr>
<tr>
<td></td>
<td>West Scone Conservation Area including:</td>
<td>Local</td>
</tr>
<tr>
<td></td>
<td>Grammar School former St Luke’s</td>
<td>Local</td>
</tr>
<tr>
<td></td>
<td>St Luke’s Church and Rectory</td>
<td>Local</td>
</tr>
<tr>
<td></td>
<td>Old Court Theatre</td>
<td>Local</td>
</tr>
<tr>
<td></td>
<td>Historical Museum (former Constable Quarters and Lock Up)</td>
<td>Local</td>
</tr>
</tbody>
</table>

* According to the Upper Hunter LEP, two Conservation Areas are located in Scone, the West Scone Conservation Area and the Central Scone Conservation Area. As there is no information in the item listing sheet, this item has been listed here under the SHI as potentially referring to the West Scone Conservation Area.

### Results of field survey

All heritage items recorded from the database searches and the field survey are shown on Figure 6.16. Further details regarding the heritage items identified during the Historical Heritage Assessment are provided in the Historical Heritage Assessment (Appendix I).

The survey of the proposal area identified a total of nine historical heritage items including the two registered heritage items in proximity to the proposal, being the St Aubins Arms property (Item 7 on Figure 6.16) and West Scone Conservation Area (Heritage Item 9 on Figure 6.16)).

No visible built or movable heritage items were identified in the western portion of the St Aubins Arms property (Lot 1, DP 881852). The St Aubins Arms property is a listed heritage item on the Australian Heritage Database (indicative only), the State Heritage Inventory, and the Upper Hunter LEP 2013 (Schedule 5). Within this property one dam was recorded during survey as a feature of this property.

Two other heritage items were also recorded at the rear (west) of the St Aubins Arms property. These include a rail culvert which extends under the Great Northern Railway (Heritage Item 2 on Figure 6.16); and the section of the Great Northern Railway which is crossed by the proposal (Heritage Item 8 on Figure 6.16). The rail corridor was not entered for survey as it is a functional...
railway and access is restricted, and the southern portion of the cross over area is adjacent to a property where access permission was not granted by the property owner.

The survey through the Scone Golf Course property identified stockyards adjacent to the golf course to the north (approximately 40 metres north-east of the proposal and outside the proposal site (Heritage Item 1 on Figure 6.16). No further heritage items were identified in this area or from further north of the golf course within the Bill Rose Sports Complex area. Survey of the proposal area from the sports complex to Liverpool Street continued as full pedestrian survey with no heritage items identified in the paddocks and council land through which the proposal passes.

An attempt was made to access the paddocks between Liverpool Street and St Aubins Street but the area was not walked due to a waterlogged ground surface (with residual water) and dense ground cover. However, the paddocks were observed (with good visibility over the paddocks) from the Liverpool Street end and the St Aubins Street end with no heritage items identified. One heritage item, a timber structure, was observed in the adjoining paddocks about 40 metres to the north of St Aubins Street (Heritage Item 3 on Figure 6.16). No further heritage items were identified in this area however at Susan Street stockyards and a loading ramp were recorded (Heritage Item 4 on Figure 6.16).

Survey north-north-east from Susan Street crossed horse and cattle paddocks with good visibility and only modern fencing and associated farming infrastructure were noted. About 80 metres north-north-west of the western end of Forbes Street, a farmyard complex consisting of a shed, stockyards and ramp, and mature peppercorn trees were recorded (Heritage Item 5 on Figure 6.16).

The remainder of the survey to the northern end was examined in full by pedestrian survey with no further heritage items identified within the proposal site. However, one heritage item (house) was identified in proximity to the proposed northern at grade intersection. This house (Lot 19, DP 6498) is recorded as Heritage Item 6 on Figure 6.16.

Two items identified during the survey of the proposal area Heritage Item 1 – Stockyards (1) and Heritage Item 4 – Stockyards (2) are considered to have limited to zero heritage value. The remaining seven items are identified as having local significance.

Table 6-38 provides a summary of the cultural significance for each heritage item identified within proximity to the proposal. Six items of heritage value are in the immediate vicinity of the proposal. One of these, St Aubins Arms, is a listed item. The remaining five items were identified during survey of the proposal area and are not listed on any heritage registers.

<table>
<thead>
<tr>
<th>Heritage item</th>
<th>Relevant NSW Heritage Branch significance criteria</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heritage Item 2 – Rail Culvert</td>
<td>Historical (criterion a), Aesthetic (criterion c)</td>
<td>Local</td>
</tr>
<tr>
<td>Heritage Item 3 – Timber Structure</td>
<td>Historical (criterion a)</td>
<td>Local</td>
</tr>
<tr>
<td>Heritage Item 5 – Farmyard Complex</td>
<td>Historical (criterion a), Research (criterion e)</td>
<td>Local</td>
</tr>
<tr>
<td>Heritage Item 6 – House (Lot 19 DP6498)</td>
<td>Historical (criterion a)</td>
<td>Local</td>
</tr>
<tr>
<td>Heritage Item 7 – St Aubins Arms</td>
<td>Historical (criterion a), Associative (criterion b), Aesthetic (criterion c) and Research (criterion e)</td>
<td>Local</td>
</tr>
<tr>
<td>Heritage Item 8 – Great Northern Railway</td>
<td>Historical (criterion a)</td>
<td>Local</td>
</tr>
<tr>
<td>Heritage item</td>
<td>Relevant NSW Heritage Branch significance criteria</td>
<td>Significance</td>
</tr>
<tr>
<td>--------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>Heritage Item 9 – West Scone Conservation Area</td>
<td>Historical (criterion a), Aesthetic (criterion c), Social (criterion d), Research (criterion e) and Representative (criterion g)</td>
<td>Local</td>
</tr>
</tbody>
</table>

### 6.8.3 Potential impacts

#### Construction

Three items would be directly impacted by the proposal; these are:

- The dam and surrounding property at St Aubins Arms (Heritage Item 7)
- Timber Structure (Heritage Item 3)
- The Farmyard Complex (Heritage Item 5).

An additional four items may be indirectly impacted through vibration caused by general construction works and piling. These items include the Rail Culvert (Heritage Item 2), House (Lot 19, DP6498) (Heritage Item 6), the Great Northern Railway (Heritage Item 8) and the West Scone Conservation Area (Heritage Item 9).

Table 6-39 provides a summary of each heritage item in proximity to the proposal and the potential impacts from the proposal.

#### Operation

There are no expected impacts during operation.
<table>
<thead>
<tr>
<th>Heritage Item</th>
<th>Element</th>
<th>Directly impacted by the proposal</th>
<th>Within potential vibration impact area</th>
<th>Physical impact</th>
<th>Visual impact</th>
<th>Heritage impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item 1: Stockyards (1)</td>
<td>Stockyards</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>None</td>
</tr>
<tr>
<td>Item 2: Rail Culvert</td>
<td>Rail Culvert</td>
<td>Yes but won’t be directly impacted by construction works as proposal crosses this item.</td>
<td>Yes</td>
<td>Potential</td>
<td>Yes</td>
<td>Yes, some potential indirect impact from construction vibration. To be mitigated through vibration monitoring.</td>
</tr>
<tr>
<td>Item 3: Timber Structure</td>
<td>Timber posts and crossbeams</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes, direct impact by construction but to be mitigated through archival recording</td>
</tr>
<tr>
<td>Item 4: Stockyards (2)</td>
<td>Stockyards</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No because this item is assessed as having little to zero heritage value.</td>
</tr>
<tr>
<td>Item 5: Farmyard Complex</td>
<td>Timber shed, stockyards, loading ramp, mature peppercorn trees</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes, direct impact from construction to all elements to be mitigated through archaeological investigation and archival recording.</td>
</tr>
<tr>
<td>Item 6: House (Lot 19, DP6498)</td>
<td>House</td>
<td>No</td>
<td>Yes – 10 metres</td>
<td>Potential</td>
<td>No</td>
<td>Yes, some potential indirect impact to be mitigated through vibration monitoring and further assessment, if management measures are required to mitigate noise.</td>
</tr>
<tr>
<td>Heritage Item</td>
<td>Element</td>
<td>Directly impacted by the proposal</td>
<td>Within potential vibration impact area</td>
<td>Physical impact</td>
<td>Visual impact</td>
<td>Heritage impact</td>
</tr>
<tr>
<td>---------------</td>
<td>---------</td>
<td>----------------------------------</td>
<td>----------------------------------------</td>
<td>----------------</td>
<td>--------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Item 7: St Aubins Arms</td>
<td>House and structures</td>
<td>No</td>
<td>No – but very close about 40 metres</td>
<td>No</td>
<td>No</td>
<td>Yes, some potential indirect impact to these elements to be mitigated through vibration monitoring as very close to predicted construction vibration corridor and further assessment if, management measures are required to mitigate noise. A section 140 Excavation Permit will be obtained for the impacted sections of the St Aubins Arms property (Heritage Item 7).</td>
</tr>
<tr>
<td>Gardens and plantings</td>
<td>No</td>
<td>Yes</td>
<td>Potential</td>
<td>No</td>
<td>No</td>
<td>No, gardens will be disturbed by construction works as they are outside the proposal site.</td>
</tr>
<tr>
<td>Dam and surrounding property</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes, direct impact from construction to all elements to be mitigated through archaeological investigation and archival recording. A section 140 Excavation Permit would be obtained for the impacted sections of the St Aubins Arms property (Heritage Item 7).</td>
</tr>
<tr>
<td>Item 8: Great Northern Railway</td>
<td>Rail line and associated embankments</td>
<td>Yes but not to be directly impacted by construction works as proposal crosses this item</td>
<td>Yes</td>
<td>Potential</td>
<td>Yes</td>
<td>Yes, some potential to these elements to be impacted by vibration to be mitigated through vibration monitoring.</td>
</tr>
</tbody>
</table>
### Heritage Item | Element | Directly impacted by the proposal | Within potential vibration impact area | Physical impact | Visual impact | Heritage impact
---|---|---|---|---|---|---
West Scone Conservation Area | Curtilage of: a) Grammar School former St Luke’s b) St Luke’s Church and Rectory c) Old Court Theatre d) Historical Museum (former Constable Quarters and Lock Up) | No | No – but very close about 40 metres to the curtilage of the buildings. | No | No | Yes, some potential to these elements from vibration to be mitigated through vibration monitoring as very close to the curtilage of buildings. Further assessment will be completed, if management measures are required to mitigate noise.
6.8.4 Safeguards and management measures

Mitigation measures provided in Table 6-40 would be implemented to minimise potential impacts on non-Aboriginal heritage.

Table 6-40 Summary of potential impacts and environmental safeguards – non-Aboriginal heritage

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inadvertent impacts on heritage items</td>
<td><strong>Archival recording of the impacted elements of the Farming Complex (Heritage Item 5), St Aubins Arms property (Heritage Item 7) and Timber Structure (Heritage Item 3) will be carried out. The archival recording will include photographs and detailed inventory and plans and will be prepared to the standard of Local significance as specified in Heritage Branch’s requirements for <em>Archival Recording of Heritage Items</em> and prepared by a qualified heritage consultant. Final copies of the archival recording will be lodged with the Upper Hunter Valley Council’s local studies collection.</strong></td>
<td>Roads and Maritime</td>
<td>Pre-construction</td>
</tr>
<tr>
<td><em>New England Highway bypass at Scone</em></td>
<td><strong>A section 140 Excavation Permit will be obtained for the impacted sections of the Farming Complex (Heritage Item 5) and St Aubins Arms property (Heritage Item 7). This is to be prepared by a heritage consultant / archaeologist in consultation with Heritage Division NSW.</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>As part of the site induction, all workers will be advised of their obligations in relation to heritage before construction begins and the guidelines to follow if unanticipated heritage items or deposits are located during construction.</strong></td>
<td></td>
<td></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>Inadvertent impacts on heritage items</td>
<td>A program of vibration monitoring and dilapidation reports will be completed for potential indirect impacts from vibration during construction works on the Rail Culvert (Heritage Item 2), House (Lot 19, DP6498) (Heritage Item 6), the Great Northern Railway (Heritage Item 8), the West Scone Conservation Area (Heritage Item 9) and the buildings associated with the St Aubins Arms (Heritage Item 7).</td>
<td>Construction Contractor</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>All identified historical heritage items within the proposal or within vicinity of the proposal area will be mapped and provided to site planners, Roads and Maritime workers and sub-contractors so they are aware of their responsibilities under the Heritage Act 1977.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unanticipated archaeological finds</td>
<td>In the unlikely event of an unexpected find of an archaeological deposit (or suspected item), work would cease in the affected area and the Roads and Maritime Environment Manager, Hunter Region will be contacted for advice on how to proceed. The Roads and Maritime Unexpected Archaeological Finds Procedure 2012 will be followed in the event a potential artefact is uncovered.</td>
<td>Construction Contractor</td>
<td>Construction</td>
</tr>
</tbody>
</table>

6.9 Air quality

6.9.1 Existing environment

Sensitive receivers

Sensitive receivers in the vicinity of the proposal (Figure 6.7) have been grouped according to location, proximity and/or land use for the air quality assessment as follows:

- Rural residential receivers adjacent to the New England Highway to the north and south of Scone (about 130 metres from the proposal)
- Residential receivers adjacent to the New England Highway (Kelly Street) at the northern extent of the proposal (about 20 metres from New England Highway and 30 metres from proposal)
- Residential receivers within the Scone and rural receivers beyond Scone (about 50 metres from the proposal)
- Scone Grammar School
- Recreational areas, including Scone Golf Club (and course), Bill Rose Sports Complex and Scone Rugby Club.
**Ambient air quality**

Air quality standards and goals are provided as cumulative values which are made up of the incremental impact from the proposal as well as background concentration levels of pollutants. Therefore, to assess impacts against the relevant air quality standards and goals it is useful to have information on existing air quality pollution levels in the area.

Long term fine particulate matter (PM$_{10}$) data was obtained from the nearest OEH air quality monitoring station, which is located at Aberdeen, about 13 kilometres south of Scone. PM$_{10}$ data recorded over the past 18 months indicate an average daily concentration of 16 µg/m$^3$, which is typical of a rural environment with minimal industrial activities. Based on similar types of land use, this data is considered representative of the proposal area.

The National Pollutant Inventory (NPI) holds a database of facilities and emissions to air in the Hunter Valley region. A search of the National Pollutant Inventory for a two kilometre radius around the site indicated that there are two reporting facilities in the study area.

Aero Refuellers Scone, located to the west of the proposal area reports emissions of Toluene (methylbenzene) and total volatile organic compounds. Neither of these emissions is expected in significant quantities during construction or operation of the proposal.

Scone Abattoir is located to the east of the New England Highway and proposal site. Reported emissions include carbon monoxide, oxides of nitrogen, sulphur dioxide, volatile organic compounds and particulate matter.

The primary source of air emissions within immediate proximity of the proposal is expected to be vehicles, generating particulate matter and products of combustions (exhaust emissions). The New England Highway and Liverpool Street carry the majority of existing traffic within the study area.

**Local meteorology**

The relative exposure of sensitive receptors (ie residences) to air emissions from a source generally varies at a given range from the source dependent on the wind climate and, in particular, on the direction(s) of poor dispersion. Poor dispersion for ground based sources is characterised by light winds and stable atmospheres. Wind directions which have these characteristics would have greater risk of air quality impact. Strong winds become important for the construction phase where dust from unconsolidated and stockpiled sources requires mitigation measures to be implemented.

The proposal site is located about two kilometres east of the nearest Bureau of Meteorology (BoM) Automatic Weather Station (AWS) at Scone Airport. Wind data from this station is considered to the best available for the site.

The annual and seasonal average wind rose for a five year period (2007 - 2011) was assessed and is shown in Figure 6.17 with the following features:

- The major incidence of winds is from the south, with lesser components from the northwest quadrant. Southwest and south-southeast winds comprise 82 per cent of all winds
- The incidence of easterly, north-easterly and south-westerly winds are low, at less than two per cent respectively
- The incidence of strong (greater than six metres per second) winds is most marked for southerly and south-south-easterly winds
- The incidence of light (0.5 to two metres per second) winds is most marked from north, northeast and westerly directions.
Figure 6.18 shows the seasonal winds roses, where the following can be seen:

- Summer - winds are predominantly from the south and southeast
- Winter - winds are predominantly from the northwest quadrant and the south
- Spring and autumn - winds are predominantly from the south.

Figure 6.17    Annual wind rose for Scone Airport, 2007-11 (average wind speed 3.9 m/s)
6.9.2 Criteria

OEH has established air quality impact criteria for key air pollutants to achieve appropriate environmental outcomes and minimise the risk to human health and amenity.

Air quality impact assessment criteria for the proposal are prescribed within the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (DEC 2005).
**Construction - dust**

Criteria for PM$_{10}$, total suspended particulates and deposited dust concentrations are provided in Table 6-41. Concentration limits are applied at the location of the nearest identified sensitive receptors (due to health and amenity impacts on human activity).

Table 6-41  Impact assessment criteria for airborne particulate matter (PM$_{10}$) and total suspended particulates

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Averaging period</th>
<th>Criteria $^{(1)}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM$_{10}$</td>
<td>24 hours</td>
<td>50 µg/m$^3$</td>
</tr>
<tr>
<td></td>
<td>Annual</td>
<td>30 µg/m$^3$</td>
</tr>
<tr>
<td>Total suspended particulates</td>
<td>Annual</td>
<td>90 µg/m$^3$</td>
</tr>
<tr>
<td>Deposited dust</td>
<td>Annual</td>
<td>2 g/m$^2$/month (increment)</td>
</tr>
</tbody>
</table>

$^{(1)}$ Total impact (incremental impact plus background)

µg/m$^3$ - micrograms per cubic metre

g/m$^2$/month - grams per square metre per month

**Operation – vehicle emissions**

Expected emissions to air during operation of the proposal would primarily consist of emissions linked to vehicles, such as products of combustion (from exhaust) and particulate matter (exhaust but also mechanically induced including road dust). Relevant criteria are presented in Table 6-42.

Table 6-42  Assessment criteria for operational air quality

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Averaging period</th>
<th>Concentration</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen dioxide (NO$_{2}$)</td>
<td>1 hour</td>
<td>12 pphm</td>
<td>246 µg/m$^3$</td>
</tr>
<tr>
<td></td>
<td>Annual</td>
<td>3 pphm</td>
<td>62 µg/m$^3$</td>
</tr>
<tr>
<td>PM$_{10}$</td>
<td>24 hours</td>
<td>-</td>
<td>50 µg/m$^3$</td>
</tr>
<tr>
<td></td>
<td>Annual</td>
<td>-</td>
<td>30 µg/m$^3$</td>
</tr>
<tr>
<td>Total suspended particulates</td>
<td>Annual</td>
<td>-</td>
<td>90 µg/m$^3$</td>
</tr>
<tr>
<td>Carbon monoxide (CO)</td>
<td>15 minutes</td>
<td>87 ppm</td>
<td>100 mg/m$^3$</td>
</tr>
<tr>
<td></td>
<td>1 hour</td>
<td>25 ppm</td>
<td>30 mg/m$^3$</td>
</tr>
<tr>
<td></td>
<td>8 hours</td>
<td>9 ppm</td>
<td>10 mg/m$^3$</td>
</tr>
</tbody>
</table>

pphm - parts per hundred million

ppm – parts per million

µg/m$^3$ - micrograms per cubic metre

mg/m$^3$ – milligrams per cubic metre
6.9.3 Potential impacts

Construction

Construction of the proposal may have short-term localised impacts on air quality, primarily due to dust generation. Dust (Total suspended particulates, including PM10) would be the primary emission to air generated during the construction of the proposal.

The individual processes that generate dust are:

- Mechanical disturbance - dust emissions brought about by the operation of construction and maintenance vehicles and equipment
- Wind erosion - dust emissions from exposed, disturbed soil surfaces under high wind speeds during construction.

The potential for exposure to dust emissions is dependent on the intensity of construction work (ie the amount of dust generated and material transfer volumes occurring), duration and frequency of the operations in any given locality and the relative location of nearby sensitive receptors.

Dust emission sources to consider are:

- Material handling during earthworks
- Loading and dumping of material
- Levelling, grading and compacting of disturbed soil surfaces
- Wind erosion of exposed unstable soil surfaces and localised stockpiles.

Sensitive receptors closest to the construction work area have the highest potential for adverse air quality impacts. As the proposal is linear in nature, construction work fronts would be transient and unlikely to affect an individual receptor for an extended period of time. Dust emissions during construction are typically sufficiently managed through the application of mitigation measures. Dust management measures have been outlined in section 6.9.4 to assist in minimising off-site impacts during the construction phase of the proposal.

Vehicle exhaust emissions during the construction phase have the potential to impact on air quality; however the impact is likely to be negligible given the limited amount of equipment, distance to receptors and the short-term construction period at any one location. All construction and administrative vehicles are expected to be maintained in a serviceable condition such that exhaust emissions are reduced to manufacturer specified levels.

Operation

Air emissions during operation of the proposal have been identified to consist of products of combustion (exhaust) and particulate matter. Emissions which have been assessed are:

- Carbon monoxide (CO)
- Oxides of nitrogen (NOx)
- Particulate matter (PM_{10}).

Predictions of pollutant concentrations have been made using the Roads and Maritime Tool for Roadside Air Quality (TRAQ) (Sinclair Knight Merz (SKM) 2012) software. TRAQ has been designed as a ‘first-pass’ screening assessment and uses a conservative approach to estimate pollutant concentrations near a roadway (TRAQ Manual, Roads and Maritime Services 2012). The model has been used extensively in NSW and is currently accepted by regulatory agencies as an appropriate conservative model for forecasting near field ground level pollutant concentrations from traffic on major roads.
TRAQ is based on the USEPA CALINE4 dispersion model for air quality assessment, which predicts one hour average pollutant concentrations. Conversion factors are then applied through the TRAQ model to estimate pollutant concentrations at averaging times that are consistent with Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (DEC 2005).

Model configuration and input were as follows:

- Assessment years of 2017 (proposal opening) and 2027 (10 years after proposal opening)
- 24-hour traffic volumes have been predicted for different sections of the proposal. Two sections of the proposal have been considered, being north and south of St Aubins Street. Table 6-43 provides input traffic volumes
- A TRAQ simulation was run for the highest traffic volumes of both year 2017 and 2027
- Default TRAQ traffic mix input for the road type was selected
- TRAQ utilises vehicle emission factors developed for certain years. TRAQ vehicle fleet emission factors for year 2016 was used to represent proposal year 2017. TRAQ vehicle fleet emission factors for year 2026 emission factors were used for proposal year 2027 due to expected advances in technologies resulting in reduced emissions
- Traffic speed of 100 kilometres per hour
- Grade: flat to three per cent. Results have been presented for the three per cent grade sections as this input produced the highest air emissions and concentrations. Results presented are therefore an over-estimate for sections of the proposal with have a grade of less than three per cent
- ‘Worst-case’ meteorological conditions and inclusion of cold start emissions have been included. The inclusion of cold start emissions is considered conservative since it would not be typical of free-flowing highway traffic
- Rural surrounding land use and ambient air quality environment. Background pollutant concentrations have been determined using TRAQ assumptions.

Table 6-43  Expected proposal traffic volumes

<table>
<thead>
<tr>
<th>Proposal section</th>
<th>Direction</th>
<th>Year 2017</th>
<th>Year 2027</th>
</tr>
</thead>
<tbody>
<tr>
<td>North of St Aubins Street</td>
<td>Northbound</td>
<td>2144</td>
<td>2536</td>
</tr>
<tr>
<td></td>
<td>Southbound</td>
<td>1931</td>
<td>2261</td>
</tr>
<tr>
<td>South of St Aubins Street</td>
<td>Northbound</td>
<td>2873</td>
<td>3585</td>
</tr>
<tr>
<td></td>
<td>Southbound</td>
<td>2903</td>
<td>3750</td>
</tr>
</tbody>
</table>

The TRAQ predicted results are presented for each identified pollutant in the sections below.

**Carbon monoxide (CO)**

Ground level concentrations for CO were predicted out to a distance of 100 metres from the proposal (kerb edge). Predicted results were added to the adopted background concentration before comparison with the criteria (Table 6-44 and Table 6-45). Predicted results indicate compliance at all distances.
Table 6-44  CO 1-hour average (mg/m³)

<table>
<thead>
<tr>
<th>Receptor distance</th>
<th>Proposal contribution 2017</th>
<th>Proposal contribution 2027</th>
<th>Background</th>
<th>Highest cumulative</th>
<th>Criterion</th>
</tr>
</thead>
<tbody>
<tr>
<td>At kerb</td>
<td>1.4</td>
<td>1.5</td>
<td>0.7</td>
<td>2.2</td>
<td>30</td>
</tr>
<tr>
<td>10 m from kerb</td>
<td>0.5</td>
<td>0.6</td>
<td>0.7</td>
<td>1.3</td>
<td>30</td>
</tr>
<tr>
<td>20 m from kerb</td>
<td>0.4</td>
<td>0.4</td>
<td>0.7</td>
<td>1.1</td>
<td>30</td>
</tr>
<tr>
<td>50 m from kerb</td>
<td>0.2</td>
<td>0.3</td>
<td>0.7</td>
<td>1.0</td>
<td>30</td>
</tr>
<tr>
<td>100 m from kerb</td>
<td>0.2</td>
<td>0.2</td>
<td>0.7</td>
<td>0.9</td>
<td>30</td>
</tr>
</tbody>
</table>

Table 6-45  CO 8-hour average (mg/m³)

<table>
<thead>
<tr>
<th>Receptor distance</th>
<th>Proposal contribution 2017</th>
<th>Proposal contribution 2027</th>
<th>Background</th>
<th>Highest cumulative</th>
<th>Criterion</th>
</tr>
</thead>
<tbody>
<tr>
<td>At kerb</td>
<td>0.9</td>
<td>1.1</td>
<td>0.7</td>
<td>1.8</td>
<td>10</td>
</tr>
<tr>
<td>10 m from kerb</td>
<td>0.4</td>
<td>0.4</td>
<td>0.7</td>
<td>1.1</td>
<td>10</td>
</tr>
<tr>
<td>20 m from kerb</td>
<td>0.3</td>
<td>0.3</td>
<td>0.7</td>
<td>1.0</td>
<td>10</td>
</tr>
<tr>
<td>50 m from kerb</td>
<td>0.2</td>
<td>0.2</td>
<td>0.7</td>
<td>0.9</td>
<td>10</td>
</tr>
<tr>
<td>100 m from kerb</td>
<td>0.1</td>
<td>0.1</td>
<td>0.7</td>
<td>0.8</td>
<td>10</td>
</tr>
</tbody>
</table>

Nitrogen dioxide (NO₂)

Ground level concentrations for NO₂ were predicted out to a distance of 100 metres from the proposal (kerb edge). Predicted results were added to the adopted background concentration before comparison with the criteria (Table 6-46 and Table 6-47). Predicted results indicate compliance at all distances.

Table 6-46  NO₂ 1-hour average (µg/m³)

<table>
<thead>
<tr>
<th>Receptor distance</th>
<th>Proposal contribution 2017</th>
<th>Proposal contribution 2027</th>
<th>Background</th>
<th>Highest cumulative</th>
<th>Criterion</th>
</tr>
</thead>
<tbody>
<tr>
<td>At kerb</td>
<td>27.2</td>
<td>16.7</td>
<td>11.5</td>
<td>38.7</td>
<td>246</td>
</tr>
<tr>
<td>10 m from kerb</td>
<td>16.6</td>
<td>10.1</td>
<td>11.5</td>
<td>28.1</td>
<td>246</td>
</tr>
<tr>
<td>20 m from kerb</td>
<td>15.5</td>
<td>9.3</td>
<td>11.5</td>
<td>27.0</td>
<td>246</td>
</tr>
<tr>
<td>50 m from kerb</td>
<td>9.5</td>
<td>5.8</td>
<td>11.5</td>
<td>21.0</td>
<td>246</td>
</tr>
<tr>
<td>100 m from kerb</td>
<td>6.4</td>
<td>3.9</td>
<td>11.5</td>
<td>17.9</td>
<td>246</td>
</tr>
</tbody>
</table>
Table 6-47  NO₂ annual average (µg/m³)

<table>
<thead>
<tr>
<th>Receptor distance</th>
<th>Proposal contribution 2017</th>
<th>Proposal contribution 2027</th>
<th>Background</th>
<th>Highest cumulative</th>
<th>Criterion</th>
</tr>
</thead>
<tbody>
<tr>
<td>At kerb</td>
<td>5.4</td>
<td>3.3</td>
<td>4.6</td>
<td>10.0</td>
<td>62</td>
</tr>
<tr>
<td>10 m from kerb</td>
<td>3.3</td>
<td>2.0</td>
<td>4.6</td>
<td>7.9</td>
<td>62</td>
</tr>
<tr>
<td>20 m from kerb</td>
<td>3.1</td>
<td>1.9</td>
<td>4.6</td>
<td>7.7</td>
<td>62</td>
</tr>
<tr>
<td>50 m from kerb</td>
<td>1.9</td>
<td>1.2</td>
<td>4.6</td>
<td>6.5</td>
<td>62</td>
</tr>
<tr>
<td>100 m from kerb</td>
<td>1.3</td>
<td>0.8</td>
<td>4.6</td>
<td>5.9</td>
<td>62</td>
</tr>
</tbody>
</table>

Particulate matter (PM₁₀)

Ground level concentrations for PM₁₀ were predicted out to a distance of 100 metres from the proposal (kerb edge). Predicted results were added to the adopted background concentration before comparison with the criteria (Table 6-48 and Table 6-49). Predicted results indicate compliance at all distances.

Table 6-48  PM₁₀ 24-hour average (µg/m³)

<table>
<thead>
<tr>
<th>Receptor distance</th>
<th>Proposal contribution 2017</th>
<th>Proposal contribution 2027</th>
<th>Background</th>
<th>Highest cumulative</th>
<th>Criterion</th>
</tr>
</thead>
<tbody>
<tr>
<td>At kerb</td>
<td>5.1</td>
<td>6.4</td>
<td>21.0*</td>
<td>27.4</td>
<td>50</td>
</tr>
<tr>
<td>10 m from kerb</td>
<td>2.2</td>
<td>2.7</td>
<td>21.0</td>
<td>23.7</td>
<td>50</td>
</tr>
<tr>
<td>20 m from kerb</td>
<td>1.5</td>
<td>2.0</td>
<td>21.0</td>
<td>23.0</td>
<td>50</td>
</tr>
<tr>
<td>50 m from kerb</td>
<td>1.0</td>
<td>1.2</td>
<td>21.0</td>
<td>22.2</td>
<td>50</td>
</tr>
<tr>
<td>100 m from kerb</td>
<td>0.7</td>
<td>0.8</td>
<td>21.0</td>
<td>21.8</td>
<td>50</td>
</tr>
</tbody>
</table>

* Long term data from ambient air monitoring at Aberdeen indicates a lower concentration of 16 µg/m³, however the TRAQ background data has been used as a conservative measure.

Table 6-49  PM₁₀ annual average (µg/m³)

<table>
<thead>
<tr>
<th>Receptor distance</th>
<th>Proposal contribution 2017</th>
<th>Proposal contribution 2027</th>
<th>Background</th>
<th>Highest cumulative</th>
<th>Criterion</th>
</tr>
</thead>
<tbody>
<tr>
<td>At kerb</td>
<td>1.9</td>
<td>2.3</td>
<td>13.1</td>
<td>15.7</td>
<td>30</td>
</tr>
<tr>
<td>10 m from kerb</td>
<td>0.9</td>
<td>1.1</td>
<td>13.1</td>
<td>14.2</td>
<td>30</td>
</tr>
<tr>
<td>20 m from kerb</td>
<td>0.7</td>
<td>0.8</td>
<td>13.1</td>
<td>13.9</td>
<td>30</td>
</tr>
<tr>
<td>50 m from kerb</td>
<td>0.4</td>
<td>0.5</td>
<td>13.1</td>
<td>13.6</td>
<td>30</td>
</tr>
<tr>
<td>100 m from kerb</td>
<td>0.2</td>
<td>0.3</td>
<td>13.1</td>
<td>13.4</td>
<td>30</td>
</tr>
</tbody>
</table>

TRAQ simulations for the proposal predict compliance for all pollutants, even at the kerb of the road, indicating further detailed assessment is not required.
Air quality impacts from the proposal are therefore predicted to be readily compliant at all identified sensitive receivers, including residences, schools and recreation areas. Air quality impacts at recreation areas are discussed further below.

Air quality criteria prescribed within the Approved Methods (DECC 2005) are based on averaging periods of 1-hour or more. These criteria are applicable only when the recreation areas are in use. While predicted results even at the kerb are well below the Approved Methods (DECC 2005) criteria, exposure is further reduced within recreation areas such as a Bill Rose Sports Complex, due to the limited time that people are present within proximity to the roadway.

Traffic volumes on Kelly Street through Scone would reduce by about 40 per cent following the proposal, leading to a reduction of traffic-related air emissions for residences and commercial premises in the vicinity.

### 6.9.4 Safeguards and management measures

Mitigation measures provided in Table 6-50 would be implemented to minimise potential impacts on air quality.

#### Table 6-50 Summary of potential impacts and environmental safeguards – air quality

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>General air quality impacts</td>
<td>The CEMP will include a procedure for effective dust control, including dust monitoring and reporting procedures.</td>
<td>Construction contractor</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>Dust emissions</td>
<td>Dust suppression measures will be implemented in accordance with the CEMP. This would include water carts as required.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>Dust emissions</td>
<td>Stockpiled materials will be managed in accordance with Stockpile Management Guideline (RTA, 2011b).</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>Dust emissions</td>
<td>All trucks will be covered when transporting dust generating material to and from the site.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>Exhaust emissions</td>
<td>Construction plant and equipment will be maintained in a good working condition in order to limit impacts on air quality.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>Exhaust emissions</td>
<td>Plant and machinery will be turned off when not in use.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>Impacts on sensitive receivers</td>
<td>Local residents will be advised of hours of operation and duration of work and supplied with a contact name and number for queries regarding air quality.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
</tbody>
</table>
6.10 Agricultural impact

6.10.1 Methodology

This agricultural impact assessment has been prepared based on the NSW Department of Primary industries (2013) Agricultural Impact Statement technical notes - A companion to the Agricultural Impact Statement guideline and the Prime Fact Infrastructure proposals on rural land.

The assessment provides an appraisal of the impact of the proposal on the operation and viability of the rural properties and makes recommendations as to overarching mitigation measures that could be adopted to minimise impacts. This agricultural assessment has considered a number of relevant policies, guidelines and strategies. In general, these policies seek to protect agricultural land but recognise that diverse social and economic interests need to be considered.

The potential impacts of the proposal have been determined in consideration to the following methodology. Potential impacts will vary depending on the type of business impacted with the following characteristics of each property requiring consideration:

- Farm attributes – land area, topography, soils and agribusiness activities
- Livestock – type and average numbers
- Crop and pasture - type and area
- Infrastructure.

The degree of agribusiness impact for each category on each farm is assessed at one of the following four levels: major, moderate, minor or nil.

The potential impact of a proposal (construction and operation) can be defined under seven main categories: severance, loss of agricultural land, water supply, infrastructure, property income, non-productive assets and social value. Further explanation of each of these categories and example mitigation measures is provided below.

**Severance** – the degree to which a proposal would divide the property into different sections. A division may potentially increase the difficulty of management by reducing ease of accessibility by the owner and staff, or increase the difficulty of movement of livestock, plant and equipment. Mitigation for severance may include the provision of under-passes or over-passes and land swapping, but it may also include realignment of internal fences and provision of laneways to ensure optimum livestock movement.

**Loss of agricultural land** – the degree to which a proposal would remove productive land. In general the most productive land will be the flat, arable land which will have the highest yields and carrying capacity per hectare. Mitigation for loss of prime agricultural land could include land swapping, where practical, or compensation.

**Water supply** – proposal construction and operation may affect surface water run-off which could impact on stock and domestic water supplies from farm dams and creeks (both quantity and quality). Some properties also rely on bore water for stock and domestic supplies which may be disrupted by road construction and later operation. Mitigation to ensure maintenance of surface water supply at current levels could be via culverts and other diversions. If bore water is impacted mitigation may be the construction of replacement bores.
Infrastructure – proposal construction potentially impacts on a range of infrastructure including houses, sheds, yards, fences, and access roads. Loss of these facilities or newly placed proximity to a road which make the facilities unworkable would impact on agribusiness outcomes. Mitigation would most likely be the replacement of the infrastructure or refurbishment to ensure their efficient operation in the future.

Property income – if proposal construction causes loss of agricultural production there would be an impact on family income. The degree of impact would depend on the extent of current agribusiness activity and the effect of the bypass. Mitigation against loss of future income is difficult to determine but may be included in a compensation arrangement.

Non-productive assets – proposal construction has the potential to impact on a number of non-productive assets including trees, and visual and auditory amenities. This would reduce property value or negatively impact on agribusiness marketing activities (for example horse selling). Agricultural businesses place importance on the value of their land as well as the land’s production potential. The capital value of the land is important when considering equity for property or business expansion. Mitigation of impacts on non-productive assets could be through construction and/or replanting of assets to restore land values.

Social value – this relates to the generational value and family history of each property as well as the possible impacts on employment on the properties as a result of the proposal. From an agribusiness perspective the social value is likely to be associated with farm type, including if properties are for lifestyle or productive agriculture.

6.10.2 Existing environment

Regional location and agriculture

Scone is located in the Upper Hunter local government area and its land use and economy, including employment opportunities, is heavily reliant on agriculture.

The Upper Hunter local government area is located in a region with a temperate climate, with mean annual rainfall of about 647 millimetres with monthly totals being relatively higher for the summer months. The area has relatively high mean maximum temperatures in summer (32 degrees Celsius in January) and cool mean minimum temperatures in winter (3.1 degrees Celsius in July).

The topography varies from flat (flood plains along the Hunter River) through to undulating and steeper slopes (Mount Royal Range in the east and Liverpool Range in the west). Soils tend to be deep and of alluvial origin on the flat and undulating land. These alluvial soils are generally fertile and intensively used for agricultural operations with low soil erosion risk, and many areas have been classified as biophysical strategic agricultural land. The steeper land in the local government area is comprised predominantly of solodic texture contract with low permeability and lower fertility.

The Upper Hunter local government area has a variety of agricultural enterprises as a result of its natural features which is enhanced by its close proximity to ports and transport routes to both domestic and export markets. Agricultural activity accounts for over 86 per cent of the land use, with cattle (both dairy and beef), equine industry and viticulture the main agricultural enterprises within the broader region. Other main land uses include parklands (national parks and state forests) and a small area of existing underground coal mining (refer to Table 6-51).
### Table 6-51 Land use within the Upper Hunter local government area

<table>
<thead>
<tr>
<th>Land use</th>
<th>Land use area (hectares)</th>
<th>Percentage of Upper Hunter local government area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural</td>
<td>700,055</td>
<td>86.44%</td>
</tr>
<tr>
<td>Commercial</td>
<td>41</td>
<td>0.01%</td>
</tr>
<tr>
<td>Education</td>
<td>26</td>
<td>0.00%</td>
</tr>
<tr>
<td>Hospital/Medical</td>
<td>16</td>
<td>0.00%</td>
</tr>
<tr>
<td>Industrial</td>
<td>24</td>
<td>0.00%</td>
</tr>
<tr>
<td>Parkland</td>
<td>101,266</td>
<td>12.50%</td>
</tr>
<tr>
<td>Residential</td>
<td>7,292</td>
<td>0.90%</td>
</tr>
<tr>
<td>Transport</td>
<td>6</td>
<td>0.00%</td>
</tr>
<tr>
<td>Water</td>
<td>1,193</td>
<td>0.15%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>809,919</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Source: GHD analysis based on GIS interpretation of land use mapping

Australian Bureau of Statistics (ABS) data provide information on the scale and value of agricultural production in the Upper Hunter local government area (Table 6-52) with the gross value of agricultural production being about $100 million per year. In addition to this is the value-added component associated with the equine and viticulture industries.

### Table 6-52 Annual gross value of major agricultural commodities Upper Hunter local government area

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Value ($ million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Livestock slaughtering – cattle</td>
<td>57.8</td>
</tr>
<tr>
<td>Livestock products - whole milk</td>
<td>12.6</td>
</tr>
<tr>
<td>Broadacre crops - hay</td>
<td>6</td>
</tr>
<tr>
<td>Broadacre crops – other cereal crops</td>
<td>5.1</td>
</tr>
<tr>
<td>Livestock products - wool</td>
<td>5</td>
</tr>
<tr>
<td>Livestock slaughtering – sheep &amp; lambs</td>
<td>3.7</td>
</tr>
<tr>
<td>Broadacre crops – wheat</td>
<td>3.2</td>
</tr>
<tr>
<td>Broadacre crops – canola</td>
<td>2.7</td>
</tr>
<tr>
<td>Horticulture - olives</td>
<td>1.9</td>
</tr>
<tr>
<td>Broadacre crops – barley</td>
<td>1.6</td>
</tr>
<tr>
<td>Horticulture - grapes</td>
<td>0.2</td>
</tr>
<tr>
<td>Horticulture - vegetables (tomatoes)</td>
<td>0.1</td>
</tr>
<tr>
<td><strong>Total ($ million)</strong></td>
<td><strong>99.9</strong></td>
</tr>
</tbody>
</table>

Source: ABS Agricultural Commodities Small Area Data, Australia, 2011
Land use associated with livestock grazing is the predominant land use within the Upper Hunter local government area, with beef cattle and sheep being the most numerous (Table 6-53). In 2009, thoroughbred breeding in the Upper Hunter region contributed over 80 per cent of the total value of stud horses exported by Australia and account for almost 15 per cent of the total stud horses within NSW. The Australian Stockhorse Society also has its headquarters at Scone. There are about 656 agricultural businesses operating within the Upper Hunter local government area which relates to an average farm size of about 1,067 hectares.

Table 6-53  Number and size of selected agricultural industries in Upper Hunter Upper Hunter local government area

<table>
<thead>
<tr>
<th>Livestock enterprise</th>
<th>Livestock numbers</th>
<th>% of Upper Hunter Shire to NSW</th>
<th>No. agricultural businesses</th>
<th>% of Upper Hunter Shire to NSW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle – beef</td>
<td>184,869</td>
<td>3.49%</td>
<td>567</td>
<td>2.11%</td>
</tr>
<tr>
<td>Cattle – dairy</td>
<td>7674</td>
<td>2.40%</td>
<td>30</td>
<td>2.05%</td>
</tr>
<tr>
<td>Sheep</td>
<td>190,408</td>
<td>0.74%</td>
<td>200</td>
<td>1.24%</td>
</tr>
<tr>
<td>Horses – stud</td>
<td>4944</td>
<td>14.83%</td>
<td>112</td>
<td>4.61%</td>
</tr>
<tr>
<td>Horses – other</td>
<td>2713</td>
<td>5.10%</td>
<td>308</td>
<td>2.91%</td>
</tr>
</tbody>
</table>

Source: ABS (2010-11) Agricultural Commodities Australia

**Employment**

The importance of agriculture can be gauged by employment statistics which show that of all employed people in the Upper Hunter local government area the majority are employed in the agriculture, fisheries and forestry industry (25.5 per cent), followed by retail trade (10.2 per cent) and education and training (9.4 per cent).

Table 6-54 details the employment within specific agricultural industries. Specialised beef cattle farming employs 440 people while horse farming employs 382 people out of a total of 1,180 people employed in agriculture.

Table 6-54  Employment in agricultural industries within Upper Hunter local government area

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture, Forestry and Fishing, nfd*</td>
<td>12</td>
</tr>
<tr>
<td>Agriculture, nfd*</td>
<td>38</td>
</tr>
<tr>
<td>Olive Growing</td>
<td>3</td>
</tr>
<tr>
<td>Sheep, Beef Cattle and Grain Farming, nfd*</td>
<td>12</td>
</tr>
<tr>
<td>Sheep Farming (Specialised)</td>
<td>30</td>
</tr>
<tr>
<td>Beef Cattle Farming (Specialised)</td>
<td>440</td>
</tr>
<tr>
<td>Beef Cattle Feedlots (Specialised)</td>
<td>3</td>
</tr>
<tr>
<td>Sheep-Beef Cattle Farming</td>
<td>111</td>
</tr>
<tr>
<td>Grain-Sheep or Grain-Beef Cattle Farming</td>
<td>32</td>
</tr>
<tr>
<td>Other Grain Growing</td>
<td>14</td>
</tr>
<tr>
<td>Commodity</td>
<td>Employees</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>Other Crop Growing nec**</td>
<td>16</td>
</tr>
<tr>
<td>Dairy Cattle Farming</td>
<td>33</td>
</tr>
<tr>
<td>Poultry Farming, nfd*</td>
<td>3</td>
</tr>
<tr>
<td>Poultry Farming (Eggs)</td>
<td>6</td>
</tr>
<tr>
<td>Deer Farming</td>
<td>3</td>
</tr>
<tr>
<td>Horse Farming</td>
<td>382</td>
</tr>
<tr>
<td>Shearing Services</td>
<td>6</td>
</tr>
<tr>
<td>Other Agriculture and Fishing Support Services</td>
<td>36</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,180</strong></td>
</tr>
</tbody>
</table>

* nfd – not further defined (ABS classifications)

** nec – not elsewhere classified (ABS classifications)

Source: NSW Trade and Investment (2015)

Local context

Within the vicinity of the proposal the land tends to be low lying and prone to flooding and water logging following rain events. The majority of land within and surrounding the proposal is zoned RU4 (rural small holdings) and is predominantly used as low intensive grazing land or as ‘lifestyle farms’. The average lot size for land within the proposal site is generally four hectares in size. Within the Upper Hunter local government area the smaller ‘lifestyle’ farms produce a range of agricultural products to supplement non-farm income. Typically the primary rural activities conducted on these properties throughout the LGA include sheep, cattle and horse grazing and the production of cereal grain and fodder crops such as lucerne. Small rural land holdings with the proposal site include activities such as horse agistment and cropping for animal fodder to supplement non-farm incomes.

Two larger landholdings are located at the northern end and one at the southern end of the proposal site. The property at the northern end is associated with the Primo Meats (abattoir) operation; however the lots through which the proposal passes are isolated from the main operation by Parsons Gully and are currently leased to the adjacent landowner and used for cropping. These lots comprise a total area of about 15 hectares. The other property at the northern end is about 24 hectares in size and is used predominantly for grazing purposes. The St Aubins property at the southern end is an extensive landholding greater than 2000 hectares and is used primarily for cattle grazing.

Due to a combination of the small landholdings and low lying nature of the land there is limited farming infrastructure other than fences and groundwater bores, or non-productive assets, in the vicinity of the proposal.

There are a number of groundwater bores located in the Kingdon Ponds, Parsons Gully and Middlebrook areas as well as a lesser quantity in Scone. They appear to be for irrigation and stock, including irrigation for the golf course. Department of Primary Industries (DPI) Water records include 11 registered bores in the vicinity of the proposal. In addition to these registered bores, the survey carried out as part of preliminary investigations identified additional groundwater bores in the vicinity of the proposal.
Biophysical strategic agricultural land

Within the Upper Hunter local government area, 149,205 hectares or 18.5 per cent of the total land area is classed as biophysical strategic agricultural land. This is land that has high quality soil and water resource characteristics that are capable of sustaining high levels of productivity. Figure 6.19 shows the extent of biophysical strategic agricultural land within the Upper Hunter local government area.

Within the vicinity of the proposal the majority of land to the south and west of Scone (refer to Figure 6.21), through which the proposal passes, is mapped as biophysical strategic agricultural land. However as discussed above this land tends to be low lying and prone to flooding and water logging following rain events limiting its agricultural potential.

Critical industry clusters

Critical industry clusters are defined as concentrations of highly productive industries within a region that contribute to the identity of that region and provide significant employment opportunities. The Upper Hunter local government area has extensive critical industry cluster areas (180,430 hectares or 22 per cent of the total land area) due to the concentration of equine industries. Figure 6.20 shows the extent of critical industry cluster within the Upper Hunter local government area.

Within the vicinity of the proposal the majority of land to the south and west of Scone (refer to Figure 6.22), through which the proposal passes, and to the east of Scone is mapped as critical industry cluster (equine). However as discussed above the land to the west of Scone tends to be low lying and prone to flooding and water logging following rain events limiting its agricultural potential.
Biophysical Strategic Agricultural Land
Total = 149,205 ha
6.10.3 Potential impacts

This section discusses the potential impacts to agriculture in the regional and local context as a result of the proposal. These impacts would also result in changes in land use and potential socio-economic effects (including amenity impacts). Refer to section 6.11 for further discussion on land use impacts and section 6.12 for further discussion on socio-economic effects.

Construction

Construction of the proposal would result in the direct removal of agricultural land by acquisition as summarised in Table 6-55. It should be noted that of the 31.8 hectares of mapped biophysical strategic agricultural land and the 21.7 hectares of mapped critical industry cluster (equine) about 5.5 hectares are contained within the Scone Golf Course. Other mapped areas are also contained within road and rail reserves and are not available for agricultural use. Impacted areas of biophysical strategic agricultural land, critical industry cluster (equine) and land zoned RU4 (rural small holdings) are shown on Figure 6.21, Figure 6.22 and Figure 6.23 respectively.

The impacted areas within the proposal site collectively equate to less than about 0.02 per cent of the equivalent classification lands in the Upper Hunter local government area.

Table 6-55 Agricultural land within the proposal site

<table>
<thead>
<tr>
<th>Type</th>
<th>Area within local government area (hectares)</th>
<th>Area within proposal site (hectares)</th>
<th>Area within proposal site (%)</th>
<th>Area within proposal site as a % of land within local government area</th>
</tr>
</thead>
<tbody>
<tr>
<td>RU4 - Rural Small Holdings</td>
<td>809,919</td>
<td>20.0</td>
<td>58%</td>
<td>0.002</td>
</tr>
<tr>
<td>Biophysical strategic agricultural land</td>
<td>149,205</td>
<td>31.8</td>
<td>95%</td>
<td>0.021</td>
</tr>
<tr>
<td>Critical industry cluster (equine)</td>
<td>180,430</td>
<td>21.7</td>
<td>64%</td>
<td>0.012</td>
</tr>
</tbody>
</table>

At the northern end of the proposal there is a travelling stock route which is managed by Local Land Services to facilitate the movement of livestock to and from the Scone sale yards. There is considerable variation in the frequency of use of this stock reserve given the route is already severed by the existing New England Highway and Great Northern Railway. The proposal would cross the travelling stock route and during construction access would be provided as required to enable continued stock movements.

The need for property acquisitions is still being investigated and would be further refined during the detailed design phase. Based on the concept design and subject to negotiations in accordance with the Land Acquisition Information Guide (Roads and Maritime, 2013) and the Land Acquisition (Just Terms Compensation) Act 1991, 25 individual lots comprising 17.8 hectares used or potentially used for agricultural purposes would be directly impacted by the proposal through partial or total acquisition (refer to Table 6-58 for details of all lots directly impacted). Of the 25 agricultural lots, eight have already been acquired by Roads and Maritime, 14 are privately owned by eight separate private owners and three are owned by Upper Hunter Shire Council (comprising an unformed council road and land identified for future expansion of the golf course following construction of the proposal).
The agricultural lots impacted vary in size from about 60 hectares to less than one hectare. For the 17 lots still to be acquired, two would be subject to total acquisition with the rest being subject to partial acquisition ranging from about two per cent to 58 per cent, with an average of about 28 per cent.

Potential impacts to these properties in addition to the loss of land through acquisition could relate to loss of infrastructure (i.e., fencing, no buildings or residences would be directly impacted), property severance / fragmentation, ongoing viability issues and temporary access restrictions to and within property during construction. Further consultation with property owners about impacts to their property such as severance, ongoing viability and sterilisation would be carried out to further inform the proposal.

Of the lots not already acquired by Roads and Maritime that are used for agricultural purposes, the proposal would result in severance of nine lots affecting five separate owners. This would result in either fragmentation of the affected lots or broader properties and could also sterilise portions of lots or properties. For those lots subject to severance, and two others subject to partial acquisition, a change in how the impacted portion of the property is managed could be required as a result of the reduced availability or fragmented nature of the property. Roads and Maritime would consult with the affected landowners regarding severance and potential viability impacts, including the need for provision of alternate access where required.

There is limited farming infrastructure within the proposal site with impacts being limited to fences and five groundwater bores. Any infrastructure removed as part of the proposal would be replaced by Roads and Maritime in consultation with the affected owner.

For these smaller rural holdings the extent of economic impacts would vary according to individual circumstances. However given they are predominantly used as lifestyle farms and are subject to water logging / flooding the proposal is expected to have limited/minimal impacts to the ongoing operation or viability of these properties. The majority of lots are subject to partial acquisition and as a result there could be residual land within the affected lots or in some cases on neighbouring lots (within the same land ownership), to permit continued operations with the provision of alternate access where required. During construction, alternative access arrangements would be provided where required to parts of land not required for construction activities.

In relation to the three larger landholdings that are impacted at the northern and southern ends of the proposal:

- A property at the northern end is associated with the Primo Meats (abattoir) operation, however the lots through which the proposal passes are isolated from the main operation by Parsons Gully and acquisition is unlikely to affect the overall viability of the larger landholding. One of the impacted lots is currently leased to the adjacent landowner and used for animal fodder cropping. This lot would be severed and subject to acquisition of about 54% of the total lot area. This would impact on the viability of this lot for the current agricultural purpose and a changed in agricultural use could be required.

- Another property at the northern end is about 24 hectares in size and is used predominantly for grazing purposes. This property would be subject to minor strip acquisition of about 0.43 hectares, representing about two per cent of the total lot area.

- The St Aubins property is an extensive landholding greater than 2000 hectares and is used primarily for cattle grazing. Two lots within the landholding would be subject to partial acquisition. One lot would be subject to strip acquisition (about 0.2 hectares (four per cent)) and would not affect the viability of the lot or landholding. The second lot would be subject to partial acquisition of about 5.5 hectares (58 per cent) which would impact on the viability of the lot, however it is prone to frequent water logging / inundation, and would not affect the viability of the overall landholding. Changes to the overall property management practices could be required as a result of this partial acquisition.
The impacts discussed above in relation to property acquisition, severance / fragmentation, access changes and loss of infrastructure would result in varying degrees of impacts to each individual owner. The key impacts would be associated with changes to how the property is managed, whether or not the existing use continues to be viable and resulting economic impacts. Roads and Maritime would consult with all affected owners and the acquisition process would take these potential impacts into account in accordance with the *Land Acquisition Information Guide* (Roads and Maritime, 2013) and the *Land Acquisition (Just Terms Compensation) Act 1991*.

**Operation**

During operation the existing travelling stock route located at the northern end of the proposal would be partially relocated and a permanent underpass provided beneath the proposal to enable continued stock movements.

During operation of the proposal ongoing viability, profitability, productivity and sustainability impacts on the properties may be experienced as a result of land acquisition as discussed above. These impacts could arise as a result of property severance / fragmentation, reduced availability of land and loss of infrastructure such as fencing or groundwater bores. A change in agricultural use of these affected lots and broader properties could be required.

However, it is expected that given the general low intensity of agricultural usage (i.e. hobby farms) of the affected lots original activities on the majority of properties could be resumed and sustained on residual land not subject to acquisition. For those lots located beneath the overbridge generally between Kingdon and Liverpool streets, subject to detailed design and final placement of the overbridge piers, normal activities beneath the overbridge may be able to resume following construction.

The partial acquisition from the two larger landholdings at the northern end of the proposal, including Primo Meats, is considered unlikely to impact on the viability of these operations. The land currently leased by Primo Meats to the adjacent landholder is currently used for animal fodder cropping. Following construction of the proposal this use in not likely to be viable. The proposal is unlikely to impact on the viability of the overall St Aubins property however over half of one of the impacted lots would be subject to acquisition and would impact on management of the affected lot. Changes to the overall property management practices could be required as a result of this partial acquisition.

All impacted infrastructure, such as fencing and groundwater bores (or other water sources) would be replaced by Roads and Maritime in consultation with the affected owners. Property access would be available during operation of the proposal.

As discussed above for construction the impacts during operation would vary depending on individual owner circumstances. The key impacts would be associated with changes to how the property is managed, whether or not the existing use continues to be viable and resulting economic impacts. Roads and Maritime would consult with all affected owners and the acquisition process would take these potential impacts into account in accordance with the *Land Acquisition Information Guide* (Roads and Maritime, 2013) and the *Land Acquisition (Just Terms Compensation) Act 1991*.

Additional operational impacts could be associated with potential for a loss of amenity and access for individual properties. These impacts and mitigation measures are discussed in the following sections: traffic and access (section 6.1), noise and vibration (section 6.5) and air quality (section 6.9).
Mitigation measures provided in Table 6-56 would be implemented to minimise potential impacts on agriculture.

Table 6-56 Summary of potential impacts and environmental safeguards – agricultural impact

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual property impacts</td>
<td>Roads and Maritime will consult with potentially affected landholders before and during construction to minimise the potential for impacts on agriculture.</td>
<td>Roads and Maritime</td>
<td>Pre-construction and Construction</td>
</tr>
<tr>
<td>Property acquisition and severance</td>
<td>Roads and Maritime will carry out regular and ongoing engagement with the property owners. Acquisition will be carried out in accordance with the <em>Land Acquisition Information Guide</em> (Roads and Maritime, 2013) and <em>Land Acquisition (Just Terms Compensation) Act 1991</em>.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td>Travelling stock route</td>
<td>Roads and Maritime will continue to liaise with Local Land Services during detailed design to maintain connectivity for travelling stock route. This will include provision of suitable arrangements during construction which could include early construction of the underpass and / or temporary cessation of works in the vicinity when stock movements are required.</td>
<td>Roads and Maritime and Construction Contractor</td>
<td>Detailed design and Construction</td>
</tr>
<tr>
<td>Groundwater bores and water access</td>
<td>Roads and Maritime will consult with all directly affected landholders, including the owners of the groundwater bores that would be removed, to determine requirements for access to water and replacement facilities or access if required.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
</tbody>
</table>
6.11 Land use and property

6.11.1 Existing environment

The proposal is located within the Upper Hunter local government area. The town of Scone is surrounded by rural landscape with views of mountains, creeks and farmland. The proposal site is located to the west of Scone mainly through cleared paddocks dominated by grasses and weeds. Adjoining land uses include:

- North: Great Northern Railway, New England Highway, agricultural land and rural residences
- South: Great Northern Railway, New England Highway, Bill Rose Sports Complex, Scone Golf Club, White Park, rural residential and agricultural properties
- East: Scone, Scone Park, residential and agricultural properties, and Figtree Creek
- West: rural residences and agricultural properties, Satur, Scone Airport, Scone Racecourse, Kingdon Ponds, and Middle Brook.

The population of Scone in 2011 was 5079 people living in 2176 dwellings. The majority of dwellings in Scone are separate houses which is consistent with the local government area. Scone makes up 37 per cent of the population of the local government area. The population of the Upper Hunter local government area is expected to grow by 14.5 per cent over the next 30 years to 15,750 persons by 2031 (Department of Planning and Environment, 2014). The main industries of employment in Scone are mining, retail, trade, health care and social assistance, manufacturing and education and training. There are a number of businesses along the New England Highway through Scone. These include a variety of businesses to cater for the equine industry, agriculture and tourism as well as services for local residents of Scone and the region.

As outlined in section 4.2.1, the proposal site is within or adjacent to the following zones under the LEP (refer to Figure 6.23):

- SP2 (infrastructure)
- R1 (general residential)
- RE1 (public recreation)
- RE2 (private recreation)
- RU4 (rural small holdings)
- B4 (mixed use)
- B2 (local centre)
- IN2 (light industrial).

The majority of land within and surrounding the proposal is zoned RU4 and is predominantly low intensive grazing land. As outlined in section 6.10 livestock grazing is the predominant land use within the local government area, with beef cattle and sheep being the most numerous. The average lot size for land adjoining the proposal site is generally four hectares in size.

Key social and recreational infrastructure in the vicinity of the proposal includes (refer to Figure 6.24):

- The Scone Golf Course is a nine hole golf course associated with the Scone RSL club
- Bill Rose Sports Complex provides general sports fields, netball courts, cricket ovals and nets, hockey fields, an athletics oval, tables and seating, play equipment, electric barbecues and outdoor gym equipment
- White Park contains a parade arena, clubhouse buildings, rodeo ring, holding yards, portable grandstands and horse stalls/stables
- Dog park located on Liverpool Street
- Scone Grammar School
- Scone Rugby Oval consists of a public sports oval and clubhouse facilities.
Figure 6.23

Land Use Zoning

Roads and Maritime Services
HW19 New England Highway Scone Bypass
Review of Environmental Factors

LEGEND

- B2 Local Centre
- B4 Mixed Use
- E1 National Parks and Nature Reserves
- E3 Environmental Management
- IN1 General Industrial
- IN2 Light Industrial
- R1 General Residential
- R4 Rural Small Holdings
- R5 Large Lot Residential
- RE1 Public Recreation
- RE2 Private Recreation
- RU1 Primary Production
- RU4 Rural Small Holdings
- IN2 Light Industrial
- RE1 Public Recreation
- SP1 Special Activities
- SP2 Infrastructure
- Proposal site
- Railway
- Cadastre

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300
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Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

Paper Size A4
0 62.5 125 250 375 500 625 Meters

Data source: DoPPI LEP data, 2014/03/28, Created by fmackay, tsmorton, glmampert

Job Number
Revision Date
22-17554
08 Dec 2015

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6.11.2 Potential impacts

Long term impacts on land use and property would occur from the commencement of construction. These impacts would be related to property acquisition, changes in local road connections to the New England Highway and changes to property access. Long term impacts to property have been discussed below as operational impacts.

Construction

The proposal site encompasses an area of about 33.48 hectares of which about 20 hectares is classed as RU4 under the LEP. The two other main zones are RE1 (5.48 hectares) and SP2 (5.21 hectares). The land zoned RU4 within and adjoining the proposal site is predominantly low intensive agricultural land. Table 6-57 outlines the land zones within the proposal site.

Table 6-57  Land use within the proposal site

<table>
<thead>
<tr>
<th>Land use zone</th>
<th>Impacted area (hectares)</th>
<th>area</th>
</tr>
</thead>
<tbody>
<tr>
<td>RU4 - Rural Small Holdings</td>
<td>20.00</td>
<td></td>
</tr>
<tr>
<td>RE1 - Public Recreation</td>
<td>5.48</td>
<td></td>
</tr>
<tr>
<td>SP2 - Infrastructure</td>
<td>5.21</td>
<td></td>
</tr>
<tr>
<td>R1 – General Residential</td>
<td>2.75</td>
<td></td>
</tr>
<tr>
<td>B4 – Mixed Use</td>
<td>0.03</td>
<td></td>
</tr>
<tr>
<td>IN2 – Light Industrial</td>
<td>0.01</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>33.48</strong></td>
<td></td>
</tr>
</tbody>
</table>

Impacts on land use as a result of construction of the proposal would mainly relate to the presence of construction work along the proposal site. Construction may temporarily impact on vehicular and pedestrian access in the immediate vicinity of the work sites. Potential traffic and access impacts are considered in section 6.1.

During construction, partial acquisition of agricultural properties has the potential to temporarily impact on the viability and maintenance of properties that are used as grazing paddocks. The proposal would result in reconfiguration of the Scone Golf Club and would pass over the eastern edge of the Bill Rose Sports Complex and a dog park. These recreational facilities would experience amenity impacts due to traffic and access issues, increases in noise, visual impacts, closures for safety reasons and potential dust generation during construction of the proposal.

These potential impacts and safeguards issues have been addressed in other sections of this REF, as follows:

- Traffic and access (refer section 6.1)
- Noise and vibration (refer section 6.5)
- Visual impacts (refer section 6.6)
- Air quality (refer section 6.9)
- Agricultural impact (refer section 6.10)
- Socio-economic effects (refer section 6.12).

Roads and Maritime would consult with potentially affected landholders before and during construction to minimise the potential for impacts on land use.
Construction activities have the potential to impact on existing utilities and services, in particular underground services such as electricity, gas, and telecommunications. The proposed strategies for adjustment and/or protection of each utility (based on initial consultation with utility providers) are provided in section 3.5. Roads and Maritime would consult with relevant service providers during detailed design to identify possible interactions and develop procedures to be implemented to minimise the potential for service interruptions which have the potential to impact on existing land use.

**Operation**

The need for property acquisitions is still being investigated and would be further refined during the detailed design phase. Based on the concept design and subject to negotiations in accordance with the *Land Acquisition Information Guide* (Roads and Maritime, 2013) and the *Land Acquisition (Just Terms Compensation) Act 1991*, the following property adjustments may be required:

- 41 individual lots would be directly impacted, of these 14 privately and 16 publically owned lots would be subject to acquisition, with 11 lots having already been acquired by Roads and Maritime
- The 14 privately owned lots subject to acquisition are owned by eight separate owners
- The 16 publically owned lots subject to acquisition are owned by three separate owners (Upper Hunter Shire Council, Local Land Services (NSW Government) and the State of NSW)
- Of the 30 individual lots subject to acquisition, two privately owned lots (one owner) and one publically owned lot (Upper Hunter Shire Council) would be subject to total acquisition, with the remaining 27 lots subject to partial acquisition
- Of the 30 individual lots subject to acquisition, 10 are zoned RE1 (Public Recreation) and comprise the Scone Golf Course, a public park on Kingdon Street and the Bill Rose Sports Complex. All would be subject to partial acquisition only
- Excluding properties already acquired by Roads and Maritime no houses would be subject to acquisition.

Details of direct property acquisition are provided in Table 6-58.

Roads and Maritime will carry out ongoing consultation with all affected landholders.

The proposal would result in a permanent change in land use from the existing land use to a road corridor. Operation of the proposal would result in land fragmentation of properties intersected by the proposal including recreational, agricultural and rural residential properties. This could have an adverse impact property viability (refer to section 6.10 for further discussion regarding potential agricultural impacts). Reconfiguration of the golf course may result in a long term positive outcome for the club and its members (refer to section 6.12 for further discussion regarding potential socio-economic effects).

There is potential for minor amenity impacts to residential properties and recreational facilities in close proximity to the proposal. The intersection at St Aubins Street may increase traffic and traffic safety concerns on local streets that currently have low volumes of traffic such as St Aubins Street and Aberdeen Street. Properties to the west of Aberdeen Street would be adjacent to the proposal and may experience amenity impacts during operation. The Bill Rose Sports Complex is likely to experience minor amenity impacts during operation of the proposal including visual and air quality.

These potential impacts and safeguards issues have been addressed in other sections of this REF, as follows:

- Traffic and access (refer section 6.1)
- Noise and vibration (refer section 6.5)
- Visual impacts (refer section 6.6)
- Air quality (refer section 6.9)
- Socio-economic effects (refer section 6.12).
<table>
<thead>
<tr>
<th>Property reference</th>
<th>Lot and DP</th>
<th>Existing land use</th>
<th>Ownership</th>
<th>Total area of lot (hectare)</th>
<th>Area of lot directly impacted (hectares)</th>
<th>Percentage of lot directly impacted</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lot 1 DP 804243</td>
<td>Agricultural</td>
<td>Private</td>
<td>5.80</td>
<td>0.20</td>
<td>4%</td>
</tr>
<tr>
<td>2</td>
<td>Lot 103 DP 1093507</td>
<td>Agricultural</td>
<td>Private</td>
<td>9.54</td>
<td>5.51</td>
<td>58%</td>
</tr>
<tr>
<td>3</td>
<td>Lot 121 DP 5417</td>
<td>Agricultural</td>
<td>Roads and Maritime Services</td>
<td>0.40</td>
<td>0.25</td>
<td>62%</td>
</tr>
<tr>
<td>4</td>
<td>Lot 122 DP 5417</td>
<td>Agricultural</td>
<td>Roads and Maritime Services</td>
<td>0.40</td>
<td>0.25</td>
<td>62%</td>
</tr>
<tr>
<td>5</td>
<td>Lot 123 DP 5417</td>
<td>Agricultural</td>
<td>Roads and Maritime Services</td>
<td>0.40</td>
<td>0.20</td>
<td>51%</td>
</tr>
<tr>
<td>6</td>
<td>Lot 124 DP 5417</td>
<td>Agricultural</td>
<td>Roads and Maritime Services</td>
<td>0.40</td>
<td>0.15</td>
<td>36%</td>
</tr>
<tr>
<td>7</td>
<td>Lot 129 DP 5417</td>
<td>Agricultural</td>
<td>Roads and Maritime Services</td>
<td>2.02</td>
<td>0.95</td>
<td>47%</td>
</tr>
<tr>
<td>8</td>
<td>Lot 137 DP 5417</td>
<td>Agricultural</td>
<td>Roads and Maritime Services</td>
<td>2.02</td>
<td>0.02</td>
<td>1%</td>
</tr>
<tr>
<td>9</td>
<td>Lot 140 DP 5417</td>
<td>Agricultural (unformed council road)</td>
<td>Upper Hunter Shire Council</td>
<td>0.75</td>
<td>0.05</td>
<td>7%</td>
</tr>
<tr>
<td>10</td>
<td>Lot 1 Sec 23 DP 758898</td>
<td>Agricultural</td>
<td>Private</td>
<td>0.81</td>
<td>0.81</td>
<td>100%</td>
</tr>
<tr>
<td>11</td>
<td>Lot 5 Sec 23 DP 758898</td>
<td>Agricultural</td>
<td>Private</td>
<td>0.81</td>
<td>0.81</td>
<td>100%</td>
</tr>
<tr>
<td>12</td>
<td>Lot 1 DP 732158</td>
<td>Agricultural</td>
<td>Private</td>
<td>1.32</td>
<td>0.14</td>
<td>10%</td>
</tr>
<tr>
<td>13</td>
<td>Lot 2 DP 5949</td>
<td>Agricultural</td>
<td>Private</td>
<td>23.77</td>
<td>0.43</td>
<td>2%</td>
</tr>
<tr>
<td>14</td>
<td>Lot 111 DP 623382</td>
<td>Agricultural</td>
<td>Private</td>
<td>3.47</td>
<td>1.88</td>
<td>54%</td>
</tr>
<tr>
<td>15</td>
<td>Lot 202 DP 579923</td>
<td>Agricultural</td>
<td>Private</td>
<td>57.34</td>
<td>2.57</td>
<td>4%</td>
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<tr>
<td>16</td>
<td>Lot 1 DP 68348</td>
<td>Agricultural</td>
<td>Private</td>
<td>0.81</td>
<td>0.30</td>
<td>37%</td>
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<td>Property reference</td>
<td>Lot and DP</td>
<td>Existing land use</td>
<td>Ownership</td>
<td>Total area of lot (hectare)</td>
<td>Area of lot directly impacted (hectares)</td>
<td>Percentage of lot directly impacted</td>
</tr>
<tr>
<td>---------------------</td>
<td>---------------------</td>
<td>--------------------------</td>
<td>------------------------------------</td>
<td>----------------------------</td>
<td>------------------------------------------</td>
<td>------------------------------------</td>
</tr>
<tr>
<td>17</td>
<td>Lot 5 Sec 4 DP 758898</td>
<td>Agricultural</td>
<td>Private</td>
<td>0.20</td>
<td>0.10</td>
<td>50%</td>
</tr>
<tr>
<td>18</td>
<td>Lot 200 DP 579923</td>
<td>Travelling stock route</td>
<td>State government</td>
<td>0.97</td>
<td>0.40</td>
<td>42%</td>
</tr>
<tr>
<td>19</td>
<td>Lot 2 DP 881852</td>
<td>Agricultural</td>
<td>Upper Hunter Shire Council</td>
<td>1.79</td>
<td>0.61</td>
<td>34%</td>
</tr>
<tr>
<td>20</td>
<td>Lot 1 DP 197254</td>
<td>Agricultural</td>
<td>Roads and Maritime Services</td>
<td>0.81</td>
<td>0.81</td>
<td>100%</td>
</tr>
<tr>
<td>21</td>
<td>Lot 106 DP 259201</td>
<td>Residential</td>
<td>Roads and Maritime Services</td>
<td>0.07</td>
<td>0.07</td>
<td>100%</td>
</tr>
<tr>
<td>22</td>
<td>Lot 11 DP 1204106</td>
<td>Rural residential</td>
<td>Roads and Maritime Services</td>
<td>0.60</td>
<td>0.60</td>
<td>100%</td>
</tr>
<tr>
<td>23</td>
<td>Lot 2 DP 197254</td>
<td>Agricultural</td>
<td>Roads and Maritime Services</td>
<td>0.81</td>
<td>0.81</td>
<td>100%</td>
</tr>
<tr>
<td>24</td>
<td>Lot 3 DP 857957</td>
<td>Rural residential</td>
<td>Roads and Maritime Services</td>
<td>1.23</td>
<td>1.23</td>
<td>100%</td>
</tr>
<tr>
<td>25</td>
<td>Lot 1 DP 1086721</td>
<td>Sports complex</td>
<td>Upper Hunter Shire Council</td>
<td>25.31</td>
<td>0.17</td>
<td>0.7%</td>
</tr>
<tr>
<td>26</td>
<td>Lot 17 Sec 4 DP 758898</td>
<td>Dog park</td>
<td>Upper Hunter Shire Council</td>
<td>0.20</td>
<td>0.10</td>
<td>50%</td>
</tr>
<tr>
<td>27</td>
<td>Lot 18 Sec 4 DP 758898</td>
<td>Dog park</td>
<td>Upper Hunter Shire Council</td>
<td>0.20</td>
<td>0.20</td>
<td>100%</td>
</tr>
<tr>
<td>28</td>
<td>Lot 19 Sec 4 DP 758898</td>
<td>Dog park</td>
<td>Upper Hunter Shire Council</td>
<td>0.20</td>
<td>0.10</td>
<td>50%</td>
</tr>
<tr>
<td>29</td>
<td>Lot 2 DP 1118494</td>
<td>Park</td>
<td>Upper Hunter Shire Council</td>
<td>0.20</td>
<td>0.03</td>
<td>17%</td>
</tr>
<tr>
<td>30</td>
<td>Lot 3 DP 1118494</td>
<td>Park</td>
<td>Upper Hunter Shire Council</td>
<td>0.20</td>
<td>0.10</td>
<td>50%</td>
</tr>
<tr>
<td>31</td>
<td>Lot 4 DP 1118494</td>
<td>Park</td>
<td>Upper Hunter Shire Council</td>
<td>0.20</td>
<td>0.14</td>
<td>67%</td>
</tr>
<tr>
<td>32</td>
<td>Lot 5 DP 1118494</td>
<td>Park</td>
<td>Upper Hunter Shire Council</td>
<td>0.20</td>
<td>0.10</td>
<td>50%</td>
</tr>
<tr>
<td>33</td>
<td>Lot 202 DP 585078</td>
<td>Golf course</td>
<td>Upper Hunter Shire Council</td>
<td>16.84</td>
<td>1.54</td>
<td>9%</td>
</tr>
<tr>
<td>34</td>
<td>Lot 21 DP 11961</td>
<td>Golf course</td>
<td>Upper Hunter Shire Council</td>
<td>11.57</td>
<td>0.96</td>
<td>8%</td>
</tr>
<tr>
<td>Property reference</td>
<td>Lot and DP</td>
<td>Existing land use</td>
<td>Ownership</td>
<td>Total area of lot (hectare)</td>
<td>Area of lot directly impacted (hectares)</td>
<td>Percentage of lot directly impacted</td>
</tr>
<tr>
<td>---------------------</td>
<td>------------------</td>
<td>-------------------</td>
<td>-------------------------</td>
<td>-----------------------------</td>
<td>------------------------------------------</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td>35</td>
<td>Lot 22 DP 11961</td>
<td>Golf course</td>
<td>Upper Hunter Shire Council</td>
<td>9.89</td>
<td>1.42</td>
<td>14%</td>
</tr>
<tr>
<td>36</td>
<td>Lot 118 DP 5417</td>
<td>Agricultural</td>
<td>Private</td>
<td>0.40</td>
<td>0.15</td>
<td>37%</td>
</tr>
<tr>
<td>37</td>
<td>Lot 119 DP 5417</td>
<td>Agricultural</td>
<td>Private</td>
<td>0.40</td>
<td>0.21</td>
<td>52%</td>
</tr>
<tr>
<td>38</td>
<td>Lot 120 DP 5417</td>
<td>Agricultural</td>
<td>Private</td>
<td>0.40</td>
<td>0.25</td>
<td>61%</td>
</tr>
<tr>
<td>39</td>
<td>Lot 117 DP 5417</td>
<td>Agricultural</td>
<td>Private</td>
<td>0.40</td>
<td>0.02</td>
<td>5%</td>
</tr>
<tr>
<td>40</td>
<td>Lot 2 Sec 1 DP 758898</td>
<td>Park</td>
<td>State government</td>
<td>0.20</td>
<td>0.03</td>
<td>17%</td>
</tr>
<tr>
<td>41</td>
<td>Lot 102 DP 1093507</td>
<td>Agricultural</td>
<td>Upper Hunter Shire Council</td>
<td>22.34</td>
<td>0.36</td>
<td>2%</td>
</tr>
</tbody>
</table>
### 6.11.3 Safeguards and management measures

Mitigation measures provided in Table 6-59 would be implemented to minimise potential impacts on land use and property.

**Table 6-59** Summary of potential impacts and environmental safeguards – land use and property

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjacent land use impacts</td>
<td>Roads and Maritime will consult with potentially affected landholders before and during construction to minimise the potential for impacts on land use.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td>Property acquisition</td>
<td>Property acquisition will be carried out in accordance with the <em>Land Acquisition Information Guide</em> (Roads and Maritime, 2013) and the <em>Land Acquisition (Just Terms Compensation) Act 1991</em>.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td>Service provider impacts</td>
<td>Roads and Maritime will consult with relevant service providers during detailed design to identify possible interactions and develop procedures to be implemented to minimise the potential for service interruptions which have the potential to impact on existing land use.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
</tbody>
</table>

### 6.12 Socio-economic effects

This section addresses the socio-economic impacts associated with the proposal and details the management measures proposed to mitigate these impacts.

The information presented in this section is summarised from the socio-economic impact assessment prepared by GHD, 2015. The complete Assessment is provided in Appendix K.

#### 6.12.1 Existing environment

Scone is located in the Upper Hunter Shire in the Hunter Region of New South Wales and is a business hub for the entire local government area. The population of Scone in 2011 was 5079 people living in 2176 dwellings. The population of the Upper Hunter Shire local government area in 2011 was 13,754, with Scone making up 37 per cent of the local government area.

Scone displays relatively low levels of cultural diversity, which is characteristic of the local government area. Only 1.9 per cent (97 persons) were born in a non-main English speaking country (consistent with 1.6 per cent for the local government area), while 2.9 per cent speak a language other than English (1.9 per cent for the local government area average).

The rate of labour force participation in 2011 was 60.3 per cent in 2011, while the unemployment rate was 3.8 per cent, both of which are consistent with the local government area average (62.4 per cent and 3.6 per cent). Incomes were also consistent with the local government area. The median individual income in Scone was $568 per week compared to $552 per person for the local government area, and $1096 per household compared to $1071 per household for the local government area.
The economy of Scone and the local government area are quite limited. Agriculture has been and still is the mainstay of the Upper Hunter Shire regional economy. This sector includes broad acre farming, intensive agriculture, livestock production and equine industries. Scone is also noted for breeding thoroughbred racehorses and is described by Upper Hunter Tourism as the ‘Horse capital of Australia’. Tourism, mining, retail and services which support the agriculture business are also key contributors to Scone’s economy.

There are a total of 104 operating businesses located along Kelly Street. The range of businesses indicate that Scone caters to a variety of industries such as the equine industry, agriculture and tourism and well as services for local residents of Scone and the region.

Figure 6.24 shows a map of the town centre of Scone, the proposal, and the location of key social infrastructure. The map demonstrates the majority of facilities are located along the main road, with those located near the proposal alignment including the following social and recreational infrastructure.

- The Scone Golf Course is a nine hole golf course associated with the Scone RSL club
- Bill Rose Sports Complex provides general sports fields, netball courts, cricket ovals and nets, hockey fields, an athletics oval, tables and seating, play equipment, electric barbecues and outdoor gym equipment
- White Park contains a parade arena, clubhouse buildings, rodeo ring, holding yards, portable grandstands and horse stalls/stables
- Dog park located on Liverpool Street
- Scone Grammar School
- Scone Rugby Oval consists of a public sports oval and clubhouse facilities.

The profile of the existing socio-economic environment for Scone indicates a number of key opportunities and challenges relevant to the proposal:

- Scone has a number of industries that offer employment and business opportunities such as the horse industry, agriculture (including sale yards), food processing (the abattoir), health services, administrative services (council), education (schools, TAFE, equine research centre), mining and manufacturing/processing (industrial estate)
- While in 2011 the top industry of employment was coal mining, the down-turn in the mining industry since then may mean there are people with trade qualifications and skills who may be available for employment
- The proposal offers opportunities to restore community values and lifestyle by removing passing heavy vehicles from the centre of town, making it a safer place for pedestrians and offering business expansion opportunities for local businesses along Kelly Street.
<table>
<thead>
<tr>
<th><strong>LEGEND</strong></th>
<th><strong>Accommodation facilities</strong></th>
<th><strong>Education</strong></th>
<th><strong>Emergency services</strong></th>
<th><strong>Public open space</strong></th>
<th><strong>Public Transport</strong></th>
<th><strong>Shopping</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>l) Scone Youth Centre</td>
<td>x) Scone Public School</td>
<td>g) Ambulance Service</td>
<td>h) Elizabeth Park</td>
<td>i) Scone Train Station</td>
<td>uu) Define Style</td>
</tr>
<tr>
<td></td>
<td>c) Scone Caravan Park</td>
<td>y) St. Marys School</td>
<td></td>
<td>q) Anniversary Park</td>
<td></td>
<td>vv) EyecarePlus</td>
</tr>
<tr>
<td></td>
<td>d) Highway Caravan Park</td>
<td>bb) Scone High School</td>
<td></td>
<td>b) Dog Park</td>
<td></td>
<td>wv) Scone Florist &amp; Giftware</td>
</tr>
<tr>
<td></td>
<td>m) INN Scone</td>
<td>f) Scone Grammar School</td>
<td></td>
<td></td>
<td></td>
<td>xx) Roberts Meats</td>
</tr>
<tr>
<td></td>
<td>k) Scone Motor Inn</td>
<td></td>
<td>g) Forest Service</td>
<td></td>
<td></td>
<td>yy) The Reject Shop</td>
</tr>
<tr>
<td></td>
<td>i) Royal Hotel-Motel</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>zz) Newsagent</td>
</tr>
<tr>
<td></td>
<td>f) Colonial Motor Lodge</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ab) Ascot</td>
</tr>
<tr>
<td></td>
<td>h) ISIS Motel</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>cb) Target</td>
</tr>
<tr>
<td></td>
<td>g) Scone Villas</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>db) The Secondary collection</td>
</tr>
<tr>
<td></td>
<td>m) Balmore Hotel Scone</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>fb) Farramas Clothing and Footware</td>
</tr>
<tr>
<td></td>
<td>o) Willow Tree Hotel</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>gb) PharmaSave Chemist</td>
</tr>
<tr>
<td></td>
<td>p) Golden Fleeces Hotel</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>hb) Scone Sports Store</td>
</tr>
<tr>
<td></td>
<td>q) Thoroughbred Hotel</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>b) Saddley</td>
</tr>
<tr>
<td></td>
<td>r) Willows Gate Hall Bed &amp; Breakfast</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>jj) Willow Gate Hall Bed &amp; Breakfast</td>
</tr>
<tr>
<td></td>
<td>s) The Cedar</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>jj) Willow Gate Hall Bed &amp; Breakfast</td>
</tr>
<tr>
<td></td>
<td>t) Arlie House Motor Inn</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>jj) Willow Gate Hall Bed &amp; Breakfast</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>jj) Willow Gate Hall Bed &amp; Breakfast</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Aged care services</strong></th>
<th><strong>Automotive</strong></th>
<th><strong>Churches and Places of Worship</strong></th>
<th><strong>Emergency services</strong></th>
<th><strong>Public open space</strong></th>
<th><strong>Public Transport</strong></th>
<th><strong>Shopping</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Integrated Living</td>
<td>t) BP Scone</td>
<td>(j) Catholic Church</td>
<td>g) Forest Service</td>
<td>h) Elizabeth Park</td>
<td>i) Scone Train Station</td>
<td>uu) Define Style</td>
</tr>
<tr>
<td>b) Quality Care Pty Ltd</td>
<td>s) Liberty Service Station</td>
<td>(cc) St. Andrews Uniting Church</td>
<td></td>
<td>q) Anniversary Park</td>
<td></td>
<td>vv) EyecarePlus</td>
</tr>
<tr>
<td></td>
<td>v) BP</td>
<td>(ee) Presbyterian Church</td>
<td></td>
<td>b) Dog Park</td>
<td></td>
<td>wv) Scone Florist &amp; Giftware</td>
</tr>
<tr>
<td></td>
<td>u) Shell</td>
<td>(dd) Baptist Church</td>
<td></td>
<td></td>
<td></td>
<td>xx) Roberts Meats</td>
</tr>
<tr>
<td></td>
<td>r) Woolworths / Caltex Petrol</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>yy) The Reject Shop</td>
</tr>
<tr>
<td></td>
<td>v) Scone Toyota</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>zz) Newsagent</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Community facilities</strong></th>
<th><strong>Sporting</strong></th>
<th><strong>Emergency services</strong></th>
<th><strong>Public open space</strong></th>
<th><strong>Public Transport</strong></th>
<th><strong>Shopping</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>aa) RSL</td>
<td>i) Scone War Memorial Swimming Pool</td>
<td>g) Forest Service</td>
<td>h) Elizabeth Park</td>
<td>i) Scone Train Station</td>
<td>uu) Define Style</td>
</tr>
<tr>
<td>e) Scone Civic Theatre</td>
<td>p) Scone Rugby Union Club</td>
<td></td>
<td>q) Anniversary Park</td>
<td></td>
<td>vv) EyecarePlus</td>
</tr>
<tr>
<td>v) Library</td>
<td>m) Bill Rose Sports Complex</td>
<td></td>
<td>b) Dog Park</td>
<td></td>
<td>wv) Scone Florist &amp; Giftware</td>
</tr>
<tr>
<td></td>
<td>o) White Park</td>
<td></td>
<td></td>
<td></td>
<td>xx) Roberts Meats</td>
</tr>
<tr>
<td></td>
<td>k) Scone Park</td>
<td></td>
<td></td>
<td></td>
<td>yy) The Reject Shop</td>
</tr>
<tr>
<td></td>
<td>n) Golf Club / Golf Course</td>
<td></td>
<td></td>
<td></td>
<td>zz) Newsagent</td>
</tr>
</tbody>
</table>
6.12.2 Potential impacts

Construction

Property impacts – acquisition

The need for property acquisitions is still being investigated and would be further refined during the detailed design phase. Based on the concept design and subject to negotiations in accordance with the *Land Acquisition Information Guide* (Roads and Maritime, 2013) and the *Land Acquisition (Just Terms Compensation) Act 1991*, the following property adjustments may be required:

- 41 individual lots would be directly impacted, of these 14 privately and 16 publically owned lots would be subject to acquisition, with 11 lots having already been acquired by Roads and Maritime
- The 14 privately owned lots subject to acquisition are owned by eight separate owners
- The 16 publically owned lots subject to acquisition are owned by three separate owners (Upper Hunter Shire Council, Local Land Services (NSW Government) and the State of NSW)
- Of the 30 individual lots subject to acquisition, two privately owned lots (one owner) and one publically owned lot (Upper Hunter Shire Council) would be subject to total acquisition, with the remaining 27 lots subject to partial acquisition
- Of the 30 individual lots subject to acquisition, 10 are zoned RE1 (Public Recreation) and comprise the Scone Golf Course, a public park on Kingdon Street and the Bill Rose Sports Complex. All would be subject to partial acquisition only
- Excluding properties already acquired by Roads and Maritime no houses would be subject to acquisition.

Details of direct property impacts are discussed in section 6.11 and provided in Table 6-58.

Roads and Maritime will carry out ongoing consultation with all affected landholders.

There are three residential properties (two rural residential and one residential) located within the proposal site, of which two have residences on them, while the third had housing entitlement but no residence on it. Roads and Maritime have already acquired all the three properties upon request from owners due to hardship conditions. One of the rural residential properties was a partial acquisition of the lot and the residence is contained on land not acquired by Roads and Maritime. This owner has already voluntarily relocated interstate and the remainder of the property is for sale. The second rural residential property currently has no residence on it and relocation of the owner is therefore not required. The owner of the residential property has already purchased a new property in Scone following acquisition of the existing residence by Roads and Maritime. Therefore the acquisition of these properties would not have noticeable impacts on these landholdings.

Property impacts – rural small holdings and agricultural use

The proposal would involve direct impacts to 25 individual lots comprising 17.8 hectares used or potentially used for agricultural purposes would be directly impacted by the proposal through partial or total acquisition (refer to Table 6-58 for details of all lots directly impacted). Of the 25 agricultural lots, eight have already been acquired by Roads and Maritime, 14 are privately owned by eight separate private owners and three are owned by Upper Hunter Shire Council (comprising an unformed council road and land identified for future expansion of the golf course following construction of the proposal).

The agricultural lots impacted vary in size from about 60 hectares to less than one hectare. For the 17 lots still to be acquired, two would be subject to total acquisition with the rest being subject to partial acquisition ranging from about two per cent to 58 per cent, with an average of about 28 per cent.
Potential impacts to these properties in addition to the loss of land through acquisition could relate to loss of infrastructure (ie fencing, no buildings or residences would be directly impacted), property severance / fragmentation, ongoing viability issues and temporary access restrictions to and within property during construction. Further consultation with property owners about impacts to their property such as severance, ongoing viability and sterilisation would be carried out to further inform the proposal.

Of the lots not already acquired by Roads and Maritime that are used for agricultural purposes, the proposal would result in severance of nine lots affecting five separate owners. This would result in either fragmentation of the affected lots or broader properties and could also sterilise portions of lots or properties. For those lots subject to severance, and two others subject to partial acquisition, a change in how the impacted portion of the property is managed could be required as a result of the reduced availability or fragmented nature of the property. Roads and Maritime would consult with the affected landowners regarding severance and potential viability impacts, including the need for provision of alternate access where required.

There is limited farming infrastructure within the proposal site with impacts being limited to fences and five groundwater bores. Any infrastructure removed as part of the proposal would be replaced by Roads and Maritime in consultation with the affected owner.

For these smaller rural holdings the extent of economic impacts would vary according to individual circumstances. However given they are predominantly used as lifestyle farms and are subject to water logging / flooding the proposal is expected to have limited/minimal impacts to the ongoing operation or viability of these properties. The majority of lots are subject to partial acquisition and as a result there could be residual land within the affected lots or in some cases on neighbouring lots (within the same land ownership), to permit continued operations with the provision of alternate access where required. During construction, alternative access arrangements would be provided where required to parts of land not required for construction activities.

In relation to the three larger landholdings that are impacted at the northern and southern ends of the proposal:

- A property at the northern end is associated with the Primo Meats (abattoir) operation, however the lots through which the proposal passes are isolated from the main operation by Parsons Gully and acquisition is unlikely to affect the overall viability of the larger landholding. One of the impacted lots is currently leased to the adjacent landowner and used for animal fodder cropping. This lot would be severed and subject to acquisition of about 54% of the total lot area. This would impact on the viability of this lot for the current agricultural purpose and a changed in agricultural use could be required

- Another property at the northern end is about 24 hectares in size and is used predominantly for grazing purposes. This property would be subject to minor strip acquisition of about 0.43 hectares, representing about two per cent of the total lot area

- The St Aubins property is an extensive landholding greater than 2000 hectares and is used primarily for cattle grazing. Two lots within the landholding would be subject to partial acquisition. One lot would be subject to strip acquisition (about 0.2 hectares (four per cent)) and would not affect the viability of the lot or landholding. The second lot would be subject to partial acquisition of about 5.5 hectares (58 per cent) which would impact on the viability of the lot, however it is prone to frequent water logging / inundation, and would not affect the viability of the overall landholding. Changes to the overall property management practices could be required as a result of this partial acquisition.
• The impacts discussed above in relation to property acquisition, severance / fragmentation, access changes and loss of infrastructure would result in varying degrees of impacts to each individual owner. The key impacts would be associated with changes to how the property is managed, whether or not the existing use continues to be viable and resulting economic impacts. Roads and Maritime would consult with all affected owners and the acquisition process would take these potential impacts into account in accordance with the Land Acquisition Information Guide (Roads and Maritime, 2013) and the Land Acquisition (Just Terms Compensation) Act 1991.

Refer to section 6.10 for further discussion of potential agricultural impacts.

*Property impacts - sporting and recreational areas*

**Scone Golf Course**

The proposal would be located to the west of the town of Scone, passing through the north eastern section of the golf course. The proposal would result in acquisition of about 3.9 hectares of the existing golf course, resulting in the loss of three golf holes.

To manage the impacts to the golf course, Roads and Maritime have engaged with Upper Hunter Shire Council and the Scone Golf Club to reconfigure the golf course on adjacent land which is owned by the council. Roads and Maritime and the Upper Hunter Shire Council have worked with the golf club to prepare a brief for the concept design of the reconfigured golf course. Council awarded a contract for the re-design of the golf course in October 2015. It is Council’s intention to design and construct the nine hole layout and additional holes prior to commencement of proposal construction.

The proposal would pass between the club house and the golf course and includes an underpass as part of the overbridge at this location (that extends from the southern side of Parsons Gully through to the northern side of Liverpool Street) to provide access for golfers and maintenance staff (including maintenance equipment). During construction access between the club house and the golf course may be closed, temporarily or for the duration of construction at this location, or restricted for safety reasons. Where the existing access is closed alternate access is available via Kingdon Street and through the Bill Rose Sports Complex access road.

**Bill Rose Sports Complex**

The proposal would be constructed through the eastern edge of the Bill Rose Sports Complex impacting on the existing netball courts, a playing field and adjacent park (including play equipment). At this location the proposal includes an overbridge that extends from the southern side of Parsons Gully through to the northern side of Liverpool Street. About 0.58 hectares (two per cent) of the complex (and adjacent park) would be subject to acquisition.

For safety reasons some of the netball courts would be closed for the duration of the construction of the overbridge, which is anticipated to be about 12 months. This is likely to impact on competition and training usage of the courts and as a result temporary courts are likely to be provided for this period.

The playing field and park (including play equipment) would be permanently impacted by the proposal through acquisition and likely temporary restrictions on use of the residual land during construction for safety reasons. The proposal passes directly through (as an overbridge) the park and playing field. As a result the park would be closed during construction. Use of the playing field would be highly constrained as the proposal passes through the centre of the playing area and current activities are unlikely to be able to be continued during construction. The provision of an alternative area for both facilities within the sports complex would be considered in consultation with council during construction.
Access to the sports complex is along Kingdon Street, this would pass beneath the proposed overbridge. This access is also used by pedestrians including students from Scone Grammar School. For public safety reasons access along this route may be restricted or temporarily closed at time during construction and alternate arrangements put in place as required.

Dog park

Near its northern extent the proposed overbridge (from the southern side of Parsons Gully through to the northern side of Liverpool Street) would be constructed over the existing dog park located on the southern side of Liverpool Street. The proposal would require acquisition of about 0.4 hectares (about 60 per cent) of the dog park and this area would be unavailable for use during construction. The residual area may also be closed during construction for safety reasons. The provision of an alternative area would be considered in consultation with council during construction.

Property impacts –neighbouring residential properties

Construction of the proposal may lead to access issues for some properties in the vicinity of the proposal. There is also potential for minor amenity impacts on the local community due to the following:

- Potential increase in construction traffic due to the delivery of plant, materials and construction personnel and disruptions to access
- Increases in noise due to the operation of plant and equipment and increased traffic.
- Visual impacts due to construction work
- Potential dust disturbance due to exposed soils or removal of existing infrastructure.

These potential impacts and safeguards issues have been addressed in other sections of this REF, as follows:

- Traffic and access (refer to section 6.1)
- Noise and vibration (refer to section 6.5)
- Visual impacts (refer to section 6.6)
- Air quality (refer to section 6.9)
- Agricultural impacts (refer to section 6.10)
- Land use and property (refer to section 6.11).

Amenity impacts would be temporary and appropriately managed with the relevant safeguards provided in the above referenced sections.

Demographic impacts

Due to the temporary nature of construction work and likely small proportion of non-resident workforce required for the proposal, it is expected the proposal would result in a negligible, temporary increase in the non-resident population of Scone during the construction period.

The proposal is not expected to result in any noticeable demographic impacts associated with property acquisition as discussed above. The proposal is also not expected to create any land use changes which may result in opening up of land for residential or other development.

Employment and local business impacts

Construction of the proposal is expected to take about two years, and during this period the workforce would be expected to fluctuate between about 25 and 30 personnel at any given time. The demand for construction workers is likely to generate local employment opportunities. In addition to the employment, construction activities would generate demand for goods and services, creating business opportunities for local business and generating additional jobs within these businesses.
Impacts on other regional industries
Consultation with the Upper Hunter Shire Council, Australian Stock Horse Society and Hunter Thoroughbred Breeders Association suggested that the construction of the proposal is not expected to impact the equine industry in the region. Findings from the agricultural impact assessment (section 6.10) confirm that the impact from the construction and operation of the proposal on the regional agricultural industry are likely to negligible.

Impacts on emergency services
Consultation with emergency service providers in Scone indicated that it is unlikely that the construction of the proposal would generate demand for emergency services that would constrain their ability to service the local community. During construction it is likely that due to temporary road closures or diversions emergency vehicle access may be altered but would be provided at all times.

Impacts on community values
Pedestrian and traffic safety
For safety reasons there would be temporary changes to traffic and pedestrian access within the vicinity of construction activities. This could include temporary closures, construction vehicle movements and reduced speed limits (typically 40 kilometres per hour). Vehicular, pedestrian and cyclist access would be maintained during construction with alternative access provided where required. For safety and convenience of local traffic, heavy vehicle traffic would be restricted as much as possible, to the regional road network to minimise impacts on local roads.

Community cohesion - barriers to movement and access
Construction activities may cause road/lane closures, diversions or a reduction in speed limits on local roads near the proposal site. This could cause inconvenience by limiting access or causing delays especially for the residents in the area and for people accessing the Scone Grammar School and the Bill Rose Sports Complex. Due to the linear nature of construction such impacts would be temporary and access would be restored/resumed post construction. However emergency and public access would be maintained at all times to the residences, school and sports complex.

Community cohesion - sense of community and participation
A sense of belonging to a place, including a person’s connection to their community, property or home, are indicators of community cohesion. It is possible that property owners who are impacted by property acquisition may have owned and/or resided at these properties for a considerable period of time, forming attachments with their land and the activities they may be pursuing on those properties. Potential acquisition of properties can lead to a feeling of loss.

As discussed above of the properties subject to acquisition only one owner has relocated as a result of the proposal. This owner has already purchased another property within Scone. The rest of the privately owned properties subject to acquisition are either small rural landholdings that do not contain residences. The proposal is expected to have limited/minimal impacts to the ongoing operation or viability of these properties. Therefore the proposal is unlikely to generate such feeling of loss or isolation among the property owners or is unlikely to disrupt community networks that they would be part of.

Access would be maintained at all times to residences, Bill Rose Sports Complex, School Grammar School, to and within the Scone Golf Course and with alternate arrangements in place for netball courts, playing fields, parks, dog park, people’s participation in activities at these locations is unlikely to be impacted. Due to the linear nature of construction such impacts would be temporary and access will be restored/resumed post construction.
Other impacts

Construction activities have the potential to result in temporary disruptions to services (power, water, gas and telecommunications) for neighbouring properties during the relocation of utility services. These impacts are considered to be minimal as the disruptions would be short-term in nature and affected residents would be notified of the disruptions by letter in accordance with Roads and Maritime utility relocation requirements.

Operation

Property impacts – rural small holdings and agricultural use

During operation the existing travelling stock route located at the northern end of the proposal would be partially relocated and a permanent underpass provided beneath the proposal to enable continued stock movements.

During operation of the proposal ongoing viability, profitability, productivity and sustainability impacts on the properties may be experienced as a result of land acquisition as discussed above. These impacts could arise as a result of property severance / fragmentation, reduced availability of land and loss of infrastructure such as fencing or groundwater bores. A change in agricultural use of these affected lots and broader properties could be required. Further consultation with property owners about impacts to their property such as severance, ongoing viability and sterilisation would be carried out to further inform the proposal.

However, it is expected that given the general low intensity of agricultural usage (ie hobby farms) of the affected lots original activities on the majority of properties could be resumed and sustained on residual land not subject to acquisition. For those lots located beneath the overbridge generally between Kingdon and Liverpool streets, subject to detailed design and final placement of the overbridge piers, normal activities beneath the overbridge may be able to resume following construction.

The partial acquisition from the two larger landholdings at the northern end of the proposal, including Primo Meats, is considered unlikely to impact on the viability of these operations. The land currently leased by Primo Meats to the adjacent landholder is currently used for animal fodder cropping. Following construction of the proposal this use in not likely to be viable. The proposal is unlikely to impact on the viability of the overall St Aubins property however over half of one of the impacted lots would be subject to acquisition and would impact on management of the affected lot. Changes to the overall property management practices could be required as a result of this partial acquisition.

All impacted infrastructure, such as fencing and groundwater bores (or other water sources) would be replaced by Roads and Maritime in consultation with the affected owners. Property access would be available during operation of the proposal.

As discussed above for construction the impacts during operation would vary depending on individual owner circumstances. The key impacts would be associated with changes to how the property is managed, whether or not the existing use continues to be viable and resulting economic impacts. Roads and Maritime would consult with all affected owners and the acquisition process would take these potential impacts into account in accordance with the Land Acquisition Information Guide (Roads and Maritime, 2013) and the Land Acquisition (Just Terms Compensation) Act 1991.

Additional operational impacts could be associated with potential for a loss of amenity. These impacts and mitigation measures are discussed in the following sections: noise and vibration (section 6.5) and air quality (section 6.9).

Impacts on agricultural properties are further discussed in section 6.10.
Property impacts - sporting and recreational areas

The following sporting and recreational facilities would be likely to experience property impacts as a result of the operation of the proposal:

- **Scone Golf Course** – the land under the proposal footprint would be permanently lost through acquisition. However due to the reconfiguration of the golf course no impacts on the use of the land would be expected. The proposal would pass between the club house and the reconfigured golf course. However no access or connectivity impacts between the two would be expected during operation because as part of proposal design, an underpass would be provided beneath overbridge, which would provide access to and from the golf course for golfers and maintenance staff and equipment.

- **Bill Rose Sports Complex** - during operation of the proposal normal activities on the existing netball courts would be able to resume as they are located clear of the overbridge at this location. The existing location of the playing field and park is located beneath the proposed overbridge and it is likely that use of these areas for existing activities during operation could not be resumed. The provision of an alternative area within the sports complex for both facilities would be considered in consultation with council during operation. Access to the sports complex via Kingdon Street will be restored during operation.

- **Dog park** – while the dog park would be subject to partial acquisition (about 0.4 hectares or 60 per cent), subject to detailed design and final placement of the overbridge piers, normal activities may be able to resume beneath the overbridge following construction. The residual land not affected by acquisition would be available for resumption of normal activities during operation.

- **White Park** - in addition following construction of the proposal there would be some residual land within the existing golf course (to the north and south of the proposal) that would not be required as part of operation of the proposal. This land may be available for potential expansion of White Park for equine activities with access available beneath the proposal at the Figtree Creek culvert.

Property impacts –neighbouring residential properties

During operation neighbouring residential properties would be subject to amenity impacts from road traffic noise, changed traffic patterns, altered access arrangements and visual impacts. These potential impacts and safeguards issues have been addressed in other sections of this REF, as follows:

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

Demographic impacts

There are no expected demographic impacts associated with operation of the proposal.

Employment and local business impacts

The New England Highway currently passes through the Scone town centre at Kelly Street. As discussed in section 6.1 operation of the proposal would result in reduced number of light and heavy vehicles passing through the town of Scone, however this is not expected to have adverse economic impacts on the local businesses. Stakeholder consultation suggested that the proposal would continue to provide opportunities for passing traffic to access the service stations and local businesses along Kelly Street.
The reduction in heavy vehicles passing through town would offer increased pedestrian and vehicle (parking) safety and better amenity along Kelly Street. This in turn may allow local businesses along Kelly Street the opportunity to improve their street frontage and expand their business by allowing businesses such as cafes to offer outdoor seating which is currently hindered due to noise and emissions from passing heavy vehicles on Kelly Street. This could further attract passing traffic from light vehicles. With a safer and more attractive street, customers may be more likely to spend more time walking along Kelly Street, and potentially visiting local businesses.

The proposal is located relatively close to Scone and provides opportunities for passing travellers to enter Scone via the connections with the existing highway at the southern and northern ends and at St Aubins Street. Passing motorists would be able to see the town from the highway, which would provide an opportunity for them to enter town and make use of the accommodation and business facilities.

The businesses in Scone are only partially dependent on highway related trade and have a local market. Scone has a diverse economy with employment and business opportunities in a range of industry sectors which would continue to draw visitors to town who would create ongoing demand for goods and services provided by businesses in Scone including those along Kelly Street.

It is therefore anticipated that there would be a minor drop in passing trade for a small number of businesses along Kelly Street in the short term, however this would not impact on the sustainability of any businesses. In the long term, it is anticipated that there would be no impacts of the proposal operation on the local businesses, due to the improved street scape opportunities and other forward planning opportunities and initiatives undertaken by the council, Chamber of Commerce and the local businesses.

Impacts on other regional industries

Consultation with the Upper Hunter Shire Council, Australian Stock Horse Society and Hunter Thoroughbred Breeders Association suggested that operation of the proposal is not expected to impact the equine industry in the region. This consultation identified the potential expansion of White Park equestrian centre would be a benefit for the community and the horse industry in Scone. This may also provide an indirect opportunity for the Upper Hunter Shire Council to improve or upgrade the park to attract more horse-related activities and events to Scone in the future.

Impacts on emergency services

The proposal would provide an overbridge at the Great Northern Railway to the south of Scone. During operation this overbridge would provide an alternate and fast route for emergency vehicles to cross the railway line to access the western parts of the town, removing the need to queue up at the current level crossing at Kelly Street or Liverpool Street. This would provide the opportunity to improve response time for emergency vehicles when they need to access the western side of the Great Northern Railway.

Impacts on community values

Pedestrian and traffic safety

The New England Highway currently passes through the Scone town centre at Kelly Street. As discussed in section 6.1 operation of the proposal would result in reduced number of light and heavy vehicles passing through the town of Scone. This would improve driver and pedestrian safety along Kelly Street.

There are no anticipated impacts on existing pedestrian and cyclist facilities as a result of the proposal. The existing shared path along the southern side of Liverpool Street would be modified to suit the proposal. Cyclists would be able to use the road shoulders on the proposal. Due to the expected reduction in traffic volumes on Kelly Street and Liverpool Street, pedestrians crossing and cycling on these streets are likely to be safer.
There would be an increase in traffic using St Aubins Street and Aberdeen Street to enter and exit the proposal, potentially resulting in amenity impacts (increased noise and air emissions) and safety concerns for local residents while merging into the streets from their driveways, which are otherwise currently quiet streets.

During operation of the proposal access to a number of properties would be changed however the proposal provides for appropriate safe access to all properties.

**Community cohesion - barriers to movement and access**

The proposal would positively impact on community cohesion as it would offer improved connectivity across both sides of the Great Northern Railway, removing the physical barrier that divides the community, especially when the level crossings are closed for prolonged periods.

**Community cohesion - sense of community and participation**

The improved pedestrian/traffic safety and amenity (as a result of reduced air emissions and noise) along Kelly Street would provide opportunity to improve the overall streetscape of Kelly Street. This would not only provide locals with the opportunity to enhance Kelly Street as a social space, but also attract people from nearby towns and passing trade, which would positively influence the community’s sense of pride/belonging and sense of community.

### 6.12.3 Safeguards and management measures

Mitigation measures provided in Table 6-60 would be implemented to minimise potential socio-economic impacts.

#### Table 6-60 Summary of potential impacts and environmental safeguards – socio-economic

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community impacts</td>
<td>Roads and Maritime will carry out regular and ongoing engagement with the community in accordance with a project stakeholder consultation plan. The plan will include information on who will be consulted, the means of consultation and a complaints management procedure.</td>
<td>Roads and Maritime</td>
<td>Detailed design Pre-construction</td>
</tr>
<tr>
<td>Impacts on properties within the proposal site</td>
<td>Roads and Maritime will carry out regular and ongoing engagement with the property owners affected by property acquisition.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td></td>
<td>Property acquisition will be carried out in accordance with the <em>Land Acquisition Information Guide</em> (Roads and Maritime, 2013) and the <em>Land Acquisition (Just Terms Compensation) Act 1991</em>.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td>Impacts on neighbouring properties</td>
<td>Roads and Maritime will notify the community of the changes to road conditions at St Aubins street and other local streets.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td></td>
<td>Roads and Maritime will carry out regular and ongoing engagement with the residents in St Aubins Street and Aberdeen Street where traffic is predicted to increase.</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>
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<tr>
<td>Impacts on sporting and recreational areas – Scone Golf Course</td>
<td>Roads and Maritime will carry out regular and ongoing engagement with Upper Hunter Shire Council and Scone Golf Club to address potential impacts associated with acquisition of part of the golf course.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
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<tr>
<td></td>
<td>Consultation will be carried out with Upper Hunter Shire Council and Scone Golf Club to address potential construction impacts including provision of safe access from the clubhouse to the golf course.</td>
<td>Construction contractor</td>
<td>Pre-construction</td>
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<td></td>
<td>Construction</td>
</tr>
<tr>
<td>Impacts on sporting and recreational areas– Bill Rose Sports Complex</td>
<td>Roads and Maritime will carry out regular and ongoing engagement with Upper Hunter Shire Council and Scone Grammar School to address potential construction impacts including provision of safe access to and from the sports complex.</td>
<td>Construction contractor</td>
<td>Pre-construction</td>
</tr>
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<td></td>
<td></td>
<td>Construction</td>
</tr>
<tr>
<td>Impacts on sporting and recreational areas– Bill Rose Sports Complex</td>
<td>Roads and Maritime will continue to liaise with Upper Hunter Shire Council regarding the closure and temporary provision of alternate netball courts. The location and details would be identified in detailed design in consultation with council and the netball association/club.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
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<tr>
<td>Impacts on sporting and recreational areas– Bill Rose Sports Complex</td>
<td>Roads and Maritime will continue to liaise with Upper Hunter Shire Council regarding the provision of an alternative area within the sports complex for the impacted playing field and park. The location and details would be identified in detailed design in consultation with Council.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
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</tr>
<tr>
<td>Impacts on sporting and recreational areas– dog park</td>
<td>Roads and Maritime will continue to liaise with Upper Hunter Shire Council for consideration of an alternate area for the dog park during construction and resumption of usual activities during operation.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
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<tr>
<td>Travelling stock route impacts</td>
<td>Continued access across the proposal site will be provided in consultation with Local Land Services, this could include early construction of the underpass and/or temporary cessation of works in the vicinity when stock movements are required.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
</tbody>
</table>
Impact | Environmental safeguards | Responsibility | Timing
--- | --- | --- | ---
Construction impacts on the community | Roads and Maritime will carry out regular and ongoing engagement with the community will be carried out in accordance with a project stakeholder consultation plan. The plan will include information on who will be consulted, the means of consultation and a complaints management procedure. Local residents, potentially affected businesses, schools and road users (including emergency service providers) would be notified before work starts and would be kept regularly informed of construction activities, timing and progress during the construction process. | Roads and Maritime | Pre-construction Construction

Potential impacts on highway dependent business in Scone | Roads and Maritime will continue to engage with the Upper Hunter Shire Council and the Scone Chamber of Commerce to manage potential impacts associated with bypassing traffic and the potential benefits of reduced traffic within the town centre. | Roads and Maritime | Detailed design Pre-construction Construction Post-construction

Safety concerns at schools | Roads and Maritime will carry out regular and ongoing engagement with Upper Hunter Shire Council, Scone Grammar School and Scone Public School to address safety concerns regarding operational and construction traffic. | Roads and Maritime | Detailed design Pre-construction

6.13 Resource use and waste management

6.13.1 Policy setting

Roads and Maritime is committed to ensuring responsible management of unavoidable waste and to promoting the reuse of such waste through appropriate measures in accordance with the resource management hierarchy principles embodied in the *Waste Avoidance and Resource Recovery Act 2001*. The resource management hierarchy principles in order of priority as outlined in the *Waste Avoidance and Resource Recovery Act 2001* are:

- Avoidance of unnecessary resource consumption
- Resource recovery (including reuse, reprocessing, recycling and energy recovery)
- Disposal
- By adopting the above principles, Roads and Maritime encourages the most efficient use of resources and reduces cost and environmental harm in accordance with the principles of ecologically sustainable development.
6.13.2 Potential impacts

Construction

Resource use

Construction of the proposal would require the use of a number of resources, including:

- Resources associated with the operation of construction machinery and motor vehicles (this includes the use of diesel and petrol)
- Material required for bridges and road pavements including road base, asphalt, spray seal, sand, concrete and aggregate
- Fill required to meet design levels
- Materials required for road signage, street lighting and traffic lights
- Construction water (for concrete mixing and dust suppression).

The initial estimated quantities of these materials that would be required for the proposal are provided in section 3.3.7. The materials required for construction of the proposal are not currently limited in availability. However, materials such as metal and fuel are non-renewable and would be used conservatively. Excess spoil, not suitable for reuse, would be disposed of in accordance with safeguards and mitigation measures outlined in section 6.13.3.

The management measures outlined in section 6.13.3 to reuse waste on-site would assist in minimising the amount of resources required for construction.

Waste generation

The proposal has the potential to generate waste from the following activities:

- Vegetation (native, exotic and noxious) to be removed as part of the proposal
- Earthworks
- Utility adjustments
- Removal of the existing pavement
- Demolition of structures.

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

- Excess spoil unsuitable for reuse
- Green waste as a result of vegetation clearing. Noxious weed material would be separated from native green waste
- Roadside materials (fencing, guide posts, guard rails etc)
- Packaging and general waste from staff (lunch packaging, portable toilets etc)
- Chemicals and oils
- Waste water from wash-down and bunded areas
- Redundant erosion and sediment controls
- Asphalt waste from the removal of the existing pavement
- Potential asbestos and other hazardous waste from demolition of structures and existing utilities.

The potential to reuse materials would be investigated during detailed design. Unsuitable fill material that cannot be used on-site would be classified in accordance with the Waste Classification Guidelines (DECCW, 2009) and disposed of at an approved materials recycling or waste disposal facility.

Operation

The proposal would not result in a noticeable increase in waste generation during operation.

6.13.3 Safeguards and management measures

Mitigation measures provided in Table 6-61 would be implemented to minimise resource use and provide for appropriate management of waste.
<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demand on resources</td>
<td>Procurement will endeavour to use materials and products with a recycled content where that material or product is cost and performance effective.</td>
<td>Construction contractor</td>
<td>Pre-construction and construction</td>
</tr>
</tbody>
</table>
| Waste management               | A waste management sub-plan will be prepared and included in the construction environmental management plan (CEMP) in accordance with Roads and Maritime Specification G36 Environmental Protection. The plan is to be guided by the following publications:  
  • EPA Waste Classification Guidelines  
  • NSW Government Waste Reduction and Purchasing Policy (WRAPP)  
  • Roads and Maritime waste fact sheets for Virgin Excavated Natural Material (VENM), Excavated Natural Material (ENM), Excavated Public Road Materials, Recovered Aggregates, Asbestos Waste and Waste Sampling. | Construction contractor | Pre-construction |
| Demand on resources            | Excavated material will be reused on-site for fill where feasible to reduce demand on resources. | Construction contractor | Construction |
| Demand on resources            | Any additional fill material required will be sourced from appropriate sources and/or other Roads and Maritime projects. | Construction contractor and Roads and Maritime | Construction |
| Waste minimisation             | The following resource management hierarchy principles will be followed:  
  • Avoid unnecessary resource consumption as a priority  
  • Avoidance will be followed by resource recovery (including reuse of materials, reprocessing, and recycling and energy recovery)  
  • Disposal will be a last resort (in accordance with the Waste Avoidance and Resource Recovery Act 2001). | Construction contractor | Construction |
| Management of green waste      | Cleared weed-free vegetation will be chipped and reused on-site as part of the proposed landscaping and to stabilise disturbed soils where possible. | Construction contractor | Construction |
### Impact | Environmental safeguards | Responsibility | Timing
--- | --- | --- | ---
Spoil management | Excess soil requiring waste disposal would first be assessed against the *Waste Classification Guidelines* (DECCW, 2009a). Waste would be disposed of appropriately with supporting waste classification documentation. | Construction contractor | Construction
Waste management | Garbage receptacles will be provided and recycling of materials encouraged. Rubbish will be transported to an appropriate waste disposal facility. | Construction contractor | Construction
Waste management | All wastes will be managed in accordance with the POEO Act. | Construction contractor | Construction
Waste management | Portable toilets will be provided for construction workers and will be managed to ensure the appropriate disposal of sewage. | Construction contractor | Construction
Waste management | Noxious weeds removed during work will be managed in accordance with the Department of Primary Industries’ requirements that relate to its classification status. | Construction contractor | Construction
Waste management | Site inductions will occur and be recorded as specified in the CEMP to ensure staff are aware of waste disposal protocols. | Construction contractor | Construction
Waste management | A facility for collecting, treating and disposing of wastes generated in the construction of the proposal will be installed on site. | Construction contractor | Construction
Waste management | All working areas will be maintained, kept free of rubbish and cleaned up at the end of each working day. | Construction contractor | Construction
Wastewater contamination of soils and water | A dedicated concrete washout facility will be provided during construction so that run-off from the washing of concrete machinery and equipment can be collected and disposed of at an appropriate waste facility. | Construction contractor | Construction

### 6.14 Hazards and risks

#### 6.14.1 Existing environment

Existing hazards and risks in the vicinity of the proposal site are generally associated with operation of the existing road network.

#### 6.14.2 Potential impacts

**Construction**

Hazards and risks associated with construction include:

- Spills or leakage of contaminants such as fuels, chemicals and hazardous substances entering surface and groundwater or contaminating soils
• Discharge of turbid run-off, resulting in pollution of waterways
• Encountering utilities or contaminated material during earthwork including asbestos.
• Spread of noxious weed material
• Flooding of the area during extreme rain events
• Changed traffic conditions leading to incidents.

These potential impacts and safeguards issues have been addressed in other sections of this REF, as follows:
• Geology and soils (refer section 6.3)
• Hydrology, water quality and flooding (refer section 6.4)
• Land use and property (refer section 6.11)
• Biodiversity (refer section 6.2)
• Resource use and waste management (refer section 6.13).

Construction risks would be temporary and managed with the relevant safeguards provided in the above referenced sections. Hazards and risks to the local area would be localised and limited to areas immediately adjacent to the proposal.

Operation

Operational hazards and risks relating to the proposal could include:
• Fuel and oil spills during maintenance activities polluting the natural environment
• Vehicle incidents
• Vehicle crashes are an inherent aspect of the operation of any road. During design of the proposal, Roads and Maritime has applied the requirements of all relevant standards as listed in section 3.2.1.

6.14.3 Safeguards and management measures

Mitigation measures provided in Table 6-62 would be implemented to ensure potential hazards and risks are minimised.

Table 6-62 Summary of potential impacts and environmental safeguards – hazards and risks

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Management</td>
<td>Emergency response plans will be incorporated into the construction environmental management plan.</td>
<td>Construction contractor</td>
<td>Pre-construction and construction</td>
</tr>
<tr>
<td>Risk Management</td>
<td>An incident response plan will be developed and implemented as required as part of the construction environmental management plan to manage any identified risks on site.</td>
<td>Construction contractor</td>
<td>Pre-construction and construction</td>
</tr>
</tbody>
</table>

6.15 Greenhouse gas and climate change

6.15.1 Policy setting

The Commonwealth Department of the Environment estimates annual greenhouse gas emissions for Australia to fulfil the reporting requirements of the United Nations Framework Convention on Climate Change and the Kyoto Protocol. The latest breakdown of Australia’s greenhouse gas emissions by state and territory was published on the Commonwealth Department of the Environment website for 2013.
Australia’s and NSW’s total greenhouse gas for 2013 were estimated as 548.6 million tonnes of carbon dioxide equivalent (Mt CO2-e) and 141.8 Mt CO2-e respectively. The major emission sources for NSW were fuel combustion for stationary energy purposes and fuel combustion for transport purposes. In 2012, global greenhouse gas emissions for Annex 1 Parties to the United Nations Framework Convention on Climate Change were 15 gigatons of carbon dioxide equivalent (Gt CO2-e).

The Australian Government has agreed to reduce emissions in Australia by 26-28 per cent below 2005 levels by 2030. The target has been set as negotiations continue for a global agreement on the reduction of greenhouse gas emissions.

### 6.15.2 Methodology

Greenhouse gas emissions are separated into Scope 1, 2 and 3 emissions based on the following:

- **Scope 1 emissions** are greenhouse gas emissions created directly by a person or business from sources that are owned or controlled by that person or business.

- **Scope 2 emissions** are greenhouse gas emissions created as a result of the generation of electricity, heating, cooling or steam that is purchased and consumed by a person or business. These are indirect emissions as they arise from sources that are not owned or controlled by the person or business who consumes the electricity.

- **Scope 3 emissions** are greenhouse gas emissions that are generated in the wider economy as a consequence of a person’s or business’s activities. These are indirect emissions as they arise from sources that are not owned or controlled by that person or business but they exclude Scope 2.

Scope 1 emissions are produced by the combustion of fuels such as diesel at the development site, and by vehicles and equipment which the proponent owns and has operational control over. Note that only the direct combustion of the fuels is considered as Scope 1 emissions. Scope 2 emissions arise from the consumption of electricity from the grid at the development site, in plant and equipment that is owned and operated by the proponent.

Emissions arising from the extraction, processing and transportation and distribution of fuels and electricity are classified as Scope 3, since these activities are not within the operational control of the end user. All other emissions associated with a development are defined as Scope 3, since they are produced outside the development site, and the proponent does not have operational control of the facilities from which they originate.

The following emissions sources are relevant to the proposal:

- Fuel consumed during construction of the proposal
- Electricity consumption during construction
- Vegetation removal.

Scope 1 and Scope 2 greenhouse gas emissions from the construction of the proposal were estimated using the VicRoads Greenhouse Gas Assessment Calculator for Road Projects Version 0.1.111215 (Carbon Gauge). Scope 3 emissions associated with fuel combustion, electricity consumption and construction materials were also assessed. Emissions associated with operation were excluded from the assessment as there is minimal street lighting and no traffic lights proposed. Changes in vehicle emissions due to the proposal are likely to be negligible and were not assessed. Emissions associated with maintenance over a 50 year period were included.

The assessment was based on the variables listed in Table 6-63.

### Table 6-63  Greenhouse gas and energy use assessment variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value (indicative)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration of proposal</td>
<td>24 months</td>
</tr>
</tbody>
</table>
Variable | Value (indicative)
---|---
Earthworks | 5200 m³ strip and respread topsoil 41,440 m³ cut to fill 226,570 m³ import and place fill
Pavement area | 60,000 m² of 100 millimetre asphaltic concrete over 400 millimetres of heavy bound pavement over 300 millimetres select gravel pavement
Reinforced concrete bridges | 640 metres long by 13 metres wide
Culverts | 200 metres of reinforced concrete pipe culverts 1.2 kilometres of reinforced concrete box culverts
Road safety barriers | 4.5 kilometres of steel barriers
Noise walls | 1.5 kilometres of concrete noise walls
Maintenance | 60,000 m² of pavement

### 6.15.3 Potential impacts

#### Construction

Scope 1, 2 and 3 emissions for the construction of the proposal are summarised in Table 6-64. Total construction emissions were estimated as 17,641 tonnes CO₂-e, or about 8,800 tonnes CO₂-e per annum.

All electricity generation for the proposal was assumed to be from diesel generators. Hence there are no Scope 2 emissions from electricity imported from the grid.

<table>
<thead>
<tr>
<th>Emission source</th>
<th>Scope 1 emissions (tonnes CO₂-e)</th>
<th>Scope 2 emissions (tonnes CO₂-e)</th>
<th>Scope 3 emissions (tonnes CO₂-e)</th>
<th>Total emissions (tonnes CO₂-e)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site offices</td>
<td>419</td>
<td>0</td>
<td>32</td>
<td>450</td>
</tr>
<tr>
<td>Earthworks</td>
<td>2255</td>
<td>0</td>
<td>172</td>
<td>2427</td>
</tr>
<tr>
<td>Pavement</td>
<td>431</td>
<td>0</td>
<td>2938</td>
<td>3369</td>
</tr>
<tr>
<td>Structures</td>
<td>849</td>
<td>0</td>
<td>9135</td>
<td>9984</td>
</tr>
<tr>
<td>Drainage</td>
<td>348</td>
<td>0</td>
<td>341</td>
<td>689</td>
</tr>
<tr>
<td>Road furniture</td>
<td>168</td>
<td>0</td>
<td>553</td>
<td>721</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>4470</strong></td>
<td><strong>0</strong></td>
<td><strong>13,172</strong></td>
<td><strong>17,641</strong></td>
</tr>
</tbody>
</table>

The proposal emissions are insignificant compared with Australia’s and NSW’s total greenhouse gas emissions (refer section 6.15.1). The proposal emissions per annum would be about 0.006 per cent of NSW’s total greenhouse gas emissions and 0.002 per cent of Australia’s total greenhouse gas emissions in 2013.
Operation

Emissions associated with maintenance were estimated as 2941 tonnes CO2-e per annum. These emissions are insignificant compared with Australia’s and NSW’s total greenhouse gas emissions. There would not be any significant additional greenhouse gas and energy impacts during operation of the proposal.

6.15.4 Safeguards and management measures

Mitigation measures provided in Table 6-65 would be implemented to minimise potential greenhouse gas emissions.

Table 6-65  Summary of potential impacts and environmental safeguards – greenhouse gases

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greenhouse gas emissions</td>
<td>The use of alternative fuels and power sources for construction plant and equipment will be investigated and implemented, where appropriate.</td>
<td>Construction contractor</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>Recycled materials will be incorporated in the design of pavement and structures where possible.</td>
<td>Construction contractor</td>
<td>Pre-construction</td>
<td></td>
</tr>
<tr>
<td>The energy efficiency and related carbon emissions will be considered in the selection of vehicle and plant equipment.</td>
<td>Construction contractor</td>
<td>Pre-construction</td>
<td></td>
</tr>
<tr>
<td>Materials will be delivered as full loads and local suppliers will be used where possible.</td>
<td>Construction contractor</td>
<td>Construction</td>
<td></td>
</tr>
<tr>
<td>Construction equipment, plant and vehicles will be appropriately sized for the task.</td>
<td>Construction contractor</td>
<td>Construction</td>
<td></td>
</tr>
<tr>
<td>Equipment will be serviced frequently to confirm they are operating efficiently.</td>
<td>Construction contractor</td>
<td>Construction</td>
<td></td>
</tr>
<tr>
<td>Vehicles and machinery will not be left idling when not in use.</td>
<td>Construction contractor</td>
<td>Construction</td>
<td></td>
</tr>
</tbody>
</table>

6.16 Cumulative impacts

6.16.1 Existing environment

Cumulative impacts have the potential to arise from the interaction of individual elements within the proposal and the additive effects of other external projects. Roads and Maritime is required under Clause 228 (2) of the EP&A Act, to take into account potential cumulative impacts as a result of the proposal.

This section describes the cumulative impacts and benefits likely to arise from the combination of the construction and operation of the proposal with other projects being carried out in the area. The following known projects within the vicinity of the proposal site may be constructed at the same time as the proposal:

- Scone town centre rail bridge
- Potential residential subdivision on the northern side of Scone to the east of the existing New England Highway
- Proposed expansion of Primo Meats.
6.16.2 Potential impacts

Construction

Potential cumulative impacts may occur as a result of construction of the proposal occurring simultaneously with the construction of other projects. Subject to selection of a preferred option for the Scone town centre rail bridge and the timing of construction it is possible that there could be cumulative impacts. These could relate to:

- Construction noise and vibration impacts
- Construction traffic impacts
- Socio-economic impacts
- Visual impacts
- Air quality impacts
- Hazards and risks.

It is not expected that there would be significant cumulative impacts associated with the proposal and the potential residential subdivision or Primo Meats expansion. Potential short term and local amenity impacts may arise if the construction of these occurs simultaneously with the proposal.

Cumulative impacts are not expected to be significant and would be minimised through the application of individual project specific environmental safeguards and management measures as summarised in sections 6.16.3. Consultation with the relevant stakeholders would be carried out during construction planning to ensure that potential cumulative impacts are minimised. Any additional mitigation measures from the consultation would be included in relevant construction management plans for the proposal.

Operation

The long-term effect of the proposal would have a positive cumulative impact on travel times, road safety and efficiency, facilitating the anticipated increase in traffic volumes as a result of future traffic predictions and population growth. The proposal would result in improved safety for Scone with the removal of the existing rail level crossing and an improved transport corridor for through traffic in the Upper Hunter area. Subject to selection of a preferred option for the Scone town centre rail bridge it is possible that there could be operational cumulative impacts. These could relate to:

- Road traffic noise impacts
- Socio-economic impacts
- Visual impacts
- Air quality impacts
- Hazards and risks.

The combined operation of the proposal and the Scone town centre rail bridge would have a positive cumulative benefit to Scone through elimination of the two level crossings. Cumulative impacts are not expected to be significant and would be minimised through the application of individual project specific environmental safeguards and management measures as summarised in sections 6.16.3.

6.16.3 Safeguards and management measures

Mitigation measures provided in Table 6-66 would be implemented to minimise potential cumulative impacts.
<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cumulative impacts</td>
<td>Ongoing coordination and consultation will be carried out with other proponents to ensure potential cumulative impacts are appropriately assessed and managed.</td>
<td>Roads and Maritime and construction contractor</td>
<td>Detailed design and construction</td>
</tr>
<tr>
<td></td>
<td>When the preferred option for Scone town centre rail bridge is selected Roads and Maritime will complete a cumulative impact assessment to identify appropriate mitigation measures to address any potential cumulative impacts.</td>
<td>Roads and Maritime</td>
<td>Detailed design and construction</td>
</tr>
<tr>
<td></td>
<td>The construction environmental management plan will be revised to consider potential cumulative impacts from surrounding development activities as they become known.</td>
<td>Construction contractor</td>
<td>Pre-construction</td>
</tr>
</tbody>
</table>

### 6.17 Summary of beneficial effects

The beneficial effects of the proposal would include:

- Improved road safety on the New England Highway and Kelly Street
- Removal of the only remaining rail level crossing on the New England Highway
- Provide unimpeded access for emergency services to the western side of the Great Northern Railway
- Improve urban amenity in Scone town centre
- Reduced travel times.
6.18 **Summary of adverse effects**

The key potential adverse effects of the proposal would include:

- Traffic impacts during construction, due to changed traffic conditions and increased heavy vehicle movements on the existing road network
- Amenity impacts to properties adjacent to the proposal site during construction
- Temporary disruptions to access during construction
- Minor vegetation removal
- Changed access arrangements for some properties
- Total acquisition of three lots and partial acquisition of 27 lots
- Increased traffic on St Aubins and Aberdeen streets
- Increased traffic noise levels in the vicinity of the proposal
- Changed flooding patterns in the vicinity of the proposal
- Visual impacts associated with proposal.
7. Environmental management

This section describes how the proposal will be managed to reduce potential environmental impacts throughout detailed design, construction and operation. A framework for managing the potential impacts is provided with reference to environmental management plans and relevant Roads and Maritime Services QA specifications. A summary of site-specific environmental safeguards is provided as detailed in section 6 and the licence and/or approval requirements required prior to construction are also listed.

7.1 Environmental management plans

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

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

The plans will be prepared prior to construction of the proposal and must be reviewed and certified by the Roads and Maritime Environment Manager, Hunter Region, prior to the commencement of any on-site works. The CEMP will be a working document, subject to ongoing change and updated as necessary to respond to specific requirements. The CEMP and PEMP would be developed in accordance with the specifications set out in the QA Specification G36 – Environmental Protection (Management System), QA Specification G38 – Soil and Water Management (Soil and Water Plan) and the 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 works on the surrounding environment. The safeguards and management measures are summarised in Table 7-1.
<table>
<thead>
<tr>
<th>No.</th>
<th>Aspect</th>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
</table>
| 1   | General| General| All environmental safeguards from the REF must be incorporated within the following:  
- Project Environmental Management Plan  
- Detailed design stage  
- Contract specifications for the proposal  
- Contractor’s Environmental Management Plan | Roads and Maritime | Pre-construction |
| 2   | General| General| Any works 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. | Roads and Maritime | Pre-construction and Construction |
| 3   | General| General| The environmental contract specification must be forwarded to the Roads and Maritime Environment Manager Hunter Region for review at least 10 working days prior to the tender stage.  
A contractual hold point must be maintained until the CEMP is reviewed by the Roads and Maritime Environment Manager Hunter Region. | Roads and Maritime | Pre-construction |
<p>| 4   | General| General| The Roads and Maritime Project Manager must notify the Roads and Maritime Environment Manager Hunter Region at least five working days prior to work commencing. | Roads and Maritime | Pre-construction |
| 5   | General| General| All businesses and residences likely to be affected by the proposal must be notified at least five working days prior to the commencement of the proposed activities. | Roads and Maritime | Pre-construction |
| 6   | General| General| Environmental awareness training must be provided, by the contractor, to all field personnel and subcontractors. | Construction contractor | Pre-construction and Construction |</p>
<table>
<thead>
<tr>
<th>No.</th>
<th>Aspect</th>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Traffic and Access</td>
<td>Access to properties</td>
<td>Residents and businesses will be notified of any specific impacts to property access and arrangements required during construction. Roads and Maritime will continue to consult with all properties that will have altered access following construction of the proposal.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td>8</td>
<td>Traffic and Access</td>
<td>Altered traffic patterns</td>
<td>Roads and Maritime will continue to consult with residents likely to be affected by increased traffic on St Aubins and Aberdeen streets to minimise amenity impacts and address safety concerns.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td>9</td>
<td>Construction traffic</td>
<td></td>
<td>A detailed construction traffic management plan will be prepared in accordance with <em>Traffic Control at Work Sites Manual Version 4</em> (RTA, 2010) and Specification G10 - <em>Control of Traffic</em>. The plan will be approved by Roads and Maritime before implementation to provide a comprehensive and objective approach to minimise any potential impacts on road network operations during construction.</td>
<td>Construction contractor</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>10</td>
<td>Traffic</td>
<td></td>
<td>The plan will focus on maintaining general traffic flow and providing appropriate site accesses and construction traffic routes and will include measures such as: • Access routes and signage • Hours of operation, including prohibitions on queuing outside sites prior to commencement of working hours • Restrictions on delivery times and access (arterial roads would be used wherever possible) • Special control arrangements (such as warning signs or lights) at site accesses • Road safety audit requirements • Any localised improvements/adjustments to existing traffic management arrangements • Arrangements for pedestrians and cyclists. The plan will be reviewed if complaints are received.</td>
<td>Construction contractor</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>11</td>
<td>Congestion and safety</td>
<td></td>
<td>Traffic control will be provided in accordance with the approved construction traffic management plan to manage and regulate traffic movements during construction.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>No.</td>
<td>Aspect</td>
<td>Impact</td>
<td>Environmental safeguards</td>
<td>Responsibility</td>
<td>Timing</td>
</tr>
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<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>--------------------------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>12</td>
<td>Access to properties</td>
<td>Property access will be maintained at all times where practicable.</td>
<td></td>
<td>Construction contractor and Roads and Maritime</td>
<td>Construction</td>
</tr>
<tr>
<td>13</td>
<td>Access to properties</td>
<td>Where changes to access arrangements are necessary, Roads and Maritime will advise owners and tenants and consult with them in advance regarding alternate access arrangements.</td>
<td></td>
<td>Construction contractor and Roads and Maritime</td>
<td>Construction</td>
</tr>
<tr>
<td>14</td>
<td>Pedestrian and cyclist access</td>
<td>Pedestrian and cyclists connectivity across the site will be maintained during construction.</td>
<td></td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>15</td>
<td>Biodiversity</td>
<td>Potential impacts to Parsons Gully</td>
<td>Roads and Maritime will carry out further consultation with DPI (Fisheries) during detailed design to confirm any specific requirements for approvals under the FM Act.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td>16</td>
<td>Direct impacts to native vegetation</td>
<td>Where possible, minimise the clearing of mature trees, in particular hollow-bearing and habitat trees.</td>
<td></td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td>17</td>
<td>Potential for artificial lighting impacts on native fauna</td>
<td>Design of all permanent lighting to minimise light spill and the associated secondary impact on nocturnal fauna species potentially utilising the area.</td>
<td></td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td>No.</td>
<td>Aspect</td>
<td>Impact</td>
<td>Environmental safeguards</td>
<td>Responsibility</td>
<td>Timing</td>
</tr>
<tr>
<td>-----</td>
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<td>--------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>----------------</td>
<td>--------------</td>
</tr>
<tr>
<td>18</td>
<td>18</td>
<td>Potential impacts on native flora and fauna</td>
<td>A construction environmental management plan will be developed for the construction phase of the proposal. The construction environmental management plan will be prepared and implemented in accordance with the Roads and Maritime Biodiversity Guidelines (RTA 2011) and include the procedures outlined below.</td>
<td>Construction contractor</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>19</td>
<td>19</td>
<td>Protocols for clearing of vegetation will be developed and implemented in accordance with the Roads and Maritime Biodiversity Guidelines (Guide 4: Clearing of vegetation and removal of bushrock) (RTA 2011).</td>
<td>Construction contractor</td>
<td>Construction</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>20</td>
<td>Potential for spread of exotic or invasive species, or spread of pathogens that may be harmful to native biota</td>
<td>Protocols for preventing or minimising the spread of noxious and environmental weeds will be developed and implemented in accordance with the Roads and Maritime Biodiversity Guidelines (Guide 6: Weed Management) (RTA 2011).</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>21</td>
<td>21</td>
<td>Protocols for preventing the introduction and/or spread of disease causing agents such as bacteria and fungi will be developed and implemented in accordance with the Roads and Maritime Biodiversity Guidelines (Guide 7: Pathogen Management) (RTA 2011).</td>
<td>Construction contractor</td>
<td>Construction</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>22</td>
<td>Potential for erosion and sediment removal into wetlands and creeks</td>
<td>Protocols for minimising impacts on aquatic habitat will be developed and implemented in accordance with Roads and Maritime Biodiversity Guidelines (Guide 10: Aquatic habitats and riparian zones) (RTA 2011). This will also include relevant measures from the Office of Water Guidelines for Riparian Corridors on Waterfront Lands and Guidelines for Vegetation Management Plans.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>No.</td>
<td>Aspect</td>
<td>Impact</td>
<td>Environmental safeguards</td>
<td>Responsibility</td>
<td>Timing</td>
</tr>
<tr>
<td>-----</td>
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<td>---------------------------</td>
<td>---------------</td>
<td>--------</td>
</tr>
<tr>
<td>23</td>
<td></td>
<td></td>
<td>Temporary stockpiles to be restricted to the construction area and identified construction compounds, in areas of cleared land and exotic grassland and managed to ensure no offsite impacts of dust generation or sedimentation.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>24</td>
<td></td>
<td></td>
<td>Remove from site any excavated material not required for backfilling as soon as practical.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>25</td>
<td></td>
<td>Potential for direct impacts on native fauna species</td>
<td>A pre-clearance procedure will be developed and implemented in accordance with the Roads and Maritime <em>Biodiversity Guidelines (Guide 1: Pre-clearing process)</em> (RTA 2011) and include (but not limited to) inspection of hollow trees prior to removal.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>26</td>
<td></td>
<td>Fauna handling will be conducted in accordance with the Roads and Maritime <em>Biodiversity Guidelines (Guide 9: Fauna handling)</em> (RTA 2011).</td>
<td>Construction contractor</td>
<td>Construction</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td></td>
<td>Any unexpected threatened species finds will be dealt with in accordance with the Roads and Maritime <em>Biodiversity Guidelines</em> (RTA, 2011).</td>
<td>Construction contractor</td>
<td>Construction</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td></td>
<td>Exclusion zones are to be identified and demarcated in accordance with the Roads and Maritime <em>Biodiversity Guidelines (Guide 2: Exclusion zones)</em> (RTA 2011).</td>
<td>Construction contractor</td>
<td>Construction</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td></td>
<td>Direct impacts to native vegetation</td>
<td>Protocols for the re-establishment of native vegetation is to be developed in accordance with the Roads and Maritime <em>Biodiversity Guidelines (Guide 3: Re-establishment of native vegetation)</em> (RTA 2011).</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
</tbody>
</table>

New England Highway bypass at Scone
Review of environmental factors
<table>
<thead>
<tr>
<th>No.</th>
<th>Aspect</th>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>Environmental safeguards</td>
<td>Potential for artificial lighting impacts on native fauna</td>
<td>Using down-lights and motion sensor lighting during construction in order to reduce light spill and the associated secondary impact on nocturnal fauna species potentially utilising the area.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
</tbody>
</table>
| 31  | Geology and Soils | Erosion and sedimentation | A soil and water management plan will be prepared as part of the construction environmental management plan in accordance with the requirements of Roads and Maritime contract specification G38 prior to the commencement of construction. The soil and water management plan will address the following:  
- Roads and Maritime Code of Practice for Water Management, the Roads and Maritime Erosion and Sedimentation Procedure  
| 32  | Contamination of soil | | The construction environmental management plan will include a contaminated land management plan prepared in accordance with the Contaminated Land Management Act 1997, Roads and Maritime Contaminated Land Management Guideline, Roads and Maritime Environmental Incident Classification and Reporting Procedure, and EPA guidelines on contaminated land management. The contaminated land management plan would provide for dealing with:  
- Areas of potential contamination  
- Unexpected contamination finds  
- Any land contamination caused during construction. | Construction contractor | Pre-construction |
<p>| 33  | Erosion and sedimentation | | Erosion and sediment controls will be implemented before any construction starts and inspected regularly, particularly after a rainfall event. Maintenance work will be carried out as needed. | Construction contractor | Construction |</p>
<table>
<thead>
<tr>
<th>No.</th>
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<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
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<tbody>
<tr>
<td>34</td>
<td></td>
<td></td>
<td>Site stabilisation of disturbed areas will be carried out progressively as stages are completed.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>35</td>
<td></td>
<td></td>
<td>All stockpiles will be designed, established, operated and decommissioned in accordance with Roads and Maritime <em>Stockpile Management Guideline</em> (RTA, 2011).</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>36</td>
<td></td>
<td></td>
<td>Controls will be implemented at exit points to minimise the tracking of soil and particulates onto pavement surfaces.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>37</td>
<td></td>
<td></td>
<td>Any material transported onto pavement surfaces will be swept and removed at the end of each working day.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>38</td>
<td>Excess spoil</td>
<td></td>
<td>Excess spoil not required or able to be used for backfilling will be stockpiled in a suitable location before being reused or removed from the site, and disposed of appropriately in accordance with the NSW EPA <em>Waste Classification Guidelines</em> (2014).</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>39</td>
<td>Contamination of soils</td>
<td></td>
<td>In the event that indicators of contamination are encountered during construction (such as odours or visually contaminated materials), work in the area will cease until advice on the need for remediation or other action is obtained from an environmental consultant.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>40</td>
<td></td>
<td></td>
<td>A fully equipped emergency spill kit will be kept on-site at all times.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>41</td>
<td>Hydrology, Water Quality and Flooding</td>
<td>Drainage design</td>
<td>Roads and Maritime will consult with Upper Hunter Shire Council during detailed design to ensure appropriate integration with council’s stormwater network.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
</tbody>
</table>

New England Highway bypass at Scone
Review of environmental factors
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<tr>
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<tbody>
<tr>
<td>42</td>
<td>Flooding</td>
<td></td>
<td>Roads and Maritime will continue to refine the design throughout the detailed design phase to try and further reduce potential flooding impacts.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td>43</td>
<td></td>
<td></td>
<td>Roads and Maritime will consult with relevant authorities throughout the detailed design phase regarding potential changes to the relevant plans including development control plans and floodplain risk management plans.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td>44</td>
<td></td>
<td></td>
<td>Roads and Maritime will consult with all affected property owners likely to be affected by a change in flood levels including providing details of the predicted actual changes in flood levels in relation to each individual property.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td>45</td>
<td>Groundwater bores</td>
<td></td>
<td>Roads and Maritime will consult with the owners of the five known groundwater bores to be removed to determine requirements for replacement of these bores if required.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td>46</td>
<td>Sedimentation and contamination of surface water</td>
<td></td>
<td>Erosion, sedimentation and contamination safeguard measures identified for the geology and soils aspect will be implemented.</td>
<td>Construction contractor</td>
<td>Pre-construction and Construction</td>
</tr>
<tr>
<td>47</td>
<td>Flood hazards</td>
<td></td>
<td>As part of the construction environmental management plan a flood risk management plan will be prepared that details the processes for monitoring of flood alerts. The plan will specify the steps to be taken in the event a flood warning is issued including removal or securing of loose material in the floodplain and removal or securing of all fuels and chemicals.</td>
<td>Construction contractor</td>
<td>Pre-construction and Construction</td>
</tr>
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<tr>
<td>48</td>
<td>Environmental safeguards</td>
<td>A system for daily monitoring of flood alerts will be implemented so that in the event of a flood warning being issued all unsecured material in the floodplain can be removed and other appropriate precautionary measures taken.</td>
<td>Construction contractor</td>
<td>Pre-construction and Construction</td>
<td></td>
</tr>
<tr>
<td>49</td>
<td>Storage of excess materials</td>
<td>Storage of excess materials within the floodplain, including within compound areas will be minimised. As far as is practical materials are to be ordered on, or as close as possible to, an as needs basis.</td>
<td>Construction contractor</td>
<td>Construction</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>Contamination of surface water</td>
<td>All fuels, chemicals, and liquids will be stored at least 50 metres away from any waterway or drainage line as far as is practicable and will be stored in an impervious bunded area within the compound site.</td>
<td>Construction contractor</td>
<td>Construction</td>
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<tr>
<td>51</td>
<td>Vehicle wash downs</td>
<td>Vehicle wash downs and/or concrete truck washouts will be carried out within a designated bunded area on an impervious surface or carried out off-site.</td>
<td>Construction contractor</td>
<td>Construction</td>
<td></td>
</tr>
<tr>
<td>52</td>
<td>Visual monitoring of local water</td>
<td>Visual monitoring of local water quality (ie turbidity, hydrocarbon spills/slicks) will be carried out on a regular basis to identify potential spills or the effects of sediment-laden runoff.</td>
<td>Construction contractor</td>
<td>Construction</td>
<td></td>
</tr>
<tr>
<td>53</td>
<td>Maintenance</td>
<td>Vehicles and plant will be properly maintained and regularly inspected for fluid leaks.</td>
<td>Construction contractor</td>
<td>Construction</td>
<td></td>
</tr>
<tr>
<td>54</td>
<td>An emergency spill kit</td>
<td>An emergency spill kit will be kept on site at all times. All staff will be made aware of the location of the spill kit and trained in its use.</td>
<td>Construction contractor</td>
<td>Construction</td>
<td></td>
</tr>
<tr>
<td>55</td>
<td>Dewatering</td>
<td>Dewatering (groundwater and surface runoff collected within the works area) will be carried out in accordance with the Roads and Maritime Technical Guideline for Dewatering.</td>
<td>Construction contractor</td>
<td>Construction</td>
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<tr>
<td>56</td>
<td>Groundwater dewatering</td>
<td>In consultation with DPI water, a licence will be obtained if groundwater extraction of more than three mega litres per year (ML/yr) is required. Any requirement of this licence including monitoring will be completed.</td>
<td>Constructon contractor</td>
<td>Construction</td>
<td>Construction</td>
</tr>
<tr>
<td>57</td>
<td>Noise and Vibration</td>
<td>Operational noise and vibration</td>
<td>During detailed design Roads and Maritime will review the predicted noise levels and exceedances for the proposal. Roads and Maritime will then determine the preferred mitigation solution for the proposal which could include low noise pavements, noise barriers and / or at-property treatments.</td>
<td>Roads and Maritime</td>
<td>Detailed Design</td>
</tr>
<tr>
<td>58</td>
<td>Construction noise and vibration - General</td>
<td>A construction noise and vibration management plan will be prepared as part of the construction environmental management plan. The plan will include, but not be limited to:   * Community consultation measures   * Environmental site inductions.   * Behavioural practices   * Noise monitoring program   * Attended vibration measurement requirements.</td>
<td>Construction contractor</td>
<td>Pre-construction and construction</td>
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</tr>
<tr>
<td>59</td>
<td>Source controls – Construction hours and scheduling</td>
<td>Where reasonable and feasible, construction should be carried out during the standard daytime working hours. Work generating high noise and/or vibration levels should be scheduled during less sensitive time periods. The use of mulchers, jack hammers, concrete saws, rock breakers, compaction or other equipment used in very close proximity to the receivers should be limited where feasible and reasonable to the standard construction hours.</td>
<td>Construction contractor</td>
<td>Construction</td>
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</tr>
<tr>
<td>60</td>
<td>Source controls – Construction respite period</td>
<td>If highly noise affected impacts are predicted high noise and vibration generating activities may only be carried out in continuous blocks, not exceeding three hours each, with a minimum respite period of one hour between each block. If highly noise affected impacts are predicted no more than four consecutive nights of high noise and/or vibration generating work may be carried out over any seven day period, unless otherwise approved by the relevant authority.</td>
<td>Construction contractor</td>
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<tr>
<td>61</td>
<td>Source controls – Equipment selection</td>
<td>Where reasonable and feasible, use quieter and less vibration emitting construction methods</td>
<td>Where reasonable and feasible, use quieter and less vibration emitting construction methods</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>62</td>
<td>Source controls – Maximum noise levels</td>
<td>The noise levels of plant and equipment must have operating Sound Power or Sound Pressure Levels compliant with the criteria listed in Table 2 of the <strong>Construction Noise Strategy</strong></td>
<td>The noise levels of plant and equipment must have operating Sound Power or Sound Pressure Levels compliant with the criteria listed in Table 2 of the <strong>Construction Noise Strategy</strong></td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>63</td>
<td>Source controls – Rental plant and equipment</td>
<td>The noise levels of plant and equipment items are to be considered in rental decisions and in any case cannot be used on site unless compliant with the criteria in Table 2 of the <strong>Construction Noise Strategy</strong></td>
<td>The noise levels of plant and equipment items are to be considered in rental decisions and in any case cannot be used on site unless compliant with the criteria in Table 2 of the <strong>Construction Noise Strategy</strong></td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>64</td>
<td>Source controls – Use and siting of plant</td>
<td>Simultaneous operation of noisy plant within discernible range of a sensitive receiver is to be avoided The offset distance between noisy plant and adjacent sensitive receivers is to be maximised Plant used intermittently to be throttled down or shut down. Noise-emitting plant to be directed away from sensitive receivers.</td>
<td>Simultaneous operation of noisy plant within discernible range of a sensitive receiver is to be avoided The offset distance between noisy plant and adjacent sensitive receivers is to be maximised Plant used intermittently to be throttled down or shut down. Noise-emitting plant to be directed away from sensitive receivers.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>65</td>
<td>Source controls – Plan worksites and activities to minimise noise and vibration</td>
<td>Plan traffic flow, parking and loading/ unloading areas to minimise reversing movements within the site.</td>
<td>Plan traffic flow, parking and loading/ unloading areas to minimise reversing movements within the site.</td>
<td>Construction contractor</td>
<td>Construction</td>
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<tr>
<td>66</td>
<td>Source controls – Non-tonal reversing alarms</td>
<td>Non-tonal reversing beepers (or an equivalent mechanism) must be fitted and used on all construction vehicles and mobile plant regularly used on site and for any out of hours work.</td>
<td>Non-tonal reversing beepers (or an equivalent mechanism) must be fitted and used on all construction vehicles and mobile plant regularly used on site and for any out of hours work.</td>
<td>Construction contractor</td>
<td>Construction</td>
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<tr>
<td>67</td>
<td>Source controls – Minimise disturbance arising from delivery of goods to construction sites</td>
<td>Loading and unloading of materials/deliveries is to occur as far as possible from sensitive receivers. Select site access points and roads as far as possible away from sensitive receivers. Dedicated loading/unloading areas to be shielded if close to sensitive receivers. Delivery vehicles to be fitted with straps rather than chains for unloading, wherever possible.</td>
<td>Loading and unloading of materials/deliveries is to occur as far as possible from sensitive receivers. Select site access points and roads as far as possible away from sensitive receivers. Dedicated loading/unloading areas to be shielded if close to sensitive receivers. Delivery vehicles to be fitted with straps rather than chains for unloading, wherever possible.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>68</td>
<td>Path controls - Shield stationary noise sources such as pumps, compressors and fans</td>
<td>Stationary noise sources should be enclosed or shielded whilst ensuring that the occupational health and safety of workers is maintained.</td>
<td>Stationary noise sources should be enclosed or shielded whilst ensuring that the occupational health and safety of workers is maintained.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>69</td>
<td>Path controls - Shield sensitive receivers from noisy activities</td>
<td>Use structures to shield residential receivers from noise such as site shed placement; earth bunds; fencing; erection of operational stage noise barriers (where practicable) and consideration of site topography when situating plant.</td>
<td>Use structures to shield residential receivers from noise such as site shed placement; earth bunds; fencing; erection of operational stage noise barriers (where practicable) and consideration of site topography when situating plant.</td>
<td>Construction contractor</td>
<td>Construction</td>
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<td>70</td>
<td>Project specific noise mitigation</td>
<td>In circumstances where the noise levels are predicted to exceed construction noise management levels after implementation of the general work practices, additional mitigation measures are required. These include monitoring, individual briefings, letter box drops, phone calls, specific notifications and alternative accommodation.</td>
<td></td>
<td>Construction contractor</td>
<td>Construction</td>
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<td>71</td>
<td></td>
<td>Where reasonable and feasible, it is recommended high noise generating activities (75 dB(A) Leq at receiver) be used during standard construction hours and in continuance blocks of no more than 3 hours with at least a one hour respite between each block of work generating high noise impact, where the location of the work is likely to impact the same receivers.</td>
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<td>Construction contractor</td>
<td>Construction</td>
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<tr>
<td>72</td>
<td></td>
<td>Where high noise generating activities (75 dB(A) Leq at receiver) are required out of hours the following will be implemented: • The equipment will be used prior to 10pm where reasonable and feasible • Where the above cannot be achieved the equipment will be used prior to midnight where reasonable and feasible • It is not proposed to apply a 3 hour on and a 1 hour off respite approach in an effort to ensure that the use of such equipment is completed as early in the night as possible.</td>
<td></td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>73</td>
<td>Project specific noise mitigation - Construction compound</td>
<td>Temporary barriers or hoarding will be constructed around the eastern and southern boundaries of the northern compound. The noise barriers should aim to break line of sight from between the sources and receiver locations. It is recommended any temporary noise barriers extend all the way down to the ground and all gaps are eliminated to prevent noise flanking.</td>
<td></td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>74</td>
<td>Project specific noise mitigation - Construction related traffic</td>
<td>Roads and Maritime will undertake further construction noise modelling during detailed design to confirm potential increases in construction traffic noise levels on St Aubins and Aberdeen streets.</td>
<td></td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
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<tr>
<td>75</td>
<td>Project specific noise mitigation - Construction related traffic</td>
<td>Management of construction related traffic or traffic reroutes should as a minimum include the following controls: • Scheduling and routing of vehicle movements • Speed of vehicles • Driver behaviour and avoidance of the use of engine compression brakes • Ensuring vehicles are adequately silenced before allowing them to access the site.</td>
<td>Construction contractor</td>
<td>Construction</td>
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<tr>
<td>76</td>
<td></td>
<td>Where noise impacts are greater than one year then consideration should be given to the following measures where feasible and reasonable: • Temporary noise barriers • At-receiver noise mitigation.</td>
<td>Construction contractor</td>
<td>Construction</td>
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<td>77</td>
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<td>Feasible and reasonable considerations should also include: • Time of day of the noise increase and exceedance of criteria • Time of use of affected receivers • How many decibels the noise levels are to increase • How long the mitigation will provide benefit to the receiver during the project. • Maintaining the road surface to minimise the potential increase in noise due to pot-holes and road surface irregularities.</td>
<td>Construction contractor</td>
<td>Construction</td>
<td></td>
</tr>
<tr>
<td>78</td>
<td>Project specific noise mitigation – compliance noise and vibration monitoring</td>
<td>Attended compliance noise or vibration monitoring will be carried out to confirm the predicted noise or vibration levels upon receipt of a complaint. This would be carried out at the complainant’s location and the monitoring will cover the time of day when the impacts were reported to occur, will be completed by a suitably qualified professional and in accordance with the ICNG.</td>
<td>Construction contractor and Roads and Maritime</td>
<td>Construction</td>
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<tr>
<td>79</td>
<td></td>
<td>Project specific noise mitigation – building condition inspections and vibration trials</td>
<td>Where construction activities generating vibration are to be carried out at a distance of less than 20 m from a building and 35 m from a heritage building, initial vibration monitoring trials will be carried out at the commencement of breaking, rolling and compacting activities.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
</tbody>
</table>
| 80  |        | Project specific noise mitigation – human comfort impacts | Where non-vibration inducing construction methods are impractical, the following principles in accordance with the ICNG will be applied:  
• Confining vibration-generating operations to the least vibration-sensitive part of the shift – which could be when the background disturbance is highest  
• Determining an upper level for vibration impact also considering what is achievable using feasible and reasonable mitigation  
• Consulting with the community regarding the proposed events. | Construction contractor | Construction |
<p>| 81  |        | Project specific noise mitigation – community relations | Where construction work will be outside of standard construction hours, measures outlined in section 6.12.3 and the procedures outlined in <em>Environmental Noise Management Manual</em> (RTA, 2001) Practice Note (vii) will be applied in relation to consultation with the community. | Roads and Maritime | Construction |
| 82  |        | Noise and vibration – Post construction noise monitoring | To confirm that the noise level targets are achieved, a post-construction noise monitoring program be carried out in accordance with the <em>Noise Mitigation Guideline</em> (Roads and Maritime 2014). | Roads and Maritime | Post-construction |</p>
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<tbody>
<tr>
<td>83</td>
<td>Landscape and visual amenity</td>
<td>Light spill</td>
<td>Permanent lighting will be designed to minimise light spill into residential properties and sensitive receptors.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td>84</td>
<td>Visual impacts</td>
<td></td>
<td>Bridges will be designed and constructed in accordance with the Roads and Maritime <em>Bridge Aesthetics Guidelines</em> (RTA, 2003) including the following considerations: • Bridges should be as simple and elegant as possible to complement the semi-rural setting • All bridge elements including lighting columns, barrier supports, crash barriers and piers to be considered as a whole to simplify the structure and reduce visual clutter • Bridges to connect seamlessly with abutments and embankments.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td>85</td>
<td></td>
<td></td>
<td>Develop a limited range of materials, colours and textures for all built elements to achieve a simple uncluttered design.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
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<td>No.</td>
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</table>
| 86  | Landscape and visual impacts         | A detailed landscape plan will be prepared and implemented in accordance with the Roads and Maritime Landscape Guideline (RTA 2008). The plan will consider the following:  
- Planting either side of the proposal to screen built form and reduce the scale of the infrastructure  
- Fill embankments to be planted with low groundcovers/native grasses and groups of trees  
- Reinforce the local semi-rural landscape character through the use of appropriate vegetation  
- Low planting of native species, mostly grasses and low shrubs to less than one metre high, combined with appropriately spaced tall Eucalyptus species to retain sightlines  
- Areas disturbed by construction to be restored to match existing condition as far as possible  
- Protect and retain riparian vegetation as far as possible  
- Slope stabilisation matting such as a Jute mat to be used to assist plant establishment and prevent erosion  
- Tree planting outside the proposal site may assist in visually screening the proposal and should be considered further during the detailed design. | Roads and Maritime   | Detailed design                      |
<p>| 87  | Vegetation                           | Existing vegetation will be maintained and protected wherever possible, particularly in riparian areas. Trimming of trees rather than clearing will be carried out where possible. | Construction contractor                                | Construction         |
| 88  | Visual impacts                       | Compounds, storage areas, stockpiles and associated works areas will be located in cleared or disturbed areas as far as possible. | Construction contractor                                | Construction         |
| 89  |                                      | The construction site will be kept tidy and rubbish free. | Construction contractor                                | Construction         |</p>
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<td>90</td>
<td></td>
<td></td>
<td>Work areas will be restored progressively and maintained until established.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>91</td>
<td>Visual impacts</td>
<td></td>
<td>The site will be rehabilitated and landscaped in accordance with an approved landscape plan.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>92</td>
<td>Light spill</td>
<td></td>
<td>Temporary lighting for construction will be sited and designed to minimise light spill into residential properties and identified sensitive receptors.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>93</td>
<td>Aboriginal cultural heritage</td>
<td>Inadvertent impacts on heritage items</td>
<td>As part of the site induction, all workers will be advised of their obligations in relation to heritage under the <em>National Parks and Wildlife Act 1974</em> before construction begins and the guidelines to follow if unanticipated heritage items or deposits are located during construction.</td>
<td>Construction Contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>94</td>
<td>Aboriginal heritage item encountered during work</td>
<td></td>
<td>In the event of an unexpected find of an Aboriginal heritage item (or suspected item), work will cease in the affected area and the Roads and Maritime Environment Manager, Hunter Region and the Roads and Maritime Aboriginal Cultural Heritage Officer, will be contacted for advice on how to proceed. The Roads and Maritime <em>Unexpected Archaeological Finds Procedure 2012</em> will be followed in the event a potential artefact is uncovered.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>95</td>
<td>Non-Aboriginal heritage</td>
<td>Inadvertent impacts on heritage items</td>
<td>Archival recording of the impacted elements of the Farming Complex (Heritage Item 5), St Aubins Arms property (Heritage Item 7) and Timber Structure (Heritage Item 3) will be carried out. The archival recording will include photographs and detailed inventory and plans and will be prepared to the standard of Local significance as specified in Heritage Branch’s requirements for <em>Archival Recording of Heritage Items</em> and prepared by a qualified heritage consultant. Final copies of the archival recording will be lodged with the Upper Hunter Valley Council’s local studies collection.</td>
<td>Roads and Maritime</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>No.</td>
<td>Aspect</td>
<td>Impact</td>
<td>Environmental safeguards</td>
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<tr>
<td>96</td>
<td></td>
<td></td>
<td>A section 140 Excavation Permit will be obtained for the impacted sections of the Farming Complex (Heritage Item 5) and St Aubins Arms property (Heritage Item 7).</td>
<td>Roads and Maritime</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>97</td>
<td></td>
<td></td>
<td>As part of the site induction, all workers will be advised of their obligations in relation to heritage before construction begins and the guidelines to follow if unanticipated heritage items or deposits are located during construction.</td>
<td>Roads and Maritime</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>98</td>
<td></td>
<td></td>
<td>A program of vibration monitoring and dilapidation reports will be completed for potential indirect impacts from vibration during construction works on the Rail Culvert (Heritage Item 2), House (Lot 19, DP6498) (Heritage Item 6), the Great Northern Railway (Heritage Item 8), the West Scone Conservation Area (Heritage Item 9) and the buildings associated with the St Aubins Arms (Heritage Item 7).</td>
<td>Construction Contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>99</td>
<td></td>
<td></td>
<td>All identified historical heritage items within the proposal or within vicinity of the proposal area will be mapped and provided to site planners, Roads and Maritime workers and sub-contractors so they are aware of their responsibilities under the Heritage Act 1977.</td>
<td>Construction Contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>100</td>
<td></td>
<td>Unanticipated archaeological finds</td>
<td>In the unlikely event of an unexpected find of an archaeological deposit (or suspected item), work would cease in the affected area and the Roads and Maritime Environment Manager, Hunter Region will be contacted for advice on how to proceed. The Roads and Maritime Unexpected Archaeological Finds Procedure 2012 will be followed in the event a potential artefact is uncovered.</td>
<td>Construction Contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>101</td>
<td>Air quality</td>
<td>General air quality impacts</td>
<td>The construction environmental management plan will include a procedure for effective dust control, including dust monitoring and reporting procedures.</td>
<td>Construction contractor</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>102</td>
<td>Dust emissions</td>
<td></td>
<td>Dust suppression measures will be implemented in accordance with the construction environmental management plan. This would include water carts as required.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
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<td>Environmental safeguards</td>
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<tr>
<td>103</td>
<td>Stockpiled materials</td>
<td>Stockpiled materials will be managed in accordance with <em>Stockpile Management Guideline</em> (RTA, 2011b).</td>
<td>Constructon contractor</td>
<td>Construction</td>
<td></td>
</tr>
<tr>
<td>104</td>
<td>All trucks</td>
<td>All trucks will be covered when transporting dust generating material to and from the site.</td>
<td>Constructon contractor</td>
<td>Construction</td>
<td></td>
</tr>
<tr>
<td>105</td>
<td>Exhaust emissions</td>
<td>Construction plant and equipment will be maintained in a good working condition in order to limit impacts on air quality.</td>
<td>Constructon contractor</td>
<td>Construction</td>
<td></td>
</tr>
<tr>
<td>106</td>
<td>Plant and machinery</td>
<td>Plant and machinery will be turned off when not in use.</td>
<td>Constructon contractor</td>
<td>Construction</td>
<td></td>
</tr>
<tr>
<td>107</td>
<td>Impacts on sensitive receivers</td>
<td>Local residents will be advised of hours of operation and duration of work and supplied with a contact name and number for queries regarding air quality.</td>
<td>Constructon contractor</td>
<td>Construction</td>
<td></td>
</tr>
<tr>
<td>108</td>
<td>Individual property impacts</td>
<td>Roads and Maritime will consult with potentially affected landholders before and during construction to minimise the potential for impacts on agriculture.</td>
<td>Roads and Maritime</td>
<td>Pre-construction and Construction</td>
<td></td>
</tr>
<tr>
<td>109</td>
<td>Property acquisition and severance</td>
<td>Roads and Maritime will carry out regular and ongoing engagement with the property owners. Acquisition will be carried out in accordance with the <em>Land Acquisition Information Guide</em> (Roads and Maritime, 2013) and the <em>Land Acquisition (Just Terms Compensation) Act 1991</em>.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
<td></td>
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<td>No.</td>
<td>Aspect</td>
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<tr>
<td>110</td>
<td>Travelling stock route</td>
<td></td>
<td>Roads and Maritime will continue to liaise with Local Land Services during detailed design to maintain connectivity for travelling stock route. This will include provision of suitable arrangements during construction which could include early construction of the underpass and / or temporary cessation of works in the vicinity when stock movements are required.</td>
<td>Roads and Maritime and Construction Contractor</td>
<td>Detailed design and Construction</td>
</tr>
<tr>
<td>111</td>
<td>Groundwater bores and water access</td>
<td></td>
<td>Roads and Maritime will consult with all directly affected landholders, including the owners of the groundwater bores that would be removed, to determine requirements for access to water and replacement facilities or access if required.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td>112</td>
<td>Land use and property</td>
<td>Adjacent land use impacts</td>
<td>Roads and Maritime will consult with potentially affected landholders before and during construction to minimise the potential for impacts on land use.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td>113</td>
<td>Property acquisition</td>
<td>Property acquisition</td>
<td>Property acquisition will be carried out in accordance with the <em>Land Acquisition Information Guide</em> (Roads and Maritime, 2013) and the <em>Land Acquisition (Just Terms Compensation) Act 1991</em>.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td>114</td>
<td>Service provider impacts</td>
<td></td>
<td>Roads and Maritime will consult with relevant service providers during detailed design to identify possible interactions and develop procedures to be implemented to minimise the potential for service interruptions which have the potential to impact on existing land use.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td>115</td>
<td>Socio-economic</td>
<td>Community impacts</td>
<td>Roads and Maritime will carry out regular and ongoing engagement with the community in accordance with a project stakeholder consultation plan. The plan will include information on who will be consulted, the means of consultation and a complaints management procedure.</td>
<td>Roads and Maritime</td>
<td>Detailed design Pre-construction</td>
</tr>
<tr>
<td>116</td>
<td>Impacts on properties within the proposal site</td>
<td></td>
<td>Roads and Maritime will carry out regular and ongoing engagement with the property owners affected by property acquisition.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td>No.</td>
<td>Aspect</td>
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<tr>
<td>117</td>
<td></td>
<td>Property acquisition will be completed in accordance with the <em>Land Acquisition Information Guide</em> (Roads and Maritime, 2013) and the <em>Land Acquisition (Just Terms Compensation) Act 1991.</em></td>
<td></td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td>118</td>
<td></td>
<td>Impacts on neighbouring properties</td>
<td>Roads and Maritime will notify the community of the changes to road conditions at St Aubins street and other local streets. Roads and Maritime will carry out regular and ongoing engagement with the residents in St Aubins Street and Aberdeen Street where traffic is predicted to increase.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td>119</td>
<td></td>
<td>Impacts on sporting and recreational areas – Scone Golf Course</td>
<td>Roads and Maritime will carry out regular and ongoing engagement with Upper Hunter Shire Council and Scone Golf Club to address potential impacts associated with acquisition of part of the golf course.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td>120</td>
<td></td>
<td></td>
<td>Consultation will be carried out with Upper Hunter Shire Council and Scone Golf Club to address potential construction impacts including provision of safe access from the clubhouse to the golf course.</td>
<td>Roads and Maritime</td>
<td>Pre-construction Construction</td>
</tr>
<tr>
<td>121</td>
<td></td>
<td>Impacts on sporting and recreational areas– Bill Rose Sports Complex</td>
<td>Roads and Maritime will carry out regular and ongoing engagement with Upper Hunter Shire Council and Scone Grammar School to address potential construction impacts including provision of safe access to and from the sports complex.</td>
<td>Roads and Maritime</td>
<td>Pre-construction Construction</td>
</tr>
<tr>
<td>No.</td>
<td>Aspect</td>
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<tr>
<td>122</td>
<td>Impacts on sporting and recreational areas– Bill Rose Sports Complex</td>
<td>Roads and Maritime will continue to liaise with Upper Hunter Shire Council regarding the closure and temporary provision of alternate netball courts. The location and details would be identified in detailed design in consultation with council and the netball association/club.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
<td></td>
</tr>
<tr>
<td>123</td>
<td>Impacts on sporting and recreational areas– Bill Rose Sports Complex</td>
<td>Roads and Maritime will continue to liaise with Upper Hunter Shire Council regarding the provision of an alternative area within the sports complex for the impacted playing field and park. The location and details would be identified in detailed design in consultation with Council.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
<td></td>
</tr>
<tr>
<td>124</td>
<td>Impacts on sporting and recreational areas– dog park</td>
<td>Roads and Maritime will continue to liaise with Upper Hunter Shire Council for consideration of an alternate area for the dog park during construction and resumption of usual activities during operation.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
<td></td>
</tr>
<tr>
<td>125</td>
<td>Travelling stock route impacts</td>
<td>Continued access across the proposal site will be provided in consultation with Local Land Services, this could include early construction of the underpass and / or temporary cessation of works in the vicinity when stock movements are required.</td>
<td>Constructon contractor</td>
<td>Construction</td>
<td></td>
</tr>
<tr>
<td>126</td>
<td>Construction impacts on the community</td>
<td>Roads and Maritime will carry out regular and ongoing engagement with the community will be carried out in accordance with a project stakeholder consultation plan. The plan will include information on who will be consulted, the means of consultation and a complaints management procedure. Local residents, potentially affected businesses, schools and road users (including emergency service providers) would be notified before work starts and would be kept regularly informed of construction activities, timing and progress during the construction process.</td>
<td>Roads and Maritime</td>
<td>Pre-construction Construction</td>
<td></td>
</tr>
<tr>
<td>No.</td>
<td>Aspect</td>
<td>Impact</td>
<td>Environmental safeguards</td>
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<tr>
<td>127</td>
<td>Potential impacts on highway dependent business in Scone</td>
<td>Roads and Maritime will continue to engage with the Upper Hunter Shire Council and the Scone Chamber of Commerce to manage potential impacts associated with bypassing traffic and the potential benefits of reduced traffic within the town centre.</td>
<td>Roads and Maritime</td>
<td>Detailed design Pre-construction Construction Post-construction</td>
<td></td>
</tr>
<tr>
<td>128</td>
<td>Safety concerns at schools</td>
<td>Roads and Maritime will carry out regular and ongoing engagement with Upper Hunter Shire Council, Scone Grammar School and Scone Public School to address safety concerns regarding operational and construction traffic.</td>
<td>Roads and Maritime</td>
<td>Detailed design Pre-construction</td>
<td></td>
</tr>
<tr>
<td>129</td>
<td>Resource use and waste management</td>
<td>Demand on resources</td>
<td>Procurement will endeavour to use materials and products with a recycled content where that material or product is cost and performance effective.</td>
<td>Construction contractor</td>
<td>Pre-construction and construction</td>
</tr>
</tbody>
</table>
| 130 | Waste management | A waste management sub-plan will be prepared and included in the construction environmental management plan in accordance with Roads and Maritime Specification G36 Environmental Protection. The plan is to be guided by the following publications:  
  - EPA Waste Classification Guidelines  
  - NSW Government Waste Reduction and Purchasing Policy (WRAPP)  
<p>| 131 | Demand on resources | Excavated material will be reused on-site for fill where feasible to reduce demand on resources. | Construction contractor | Construction |</p>
<table>
<thead>
<tr>
<th>No.</th>
<th>Aspect</th>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
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</thead>
<tbody>
<tr>
<td>132</td>
<td>Environmental safeguards</td>
<td>Any additional fill material required will be sourced from appropriate sources and/or other Roads and Maritime projects.</td>
<td>Construction contractor and Roads and Maritime</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>133</td>
<td>Waste minimisation</td>
<td>The following resource management hierarchy principles will be followed: • Avoid unnecessary resource consumption as a priority • Avoidance will be followed by resource recovery (including reuse of materials, reprocessing, and recycling and energy recovery) • Disposal will be a last resort (in accordance with the Waste Avoidance and Resource Recovery Act 2001).</td>
<td>Construction contractor</td>
<td>Construction</td>
<td>Construction</td>
</tr>
<tr>
<td>134</td>
<td>Management of green waste</td>
<td>Cleared weed-free vegetation will be chipped and reused on-site as part of the proposed landscaping and to stabilise disturbed soils where possible.</td>
<td>Construction contractor</td>
<td>Construction</td>
<td>Construction</td>
</tr>
<tr>
<td>135</td>
<td>Spoil management</td>
<td>Excess soil requiring waste disposal would first be assessed against the Waste Classification Guidelines (DECCW, 2009a). Waste would be disposed of appropriately with supporting waste classification documentation.</td>
<td>Construction contractor</td>
<td>Construction</td>
<td>Construction</td>
</tr>
<tr>
<td>136</td>
<td>Waste management</td>
<td>Garbage receptacles will be provided and recycling of materials encouraged. Rubbish will be transported to an appropriate waste disposal facility.</td>
<td>Construction contractor</td>
<td>Construction</td>
<td>Construction</td>
</tr>
<tr>
<td>137</td>
<td></td>
<td>All wastes will be managed in accordance with the POEO Act.</td>
<td>Construction contractor</td>
<td>Construction</td>
<td>Construction</td>
</tr>
<tr>
<td>No.</td>
<td>Aspect</td>
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<tr>
<td>138</td>
<td>Portable toilets will be provided for construction workers and will be managed to ensure the appropriate disposal of sewage.</td>
<td></td>
<td>Construction contractor</td>
<td>Construction</td>
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</tr>
<tr>
<td>139</td>
<td>Noxious weeds removed during work will be managed in accordance with the Department of Primary Industries’ requirements that relate to its classification status.</td>
<td></td>
<td>Construction contractor</td>
<td>Construction</td>
<td></td>
</tr>
<tr>
<td>140</td>
<td>Site inductions will occur and be recorded as specified in the construction environmental management plan to ensure staff are aware of waste disposal protocols.</td>
<td></td>
<td>Construction contractor</td>
<td>Construction</td>
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</tr>
<tr>
<td>141</td>
<td>A facility for collecting, treating and disposing of wastes generated in the construction of the proposal will be installed on site.</td>
<td></td>
<td>Construction contractor</td>
<td>Construction</td>
<td></td>
</tr>
<tr>
<td>142</td>
<td>All working areas will be maintained, kept free of rubbish and cleaned up at the end of each working day.</td>
<td></td>
<td>Construction contractor</td>
<td>Construction</td>
<td></td>
</tr>
<tr>
<td>143</td>
<td>Wastewater contamination of soils and water</td>
<td>A dedicated concrete washout facility will be provided during construction so that run-off from the washing of concrete machinery and equipment can be collected and disposed of at an appropriate waste facility.</td>
<td>Construction contractor</td>
<td>Construction</td>
<td></td>
</tr>
<tr>
<td>144</td>
<td>Hazards and risks</td>
<td>Risk Management</td>
<td>Emergency response plans will be incorporated into the construction environmental management plan.</td>
<td>Construction contractor</td>
<td>Pre-construction and construction</td>
</tr>
<tr>
<td>No.</td>
<td>Aspect</td>
<td>Impact</td>
<td>Environmental safeguards</td>
<td>Responsibility</td>
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<tr>
<td>145</td>
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<td></td>
<td>An incident response plan will be developed and implemented as required as part of the construction environmental management plan to manage any identified risks on site.</td>
<td>Construction contractor</td>
<td>Pre-construction and construction</td>
</tr>
<tr>
<td>146</td>
<td>Greenhouse gas and climate change</td>
<td>Greenhouse gas emissions</td>
<td>The use of alternative fuels and power sources for construction plant and equipment will be investigated and implemented, where appropriate.</td>
<td>Construction contractor</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>147</td>
<td></td>
<td></td>
<td>Recycled materials will be incorporated in the design of pavement and structures where possible.</td>
<td>Construction contractor</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>148</td>
<td></td>
<td></td>
<td>The energy efficiency and related carbon emissions will be considered in the selection of vehicle and plant equipment.</td>
<td>Construction contractor</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>149</td>
<td></td>
<td></td>
<td>Materials will be delivered as full loads and local suppliers will be used where possible.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>150</td>
<td></td>
<td></td>
<td>Construction equipment, plant and vehicles will be appropriately sized for the task.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>151</td>
<td></td>
<td></td>
<td>Equipment will be serviced frequently to confirm they are operating efficiently.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>152</td>
<td></td>
<td></td>
<td>Vehicles and machinery will not be left idling when not in use.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
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<td>No.</td>
<td>Aspect</td>
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<tr>
<td>153</td>
<td>Cumulative impacts</td>
<td>Cumulative impacts</td>
<td>Ongoing coordination and consultation will be carried out with other proponents to ensure potential cumulative impacts are appropriately assessed and managed.</td>
<td>Roads and Maritime and construction contractor</td>
<td>Detailed design and construction</td>
</tr>
<tr>
<td>154</td>
<td></td>
<td></td>
<td>When the preferred option for Scone town centre rail bridge is selected Roads and Maritime will complete a cumulative impact assessment to identify appropriate mitigation measures to address any potential cumulative impacts.</td>
<td>Roads and Maritime</td>
<td>Detailed design and construction</td>
</tr>
<tr>
<td>155</td>
<td></td>
<td></td>
<td>The construction environmental management plan will be revised to consider potential cumulative impacts from surrounding development activities as they become known.</td>
<td>Construction contractor</td>
<td>Pre-construction</td>
</tr>
</tbody>
</table>
7.3 **Licensing and approvals**

Table 7-2 summarises notifications, licences and approvals required for the proposal.

**Table 7-2 Summary of notifications, licences and approvals**

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roads and Maritime will carry out further consultation with DPI (Fisheries) during detailed design to confirm any specific requirements for approvals under the FM Act in relation to blocking of fish passage.</td>
<td>Detailed design</td>
</tr>
<tr>
<td>Road occupancy licence</td>
<td>Prior to commencement of construction</td>
</tr>
<tr>
<td>Minister for Primary Industries must be notified of any dredging or reclamation works prior to the undertaking of such works.</td>
<td>A minimum of 28 days prior to the commencement of construction</td>
</tr>
<tr>
<td>In consultation with DPI water, a licence will be obtained if groundwater extraction of more than three mega litres per year (ML/yr) is required. Any requirement of this licence including monitoring will be completed.</td>
<td>During construction</td>
</tr>
</tbody>
</table>
This section provides the justification for the proposal taking into account its biophysical, social and economic impacts, the suitability of the site and whether or not the proposal is in the public interest. The proposal is also considered in the context of the objectives of the EP&A Act, including the principles of ecologically sustainable development as defined in Schedule 2 of the Environmental Planning and Assessment Regulation 2000.

8.1 Justification

The proposal is consistent with a number of national, State and local strategies and plans, including:

- *NSW 2021: A Plan to Make NSW Number One* (Department of Premier and Cabinet, 2011)
- *State Infrastructure Strategy 2012-2032* (Infrastructure NSW, 2012)
- *NSW Long Term Transport Master Plan* (Transport for NSW, 2012)
- *Upper Hunter Strategic Regional Land Use Plan 2012* (Department of Planning, 2012)
- *Hunter Regional Transport Plan* (Transport for NSW, 2014)
- *Upper Hunter Bicycle Plan* (ROSS Planning, 2014)
- *Lower Hunter Transport Needs Study (2008).*

The proposal is considered to be justified as it would:

- Remove the only remaining rail level crossing on the New England Highway
- Provide unimpeded access for emergency services to the western side of the Great Northern Railway
- Improve freight and long distance travel around Scone on the New England Highway
- Improve urban amenity in Scone
- Improve the safety on the New England Highway and in Scone
- Eliminate community division caused by rail infrastructure.

While there would be environmental impacts as a consequence of the proposal, they have been avoided or minimised wherever possible through design and site-specific safeguards summarised in section 7.
## Objects of the EP&A Act

### Table 8-1  
Objects of EP&A Act

<table>
<thead>
<tr>
<th>Object</th>
<th>Comment</th>
</tr>
</thead>
<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 improve the safety on the New England Highway and in Scone. The proposal would result in traffic and amenity benefits within Scone including provision of unimpeded access for emergency services to the western side of the Great Northern Railway. The proposal would result in some traffic and amenity impacts to parts of western Scone and impact on agricultural land used for predominantly low intensive grazing. A number of mitigation measures would be implemented to minimise any environmental impacts associated with the proposal.</td>
</tr>
<tr>
<td>5(a)(ii) To encourage the promotion and co-ordination of the orderly economic use and development of land.</td>
<td>The proposal is needed to improve the safety on the New England Highway and in Scone. The proposal would improve freight and long distance travel within Scone and on the New England Highway. It would provide for future growth and development in Scone due to improved safety.</td>
</tr>
<tr>
<td>5(a)(iii) To encourage the protection, provision and co-ordination of communication and utility services.</td>
<td>Some utilities would need to be relocated or protected during construction. The management of utilities is considered in section 3.5.</td>
</tr>
<tr>
<td>5(a)(iv) To encourage the provision of land for public purposes.</td>
<td>The proposal involves work for the purpose of a road, which is for a public purpose.</td>
</tr>
<tr>
<td>5(a)(v) To encourage the provision and co-ordination of community services and facilities.</td>
<td>The proposal would benefit the community by providing a new highway bypass around the town of Scone. This would improve safety on the New England Highway, in Scone and associated with removing the rail level crossing. The proposal would provide unimpeded access for emergency services to the western side of the Great Northern Railway.</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>Construction of the proposal would require the clearing or permanent modification of existing vegetation. The majority of vegetation within the proposal site is highly modified and no threatened species of communities were identified. The potential impacts on vegetation, threatened species, population and ecological communities are discussed in section 6.2.3.</td>
</tr>
</tbody>
</table>
To encourage ecologically sustainable development. Ecologically sustainable development is considered in sections 8.2.1 to 8.2.4 below.

To encourage the provision and maintenance of affordable housing. Not relevant to the project.

To promote the sharing of the responsibility for environmental planning between different levels of government in the State. Not relevant to the project.

To provide increased opportunity for public involvement and participation in environmental planning and assessment. Consultation with the community and relevant government agencies was carried out during the development of the proposal. Details of this consultation can be found in section 5.

8.2.1 The precautionary principle

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

Evaluation and assessment of alternative options have aimed to reduce the risk of serious and irreversible impacts on the environment. Consultation considered issues raised by stakeholders and a range of specialist studies were carried out for key issues to provide accurate and impartial information to assist in the development process.

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

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

8.2.2 Intergenerational equity

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

The proposal would result in amenity impacts for some of the western parts of Scone however would not result in any impacts that are likely to adversely impact on the health, diversity or productivity of the environment for future generations. The proposal would benefit future generations by ensuring road safety is improved, with this being a positive benefit for all road users.

Should the proposal not proceed, the principle of intergenerational equity may be compromised, as public safety may be affected by future traffic incidents associated with the existing New England Highway and the rail level crossing.
8.2.3 Conservation of biological diversity and ecological integrity

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

The environment in which the proposal would be located is predominantly exotic and/or planted vegetation. A small number of remnant native trees would be impacted. An assessment of the existing local environment was carried out to identify and manage any potential impacts of the proposal on local biodiversity. Specific design efforts have been taken to minimise impacts upon vegetation.

The proposal would not have a significant impact on biological diversity and ecological integrity. A biodiversity assessment and appropriate site-specific safeguards are provided in section 6.2.4.

8.2.4 Improved valuation, pricing and incentive mechanisms

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

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

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

8.3 Conclusion

The proposed highway bypass to the west of Scone is subject to assessment under Part 5 of the EP&A Act. The REF has examined and taken into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the proposed activity. This has included consideration of conservation agreements and plans of management under the NPW Act, joint management and biobanking agreements under the TSC Act, 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 have been avoided or reduced during the concept design development and options assessment. The proposal as described in the REF best meets the project objectives but would still result in some impacts on traffic, amenity and flooding to parts of western Scone, and impact on agricultural land used for predominantly low intensive grazing. Mitigation measures as detailed in this REF would manage or minimise these expected impacts. The proposal would also reduce travel times and congestion, improve safety for road users, remove the existing rail level crossing on the New England Highway and provide unimpeded access for emergency services to the western side of the Great Northern Railway. 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 EP&A Act. 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.
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.

Simon Pearce
Principal Environmental Scientist
GHD Pty Ltd
Date: 16/12/2015

I have examined this review of environmental factors and the certification by Simon Pearce from GHD Pty Ltd and accept the review of environmental factors on behalf of Roads and Maritime Services.

Philip Davidson
Project Manager
Roads and Maritime Hunter
Region Date: 16/12/2015
Australian Bureau of Statistics 2011, *Census of Population and Housing – Upper Hunter LGA*


AECOM 2014, *Scone – Kelly Street Level Crossing Options assessment and feasibility report*


Bewsher Consulting Pty Ltd. 1999, *Scone Flood Risk Management Study*


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Department of Primary Industries 2013, *Agricultural Impact Statement technical notes - A companion to the Agricultural Impact Statement guideline*

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Northern Transport Planning and Engineering (NTPE) 2015,


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NSW Government 2014 *Strategic Regional Land Use Policy - Frequently Asked Questions - Critical Industry Clusters Upper Hunter*


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Roads and Traffic Authority (RTA) 2005, *Shortcrete Design Guidelines*

Roads and Traffic Authority (RTA) 2006, *Noisewall Design Guideline*


ROSS Planning 2014, *Upper Hunter Bicycle Plan*

Sinclair Knight Merz (SKM) 2012, *Tool for Roadside Air Quality (TRAQ)*, Developed for NSW Roads and Maritime Services by Sinclair Knight Merz.

Transport for NSW 2012, *NSW Long Term Transport Master Plan*

Transport for NSW 2013, *NSW Freight and Ports Strategy*

Transport for NSW 2014, *Hunter Regional Transport Plan*
### Terms and acronyms used in this REF

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AEP</td>
<td>Annual Exceedance Probability</td>
</tr>
<tr>
<td>AHD</td>
<td>Australian Height Datum</td>
</tr>
<tr>
<td>ARI</td>
<td>Average recurrence interval</td>
</tr>
<tr>
<td>ARTC</td>
<td>Australian Rail Track Corporation</td>
</tr>
<tr>
<td>CEMP</td>
<td>Construction Environmental Management Plan</td>
</tr>
<tr>
<td>EPA</td>
<td>NSW Environmental Protection Authority</td>
</tr>
<tr>
<td>EP&amp;A Act</td>
<td><em>Environmental Planning and Assessment Act 1979</em> (NSW). Provides the legislative framework for land use planning and development assessment in NSW.</td>
</tr>
<tr>
<td>DLWC</td>
<td>Department of Land and Water Conservation</td>
</tr>
<tr>
<td>DoIRD</td>
<td>Department of Infrastructure and Regional Development</td>
</tr>
<tr>
<td>DoTE</td>
<td>Commonwealth Department of the Environment</td>
</tr>
<tr>
<td>DPI</td>
<td>Department of Primary Industries</td>
</tr>
<tr>
<td>GHD</td>
<td>GHD Pty Ltd.</td>
</tr>
<tr>
<td>GPS</td>
<td>Global Positioning System</td>
</tr>
<tr>
<td>ISEPP</td>
<td><em>State Environmental Planning Policy (Infrastructure)</em> 2007.</td>
</tr>
<tr>
<td>km/h</td>
<td>Kilometres per hour</td>
</tr>
<tr>
<td>The LEP</td>
<td><em>Upper Hunter Local Environmental Plan 2013</em></td>
</tr>
<tr>
<td>LGA</td>
<td>Local Government Area</td>
</tr>
<tr>
<td>m³/s</td>
<td>cubic metres per second</td>
</tr>
<tr>
<td>MNES</td>
<td>Matters of national environmental significance</td>
</tr>
<tr>
<td>NPI</td>
<td>National Pollutant Inventory</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
<td>-------------</td>
</tr>
<tr>
<td>NSW</td>
<td>New South Wales</td>
</tr>
<tr>
<td>NW Act</td>
<td>Noxious Weeds Act 1993</td>
</tr>
<tr>
<td>OEH</td>
<td>Office of Environment and Heritage</td>
</tr>
<tr>
<td>PM(_{10})</td>
<td>Particulate matter</td>
</tr>
<tr>
<td>PMF</td>
<td>Portable Maximum Flood</td>
</tr>
<tr>
<td>PMST</td>
<td>Protected Matter Search Tool</td>
</tr>
<tr>
<td>Proposal site</td>
<td>The area that would be directly impacted by the proposal.</td>
</tr>
<tr>
<td>QA Specifications</td>
<td>Specifications developed by Roads and Maritime for use with roadworks and bridgeworks contracts let by Roads and Maritime</td>
</tr>
<tr>
<td>QA/QC</td>
<td>Quality assurance and quality control</td>
</tr>
<tr>
<td>REF</td>
<td>Review of environmental factors.</td>
</tr>
<tr>
<td>Roads and Maritime</td>
<td>Roads and Maritime Services</td>
</tr>
<tr>
<td>RTA</td>
<td>NSW Roads and Traffic Authority which now forms part of Roads and Maritime.</td>
</tr>
<tr>
<td>RTA QA Specifications</td>
<td>Specifications developed by Roads and Maritime for use with roadwork and bridgework contracts let by Roads and Maritime.</td>
</tr>
<tr>
<td>SEPP 44</td>
<td>State Environmental Planning Policy 44 Koala Habitat Protection</td>
</tr>
<tr>
<td>Study area</td>
<td>The area that encompasses the proposal site and that may be indirectly impacted by the proposal.</td>
</tr>
<tr>
<td>TSP</td>
<td>Total suspended particles</td>
</tr>
<tr>
<td>XP-RAFTS</td>
<td>Extreme Programming - Runoff Analysis &amp; Flow Training Simulation – computer modelling software for urban and rural runoff</td>
</tr>
</tbody>
</table>
Appendix A

Consideration of clause 228(2) factors and matters of national environmental significance
### Clause 228(2) Checklist

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

<table>
<thead>
<tr>
<th>Factor</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Any environmental impact on a community?</td>
<td></td>
</tr>
<tr>
<td>The proposal would reduce travel times and congestion, improve safety for road users, remove the existing rail level crossing on the New England Highway and provide unimpeded access for emergency services to the western side of the Great Northern Railway.</td>
<td>Long-term positive</td>
</tr>
<tr>
<td>Construction of the proposal would result in negative traffic, noise and vibration impacts to the local community as discussed in section 6.5. Potential traffic impacts include an increase in the volume of heavy vehicles, disruptions to access and local traffic changes. Construction impacts would be managed by preparation of a construction environmental management plan including all mitigation measures identified in the REF.</td>
<td>Short-term negative</td>
</tr>
<tr>
<td>Operation of the proposal would result in traffic, amenity and flooding impacts to parts of western Scone, and result in the acquisition of agricultural land used for predominantly low intensive grazing. There would also be changed access arrangements for some properties along the existing New England Highway and adjacent to the proposal. The mitigation measures detailed in this REF would be implemented to manage these impacts.</td>
<td>Long-term negative</td>
</tr>
<tr>
<td>Subject to detailed design the proposal would require total acquisition of three lots and partial acquisition of 27 lots. Property acquisition will be carried out in accordance with the <em>Land Acquisition Information Guide</em> (Roads and Maritime, 2013) and the <em>Land Acquisition (Just Terms Compensation) Act 1991</em>.</td>
<td>Long-term negative</td>
</tr>
<tr>
<td>b. Any transformation of a locality?</td>
<td></td>
</tr>
<tr>
<td>The proposal would reduce traffic congestion and improve safety and amenity within the Scone town centre. It would also remove the existing rail level crossing on the New England Highway and provide unimpeded access for emergency services and the general community to the western side of the Great Northern Railway.</td>
<td>Long-term positive</td>
</tr>
</tbody>
</table>
The proposal would involve construction of four kilometres of new two lane highway to the west of Scone. The land through which the proposal passes is currently either agricultural land used for predominantly low intensive grazing or part of the Scone golf course. The proposal would result in a transformation of the locality from recreational and rural lands to a highway.

The proposal is located on a raised embankment and includes two bridges in order to provide for the required clearances over the Great Northern Railway and local streets, and to minimise changes to existing flood patterns. Visual impacts of the proposal on the locality would be reduced through the implementation of safeguards and management measures outlined in section 6.6.

c. Any environmental impact on the ecosystems of the locality?

The proposal would remove and/or impact about 33.4 hectares of predominantly planted and exotic vegetation. The study area comprises a highly modified, urban environment with limited fauna habitat values.

The proposal would have minimal impacts to flora and fauna during operation.

Mitigation measures provided in section 6.2 would be implemented to minimise potential impacts on biodiversity.

d. Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality?

The proposal would reduce traffic congestion and improve safety and amenity within the Scone town centre. It would also remove the existing rail level crossing on the New England Highway and provide unimpeded access for emergency services and the general community to the western side of the Great Northern Railway.

During construction there is potential for short term impacts associated with traffic, visual, dust, water quality, noise and vibration. These impacts would be minimised through the implementation of safeguards summarised in section 7.

The proposal would pass over the western edge of the Bill Rose Sports Complex. During construction safe access to the sports complex would be retained however some of the netball courts would be closed for safety reasons. A playing field, public park and dog park would also be closed during construction. During construction there is potential for short term amenity impacts. Operation of the proposal is not expected to significantly impact on users of the sports complex, however due to the location of the overbridge an alternate site for the playing field and public park would be required in consultation with council.
<table>
<thead>
<tr>
<th>Factor</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>The proposal would involve acquisition of part of the Scone golf</td>
<td>Short-term negative</td>
</tr>
<tr>
<td>course. Roads and Maritime has been consulting with Upper Hunter</td>
<td></td>
</tr>
<tr>
<td>Shire Council and the golf club throughout development of the</td>
<td></td>
</tr>
<tr>
<td>proposal. Upper Hunter Shire Council proposes to reconfigure the</td>
<td></td>
</tr>
<tr>
<td>golf course and provide new golf holes on the western side of the</td>
<td></td>
</tr>
<tr>
<td>existing golf course.</td>
<td></td>
</tr>
<tr>
<td>The proposal is located on a raised embankment and includes two</td>
<td>Long-term negative</td>
</tr>
<tr>
<td>bridges in order to provide for the required clearances over the Great</td>
<td></td>
</tr>
<tr>
<td>Northern Railway and local streets, and to minimise changes to</td>
<td></td>
</tr>
<tr>
<td>existing flood patterns. Visual impacts of the proposal on the locality</td>
<td></td>
</tr>
<tr>
<td>would be reduced through the implementation of safeguards and</td>
<td></td>
</tr>
<tr>
<td>management measures outlined in section 6.6.</td>
<td></td>
</tr>
<tr>
<td>e. Any effect on a locality, place or building having aesthetic,</td>
<td>Neutral</td>
</tr>
<tr>
<td>anthropological, archaeological, architectural, cultural, historical,</td>
<td></td>
</tr>
<tr>
<td>scientific or social significance or other special value for present</td>
<td></td>
</tr>
<tr>
<td>or future generations?</td>
<td></td>
</tr>
<tr>
<td>A review of the AHIMS database (6 January 2015 and 24 April 2015) and</td>
<td>Neutral</td>
</tr>
<tr>
<td>site inspection of the proposal site by the Roads and Maritime</td>
<td></td>
</tr>
<tr>
<td>Aboriginal Cultural Heritage Officer revealed there are no registered</td>
<td></td>
</tr>
<tr>
<td>sites near the proposal and the area is unlikely to contain any</td>
<td></td>
</tr>
<tr>
<td>previously unrecorded sites due to the history of disturbance.</td>
<td></td>
</tr>
<tr>
<td>The proposal would directly impact on sites recorded by the historic</td>
<td>Long-term minor negative</td>
</tr>
<tr>
<td>heritage assessment field survey. These sites have potential local</td>
<td></td>
</tr>
<tr>
<td>heritage significance.</td>
<td></td>
</tr>
<tr>
<td>Mitigation measures provided in section 6.8 would be implemented to</td>
<td></td>
</tr>
<tr>
<td>manage impacts on historic heritage.</td>
<td></td>
</tr>
<tr>
<td>During construction there is potential for vibration from construction</td>
<td>Short-term negative</td>
</tr>
<tr>
<td>activities to impact on listed heritage structures in proximity to the</td>
<td></td>
</tr>
<tr>
<td>proposal. Mitigation measures provided in section 6.8 would be</td>
<td></td>
</tr>
<tr>
<td>implemented to manage impacts on historic heritage.</td>
<td></td>
</tr>
<tr>
<td>f. Any impact on the habitat of protected fauna (within the meaning of</td>
<td>Long-term minor negative</td>
</tr>
<tr>
<td>the National Parks and Wildlife Act 1974)?</td>
<td></td>
</tr>
<tr>
<td>The proposal would remove and/or impact about 33.4 hectares of</td>
<td></td>
</tr>
<tr>
<td>predominantly planted and exotic vegetation. The proposal would not</td>
<td></td>
</tr>
<tr>
<td>result in a significant impact to any protected species.</td>
<td></td>
</tr>
<tr>
<td>The proposal would have minimal impacts to flora and fauna during</td>
<td></td>
</tr>
<tr>
<td>operation. Mitigation measures provided in section 6.2 would be</td>
<td></td>
</tr>
<tr>
<td>implemented to minimise potential impacts on biodiversity.</td>
<td></td>
</tr>
<tr>
<td>Factor</td>
<td>Impact</td>
</tr>
<tr>
<td>--------</td>
<td>--------</td>
</tr>
<tr>
<td>g. Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air?</td>
<td>Long-term minor negative</td>
</tr>
<tr>
<td>The proposal would remove and/or impact about 33.4 hectares of predominantly planted and exotic vegetation. The proposal would not result in a significant impact to any protected species. The proposal would have minimal impacts to flora and fauna during operation. Mitigation measures provided in section 6.2 would be implemented to minimise potential impacts on biodiversity.</td>
<td></td>
</tr>
<tr>
<td>h. Any long-term effects on the environment?</td>
<td>Long-term positive</td>
</tr>
<tr>
<td>The proposal would reduce travel times and congestion, improve safety for road users, remove the existing rail level crossing on the New England Highway and provide unimpeded access for emergency services to the western side of the Great Northern Railway.</td>
<td></td>
</tr>
<tr>
<td>The proposal would remove and/or impact about 33.4 hectares of predominantly planted and exotic vegetation. The proposal would not result in a significant impact to any protected species.</td>
<td>Long-term minor negative</td>
</tr>
<tr>
<td>The proposal would involve construction of four kilometres of new two lane highway to the west of Scone. The land through which the proposal passes is currently either agricultural land used for predominantly low intensive grazing or part of the Scone golf course. Some of these lands would be subject to acquisition. The proposal would also result in altered traffic movements in the vicinity of St Aubins and Aberdeen streets, and would result in changed flooding patterns and increased road traffic noise for parts of western Scone.</td>
<td>Long-term negative</td>
</tr>
<tr>
<td>i. Any degradation of the quality of the environment?</td>
<td>Long-term positive</td>
</tr>
<tr>
<td>The proposal would reduce traffic congestion and improve safety and amenity within the Scone town centre. It would also remove the existing rail level crossing on the New England Highway and provide unimpeded access for emergency services and the general community to the western side of the Great Northern Railway. During construction there is potential for short term impacts associated with traffic, visual, dust, water quality, noise and vibration. These impacts would be minimised through the implementation of safeguards summarised in section 7.</td>
<td>Short-term minor negative</td>
</tr>
<tr>
<td>j. Any risk to the safety of the environment?</td>
<td></td>
</tr>
<tr>
<td>Factor</td>
<td>Impact</td>
</tr>
<tr>
<td>-----------------------------------------------------------------------</td>
<td>-------------------------------------------</td>
</tr>
<tr>
<td>The proposal would reduce travel times and congestion, improve safety for road users, remove the existing rail level crossing on the New England Highway and provide unimpeded access for emergency services to the western side of the Great Northern Railway.</td>
<td>Long-term positive</td>
</tr>
<tr>
<td>There is potential for road safety to be decreased during construction due to altered traffic conditions and increased heavy vehicle movements. Traffic management safeguards including the preparation of a traffic management plan, would address safety risks.</td>
<td>Short-term potential negative</td>
</tr>
<tr>
<td>k. Any reduction in the range of beneficial uses of the environment?</td>
<td></td>
</tr>
<tr>
<td>The proposal would reduce travel times and congestion, improve safety for road users, remove the existing rail level crossing on the New England Highway and provide unimpeded access for emergency services to the western side of the Great Northern Railway. These benefits could result in opportunities for beneficial uses of areas within and surrounding Scone.</td>
<td>Long-term positive</td>
</tr>
<tr>
<td>During construction, minor traffic impacts due to an increase in heavy vehicle movements and potential interruptions to traffic flow would temporarily reduce the beneficial use of the local road network. The proposal would pass over the western edge of the Bill Rose Sports Complex. During construction safe access to the sports complex would be retained however some of the netball courts would be closed for safety reasons. A playing field, public park and dog park would also be closed during construction. During construction there is potential for short term amenity impacts. Operation of the proposal is not expected to significantly impact on users of the sports complex, however due to the location of the overbridge an alternate site for the playing field and public park would be required in consultation with council.</td>
<td>Short-term minor negative</td>
</tr>
<tr>
<td>The proposal would involve construction of four kilometres of new two lane highway to the west of Scone. The land through which the proposal passes is currently either agricultural land used for predominantly low intensive grazing or part of the Scone golf course. Some of these lands would be subject to acquisition. As a result the proposal would result in a reduction in the range of beneficial uses of the parcels of land that it impacts.</td>
<td>Long-term negative</td>
</tr>
<tr>
<td>l. Any pollution of the environment?</td>
<td></td>
</tr>
<tr>
<td>The proposal would reduce travel times and congestion and improve safety for road users. This would result improvements to the amenity (including noise and air pollution) within the centre of Scone and improve traffic efficiency on the new section of New England Highway.</td>
<td>Long-term positive</td>
</tr>
<tr>
<td>Factor</td>
<td>Impact</td>
</tr>
<tr>
<td>--------</td>
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</tr>
<tr>
<td>The proposal could potentially result in minor short-term water pollution from sediments, soil nutrients, waste, and spilt fuels and chemicals. Management of water quality impacts would be undertaken in accordance with the mitigation measures summarised in section 7. The proposal would result in minor short-term air pollution from plant and machinery and the generation of dust during construction. Management of air quality impacts would be undertaken in accordance with the mitigation measures outlined in section 6.9.</td>
<td>Short-term minor negative</td>
</tr>
<tr>
<td>The proposal could involve the removal and disposal of asbestos waste which would be adequately managed in accordance with safeguards provided in section 6.13. All other waste streams generated during construction are common and would pose no difficulty in their disposal. Waste would be recycled wherever possible.</td>
<td>Short-term minor negative</td>
</tr>
<tr>
<td>All resources required for the proposal are readily available and are not in short supply.</td>
<td>nil</td>
</tr>
<tr>
<td>The long-term effect of the proposal would have a positive cumulative impact on travel times, road safety and efficiency, facilitating the anticipated increase in traffic volumes as a result of future traffic predictions and population growth. The proposal would result in improved safety for Scone with the removal of the existing rail level crossing and an improved transport corridor for through traffic in the Upper Hunter area.</td>
<td>Long-term positive</td>
</tr>
<tr>
<td>Temporary potential cumulative impacts may occur as a result of construction activities occurring simultaneously with other projects in the local area. Cumulative impacts are not expected to be significant and would be minimised through the application of individual project specific environmental safeguards and management measures.</td>
<td>Short-term minor negative</td>
</tr>
<tr>
<td>The proposal is not located in proximity to the coast.</td>
<td>nil</td>
</tr>
</tbody>
</table>
Matters of National Environmental Significance

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

<table>
<thead>
<tr>
<th>Factor</th>
<th>Impact</th>
</tr>
</thead>
</table>
| Any impact on a World Heritage property?  
No world heritage listed properties are located within a ten kilometre radius of the proposal site. | nil |
| Any impact on a National Heritage place?  
No national heritage places are located within a ten kilometre radius of the proposal site. | nil |
| Any impact on a wetland of international importance?  
No wetlands of international importance are located within a ten kilometre radius of the proposal site. | nil |
| Any impact on a listed threatened species or communities?  
The proposal would not result in significant impacts on any threatened species or communities. The proposal would remove and/or impact about 33.4 hectares of predominantly planted and exotic vegetation including about 6.5 hectares of potential foraging habitat for the Grey-headed Flying-fox. An assessment of significance (Appendix E) concluded that the proposal is unlikely to have a significant impact on this species given that:  
• Vegetation to be removed is likely to be outside the species home range (as it about 60 kilometres from the nearest roost camp) and comprises a negligible proportion of potential foraging habitat present in surrounding areas and the broader locality  
• The proposal would not result in the isolation of potential foraging habitat could affect the foraging or dispersive movements of this species. | nil |
### Factor

<table>
<thead>
<tr>
<th>Any impacts on listed migratory species?</th>
</tr>
</thead>
<tbody>
<tr>
<td>An assessment of the likelihood of occurrence of migratory species was undertaken for the proposal (Appendix C). This assessment found that based on the nature and condition of habitat and recent local records (including the results of the field survey for the proposal) there are three migratory species listed under the EPBC Act that may utilise the proposal site on an opportunistic or seasonal basis. These are:</td>
</tr>
<tr>
<td>Cattle Egret (<em>Ardea ibis</em>)</td>
</tr>
<tr>
<td>Great Egret (<em>Ardea alba</em>)</td>
</tr>
<tr>
<td>Rainbow Bee-eater (<em>Merops ornatus</em>)</td>
</tr>
<tr>
<td>An assessment of significance using the <em>Significant Impact Guidelines 1.1: Matters of National Environmental Significance</em> (DSEWPaC 2013) have been prepared for migratory species listed under the EPBC Act with a moderate likelihood of occurrence in the study area. This assessment concluded that the proposal would be unlikely to result in a significant impact on any of these migratory species. The full assessment of significance is provided in Appendix E.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Any impact on a Commonwealth marine area?</th>
</tr>
</thead>
<tbody>
<tr>
<td>The proposal would not have any impact on a Commonwealth marine area.</td>
</tr>
<tr>
<td>nil</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Any impact on the Great Barrier Reef Marine Park?</th>
</tr>
</thead>
<tbody>
<tr>
<td>The proposal would not impact on the Great Barrier Reef Marine Park.</td>
</tr>
<tr>
<td>nil</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Does the proposal involve a nuclear action (including uranium mining)?</th>
</tr>
</thead>
<tbody>
<tr>
<td>The proposal does not involve a nuclear action.</td>
</tr>
<tr>
<td>Not applicable</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Any impact on a water resource, in relation to coal seam gas development and large coal mining development?</th>
</tr>
</thead>
<tbody>
<tr>
<td>The proposal is not a coal seam gas development or large coal mining development.</td>
</tr>
<tr>
<td>Not applicable</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Any impact (direct or indirect) on Commonwealth land?</th>
</tr>
</thead>
<tbody>
<tr>
<td>The proposal would not impact Commonwealth land.</td>
</tr>
<tr>
<td>nil</td>
</tr>
</tbody>
</table>
Appendix B

Concept design plans
Appendix C

Biodiversity likelihood of occurrence table
**Threatened Biota Habitat Table**

### Databases Searched

Office of Environment and Heritage (OEH) (2015a) Threatened species profiles- threatened ecological communities known or predicted to occur within the Hunter CMA subregion.

Department of the Environment (DoE) (2015a) EPBC PMST Online Search including a 10 km buffer.

Department of Primary Industries (DPI) (2014) Records viewer search for threatened and protected aquatic species - Hunter/Central Rivers CMA.

Office of Environment and Heritage (OEH) (2015b) NSW Wildlife Atlas Search - threatened species results within a 10 km buffer

Note: Marine species which are restricted to marine environments only (such as whales, dolphins, sharks and seabirds) are excluded from the Likelihood of Occurrence Table as there is no marine habitat in the proposal site.

### Likelihood of Occurrence

Matters considered in determining the likelihood of occurrence include:

- Known natural distributions including prior records (database searches) and site survey results.
- Geological/ soil preferences.
- Specific habitat requirements (e.g. aquatic environs, seasonal nectar resources, tree hollows etc).
- Climatic considerations (e.g. wet summers; snow fall).
- Home range size and habitat dependence.
- Topographical preferences (e.g. coastal headlands, ridgetops, midslopes, gilgai, wetlands).

The likelihood of occurrence scale is defined in the following table.

<table>
<thead>
<tr>
<th>Scale</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Known</td>
<td>Species known to occur within the site (e.g. breeding and foraging habitat; foraging habitat; movement corridors). Detected on or immediately adjacent to the site.</td>
</tr>
<tr>
<td>High</td>
<td>Presence of high value suitable habitat (e.g. breeding and foraging habitat; important movement corridors). Not detected.</td>
</tr>
<tr>
<td>Moderate</td>
<td>Presence of medium value suitable habitat (e.g. disturbed breeding conditions; constrained foraging habitat; movement corridors). Not detected.</td>
</tr>
<tr>
<td>Low/Unlikely</td>
<td>Presence of low value suitable habitat (e.g. disturbed conditions; isolated small habitat area; fragmented movement corridors). Not detected.</td>
</tr>
<tr>
<td>None</td>
<td>No suitable habitat or corridors linking suitable habitat present. Not detected.</td>
</tr>
<tr>
<td>Scientific name</td>
<td>Common name</td>
</tr>
<tr>
<td>-----------------</td>
<td>-------------</td>
</tr>
<tr>
<td><strong>EECs</strong></td>
<td></td>
</tr>
<tr>
<td>Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions</td>
<td>-</td>
</tr>
<tr>
<td>Central Hunter Valley eucalypt forest and woodland</td>
<td>-</td>
</tr>
<tr>
<td>Scientific name</td>
<td>Common name</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Coolibah – Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions</td>
<td>-</td>
</tr>
<tr>
<td>Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived native Grassland of South-eastern Australia</td>
<td>-</td>
</tr>
<tr>
<td>Scientific name</td>
<td>Common name</td>
</tr>
<tr>
<td>-----------------</td>
<td>-------------</td>
</tr>
<tr>
<td>Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland</td>
<td>-</td>
</tr>
<tr>
<td>Central Hunter Ironbark - Spotted Gum-Grey Box Forest in the New South Wales North Coast and Sydney Basin Bioregions</td>
<td>-</td>
</tr>
<tr>
<td>Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions</td>
<td>-</td>
</tr>
</tbody>
</table>
## Endangered ecological communities (EEC) known or predicted to occur in the locality

<table>
<thead>
<tr>
<th>Scientific name</th>
<th>Common name</th>
<th>TSC/FM Act</th>
<th>EPBC Act</th>
<th>Habitat association</th>
<th>Likelihood of occurrence at proposal site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions</td>
<td>-</td>
<td>EEC</td>
<td>VEC</td>
<td>Coastal Saltmarsh occurs in the intertidal zone on the shores of estuaries and lagoons that are permanently or intermittently open to the sea. It is frequently found as a zone on the landward side of mangrove stands. Characteristic plants include <em>Baumea juncea</em>, Sea Rush (<em>Juncus krausii subsp. australiensis</em>), Samphire (<em>Sarcocornia quinqueflora subsp. quinqueflora</em>), Marine Couch (<em>Sporobolus virginicus</em>), Streaked Arrowgrass (<em>Triglochin striata</em>), Knobby Club-rush (<em>Ficinia nodosa</em>), Creeping Brookweed (<em>Samolus repens</em>), Swamp Weed (<em>Selliera radicans</em>), Seablite (<em>Suaeda australis</em>) and Prickly Couch (<em>Zoysia macrantha</em>).</td>
<td>Absent from the proposal site.</td>
</tr>
<tr>
<td>Hunter Valley Footslopes Slaty Gum Woodland in the Sydney Basin Bioregion</td>
<td>-</td>
<td>EEC</td>
<td>-</td>
<td>Hunter Valley Footslopes Slaty Gum Woodland typically forms a woodland, or occasionally forest, comprising a sparse to moderately dense tree stratum, occasional low tree stratum, and moderately dense to dense shrub stratum. The tree canopy is typically dominated by <em>Eucalyptus dawsonii</em> (Slaty Gum) and/or <em>Eucalyptus moluccana</em> (Grey Box). <em>Acacia salicina</em> (Cooba) and <em>Allocasuarina luehmannii</em> (Buloke) may form a low tree stratum, or may be part of the upper-most canopy. This community generally occurs at the interface of Narrabeen Sandstone and Permian sediments in the Hunter Valley</td>
<td>Absent from the proposal site.</td>
</tr>
<tr>
<td>Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions</td>
<td>-</td>
<td>EEC</td>
<td>-</td>
<td>Hunter Floodplain Red Gum Woodland typically forms a tall to very tall (18-35 m) woodland. Stands on major floodplains are generally dominated by <em>Eucalyptus camaldulensis</em> (River Red Gum) in combinations with <em>Eucalyptus tereticornis</em> (Forest Red Gum), <em>Eucalyptus melliodora</em> (Yellow Box) and <em>Angophora floribunda</em> (Rough-barked Apple). This community generally occurs on floodplains and associated floodplain rises along the Hunter River.</td>
<td>Absent from the proposal site.</td>
</tr>
<tr>
<td>Scientific name</td>
<td>Common name</td>
<td>TSC/FM Act</td>
<td>EPBC Act</td>
<td>Habitat association</td>
<td>Likelihood of occurrence at proposal site</td>
</tr>
<tr>
<td>---------------------------------------------------------------------------------</td>
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<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>------------------------------------------</td>
</tr>
<tr>
<td>Lower Hunter Spotted-Gum Ironbark Forest in the Sydney Basin Bioregion</td>
<td>-</td>
<td>EEC</td>
<td>-</td>
<td>Restricted to a range of approximately 65 km by 35 km centred on the Cessnock - Beresfield area in the Central and Lower Hunter Valley. Remnants occur within the Local Government Areas of Cessnock, Maitland, Singleton, Lake Macquarie, Newcastle and Port Stephens but may also occur elsewhere within the bioregion. Outliers are also present on the eastern escarpment of Pokolbin and Corrabare State Forests on Narrabeen Sandstone. Occurs principally on Permian geology in the central to lower Hunter Valley. The community is strongly associated with, though not restricted to, the yellow podsolic and solodic soils of the Lower Hunter soil landscapes of Aberdare, Branxton and Neath.</td>
<td>Absent from the proposal site.</td>
</tr>
<tr>
<td>Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions</td>
<td>-</td>
<td>EEC</td>
<td>-</td>
<td>The Hunter Lowland Redgum Forest in the Sydney Basin and NSW North Coast Bioregions is generally an open forest with most common canopy trees species being <em>Eucalyptus tereticornis</em> and <em>Eucalyptus punctata</em> although other frequently occurring canopy species are <em>Angophora costata</em>, <em>Corymbia maculata</em>, <em>Eucalyptus crebra</em> and <em>Eucalyptus moluccana</em>, with a number of other eucalypts being less frequently recorded. It is generally found on gentle slopes arising from depressions and drainage flats on permian sediments of the Hunter Valley floor.</td>
<td>Absent from the proposal site.</td>
</tr>
<tr>
<td>River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions</td>
<td>-</td>
<td>EEC</td>
<td>-</td>
<td>Occurs on flats, drainage lines and river terraces of coastal floodplains where flooding is periodic and soils generally rich in silt, lack deep humic layers and have little or no saline (salt) influence. Occurs south from Port Stephens in the NSW North Coast, Sydney Basin and South East Corner bioregions. Characterised by a tall open canopy layer of eucalypts with variable species composition.</td>
<td>Absent from the proposal site.</td>
</tr>
<tr>
<td>Scientific name</td>
<td>Common name</td>
<td>TSC/FM Act</td>
<td>EPBC Act</td>
<td>Habitat association</td>
<td>Likelihood of occurrence at proposal site</td>
</tr>
<tr>
<td>-----------------</td>
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<td>------------------------------------------</td>
</tr>
<tr>
<td>Swamp Oak Floodplain forest of the NSW North Coast, Sydney basin and South East Corner Bioregions</td>
<td>-</td>
<td>EEC</td>
<td>-</td>
<td>Typically occurs below 20 metres above sea level on waterlogged or periodically inundated flats, drainage lines, lake margins and estuarine fringes on coastal floodplains of NSW. Associated with grey-black clay-loams and sandy loams, saline or sub-saline groundwater. Structure variable from open forests to scrubs or reedlands with scattered trees. Canopy dominated by <em>Casuarina glauca</em> (north of Bermagui) or <em>Melaleuca ericifolia</em> (south of Bermagui). Understorey characterised by frequent occurrences of vines, a sparse cover of shrubs, and a continuous groundcover of forbs, sedges, grasses and leaf litter.</td>
<td>Absent from the proposal site.</td>
</tr>
<tr>
<td>Swamp Sclerophyll forest on Coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions</td>
<td>-</td>
<td>EEC</td>
<td>-</td>
<td>Usually occurs below 20 metres above sea level (sometimes up to 50 metres). Associated with humic clay loams and sandy loams, on waterlogged or periodically inundated alluvial flats and drainage lines associated with coastal floodplains. Characterised by open to dense tree layer of eucalypts and paperbarks, with trees up to or higher than 25 m. Includes areas of fern land and tall reed or sedge land, where trees are sparse or absent.</td>
<td>Absent from the proposal site.</td>
</tr>
<tr>
<td>Sydney Freshwater Wetlands in the Sydney Basin Bioregion</td>
<td>-</td>
<td>EEC</td>
<td></td>
<td>Sydney Freshwater Wetlands are a complex of vegetation types largely restricted to freshwater swamps in coastal areas, occurring on sand dunes and low-nutrient sandplains along coastal areas in the Sydney Basin bioregion, varying considerably with fluctuating water levels and seasonal conditions. Characteristic species include sedges and aquatic plants such as <em>Baumea</em> species, <em>Eleocharis sphacelata</em>, <em>Gahnia</em> species, <em>Ludwigia peploides</em> ssp. <em>montevdensis</em> and <em>Persicaria</em> species. Areas of open water may occur where drainage conditions have been altered, with patches of emergent trees and shrubs also occurring. This community group has been extensively cleared and filled, with remaining remnants often small and disturbed (OEH 2010).</td>
<td>Absent from the proposal site.</td>
</tr>
</tbody>
</table>
## Endangered ecological communities (EEC) known or predicted to occur in the locality

<table>
<thead>
<tr>
<th>Scientific name</th>
<th>TSC/FM Act</th>
<th>EPBC Act</th>
<th>Habitat association</th>
<th>Likelihood of occurrence at proposal site</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lower Hunter Valley Dry Rainforest in the Sydney Basin and NSW North Coast Bioregions</strong></td>
<td>EEC</td>
<td>-</td>
<td>Lower Hunter Valley Dry Rainforest typically has a canopy of 15-25 metres high with 40-80% cover. The most common trees include <em>Elaeocarpus obovatus</em> (Hard Quandong), <em>Alectryon subcinereus</em> (Wild Quince), <em>Baloghia inophylla</em> (Brush Bloodwood), <em>Melia azedarach</em> (White Cedar), <em>Melicope micrococcia</em> (Hairy-leaved Doughwood), <em>Scolopia braunii</em> (Flintwood), <em>Streblus brunonianus</em> (Whalebone Tree), <em>Mallotus philippensis</em> (Red Kamala), <em>Capparis arborea</em> (Brush Caper Berry), <em>Olea paniculata</em> (Native Olive), <em>Guioa semiglaucha</em> (Guioa), <em>Alectryon tomentosus</em>, <em>Claoxylon australe</em> (Brittlewood), <em>Elaeodendron australis</em> var. <em>australis</em> (Red Olive Plum), <em>Diospyros australis</em> (Black Plum), and <em>Pararchidendron pruinum</em> var. <em>pruinum</em> (Snow Wood). The community usually forms a closed forest 15-20 metres high with emergent trees 20-30 metres high. Vines are abundant and there is a dense shrub and ground layer.</td>
<td>Absent from the proposal site.</td>
</tr>
<tr>
<td><strong>Hunter Valley Vine Thicket in the NSW North Coast and Sydney Basin Bioregions</strong></td>
<td>EEC</td>
<td>-</td>
<td>This community mainly occurring on Carboniferous sediments on rocky slopes. Hunter Valley Vine Thicket typically forms a low forest, usually less than 10 m tall, with a closed canopy dominated by trees, with shrubs and vines. The canopy may include the two varieties of <em>Elaeodendron australis</em> (Red Olive Plum), <em>Geijera parviflora</em> (Wilga), <em>Notelaea microcarpa</em> var. <em>microcarpa</em> (Native Olive) and <em>Alectryon oleifolius</em> subsp. <em>elongatus</em> (Western Rosewood).</td>
<td>Absent from the proposal site.</td>
</tr>
<tr>
<td>Scientific name</td>
<td>Common name</td>
<td>TSC/FM Act</td>
<td>EPBC Act</td>
<td>Habitat association</td>
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</tr>
<tr>
<td>Hunter Valley Weeping Myall Woodland of the Sydney Basin Bioregion</td>
<td>-</td>
<td>EEC</td>
<td>CEEC</td>
<td>Hunter Valley Weeping Myall Woodland of the Sydney Basin bioregion typically has a dense to open tree canopy up to about 15 m tall, depending on disturbance and regrowth history (Peake 2005). The most common tree is <em>Acacia pendula</em> (Weeping Myall), which may occur with <em>Eucalyptus crebra</em> (Narrow-leaved Ironbark), <em>A. salicina</em> (Cooba) and/or trees within the <em>A. homalophylla</em> - <em>A. melvillei</em> complex. It is associated with heavy clay soils on depositional landforms in the south-western part of the Hunter River valley floor.</td>
</tr>
<tr>
<td>Kurri Sand Swamp Woodland in the Sydney Basin Bioregion</td>
<td>-</td>
<td>EEC</td>
<td>-</td>
<td>Kurri Sand Swamp Woodland is or has been known to occur in the Kurri Kurri - Cessnock area in the lower Hunter Valley, in the local government area of Cessnock, but may occur elsewhere. Kurri Sand Swamp Woodland generally ranges from low open-woodland to low woodland and open scrub. There is generally a low open canopy rarely exceeding 15 metres in height, with <em>Eucalyptus parramattensis subsp. decadens</em>, <em>Angophora bakeri</em> and occasionally <em>Eucalyptus signata</em> and <em>Eucalyptus sparsifolia</em>.</td>
</tr>
<tr>
<td>Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions</td>
<td>-</td>
<td>EEC</td>
<td>CEEC</td>
<td>Littoral Rainforest is generally a closed forest, the structure and composition of which is strongly influenced by its proximity to the ocean. The plant species of this community are predominantly rainforest species. Several species have compound leaves, and vines may be a major component of the canopy. These features differentiate littoral rainforest from forest or scrub, but while the canopy is dominated by rainforest species, scattered emergent individuals of sclerophyll species, such as <em>Angophora costata</em>, <em>Banksia integrifolia</em>, <em>Eucalyptus botryoides</em> and <em>Eucalyptus tereticornis</em> occur in many stands. The community occurs only on the coast. Occurs on sand dunes and on soil derived from underlying rocks.</td>
</tr>
<tr>
<td>Scientific name</td>
<td>Common name</td>
<td>TSC/FM Act</td>
<td>EPBC Act</td>
<td>Habitat association</td>
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</tr>
<tr>
<td>Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions</td>
<td>-</td>
<td>EEC</td>
<td>CEEC</td>
<td>Lowland Rainforest may be associated with a range of high-nutrient geological substrates, notably basalts and fine-grained sedimentary rocks, on coastal plains and plateaux, footslopes and foothills. Lowland Rainforest, in a relatively undisturbed state, has a closed canopy, characterised by a high diversity of trees whose leaves may be mesophyllous and encompass a wide variety of shapes and sizes. Typically, the trees form three major strata: emergents, canopy and subcanopy which, combined with variations in crown shapes and sizes, give the canopy an irregular appearance (Floyd 1990). The trees are taxonomically diverse at the genus and family levels, and some may have buttressed roots. A range of plant growth forms are present in Lowland Rainforest, including palms, vines and vascular epiphytes. Scattered eucalypt emergents (e.g. <em>Eucalyptus grandis</em>, <em>E. saligna</em>) may occasionally be present. In disturbed stands of this community the canopy continuity may be broken, or the canopy may be smothered by exotic vines.</td>
</tr>
<tr>
<td>Warkworth Sands Woodland in the Sydney Basin Bioregion</td>
<td>-</td>
<td>EEC</td>
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<td>Warkworth Sands Woodland is generally of woodland to low woodland structure with trees of <em>Angophora floribunda</em> and <em>Banksia integrifolia</em>, and shrubs and ground species including <em>Acacia filicifolia</em>, <em>Pteridium esculentum</em>, <em>Imperata cylindrica</em>, <em>Brachyloma daphnoides</em> and <em>Melaleuca thymifolia</em>. The community occurs on aeolian sand deposits south east of Singleton in the Hunter Valley. This ecological community is currently known to occur in the local government area of Singleton but may occur elsewhere in the Bioregion.</td>
</tr>
</tbody>
</table>
### Endangered ecological communities (EEC)
known or predicted to occur in the locality

<table>
<thead>
<tr>
<th>Scientific name</th>
<th>Common name</th>
<th>TSC/FM Act</th>
<th>EPBC Act</th>
<th>Habitat association</th>
<th>Likelihood of occurrence at proposal site</th>
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</thead>
<tbody>
<tr>
<td>White Box Yellow Box Blakely’s Red Gum Woodland</td>
<td>-</td>
<td>EEC</td>
<td>CEEC</td>
<td>White Box Yellow Box Blakely’s Red Gum Woodland (commonly referred to as Box-Gum Woodland) is an open woodland community (sometimes occurring as a forest formation), in which the most obvious species are one or more of the following: White Box <em>Eucalyptus albens</em>, Yellow Box <em>E. melliodora</em> and Blakely’s Red Gum <em>E. blakelyi</em>. Box-Gum Woodland is found from the Queensland border in the north, to the Victorian border in the south. It occurs in the tablelands and western slopes of NSW.</td>
<td><strong>Absent</strong> from the proposal site.</td>
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<td><strong>FLORA</strong></td>
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<tr>
<td><strong>Cymbidium canaliculatum - endangered population</strong></td>
<td>-</td>
<td>EP</td>
<td>-</td>
<td>The Hunter population is known to occur naturally as far south as Weston and Pokolbin in the Lower Hunter, which represents its south-eastern geographic limit, but appears to be more centred in the Upper Hunter, predominantly north of Singleton. In this area it is chiefly known from an area bounded by Ravensworth, Muswellbrook, Denman and Sandy Hollow, but extends northwards to the Aberdeen – Scone – Wingen districts. Isolated occurrences are also known from the Merriwa plateau, Bylong valley and the Gungal area near Goulburn River (including the Goulburn River National Park). An epiphytic orchid (with sympodial growth) which grows in the hollows and forks of eucalypts and wattles, usually occurring singly or as a single clump, typically between two and six metres above the ground.</td>
<td>Previously recorded in locality (OEH 2014b).</td>
</tr>
<tr>
<td><strong>Cynanchum elegans</strong></td>
<td>White-flowered Wax Plant</td>
<td>E</td>
<td>E</td>
<td>Occurs from Gerroa (Illawarra) to Brunswick Heads and west to Merriwa in the upper Hunter. Most common near Kempsey. Usually occurs on the edge of dry rainforest or littoral rainforest, but also occurs in Coastal Banksia Scrub, open forest and woodland, and Melaleuca scrub. Soil and geology types are not limiting.</td>
<td>Predicted to occur in locality (DotE 2015).</td>
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<tr>
<td><em>Eucalyptus camaldulensis</em></td>
<td>River Red Gum</td>
<td>EP</td>
<td>-</td>
<td>The Hunter population occurs from the west at Bylong, south of Merriwa, to the east at Hinton, on the bank of the Hunter River, in the Port Stephens local government area. It has been recorded in the local government areas of Lithgow, Maitland, Mid-Western Regional, Muswellbrook, Port Stephens, Singleton and Upper Hunter. Prior to European settlement, between 10,000 and 20,000 ha of habitat suitable for the River Red Gum occurred in the Hunter catchment. Today only 19 stands are known, occupying at most c. 100 ha, the largest remnant being 15 - 20 ha in extent. Smaller remnants contain only one to several trees. The total number of individuals is estimated to be between 600 - 1000 mature or semi mature trees. May occur with <em>Eucalyptus tereticornis</em>, <em>Eucalyptus melliodora</em>, <em>Casuarina cunninghamiana</em> subsp. <em>cunninghamiana</em> and <em>Angophora floribunda</em></td>
<td>Previously recorded in locality (OEH 2014b).</td>
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<tr>
<td><em>Eucalyptus camfieldii</em></td>
<td>Camfield’s Stringybark</td>
<td>V</td>
<td>V</td>
<td>Occurs from Raymond Terrace to Waterfall, with populations known from Norah Head (Tuggerah Lakes), Peats Ridge, Mt Colah, Elvina Bay Trail (West Head), Terrey Hills, Killara, North Head, Menai and the Royal NP. Occurs in exposed situations on sandstone plateaus, ridges and slopes near the coast, often on the boundary of tall coastal heaths or low open woodland. It grows in shallow sandy soils overlying Hawkesbury sandstone.</td>
<td>Previously recorded in locality (OEH 2014b).</td>
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<tr>
<td><em>Euphrasia arguta</em></td>
<td>-</td>
<td>CE</td>
<td>CE</td>
<td><em>Euphrasia arguta</em> is an erect annual herb ranging in height from 20-35 cm. Historic records of the species noted the following habitats: ‘in the open forest country around Bathurst in sub humid places’, ‘on the grassy country near Bathurst’, and ‘in meadows near rivers’. Plants from the Nundle area have been reported from eucalypt forest with a mixed grass and shrub understorey; here, plants were most dense in an open disturbed area and along the roadside, indicating the species had regenerated following disturbance.</td>
<td>Predicted to occur in locality (DotE 2015).</td>
</tr>
<tr>
<td><em>Prasophyllum petilum</em></td>
<td>Tarengo Leek Orchid</td>
<td>-</td>
<td>E</td>
<td>Occurs at 4 sites in NSW (Captains Flat Cemetery, Ilford Cemetery, Steves TSR at Delegate and Tarengo TSR near Boorowa). Also at Hall in ACT. Grows on relatively fertile soils in grassy woodland or natural grassland. Occurs in relatively moist, poorly drained areas.</td>
<td>Predicted to occur in locality (DotE 2015).</td>
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<tr>
<td><em>Prasophyllum</em> sp. Wybong (C.Phelps ORG 5269)</td>
<td>-</td>
<td>-</td>
<td>CE</td>
<td><em>Prasophyllum</em> sp. Wybong occurs within the Border Rivers (Gwydir, Namoi, Hunter), Central Rivers and Central West Natural Resource Management Regions. <em>Prasophyllum</em> sp. Wybong is known to occur in open eucalypt woodland and grassland</td>
<td><strong>Predicted</strong> to occur in locality (DotE 2015).</td>
</tr>
<tr>
<td><em>Thesium austral</em></td>
<td>Austral Toadflax</td>
<td>V</td>
<td>V</td>
<td>Found in small, scattered populations along the east coast, northern and southern tablelands. Occurs in grassland or grassy woodland, and is often found in association with Kangaroo Grass (<em>Themeda australis</em>).</td>
<td><strong>Predicted</strong> to occur in locality (DotE 2015).</td>
</tr>
<tr>
<td><em>Tylophora linearis</em></td>
<td>-</td>
<td>-</td>
<td>E</td>
<td><em>Tylophora linearis</em> has rarely been collected and is known from eight localities in the Dubbo area and Mt Crow near Barraba in NSW, and “Myall Park” near Glenmorgan in Queensland. <em>Tylophora linearis</em> grows in dry scrub, open forest and woodlands associated with <em>Melaleuca uncinata</em>, <em>Eucalyptus fibrosa</em>, <em>E. sideroxylon</em>, <em>E. albena</em>, <em>Callitris endlicheri</em>, <em>C. glaucophylla</em>, * Allocasuarina luehmannii*, <em>Acacia hakeoides</em>, <em>A. lineata</em>, <em>Myoporum</em> spp., and <em>Casuarina</em> spp.</td>
<td><strong>Predicted</strong> to occur in locality (DotE 2015).</td>
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<td><strong>Birds</strong></td>
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<tr>
<td><em>Anthochaera phrygia</em></td>
<td>Regent Honeyeater</td>
<td>CE</td>
<td>E</td>
<td>In NSW confined to two known breeding areas: the Capertee Valley and Bundarra-Barraba region. Non-breeding flocks occasionally seen in coastal areas foraging in flowering Spotted Gum and Swamp Mahogany forests, presumably in response to drought. Inhabits dry open forest and woodlands, particularly Box-Ironbark woodland and riparian forests of River Sheoak, with an abundance of mature trees, high canopy cover and abundance of mistletoes.</td>
<td>Predicted to occur in locality (DotE 2015).</td>
</tr>
<tr>
<td><em>Botaurus poiciloptilus</em></td>
<td>Australasian Bittern</td>
<td>E</td>
<td>E</td>
<td>Widespread but uncommon over most NSW except the northwest. Favours permanent freshwater wetlands with tall dense reedbeds particularly <em>Typha</em> spp. and <em>Eleocharis</em> spp., with adjacent shallow, open water for foraging. Roosts during the day amongst dense reeds or rushes and feeds mainly at night on frogs, fish, yabbies, spiders, insects and snails.</td>
<td>Predicted to occur in locality (DotE 2015).</td>
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<tr>
<td><em>Calyptorhynchus lathami</em></td>
<td>Glossy Black-Cockatoo</td>
<td>V</td>
<td>-</td>
<td>Widespread but uncommon from coast to southern tablelands and central western plains. Feeds almost exclusively on the seeds of <em>Allocasuarina</em> species. Prefers woodland and open forests, rarely away from Allocasuarina. Roost in leafy canopy trees, preferably eucalypts, usually &lt;1 km from feeding site. Nests in large (approx. 20 cm) hollows in trees, stumps or limbs, usually in Eucalypts (Higgins 1999).</td>
<td>Previously recorded in locality (OEH 2014b).</td>
</tr>
<tr>
<td><em>Chthonicola sagittata</em></td>
<td>Speckled Warbler</td>
<td>V</td>
<td>-</td>
<td>The Speckled Warbler has a patchy distribution throughout south-eastern Queensland, the eastern half of NSW and into Victoria, as far west as the Grampians. The species is most frequently reported from the hills and tablelands of the Great Dividing Range, and rarely from the coast. The Speckled Warbler lives in a wide range of <em>Eucalyptus</em> dominated communities that have a grassy understorey, often on rocky ridges or in gullies. Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy. Large, relatively undisturbed remnants are required for the species to persist in an area.</td>
<td>Previously recorded in locality (OEH 2014b).</td>
</tr>
<tr>
<td><em>Grantiella picta</em></td>
<td>Painted Honeyeater</td>
<td>V</td>
<td>V</td>
<td>Nomadic, occurring in low densities across most of NSW. Highest concentrations and almost all breeding occur on inland slopes of the Great Dividing Range. Inhabits Boree, Brigalow and Box Gum woodlands and Box-Ironbark forests. Specialist forager on the fruits of mistletoes, preferably of the Amyema genus. Nests in outer tree canopy.</td>
<td>Predicted to occur in locality (DotE 2015).</td>
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<tr>
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<tr>
<td><em>Lathamus discolor</em></td>
<td>Swift Parrot</td>
<td>E</td>
<td>E,M</td>
<td>Migratory, travelling to the mainland from March to October. Breeds in Tasmania from September to January. On the mainland, it mostly occurs in the southeast foraging on winter flowering eucalypts and lerp, with records of the species between Adelaide and Brisbane. Principal over-winter habitat is box-ironbark communities on the inland slopes and plains. Eucalyptus robusta, Corymbia maculata and C. gumifera dominated coastal forests are also important habitat.</td>
<td>Predicted to occur in locality (DotE 2015).</td>
</tr>
<tr>
<td><em>Pomatostomus temporalis</em></td>
<td>Grey-crowned Babbler (eastern subspecies)</td>
<td>V</td>
<td>-</td>
<td>In NSW, the eastern sub-species occurs on the western slopes of the Great Dividing Range, and on the western plains reaching as far as Louth and Balranald. It also occurs in woodlands in the Hunter Valley and in several locations on the north coast of NSW (OEH 2012). It may be extinct in the southern, central and New England tablelands. Inhabits open Box-Gum Woodlands on the slopes, and Box-Cypress-pine and open Box Woodlands on alluvial plains (OEH 2012).</td>
<td>Previously recorded in locality (OEH 2014b).</td>
</tr>
<tr>
<td><em>Rostratula australis</em></td>
<td>Australian Painted Snipe</td>
<td>E</td>
<td>E</td>
<td>In NSW many records are from the Murray-Darling Basin including the Paroo wetlands, Lake Cowal, Macquarie Marshes, Fivebough Swamp and more recently, swamps near Balliade and Wanganella. Other important locations with recent records include wetlands on the Hawkesbury River and the Clarence and lower Hunter Valleys. Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber.</td>
<td>Predicted to occur in locality (DotE 2015).</td>
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<td><strong>Mammals</strong></td>
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<tr>
<td><em>Chalinolobus dwyeri</em></td>
<td>Large-eared Pied Bat</td>
<td>V</td>
<td>V</td>
<td>Occurs from the coast to the western slopes of the divide. Largest numbers of records from sandstone escarpment country in the Sydney Basin and Hunter Valley (Hoye and Schulz 2008). Roosts in caves and mines and most commonly recorded from dry sclerophyll forests and woodlands. An insectivorous species that flies over the canopy or along creek beds (Churchill 2008). In southern Sydney appears to be largely restricted to the interface between sandstone escarpments and fertile valleys.</td>
<td>Predicted to occur in locality (DotE 2015).</td>
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<tr>
<td><em>Dasyurus maculatus</em></td>
<td>Spotted-tailed Quoll</td>
<td>V</td>
<td>E</td>
<td>Inhabits a range of environments including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Den subject sites are in hollow-bearing trees, fallen logs, small caves, rock crevices, boulder fields and rocky-cliff faces. Females occupy home ranges of up to 750 ha and males up to 3,500 ha, which are usually traversed along densely vegetated creek lines.</td>
<td>Predicted to occur in locality (DotE 2015).  Previous recorded in locality (OEH 2014b).</td>
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<tr>
<td><em>Nyctophilus corbeni</em></td>
<td>South-eastern Long-eared Bat</td>
<td>V</td>
<td>V</td>
<td>The South-eastern Long-eared Bat has a limited distribution that is restricted around the Murray-Darling Basin in south-eastern Australia. Even in this region its distribution is scattered and it is rarely recorded (Turbill &amp; Ellis 2006). It is distributed throughout inland NSW except in the north-west area which is dominated by treeless plains. It can be found in the Hunter Valley, extending from central NSW to the eastern Hunter Valley coast. Occurs in a range of vegetation types including mallee, bulloke <em>Allocasuarina leuhmannii</em> and box eucalypt dominated communities, but it is distinctly more common in box/ironbark/cypress-pine vegetation that occurs in a north-south belt along the western slopes and plains of NSW and southern Queensland... Roosts in tree hollows, crevices, and under loose bark</td>
<td>Predicted to occur in locality</td>
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<tr>
<td><em>Petrogale penicillata</em></td>
<td>Brush-tailed Rock-wallaby</td>
<td>E</td>
<td>V</td>
<td>Occurs from the Shoalhaven north to the Queensland border. Now mostly extinct west of the Great Dividing Range, except in the Warrumbungles and Mt Kaputar. Occurs on rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges facing north. Diet consists of vegetation in adjacent to rocky areas eating grasses and forbs as well as the foliage and fruits of shrubs and trees.</td>
<td>Predicted to occur in locality</td>
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<td><em>Phascolarctos cinereus</em></td>
<td>Koala</td>
<td>V</td>
<td>V</td>
<td>Occurs from coast to inland slopes and plains. Restricted to areas of preferred feed trees in eucalypt woodlands and forests. Home range varies depending on habitat quality, from &lt; 2 to several hundred hectares.</td>
<td>Predicted to occur in locality</td>
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<tr>
<td><em>Pteropus poliocephalus</em></td>
<td>Grey-headed Flying-fox</td>
<td>V</td>
<td>V</td>
<td>Roosts in camps within 20 km of a regular food source, typically in gullies, close to water and in vegetation with a dense canopy. Forages in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths, swamps and street trees, particularly in eucalypts, melaleucas and banksias. Highly mobile with movements largely determined by food availability (Eby and Law 2008). Will also forage in urban gardens and cultivated fruit crops.</td>
<td>Predicted to occur in locality (DotE 2015).</td>
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<tr>
<td><em>Vespadelus troughtoni</em></td>
<td>Eastern Cave Bat</td>
<td>V</td>
<td>-</td>
<td>The Eastern Cave Bat is found in a broad band on both sides of the Great Dividing Range from Cape York to Kempsey, with records from the New England Tablelands and the upper north coast of NSW. Very little is known about the biology of this uncommon species. A cave-roosting species that is usually found in dry open forest and woodland, near cliffs or rocky overhangs; has been recorded roosting in disused mine workings, occasionally in colonies of up to 500 individuals. Occasionally found along cliff-lines in wet eucalypt forest and rainforest. Little is understood of its feeding or breeding requirements or behaviour.</td>
<td>Previously recorded in locality (OEH 2014b).</td>
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Frogs
<table>
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<tr>
<th>Threatened fauna known or predicted from the locality</th>
<th>Scientific name</th>
<th>Common name</th>
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<tr>
<td></td>
<td><em>Litoria boorooolongensis</em></td>
<td>Booroolong Frog</td>
<td>E</td>
<td>E</td>
<td>The Booroolong Frog is restricted to NSW and northeastern Victoria, predominantly along the western-flowing streams of the Great Dividing Range. The species lives along permanent streams with some fringing vegetation cover such as ferns, sedges or grasses. Adults occur on or near cobble banks and other rock structures within stream margins and shelter under rocks or amongst vegetation near the ground on the stream edge.</td>
<td>Predicted to occur in locality (DotE 2015).</td>
<td>Unlikely. No suitable habitat for this species exists within the study area.</td>
</tr>
<tr>
<td></td>
<td><em>Aprasia parapulchella</em></td>
<td>Pink-tailed Worm Lizard</td>
<td>V</td>
<td>V</td>
<td>Populations occur in the Queanbeyan/Canberra district, Cooma, Yass, Bathurst, Albury and West Wyalong areas. Inhabits grassland and open woodland with substantial embedded rock cover in sunny situations. Recorded in both native and non-native grasslands. Usually recorded under small rocks (150 - 600 mm basal area) shallowly embedded in the soil (2 - 5 cm, and use ant burrows under these rocks.</td>
<td>Predicted to occur in locality (DotE 2015).</td>
<td>Unlikely. No suitable habitat for this species exists within the study area.</td>
</tr>
</tbody>
</table>

All information in this table is taken from NSW OEH and Commonwealth DoE Threatened Species profiles (OEH 2015a, DotE 2015a) unless otherwise stated. The codes used in this table are: CE – critically endangered; E – endangered; V – vulnerable; EP – endangered population; CEEC – critically endangered ecological community; EEC – endangered ecological community
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<thead>
<tr>
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<th>EPBC Act</th>
<th>Habitat association</th>
<th>Nature of record</th>
<th>Likelihood of occurrence in the proposal site</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Apus pacificus</em></td>
<td>Fork-tailed Swift</td>
<td>-</td>
<td>M</td>
<td>Recorded in all regions of NSW. Non-breeding, and almost exclusively aerial while in Australia. Occurs over urban and rural areas as well as areas of native vegetation.</td>
<td><strong>Predicted</strong> to occur in locality (DotE 2015).</td>
<td>May occasionally fly over site</td>
</tr>
<tr>
<td><em>Ardea alba</em></td>
<td>Great Egret</td>
<td>-</td>
<td>M</td>
<td>Occurs across NSW. Within NSW there are breeding colonies within the Darling Riverine Plains and Riverina regions and minor colonies across its range including the north and north-east of the state. Reported from a wide range of wetland habitats (for example inland and coastal, freshwater and saline, permanent and ephemeral, open and vegetated, large and small, natural and artificial).</td>
<td><strong>Predicted</strong> to occur in locality (DotE 2015).</td>
<td>Possible. Suitable habitat present along creek although has not been previously recorded in locality.</td>
</tr>
<tr>
<td><em>Ardea ibis</em></td>
<td>Cattle Egret</td>
<td>-</td>
<td>M</td>
<td>Occurs across NSW. Principal breeding sites are the central east coast from Newcastle to Bundaberg. Also breeds in major inland wetlands in north NSW (notably the Macquarie Marshes). Occurs in tropical and temperate grasslands, wooded lands and terrestrial wetlands. Uses predominately shallow, open and fresh wetlands with low emergent vegetation and abundant aquatic flora. Sometimes observed in swamps with tall emergent vegetation and commonly use areas of tall pasture in moist, low-lying areas.</td>
<td><strong>Predicted</strong> to occur in locality (DotE 2015).</td>
<td>Possible. Suitable habitat present along creek although has not been previously recorded in locality.</td>
</tr>
<tr>
<td>Scientific name</td>
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<td>TSC/FM Act</td>
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</tr>
<tr>
<td>Gallinago hardwickii</td>
<td>Latham's Snipe</td>
<td>M</td>
<td></td>
<td>Occurs along the coast and west of the great dividing range. Non breeding visitor to Australia. Inhabit permanent and ephemeral wetlands up to 2000 metres above sea level. Typically in open, freshwater wetlands with low, dense vegetation (incl. swamps, flooded grasslands and heathlands). Can also occur in saline/brackish habitats and in modified or artificial habitats close to human activity.</td>
<td>Predicted to occur in locality (DotE 2015)</td>
<td>Low. Minimal suitable habitat present along creek and has not been previously recorded in locality.</td>
</tr>
<tr>
<td>Rostratula benghalensis</td>
<td>Painted Snipe</td>
<td>M</td>
<td></td>
<td>Most common in eastern Australia, it has been recorded at scattered locations throughout much of Queensland, NSW, Victoria and south-eastern South Australia. The species inhabits many different types of shallow, brackish or freshwater terrestrial wetlands, especially temporary ones which have muddy margins and small, low-lying islands. Suitable wetlands usually support a mosaic of low, patchy vegetation, as well as lignum and canegrass.</td>
<td>Predicted to occur in locality (DotE 2015)</td>
<td>Low. Minimal suitable habitat present along creek and has not been previously recorded in locality.</td>
</tr>
</tbody>
</table>

**Terrestrial species**

<table>
<thead>
<tr>
<th>Scientific name</th>
<th>Common name</th>
<th>TSC/FM Act</th>
<th>EPBC Act</th>
<th>Habitat association</th>
<th>Nature of record</th>
<th>Likelihood of occurrence in the proposal site</th>
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</thead>
<tbody>
<tr>
<td>Haliaeetus leucogaster</td>
<td>White-bellied Sea-eagle</td>
<td>M</td>
<td></td>
<td>Primarily coastal but may extend inland over major river systems. Breeds close to water, mainly in tall open forest/woodland but also in dense forest, rainforest, closed scrub or remnant trees. Usually forages over large expanses of open water, but also over open terrestrial habitats (e.g. grasslands).</td>
<td>Predicted to occur in locality (DotE 2015)</td>
<td>Unlikely. No suitable habitat for this species exists within the study</td>
</tr>
<tr>
<td>Scientific name</td>
<td>Common name</td>
<td>TSC/FM Act</td>
<td>EPBC Act</td>
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<td>Likelihood of occurrence in the proposal site</td>
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<tr>
<td><em>Hirundapus caudacutus</em></td>
<td>White-throated Needletail</td>
<td>-</td>
<td>M</td>
<td>Recorded along NSW coast to the western slopes and occasionally from the inland plains. Breeds in northern hemisphere. Almost exclusively aerial while in Australia. Occur above most habitat types, but are more frequently recorded above more densely vegetated habitats (rainforest, open forest and heathland) than over woodland or treeless areas.</td>
<td>Predicted to occur in locality (DotE 2015).</td>
<td>Unlikely. No suitable habitat for this species exists within the study</td>
</tr>
<tr>
<td><em>Merops ornatus</em></td>
<td>Rainbow Bee-eater</td>
<td>-</td>
<td>M</td>
<td>Widespread across mainland Australia. Mainly inhabits open forests and woodlands and shrublands, often in proximity to permanent water. Also occurs in cleared/semi-cleared habitats including farmland and residential areas. Excavates a nest burrow in flat/sloping ground in banks of waterways, dams, roadside cuttings, gravel pits or cliff faces. Southern populations migrate north for winter after breeding.</td>
<td>Predicted to occur in locality (DotE 2015).</td>
<td>Possible. May occur in study area during migration however have not been previously recorded in locality.</td>
</tr>
<tr>
<td><em>Monarcha melanopsis</em></td>
<td>Black-faced Monarch</td>
<td>M</td>
<td></td>
<td>Summer breeding migrant to south-east. Occurs along the coast of NSW. Inhabits rainforests, eucalypt woodlands, coastal scrub and damp gullies. It may be found in more open woodland when migrating (Birds Australia 2005).</td>
<td>Predicted to occur in locality (DotE 2015).</td>
<td>Unlikely. No suitable habitat for this species exists within the study</td>
</tr>
<tr>
<td>Scientific name</td>
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<td>EPBC Act</td>
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<tr>
<td><em>Myiagra cyanoleuca</em></td>
<td>Satin Flycatcher</td>
<td>-</td>
<td>M</td>
<td>In NSW widespread on and east of the Great Divide, sparsely scattered on the western slopes, very occasional records on the western plains. Inhabit heavily vegetated gullies in eucalypt-dominated forests and taller woodlands, often near wetlands and watercourses. On migration, occur in coastal forests, woodlands, mangroves and drier woodlands and open forests. Generally not in rainforests.</td>
<td>Predicted to occur in locality (DotE 2015).</td>
<td>Unlikely. No suitable habitat for this species exists within the study.</td>
</tr>
<tr>
<td><em>Rhipidura rufifrons</em></td>
<td>Rufous Fantail</td>
<td>-</td>
<td>M</td>
<td>Found along NSW coast and ranges. Inhabits rainforest, dense wet forests, swamp woodlands and mangroves. During migration, it may be found in more open habitats or urban areas (Birds Australia 2008).</td>
<td>Predicted to occur in locality (DotE 2015).</td>
<td>Low. May occur in study area during migration however have not been previously recorded in locality.</td>
</tr>
</tbody>
</table>

All information in this table is taken from NSW OEH and Commonwealth Department of the Environment Threatened Species profiles (OEH 2015a, DotE 2015a) unless otherwise stated. The codes used in this table are: M - migratory.
Flora and fauna species recorded within study area
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<td><em>Amaranthus deflexus</em></td>
<td>Spreading Amaranth</td>
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<td><em>Ammi majus</em></td>
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<td>Pacific Azolla</td>
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Key to table - * = exotic species

P = planted species
Appendix E

Assessments of significance for threatened and migratory species
Introduction

Assessments of significance have been prepared in accordance with the Threatened species assessment guidelines: The assessment of significance (DECC 2007) to determine the likely significance of impacts of the proposal on threatened species listed under the NSW Threatened Species Conservation Act 1995 (TSC Act). The Assessments of Significance have been prepared for those species that may forage and roost/nest on the site at least on occasion and hence may be impacted by the proposal.

Assessments of significance have been prepared for the following species and populations

- Grey-headed Flying Fox (*Pteropus poliocephalus*) - listed as vulnerable under the TSC Act
- River Red Gum (*Eucalyptus camaldulensis*) – listed as an endangered population in the Hunter Catchment.

References:


Grey-headed Flying-fox (*Pteropus poliocephalus*)

The Grey-headed Flying-fox occurs in the coastal belt from Rockhampton in central Queensland to Melbourne in Victoria however, only a small portion of this range is used at any one time, depending on the availability of food. The species is widespread throughout its range in summer, whilst in autumn it occupies coastal lowlands and is uncommon inland (DotE 2015b).

This species requires roosting sites and foraging resources comprising fruit and nectar producing canopy species in a variety of vegetation communities including rainforest, open forest, closed and open woodland, Paperbark (*Melaleuca*) swamps, Banksia woodlands and commercial fruit crops and introduced species in urban environments (DotE 2015b).

Grey-headed Flying-fox were not observed within the proposal site but suitable foraging habitat (in the form of blossom-producing trees) was identified within the proposal site. There are no camp sites or breeding habitat for this species within the proposal site.

The proposal would result in the removal of up to 6.5 hectares of native vegetation identified as providing a suitable foraging resource for the Grey-headed Flying-fox.

EP&A Act Section 5A – Assessment of Significance

Grey-headed Flying-fox (Vulnerable)

a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction
### Grey-headed Flying-fox (Vulnerable)

The Grey-headed Flying-fox was not recorded within the study area. This species roosts communally in large, established camps which may support several thousand individuals. However, the closest recorded roost camp is approximately 60 km south of the study area (DotE 2015c) and would not be affected by the proposal. The species is unlikely to utilise the proposal site for foraging as it generally does not travel more than 50 kilometres from their roost to forage at night. The closest records of the Grey-headed Flying-fox are approximately 10 kilometres south of the proposal site (OEH 2015a) The proposal would remove up to 6.5 hectares of potential foraging habitat for this species, containing known preferred feed trees. The scattered trees to be removed along the alignment are a large distance from a known roost camp and there are large patches of forest closer to the nearest roost camp which is likely to be preferred habitat for the species.

The proposal would lead to an increase in noise, vibration and dust generation during the construction of the proposal. As construction would occur during the day this would not affect the foraging movements of this nocturnal species. The proposal would not isolate any areas of habitat or cause significant habitat fragmentation that would affect the breeding, foraging or dispersive movements of this highly mobile species.

The proposal is unlikely to impact the lifecycle of the species such that viable local population would be placed at risk of extinction.

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<th>(b)</th>
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<th>(c)</th>
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The proposal would not remove any areas of suitable breeding or roosting habitat for this species. The proposal would remove up to 6.5 hectares of mostly potential habitat for this species including 4.6 hectares of exotic grassland with planted trees and scattered remnant trees and 1.9 hectares of planted native trees. The proposal would remove a number of planted and remnant which may be utilised on occasion as foraging habitat for the species. Given the distance from the closest roost camp (60 kilometres), and the foraging range of the species (50 kilometres) it is unlikely that the species would frequent the area to forage. Furthermore the proposal has been designed to retain large trees where possible. These trees would provide important foraging resources for this species (if present) if food was unavailable elsewhere.
**EP&A Act Section 5A – Assessment of Significance**

**Grey-headed Flying-fox (Vulnerable)**

**(ii)** whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

The proposal involves the construction of a bypass that will be constructed to the western side of Scone which would pass through the Bill Rose Sports Complex and a combination of farmland and residential land. Isolated trees would be removed along the alignment. This impact would not prevent movements of this highly mobile, aerial species.

**(iii)** the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality

The proposal would remove up to 6.5 hectares of potential foraging habitat for this species. The closest record of the species is 10 kilometres south of the proposal and the nearest known roost camp is 60 kilometres from the proposal site. The species travels up to 50 kilometres to forage (DotE 2015b), so it is unlikely that the trees to be removed could be considered important habitat for the species as it is most likely outside of their home range. It is therefore considered that the removal of habitats as described above would be unlikely to threaten the long-term persistence of this species in the locality.

**(e)** whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)

No critical habitat has been listed for these species.

**(f)** whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan

The draft national recovery plan (DECCW 2009) states that foraging habitat that meets at least one of the following criteria qualifies as critical habitat:

- Productive during winter and spring, when food bottlenecks have been identified
- Known to support populations of > 30,000 individuals within an area of 50 kilometre radius (the maximum foraging distance of an adult)
- Productive during the final weeks of gestation, and during the weeks of birth, lactation and conception (September to May)
- Productive during the final stages of fruit proposal and ripening in commercial crops affected by Grey-headed Flying-foxes (months vary between regions)
- Known to support a continuously occupied camp.

Vegetation in the study area does not support a continuously occupied roost camp, and is not in a region with significant commercial fruit crops. The study area does not support a population of more than 30,000 individuals, but would contribute to available foraging resources for individuals of the population. While there would be some productivity of foraging resources during winter and spring, the resources present in the study area are limited and over 60 kilometres from the nearest known roost camp for this species. In this context the removal of up to 6.5 hectares of foraging habitat is unlikely to threaten the survival of local populations of this species.

**(g)** whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process
**EP&A Act Section 5A – Assessment of Significance**

**Grey-headed Flying-fox (Vulnerable)**

The proposed action would contribute to the operation of one KTP of relevance to this species as follows:

Clearing of vegetation – the proposal would remove about 6.5 hectares of vegetation that represents possible foraging habitat for this species.

As previously discussed, the vegetation to be removed is likely to be outside of the species home range, and would therefore represent a minor increase in the operation of this KTP.

**Conclusion of Assessment of Significance**

The proposal is unlikely to have a significant impact on the Grey-headed Flying-fox, in accordance with section 5A of the EP&A Act, given that:

- No breeding or roosting habitat would be removed
- Vegetation to be removed is likely to be outside the species home range (as it 60 kilometres from the nearest roost camp) and comprises a negligible proportion of potential foraging habitat present in surrounding areas and the broader locality; and
- The proposal would not result in the isolation of potential foraging habitat could affect the foraging or dispersive movements of this species.
River Red Gum (Eucalyptus camaldulensis)

The Hunter population occurs from the west at Bylong, south of Merriwa, to the east at Hinton, on the bank of the Hunter River, in the Port Stephens local government area. It has been recorded in the local government areas of Lithgow, Maitland, Mid-Western Regional, Muswellbrook, Port Stephens, Singleton and Upper Hunter (OEH 2015c).

Prior to European settlement, between 10,000 and 20,000 ha of habitat suitable for the River Red Gum occurred in the Hunter catchment. Today only 19 stands are known, occupying at most 100 ha, the largest remnant being 15 - 20 ha in extent. Smaller remnants contain only one to several trees. The total number of individuals is estimated to be between 600 - 1000 mature or semi mature trees (OEH 2015c).

One remnant Eucalyptus camaldulensis (River Red Gum) individual was recorded within the proposal site, a number of other planted Eucalyptus camaldulensis (River Red Gum) individuals were recorded within the study area, however as these have all been planted and their local provenance is unknown they are not considered to be part of the Hunter Catchment endangered population.

This proposition is supported by historic aerial photos that show that areas containing planted River Red Gums did not contain any trees in 1972. Furthermore the fact that these planted Eucalyptus camaldulensis (River Red Gum) occur along the fairway of the Scone Golf course over an exotic groundcover comprised of turf grasses that are regularly mown means there are no opportunities for recruitment of these species.

This of significance has been prepared to assess the significance of impacts of the project on the Hunter Catchment Endangered Population of Eucalyptus camaldulensis (River Red Gum).

### EP&A Act Section 5A – Assessment of Significance

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The proposal would result in the clearing of one remnant and five planted Eucalyptus camaldulensis individuals. The remnant individual is located on private property to the south west of the rail line and planted individual are located on a fairway of the Scone Golf Course. The provenance of these species is unknown. If the plants were to be planted from local provenance seed then they may be contributing to the local gene pool of the population. However there is also potential that if these trees are not derived from local provenance seed that they may in fact be threatening the genetic integrity of the local population. This potential threat from planted individuals of non-local provenance is recognised in the scientific determination for this species.

The planted trees are located on a fairway of a golf course which is regularly mown and maintained. There would therefore be very limited opportunity for any of these individuals to recruit new plants into the population. Within the study area there are approximately 30 other planted Eucalyptus camaldulensis individuals that would not be impacted by the proposal. These plants would continue to contribute to the local gene pool (if planted from local provenance).

It is unlikely that the removal of one remnant and five planted trees would have an adverse effect on the life cycle of Eucalyptus camaldulensis in the Hunter Catchment such endangered population would be placed at risk of extinction.
### EP&A Act Section 5A – Assessment of Significance

**Eucalyptus camaldulensis** (Endangered Population)

c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

Not applicable to this endangered population

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Not applicable to this endangered population.

d) in relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

The proposal would not remove any areas of suitable habitat for this population as the remnant individual occurs as an isolated paddock tree within a grazed lot, while the planted individuals occurs on a fairway of a golf course that is dominated by exotic and turf species and is regularly mown and maintained. Therefore there would be very limited opportunity for this species to naturally recruit within the proposal area.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

One remnant individual and five isolated planted *Eucalyptus camaldulensis* trees would be removed from the fairway of the Scone Golf Course. The proposal would not result in habitat for this species becoming fragmented or isolated as pollinators would still be able to move between the remaining planted *Eucalyptus camaldulensis* individuals that occur within the golf course.

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality

Habitat that would be removed as a result of the proposal would include derived grasslands within grazed paddocks and maintained turf within the Scone Golf Course. It is highly unlikely that any *Eucalyptus camaldulensis* individuals would recruit within the area to be impacted as it is either heavily grazed or regularly mown and maintained and has highly compacted soils.

e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)

No critical habitat has been listed for these species.

f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan

There is no recovery plan or threat abatement plan for this population.

g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process

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**EP&A Act Section 5A – Assessment of Significance**

**Eucalyptus camaldulensis** (Endangered Population)

The proposed action would contribute to the operation of one KTP of relevance to this species as follows:

Clearing of native vegetation – Clearing of native vegetation has occurred historically within and around the proposal site. This has resulted in a variety of impacts on the remaining native vegetation including increased weed invasion due to soil disturbance and edge effects. This key threatening process would be slightly exacerbated by the removal of up to 8.65 hectares of highly modified native vegetation (derived grassland) within the proposal site.

This grassland is located in the north and south of the study area. One remnant Eucalyptus camaldulensis individual was recorded within this patch of derived grassland in the south of the study area.

**Conclusion of Assessment of Significance**

The proposal is unlikely to have a significant impact on The endangered population of *Eucalyptus camaldulensis*, in accordance with section 5A of the EP&A Act, given that:

- Only one remnant and five planted individuals would be removed.
- The genetic provenance of the planted individuals is unknown.
- There is currently little opportunity for any of these individuals to contribute to maintenance of the population through requitement as they are located either in a grazed paddock on a fairway of a golf course that is regularly mown.

The proposal would not impact on the ability of pollinators to move between other planted individuals at the golf course that would not be impacted by the proposal.
**EPBC Act - Assessment of Significance**

**Grey-Headed Flying-Fox (Vulnerable)**

According to the DotE (2013) ‘significant impact criteria’ for vulnerable species, an action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

- Lead to a long-term decrease in the size of an important population of a species

The Grey-headed Flying-fox has not been previously recorded within the proposal site, however potential foraging habitat for the species occurs within flowering eucalypts present within the remnant and native vegetation at the site. As a precautionary measure an assessment of significance has been undertaken to assess the impact of the proposal.

The estimate for the total Grey-headed Flying-fox population in all national camps was 365,000 animals. In this count 63 per cent of the counted Grey-headed Flying-foxes were in NSW (DoE, 2015). The entire Australian population of the Grey-headed Flying-fox would qualify as an important population according to DotE (2013).

Grey-headed Flying-foxes are a highly mobile species that are capable of traveling large distances in search of food. Radio-tracking, genetic and banding studies indicate that the occurrence of the Grey-headed Flying fox in Australia represents one population, with regular interchange and movement between camps throughout their range (Webb and Tidemann 1996; DoE 2014). This species roosts communally in large, established camps which may support several thousand individuals. According to the National Flying-fox Monitoring Viewer, the nearest camp is about 60 kilometres away.

Individuals of Grey-headed Flying fox could theoretically utilise native vegetation within the proposal site for foraging purposes. However The closest records of the Grey-headed Flying-fox are about 10 kilometres south of the proposal site (OEH 2015). Vegetation within the proposal site may provide seasonal foraging habitat for a few months of the year (while flowering and fruiting) and would only represent a small fraction of the foraging resources available in the locality for this species. The proposal would remove up to 6.5 hectares of potential foraging habitat for this species, containing known preferred feed trees. Given the large home range and migratory habits of this species, it is unlikely that this would lead to a long-term decrease in the size of an important population of the Grey-headed Flying-fox.

Reduce the area of occupancy of an important population

The 6.5 hectares of potential foraging habitat that would be cleared during construction consists primarily of exotic planted vegetation which contains some isolated trees. This area of potential foraging habitat is negligible in comparison to the area of occupancy for this species. The proposal is not likely to affect the occupancy of the local camp which is located 60 kilometres away. The proposal would not remove any areas of suitable breeding or roosting habitat for this species.
**EPBC Act - Assessment of Significance**

**Grey-Headed Flying-Fox (Vulnerable)**

**Fragment an existing important population into two or more populations**

The proposal is not likely to fragment an important population of the Grey-headed Flying fox, because:

- This species is highly mobile and therefore vegetation removal within the proposal site to allow construction of the proposal is not likely to affect dispersal or movement of this species.
- The proposal is not likely to have any direct or indirect effects on the permanent roost (camp) sites and therefore any breeding habitat for this species will not be fragmented.
- The minor nature and location of the proposal is unlikely to result in population fragmentation.

On the basis of the above, the proposal will not result in the fragmentation of the population of the Grey-headed Flying-fox into two or more populations.

**Adversely affect habitat critical to the survival of a species**

About 6.5 hectares of potential foraging habitat for the Grey-headed Flying-fox would be lost as a result of the proposal. While critical habitat for the Grey-headed Flying-fox has not been mapped, the *Draft National Recovery Plan* for the Grey-headed Flying-fox (DECCW 2009) defines habitat critical of the Grey-headed Flying-fox as natural foraging habitat that is:

- Productive during winter and spring, when food bottlenecks have been identified
- Known to support populations of > 30 000 individuals within an area of 50 km radius (the maximum foraging distance of an adult)
- Productive during the final weeks of gestation, and during the weeks of birth, lactation and conception (September to May)
- Productive during the final stages of fruit development and ripening in commercial crops affected by Grey-headed Flying-foxes (months vary between regions)
- Known to support a continuously occupied camp.

Vegetation in the proposal site does not support a continuously occupied roost camp. The proposal site would not support a population of more than 30,000 individuals, but would contribute to available foraging resources for individuals of the wider population. While there would be some productivity of foraging resources during winter and spring, the resources present in the proposal site are limited in comparison to available foraging resources in nearby areas, including protected native vegetation within Towarri National Park and Manobalai Nature Reserve. In this context the removal of 6.5 hectares of potential foraging habitat is unlikely to threaten the survival of local populations of this species.

There is no evidence that vegetation within the proposal site is currently used for foraging by Grey-headed Flying-fox. While the loss of 6.5 hectares of potential foraging habitat contributes to the incremental loss of habitat affecting this species, the proposal is unlikely to adversely affect the survival of the Grey-headed Flying-fox due to the highly mobile nature of the species and the abundance of suitable habitat in the surrounding area.
**EPBC Act - Assessment of Significance**

**Grey-Headed Flying-Fox (Vulnerable)**

### Disrupt the breeding cycle of an important population

There is no evidence that vegetation within the proposal site is currently used for Grey-headed Flying-fox breeding activities. As noted above, the nearest camp sites for the Grey-headed Flying-fox is located about 60 kilometres away from the proposal. Given the distance from the camp site, the proposal would not affect breeding activities of individuals at the camp.

On this basis, the proposal is highly unlikely to disrupt the breeding cycle of an important population of the Grey-headed Flying-fox.

### Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The Grey-headed Flying-fox utilises various vegetation communities including rainforests, open forests, closed and open woodlands, Melaleuca swamps and Banksia woodlands (DECCW 2009). The availability of native fruits, nectar and pollen varies over time and throughout the range of the species. Grey-headed Flying Foxes accommodate this by migrating in response to food availability, sometimes travelling hundreds of kilometres.

About 6.5 hectares of planted and remnant vegetation would be cleared during construction of the proposal. Some of the vegetation to be removed includes potential feed trees for the species. Whilst potential foraging habitat for the Grey-headed Flying-fox is expected to be removed as a result of the proposal, the area of vegetation to be removed is not of high quality and is not likely to cause the species to decline.

### Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species’ habitat

It is possible that the proposal may open up areas for weed invasion and by transmitting weed propagules into the area during construction. However, the CEMP would include measures to prevent the spread of weeds, including hygiene procedures for equipment, footwear and clothing, and weed disposal protocols. This would minimise the potential for invasive species to establish in potential foraging habitat.

The proposal involves the construction of a bypass that will be constructed to the western side of Scone which would pass through the Scone Golf Course, Bill Rose Sports Complex and a combination of farmland and rural residential land. The surrounding landscape consists of urban and rural lands and does not constitute an area of significant habitat. Due to the highly disturbed nature of the surrounding lands, it is considered unlikely that the proposal would lead to an increase in invasive species within Grey-headed Flying Fox habitat.

### Introduce disease that may cause the species to decline

The effects of a selection of pathogens, including Australian Bat Lyssavirus, Bat Paramyxovirus and Menangle Pig virus on Grey-headed Flying Fox is unknown, but could, in combination with known threatening processes, be expected to have an adverse impact on the population (Tidemann et al. 1999).

The proposal is not likely to cause the introduction of any of any known pathogens of the Grey-headed Flying-fox into the proposal area. Further, the proposal is not likely to introduce a disease that would cause the grey-headed flying fox to decline.
Grey-Headed Flying-Fox (Vulnerable)

Interfere substantially with the recovery of the species

Given the small area of potential foraging habitat likely to be removed during construction, the absence of any camps sites within the proposal site and the wide-ranging nature of this species, the proposal is not likely to interfere with the recovery of the Grey-headed Flying-fox.

The overall objectives of the Draft National Recovery Plan for the Grey-headed Flying-fox (DECCW 2009) are to ‘reduce the impact of threatening processes; to arrest decline throughout their range; to conserve their functional roles in seed dispersal and pollination of native plants; and to improve the comprehensiveness and reliability of information available to guide recovery’. Short term objectives aim to ‘identify, protect and enhance key foraging and roosting habitat; to substantially reduce deliberate destruction associated with commercial fruit crops; to reduce negative public attitudes and conflict with humans; and to involve the community in recovery actions where appropriate. Further objectives aim to address the impact on the species of artificial structures such as power lines, loose netting and barbed wire fences; and to improve knowledge of demographics and population structure.

While the proposal is unlikely to have a significant impact on the Grey-headed Flying-fox population, the expected removal of potential habitat for this vulnerable species would not be conducive to the recovery of the species, notably the objective to ‘reduce the impact of threatening processes’ (of which habitat loss is identified as a high priority threat). However, considering the small scale of the proposal impacts and availability of suitable habitat within the proposal locality, it is unlikely the proposal will interfere substantially with the recovery of the Grey-headed Flying-fox.

Conclusion of Assessment of Significance

Consideration of the DotE (2013) ‘significant impact criteria’ indicates that the proposed works are unlikely to impose a significant impact on the Grey-headed Flying-fox as:

- It is unlikely that this would lead to a long-term decrease in the size of an important population given the large home range and migratory habits of this species.
- No roosting (camp) sites would be impacted by the proposal.
- Large old trees would be avoided where possible.
- Breeding habitat would not be impacted by the proposal.
- The proposal is highly unlikely to fragment an existing population as this is a highly mobile species that travel large distances every year.
- There are large areas of alternative native vegetation present within adjoining areas to the proposal site likely to comprise habitat for this species.
Migratory Species

An EPBC Act Protected Matters search was undertaken in August 2015 covering the proposal site plus a 10 kilometre search radius. The search identified 11 migratory species that have either been recorded or are predicted to occur within the search area.

The criteria used to assess likelihood of occurrence for migratory species included:

- Records of the species within the proposal site from previous or current field surveys.
- Recent records within 10 km of the proposal site from the NSW Wildlife Atlas database.
- Known habitat requirements and distributional range of each species.
- Presence, quality (such as levels of weed invasion), and distribution of habitat for listed threatened species within the proposal site, mapping and assessment of habitats from the current field surveys.
- Marine species which are restricted to marine environments only (such as whales, dolphins, sharks and albatross), were excluded from the likelihood of occurrence assessments as no marine habitats occur within or adjacent to the proposal site.

Field surveys did not record the presence of any listed migratory species. The seven migratory species identified as subject species in this report only include those determined as ‘moderate’, ‘high’ possibility of occurring’ or ‘known’ to occur within the proposal site.

- *Ardea alba* (Great Egret)
- *Ardea ibis* (Cattle Egret)
- *Merops ornatus* (Rainbow bee-eater).
### EPBC Act - Assessment of Significance

#### Migratory species

The Significant Impact Guidelines 1.1 (DotE 2013) lists criteria which are used to determine whether an action is likely to have a significant impact on migratory species. An action is considered likely to result in a significant impact on migratory species if there is a real chance or possibility that it will

Substantially modify and/or destroy an area of important habitat for a migratory species

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**Habitat that is of critical importance to the species at particular life-cycle stages:**

Habitat within the proposal site is not considered critical during the lifecycle of any of the species. The Cattle Egret breeds in colonies, either mono-specific or with other Egrets/Herons. In Australia the principal breeding sites are the central east coast from about Newcastle to Bundaberg. It also breeds in major inland wetlands in north NSW (notably the Macquarie Marshes). Breeding colonies have also been observed at Wyndham, Western Australia to Arnhem Land, Northern Territory. The site would not provide breeding habitat for this species. In Australia, the largest Great Egret breeding colonies, and greatest concentrations of breeding colonies, are located in near-coastal regions of the Top End of the Northern Territory. The Channel Country of south-western Queensland and north-eastern South Australia have at least 12 breeding colonies, and colonies are also known in the Darling Riverine Plains region of NSW and the Riverina region of NSW and Victoria. Minor breeding sites are widely scattered across the species’ distribution and include sites in western Cape York Peninsula, the central coast of Queensland, north and north-eastern NSW, south-eastern South Australia, south-western Western Australia, the Kimberley region of Western Australia and the Barkly Tablelands in the Northern Territory. The site would not provide breeding habitat for colonies of Great Egret. Rainbow Bee-eater can breed in coastal NSW, however the likelihood of these species breeding at the proposal site is low, given the highly disturbed nature of the site. These migratory species, if present at the proposal site, would likely be seasonal visitors to the area, only occurring on a transient basis to forage.

The proposal however would reduce this area of potential seasonal foraging habitat by only a very small amount (less than one hectare). The habitat proposed to be cleared is adjacent to a highly modified waterway. There are large areas of alternative native vegetation present within adjoining areas to the proposal site and in the broader locality likely to comprise habitat for these species. The proposal would therefore contribute to the incremental loss of potential seasonal foraging habitat affecting these species at a very small scale.

No aquatic foraging habitat would be cleared or altered by the proposal. The proposal has the potential to indirectly impact aquatic habitat through erosion and sedimentation during construction, although these impacts are likely to be minor and could be managed through the implementation of erosion and sedimentation controls.

**Habitat utilised by a migratory species which is at the limit of the species range:**

Habitat within the proposal site is not at the limit of species range for any of the migratory species considered in this report. Distribution of habitat for these species extends well beyond (north, south and west) the location of the proposal site throughout all of coastal NSW.

**Habitat within an area where the species is declining:**

Populations of Rainbow Bee-eater are in decline, while populations of the Cattle Egret and Great Egret are considered relatively stable (DoE 2015). However there is no evidence to suggest that the proposal site contains known habitat for these species (such as recent records of the species). The proposal site contains potential foraging habitat for these species, as broadly suitable habitat occurs, however the value of this habitat is reduced due to highly disturbed nature of the site.
**EPBC Act - Assessment of Significance**

### Migratory species

Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species;

The proposal would not seriously disrupt the lifecycle of an ecologically significant proportion of the population of a migratory species. An ecologically significant proportion of a migratory species has been determined to comprise 0.1% flyway population (i.e. the population that migrates to/from Australia) of the species (EPBC Act Policy Statement 1) (DEWHA 2009b). Habitat within the proposal site is not considered critical during the lifecycle of these species. These migratory species, if present in the proposal site, would be seasonal visitors to the area, likely only occurring on a transient basis to forage only.

Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species

The proposal is unlikely to introduce invasive species that may prevent migratory species becoming established in the proposal site. The proposed action may also affect the composition of the habitat by opening up areas for weed invasion and by transmitting weed propagules into the area during construction. The CEMP and would include measures to prevent the spread of weeds, including hygiene procedures for equipment, footwear and clothing, and weed disposal protocols. This would minimise the potential for invasive species to establish in potential foraging habitat.

### Conclusion of Assessment of Significance

Consideration of the DotE (2013) ‘significant impact criteria’ indicates that the proposed works are unlikely to impose a significant impact on migratory species as it is unlikely to:

- Substantially modify and/or destroy an area of important habitat for a migratory species. Habitat that occurs within the proposal site, whilst suitable as foraging for the above migratory species, does not constitute important habitat as defined under the EPBC Act Significant Impact Guidelines (DotE 2013)
- Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species. The proposal would not seriously disrupt the lifecycle of an ecologically significant proportion of the population of a migratory species. An ecologically significant proportion of a migratory species has been determined to comprise 0.1% flyway population (i.e. the population that migrates to/from Australia) of the species (EPBC Act Policy Statement 1) (DEWHA 2009b).
- Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species.
Appendix F

Hydrological and hydraulic assessment
Appendix G

Noise and vibration assessment
Appendix H

Urban design and landscape plan
Appendix I

Historical heritage assessment
Appendix J

Aboriginal heritage assessment
Appendix L

Agency consultation
Appendix M

EPBC Act protected matters search tool results